"Prevalence of Overweight and Obesity in School Going Adolescents: It's Relationship with Socioeconomic Status and Gender Difference"

A

Thesis

Submitted for the Award of Ph.D. degree of

University of Kota, Kota

In the Faculty of Social Science (Home Science)

By

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UNIVERSITY OF KOTA, KOTA (RAJASTHAN)

2017

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Thesis Approval for Doctor of Philosophy

This thesis entitled "**Prevalence of Overweight and Obesity in School Going Adolescents: It's Relationship with Socioeconomic Status and Gender Difference**" submitted by Shruti Hada Enrolment No. F 6()/Res/UOK/2013/14325-26 submitted to the University Department of Social Science (Home Science) Government Girls' P.G. College Jhalawar. University of Kota, Kota is approved for the award of Degree or Doctor of Philosophy.

Examiners

Supervisor (s)

Date: ....

Place: ....

CANDIDATE'S DECLARATION

I hereby certify that the work, which is being presented in the thesis, entitled "**Prevalence of Overweight and Obesity   in School Going Adolescents: It's Relationship with Socioeconomic Status and Gender Difference**" in partial fulfilment of the requirement for the award of the Degree of Doctor of Philosophy, carried under the supervision of Retired Professor Dr. Savita Swami and submitted to the University Department of Social Science (Home Science) Research centre is Govt. Girls' P.G. College, Jhalawar , University of Kota, Kota represents my ideas in my own words and where others ideas or words have been included. I have adequately cited and referenced the original sources .The work presented in this thesis as not been submitted elsewhere for the award of any other degree of diploma from any Institutions. I also declare that I have adhered to all principals of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

 Date.............   (Signature)

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        This is to certify that the above statement made by Shruti Hada Enrolment No. F-6( )/Res/UOK/2013/14325-26 is correct to the best of my knowledge.

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(Certificate to be given by the Supervisor)

CERTIFICATE

I feel great pleasure in certifying that the thesis entitled "**Prevalence of Overweight and Obesity in School Going Adolescents: It's Relationship with Socioeconomic Status and Gender Difference"** submitted by Shruti Hada under my guidance. She has completed the following requirements as per Ph.D regulations of the University

(a) Course work as per the university rules.

(b) Residential requirements of the university (200 days).

(c) Regularly submitted annual progress report.

(d) Presented her work in the departmental committee.

(e) Published/accepted minimum of one research paper in a referred research journal.

I recommend the submission of thesis.

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ACKNOWLEDGEMENT

God is whom I would like to express gratitude first, Without God's blessings not any of this would have been achievable. This thesis is respectfully presented in the feet of the Lord as a coupon of thankfulness.

This study would not have been potential without the direction and support of the many persons. I am very thankful to my research guide, Dr. Savita Swami, lecturer Government Girls' PG. College, Jhalawar, University of Kota, for being fantastically kind with her time and energy over the years. Her availableness and fast responsiveness kept me on track associated. I am additionally obliged to her for encouraging me to search research questions that were of most interest to me, for motivating me at my fullest potential. Most of all, I appreciate her kind – heartedness and really admire her consideration.

I would like to give a big thanks to my maternal grand-father and maternal grand-mother, my parents and my father- in- law and mother- in - law. Their never-ending support for my study, celebrating my accomplishments and rallying me very well from my disappointments, helped me to keep dedicated over the end of the day. Most of all, I would like to thank to my dearest husband, Jaideep Singh Rathore, for his sacred persistence, assistance suggestions, moral support, indefatigable support, encouragement and love throughout the completion of my thesis. He has sacrificed lots of thing for my Ph.D. Finally we have done it.   I am really thankful to the respected Principal Sir and all staff of Govt. Girls' P. G. College, Jhalawar for development of healthy academic environment which always accelerated the progress of my research work. I would also like to bestow, my genuine thanks to all the staff of university of Kota. I am obliged to college authorities for given me all the necessary data. Last but not the least I pay my regards for all the relatives, teachers and friends who cooperated in obtaining the research work done easily.

<p align="center">Many thanks to all of you...............!!!</p>

LIST OF ABBREVIATIONS

BMI	Body Mass Index
WHR	Waist to Hip Ratio
WC	Waist Circumference
HC	Hip Circumference
ANNOVA	Analysis of Variance
CAD	Coronary Artery Disease
CHD	Coronary Heart Disease
CVD	Cardiovascular Disease
ICMR	Indian Council of Medical Research
K cal	Kilocalorie
Kg	Kilogram
RDA	Recommended Dietary Allowances
SFT	Skin – fold thickness
WHO	World Health Organisation
NIDDM	Non-Insulin Dependent Diabetes Mellitus
NHANES	National Health and Nutrition Examination Survey

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ABSTRACT

This thesis is a result of Ph.D. research plan entitled "Prevalence of Overweight and Obesity in School Going Adolescent: It's Relationship with Socioeconomic Status and Gender Differences." The rising prevalence of overweight and obesity at school going adolescent boys and girls is main worldwide community health concern. Overweight and obese adolescents suffer from unpleasant physical and emotional consequence. Generally adolescent overweight and obesity could be a complex illness and its growth is because of numerous connections between genes and environment. Lots of risk factors like socioeconomic status, eating habits, physical activity are often known as contributors to its growth.

This study examined the influences of socioeconomic status, nutritional factors and eating behaviour on overweight and obesity among school going adolescents of Jhalawar District. The study is centred on 1000 school going adolescents, 500 boys and 500 girls aged 13 to 18.

Data was collected from primary and secondary sources. In primary source, questionnaire cum interview method was used. In secondary resource, journals, books and associate literature were studied. In the present study, the prevalence of overweight in boys was 42.6% and obesity was 21.6%. The prevalence of overweight in girls was 45.4% and obesity was 25.8%. Socioeconomic status of adolescent boys was 17.8 boys were from high socioeconomic status, 57.6% boys were from middle socioeconomic status and 24.6% boys were from low

socioeconomic status. Socioeconomic status of adolescent girls was 20.6% girls were from high socioeconomic status, 56.0% girls were from middle socioeconomic status and 23.4% girls' were from low socioeconomic status.

The height and weight of the subjects were measured by the standard process and Body Mass Index (BMI), Waist Hip Ratio (WHR), Skin Fold Measurements were used for measurement of overweight and obesity, while analyzing it was discovered that adolescents had extra weight and less height as compared to Indian standards.

While analysing the utilization pattern of adolescent it was found that every adolescent obtained most of the calories from fast food. The mean consumption of most of the adolescents was high compared to the required intake given by RDA. Once the nutrient intake of the sample was compared with RDA standards, it was discovered that diet of each girl and boy was high in each macro and micronutrients. The result recommended that women are extra overweight and obese than boys. Adolescents from high socioeconomic status were most probable to be overweight or obese compared to others.

KEYWORDS: Adolescents, Overweight, Obesity, Body Mass Index, Waist to Hip Ratio (WHR), Skin fold Measurements, Socioeconomic status, Diet pattern.

CHAPTER- 1

INTRODUCTION

THE INTRODUCTION WAS GENERALLY CLASSIFIED INTO THE SUBSEQUENT CATEGORIES:

1.1. RELEVANCE AND IMPORTANCE OF THE TOPIC

1.2. GENERAL ASPECTS ABOUT ADOLESCENTS.

1.3. GENERAL ASPECTS ABOUT OVERWEIGHT AND OBESITY.

1.4. ADOLESCENTS OVERWEIGHT AND OBESITY.

1.5. SOCIOECONOMIC ISSUES RELATED TO OVERWEIGHT AND OBESITY.

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1.7. OBJECTIVES OF THE STUDY.

1.8. HYPOTHESIS.

1.9. DELIMITATIONS.

1.1. RELEVANCE AND IMPORTANCE OF THE TOPIC

Obesity has been discribed differently by many research scholars. They have given various meanings of this term. Albrink and Meig (1965) stated that "obesity is that state in which the accumulation of reserve fat becomes so extreme that the functions of the organism are interfered with". (4) Berry (1968) defined the term obesity as excess of fat in body often causing its bulkiness. Obesity is excessive proportion of body fat in the total body mass. Obesity is a condition caused by an excessive storage of body fat. Obesity is bodily condition marked by excessive generalized deposition and storage of fat. (14)

Health isn't a static development however a dynamic life process that begins at birth and is ruled by genetic biological process and environmental factors throughout life. Obesity is an increasingly important public health problem of world significance. It is a significant focus of attention in India. Improved health facilities, increase in financial gain and accessibility of food and reduce in physical activity have contributed to the current epidemic of obesity in urban areas of the developed and developing countries. Adolescent obesity is one of the foremost international health challenges of the twenty first century. (138) Obesity an international pandemic and a serious health concern owing to the ensuing morbidity and premature mortality. The prevalence of fat is escalating at a horrendous rate to epidemic proportions throughout the developed world. The prevailing information from individual national studies collected by the International fat Taskforce (2005) concludes that fat ranges from ten to twenty per cent for men and ten to twenty five per cent for ladies. Obesity isn't any longer a priority for developed countries, however is additionally changing into an increasing downslide in several downslide countries. (76)

The prevalence of fatness is higher within the economically developed regions of the globe compared to the developing regions. (67) However, with increasing

adoption of western lifestyle, the developing countries also are apace catching up with the fatness. Ironically, developing countries that are saddled with communicable disease and under – nutrition for generations are currently facing associate upsurge of fatness and its adverse health consequences. Afridi and Khan (2004) reported that the normal societies undergoing the method of economic modernization demonstrate speedy will increase in prevalence of fatness. El Rhazi et al.,(2011) found that in low and middle – income countries, deficiency disease has become a double- headed monster. It's not uncommon to seek out beneath nutrition co – existing with fatness, particularly in urban settings. It's calculable that at the start of this century, additional individuals can die from complications of over nutrition than of starvation. (42)

Obesity among adolescents causes twin issues: First obesity is related to serious medical issues, together with high vital sign, adverse conjugated protein profiles, diabetes, cerebrovascular disease, coronary cardiovascular disease, body part cancer and death from all – the higher than mentioned – causes. Secondly, obesity could persist into adulthood and increase the danger for a few chronic diseases later in life. (101) The Harvard Growth Study showed that the chance of being overweight in adulthood is double as high for people who were overweight as kids than for people who weren't overweight. Obesity is related to variety of psychosocial consequences in childhood and adolescence, as well as poor self – esteem. Overweight adolescents are socially isolated and to be peripheral to social networks. (111) Due to fast urbanization and life style modification prevalence of fatness among adolescents is additionally increasing within the developing world like India. Identification of risk factors interference and management of childhood and adolescent overweight is that the key for interference of fatness and its consequences in adult life.

Obesity may be an unhealthy way over body fat and is a major contributor to the worldwide burden of chronic sickness and incapacity. (97) Andreyeva et al.,

(2004) discovered that excess weight reduces the standard of life, raises medical expenditures, places stress on the health care system and ends up in productivity losses as a result of incapacity, health problem and premature mortality. (6) Kokiwar (2011) reported that fatness is exclusive with its own risk issues on one hand and is itself additionally a risk factor for several alternative vital diseases on the opposite hand. (91) In a population – base sample of five to seventeen year previous American youngsters, seventy per cent of fatty youngsters had a minimum of one upset risk issue while thirty – seven per cent of fatty teenagers had two or extra risk factors. (26) Here is additionally growing proof of connecting unhealthy weight with multiplied risk of developing cancer. The studies conducted by American institute for Cancer Research (2008) indicate that over a 100000 cancers within the US annually are joined to excess body fat.(5) Obesity could be a common however complicated complex disorder that develops from the interactions of multiple genes and setting characterised by future energy imbalance.(23)

Obesity features a wide constitution variability starting from gently overweight to morbidly fat. Though the trend of accelerating body girth is extremely abundant driven by the obesogenic surroundings, it's expedited by the individual's genetic status to excessive weight gain. (96) The risk of overweight and obesity in youngsters of some families with fatty oldsters is overstated two to three folds for to excessive weight gain. (96) The risk of overweight and obesity in youngsters of some families with fatty oldsters is overstated two to three fold for moderate fat and up to twenty one times for severe fat. (20) A growing unity is that environmental factors have contended an important role in influencing people's lifestyles. (151)Among environmental influences there are 2 major factors concerned. The primary is that among all populations' youngsters are targets of food advertisements that are potential health risks, because the consumption of those products becomes a habit and way of life. The second is that the better known social networks (family, friends, neighbours and siblings) have nice influence on the individual's food consumption.

Thus, once 2 persons are perceived as friends and one is weighty, the danger of alternative friend turning into weighty is seventeen percent. Among siblings, if one is fatty, the danger that the opposite relation to become weighty is forty per cent. Today these social networks (family, friends, life partners and associates) are recognized as a vital issue pointing at the incidence of fat. (30)

Fatness is getting higher in many countries even in India also. There's insufficiency of nationwide information on fatness in India, although researches from different states of India suggest that the prevalence range from 10 − 15 percent. (180) WHO (2006) reported that in India there are 2.40 percent obese, 13.50 percent pre obese boys' and 6.10 percent obese and 17.40 percent pre obese girls.(150) Joshi and Joshi (2002) conjointly reported that obesity as a rising drawback might be a main constant disorder moving twenty to forty per cent adults in India. (80) In a study among Kashmiri population the prevalence of fatness has been found to be 15.01 percent, the prevalence of obesity between males was 7.0 percent and in females 23.69 percent. A study by Gopalan (1998) on Indian population revealed that just about twenty percent of adults who weren't overweight and fatty still had central fat, which put them at a bigger risk of developing associated diseases. (957) Gupta and Kapoor (2011) reported that there's familial aggregation for obesity additionally as gender variations in familial correlations of fatness in kids, with daughters being additional than sons to be suffering from parental obesity. (62)

Hill and Peters (1998) states that the fashionable obesogenic setting of industrial countries developed over past few decades in our bid to cut back work and improve potency and quality of life, is characterised by quick access to extremely comestible, extremely caloric food, inactive vocations and leisure time activities dominated by TV, videogames and computers that lead to a discount of energy expenditure and enlarged energy intake. (73) Reddy (1998) additionally report that changes in dietary patterns, physical activity levels and lifestyles related to

diet and urbanization are associated with increasing incidence of obesity in India. (122)

In most of the developed and lots of of developing countries there is an overall abundance of appetising and caloric-dense food. For several folks, even once caloric intake isn't higher than the counselled level, the quantity of calories gone in physical activity is lean to offset consumption. All this lead an individual to be fat. (48)Galson (2008) identifies poor attention to nutrition, magnified access to nutrition, high fat content processed snacks, and high calorie sweetened beverages as major contributors to the growing fat crisis. (51) Higher intake of energy and carbohydrates by each gender further as high intakes of macromolecule and fat by men are associated with bigger incidence of being overweight. Inflated consumption of total energy, soft drinks, snacks foods and frequent consumption consumption at victuals or alternative restaurants and inadequate consumption of vegetables and fruits contributes to the inflated risk of obesity. A powerful link exists between physical inactivity and weight gain.

Deckelbaum and Williams (2001) conjointly reported that physical inactivity, high frequency of TV viewing or laptop usage, over consumption of high calorie foods, snacking whereas observation TV or doing school assignment and over exposure to advertisements of high calorie foods are modifiable risk factors for fatness among kids.(34) According to Marshall et al., (2004) the worldwide changes in diet and physical inactivity are fuelled by changes in agricultural practices, food process, promoting and distribution, transportation and different aspects of urban designing and television primarily based physical inactivity could also be involved in recent epidemiological trends of overweight and obesity among adolescents. (104)

Many studies conducted within the USA and different advanced countries relating to adolescents' fat reveal the way reaching consequences on their health. India is developing country in human development indices should conduct serious studies on fat and associated factors leading everyday life sickness. Such a study of socio economic factors, gender variations and adolescent's fat are going to be an eye opener to oldsters, teachers, adolescents and policy manufactures towards interference of life vogue diseases as a result of physiological state could be a main cause in our pleasure and used for an energetic life.

The study reviews the link between socioeconomic status and adolescent overweight and obesity. Further, it reviews and compares the impact of socioeconomic status on overweight and obesity level between genders. Findings show that there's a relationship between socioeconomic status and obesity. There are variations between genders and also the impact socioeconomic status has on weight patterns. The analysis uncovers two main findings. First, the socioeconomic status, obesity gradient widens over the lifecycle, a result according to analysis examining different health outcomes like overall standing of specific medical conditions. Second a considerable portion of the socioeconomic "impact "is transmitted also the translations of privileged family backgrounds throughout childhood into high levels of future educations. The epidemic of obesity may be a substantial health burden worldwide and its impact is being ascertained in developing countries as well. (15) Lifestyle influences promoting excessive caloric intake and inactive patterns are familiar to induce a positive energy balance resulting in weight gain. (142)

An absence of physical activity imparts and enlarged risk for each CVD and adult onset diabetes. The least physical activity among kids has been joined to their inactive behaviours, together with the enlarged amounts of your time spent engaged with media sources TV, videos, DVD and flicks averaged slightly over three hours per day among kids aged 8 – 18 years. A positive association between

times spent viewing TV and enlarged prevalence of obesity in kids has been rumoured by federal agency. (27)

Along with their inactive life the kids are facing other pressures like tuitions, school work, exams and assignments. These pressure result in overeating along with more inactive lifestyle. Adolescent try to follow the celebrities who endorse aerated drinks, fast food like pizzas, burgers, chips etc. Average Indians are lured by processed foods because it is easy to cook and requires very little time and effort. Present study is an attempt to investigate the impact of reduced activity, modern lifestyle and SES on adolescent obesity. Prevalence of obesity is rising in India and there is still deficit of organised research in this area. The importance of the study is in finding the health level of adolescents. (117)

On the basis of the available literature it is evident that there is need of family study on overweight and obese people in India and specifically in Rajasthan. This study has been planned and is targeted at observing of avoirdupois from selected sample of overweight, obese and normal weight school going adolescents on the basis of BMI (Body Mass Index), WHR (Waist to Hip Ratio) and Skin Fold Measurements. A lot is required to be done not only in the form of successful policy but also by targeting at need based strategies. Teenagers have to be viewed and determined ahead with utmost importance because firstly, it is their right to reach the maximum achievable level of fitness. Secondly, a country gets financial profit because better organized and healthy youth will result in more productivity. Thirdly, there would be health profit as the load of morbidity and mortality in later life would be nominal. India is developing country in human development indices should conduct serious studies on fat and associated factors leading to everyday life diseases. Such a study of socio economic status, gender differences and adolescent's overweight and obesity are going to be an eye opener to teachers, adolescents and policy manufactures.

1.2. GENERAL ASPECTS ABOUT ADOLESCENTS

The word "adol" comes from Latin word "aldolescere" which suggests growth to maturity. Adolescents represent a serious part of human resources of a country. Adolescence is additionally necessary quantity in the living of a classified formerly enters a substitute era of life fraught with issues. Adolescents will perceive this and picture the longer term. Adolescents are egocentric and infrequently have interaction in self-analysis and critique. (53) Adolescence is mostly outlined in respect to a sum of years. Adolescence is also apparently outlined as amount of physical, psychological and social maturity from childhood to adulthood. It's a bridge between childhood and adulthood and a quantity of speedy changes in the majority developmental dimensions of increasing sexual development, searching one's real personality, shaping temperament values and findings one's line of work as well as public directions. It's conjointly an occasion of pushing against ones capabilities and limitations as displayed by adults. (31)

The adolescents might develop range of special medical and social problems. Some are associated with genetic factors and a few to physiological changes at drinking alcohol, drugs, physiological condition and genital diseases. (65). Currently, the full population of adolescents between the ages of ten and nineteen years is 1.2 billion, that is, one in each 5 individuals within the world these days, the largest generation of teens in history. The overwhelming majority of, about eighty five percent, developing countries whereas, in many areas, they create up quite a 3rd of the population (154). A significant and increasing range of those youngsters belong to middle and high socioeconomic range. Demographically the adolescent population is rising quicker than that of different age groups. The proportion of adolescent's population in Rajasthan state is almost twenty two percent. (53)

Malnutrition is extremely common in adolescents. The foremost prevailing consequences of deficiency disease in adolescent's are, overweight or obesity; iron deficiency anaemia and uptake disorders like eating disorder nervosa and bulimia. Under nutrition ends up in inferior growth and low body weight, over – nutrition ends up in overweight and obesity. Consumption of healthy foods like milk, fruits, and vegetables is low, whereas consumption of sugary foods is high. Thus poor dietary pattern is the reason for many nutritional deficiencies, overweight and obesity in adolescents. Iron deficiency is one of the foremost prevailing nutritional deficiencies in adolescents. (21)

Several specific biological changes occur throughout adolescence. Variations between genders and between people of a similar gender become additional pronounced throughout this age span. Hormones drive growth spurt begins between age ten years and eleven years for females with the height within the rate of growth at around twelve. For boys' growth spurt begins between twelve and thirteen years and peak at around age fourteen. Average boys' grow eight inches and girls' six inches at this time of life. Growth rates are closely associated with sexual maturation. The second part of adolescent is creative. (147)

Adolescence may be a time of modification to adult behaviour and there by ingestion habits of childhood step by step transform those typical of an adult.. Eating habits are also erratic. Calorie demand for adolescents is high when a young adult goes to school at the same time don't consume breakfast at home. They usually grabs ready to eat food that is acceptable to its age group also. This implies to snacks within the variety of fast-food (junk food) which has lots of calories and nothing else. Adolescents have higher nutrition and mineral desires compared with folks at different life stages. (70)

Food and sleep are the primary casualties of a nerve wracking life style. Snacking on sweets and savouries to reinforce mood tends to curb their craving, thereby reducing the intake of healthy of healthy diet. Skipping meals because of stress and anxiety is extremely common amongst teenagers. Sleep is lesser than required quantity. Stress can be a drag in itself; however it always results in unhealthy life style patterns which result in even additional stress. Once under stress one tends to form poor food selections. Some common ones being intense high sugar, high fat foods and snacks, skipping meals, rejection of vegetables, fruits and milk and reduced water consumption all of these adversely affects health and sleep, thereby resulting in diminished immunity, sickness and finally additional stress. Physical changes cause a teenager to focus attention on their body as they tries to include their new look into their developing sense of identity. (82)

The researchers found that the adolescent's mood states modified widely and quickly. It had been not uncommon for teenagers to be happy at one movement and acutely bored or discouraged the hours later. Thus teenagers do seem to experience hour-by-hour mood shifts. However these changes don't translate into nice mood swings on a daily basis. Instead adolescents apparently relish that causes them to total up their days mood as reasonably positive. The peer influence and therefore the growing freedom of the adolescents someday mix with unresolved issues from childhood to create difficulties in adolescents. (39)

Adolescents type a significant portion of nation's population and development of the country depends upon healthy youth. Adolescence is crucial growth spurt in one's life. Besides age previous gender distinctions, there are several variations within the current pictures of adolescents in India. The variations arise from factors like urban, rural and social group residence, quality and socio economic status of the family. Adolescence is characterised by fast physical, emotional, social, ethical and intellectual developments and changes. Healthy development of adolescents rely upon many advanced factors via social economic circumstances, the setting during which they live and grow, the standard of relationship with their families, communities, peer terms and therefore the opportunities for education

and employment. Understanding the characteristics, needs, interests, issues and growth potentialities of maturing adolescents will facilitate them expertise a gradual and relatively peaceful development from time of life of adulthood. Adolescence could be a method of achieving the utmost growth of physical and mental talents, skills, information and attitudes and beliefs required for effective participation in society. Society, family, oldsters and peer groups all have expectations from adolescence. The adolescent is challenged by combined expectations of society, parents, and peer.

Adolescent were devided into two parts:

Early Adolescence:

The initial years of adolescence are just like kid's years. At that time, they are troubled to be told new skills. Teenagers even have same qualities. Several of them bear a part of negativity; explicit with parents. Adolescents wish to travel where they're happy, like listening music at higher limit level, and carry the outfits and hair designs that are nowadays in fashion.

Late Adolescence:

The physical changes of teens are virtually complete. The clan system typically adjusts to allow the teenagers their freedom and liberty. Children attain a transparent individuality. It's actually in the midst of rising levels of self-respect and declining levels of family quarrel. (63)

In this contemporary world, long work hours, sitting continuously in front of the laptop and viewing TV to be in touch of the modern world are few reasons to eat recklessly and often useless food. Great stress leads to going out to eat at restaurants, picnics and often eating a lot of fast food. Modern lifestyle drifts away the adolescents, away from their family. This creates stress in their minds. "Adolescence could be a time of physical, cognitive, social, and emotional changes. (155)

Americans expect adolescents to attain autonomy, identity, and independence because of a shared individualistic culture. These cultures compares of tradition, conformity, obedience and fitting into family and society as against the independence, individualism, exploration and self-expression common in western cultures. Therefore, the dearth of congruency across and among completely different cultures makes the term adolescence fairly inaccurate as a definition for one distinctly comprehensive period of time. Therefore, the definition of adolescence has modified greatly over the past century. Lastly, adolescence is unambiguously skilled among people even of comparable age. Adolescence might begin as early as age nine for some women, or as late as age thirteen for others. So the physical experiences of those people can vary greatly, as can their social experiences. Consequently, early maturing women are usually treated otherwise than their later maturing peers. As a result of they appear additional mature, others usually treat them as if they're older, requiring them to act as they seem. The adolescent lacks validity and fails to handle the cultural variations, historical influences, and individual expressions of this transformation stage from childhood to adulthood. The task of shaping adolescence remains a confusing one because of the very fact those adolescents themselves influenced by varied factors that determine once the childhood ends and adulthood begins. (84)

The beginning of biological growth and development throughout adolescence is sense by the onset of puberty, that is usually outlined because the physical transformation of a baby into associate adult. A myriad of biological changes occur throughout time of life together with sexual maturation, increase in higher

weight, completion of skeletal growth among a marked increase in skeletal mass, and changes in body composition. The succession of those events throughout time of life is consistent among adolescents; however, there is also a good deal of deviation within the age of onset, duration, and tempo of those events between people. For this reason, adolescents of constant chronological age will vary greatly in physical look. This has direct connection with nutrition needs of adolescents. A 13 year old boy who has nearly completed the liner growth spurt related to time of life and has knowledgeable important muscular development can have remarkably completely different energy and nutrient wants than those of a 13 years old boys' who has not yet knowledgeable time of life. Consequently, sexual maturation ought to be accustomed assess the extent of biological growth and development and therefore the individual biological process wants of adolescents in chronological age. (135)

Adolescent's experience dramatic biological changes associated with puberty; these biological changes will considerably have an effect on psychosocial development. Dramatic changes in body form and size will cause an excellent feeling among adolescents, particularly among girls. Health professionals of WHO working on adolescents has an understanding these psychosocial features of development relate to growth and development and they appreciate that these processes have an effect on nutrition intake. Peer influence may be a dominant psychosocial issue throughout adolescence, articularly throughout the first stage. Consumption of junk foods, in line with these focus teams, was associated with being with friends, having fun, gaining weight, whereas consumption of healthy foods was related to family, family meals, and residential life. Obviously, teens develop food preferences and build food decisions with feelings of being accepted and having fun with peers and will use food as the way to exert independence from families. (10)

Teenagers appear to be in such a rush to develop. With every birthday, they grow nearer to the magic age within which the privilege of adulthood becomes accessible. It's a lot easier to ascertain the fun part of achieving adult standing instead of the hard part, operating to support oneself and family. Adolescence is claimed to be the age throughout which the kid has achieved sexual maturity however has not nevertheless take on the roles and responsibilities, or the rights that accompany full adult standing. (98)Health and nutrition are the helpful factors for human resource development of country. Nutrition status of adolescents is of explicit importance since it's the adult cluster that's primarily accountable for rendering economic support to the society as a full. Adolescents play an important role within the overall progress as they represent the most important chunk of human resource of a nation. The tremendous socioeconomic affluence has led to changes in the life style of the Indian communities particularly in food consumption patterns and undesirable life style alterations.

1.3. GENERAL ASPECTS ABOUT OVERWEIGHT AND OBESITY

"Aim for a healthy body weight" health and longevity are valuable once some one is either overweight or obese. Overweight and obesity increase one's risk of developing serious cardiovascular diseases. Likewise, people who are lean could have the risk of viscose, contractile organ and generative disorders. Thus, healthy weight is vital to a healthy and longer life. People with body fat levels falling at or close to extremes of the body fat are doubtless to possess serious health issues that threaten their quality of life. (71) Excess weight poses one amongst the foremost serious public health challenges of twenty first century for everywhere in the planet. Currently overweight and obesity aren't solely issues of developed countries however conjointly developing countries. Proof is currently rising to recommend that the prevalence of overweight and developing countries are affected.

Obesity is usually outlined as a condition of abnormal or excessive fat accumulation tissue, to the extent that health could also be impaired. The underlying truth is the undesirable positive energy balance and weight gain. The distribution of fat induced by weight gain affects the risks related to obesity and also the styles of illness that result obesity. (114) Obesity could be a medical condition during which excess body fat has accumulated to the extent that it's going to have an adverse impact on health, resulting in reduced life expectancy and hyperbolic health issues. It is outlined by body mass index (BMI) and additional evaluated in terms of fat distribution via the waist to hip ratio and total vessel risk factors. Obesity results in polygenic disorder, chronic heart diseases, particularly vessel diseases, impending sleep apnea sure sorts of cancer and degenerative joint disease. As a result, fat has been found to reduce life span. (68)

Obesity will occur once the energy price of food eaten exceeds energy spent. This situation is thought as "a positive energy balance". In this state of affairs the surplus intake of energy inevitably seems as deposits of fat. It's calculable that, at the start of this century, a lot of people will die from complications of over nutrition than of starvation. (33) The increase in childhood fat worldwide has garnered abundant recent attention, from health care professionals, health policy consultants, children's advocates, and elders. There's abundant concern that today's overweight and obese youngsters, can be converted into tomorrow's overweight and obese adults, with all the health issues and health care prices related to obesity.

Obesity is recognized as a serious unhealthy condition in several components of the planet and the incidents of the conditions is escalating at a dreadful rate. Obesity could be a condition with excess accumulation of body fat in respect to the lean body mass. The centre for malady management and hindrance outlined overweight as, at or on top of the 95th mark of BMI for age and in danger for overweight as between eighty fifth to ninety fifth percentile of BMI for age. European researchers classified over weight as, at or above eighty fifth mark and fleshiness as at or on top of ninety fifty mark of BMI. (46)

To be precise, obesity connotes an excessive fat accumulation in adipose tissue whereas overweight indicates an excessive weight with reference to height. However these terms are typically utilized synonymously. It's currently calculable that over a hundred million people worldwide are weighty and fifty eight million of those are in developing countries. The prevalence of obesity and overweight is escalating quickly worldwide. (131)

Hill & Peter, 1998 concluded that obesity has already reached epidemic proportions in developed countries and their observations are that the developing world may fall under its grip terribly shortly. Industrialized and developed countries are showing an increase in overweight persons among their populations

alongside ever-changing economic conditions. Indeed, obesity is currently therefore common public health issues, such as under nutrition and infectious diseases, jointly of the foremost vital contributors of ill-health. Moreover, increasing prevalence of obesity in an exceedingly advanced population and notably among ladies is an early indicator of rising health burden because of non-communicable chronic diseases like vascular diseases, hypertension, diabetes, metastasis issues, sleep apneas and medical science complications. (72)

Obesity in childhood and adolescence is additionally quite common. The bulk of European countries have prevalence rates of overweight and obesity beyond ten percent for ten year old boys' and girls. Of even larger concern is that many countries have rates higher than thirty percent as in Greece, Italy or Malta the prevalence of obesity has increased dramatically over the past three decades. However, the rise in kids and adolescents could be a major concern among healthcare professionals and policy manufacturers as a result that fat kids and adolescents have an increased risk for turning into rotund adults. Currently, in America more or less 15.3 % of children (ages 6-11) and 15.5 % of adolescents (ages 12-19) are rotund. Regarding 19-23 percent Australian kids and adolescent were overweight or fat (100)

Globalization, economic development and different factors like commercialization of agricultural and urbanization have crystal rectifier to ever changing patterns of living, which can be viewed as a part of the nutrition transition. Nutrition transition is mostly outlined because they shift faraway from diets high in fibre, refined foods and saturated animals fats, let alone progressively sedentary lifestyle. These dietary manner shifts are attributed to alter the likes towards extremely refined oils and fats, moves towards motorized transportations and increase in inactive occupations as possession of TV. Overweight and obesity and their health consequences are recognized as major public health issues worldwide. A big increasing trend within the prevalence of overweight and obesity among kids and adolescents has been documented over the previous couple of decades in developed and in developing countries. The foremost important long

consequences of childhood and adolescent overweight and obesity are their persistence into adulthood with all of the attendant health risks. (112) The prevalence of overweight and obesity is higher in urban than in rural areas. The results of studies among adolescents from past of Punjab, Maharashtra, Delhi, and South India revealed that the prevalence of overweight and fat was high (11% to 29%). In Ludhiana, Punjab, urban youngsters within the age of eleven to seventeen years older were a lot of overweight (11.6%) than their urban counterpart (4.7%). (85)

A thin line exists between overweight and obesity. Overweight is defined as a body mass index (BMI) of 25 to 29.9 kg/m 2 and obesity as a BMI of > 30 kg/m squire. The adiposities are a group of special cells that contain fat. These fat cells are developed at sure points of human growth. Throughout infancy, adolescence and pregnancy the body's potential for somatic cell development is mobilized and fat is created at a quicker rate than at the other times throughout life. The growth depends upon biological process and environmental issue. The fatty tissues are sensitive to organic process changes and need to be balanced since they are used as storage bins for fat. In studies done on these cells, it seems that larger cells represent obesity. Scientists have found that the event of several fat cells throughout childhood might signal the start of lifetime weight drawback and that fat cells last forever. (66)

Obesity has reached epidemic properties globally and may be a major contributor to the worldwide burden of chronic illness and incapacity. Typically coexistent in developing countries with underneath nutrition may be a complicated condition, with serious social and psychological dimensions, poignant just about all ages and socioeconomic team. Increased consumption of a lot of energy intense, nutrient – reduced meals among highest levels of sugary and inundated fats, mutual among condensed physical movement, have led to fatness rates that have up three folds or a lot of since, 1980 in several parts of USA , UK, Europe, the Centre East, Australia and China. The obesity epidemic isn't restricted to industrialised societies; this increase is commonly quicker in developing countries than in

developed world. The health consequences vary from raised risk of premature death, to serious chronic condition that scale backs the general quality of life. Of particular concern is that the increasing incidence of kid's obesity.

There is proof that increasing range of children and adolescents are overweight. Even though all overweight youngsters won't essentially become overweight adults, the increasing prevalence of obesity in childhood is probably going to be mirrored in increasing obesity in adult years. The high prevalence of obesity in our adult population and the probability that the state of the long run are going to be even additional fat demand a revaluation of the health implications of this condition (113)

Determinants of obesity are associated with either dietary intake or physical activity to each and psychosocial activity or environmental. Additionally, determinants of obesity can vary looking on other factors like age of the person. Throughout within the past a lot stress was placed on people risk factors for fat. Recent reviews and suggestions have centred on the contribution of environmental factors to the event of fat. (74) Excess weight accumulation happens with an imbalance in energy, caused by either a surplus of energy intake (calories from food) or lack of energy expenditure (physical activity). (58) The most significant long run consequence of childhood obesity is its persistence into adulthood, with varied associated health risks. (25)

Ironically, developing countries that are saddled with communicable diseases and under-nutrition for generations are currently facing an upsurge of obesity and its adverse health consequences. (3) Excess weight reduces the quality of life, raises medical expenditures, places stress on the health care system and ends up in productivity losses owing to incapacity, ill health and premature mortality. Obesity is distinctive with its own risk issues on one hand and is itself additionally a risk factor for several alternative necessary diseases on the alternative hand. (7) The size and form of the human body is greatly influenced by heredity. Being fat

is caused by a mixture of hereditary traits and therefore the body's natural response to the surroundings. Several studies have shown a uniform correlation between heredity and fat.

As with adult onset fat, childhood and adolescent obesity has multiple causes centring on an imbalance between energy intake (Calories obtained from food) and energy expenditure (Calories dilated within the basal metabolic rate and physical activity). Adolescent obesity is most possible results from an interaction of biological, environmental, familial, social, nutritional, and psychological factors. Obesity may be a medical condition within which excess body fat has accumulated to the extent that it's going to have an adverse result on health. It is related to many risk factors for later heart condition and alternative chronic diseases. (158)

Obesity is a pathological condition in which excess body fat accumulated, leading to adverse effects on health and life expectancy. It characterised by high cholesterol, carboxylic acid levels; imbalance in metabolic energy; insulin desensitization; lethargy, gallstones; high blood pressure; shortness of breath; emotional and social problems; and excessive fatty mass accumulation with dysplasia and hypertrophy It is most normally caused by a combination of excessive dietary calories, lack of physical activity, and genetic susceptibleness. (61) Obesity may be a medical condition within which excess body fat has accumulated to the extent that it's going to have an adverse result on health. It is outlined by body mass index (BMI) and evaluated in terms of fat distribution via the waist–hip quantitative relation and total cardiovascular risk factors. (37)

Hippocrates wrote "Corpulence isn't solely an illness itself, but the harbinger of others", recognizing fatness as a severe disorder with several co-morbidities. (137) Obesity is one among rising pathological state of twenty first century. WHO has declared fatness one of prime 10 health risks within the world and as a result of it will increase the chance of life treating conditions, together with diabetes, cardiovascular disease, heart condition, Sleep disorders and Cancer (Colon,

Rectal, Prostate in men and Breast, Uterine, Cervical and Ovarian in girls), similarly as, Joint issues, intake disorders, asthma, depression, anxiety and feeling of alienation from society. It conjointly decreases lifespan. Fatness is a minimum of three times additional common in cities than villages, as villages are turning into urbanised day by day and are adopting identical distributed life vogue. Worldwide there's a shift towards less physical active work and presently 60% of world's population gets in comfortable exercise. The adoption of western diet and fashion has contributed to fatness in developing countries together with India. A modification in dietary habits and exaggerated consumption of energy dense food is one among the main causes of fatness among young adults. Two minutes noodles and alternative junk foods are liable for distorting dietary habits in young generation. (158)

It is calculable that there are over 250 million weighty folks worldwide and was found that it's not solely a haul of adult population however are additionally poignant kids and adolescents. In keeping with a study, the speed of fat among young adults is doubled in U.S.A. from 10% in 1990 to 25% in 2007. (40) Eating and exercise habits are the best determinants of people who find themselves in a condition known as obesity. Over intake may be because of several reasons, some individuals merely love food and a few subconsciously equate food with emotional comfort, and eat to deal with feelings of depression, failure or low self-worth. Thus reasons for over uptake may be because of social, psychological and emotional factors. Childhood and adult obesity are a lot more common in those oldsters whose negative promoting to manage their intake as kids. Food becomes a pleasure for such individuals and these individuals as adolescents and young adults link their pleasure or recreation with food. This ends up in over uptake and obesity. Interference of fat is far a lot fascinating than treatment of the condition once it's established. Interference of overweight and obesity is meant to start early in life. Prevention includes primary interference of overweight or fat itself, secondary interference or avoidance of weight regain following weight loss, and interference of more weight will increase in obese people unable to lose weight. (160)

Health professionals' are conscious of rising trends of obesity among the young generation. Obesity in young adults will increase the chance of morbidity and mortality. Obesity is evolving as a serious organic process downside in developing countries, moving substantial range of young population leading to enlarged burden of chronic illness. Genetic factors, environmental factors and life-style preferences and cultural factors appear to play major role in rising prevalence of obesity worldwide. Obesity is growing serious medical condition that demands a preventive management. (102) Fatness has significant co-morbidities and this are associated with substantial health care and social costs. It's a fancy disorder of craving regulation and energy metabolism controlled by specific biological factors. The regulation of energy balance must be explored, as well as the system factors that manage energy intake, energy expenditure, and the differentiation of fat ensuing from excess calories. The genes that are necessary in human fatness got to be known.

1.4. ADOLESCENTS OVERWEIGHT AND OBESITY

Growing rates of overweight and obesity has reached pandemic size in developed countries and is speedily increasing in several high and middle income and less developed countries. Now a days, obesity may be a major serious public health problem and a huge challenge, since its prevalence is accelerating speedily not exclusively in developed however conjointly in developing countries. (29) These changes have shifted in societies from communicable to non – communicable diseases (NCD). (44) Overweight and obesity are significant unhealthiest, since they are related to different diseases and those they contribute to pathological state. The matter of overweight and obesity is confined not solely to adults however conjointly being reportable among the kids and adolescents of developed still as developing countries. Since, adolescence may be an age of transition from childhood to adulthood; it assumed crucial position within the life cycle of personalities, characterised by associate exceptionally fast rate of growth.

Fatness could develop at any age in either sex and in as increasing ill health. Fatness develops over time and, once it develops, is tough to treat. (143) Obesity could be an advanced sickness that results from an imbalance of energy intake and expenditure. Youngsters gain weight once the amount of food energy (calories) that's ingested exceeds the amount of energy that's employed by the body for activity and growth, so storing the surplus energy as fat. Obesity, or over nutrition, could be a generalized as excessive accumulation of fat in connective tissue tissue; it's comparatively common throughout puberty and adolescence in both sexes. It's a lot of common within the higher socioeconomic categories as a result of dietary habits (Food Containing massive amounts of starch and fat are typically involved) youngsters with moderate obesity within the pubescent years typically need no treatment, since this could be thought about traditional. Several youngsters who are corpulent as a result of over ingestion can still be obese as adult. There's a paradigm shift within the quality of life in urban population

leading to substantial increase in childhood as well as adult obesity within the urban population. It's ascertained that 30% of obesity begins in childhood and out of that 50% to 80% become obese adults. (140)

The proportion of youngsters within the general population who are overweight and obese has doubled over the past twenty years in developed and developing countries as well as India. (22) Childhood fat will increase the chance of adult fat additionally as chronic health issues like kind II polygenic disorder, high blood pressure and depression. (28) Obesity and overweight are progressively current organic process disorder among youngsters and adolescents within the world. (130) Numerous health risks are related to adolescent overweight, as well as high blood pressure, respiratory illness, many medical science disorders, diabetes mellitus and elevated humour lipoid concentrations. (59) In the Harvard study, morbidity from cardio vascular illness, diabetes, avoirdupois connected cancers and inflammatory disease was 50 percent to 100 percent higher in rotund people who were conjointly rotund as children (110)

Due to the problem of overweight and obesity in adults and also the several long adverse effects of childhood fat, the interference of kid fat has been recognized as a public health priority. (120) Obesity and overweight became an all over world epidemic currently. Overweight and obesity are the 5th leading risk of deaths, leading to around 2.8 million deaths of adults globally each year (159) According to a worldwide estimate by the World Health Organization (WHO), in 2005 there were concerning 1.6 billion overweight persons aged fifteen years and higher and among them a minimum of four hundred million adults were fat. World Health Organization adds that by 2015, close to 2.3 billion adults are going to be overweight and over700 million are going to be fat. (152)

Adolescents characterised by exceptionally speedy rate of growth is commonly ever changing in people owing to its dependence on genetic hormonal and organic process factor. Overweight or obesity is speedily increasing in adolescence. Overweight and obesity is joined with diet. Metamorphosis of food habits has led

to the replacement of nourishing food by things that are tasty, convenient in vogue junk food. Food is high in fat or calories and low in nutrient. Adolescent's eating behaviours are powerfully influenced by their Social environments that embrace family, peernetworks, schools, advertising, faith and data influence adolescent's uptake behaviour. Ill effects of standard intake of junk foods are principally lack of energy, poor concentration and fatness resulting in complex, depression, heart diseases, high sterol, scrawny growth, premature ageing, and cavity. In line with a study on adolescents, with excessive consumption of processed foods and high fat diets fatness is on the increase. (83)

The prevalence of fatness has reached forbidding levels, with quite one billion overweight adults of that three hundred million are thought of as clinically fat. Fatness has effects on nearly each developed and developing countries of all socioeconomic status. As expressed in the report of WHO Consultation on fatness "overweight and fatness cause adverse metabolic effects on blood pressure, steroid alcohol, triglycerides and hypoglycaemic agent resistance. Overweight and obesity in childhood and adolescence are related to a spread of psychosocial and medical complications that are each immediate and future and have severe economic consequences. (45)

In the global organization, the number of kids who were overweight is predicted to rise by .1.3million youngsters annually, with over 300,000 of them turning into fat annually while not pressing action to counteract the trend. (148). Overweight and obesity represent 2 of the foremost important medical health issues within the world nowadays. The results seem to be the maximum amount psychological as physiological. It is calculable that 10 million teenagers are overweight, representing around twenty percent of total young population in the united state. It's additionally been calculable that the common individual within the country who is twenty five years of age or older can gain around one pound of extra weight per annum. (106)

Excessive avoirdupois develops slowly throughout adulthood, ages twenty five to forty four being the danger year. (125) Obesity is maybe the foremost current form of deficiency disease in developed countries each among adults and youngsters. It is extraordinarily tough to access the scale of the matter and compare the prevalence rates in numerous countries as no actual figures are there and additionally as a result of the definition of fat aren't standardized. Further, there has been associate multiplied awareness of the matter in recent years. However, it's been calculable to have an effect on twenty to forty percent of the adults and ten to twenty percent of youngsters and adolescents in developed countries. (81)

Goel, Kaur and Gupta (2013) found that modification in dietary habit of overwhelming additional high energy food and shifting to inactive manner is probably going to be one amongst the vital precursors of overweight and fatness among adolescents. Over two-third (66.25%) adolescent women skipped a least one meal daily and also the most often incomprehensible meal was breakfast (41.25%).The most common (60.37%) impact of skipping meal among adolescent women was consumption of food. Potato chips, chocolate and effervescent drinks severally, were the foremost (100%, 92.50%, 91.25%) most well-liked food item. The adolescent women were consuming far more energy and fat however inadequate micronutrients like iron and beta carotene. The results stated that it's necessary to push healthy uptake habits among them regarding sick effectsof food thus on forestall overweight/obesity and fatness connected complications. (55)

Overweight and obese kids and adolescents are at a better risk of long run mortality and morbidity, moreover as facing the increase of immediate negative effects on physiological and psychological wellbeing. (24) Approximately half adult ideal weight is gained throughout adolescence. Peak weight gain follows the linear growth spurt by three to six months in females and by roughly three months

in males. Ladies can gain roughly 18.3 lb (8.3kg) annually throughout peak rates of weight gain, (12.5 years older on average). Average weight gains throughout time of life among females are between 15-55avoirdupois unit (7-25 kg), with a mean gain of thirty eight.5 lb (17.5 kg). Adolescent females could gain the maximum amount as fourteen avoirdupois units (6.3 kg) throughout the latter half adolescence (9).

It is discovered that thirty percent of fat begins in childhood and out of that fifty to eightieth percent become weighty adults.(141) With the rise in obesity prevalence there's a parallel increase in obesity associated chronic diseases and their clinical onset at ever younger ages. The obesity has reached a virulent disease proportion in urban Indian population. If we tend to enable this epidemic to continue we'll high the globe in polygenic disorder and CHD sooner than calculable. The price of treating DM and associated disorders alone can consume a significant chunk of our national resources.

Several factors could contribute to the event of obesity. It is not one disorder however a mixed group of conditions with multiple causes:

Junk food:

The kid misses regular meals as Wafers, chocolates, crunches, specially flavoured namkeen, kurkure, burgers, pizzas, noodles are present the market in each nook and corner. Most of those things are high on calories or maybe empty calories since they're deficient in different vital nutrients like vitamins, iron, minerals etc. It's postulated that consumption of additional hundred calories per day can end in five kilogram weight gain in one year time. There has additionally been a consumption increase as these high fat-sugar foods have an effect on fullness signals to become weak, and provides pleasant mouth feel thus the individual has the appetence to eat and drink additional.

Social factors:

With the increase in the per capital income of population there has been an increase in social functions. The youth has taken it as their status symbol to distribute eatables which are rich in fats and calories among friends and relatives.

Family Lifestyle:

A number of things associated with home and parental environment could have an impact on children's uptake habits and subsequent weight status. Home and parental atmosphere have additionally received a lot of attention by researchers. Investigation factors associated with development of obesity, as a result of it is in the home that the majority early experiences with food and early experiences occur. Children and adolescents who eat additional meals with the family reception tend to own healthier uptake habits. But in recent years, uptake has been happening outside of the house atmosphere additional overtimes, and kids and adolescents are creating additional choices concerning family food choice and meal preparation. Meals eaten in hotels tend to be higher in fat and energy content. The link between general parenting trend and variables regarding child's uptake, physical activity, and weight has received less attention. However there is suggestion that parenting trend characterised by support, communication, and responsiveness as well as clear limit setting could result in healthier uptake and augmented physical activity in youngsters. In addition, extreme disorganization, neglect, and abuse in some cases are joined with the event of severe obesity and uptake disorders. (Hayons, 2008).

Additionally, once adolescents' are answerable for their own food selections, they are additional probably to interact in erratic intake patterns and to eat additional junk foods. Family meals give a protecting atmosphere against such factors. Another variable associated with home atmosphere that has been found tolerate to obesity is that the availableness and utilization of technology that promoted inactive behaviour (e.g., television, video games, etc.).

Television/computer:

Most parents haven't any management over their youngster's observance numerous TV programmers. Youngsters have access to video games and computers conjointly mushrooming cyber joints have created these accessible. This contributes to the kid turning into a 'couch potato' instead of in out of doors activity. Consequently, youngsters are gaining a lot of weight than they must. Parents conjointly tend to take advantage of accessibility of video games and TV so as to satisfy their own commitments of partying, coming together and leave the youngsters at the mercy of the tiny screen.

Much stronger results are found for the link between sedentary activities and overweight and obesity, particularly TV viewing. On the one hand, inactive activities may force out additional active pursuits, creating this kind of study appear fully parallel to the activity studies. However, time spent in inactive activity could also be additional simply measured, than is physical activity, wherever intensity matters. That said, a minimum of one study that investigated the association between TV look and physical activity found none interestingly, while it did notice a relationship with laptop use, reading and schoolwork time, these inactive activities were related to higher levels of physical activity. There are many attainable pathways for television viewing to affect weight. First, of course, that physical activity is squeezed out. Second, TV advertising might increase children's want for, and ultimately consumption of, energy dense snack foods. Third, viewing TV could also be a complementary activity to snacking, resulting in higher energy intake among kids look TV. Increased TV viewing causes them in reduction of physical activity, and also the subsequent lack of exercise have an effect on kids adversely in several areas. For instance, early childhood could be a time of tremendous growth for kids and quantity of physical activity absolutely affects the strength and quantity of bone mass; lack of physical activity results in diminished bone mass. Metabolic rates throughout TV viewing are considerably not up to throughout resting amount, as well as sleep, for each fat

and traditional kid aged 8-12. Inflated health risks are related to inflated obesity and disorders at one time seen solely in adults are showing additional often in younger and younger people, like type-2 polygenic disorder and cardiovascular disease. So children aren't solely in danger of developing these diseases as adults; however they're conjointly more possible to develop them as kids. Kids who watch less TV and play fewer video games show a big reduction in measures of fatness, such as body mass index. Additionally to physical inactivity related to television viewing, there are different reasons why look TV viewing can also be connected with childhood fatness. While looking at the TV, kids usually senselessly eat high-calorie or high-fat snack foods that conjointly result in inflated weight gain. Another issue promoting uptake ahead of the TV generally is associated with commercials for every kind of food. (149)

Lack of activity:

Active individuals need additional calories than less active ones to keep up their weight. Additionally, physical activity tends to decrease appetence in fat people whereas increasing the body's ability to preferentially metabolise fat as associate energy supply a lot of of the rise in fat within the last twenty years is believed to possess resulted from the bated level of daily physical activity. Physical activity, or exercise, both prevent and reverse obesity. (38) Earlier, youngsters had longer time to play, run as compared to the kids of this generation.. While not activity, even the recommended calories result in a positive energy balance which accumulates as body fat contributively to obesity.

Insufficient play areas:

Cars are common and that they are looked as if it would be faster and safer for transport. Erosion of open areas for exercise and lack of parental time to supervise play are all a part of new lifestyles. (1, 89,126)

Eating habits

Frequency of food and composition of good food play an important role in gaining weight and becoming obese. Consumption of wrong type of food at wrong time is the major contributors of obesity among adolescents. Consumption of food those are high in fat and sugars and staying awake till late at night as a result of which the adolescent feel hungry, are the two main show cases of poor eating habits among adolescents.

Environmental factors

A person's atmosphere conjointly plays a big role. Environmental factors include way behaviours like what an individual eat and how active he or she is. As a result, not every individual can gain weight throughout a time of nice food accessibility and abundance, but some will. Living endlessly in times of food abundance, particularly the abundance of processed, sugary, fatty, and salty foods has been known as living in an exceedingly "toxic environment", one that sets the stage for unhealthy food behaviour and weight gain to occur. Though not everybody in an exceedingly cacogenic atmosphere can become fat, those who are susceptible to try and do thus, thanks to presence of genetic variations and differences, can presumably place on excess weight and have nice issue taking it off (136)

Throughout times of food shortage, human metabolism slows down, thus as to not burn up the energy if taken in too quickly. Traditionally this has been out throughout times of food shortages, seasonal changes in food handiness, and through the time of maximum environmental condition like famine. The power for metabolism to curtail throughout these times would have provided associate organic process advantage, sanctioning people with this ability to use far more slowly that was in restricted provide Along most town streets it's exhausting to miss the fast-food restaurants on each block. For many it is a fast, calorie laden

meal typically containing enough fat to satisfy a whole day's allotment. Adolescents are significantly vulnerable to these places and for the teenagers this is often their dinner outside of home. Even as fast-food restaurants attract the adolescent population, so does the constant bombardment of advertisements. The only purpose of advertising is to entice and persuade people to shop for merchandise. Advertisements for candy, gum, soda, snacks and quick foods target the youth market and may influence food beliefs and uptake patterns. Commercials tend to encourage snacking between meals. The abundance of fast-food restaurants might give a supply of convenient and a comparatively low-cost, tasty food, these institutions generally do not provide nutritious foods like fruit and vegetables. Instead a typical fast-food meal is incredibly calorie dense. People who eat fast-food restaurants tend to consume a lot of fats, sugars, and carbohydrates and fewer fruits and non-starchy vegetables than individuals who don't eat fast - food.

People, significantly youngsters and adolescents are exposed to great amount of advertising in a very kind of avenues. As an example, it's calculable that youngsters are exposed to tens of thousands of TV advertisements every year. Researchers have verified that exposure to advertisements greatly affects children's attitudes toward, and interest in, particular foods. Concern has developed over food selling to youngsters as a result of several studies has joined food selling to food decisions of youngsters. Also, advertising will increase children's attempt's to influence purchasing selections of their oldsters, an inspiration brought up as "pester power". Further, the bulk of foods and beverages publicised to youngsters are high in sugar and fat, and low in nutrients. As an example, the Institute of drugs has finished that the bulk of TV advertisements for food and drinkable product for children are energy dense however not nutrient dense.

The surroundings may be a major determinant of overweight and obesity.In developed countries just like the United States, there is associate overall abundance of palatable, calorie-dense food. Additionally, aggressive and

complicated food promoting in the mass media, supermarkets, and restaurants, and the giant parts of food served outside the home, promote high calorie consumption. Many of our social group traditions promote gluttony and the advantageous consumption of high calorie foods. For several folks, even once calorie intake is not higher than the counselled level, the number of calories gone in physical activity is insufficient to offset consumption. Many of us are entrenched in inactive daily routines consisting of sitting at work, sitting in traffic, and sitting in front of a TV or a laptop monitor for most of their waking hours. During this obesity promoting environment, individual attitudes and behaviours are essential in weight management.

Media:

The media could be a powerful influence on adolescent ingestion behaviours. Adolescents watch some three and one half hours of TV daily. Adolescents consume giant quantities of food enjoying TV and commercials tend to stimulate snacking. Overweight adolescents tend to eat additional in response to those commercials. These messages excuse and encourage ingestion these foods. Television characters eat, drink and talk about food on a mean of nine fold an hour. Adolescents' are susceptible to weight connected lethargy. (60)

Peer Influence:

Another influence on feeding behaviour is peer pressure. Fast-food restaurants are a typical "hang-out" place for teens. The meals related to these "hang-outs" are high in calories, fat and sodium. The everyday fast-food meal, burger, fries, soda and dish contain approximately 900-1300 calorie. In studies conducted on a gaggle of twelve to eighteen year olds it absolutely was noted that the bulk enclosed milk, ice-cream, no vegetarian foods, burgers, chips, chicken, fish, can drinks, muffins, cake and pie as an integral a part of their diet. These foods were

favoured over foods like liver, squash and spinach that are thought of to be distasteful among those teenagers studied .Results of researches have known that obesity will be "socially contagious", which means that folks tend to eat as their friends and family do. When friends and family become fat, their companions tend to imitate. Researchers found that an individual had associate exaggerated probability of changing into fat if their social network was fat. The danger exaggerated 57% if a follower was fat, 40% if a sibling was fat and 37% if a relation was fat. Not only do friends influence one another to become fat, having a lot of that one fat friend increases the danger even a lot of. (129)

Several alternative factors like gender, natural weight gain, and also the tendency of people to go together with similar individuals have additionally been studied because the fat has become a growing health problem. The prevalence of obesity has risen over recent years from twenty three percent to thirty one Percent. Achievable explanations embrace inactivity in social networks, food consumption in an exceedingly cluster, influence on consumption habits, adoption of similar exercise patterns, adoption of life style behaviours like smoking and tolerance for obesity. The information didn't show however blubber spreads through social networks, but social norms do seem to play a task. The influence seems to be stronger among same sex pairs, which means that very same sex friends were a lot of doubtless to influence every other than spouses whereas friends looked as if it would influence one another to obesity, the alternative was additionally true. Researchers found that once a friend loses weight that their social network might follow suit individuals will use this info to be successful in their efforts to succeed in traditional weight. Friends, siblings and spouses who conform to convert to healthy life-style habits and weight loss diets increase the chance of weight loss success for all involved. Forming bonds with folks that of normal weight might facilitate associate fat person get a special perspective on weight loss and encourage them to success. A gym or health club with normal sized people may provide the healthy motivation someone has to reach normal weight (Patrick et al., 2004).(118)

Other factors:

There are several alternative factors that influence adolescent food behaviour and dietary practices. Food behaviour could be responses to stimuli mechanisms that type the inspiration of the intake method are set within the hypothalamus of the brain, wherever the centres for hunger and repletion are set. Two sorts of intake behaviour are restrained eaters and unrestrained eaters. Restrained eaters limit their food intake below complete satiation or feeling of fullness. Unrestrained eaters eat to the purpose of complete satiation. Young kids are typically unrestrained eaters and by adolescence they're forced to regulate what they eat but worry and tedium usually stimulate eating in adolescents. If this intake isn't controlled, it will become uncontrollable and fat begins to accumulate Obese teenagers usually have disturbed patterns of intake.

A number of the common ones are listed below:

(1) Consumption of associate imbalance of high-energy and low nutrient foods, over low-energy and high nutrient foods, i.e. intake a fried cake rather than a bit of fruit.

(2) Interpretation of numerous feelings of things as reasons to eat.

(3) Status to intake cues unrelated to physiological wants.

(4) Guilt associated with intake under any circumstances.

(5) Lack of understanding of bodily wants for nourishment.

(6) Disposition to eat with others, together with relations.

(7) Lack of structure in intake patterns.

(8) Lack of sociality connected with intake patter.

(9) Night intake.

(10) Binge intake.

(11) Eating solely within the latter part the day when starvation within the early part. Nausea delineated as connected with intake within the early a part of the day.

(12) Eating speedily and indiscriminately. (99)

1.5. SOCIOECONOMIC ISSUES RELATED TO OVERWEIGHT AND OBESITY

Socio-economic status (SES) is an economic and social science combined total measure of a human work expertise and of a personality's or family's economic and social position relative to others, supported financial gain, education, and occupation. Families with higher and expendable financial gain will accumulate wealth and specialise in immediate desires whereas having the ability to consume and luxuriate in luxuries and weather crises (Smith and James, 2004) (133).The importance of individual fashion patterns for current and future health has long been accepted, very little is understood concerning the extent and pattern of socio economic variations in health behaviour throughout adolescence. (146)

Demographic and Socioeconomic changes influence the living and dealing habits of populations. Economic process, modernization, urbanization and socialization have modified the life form of Indian families. Technological advances, whereas creating life simple, inspired inactive means of living, paving way for fashion diseases. India's speedy economic process can be slowed by the sharp rise within the prevalence of cardiovascular disease, polygenic disease and stroke and therefore the productive information technology is probably going to be the toughest hit. In affluent cluster youngsters, all types of sophistication contributed the matter of adolescent fat.

Because of socioeconomic changes quick foods are simply out there for adolescents the type of such product being factory-made and heavily advertised through the media (footage of enormous sodas with snacks etc) makes the young kid compel the oldsters to acquire these things and he keeps munching them anytime and anyplace. Not amazingly, the kid misses regular meals. The temptation of very little surprise gift with the merchandise traps children. Wafers, chocolates, crunches, particularly seasoned namkeen, kurkure, burgers, pizzas; noodles are simply out there in each nook and corner. Most of those things are

high on calories or maybe empty calories since they're void of alternative vital nutrients like vitamins, iron, Ca etc. Nibbling in between the meals, intake in the dead of night and consumption of refined, star eating out usually an attending party may lead to an inflated energy intake chiefly fat. (88). Adult body weight and fat are reciprocally associated with social and economic advantage. Previous analysis, for example, indicates that the prevalence of fat declines with financial gain and education. (116) Some determinants or influences on being overweight embody socioeconomic status (SES), parental weight quality .Though inverse relationship between socioeconomic status and body mass index is well documented, and there are restricted studies that specialize in the medicine population. Occupation, education and financial gain are also the foremost oftentimes used socioeconomic status indicators within the health studies. (18). The Socio-Economic status is that the non-nutritional determinant, that greatly influence the biological process standing of a community. The per capita financial gain, family size, instructional standing of the house mate and social station of the family play a task within the consumption to the wellbeing of a private. Socioeconomic status (SES) and activity factors are necessary determinants of weight gain and overweight. (124)

The urban lifestyle has been connected with dramatic changes resulting in inflated consumption of high energy dense foods and decrease in physical activity. Fleshiness is increasing in youngsters and adults, particularly girls' as a result of inflated dependence on food, like packed and foodstuff, as a result of economic development and urbanization. Khaader et al. (2008) state that, the daily spending money was related to overweight, whereas family monthly financial gain was found to be related to obesity. The study results might be explained by the actual fact that mothers with education principally can have employment going their kids for extended times facultative them to require many unhealthy snacks. It's vital to notice that kids might gain additional weight once getting several unhealthy snacks that are out there in school's canteens and groceries. (87)

Kaur S et al. (2005) studied the socio economic gradient within the prevalence of overweight and fatness in class going youngsters. It has been reported that the increase in inactive behaviour like exaggerated use of conveyance transport and attenuated physical activity result in exaggerated prevalence of overweight and fatness. Inactive life designs within the higher socioeconomic group influence the load gain. The study found that the prevalence of overweight and fatness was marginally higher withinthe people of twelve, thirteen and seventeen year student, that wasn't statistically completely different. (85)

The socioeconomic situation is largely determined by residence, per capital income, family sizes, educational level of parents, and the spread of modernization and urbanization. Socioeconomic status and behavioural factors are important determinants of weight gain and overweight. Recent epidemiological trends in obesity indicate the primary cause of the global obesity problem lies in environmental and behavioural changes. There is an inverse relationship between socioeconomic status and prevalence of obesity, type II diabetes and CVD. It was also observed that the prevalence of overweight and obesity was higher in he higher income groups for both males and females (Kopleman, 2007). (92)

A study conducted in urban Delhi by the Nutrition Foundation of India also revealed that the prevalence of overweight among the "middle class" increased from low-to high-income groups, showing that about 32.2% of males and 50.0% of females in the high-income group suffered from overweight .(56) There are some studies on adults that have examined the relationship between socioeconomic status (SES) factors and fatness, however less analysis has used knowledge representing populations to examine the consequences of those relationships of fatness and overweight on youngsters are scanty.(95)

Diet and life style are seemingly major contributors to weight problems and varies with completely different socioeconomic status particularly countries like India. Sedentary lifestyles are a vital issue, as well as disbursement of no time for

outside sports and taking part in very little or no physical activity throughout leisure time. (47)

Our main objective was to look at the prevalence of childhood fat and overweight at school going adolescents and compare the connection between socioeconomic status issues and associated dietary and life vogue factors of obesity and overweight. On the premise of internationally primarily based cut off points we tend to design a study to see the prevalence of overweight, fat and its association with diet, inactive life style, socio-economical standing and physical activity in adolescent school kids in Jhalawar.

1.6. GENDER DIFFERENCES RELATED TO OVERWEIGHT AND OBESITY

Sex refers to ascribed biological status of being female or male, whereas gender refers to achieved rank of being a girl or a person. Clear sexual dimorphism exists in weight, with females usually having a lot of body fat than male and being a lot of probability than male to be weighty. Several sex variations are physiological and connected to generative functioning with a lot of overall hypodermic fat in females and therefore the distribution of body fat deposits being larger in lower body for females and higher body for males. (8) Many reports on fat in India have conjointly confirmed the prevalence of fat to be higher among girls' than men.(107) At all ages and throughout the globe, girls' are usually found to possess a higher mean body mass index (BMI) and better rates of blubber than men. The explanations for these variations are in all probability biological and associated with larger ability of men to deposit additional lean than fat tissue once energy imbalance happens with weight gain. This extra lean tissue is metabolically active and will increase the basal rate in men thereby compensating for the discrepancy between intake and output. Girls' are naturally fatter, with higher level of essential fats and fewer lean tissues than men. (78)

Obesity is related to over thirty medical conditions, and scientific evidence has established a robust relationship with a minimum of fifteen of these conditions. The growing prevalence of blubber is more and more recognized jointly of the foremost necessary risk factors for the event of high blood pressure, lipoid abnormalities and kind a pair of diabetes (T2DM), that are acknowledged to be freelance risk factors for cardio vascular diseases (CVDs). (103) Abdul Raahim et al. (2003) reported on the prevalence of obesity in each rural and concrete area in Palestine. He found that it had been additional rife in urban areas. The prevalence of fatness was 36.8% in ladies and 18.1% in men in rural areas as opposition 49.1% and 30.6% in urban ladies and men; severely. Central fatness is

predominantly higher among women of each urban and rural school as compared to boys. (2) It was observed by Colditz et al. (1990) that the risk conferred by obesity for the development of diabetes was 40 times more in obese women as compared to the slim women. (32)

Obesity is thought to own negative consequences for women's health and additional onset of change of life seems to be related to adverse changes in blood lipid profile and secretion levels particularly leptin, which can contribute within the aetiology of hypertension. (109) WHO (2006) had said that in India there are 2.40 per cent weighty, 13.50 per cent pre-obese males and 6.10 per cent weighty and 17.40 per cent pre-obese females. (153) Zaarger et al., (2000) discovered that among Kashmiri population the prevalence of fatness has been found to be 15.01 percent, the prevalence of fatness among males was 7.0 per cent and in females 23.69 per cent. Thus, fatness could be a growing drawback, a lot of common in females and urban population. (161)The difficulty is a lot heightened among girls than boys. In urban India, over twenty three percent of girls' are either overweight or obese, that is on top of the prevalence among men (20%). (75)

1.7. OBJECTIVES OF THE STUDY.

The main objectives of the study are:

1. To assess the prevalence of obesity among school going adolescents.

2. To find out the association between obesity and socioeconomic status (SES).

3. To find out the relationship between obesity and gender differences in school going adolescent boys' and girls'.

4. To compare the prevalence of obesity among school going adolescent boys' and girls'.

1.8. HYPOTHESIS.

On the basis of the literature reviewed, research findings, discussion with seniors, colleagues in the field and scholar's own understanding of the problem it was hypothesized that:

1) There is prevalence of overweight and obesity among school going adolescent girls' and boys'.

2) School going adolescent children belonging to high socioeconomic status are more obese than adolescents belonging to low socioeconomic status.

3) Obesity is more prevalent among school going adolescent girls' as compared to school going adolescent boys.

4) Obesity is associated with dietary pattern of school going adolescents.

1.9. DELIMITATIONS

During the data collection the investigator created all attainable efforts to persuade and build the themes to perceive the aims and objectives of the study. It absolutely was conjointly emphasised that the information being collected data are going to be used purely for research works and will be strictly confidential. The investigator tried her best to extract reliable and actual data, as much as possible from the respondents by applying numerous checks and cross checks. For socioeconomic status measurement self-administered questionnaire was used based on parent's income, education and occupation. In today's world nobody wants to give correct information about his/her income. So study is bit limited because of SES factor.

Although conducted with plenty of efforts, this study still has several limitations. At first, this was a cross sectional study, therefore it simply has delineated the case of the tiny sample, might not replicate all population. For learning nutritional status, an outsized sample size was necessary, however here solely 1000 adolescents were enclosed so the results might have some base. This study tried to explain overweight and obesity status and a few connected factors solely, didn't mentioned concerning causative relationship. The study is delimited to the adolescents of 13 to 18 years getting on and simply to the locales of Jhalawar district.

Secondly, to assess the consumption habit, this study used self-administered questionnaire, the questionnaire represented three day dietary recall pattern and food frequency questionnaire. Thus researcher couldn't approach to resident's consumption habit comprehensively.

Thirdly, in this study food consumption routine was assessed by questionnaire. Energy intake, energy expenditure and energy balance weren't approached; this

was a drawback in reflex the character of association between food consumption, physical activities and obesity.

Lastly though an anthropometric measurement activity procedure was started before however some errors might occur in measurement method, thus more or less affected to the results of the study.

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CHAPTER - 2

REVIEW OF RELATED LITERATURE

THE REVIEW OF LITERATURE WAS GENERALLY CLASSIFIED INTO THE SUBSEQUENT CATEGORIES:

2.1. ADOLESCENT: AN OVERVIEW.

2.2. OVERWEIGHT AND OBESITY.

2.3. PREVALANCE OF OVERWEIGHT AND OBESITY IN ADOLESCENTS.

2.4. RISK FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY.

2.5. SOCIOECONOMIC STATUS RELATED TO OVERWEIGHT AND OBESITY.

2.6. GENDER DIFFERENCES RELATED TO OVERWEIGHT AND OBESITY.

2.7. DIETARY PATTERN RELATED TO OVERWEIGHT AND OBESITY.

REVIEW OF LITERATURE

A review of literature relevant to the study is a vital and essential a part of the analysis method. It's a valuable guide to shaping the matter, recognizing it's important and suggestion promising information gathering devices, acceptable study style and supply of information. A study of the relevant literature is a necessary step to urge a full image of what has been done and aforementioned with relation to the matter, assortment of relevant literature provides the essential understanding of the matter and its depth. Such a review brings a couple of deep insight and a transparent perspective of the field.

Review of the connected literature, besides permitting the investigator to get acquainted with this information within the field, serves the subsequent specific purposes.

1. By learning connected literature, researchers will avoid futile and useless problem areas.

2. The review of connected studies permits the research worker to outline the bounds of his field, thereby serving to the research worker to delimit and outline his drawback.

3. The information of connected material makes the research worker up -to -date with the work that others have done and so helps to state the objectives clearly and consciously.

4. The review of connected researches provides the investigator associate understanding of research methodology that refers to the method the study is to be conducted.

5. The analysis of connected literature additionally provides insight into applied mathematics strategies through that, the validity of the results is to be established.

6. The ultimate and necessary specific reason for reviewing connected literature is to know about the recommendations of previous researchers listed, in their studies, for any analysis. A familiarity with the literature in any downside space helps the students to find what's already familiar, what others have tried to search out, what strategies are promising, and what issues stay to be solved. The literature in any field forms the muse upon that all future works can be built. The reviews of literature square measure typically used as a basis for inductive reasoning for locating and synthesizing all the relevant literature on a specific topic. A serious and pedantic try has been created by the scholar to travel through related literature and a quick review of the studies associated with the downside is described during this chapter. The investigator found many books, periodicals and journals and published thesis, while sorting out relevant facts and findings that were connected to this study.

2.1. Adolescent: An overview

1. Adolescence could be an amount of major physical and psychological modification, additionally as nice changes in social interactions and relationships. Adolescence is characterized by fast will increase hight and weight, secretion changes leading to sexual maturation and inflicting wide swings of feeling. It is an anabolic section of life and warrants accumulated nutrient demand per unit weight. (303)

(WHO, 2007)

2. Latha and Reddy propose that since Stanley Hall's characterization of the adolescent jointly of storm and stress, several theorists have delineated adolescence as a troubled and distinctive amount of the living series. The principal points that have found since the first twentieth century conceptualized "storm and stress" in terms of three characteristics: parent – adolescent conflict, moodiness and risk – taking behaviours. (153)

(Latha and Reddy, 2006)

3. Adolescence could be a characterised by necessary changes in psychological feature, behavioural, social and emotional functioning due to biological development (i.e., puberty) and to new roles and demands within the familial and social environment (e.g., shrivelled parental involvement, accumulated educational requirements).(155)

(Le Bourgeois et al., 2005)

4. National Institute of Health and Family Welfare (2000) found that the adolescence age is incredibly crucial since these are the early life   major physical, psychological and behavioural changes. This can be associate impressible amount of life. Health issues of adolescents are terribly totally different from those of younger kids and elder adults. As a result of lack of correct information about adolescent are vulnerable to varied behavioural and procreative health issues. Health care employee will play an important role in preventing these issues. (65)

5. Adolescence (Adolescence from adolescere to grow up) is that the amount from the start to time of life tills the maturity. The onset of time of life and maturity could be a gradual method and variable among people. So it's not sensible to line actual age or written record limits in shaping the adolescent amount. (81)

(Garg, 2002)

6. Adolescence is the period during which major racial/ethnic differences in overweight become apparent. (139)

(Kim et al., 2001)

7. According to central statistical organization percentage distribution of adolescents by age group and sex shows that, in 10 – 14 years, both male and female are 12.1 per cent. In 15 – 19 years male are 11 per cent and females are 10.5 per cent. (44)

8. Adolescence is that the most significant amount in human development concerning those poets, writers and historians have created occasional referencesand have control in high esteem the sacrifices created by the

adolescence. It's a transition amount turning point in the lifetime of the individual. (47)

(Chauhan, 1983)

9. Physical growth, sexual maturation and physiology development throughout adolescence are beneath the series of alteration within the secretion of variety of hormone. Through sex hormones exert a serious dominant influence; several different hormones conjointly participate with in the adolescent development. (86)

(Ghai, 1982)

10. The primary man of science who consistently conducted analysis on adolescent was Hall (1844 – 1924) who in the starting of the current century collected monumental knowledge on adolescents. He outlined adolescent in terms of psychological changes occurring in adolescents. He begins this era from ten – thirteen years of age and ends once full adult standing is earned by twenty two – twenty five years of age. In step with Hall "adolescence is a period of storm and stress". (102)

(Hall, 1977)

11. Sex variations in body contours proportions and composition becomes additional pronounced throughout time of life and adolescence. As a result of bigger production of and organs primarily androgenic hormone, male develop wider muscle mass, feminine with higher estrogens secretion develop wider hips and additional fat tissues. An extended forearm relative to the length of the higher arm or total height than do females. These changes together with development of secondary sex characteristics contribute to increasing variations in physical size and look between males and females. (104)

(Hamil and roche, 1977)

12. The Second section of adolescence involves lateral growth. Here the adolescence fills up or gains weight. External factors like diet and exercise impact weight gain quite linear growth, therefore weight gain will vary wide among adolescents. A typical healthy woman can gain thirty five pounds throughout adolescence; a typical boy gains forty five pounds. Girl's peak weight gain sometimes happens round the time of start. (233)

<p align="right">(Roche, 1976)</p>

13. Calorie desires will increase with the metabolic demands of growth and energy expenditure. Though individual desires vary, ladies consume fewer kilocalories than boys. Boys' want 2500 – 2800 kilocalories on a daily basis. Typically the massive appetency characteristic of this growth amount ends up in adolescence to satisfy their hunger with snack foods that are high in sugar and fat and low in macromolecule. Throughout adolescence from the age of ten years there are marked variations within the calorie desires of boys. (190)

<p align="right">(Mueller, 1976)</p>

2.2. Overweight and obesity.

1.. Kokiwar reported that obesity is exclusive with its own risk issues on one hand and is itself additionally a risk factor for several alternative necessary diseases on the opposite hand. (143)

(Kokiwar, 2011)

2. Gupta and Kapoor reported that there's familial aggregation for obesity also as gender variations in familial correlations of obesity in kids with daughters being a lot of possible than sons to be laid low with parental obesity. (100)

(Gupta and Kapoor, 2011)

3. Kumar et al. determined that kids with parental fatness showed 25.2 times a lot of possibilities of developing obesity. (147)

(Kumar et al., 2010)

4. Prema determined that India is undergoing a speedy nutrition and health transition. Throughout the last 20 years the country has witnessed a steep increase in over nutrition and associated non – communicable diseases. (219)

(Prema, 2010)

5. Tasiros et al., reviewed the impact of obesity on paediatric physical functioning utilizing the World Health Organization, International Classification of Functioning, incapacity and Health Frame work (ICF).Childhood fatness was found to be related to impaired cardio metabolic process fitness and performance of motor tasks; Health connected quality of life and therefore the set of physical functioning was reciprocally associated with

weight standing. However, studies investigation impacts of fatness on wider activity and participation were lacking. (273)

(Tasiros et al. 2009)

6. Suri targeted on unhealthy diet and physical inactivity that result in obesity and overweight. The surplus body fat accounts for concerning sixty percents and twenty percents of the world burden of polygenic disease and upset severally. (269)

(Suri, 2008)

7. There are hyperbolic social considerations that obesity carries with it a better risk for psychosocial difficulties for people of all ages. (243)

(Shoup et al., 2008)

8. Skin and Shin investigated the link between obesity and psychological wellbeing in youngsters and examined the mediation result of body discontentment on psychological state of Korean youngsters. Obesity youngsters' incontestable higher body discontentment and lower self – esteem than traditional weight and overweight peer, however less depression. Body discontentment mediates the association between avoirdupois and self – esteem. The rotund youngsters with body discontentment had considerably lower – esteem and better levels of depressive symptoms than the rotund youngsters while not body discontentment and traditional weight youngsters. The findings recommend high levels of depressive symptoms. (252)

(Skin and Shin, 2008)

9. The chance of obesity will increase once one has relatives who are obese and this risk is on the point of three times higher and it more will increase with the severity of obesity.(204)

(Nirmala et al., 2008)

10. Currently, approximately 1/3 of American youngsters are overweight or obese. (291)

(Wang et al., 2007)

11. One certainty is that physical activity will facilitate within the management of negative psychosocial factors intimate with by obese / overweight people. (322)

(Zhang et al., 2007)

12. When energy expenditure is below energy intake in persons vulnerable to weight gain, then obesity can develop .In a recent review on dietary risk factors for childhood and adolescence obesity. there's consistent proof solely on infants among whom high energy intake appears to be a risk issue and nursing a protecting issue for later obesity, and on sugar – sugary potable consumption being a risk issue for avoirdupois development in youngsters and adolescents.(189)

(Moreno and Rodriguez, 2007)

13. Enlarged consumption of a lot of energy – dense, nutrient – poor foods with high levels of sugar and saturated fats, combined with reduced physical activity, have light-emitting diode to obesity rates that have up three folds or a lot of since 1980 in some areas of North America, the uk , Japanese Europe, the centre East,

the Pacific Islands, Australia and China. The avoirdupois epidemic isn't restricted to industrialised societies; this increase is commonly quicker in developing countries than within the developing world. Obesity and overweight create a significant risk for serious diet –connected chronic diseases, together with kind a pair of polygenic disease, disorder, high blood pressure and stroke and bound styles of cancer. The health consequences vary from enlarged risk of premature death, to serious chronic conditions that cut back the quality of life. Of special concern is that the increasing incidence of kid obesity. (315)

14. According to Ebbeling et al. (2002), fast food consumption has robust positive association with weight gain and hypoglycaemic agent resistance, suggesting that fast food will increase the chance of obesity and kind two diabetes. (274)

15. According to Gordon – Larson et al., the impact of keeping adolescents in their same environments however dynamical family financial gain and parental education on adolescents overweight. Dynamical these socioeconomic elements had restricted impact in overweight prevalence among completely different ethnic teams and will not make a case for the inequality discovered between SES levels. They terminated that advantages seen by increasing SES along with adults couldn't be automatically transferred to different gender - age - ethnic teams. Factors like environmental, contextual, biological, and socio – cultural ought to be enclosed in addressing overweight and obesity problems. (93)

(Gordon – Larsen et al., 2006)

16. Chen et al. examined the prevalence of childhood and adolescent obesity in Taiwan and investigated the association between excess weight and fitness and blood pressure. It absolutely was found that the chance of cardiovascular disease inflated nearly two occasions for the overweight and obese –match cluster and nearly thrice for the overweight/obese kids tends to own poorer muscular strength

and vessel endurance than the traditional weight cluster. The overweight/obese and unfit group had a larger risk of cardiovascular disease than alternative teams. However, this risk was considerably lower if weighty, overweight youngsters had a better than average level of cardiovascular fitness. (48)

(Chen et al., 2006)

17. According to Benedicte et al., variations in physical activity and angle toward physical activity in adolescents with totally different degrees of overweight and explore whether or not the prediction of physical activity by angle is tempered by level of overweight. He found that overweight and obese adolescent show lower sport participation and includes a less positive attitude toward physical activity. Interventions in kids with weight issues ought to try and increase participation in sports by creating activities additional fun and engaging for these kids. (19)

(Benedicte et al., 2006)

18. A cross – sectional study was conducted in adolescents and their mothers. It was discovered that there have been vital interactions between physical activity and weighty variables in 2 of our 3 models (ie. Gender and BMI), that indicated the association between physical activity and obesity was vessel within the males than in females. Meal frequency was reciprocally associated with the prevalence of childhood overweight and fat, suggesting that frequent meals could be protecting. TV viewing alone, as an index of in activities, was powerfully related to fat. (237)

(Ruiz et al., 2006)

19. Several factors like genetic, environmental, behavioural, socioeconomic and cultural are coupled with the rotund constitution. In step with modern studies 38 percent of the burden variations may well be determined by genetic factors. In

heritable fleshiness, many genes and their interaction with the environmental factors along contribute to the rotund constitution. The environmental factors, here may well be mortal sin, inactive style, secretion changes, socioeconomic factors, etc. an outsized variety of genes alterations and polymorphisms are shown to be related to fleshiness in both/either homozygous or heterozygous conditions. (51)

(Clement, 2006)

20. Obesity refers to excess fatty tissue; overweight will be outlined as weight higher than a pre – outlined reference level. In youngsters and adolescents, the word has not been established, and consequently terms like overweight, obesity and in danger for overweight are usually used interchangeably. Even the definition of any single term could vary significantly across countries and studies. (72)

(Flegal et al., 2006)

21. As waist circumference appears to be a decent indicator of visceral adiposity and therefore the associated health risks in adults, it's presently of nice interest and beneath investigation on whether or not it's function an improved indicator of obesity than BMI in youngsters and adolescents. However, the proof of the association between waist circumference and adverse health effects also as reference values in youngsters and adolescents are scarce so far.(165)

(Lohman and Going, 2006)

22. Throughout the past twenty years, the proportion of youngsters who are overweight has nearly doubled which of adolescents has nearly tripled. One third of American youngsters are currently obese or in danger of turning into obese,

with a rise within the changes of suffering polygenic disorder, heart issues and stroke into their adult lives. (87)

(Gibney et al., 2005)

23. Zdirenc et al. conducted a study to research the consequences of environmental factors, style and time off activities on shape in rural and concrete youngsters. The results showed that body mass index and skin folds thickness were higher within the urban youngsters. The kids living within the urban areas were a lot of inactive and obese that resulted in a very decrease in their flexibility and muscle endurance fitness.(321)

(Zdirenc et al., 2005)

24. Obese adolescents are at larger risk for pattern by peers and will have fewer opportunities to develop intimate romantic relationships; this could contribute to the psychological and health difficulties frequently related with obesity. (178)

(Michelle et al., 2005)

25. Association between physical activities and obesity were found in several studies. A recent review of the on the market proof indicated that information from prospective studies instructed that exaggerated physical activity and inactive behaviour defend against weight gain in childhood and adolescence. (282)

(Ekelund et al., 2005)

26. A study conducted on 1209 black girls' and 1166 white girls' from ages nine – nineteen years found that exaggerated meal frequency was associated with cut chance of overweight for black girls. (279)

(Toschke et al., 2005)

27. Obesity disorder is treated either single or by a mix of diet management, exercise, medication or surgical intervention. The kind of treatment depends upon severity of obesity. There are clinical pointers offered by American college of physicians that are suggested before going for any weight loss treatment:

(1) If BMI > 30kg /m2, dieting therapy is recommended to reduce weight by a certain defined amount in a defined period.

(2) If there is no weight loss, pharmacological treatments are followed.

(3) If BMI > 40kg/m2 and the patient fails to reduce weight or without 1) and 2), and if there is obesity related complications, bariatric surgery is followed.(255)

(Snow et al., 2005)

28. It has been recommended that excess fat mustn't be thought of as a disease, however instead as a collective adaptation to the pathological environmental pressure to eat an excessive amount of and exercise insufficient. (16)

(Bell et al., 2005)

29. Childhood obesity is more and more being ascertained with the dynamical life-style of families with inflated hours of inactivity attributable to TV, video games and computers have replaced out of doors games and alternative social activities. (249)

(Singh and Sharma, 2005)

30. The world Health Organization has delineated obesity is mainly ignored community fitness issue. Following the rise in adult fleshiness, the proportions of

kids and adolescents who are overweight and fat have additionally been increasing. Obesity is the results of a caloric imbalance (too few calories gone for the quantity of calories consumed) and is mediate by genetic, activity and environmental factors. (314)

(Wong et al., 2005)

31. Alan et al. reviewed the past ten years of revealed analysis on psychiatrically aspects of kid and adolescents' obesity and highlight data psychological state professionals want for preventing fleshiness in youths and diagnosis and treating it. Currently, no approved pharmacologic or surgical approaches exist to treat childhood fleshiness. Health care suppliers ought to specialize in modest weight – loss goals that correlate with vital health edges. The foremost effective treatments embody substantial parental involvement. Psychological state professionals ought to facilitate fat youngsters build self – esteem to assist them lead full lives in spite of weight. (6)

(Alan et al., 2004)

32. Avoirdupois primarily of central fat distribution is usually related to dyslipemia (a condition of impaired macromolecule metabolism). Inflated incidences of heart stroke also are correlate to central avoirdupois. (95)

(Gracis et al., 2004)

33. A study on the consequences of fast food consumption among youngsters conjointly found that fast food may well be one in all the factors for inflated prevalence of obesity in youngsters. It absolutely was found that youngsters who ate fast food consumed additional total and saturated fat, additional carbohydrates, sugar and fewer dietary fibres, milk, fruits and vegetables. (32)

(Bowman et al., 2004)

34. In America, fast food business has not solely trans shaped the yank diet, however the landscape, economy, manpower and fashionable culture. Fast food is relative smart in style, cheap associated convenient that it's become a standard place that it's a no inheritable an air of inimitableness, like it were somehow ineluctable, a reality of life. Statistics show that on any given day, ¼ of the adult population visits a quick food eating place. (201)

35. A study in 2004 among 6212 children and adolescents four to nineteen years previous within the United States ended that consumption of fast food among youngsters in the United States looks to possess an adverse impact on dietary quality in ways in which believably might increase risk for obesity. (31)

(Bowman et al., 2004)

36. The pandemic of obesity is therefore nice that it's even spawned a replacement word "globesity". Nine folks in USA and one person in UK die each quarter-hour as an on the spot consequence of obesity connected ill health. (261)

(Speakman, 2004)

37. Within the European countries, the terms overweight and obesity are normally use. In the USA, the term obesity typically been reserved for clinically diagnosed obesity in kids and adolescents, wherever because the terms in danger of overweight and overweight are used for screening and survey functions. (161)

(Lissau et al., 2004)

38. Close to 30,000 adults deaths in the United States annually are owing to unhealthy dietary habits and physical inactivity or inactive behaviour. (199)

39. Obesity may be a common however advanced complex disorder that develops from the interactions of multiple genes and atmosphere characterised by future energy imbalance attributable to excessive calorie consumption, scarce energy output. (35)

(Bray, 2004)

40. According to WHO (2003), poor dietary habits combined with decreased physical activity have led to an increase in overweight and obesity among adults and children. (307)

41. Obesity has emerged as a serious disorder related to several metabolic diseases in each developed and developing countries. Though obesity encompasses a genetic etiologic, the most important causative issue is environmental, principally associated with inactive life-style and inflicting conservation of energy as body fat. (254)

(Snehalatha et al., 2003)

42. Early development of fat in childhood and adolescence is of explicit concern, each for its prognosticative association with obesity in adulthood and for its relationship with intensive health and economic consequences, freelance of adult obesity. (166)

(Magarey, Daniels et al., 2003)

43. Determinants of obesity will be associated with either dietary intake or physical activity or to each, and that they will be genetic, psychosocial, behavioural or environmental. Additionally, determinants of obesity will vary betting on alternative factors, like age of the person. Though within the past, a lot of stress was placed on individual risk factors for obesity, recent reviews and proposals have centred on the contribution of environmental factors to the event of avoirdupois. In fact, researchers seek advice from the setting during which we tend to live as associate obesogenic " avoirdupois – promoting " setting or as a toxic setting due to the decrease in opportunities for physical activity similarly because the increasing offer of extremely tasteful, energy – dense, low – nutrient foods. (113)

(Hill, 2003)

44. Fatty tissue is a necessary a part of anatomy, it consists of fat cells that store and mobilise essential and non – essential lipids of the anatomy and have additionally active endocrine functions. Additionally to multiple external factors, several proteins secreted by the adiposities could also be of key importance within the regulation of fat storage and total body energy balance. (77)

(Frayn et al., 2003)

45. Obesity is one of the most heritable traits in humans. Studies suggest that 25 percent to 70 percent of obesity can be explained by genetics. (318)

(Wu et al., 2003)

46. Obesity is related to associate atherogenic lipoid profile, that is analogous to it determined in subjects with the metabolic syndrome, and is additional distinguished in people with abdominal avoirdupois. The foremost common lipoid alteration in fat people is that the education of lipoprotein. (61)

(Eckel et al., 2002)

47. Parental obesity is a risk factor for childhood and adolescence obesity, especially if both parents are obese. (98)

(Guillaume and Lissau, 2002)

48. Ethnic variations within the prevalence, morbidity and mortality from obesity and nutrition – connected chronic diseases are a worsening drawback within the North American country, with higher obesity rates systematically ascertained in ethnic teams. (71)

(Flegal, Carroll et al., 2002)

49. The obesity epidemic is currently affecting younger populations. This issue induces an additional risk of progression to adult populations as a result of once the disease is established, it's terribly tough to curtail. (129)

(Jebb et al., 2002)

50. Several studies have known variety of risk factors like genetic or environmental factors – a number of them comparatively straightforward to switch and a few not – as tributary to the prevalence of overweight and obese youngsters and adolescents. (197)

(NHMRC, 2002)

51. The danger of excessive weight gain in youngsters of some families with obese oldsters is multiplied 2 − to − 3 fold for moderate obesity and up to eight times for severe obesity. (30)

(Bouchard, 2001)

52. Obesity will be delineated as the "New World Syndrome "as it has emerged because the most rife serious public unhealthiest. Obesity may be an inherited disorder whose development will be modulated by varied genes and by environmental influences. (78)

(Froguel and Boutin, 2001)

53. The transition to adulthood is characterised by increasing obesity incidence and divergent racial trends in obesity. (140)

(Kimm, Barton et al., 2001)

54..Evidences indicated that dyslipidemia, smoking, obesity and symptom are closely associated with fatty streaks in the second decade of life and also the same risk factors, in conjunction with cardiovascular disease, are related to plaques within the third decade of life. (175)

(Mc Gill et al., 2001)

55. Price and advertisements claiming steroid alcohol lowering potential of oils influence the selection of oil within the urban middle and high − financial gain teams. Vanaspathi consumption is a lot of common in Northern states. It's wide utilized in confectionary, store and in able to eat foods. It is conjointly an enormous issue for obesity and overweight. (136)

(Katan, 2000)

56. Strauss conducted a study on childhood fleshiness and self – esteem. He found that, by thirteen to fourteen years older, considerably lower levels of self – esteem – were ascertained in obese boys, obese Hispanic ladies, and obese white ladies compared with their no obese counterparts. Decreasing levels of self – esteem in obese youngsters were related to considerably increased rates of unhappiness, loneliness and nervousness compared with obese youngsters whose self – esteem increased or remained unchanged. Additionally, obese youngsters with decreasing levels of self – esteem demonstrate considerably higher rates of unhappiness, loneliness, and nervousness and are additional doubtless to have interaction in higher – risk behaviours like smoking or intense alcohol. (267)

(Strauss, 2000)

57. Excess weight accumulation happens with associate imbalance in energy, caused by either a surplus of energy intake (calories from food) or lack or energy expenditure (physical activity). (92)

(Goran, 2000)

58. Fleshiness or being overweight may be a fashionable epidemic with right smart consequences. The epidemic may be a vital contributor to the increased prevalence of severe explicit pathology, non – endocrine – dependent polygenic disorder, vas complications and high blood pressure. The proportion of the population who are either obese or overweight has reached 50% within the USA, and has been speedily increasing in Western Europe, reaching 30% in 2000. (97)

(Guestry, 2000)

59. Childhood BMI values correlate with BMI values in adults. The restricted variety of longitudinal studies incontestable additionally those obese youngsters are at bigger risk of turning into obese adults. Though solely low proportion of obese adults were obese youngsters, childhood fleshiness, notably throughout the

second decade of life, is associate more and more sturdy predictor of adult fleshiness. (164)

(Livingstone, 2000)

60. According to Kopelman, obesity has currently become thus common at intervals the world's population that it's starting to replace beneath nutrition and infectious diseases because the most important contributor to the poor health. The energy balance equation equates that fleshiness is that the results of positive energy balance during which intake exceeds the expenditure. (144)

(Kopelman, 2000)

61. Classifying overweight and obesity are required to supply comparisons of weight standing at intervals and between populations, to predict health risks and to focus on and measure fleshiness interventions. For adults, a World Health Organization classification of overweight and obesity primarily based totally on the association between BMI and mortality. (299)

62. In 1997, the International obesity Task Force (IOTF) convened a workshop on childhood and adolescence fleshiness that all over BMI to be a simple, duplicate and valid live of body fat and thus appropriate for getting estimates of fleshiness prevalence in youngsters and adolescents worldwide. (18)

(Bellizzi and Dietz, 1999)

63. A number of studies have shown that there is an association between being overweight in childhood and adulthood obesity. The danger of beginning child obesity (BMI > 28) in kids aged >9 years who are obese in the second nationwide fitness and nourishment assessment study is up to 80% at 35 years of age. (99)

(Guo et al., 1999)

64. Overweight is commonly represented as excess weight whereas fat is outlined as a condition wherever a pathological more than body fat is gift in a private. Weight within reason related with body fat however is additionally extremely related with height. (17)

(Bellizzi et al., 1999)

65. Fat normally is often outlined because the condition of abnormal or excessive fat accumulation by the body, to an extent that health is also impaired [WHO 1998]. To keep up the steady weight, input of energy should be adequate energy expenditure. A disturbance during this state ends up in excessive weight gain or weight loss. There are several factors shown to be related to the steady state perturbation. Genetic, economic, cultural, manner and activity factors are a number of the leading factors wont to characterize this varied downside [WHO 2002]. On the onset of fat constitution, there's a rise in body fat resulting in apparent dysplasia and hyperplasty of adiposities conducive to varied chronic disorders. (193)

(Must et al., 1999)

66. Childhood and adulthood social position were related to adult obesity for both sexes. (38)

(Brunner et al., 1999)

67. Mo – suwanel et al. conducted a study and that they found that being overweight and changing into overweight throughout adolescence was related to poor college performance. (182)

(Mo – suwanel et al., 1999)

68. in an exceedingly study conducted by freedwoman and Colleagues, nearly 60 % of overweight kids had a minimum of one cardiovascular risk issue compared to 10 % of these with a BMI – for – age <85th percentile; twenty five percent of overweight kids had 2 or additional risk factors. The psychosocial consequences of overweight are important. Overweight in kids has been joined to social discrimination, a negative self – image in adolescence that always persists into adulthood, parental neglect and activity and learning issues. (211)

69. For adults, BMI is evaluated using arbitrary BMI cut off point rather than percentiles. Cut points have been established to describe overweight (25 – 29.9) and obesity (>30). (212)

(NHLBI, 1998)

70. The scientific strategy on the classification, assessment, and management of overweight and obesity in adults published by the National Institutes of Health (NIH) IN 1998, operationally defined overweight as a BMI of 25 to 29.9 and obesity as a BMI of at least 30 (NIH,1998). A waist circumference of at least 88 cm (35 inches) in woman or 102 cm (40 inches) in men has been associated with increased health risk (NIH, 1998). (203)

71.The third edition of the Dietary pointers for Americans printed in 1990 used an age – adjusted in BMI bring to an end for overweight with a lower limit of twenty seven in adults aged thirty five years or older. This adjustment was supported insurance information showing that BMI related to minimum rate exaggerated with increasing age. (34)

(Bray, 1998)

72. Childhood and adolescent obesity is a serious, increasingly prevalent problem in the western world, including Australia. (7)

(Allan, 1998)

73. The threat of fatness seems larger than ever for United States youngsters and adolescents. All indicators purpose to be likelyhood that the present generation of youngsters can grow into the foremost weighty generation of adults in United States history, and there's each expectation that future generation of youngsters is probably going to be fatter and fewer match than the present generation. (114)

(Hill et al., 1998)

74. Most of the fatness causes are inheritable wherever in each genetic science and environmental factors manifest into chronic fat storing disorder. Prevalence of the up to date fatness epidemic might not be explained simply simply by host genetic science however additionally by our surroundings. (115)

(Hill and Peters, 1998)

75. The variations could manifest themselves with relevance variations in energy intake and necessities, energy utilization and metabolic characteristics; however these genetic science variants don't justify the apace increasing prevalence of fatness in industrialised nations. (296)

(Weinsier et al., 1998)

76. The term obesity comes from the Latin word "obesus" that means "having eaten until fat". It describes and excessive accumulation of body fat (adipose

tissue), typically caused by the consumption of a lot of calories than the body needs to fuel its energy necessities. The term "overweight" refers to a rise in weight higher than a discretionary commonplace, typically outlined in relevance height. (305)

(WHO, 1998)

77. A study by Gopalan on Indian population unconcealed that nearly 20 % of adults who were overweight or obese still had central fatness, golf stroke them at a larger risk of developing the associated diseases. (91)

(Gopalan, 1998)

78. Whitaker et al found that fatness in older youngsters is a progressively necessary predictor of adult fatness, in spite of whether or not or not their folk's are weighty. The restricted longitudinal studies reviewed additionally unconcealed that weighty youngsters are at larger risk of changing into weighty adults. Parental overweight or fatness is one in every of the foremost necessary health risk factors within the development of childhood overweight and fatness. Parental fatness doubles the danger of adult fatness among each weighty and non – weighty youngster. (298)

(Whitaker et al., 1997)

79. In general, fatness is complex sickness and its development is as a result of multiple interactions between genetic science and surroundings. Generally terms, the macro – surroundings determines the prevalence of fatness in population. The microenvironment, at the side of biological and activity influences, determines the presence of fatness in a private. (198)

(NHMRC, 1997)

80. One large prospective study has observed that increasing fruit and vegetable intake was associated with a reduced risk of major weight gain (>25 kg) or becoming obese (BMI > 30kg/m2).(133)

(Kahn et al., 1997)

81. obesity are often thought of merely as a result from an imbalance between the intake and therefore the expenditure of energy but, analysis proof summarised on top of shows that there's way more than simply the energy balance that accounts for obesity. (225)

(Rosenbaum et al., 1997)

82. The results of a cross – sectional study of 780 youngsters aged nine – ten years stated that physical activity of vigorous intensity could have a larger impact on preventing obesity in youngsters than will physical activities of lower intensity, whereas moderate to vigorous physical activity could improve children's cardiovascular fitness. (59)

(Diez, 1996)

83. Wilmore provided an interview of the role of physical activity in the interference of overweight and obesity within the treatment of overweight and weighty people. Finally researchers discuss the role physical activity plays in presenting overweight and fatness and therefore the most applicable use of exercise within the management of overweight. (310)

(Williamore, 1996)

84. Nguyen examined the relations between obesity in folks and fat intake in their youngsters, and therefore the impact of fat intake on fat mass in these youngsters.

Knowledge advised that (1) Mothers could contribute to the event of of fatness in youngsters by influencing their dietary fat intake, and (2) Dietary fat intake contributes to fatness in boys' freelance of physical activity energy expenditure. (202)

(Nguyen et al., 1996)

85. As a conclusion from considering the strengths and limitations of existing approaches to the measurement of childhood and adolescence fatness, BMI has been wide counselled for each clinical and epidemiologic use. (218)

(Poskitt, 1995)

86. According to Himes et al., (1) 85th percentile of weight – for – age commonly used to classify those "at risk" of overweight. (2) 95th percentile weight – for – age used as a cut – off for obesity. (117)

(Himes and Dietz, 1994)

87. Proof is on the market to support a genetic influence on obesity in people youngsters of weighty folks have a better risk of changing into weighty than do youngsters of non – weighty folks. (162)

(Lissau et al., 1992)

88. Uptake excess fat as a part of one's daily dietary intake contributes to a rise in overall fatty tissue mass. (277)

(Thomas et al., 1992)

89. Turpentine investigated the link between obesity and self – idea in pre – adolescents and adolescents. The finding of this study provides proof that pre – adolescent and adolescent obesity correlative powerfully with poor self – idea and low educational achievement. (281)

(Turpentine, 1981)

2.3 Prevalence of overweight and obesity in adolescents

1. There had been a worldwide increase in obesity among folks of all ages. In additional affluent countries, obesity is common not solely within the middle – aged however is additionally turning into more and more prevailing among younger adults and youngsters. (25)

(Bindah and Othman, 2011)

2. The prevalence of kid obesity is increasing quickly worldwide. Childhood obesity has over tripled within the past thirty years. The prevalence of obesity among adolescents aged twelve to nineteen years has enhanced from 5.0% to 18.1%. (210)

(Ogden et al., 2010)

3. Obesity is at epidemic proportions within the U. S. and in different developed and developing countries. The prevalence of obesity is increasing not solely in adults, however specially among kids and adolescents. Within the U. S. in 2003 to 2004, 17.1% of youngsters and adolescents were overweight, and 32.3% of adults were fat. The prevalence of obesity has enhanced steady over the past five decades, and obesity might have a big impact on quality – adjusted life years. (215)

(Pi – Sunyer, 2009)

4. Obesity is turning common in middle category and modern – wealthy class in India also; it's not a lot of the malady of high class society or the malady of the wealthy. It's assumed that there are regarding 1.5 million folks in India who are coming back into the cluster requiring surgical intervention. (250)

(Singhal, 2009)

5. According to WHO: - Close to 1.6 billion adults (age 15+) were overweight. - A minimum of four hundred million adults were fat. - A minimum of twenty million kids below the age of five years is overweight globally WHO additional comes that by 2015, close to 2.3 billion adults are overweight and over 700 million are obese. (317)

6. In 2000, a study was conducted in Seabury Province, Thailand. The result showed that prevalence of childhood obesity was 22.7% in urban and 7.4% in rural areas. (63)

(Elisabete and Henrique, 2007)

7. The majority European countries have likewise veteran a rise within the prevalence of overweight and fatness. For instance, in the Nordic countries, the prevalence of adolescence overweight has redoubled two – three folds since the 1970s or the 1980s. (297)

(Werner and Bodin, 2007)

8. Wang and Beydoun reported that among United States adults, obesity prevalence redoubled from 13% to 32% between 1960s and 2004, by 2015, 75% of adults are overweight and 41% are obese. (290)

(Wang and Beydoun, 2007)

9. Obesity is rising as necessary ill health even in India. There's scarcity of nationwide knowledge on obesity in India but studies from totally different states of India counsel that the prevalence ranged from ten – fifty per cent. (183)

(Mohan and Deepa, 2006)

10. Consistent with world calculable by the World Health Organization (WHO), in 2005 at hand contain concerning 1.6 billion overweight persons aged fifteen years and higher than and among them a minimum of four hundred million adults were obese. World Health Organization additional comes that by 2015, roughly 2.3 billion adults are overweight and quite 700 million are obese. (302)

(WHO, 2006)

11. In an estimate from the general fitness and nourishment assessment study conducted in 2003 – 2004, in United States, the prevalence of overweight (BMI > 25kg/m2) in adults was found to be 66.3%, of which 32.2% were obese with BMI > 30kg/m2. This was an increase from 199 and 200 when prevalence of overweight was found to be 64.5% and the obesity was found to be 30.5%. While the United States and Canada had similar rates of obesity only decades ago, the United States has experienced a much larger increase in obesity than Canada since that time. Between 1971 and 1974, the prevalence of obesity in the United States was 14.1%. Among 2003 – 2004, the number was 32.2%, more than double of Canada. (209)

(Ogden et al., 2006)

12. it's been found that sixty six per cent of adults are overweight or corpulent, sixteen per cent of youngsters and adolescent are overweight and thirty four per cent are in danger of overweight. United States survey demonstrates that sixty five per cent of American citizens are overweight and 30.4 per cent are corpulent. (14)

(Baron, 2006)

13. WHO had reported that in India there are 2.40 per cent obese, 13.50 per cent pre – obese male and 6.10 per cent obese and 17.40 per cent pre obese females. (301)

(WHO, 2006)

14. Globally, an estimated 10 per cent of school – aged children, between 5 and 17 year of age, are overweight or obese. (49)

15. Obesity is an excess body weight due to fat deposition. Obesity could be an international pandemic and a serious health concern because of the ensuing morbidity and premature mortality. The prevalence of blubber is escalating at an ugly rate to epidemic proportions throughout the developed world. The prevalence information from individual national studies collected by the International Obesity Taskforce (2005) calculable a complete of 1.1 billion overweight together with 320 million weighty adults worldwide. (126)

16. The prevalence of overweight roughly doubled in a study comparing self – reported data in 14 – years – olds in 1980 with measured data in 16 – years – olds in 2001 – 2002 in Northern Finland. (149)

(Laitine and Sovio, 2005)

17. Results of a study in 2004 unconcealed a prevalence of obesity among school| kids in Nakhon Pathom municipal school Nakhon Pathom Province, Thailand was twenty sixth per cent. The results of this study showed that age of student, sex, paternal obesity, meal frequency, snack consumption frequency, and a high consumption of cooked food were considerably related to obesity among primary age college kids. (283)

(Usman, 2004)

18. The prevalence of fat is increasing in childhood attributable to dramatic fashion changes in the preteen population [WHO]. Obesity could be a chronic fat storage disorder and to live it, measuring of body fat storage disorder and to live it, measuring of body fat storage is that the most applicable marker. However, terribly refined lives are needed for body fat measurements that create a population – based mostly measure of body fat nearly not possible to perform. Much, a lot of possible methodology of BMI (Body Mass Index) is very wont to obesity measurements. (76)

(Formiguera and Canton, 2004)

19. According to Bherve school based data in India demonstrates prevalence of obesity in range of 5 – 6% to 24% among children and adolescents. (23)

(Bherve, 2004)

20. The prevalence of overweight and obesity among affluent girls' aged 10 – 15 years in Chennai was 9.6%. (268)

(Subramanyam et al., 2003)

21. It has been reported that population prevalence of overweight increased by 60 – 70%, obesity increased 2 – 4 fold during 1985 – 1997 in Australia. (29)

(Booth et al., 2003)

22. It has been reported by Speakman that nine people in USA and one person in UK die every 15 minutes as a direct consequence of obesity related illness. (262)

(Speakman, 2003)

23. Special task force assembled beneath World Health organization to tackle the obesity drawback estimates that quite one billion individuals are overweight and around three hundred million individuals may be thought of as weighty worldwide. These figures grew up by five hundredth in last seven years, and that they are projected to double within the next twenty years. Increase in obesity prevalence has become a worldwide trend. (265)

(Steinberger and Daniels, 2003)

24. During a research study in Delhi it was found that, the generally frequency of obesity was 7.3 per cent in kids from rich families. (134)

(Kapil et al., 2002)

25. In another obesity study at 1500 kids of Meerut, frequency of obesity was 9.3 per cent. (226)

(Ramnath, 2002)

26. The trend of obese and skinny in adolescents' age 16 – 18 years from two countries. The frequency of overweight enlarged throughout the learning period in Brazil (from 4.2 to 13.8). China (from 6.3 to 7.6), and United States of America (from 15.3 to 25.7); lower weight decreased in Brazil (from 5.2 to 3.2). In Russia, overweight decrease (from 15.5 to 9.7). The yearly rates of boost in the frequency of overweight were 0.5% (Brazil), 0.2% (China). The load of dietary difficulty is changing from energy inequity insufficiency towards overload amongst elder kids and teenagers in Brazil and China. (42)

(Carlosmonteiro and Popkin, 2002)

27. Obesity is a major chronic disorder, affecting 20% - 40% adults in India. The prevalence of obesity is higher among women and also in economically better off individuals and who live in urban areas. Women in higher socio – economic status experience the greater risk for being pre – overweight, overweight and obese. (244)

(Shukla et al., 20002)

28. Obesity, as an emerging problem is a major chronic disorder affecting 20 – 40 per cent adults in India. (131)

(Joshi and Joshi, 2002)

29. Ramachandran., considered kids from six schools, two every from high, middle and lower financial groups in Chennai. The frequency of overweight youngsters ranged from 22.1% in better of schools to 4.6% in lower financial group schools. (224)

(Ramachandran et al., 2002)

30. In a Delhi school with tuition charge extra than Rs. 2600 for every month, the frequency of obesity was 31.3%, of which 7.7% were honestly obese. (135)

<div align="right">(Kapil et al., 2002)</div>

31. The proportion of children in the general population who are overweight and obese has doubled over the past two decades in developed and developing countries including India. In British children from 1988 to 1999 there was an extremely considerable growing tendency in the quantity of overweight kids (15.9% to 25.8%) and obese kids (4.3% to 11.3%). (39)

<div align="right">(Bundred et al., 2001)</div>

32. The prevalence of overweight among young Australians aged 7 – 15 years old increased by 60 – 70% , obesity increased 2 – 4 fold, and the combined overweight and obesity categories double from 1969 – 1997. (54)

<div align="right">(Cole et al., 2001)</div>

33. Among Kashmiri population the overall prevalence of obesity has been found to be 15.1 per cent, the prevalence of obesity among male was 7.0 per cent and in females 23.69 per cent. Thus, obesity is a growing problem, more common in females and urban population. (320)

<div align="right">(Zarger et al., 2000)</div>

34. In 2000 above 16% of 6 – 18 year or approximately 9.3 million kids in the United State of America were overweight. This frequency occurs crossways the full range of ages and is parallel for 12 to 18 year olds. The frequency is increasing speedily for 2 to 6 year old kids between whom there were 10.2% whose weight was >95% for age and gender. (45)

35. While 1960, round and fatness into the America increased across all ages, genders, and racial/ethnic groups, and the prevalence in the obese category has increased by about 10%. (96)

<div align="right">(Grundy et al., 1999)</div>

36. During 1994, there were an approximate 200 million obese youths universal and an extra 18 million below five kids classify as overweight. As 2000, the number of obese has increased to over 300 million. In developing country, it is approximate that more than 115 million persons suffer from obesity and associated difficulty. (208)

37. In 1997, a study conducted in America they found that in young adulthood 16.2% was obese. Amongst those who were overweight through early days, the possibility of fatness in maturity range from 9 per cent for $-$ 2 or 3 $-$ years $-$ olds without obese parents to 78 percent for 11 $-$ to $-$ 15 year olds with at least one obese parent. (231)

<div align="right">(Robert et al., 1997)</div>

38. In the recent study of 6 $-$ 18 year old school children in Dubai, the prevalence of obesity was found to be 15.8%. (5)

<div align="right">(Al $-$ Nuaim et al., 1996)</div>

39. Almost one $-$ quarter of children in United States are currently obese; a dramatic increase of over 20% in the past 30 years. (280)

<div align="right">(Troiano et al, 1995)</div>

40. According to Australian bureau of statistics, in the 1990s 30% of Australian school children were estimated to be overweight. (9)

41. Childhood obesity is not confined to the industrialized countries, as high rates are already evident in some developing countries. The prevalence of obesity among school children aged 6 – 14 years in Thailand, as diagnosed by weight for height exceeding 12.3% nof the Bangkok, rose from 12.3% in 1991 to 15.9% in 1993. (181)

<div align="right">(Mo – Suwan et al., 1993)</div>

42. Prevalence of obesity to be 9.4 per cent among men and 19.3 per cent among women in urban community of South Delhi. (57)

<div align="right">(Dhurandhar and Kulkarni, 1992)</div>

43. According to Hoerr, the prevalence of obesity in the population of 12 and 13 years old was 19% or greater as determined by a health screening of 400 junior high school students on two successive years. Intervention was indicated from the high prevalence of obesity. (119)

<div align="right">(Hoerr, 1985)</div>

2.4. Risk factors associated with overweight and obesity

1. obesity in itself has harmful consequences for female's health during the life. Fatness is related to over thirty medical conditions, and systematic proof has recognized a powerful relationship with a minimum of fifteen of these circumstances. The rising prevalence of fatness is increasing recognized together of the foremost necessary risk factors for the event of hypertension, liquid abnormalities and type two diabetes mellitus (T2DM) that are well-known to be freelance risk factors way cardiovascular diseases (CVDs). (172)

(Marinou et al. 2010)

2. Research show that poor sleep may be a vital risk issue for developing childhood fatness which may cause premature heart condition. Fatness contributes to many risk factors for the condition like high   blood pressure and high cholesterol. Mccrindle,s (2010) study of 1,600 Grade 9 Toronto students patterns disturbed by staying up to watch TV , play video or laptop games and social networking poor sleep related with higher weight and body mass index, blood pressure, cholesterol and different poor health conditions, together with poor food chores and lack of physical activity. Several reported problem in staying awoke throughout the day. (177)

(Mccrindle , 2010)

3.Obesity could be an unhealthy more body fat and is a major contributor to the world burden of chronic sickness and incapability .Health consequences of fat are several and varied, starting from an magnified risk of premature death to many non- fatal however serious morbidities like type2 diabetes mellitus ,non alcoholic fatty liver disease, cardiovascular disease and coronary heart condition that adversely impact the standard of life .Excess weight reduces the standard of life

,raises medical expenditures ,places stress on the health care system and ends up in productivity losses because of incapacity , health problem and premature mortality. (287)

(Victoria et al., 2009)

4. Hills reported that each developed and developing countries, magnified frequency of fat have been powerfully related to magnify incidence of type 2 diabetes mellitus (T2DM) within the adult population. (116)

(Hills AP. Et al. 2009)

5. Fat is today's a significant public health problem. The world health organization reported that globally four hundred million adults are fat, and therefore the scenario appears to rise in the future. Moreover, fat could be a major risk issue for variety of chronic diseases like type two diseases, cardiovascular disease and the metabolic syndrome. (220)

(Quintero P. 2009)

6. Recent information indicates an increase in obesity each in youngsters and adolescents in developing countries. The frequency of overweight /obesity in urban youngsters in New Delhi has shown a rise from Sixteen percent in 2002 to regarding twenty four percent in 2006-2007. Whereas India already has highest range of patients with type 2 diabetes (T2DM) globally; fast rise of obesity is that the prime reason for growing hormone resistance, the metabolic syndrome, dyslipidemia, and polycystic sex gland syndrome and raised levels of C-reactive protein. (20)

(Bhardwaj et al, 2008)

7. Obesity is rising in an outbreak manner in most countries and constitutes a public health problem by enhancing the chance for upset and metabolic disorders like kind a type two diabetes disease. (260)

(Spalding et al. 2008)

8.Women watching TV over three hours per day had the higher prevalence of abdominal obesity (waist circumference larger than or capable eighty eight centimetres) compared with female watching fewer or capable to three hours per day that increase risk of cardiovascular disease . (52)

(Cletland et al. 2008)

9. Increase in weight ends up in worsening of respiratory organ operates. The explanations for this embody the mechanical effects of obesity and therefore the metabolic effects of adipose tissue. (176)

(Mc. Clean et al. 2008)

10. Western-style diets, dysentery life style and cigarette smoking are key modifiable cardiovascular disease risk factors. Diet and life style increase upset risk each directly and indirectly. Western diet boosts international coronary failure risk by thirty percent. The cooked foods, salty snacks and meats that are staples of the western diet quantity for heart attack risk across the globe. (75)

(Forman and bulwer, 2007)

11. Type two diabetes mellitus T2DM is obesity connected metabolic disorder. The name diabetes mellitus has Greek and Latin roots. Diabetes" comes from the Greek word for "Siphon", and implies that lots of urine is made. The second term "mellitus" comes from the latin word "mel" which means "honey" and was used as a result of the urine was sweet. Diabetes mellitus and CVDs usually approx as

two sides of a coin; diabetes has been rated as corresponding to CAD. The increasing prevalence of diabetes is related to exaggerated rates of overweight and obesity and it's been calculable that ninetieth percent of T2DM is due to excess weight or so 197 million individuals worldwide have impaired glucose tolerance, mast ordinarily because of obesity and therefore the associated metabolic syndrome. This range is expected to extend to 420 million by 2025. (120)

(Hossain et al., 2007)

12. Lipscombe and Hux assessed the diabetes disease trends and mortality from 1995 to 2005 and incidence from 1997 to 2003, in adults aged twenty years and older in Ontario, Canada. They ascertained that diabetes prevalence exaggerated by 69% from 5.2% in population of 7,908,562 in 1995 to 8.8% of 9,276,945 in 2005, A 31% increase occurred in yearly incidence over six years. From 6.6 percent in one thousand in 1997 to 8.2 percent in one thousand in 2003. So, the prevalence rate in Ontario has already exceeded the worldwide rate that was foretold for 2030 by WHO. (160)

(Lipscombe and Hux, 2007)

13. The parallel increase within the frequency of obesity and asthma within the past three decades has leaded some researchers to postulate a causative relationship between two conditions. (276)

(Thomas et al .2007)

14. Song et al., (2006) reported that obesity is extremely connected with early mortality as a result of it results in associate raised risk of diabetes stroke and alternative health issues. (259)

(Song et al, 2006)

15. Some longitudinal studies have urged that low cardio metabolism fitness throughout childhood and adolescence is related to later vessel risk factors, like hyperlipidamia cardiovascular disease and obesity. (236)

(Ruiz et al. 2006)

16. The International Diabetes Federation (IDF) stated that the overall range of diabetic subjects in India was forty one million in 2006 which this could rise to seventy million by the year 2025. (248)

(Sicree et al., 2006)

17. As per Bravo et al, Obesity is one amongst the most important causes of hypertension and it's discovered that 50% of obese people suffer from hypertension. (33)

(Bravo et al. 2006)

18. From the Korean National Health and Nutrition Examination survey, 1998 and 2001, Kim et al .while finding out obesity and cardiovascular risk factors in kids and youngsters aged 10-18 years, outlined fat by body mass index cut-off points provided by the U.S. centres for Disease control and prevention. The .prevalence of obesity accumulated considerably from 5.4% in 1998 to 11.37 in 2001 (p<0.0001).around 60% of Korean obese kids and youngsters had a minimum of one CVD risk issue. These findings recommend that Korean obese kids and adolescents have an accumulated risk of CVD. (138)

(Kiim et al, 2006)

19. The obesity and the diseases it causes leads usually to sickness that increase over variety of years and ends in premature death .Incidence of cardiovascular disease among obese is 5 times the incidence among individuals of normal weight .Based on population studies . Risk estimates point out that a minimum of 2 –3rd of the prevalence of cardiovascular disease will be directly attributed to obesity. (196)

(Narkiewicz etal, 2006)

20. Li et al (2005) expressed that overweight and obese youngsters don't seem to be solely in danger for hypoglycaemic resistance syndrome, high blood pressure, dyslipidemia and hyper attempt glyceridemia, however additionally for poor small nutrient standing. (158)

(Li et at, 2005)

21. Obesity and cardio metabolic risk factors are extremely rife among urban adults that incorporate imperative measures to avert the rise of diet connected chronic illness. (26)

(Blacher, 2005)

22. As per Farwell et al, (2005) coronary artery disease and coronary risk factors were twice or thrice higher among the urban compared with the rural subjects, which can result to inactive behaviour. (67)

(Farwell et al, 2005)

23. Obesity isn't a right away explanation for most diseases; however unfavourably course the chance issue profile. For instance, fatness might cause will increase in blood pressure level and blood cholesterol, that successively will cause cardiovascular disease and stroke. Within the, obesity is the seventh leading reason for death with 2, 80,000 preventable deaths in 2005. (238)

(Rutt and coleman, 2005)

24. It's been foretold that by 2020 there would be a increase in cardiovascular death in India. This increase is way quite the 77 % for China, 106 % for different Asian countries and 15% for economically developed countries. (101)

(Gupta, 2005)

25. Coronary heart condition includes a multi-factorial aetiology with several of the danger factors being in flounced by life style. Fast modification in food habits as well as cut physical activity as a result of urbanization could part justify the step-up of coronary heart disease; India is nowadays experiencing a medical specialty transition with high rates of urbanization. This has led to financial development and the effect of that is enlarged fast food consumption and tobacco usage and cut physical activity. (251)

(Siscovick, 2005)

26. Overweight and injure youngsters are possible to be obese into adulthood and to own non-communicable illness at young age. Obese youngsters even have an immediate enlarged risk of diseases. (270)

(Swallen et al., 2005)

27. In numerous population teams an outsized range of cross sectional showed an inverse association between habitual physical performance and indicators of fatness. Person who are overweight or obese show lower levels of cardio metabolism fitness than those of normal weight. (295)

(Wareham et al. 2005)

28. Illness related to obesity might arise from two mechanisms: from the metabolic changes related to excess fat, as within the case of kind 2 diabetes and cardiovascular disease, or from the enhanced fat mass itself ,as in the case for joint diseases. The fat tissue stores excess energy in the sort of lipids however in recent years, it's been incontestable that the adipose tissue behaves as an endocrine organ, the adipose cell acting as a sort of endocrine cell. Central kind

fatness results in an unbalanced production of many metabolic merchandise hormones with a spread of local, peripheral and central effects. (154)

(Lazer, 2005)

29. Type 2 diabetes mellitus (T2DM), another obesity connected disorder, is quickly rising as a worldwide health care downside that threatens to achieve pandemic levels terribly presently. Third report of National Holstered Education programme (NCEP-III, 2001), as a part of the metabolic syndrome cardiovascular disease and polygenic disease are closely related to obesity. (108)

(Haslam and James, 2005)

30. India is the diabetes capital of the world with 41 million Indians having diabetes; every fifth diabetic in the world is an Indian. (132)

(Joshi, 2005)

31. Obesity isn't immediate deadly sickness in itself however it's related to variety of adverse health outcomes out of that CVD, T2DM and high blood pressure are the foremost ordinarily occurring ones. (110)

(Haslam and Jmes, 2005)

32. Obesity, a chronic sickness and current among all age teams, is on the danger among adults particularly the ladies worldwide in each developed and developing countries. (73)

(Flegal , 2005)

33. Cutting the well recognized contribution of obesity to the growth of coronary heart disease (CHD), the American Heart Association added obesity to its list of major risk factors of coronary heart disease. (319)

(Yusaf et at. 2004)

34. India, China and the USA had the maximum prevalence of diabetes in 2000, and these 3 countries are foretold to keep up their several prevalence ranking in 2030. India can stand at number one with 79.4 million diabetic cases in 2030 as compared to the calculable 31.7 million within the year 2000. China had 20.8 million case of diabetes in 2000 and is probable to own 22.3 million diabetic cases by the year 2030. Pakistan was graded at position six among the first ten countries with the highest diabetic rates within the year 2000 however is predictable to rank 5 after Indonesia in 2030. (308)

(Wild et al., 2004)

35. Mohan et al found that the high prevalence of constant hypertension and obesity in urban school going youngsters than their rural counterparts in Ludhiana – prevalence of sustained hypertension was on the chance in urban area even in younger age teams. Blood pressure was often elevated in weighty youngsters as compared to lean subjects. This can be presumably associated with their sedentary lifestyle, altered eating habits, inflated fat content of diet and decreased physical activities. (184)

(Mohan et al., 2004)

36. Blood pressure is found to be higher in high weight people .The weight ordinarily increase with age in youngsters and adolescents .Thus there's a positive co - relational of the blood pressure with the body weight : Overweigh and obesity in youngsters causes an extra impact an blood pressure predisposing to hypertension. (214)

(Paradis et al. 2004)

37. Type 2 diabetes and cardiovascular disorder, once consideration to occur solely in adults, are currently normally seen in weighty youngsters. (21)

(Bhargava, 2004)

38. Hamiel et at (2003) report from countries like the USA, Israel and Canada that have shown that over weight and obese youngsters have a high prevalence of iron deficiency than normal weight youngsters. (103)

(Hamiel et at, 2003)

39. High blood pressure in people less than fifty years is if related to cardiovascular risk. Systolic blood pressure becomes a additional important predictor of the chance of cardiovascular disease may be a extremely current cardiovascular risk issue worldwide due to increasing durability and prevalence of contributively issue like obesity. (60)

(Dragland, 2003)

40. However, of most public health interest are the health consequences of fat in early days and adolescence, including dyslipidemia, cardiovascular disease, orthopedically difficulties, growth problems and endocrine resistance. Moreover, signs of obesity connected chronic illness that traditionally were restricted to adults, like kind II diabetes and coronary heart condition, are revealing themselves at alarmingly early ages. (40)

(Calle, Rodriguez et al. 2003)

41. Cock et al. showed that 4% of youngsters and nearly 30% overweight youngsters in united state had the factors of metabolic syndrome. This has necessary implications for his or her future risk of type 2 diabetes and cardiovascular diseases. Additionally, obese youngsters even have an exaggerated risk of hepatic statuses, gallstones, cardiovascular disease, apnea and medical science complications. (56)

(Cock et al. 2003)

42. A recent prospective study of 10,597 adult twins in Finland followed for nine years has found fatness to be related to the chance of adult on set respiratory illness. (124)

(Huovinen et al. 2003)

43. India and China are probably to face a rising health care burden associated with diabetes because the prevalence of diabetes usually rises radically with the economic development not to mention concomitant rise in obesity and inactive life style. (121

(Hu, 2003)

44. Health professionals everywhere the globe are concerned in understanding the pathophysiology of high blood pressure amongst kids and adolescents with sedentary lifestyle and will increase weight or fat. Variety of pathophysiological changes like exaggerated sympathetic activity decreased arterial elasticity and hyper insulinaemia related to exaggerated body mass and unhealthy lifestyle are concerned within the pathological process of cardiovascular disease. (264)

(Steinberger and Daniels, 2003)

45. It had been reported that excess weight could account for up to 26% cases of cardiovascular disease in men and 28%in ladies. (312)

(wilson et al . ,2002)

46. A one centimetre rise in a ladies waist measurement will increase the chance of cardiovascular disease, by two. As per Myint et al. (2001), waist to hip ratio greater than 0.92 might considerably indentify ladies at increase risk of low high density lipoprotein- cholesterol concentration. (194)

(Myint et al. 2001)

47. Lakka et al reported that abdominal fatness is related to the accelerated progression of carotid atherosclerosis in men, freelance of overall obesity and alternative risk factors, and once solely four years of follow up. (150)

(Lakka et al. 2001)

48. Fast urbanization and economic process creates social dynamics that promote diabetes risk factors. These embody over –weight, decrease in physical activity, in sedentary activities like TV viewing, and high fat and high –energy diet among adults and kids. Alternative factors can also create India's kids and youngsters additional at risk of diabetes. (195)

(Narayan et al, 2001)

49. Obesity may be a risk issue for the growth of type 2 Diabetes, strokes, coronary heart disease and total mortality freelance of and additive to total fatness. (187)

(Montague and O' Rahilly, 2000)

50. Obesity has currently become common among the world's population that it's setting out to replace below nutrition and communicable disease as the most important contributor to the poor health. The energy balance equation equates that obesity is that the results of positive energy balance in which intake exceeds the expenditure. (145)

(Kopelmon, 2000)

51. Overweight and obese youngsters and adolescents are at the high risk of long-run mortality and morbidity, likewise as facing the increase of immediate negative effects on physiological and emotional wellbeing. (43)

(Cashel et al. , 2000)

52. Health consequences associated with overweight will bring in childhood or adolescence overweight youngsters and adolescents are at exaggerated risk for numerous chronic diseases in later life. during a study conducted by Freedman and Coveagues (1999), nearly sixty percent of overweight youngsters had a minimum of one cardiovascular risk issue compared to ten percent of those with a BMI for-age < 85th percentile, twenty five percent of overweight youngsters had two or additional risk factors. The psychosocial consequences of overweight are

important. Overweight in youngsters has been connected to social discrimination, a negative personality in adolescence that usually persists into adulthood.

53. There is conjointly proof that long –term experimental studies that over weight is predictor of cardio vascular atherosclerosis freelance of its effects on traditional risk factors. The link between degree of overweight and also the development of coronary heart disease (CHD) is also changed by age, sex, body fat distribution degree of fitness and quality. (156)

<div align="right">(Lec. et.,al , 1999)</div>

54. The foremost convincing proof of a causative link between obesity and asthma in adults is provided by an oversized prospective cohort study of 85,911 nurses followed throughout 1991 and 1995 in which obese ladies had a way larger risk of asthma and weight gain. (41)

<div align="right">(Carriage et al., 1999)</div>

55. The foremost major future consequence of early day's obesity is its persistence into adulthood in conjunction with varied associated health risks. (304)

<div align="right">(WHO, 1997)</div>

56. Obesity has a relationship with coronary heart disease (CHD) presumptively through its impact on risk factors, together with high blood pressure, dyslipdemia, impaired glucose and type 2 diabetes mellitus. (62)

<div align="right">(Eckel, 1997)</div>

57.The incidence of gastrointestinal cancer, like large intestine and gallbladder cancer has additionally been reported to be completely related to body weight or obesity in some however not all studies. And excretory organ cell cancer has systematically been related to overweight and obesity, especially in ladies. (313)

<div align="right">(Wolk et. Al., 1996)</div>

58. Obesity affects metabolism mechanics. Patient with BMI 30-35 Kg/m2 have considerably lower forced vita capability (FVC), total lung capability (TLC), and residual volume (RV) than lean subjects. FVC is considerably reduced, even in overweight subjects (BMI) 25-30 kg/m2 Central obesity (excess weight settled largely within the abdomen and a waist-to-hip ratio of >0.95) has a lot of impact on pulmonary function than once excess weight is distributed a lot of round the hip. (55)

(Collinus et. Al. 1995)

59. Hippocrates wrote "Corpulence isn't solely a disease itself, however the harbinger of others", recognizing obesity as a severe disorder with several co – morbidities. The statement is clear as obesity is widespread across the globe and extremely correlative to type II diabetes mellitus, heart disease metabolic syndrome, and hypertension. (278)

(Thomas et al., 1995)

60. Waist circumference and waist to hip circumference ratio are the main broadly used index of regional correlated with risk factors for coronary heart disease. (106)

(Hanns et al. 1995)

61. Variety of studies has found a positive relationship between overweight and also the incidence of cancer, notably of hormone dependent and gastrointestinal cancers. Larger risks of endometrial, overran, cervical and postmenopausal breast cancer are documented for obese women; whereas there's some proof for an augmented risk of prostate cancer among obese men. The augmented incidence of those cancers in the obese is bigger in those with excess abdominal fat and is believed to be direct consequence of hormonal change. (240)

(Schapira et al. 1994)

62. The danger of non-insulin-dependent-diabetes mellitus (NIDDM) will increase incessantly with BMI and reduces with weight loss. Analysis of data from two prospective studies illustrates the impact of overweight and obesity on non-insulin-dependent diabetes mellitus (NIDDM); concerning sixty four percent of male and seventy four percent of female cases of non-insulin-dependent diabetes mellitus (NIDDM) might in theory are prevented if nobody had a BMI over twenty five. (46)

(Chan et al., 1994)

63. Elaborate analysis of the link between obesity and non-insulin-dependent diabetes mellitus (NIDDM) have known characteristics of fat persons that more increase the chance of developing this condition. Smoking and family history of non-insulin-dependent diabetes mellitus (NIDDM). These embrace obesity throughout childhood and adolescence, progressive weight increase from eighteen years and intra-abdominal fat accumulation. (50)

(Chou at al. 1994)

64. As per Framingham Heart study, the excess. weight as well as overweight and obesity ,accounted for roughly twenty six percent of case of hypertension in men and twenty eight percent in women , and for roughly twenty three percent of case of coronary heart disease (CHD) in men and fifteen percent in women . (241)

(Schmieder and Messerli,1993)

65. Fatness predisposes a private to variety of cardiovascular risk factors as well as hypertension, raised cholesterol and impaired glucose tolerance. However, future prospective data currently recommend that obesity is additionally vital as an independent risk issue for CHD connected morbidity and mortality. (309)

(Willett et al. 1991)

66. Lack of physical activity and an unhealthy diet, each of that are related to way in industrial countries, also are vital modifiable risk factors for overweight and obesity. The prevalence of of non-insulin-dependent diabetes mellitus (NIDDM)

is 2-4 folds higher within the less physical activity people compare with the foremost physical active. (112)

<div align="right">(Hetmrich et al., 1991)</div>

67. The Framingham heart study ranked body weight as the third most significant predictor of coronary heart disease (CHD) among males, when age and prospective study in USA found a direct correlation between BMI and also the risk of developing CHD weight gain substantially increased this risk. (186)

<div align="right">(Manson at al. 1990)</div>

68. A positive relation between obesity and therefore the risk of developing non-insulin diabetes mellitus (NIDDM) has been frequently ascertained in each cross-sectional and prospective study. (284)

<div align="right">(Van Noord et al. 1990)</div>

69. It had been ascertained by Colditz et al. that the chance presented by obesity for the growth of diabetes was forty times more in obese ladies as compared to the slim ladies. (53)

<div align="right">(Colditz et al., 1990)</div>

70. Type 2 diabetes mellitus (T2DM), another obesity connected disorder, is speedily rising as a worldwide health care drawback that threatens to achieve pandemic levels terribly presently. Third report of National Holstered Education programme (NCEP-III, 2001), as a part of the metabolic syndrome high blood pressure and diabetes are closely related to obesity and regularly occur along in a private.

<div align="right">(Haslam and James, 2005)</div>

71. Increase in BMI ends up in weight gain. Weight gain as 2.1 to 4.9kg conjointly will increase the chance of hypertension. Each 4.5kg weight gain exaggerated the chance of hypertension by an calculable twenty percent .women who gained quite 25kg had a quintuple risk conversely, people who lost quite

10kg reduced their risk of hypertension by twenty sixth percent. Data from Framingham heart study counsel that some 65% to 75% of risk for, hypertension is directly attributed to weight gain. (83)

<div align="right">(Garrison et al., 1987)</div>

72. Overweight and obesity are unusually associated with total and LDL cholesterol. There's ranked increase in cholesterol with increasing BMI. (137)

<div align="right">(Keys, 1980)</div>

73. There is robust relationship between obesity and T2DM in each males and females in all ethnic groups. The relation among obesity and T2Dm is thus close that sims et al. (1973)BMI enhanced to 28.0 kg/m2 and there have been reversible rises in fast concentrations of insulin, glucose, and triglycerides (TG), and impaired glucose tolerance. (247)

<div align="right">(Sims et al., 1973)</div>

2.5. Socioeconomic status related to overweight and obesity

1. Among environmental influences there are two major factors concerned. The primary is that among all populations youngsters target food advertisements that are potential health risks, because the consumption of that merchandise becomes a habit of a life-style. The excessive consumption of food merchandise causes consumption of a lot of food than needed additionally to getting a progressively inactive life-style. (142)

(Klunder et al., 2011)

2. Dramatic and speedy social changes throughout the last decades have contributed considerably to childhood obesity. There's proof stating that individual's consumption and physical activity behaviours are heavily influenced by encompassing social and physical environmental contexts each for adults and youngsters. Youngsters and adolescents generally like inactive activity like TV, sitting before of computers and video games. Each hour of inactive activity will increase the prospect of obesity and is additionally conducive to failure of the weight reduction. Excessive TV viewing is related to higher intakes of energy, fat, sweet and salty snacks and effervescent beverages additionally to reducing consumption of fruits and vegetables. (221)

(Raj and Kumar, 2010)

3. Inactive life-style, poor food habits, binge consumption and prolonged TV viewing have given rice to obesity. Everyday our adolescents are getting over acutely aware concerning their body pictures and are once misguided to infuse unhealthy habits. It's usually felt that health of a teenager is usually neglected attributable to lack of awareness, busy work schedule, and poor compliance from teens. (127)

(Jain et al., 2010)

4. An inactive style plays a major role in obesity. Worldwide there has been an oversized shift towards less physical hard-to-please work, and presently a minimum of sixty percent of the world's population gets meagre exercise. This can be primarily owing to increasing use of mechanized transportation and a larger prevalence of labour saving technology within the home. (306)

(WHO, 2009)

5. Physical inactivity, currently recognised as a necessary determinant of health is that the results of a progressive shift of style towards more inactive pattern in developing countries the maximum amount as in industrial ones. (205)

(North et al., 2009)

6. It seems that direct causative relationships between SES, obesity and psychosocial factors are as complicated because the malady itself. A lot of the quality close the link between obesity and psychosocial factors is expounded to inconsistent study styles, variance within the demographics of subjects studied and socio cultural surroundings of the themes. (206)

(O'Deaa, 2008)

7. Gender seems to play a singular half within the relationship between obesity, SES and psychosocial factors. It's a vital mental object issue that influences psychosocial pathologies amongst obese/overweight people. With regard to gender psychosocial factors associated with obesity dissent among males and females. (246)

(Simmons – Alling and Talley, 2008)

8. Studies have assessed SES with a good form of indicators, exploitation ménage financial gain or years of education most frequently, and fewer oft occupation or family background. Whereas these objective measures are commonest many recent studies have found necessary associations between health and subjective

perceptions of relative ranking, like the perceived placement within the social hierarchy captured by the subjective social status (sss). (157)

<p style="text-align:right">(Lemeshow, Fisher et al., 2008)</p>

9. In youngsters, there seem to be declines in levels of physical activity thanks to less walking and education. The World Health Organization indicates folks worldwide are usurping less active recreational pursuits, In each youngsters and adults, there's is an association between TV viewing time and therefore the risk of obesity. (239)

<p style="text-align:right">(Salmon and Timperio, 2007)</p>

10. SES has been shown to be reciprocally associated with inactive behaviour and incidences of overweight in youngsters over six year more matured. In India, just about nineteen percent (190 million) of the growing population contains faculty aged kids of whom thirty percent (48 million) presently reside in urban India. A major and increasing variety of those kids belong to middle and high socio – economic teams. Developing countries are undergoing nutrition transition owing to raised economic development and market economic process resulting in speedy changes in style and dietary habits. Poor dietary habits combined with minimized physical activity have junction rectifier to a rise in overweight and obesity among adults and kids. Overweight and corpulent kids aren't solely in danger for hypoglycaemic agent resistance syndrome, high blood pressure, dyslipidemia and hypertrygly ceridemia, however additionally for poor substance standing. social hierarchy captured by the subjective rank (sss) scale. (159)

<p style="text-align:right">(Lioret et al., 2007)</p>

11. Socio – economic standing is outlined by activity position, education and financial gain. (130)

<p style="text-align:right">(John and Bhatt, 2007)</p>

12. Obesity and overweight causes a significant risk for serious diet – connected chronic diseases, as well as kind two polygenic disease, upset, cardiovascular disease and stroke and bound types of cancer. The health consequences vary from accrued risk of premature death; to serious chronic conditions that scale back the quality of life special concern is that the increasing incidence of kid obesity. Once thought of a haul in exactly high – financial gain countries, overweight and obesity are currently dramatically on the increase in low – and – middle – financial gain countries, significantly in urban settings. (316)

13. Socioeconomic standing shows a stronger bond with obesity and lack of recreational physical activity in girls' than in the other subgroup. (11)

(Ball et al., 2006)

14. Prevalence of overweight and obesity was considerably higher among the higher socioeconomic standing. The mean values of BMI and waist circumference in comparison with customary WHO2007 reference charts, full below the fiftieth percentile for subjects from lower socioeconomic standing whereas for higher socioeconomic standing, they were between fiftieth and eighty fifth percentile. Thence we tend to infer that overweight and blubber is a lot in higher socioeconomic standing. These results show consistency with results from alternative Indian studies. (174)

(Marwaha et al., 2006)

15. Recent longitudinal studies have found childhood socioeconomic conditions to be additional potent than simultaneous adult conditions on adult obesity. (10)

(Ball and Mishra, 2006)

16. A comparative study in Kolkata, India by Mukhopadhyay et al., of 215 inactive (no regular workout undertaken) Bengali boys' aged ten – seventeen years was undertaken to investigated the variations in overall adiposeness (body mass index), connective tissue adiposeness (skin fold) and body composition (percent body fat, fat mass and fat mass index). Each cluster had an analogous age. The result disclosed that boys' who failed to undertaken regular workout (NPE) had a considerably bigger mean body mass index (BMI) compared with people who undertook regular workout (PE); p <0.001. The means that for all the scaffolds yet as percent body fat (PBF), fat mass (FM) and fat mass index (FMI) were considerably higher among the NPE cluster. (191)

(Mukhopadhyay et al., 2005)

17. Obesity, arterial blood vessel illness and coronary risk factors were two or three times higher among the urban compared with the rural subjects, which can result to inactive behaviour. (66)

(Farwell et al., 2005)

18. A growing body of literature on life course SES and obesity uses a "social mobility "hypothesis, examining the influence of SES trajectories (e.g. upward, downward, and stable) on obesity and weight gain. (217)

(Pollitt, Rose et al., 2005)

19. Relationship of viewing TV, videogame and dealing on laptop to obesity: though each adults and kids pay a lot of time in inactive activities, additional information is offered for youngsters and adolescents. A recent across the nation representative media study found that youth aged twelve– eighteen pay average of five hours and twenty nine minutes per day victimization numerous form of media. In an exceedingly recent longitudinal study, TV viewing between age five – fifteen years remained a big predictor of adult BMI, even when adjustment for

childhood socioeconomic standing. Therefore analysis supports the link between TV viewing and increasing blubber, it's seemingly that the link is complicated and should be changed by alternative factors, like the media on food alternative. (171)

(Marie and David, 2005)

20. Industrialisation and modernization is justifiably blamed for increasing obesity prevalence everywhere the globe, because it inspired sedentary lifestyle. (15)

(Bell et al., 2005)

21. Urbanisation is going on quickly within the Indian sub – continent. Style changes involving major deviations in diet pattern faded physical activity because of improved transportation and handiness of energy saving devices and high level of mental stress related to improvement are the vital risk issue for coronary cardiopathy and obesity. (223)

(Ramachandra, 2004)

22. planned principle for the increased risk for obesity in higher SES teams include: the bigger capability of elite to get food, cultural values that favour spherical body shapes, and lower levels of physical activity. (188)

(Monteiro et al., 2004)

23. Stettler et al., studied kids happiness to four communities in bigger Zurich area (Switzerland) and located out that the utilization of electronic games was considerably related to obesity, severally of unsupportive factors. The association of fat with TV use and lack of physical activity confirms results from different populations and points to potential methods for obesity interference. (266)

(Stettler et al., 2004)

24. Obesity isn't any longer a priority for developed countries, however is additionally changing into an increasing downside in several developing countries. The normal societies undergoing the method of economic modernization demonstrate fast increase in prevalence of obesity. The waist circumference correlates with the quantity of fat within the abdomen and so is an indicator of severity of central obesity. (3)

(Afridi and Khan, 2004)

25. Childhood and adolescence specially are characterized by physical growth (a rise in body size furthermore as changes in body proportions and body composition), sexual maturation, furthermore as motor, cognitive, emotional and social development. Of these method are dynamic, occur at the same time however at variable rates are regulated in a very complicated method by multiple factors like genes, endocrines, sex, age, ethnicity, nutritional intake, physical activity, socioeconomic factors and general health standing of the individual. (234)

(Rosen, 2004)

26.Socio economic status (SES) is an economic and social science combined total live of a person's work expertise and of an individual's or family's economic and social position relative to others, supported financial gain, education and occupation. Families with higher and expendable financial gain will accumulate wealth and target meeting immediate wants whereas having the ability to consume and revel in luxuries and weather crises. (253)

(Smith and James, 2004)

27. Lifestyle influences promoting excessive caloric intake and inactive patterns are identified to induce a positive energy balance resulting in weight gain. (271)

(Swinburn and Egger, 2004)

28. In a comparison of adolescents from four totally different countries, the best increase within the prevalence of overweight throughout the past twenty years was ascertained in high SES cluster in Brazil. With relation to the urbanisation level, the rise within the prevalence of overweight was larger within the urban than within the rural areas in Brazil and China, wherever as no distinction between the areas was found within the USA. (292)

(Wang et al., 2002)

29. It's been shown that higher SES men and ladies had higher levels of perceived overweight, monitored their weight a lot of closely and were a lot of seemingly to be making an attempt to be thin. High SES group additionally reported a lot of restrictive dietary practices and a lot of vigorous physical activity. (294)

(Wardle and Griffith, 2001)

30. The importance of individual mode patterns for current and future health has long been accepted, very little is thought concerning the extent and pattern of socio – economic variations in health behaviour throughout adolescence. (285)

(Van Lenthe et al., 2001)

31. In the Health Examination Survey (2000) in the united states of youth between twelve and seventeen years aged solely four percent of whites and ten percent of black rated their own health as truthful to poor. The big majority of rating ranged from sensible to wonderful. Youth within the lowest financial gain cluster were a lot of beneath weight and people in higher financial gain cluster were overweight. (111)

32. Parent's education, particularly mothers have nice influence on the nutritional standing like fat. The study on prevalence and patterns of fat in urban Khon Kaen,

Northeast Thailand indicated that the youngsters were a lot of seemingly to be weighty if the patterns have high financial gain, with mother's high education being the strongest social risk issue. (151)

(Langendijk et al., 2000)

33. It had a selective advantage once, in today's atmosphere wherever there are abundances and many; such genotype ends up in excessive fat storage. Socioeconomic factors like financial gain, availableness of food and access to low-cost food is additionally completely correlative with fat in middle – east and western populations. (207)

34. Some determinants or influences on being overweight or obese include socioeconomic status (SES), parental weight and ethnicity. Some determinants or influences on being overweight or weighty embrace socioeconomic status (SES), parental weight and quality. (28)

(Booth et al., 1999)

35. Martinez – Gonzalez et al., found a powerful association of fat and better weight with a inactive mode and lack of physical activities in adult population. (173)

(Martinez – Gonzalez et al, 1999)

36. Changes in dietary patterns, physical activity levels and lifestyles related to diet and urbanization are associated with increasing incidence of fat in India. (227)

(Reddy, 1998)

37. A larger degree of racial effects on obesity may probably be "explained" with a higher conceptualization of the SES construct that has all relevant aspects of socioeconomic position which will be joined to fat standing and so reduces residual contradictory. However, given the proof for racial/ethnic variations in quality of education, wealth related to a given level of financial gain, the getting power of financial gain and employment stability related to socioeconomic standing. (311)

(Williams, 1997)

38 .One potential rationalization for the various SES overweight and fat relationships in developing countries like India is that the influence of SES on people's life-style like diet, food consumption patterns, and public services like health care and physical activity could take issue. Richer individuals have higher access to meat and different energy dense foods (which are way more expensive than different foods like vegetables) than the poor. Whereas middle SES teams typically consume a lot of vegetables and fruits, that are less energy dense, than high SES teams. (84)

(Ge et al., 1996)

39. Diet and life-style are seemingly major contributors to weight issues and varies with totally different SES particularly countries like India. (141)

(Klesges et al., 1995)

40. There's bidirectional causative relation between socioeconomic standing and fat as a result of fat could adversely have an effect on one's opportunities for education, occupation and wedding. (94)

(Gortmaker et al.,1993)

41. The impact of SES on biological process intake will directly impact a person's weight. Where as comparisons between lower SES group and high SES groups for total caloric intake have indicated noticeable variations. 123

(Hulshof et al., 1991)

42. As a social variable, SES, almost like race/ethnicity, cannot directly have an effect on overweight/obesity standing, a physiological variable. Rather, SES operates through intermediate behavioural factors that confirm weight through management of energy intake, expenditure and metabolism. A a lot of elaborate examination of the mechanisms is expedited by individually considering the links between fat and 2 major indicators of SES, i.e. financial gain and education. (258)

(Sobal, 1991)

43. Bhatnagar et al. undertook a study to look at the role of socio − economic status within the growth and development of one hundred fifty five female youngsters, subjects move in age from six to sixteen years; eighty from the upper socio − economic cluster, and seventy five from the lower socio − economic cluster. The results showed that higher socio − economic conditions had higher far better physical development and better nutritional and healthful standing. (22)

(Bhatnagar et al., 1988)

44. Increasing food abundance, cheaper, high caloric and variety foods, and sedentary lifestyle promotes perturbation of the body energy cycle. According to the thrifty phenotype hypothesis, our bodies are evolved for storage of energy when there is staple abundance. The ancient populations survived famines and droughts by their ability to store the available food in terms of fat. (200)

(Neelu, 1962)

2.6. Gender differences related to overweight and obesity

1. Zhang et al., conjointly found that the prevalence of overweight and obesity is considerably higher among Chinese girls' as compared to men that per nuclear physicist is also owing to higher body fat among females and therefore the secretion variations. (323)

(Zhang et al., 2008)

2. It seems that with females, there are stronger associations between body discontentment and better BMI particularly because it relates to higher SES. (90)

(Goldfield et al., 2007)

3. Results from studies done in India showed that females' gender is in danger of being overweight and rotund. (24)

(Sidhu et al., 2006)

4. Hancox and Poulton, followed New Zealand kids from the age of three years to the age of fifteen years and located a positive association between time spent on TV viewing and later overweight among ladies however not among boys. (105)

(Hancox and Poulton, 2006)

5. Socioeconomic status shows a stronger bond with obesity and lack of recreational physical activity in girls' than in the other subgroup. (13)

(Ball et al., 2006)

6. The differential weight gain in the females and therefore the causative behaviours related to SES standing could being early in life and be influenced by parental SES. (12)

<div align="right">(Ball and Crawford, 2005)</div>

7. The incidence of obesity has been found to be higher among females than males. (216)

<div align="right">(Pi – Sunyer, 2002)</div>

8. Mohsen and Warsy conjointly found vital increase in prevalence of fat and overweight with age in each males and females of Saudi population. Altogether age teams, fat were considerably a lot in females compared to males. (185)

<div align="right">(Mohsen and Warsy, 2002)</div>

9. Several reports on fat in India have conjointly confirmed the prevalence of fat to be higher among ladies than men. (180)

<div align="right">(Misra et al., 2001)</div>

10. The prevalence of fat in Europe is maybe within the order of ten – twenty per cent in men and fifteen – twenty fifth per cent in adult ladies. Among Asian countries, in Malaysia, the National Morbidity Survey of 1996 according slightly higher prevalence of overweight amongst ladies (21.4%) compared to men (20.7%), whereas, the matter of fat amongst ladies of Malaysia was double(7.2%) that of men (3.8%). (242)

<div align="right">(Seidell and Flegal, 1997)</div>

11. Female gender had higher preponderance to overweight and was a lot of distinguished in USES. But pubescence associated growth spurt that occur at an earlier age for women could account to contradictory impact. It's been according

that the quantity of animal tissue cells increase throughout these periods followed by lags once pubescence. (118)

(Hirsch, 1995)

12. Obesity could be a severely stigmatized condition among ladies in developed society. The negative attitudes toward fat among women are gift from an awfully young age and are for the most part absent among boys. (257)

(Sobal and Stunkard, 1989)

2.7. Dietary pattern related to overweight and obesity

1. Dietary habits have a major positive association with obesity. (24)

(Bindah and Othman,2011)

2. Ingestion habits of adolescents are influenced by varied physical and sufferer social factors. Despite high nutrient needs, adolescents typically have lower intake due to poor nutritional knowledge and ingestion disorders. Young ladies are additional probably to skip meals, particularly breakfast. The authors advised that ingestion breakfast is related to a reduced risk of changing into overweight or obese and reduction within the BMI in youngsters and adolescents in Europe. (272)

(Szajewska and Marek, 2010)

3. Epidemiologic information indicated that chronic intake of fatty diets and fructose and frequent consumption of fast foods increase risk of obesity. (170)

(Malik et al., 2010)

4. variety of meals devoured is related to being overweight and discovered that ingestion four meals per day is considerably negatively associated with being overweight or rotund suggesting that lesser variety of meals consumed ends up in magnified weight. (288)

(Vik et al., 2010)

5. In a study by Vasanthamani and Devi involving 2765 students in Coimbatore, India reported that 73% were found to consume quick foods frequently. The

foremost most well-liked quick foods were chocolates, ice creams, cold drinks, puffs, chaat things, pastries and candies. (286)

(Vasanthamani and Devi, 2009)

6. Lack of sleep interprets into habits prejudicial to overall health. Finkelstein reported that compared to those sleeping eight hours per night, those sleeping but six hours per night are considerably less probably to eat breakfast (85 % vs. 66 % within the eight – hour group) considerably less probably to possess a minimum of 3 meals per day (76% vs. 63% within the eight – hour group). These ingestion habits are risk factors for fleshiness that will increase medical prices by forty two per cent in the world. (690)

(Finkelstein, D., 2009)

7. Galson identifies poor attention to nutrition, magnified access to fast food, high fat content processed snacks, and high calorie sugary beverages as major contributors to the growing obesity crisis. (80)

(Galson, 2008)

8. Feldman et al found that adolescents looking at TV were found to own lower intakes of vegetables, dark green, yellow vegetables, calcium rich food and grains; and the next intake of soft drinks compared to adolescents not looking at TV throughout meals. (68)

(Feldman et al., 2007)

9. The adolescent dietary intake showed calorie deficit up to 20 percent of RDA at 10 to 12 years which reaches up to 25 per cent by 15 years. The deficit is

additional common among girls. This calorie deficit let alone different specific nutrient deficiencies like iron, iodine and vitamin A. (125)

(Imtiyaz Ali, 2006)

10. Adolescents don't consume the counselled range of servings of fruits, vegetables and dairy farm products; and that they consume excessive quantity of else sugar, fat and saturated fat. (36)

(Briefel and Johnson, 2006)

11. The large increase in children's TV viewing may be a vital considers rise in childhood obesity. It had been found that kids pay a large portion of their lives looking TV, several looking over four hours on a daily basis. TV would possibly cause obesity through that might preferably be spent in physical activity; by promoting ingestion whereas viewing, which can quicker each lower – quality and better – amount food intake; and be exposing kids to food advertising that adversely affects their diets. (232)

(Robinson et al., 2006)

12. Malik et al. reported strong association between soft drinks consumption and weight gain. (169)

(Malik et al., 2006)

13. Dietz and Robinson indicated that increasing range of American kids and adolescents oft eat food aloof from home and were possible to consume salty snacks, soft drinks and dish. (58)

(Dietz and Robinson, 2005)

14. Kids eat a lot of high – calorie, low – alimentary foods once looking commercial TV with advertisements for such product. (107)

(Harrison and Marske, 2005)

15. The role of diet in promoting health and preventing sickness is troublesome to elucidate, owing to its complicated network of foods and nutrients. Besides total energy intake, dietary composition is perhaps the foremost necessary individual inside and between populations. Dietary composition is mirrored in dietary patterns. (179)

(Michels et al., 2005)

16. Overweight and obesity are powerfully related to sure varieties of diets, like those who embody massive amounts of fats, animal – primarily based foods and processed food stuffs. Inactive life-style also are a very important issue, as well as time for outside sports and collaborating in very little or no physical activity throughout time off. (74)

(Flodmark et al. 2004)

17. Golan and Crow expressed that there's growing agreement among consultants that an obesogenic atmosphere, that encourage excess food intake and idealizes thinness, plays an important role within the epidemic of childhood fat and feeding disorders. As a result of oldsters give a child's discourse atmosphere, they must be thought of key players in interventions aimed toward preventing or treating weight – connected issues. Parenting vogue and feeding vogue are crucial factors in fostering healthy way and awareness of internal hunger and fullness cues and First State – action thinness. This paper reviews the environmental risk factors and oldsters' role within the interference and treatment of children's weight – connected issues. (89)

(Golan and Crow, 2004)

18. Enhanced consumption of total energy, soft drinks, snacks food and additional frequent feeding at fast food or different restaurants and inadequate consumption of vegetables and fruits contributes to the enhanced risk of fat. (37)

(Briefel and Johnson, 2004)

19. Several risk factors for CHD, as well as high blood steroid alcohol, cardiovascular disease, fat and polygenic disorder are well influenced by dietary factors. As a result of these risk factors are modifiable, primary preventive efforts holding abundant promise. (222)

(Rajaram, 2003)

22. The event of overweight and obesity has been thought to be a consequence of positive energy balance, wherever energy pay through metastasis and physical activity leading to an accumulation of energy hold on as fat within the fat. (229)

(Reddy et al., 2002)

23. WHO(1998) , survey of Delhi Public School reveals that fifty three per cent of kids between ten and fourteen years, forty five per cent between fifteen and nineteen years take snack food each day in "Delhi" and "Chandigarh" it absolutely was found that one in every four teenagers are weighty. Whereas a study of school kids in Chennai shows sixteen per cent boys' and eighteen per cent of ladies are overweight. In distinction young fleshiness within the United States of America is calculable to be below fifteen per cent whereas in Britain the figure is simply 7.3 per cent. (300)

(WHO, 1998)

25. Diet plays a very important role in maintaining ideal weight, body fat and traditional levels of lipids. The management of those parameters helps within the

bar of obesity, cardiovascular disease, and hyperlipaemia, that successively freelance diet connected risk issue for occlusion. Improper dietary practices may also trigger underlying genetic tendencies towards occlusion. (85)

(Ghafoorunnissa, 1996)

26. Skipping meals and snacking throughout adolescence: once off from home a teenager usually fare meals that are readily available, cheap and acceptable to his peer teams. This might mean snacks within the variety of "Fast food". Quick foods and prepared to eat foods obtained from merchandising machines or from the foodstuff are oftentimes referred as junk foods. To the majority food suggests that food that's terribly salty, sugared or incorporates a high fat content e.g. chips and candy bars. However, different foods generally classified as 'junk' like dish, hamburgers and French – fries do provide required nutrients. (2)

(Adamson 1996)

27. Garn unconcealed that seven to thirty per cent of the daily intake of calories, proteins, calcium, iron and vitamins B1, B2 up to fifty five per cent of vitamin A and antioxidant was provided by between meal snacks. The nutrient density of between meal foods met or exceeded the RDA quantitative relation for many nutrients. (82)

(Garn, 1969)

28. Huenemann used activity and food dairies to gather on general activity pattern of teenagers. Their finding of poor correlation between low levels of physical activity and huge quantity to body fat were too shocking as a result of all the teenagers studied was inactive. They additionally found that fat teenagers cared-for consume fewer calories than did their no fat counterparts. It had been urged that low level of physical activity in teenager's population still as that seen in adolescent population may well be a significant contributively factors to the high incidence of obesity within the USA. (122)

(Huenemann, 1967)

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CHAPTER-3

MATERIAL

AND

METHODS

THE MATERIAL AND METHODS WAS CLASSIFIED INTO SUBSEQUENT CATEGORIES:

3.1. SELECTION OF SUBJECTS.

3.2. COLLECTION OF DATA.

3.3. METHOD OF MEASUREMENT

3.4. STATISTICAL TECHNIQUES FOR ANALYSIS OF DATA.

THESIS MATERIAL AND METHOD

MEANING OF RERSEARCH:

Human being is often curious for the search of information. Researchers have provided higher changes for the event in community development. It is the method of any systematic and thorough study or analysis in support of every particular issue, topic or areas of study backed by assortment, collection, presentation and interpretation of relevant details or information. It is an alert study or investigation into any subject or material that is a trial to verify the precious facts which might be helpful for more application. Research methodology could consistently solve the analysis downside. It represents the various steps that a research worker usually adopts in learning his reasonable analysis problem. In common terms analysis is thought as a look for knowledge; the ultimate aim of any analysis is to get quantifiable and testable knowledge, step by step adding to the build-up of human knowledge for welfare of human group in one or different manner. In any analysis the suitability of the methodology to be followed is utmost vital. The right methodology plays a vital role in finishing the analysis work scientifically. The researcher must take varied selections regarding the choice of the analysis style, tools and techniques and kind of statistical analysis. Though accurate method synchronize all there steps. Keeping in sight the on top of demand, the methodology followed for this study is delineated within the following paragraphs.

RESEARCH DESIGN:

An explicit analysis study was created in confirming up with and formulating the analysis work. They cannot be manipulated by investigator. The analysis style of the study was random style. One thousands adolescents, five hundred boys' and five hundred girls' were chosen indiscriminately to investigate their Body Mass Index (BMI), Waist To Hip Ratio (WHR) and Skin fold measurements.

3.1 SELECTION OF SUBJECTS:

The Sample set up requires three decisions - Sampling Unit, Sample Size, Sampling procedure.

Sample Unit:

Adolescent boys (500) and adolescents girls (500), Sample Size: 1000. Present study was disbursed in four Government schools and four private schools of Jhalawar District in the educational year of 2014 – 2015. The study was undertaken on a thousand adolescents aged 13-18 years of age, five hundred were boys and five hundred were girls. The schools were elite from totally different zones within the town to induce an equal distribution of youngsters by socio–economic state, and gender. School authorities were requested to give a list of adolescents aged thirteen to eighteen years old. Since the amount of adolescents was overlarge to be quoted, it had been set to use sampling method. Adolescent population were chosen by easy sampling.

Sampling Procedure:

The study sample was selected by the following style.

Design:

Multi stage sampling procedure.

Process:

From every school a specific sample of 125 students both boys' as well as girls' were taken by random sampling as final sampling unit.

ORIENTATION OF STUDENTS:

Collection of information is most essential movement in any research work. To get the specified information of the subjects, study was conducted during the school time with the assistance of instrument and questionnaire. In order to ensure complete support from the adolescent students, the researcher clearly explained the aim of the study to them.

3.2 COLLECTION OF DATA

Data are all the related materials, past and present portion as the base for the study and analysis. The task of data collection begins when a research has been defined and analysis set up chalked out. The research involves gathering primary data.

(1)Primary data:

For primary data well outlined questionnaire was prepared methodically. The respondents were surveyed and interviewed personally from the selected schools. . The questionnaire was pertained to the following sections:

1.1 General Information:

Relevant questions such as name, class, date of birth, school name, residential address, gender, type of family were asked in the section of general information.

1.2 Health status:

In this part anthropometric parameters, personal status of health, past and present status of health, were observed.

1.3 Evaluation of Socio-economic status:

Socio–economic status of a youngster is extremely connected to physical status. A kid with superior or high Socio–economic status will have access to good education, food and nutrition health concern feeling, plus chance which will preserve their physical strength, fitness status and educational achievements. Socio – economic status assumes a nonstop running at society from high to low on the basis of profession, income, education, wealth, life style cultural way of life and so on. Status might depend on a diversity of factors such as birth, wealth, profession skills, kind of education, etc. An individual socio – economic status may influence their chance for contribution, his wish to shine, his choice of movement and his achievement. It was acknowledged that the Socio Economic factors play a serious role in an individual's fitness position. The category to which a youngster belongs purposefully influences above all anthropometry, physically and physiologically in total development. In short the importance of Socio Economic status, as a determinant of fitness.

In the present study, an effort was created to analyze the impact of socio economic status on overweight, obese and normal school going adolescents of Jhalawar District, Rajasthan. Therefore this variable was additionally chosen for the present research work. To review the Socio Economic status of the students, the Investigator selected Kuppusamy's Socio Economic Status Scale updated in 2013 according to financial gain and used it with some modifications to measure the socio economic status of the school going adolescents. Parental education, parental profession, income of the family was asked for measuring socioeconomic status.

1.4 General dietary survey

(a) Food Consumption frequency and Meal skipping pattern:

A questionnaire was evolved by the researcher for the adolescents to bring out data relating to dietary preferences, food intake regularity of assorted styles of foods, meal-skipping pattern, such as the variety of meals, and regarding their likes and dislikes in foods. This questionnaire was administered to all 1000 selected adolescent boys and girls. Information taken on life style pattern include utilization of vegetables, foods habits, extent of use of junk food (day/week), eating food in front of Television, habit of eating other meals and drinks in school in the break time plus the impact of mass media on eating pattern of adolescents.

(b) Evaluation of dietary habits:

Food frequency questions were asked in easy words to facilitate higher results. Total eighteen objects were recorded such as: once in a month, three – four times during a month, once a week, twice a week, and daily. Marking was completed consequently as per the responses. Scores were assigned from (0-4), and the scores were summed up using the composite score, the adolescents were categorised into two levels ie (i) Excess food consumption and (ii) less food consumption

(c) Three day food record method

In this section the investigator tried to find out the amount and type of food eaten by the subjects. Adolescent boys' and girls' were asked to recall and write down a complete inventory of foods they had eaten during past three days. The strategy was dispensed by using some household utensils and measurers that were standardized by the investigator. The overall weight of every of the raw ingredients used for cooking; the overall weight of the cooked food and also the

amount of the cooked food consumed by the adolescents were measured. Any leftovers (as in lunch-box) were subtracted from the individual consumption. This was used to calculate the quantity of the raw ingredients consumed by the adolescent per day. This procedure was adopted for two consecutive school days and one holiday, taking care to avoid days of fast or party. Thereafter the three days food consumption was recorded, averaged out and a mean consumption pattern was obtained. The cooked food consumed was recorded nearest to the particular intake with the assistance of standardized utensils and later were regenerated raw kind for calculating the nutritive value. For calculation, nutritive value of Indian foods by ICMR was used. The general daily nutrient intake of the diets was calculated by using "Diet Calc software. Original version of SPSS Software programme was used to analyze the information. (3)

1.5 Questionnaire for physical activity:

Self-created questionnaire was used, to gather the information on physical activity level along with life style pattern. This questionnaire consisted of questions like physical activity such as; exercises like sports, walking, yoga, dancing, jogging, stretching, sports, aerobics, swimming were recorded as rarely, twice a week, thrice a week, daily with time. Scores (from 0-3) were imparted to each question and were then summed up for analysis.

1.6 Unstructured Interview:

Because of the qualitative nature of study, it was felt that besides the queries enclosed within the questionnaire, certain supplementary questions were required to be asked and explanations were sought-after. It was additionally felt that by giving respondents, the freedom to speak about their focus of concentration, attitudes and opinions as they consider it. Thence formless interviews were additionally conducted on the respondents.

(2)Secondary Data:

Secondary data relating to adolescents eating habits and preferences, their shopping pattern, life style of adolescents, alternative relevant information was collected from the books, magazines, journals, newspapers, periodicals, reports and websites.

Pilot study:

A pilot survey was conducted with the twenty respondents to check the significance and reliability of the questionnaire in collection the information. On the basic of observations and suggestions unsuitable questions were removed and necessary additions were created and the questionnaire was revised and finalized once more. .In this pilot study anthropometric measurement (height, weight, waist, hip, skin fold measurement) of the adolescents were measured further as questionnaire were used. This pretesting method helped with the physical layout for the ultimate questionnaire.

3.3 METHOD OF MEASUREMENT

ANTHROPOMETRY:

Anthropometry, measure of body structure is the oldest style of body measurement identified dated back to the start of recorded history. "Anthropometry, measure of the biological oneness of human beings is much more vital than the comparatively superficial differences". The two Greek words 'Anthropos' and 'Metrien' gives birth to a replacement term 'Anthropometry'. Anthropos means 'Man' and 'Metrien' means to measure. Therefore virtually Anthropometry is the measure of the body to discover its actual dimensions and therefore the propositions of its components. Anthropometric measure consists of objective measure of structure and of functions of the body. The measure of structures includes such things as Weight, total Height, and girth of muscles, the

width, the depth and therefore the circumstance of the chest. The measure of function includes such things as pulse rate, Venus blood pressures muscular strength, basal rate calculable from cardio vascular variable, posture and respiration capability. Anthropometry is creating external measurement of the human body. This measurement could also be either objective, by using instruments like calibres or subjective using a list of characteristics. (4)

Anthropometry-based dietary assessment has the benefit of being a universally suitable, economical and non-invasive style. This method is also appropriate to big sample sizes. It may be as a tool for dietary surveillance, and in cross-sectional analysis. Measures of dietary status are typically valuable in the maximum amount as they'll be prognosticative of health outcomes, the practical necessities for assessment of nutritional adequacy adequacy arise from the need to intervene by recommendation or else next to a lot of methods towards improvement of the nutrition of people or population and thereby to scale back the danger and burdens of these diseases that have or could a nutritional components (FAO, 1999). (11) The anthropometric measurements thought-about within the present study included height, weight, body mass index, waist and hip measurements and skin fold measurements.

Recording the weight:

Reason: To measure the Weight of the Adolescents.

Gender: Both boys' and girls

Facilities and Equipment: Weighing machine, pencil, score sheet

Description of the Test: Body weight is that the most generally used and therefore the simplest reproducible anthropometric measurements for the analysis of dietary status. It is responsive to even little changes in dietary status body weight indicates the body mass and is a composite of whole body constituents as water, mineral deposits, fat, protein and bone. The adolescents were asked to

stand straight with feet placed on a weighing scale (ranging from 0-120kg). The scale was set to zero before every measurement and weight was recorded to the closest 0.5kg. The weight was measured early in the morning after assembly, with the adolescents wearing uniforms and while being barefoot. The weight was measured for all of thousand adolescents at the beginning of the study. Reading was taken in Kilograms.

Recording the height

Reason: To measure the Height of the Adolescents.

Gender: Both boys' and girls

Facilities and Equipment: Stadiometer, scale, piece of chalk, pencil and score sheet

Description of the Test: Back of head touching the upright bean. The head was in a comfortably erect position, with the lower border of the orbit in the same horizontal plane, and the arms should be hanging at the sides in a natural manner. A headpiece, a flat metal bar was placed gently on the head, and the point of contact with the top of the head was marked against the wall and height was recorded Height was measured to the nearest 0.1 centimetre using a tape.

Height is beneficial determinant in the dietary status. The height of a person is influenced by each genetic (hereditary) and environmental factors. Height is affected solely by long term dietary deprivation and is taken into account as associate index of chronic long term deficiency disease. The maximum growth potential of a person is decided by hereditary factors, whereas the environmental factors, the most important being nutrition and morbidity, verify the extent of that genetic potential. Height was determined by using a non-stretchable measuring tape set on a wall. Height of the sample in the study was measured and recorded. Height was measured while the samples were barefoot. The subject was asked to

stand straight with shoulders and heels flat against the wall, looking straight forward, and shoulders and back of head touching the upright bean.

(1) BODY MASS INDEX:

BMI is a extremely helpful measure for studying trends of investigating differences among populations. Height and weight method can be used among excellent scale of accuracy across huge numbers of persons in a short space of time. The tools required are not costly and little is required in the way of operator training. Height and weight can be calculated by nominal body contact among subject and operator, and the subject is only necessary to take off external clothes. For its effortlessness plus the verified links between BMI and future ill-health, it is the most often used measure of obesity for population surveillance. The body mass index (BMI) is a statistical method which calculates a human being's weight and height. Due to its simple activity and calculation, it's the foremost wide used diagnostic tool to spot weight issues to know, usually whether people are underweight, overweight or obese. Body mass index is outlined as the individual's body weight divided by the square of his or her height. The formulae universally used in medicine to produce a unit of measure of kg/m2. BMI can also be determined using a BMI chart, that displays BMI as performance of weight (horizontal axis) and height (vertical axis) victimisation contour lines for various values of BMI or colours for various BMI classes.BMI provided a simple numeric life of person's "heaviness" or "slimness", permitting health professionals to debate over- and under-weight problems a lot objectively with their patients. The most remarkably used measure of obesity is BMI which provides a proxy measure of total adiposeness (the quantity of fat round the body). There is a substantial body of literature demonstrating links between an elevated BMI and obesity. BMI is calculated by dividing weight in kilograms by height in metre square. (11)

Body Mass Index (BMI) was calculated by the following formula:

$$BMI = Weight\ (Kg)/\ Height\ (m2)$$

It is a well-liked tool used to categorize the grade of obesity. It is based upon an association between height and weight. It is used to measure thinness or obesity in the sample.

BMI range (kg/m2)	Classification
< 18.5	Underweight
18.5 - 24.9	Normal weight
25 -29.9	Overweight
30 - 39.9	Obese
> 40	Morbidly obese

Source: World Health Organization (WHO) (2000). Technical report series 894: Obesity: Preventing and managing the global epidemic. Geneva: World Health Organization. ISBN 92 – 4 – 120894 -5. (10)

(2) WAIST TO HIP MEASUREMENTS:

Waist circumference is the most often used measurement of 'central obesity', particularly for population. Just one measuring is needed per individual, and therefore the price of the instrumentation (a tape measure) is minor. Lots of studies have advised that the build-up of body fat around the waist (central or abdominal adiposity) may present a superior risk to health than fat deposited in different components of the body. In adults, central adiposity is understood to be related to augmented risk of variety of obesity-related conditions. The girth measuring technique was adopted from World Health Organisation (WHO). (5) Waist circumference was measured, with the least circumference of the waist, simply higher than the belly button and therefore the hip circumference was measured at its widest participation of the hips. A stretchy fibre glass measure tape was used to measure the waist and hip circumference in centimetres. From the waist and hip circumferences, the waist to hip ratio (WHR) was calculated. .

Waist to hip ratio was calculated using the formula given below:

$$\text{Waist to hip ratio} = \frac{\text{Waist circumference (cm)}}{\text{Hip circumference (cm)}}$$

CATEGORY	MALE	FEMALE
Waist to Hip Ratio I(normal)	< 0.93	< 0.81
Waist to Hip Ratio II(overweight)	0.93 – 1.0	0.81 – 0.89
Waist to Hip Ratio III(obese)	< 1.0	>0.89

Source: Despres J-P, Lemieux I, Prud'homme D.(2001). Treatment of obesity: need to focus on high risk abdominally obese patients.(2)

(3) SKINFOLD MEASUREMENT:

Reason: To measure the level of body fatness.

Gender: Both boys and girls

Description: A skin fold consists of a double layer of skin and connective tissue fat. Measurements are typically taken on the right side of the body through the subjects standing. During in intensity of analysis, bound anatomical sites are known as landmarks for skin fold testing. A number of the additional common sites are the abdomen, scapula, suprailiac, and triceps. Skin fold measurement could be a well-liked assessment of body composition. The principle behind skin fold measurement is that connective tissue fat is comparative to entire human body fat. By measurement the skin fold thickness at varied sites on the body, Percent Body fat can be calculated through a regression equation Body fat composition may additionally be calculable from measurement of subcutaneous fat as mirrored by skin fold thickness. The thickness of the fold reflects the amount of fat beneath the skin and it's measured in millimetre with the skin fold calliper. In addition, there are varieties of various approaches each to taking skin fold measurements associated to changing these into estimates of an individual's percentage body fat. Different results are attainable with different methods, and as a result skin fold thickness is most applicable for monitoring modification in body composition in people over time, where measurements is directly compared instead of converted to percentage body fat. If it's used for population observation, it's necessary to make sure that reliable style is used for the assessment of percentage body fat. (1)

METHOD ADOPTED

The appropriate sequence for administering the skin fold test consisted of strongly grasping the skin fold between thumb and forefinger and lifting it away; putting the calliper ½ inch on top of or below the skin fold; slowly releasing the pressure on the calliper trigger in order that pinchers will exert full tension on the skin fold . Then reading of the scale was observed and competed.

1. TRICEPS SKINFOLD SITE

The point on the subsequent surface of the arm,in the mid-line, at the extent on the marked Mid-acromiale-radiale landmark.

Location:

This point was found by sticking out the Mid-acromiale-radiale site vertically to the long axis of the arm around to the arm, and crossed the projected line with a vertical line within the middle of the arm once viewed from behind.

TRICEPS SKINFOLD MEASUREMENTS -

Subject position:

The subject was made to assume a comfortable standing situation. The right arm was made comfortable with the shoulder joint externally rotated to the mids-prone position and elbow extended by the side of the body. A straight up pinch, similar to the extended axis of the upper limb, was created at the landmark

2. SUBSCAPULAR SKINFOLD SITE

The site two centimetres on a stroke in a row across and diagonally downward from the sub scapula landmark at a 450 angle.

Location

A tape was used to measure to locate the point two cm from the sub scapula in an exceedingly line 450 laterally downward

SUBSCAPULAR SKINFOLD MEASUREMENTS -

Subject position:

The subject was assuming a comfortable standing position by the arms hanging by the sides.

Method:

The line of the skin fold was determined by the natural fold outline of the skin

3. ABDOMINAL SKINFOLD SITE:

Definition:

Subject was made comfortable in standing position with the arms hanging along the sides.

Location:

The site was known by a horizontal measure of 5 cm, to the subject's right, from the midpoint of the navel. The skin fold taken at this site as an erect fold.

ABDOMINAL SKINFOLD MEASUREMENTS

Subject position:

The subject was made to assume a comfortable standing position with the arms hanging by the sides.

Method:

It is particularly significant on this site that the measure was certain, the initial grasp was firm and broad since often the essential musculature is badly developed.

Source: . McKenzie TL. et al., (1996), "School Physical Education: Effect of the Child and Adolescent Trial for Cardiovascular Health". (8)

Equipment Used:

A skin fold calliper was used for taking these measurements. The calliper was made capable of accurate calibration and concerned a constant pressure of 10 gm/sq mm throughout the measurement range. For present study researcher have used Harpenden skin fold calliper. Scoring Procedures: To make sure of correctness, some readings were taken from a particular location with the average score in millimetres (to the nearest 2 mm) recorded as the score.

FORMULA FOR CALCULATION OF BODY COMPOSITION VALUES FOR SKINFOLD ASSESSENT OF BOYS

Step 1 LOHMAN EQUATION – CALUCALATION OF BODY DENSITY

BD = [1.0973 – (SUM SF X .000815)] + [(sum SF) 2 X.00000084]

Sum of SF = Triceps SF + Sub scapular SF + Abdominal SF

**FORMULA FOR CALCULATION OF BODY COMPOSITION VALUES
FOR SKINFOLD ASSESSENT OF GIRLS**

% BF = [1.35 x (sum SF)] – [0.012 x (sum SF) 2] - 3.4

Sum OF SF = Triceps SF + Sub scapular SF + Abdominal SF

Data was calculated by that formula and result was compared with body fat
categories table -:

Body Fat Categories Table

Category	Women (% fat)	Men (% fat)
Essential Fat	10% - 13%	2% - 5%
Athletic	14% - 20%	6% - 13%
Fit	21% - 24%	14% - 17%
Overweight	25% - 31%	18% - 25%
Obese	32% +	26% +

Source : Hoeger, W.K. and Hoeger, S. (1999) Principles and Labs for Physical
Fitness and Wellness (6)

RELIABILITY OF INSTRUMENTS:

The reliability of the instruments such as Wall Stadiometer, Electronic weighing machine, Measuring tapes, Harpenden Skin fold calliper, used in recording the data on selected variables were reliable, as they were supplied from the standard manufacturers who have approved these instruments with regard to their calibration.

PROCEDURES AND SCORING:

To verify the hypothesis and to conduct the analysis in a systematic approach, correct procedures were followed. Process refers to three main steps; first of all is that the preparation and also the research design part, second is instruction and also the information assortment using different tools and also the last one is conductivity, scoring, measure and analysis. The systematic procedure was made extremely necessary during analysis. Appropriate permission was taken from the principals of different schools of Jhalawar District of Rajasthan and requested to extend their collaboration throughout this research study. This was facilitated by composing meetings to simplify the objectives of the study to the adolescents; in addition the mode of the study programme was conjointly explained.

3.4 STATISTICAL ANALYSIS:

The collected information was arranged on the excel sheets. The Statistical Package for the Social Sciences (SPSS) version 16.0, PC windows was used for data analysis. Our study is survey and comparative study so chi square and calculation of prevalence was required for the results.

CHI – SQUARE TEST:

The chi – square test has been applied to observe the relationship between boys' and girls' subjects. Chi – square test was applied by using the following formula:

$$X^2 = \sum \frac{(O-E)^2}{O}$$

Where X^2 : Chi-Square Value

O = Observed Frequency

E = Expected Frequency

$\sum$ = Summation

The values of Chi-Square for respective degrees of freedom less than 0.05 probabilities have been considered as significant

ANOVA (Analysis of variance):

This test is appropriate whenever the numbers of subjects are more and there is cross query. It is also called fisher F test. This statistics was used where dependent data was metric (parametric) or interval or in ratio scale. Result of three day dietary recall was analysed by two way annova with sidak's multiple comparison test.

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CHAPTER- 4

RESULT

AND

DISCUSSION

For the ease of interpretation the result and discussion of the study have been divided into following sub titles:

4.1 Gender- Differences

4.2 School type

4.3 Age wise Distribution

4.4 Type of Family

4.5 Body Mass Index of Subjects

4.5.1Prevalence of overweight and obesity in boys' on the basis of Body Mass Index (BMI) categories

4.5.2 Prevalence of overweight and obesity in girls' on the basis of Body Mass Index (BMI) categories

4.5.3 Comparison of Body Mass Index (BMI) status of adolescent boys' and girls

4.5.4 Body Mass Index of adolescent boys' with reference to age

4.5.5 Body Mass Index of adolescent girls' with reference to age

4.6 Skin fold Thickness

4.6.1Prevalence of overweight and obesity in adolescent boys' on the basis of skin fold measurements

4.6.2 Prevalence of overweight and obesity in adolescent girls' on the basis of Skin fold measurement

4.7 Waist Hip Ration of the subjects

4.7.1 Prevalence of overweight and obesity in boys' on the basis of Waist to Hip Ratio (WHR) categories

4.7.2 Prevalence of overweight and obesity in girls' on the basis of Waist to Hip Ratio (WHR) categories

4.8 Socioeconomic Status

4.8.1 Distribution of the Boys' samples according to their socioeconomic status

4.8.2 Distribution of the Girls' samples according to their socioeconomic status

4.8.3 Comparison between boys' body weight and so

4.8.4 Comparison between girls' body weight and socioeconomic status

4.9 Dietary pattern and intake

4.9.1 Eating habits

4.9.2 How often do you eat in restaurants?

4.9.3 Meal pattern in school

4.9.4 What you do while eating

4.9.5 Food preference

4.9.6 Role of mass media in food commercials

4.9.7 Eating pattern of snacks before bed time.

4.9.8 Frequency of meals in a day.

4.10 Sleep Pattern of subjects

4.11 Food frequency pattern of subjects

4.12 Physical activity pattern

4.13 Health problem of subjects

4.14 Three day dietary analysis

Table4. 1

Distribution of adolescents according to their gender

S. No.	Participants	Quantity	Percentage
1.	Boys	500	50%
2.	Girls	500	50%
	Total	1000	100

Figure 4.1

Gender wise distribution

Analysis:

Table 4.1 shows distribution of adolescents according to their gender. Out of the total sample of 1000 adolescents 50% were boys and the rest 50% were girls.

Table4. 2

Distribution of adolescents according to school types

S. No	Type of schools.	Number of schools	Boys		Girls	
			No.	%	No.	%
1	Government	4	250	50	250	50
2	Private	4	250	50	250	50
	Total	8	500	100	500	100

Figure4. 2

School wise distribution
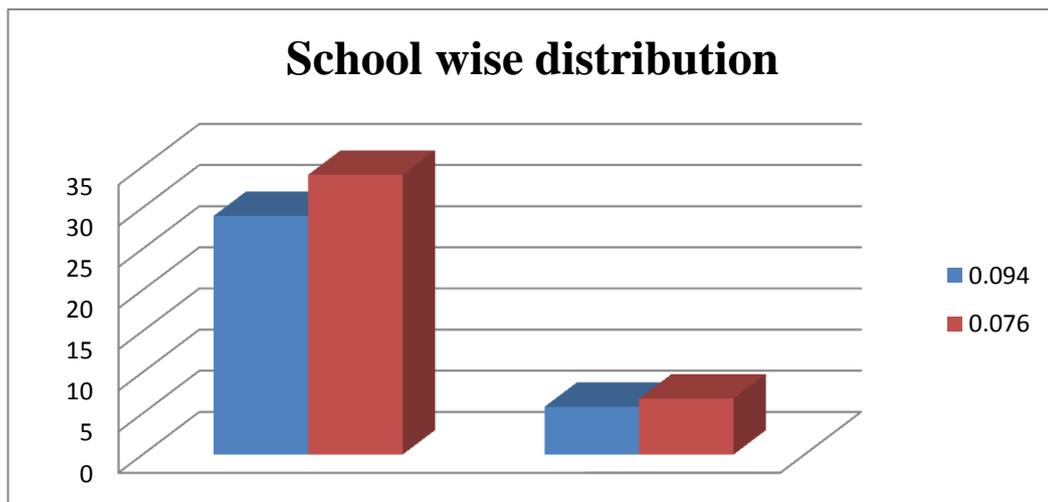
Analysis:

In order to find appropriate estimation of overweight and obesity stage it is essential to choose sample of at least reasonable size. Total 1000 adolescents were assessed. Distribution of sample size on different school types is listed in table 4.2. Four schools of government sector and four schools of private sector were selected. In the present study out of 1000 adolescent students 50% boys and 50% girls were from government school and 50% boys and 50% girls were from private schools.

Table4.3

Distribution of adolescents according to their age

Age	Total		Boys		Girls	
	No.	%	No.	%	No.	%
13+	134	13.4	73	14.6	61	12.2
14+	156	15.6	81	16.2	75	15.0
15+	178	17.8	89	17.8	89	17.8
16+	154	15.4	75	15.0	79	15.8
17+	194	19.4	97	19.4	97	19.4
18+	184	18.4	85	17.0	99	19.8
Total	1000	100	500	100	500	100

Figure 4.3

Distribution of adolescents according to their age
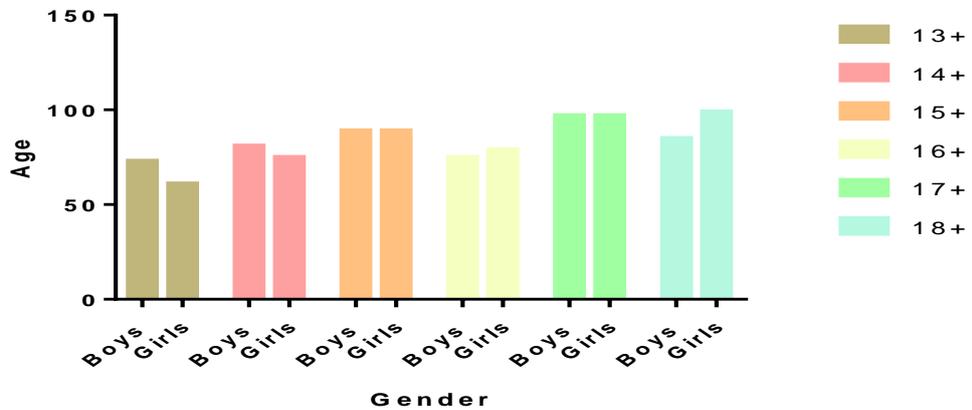
Analysis:

Table 4.3 shows that the total sample of adolescent boys and girls ranged between 13 to 18 years in age maximum i.e. 19.4 per cent boys were above 17 years of age and maximum girls i.e. 19.8 per cent girls were above 18 years of age. In the same order 14.6 % boys and 12.2 % girls were more than of 13 years, 16.2 % of boys and 15.0% of girls were in above of 14 years. Furthermore 17.8% boys and 17.8% girls were in the age of 15 years, 15.0 % of boys and 15.8 % girls were in the age of 16 years. 19.4 % boys and 19.4 % girls were in the age of 17 years, 17.0 % boys and 19.8 % girls in the age of 18 years, which represent total of 1000 adolescents.

Table4.4

Distribution of adolescents by type of family

Gender	Joint Family		Nuclear Family		Total		P. Value
	No.	%	No.	%	No.	%	$x^2 = 4.0882$
Boys	72	14.4	428	85.6	500	100	P > 0.05
Girls	51	10.2	449	89.8	500	100	Significant
Total	123	12.3	877	87.7	1000	100	

Figure 4.4

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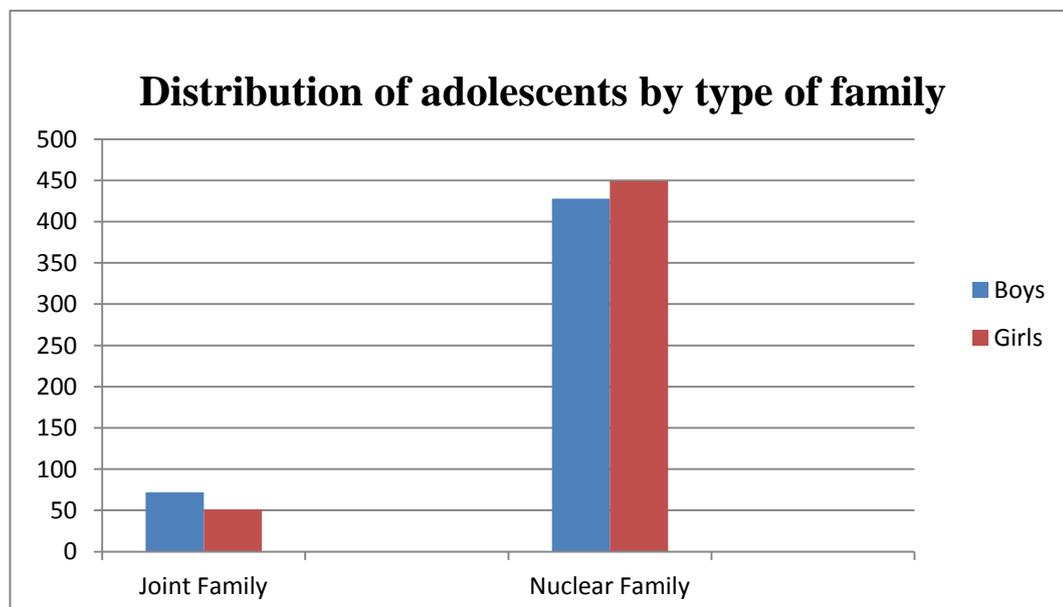
Analysis:

The above table 4.4 shows that majority of the sample 85.6% boys and 89.8% girls belonged to nuclear family.   Only 14.4% boys and 10.2% girl subjects belonged to joint family. It is therefore evident that nuclear family system was more prevalent in selected sample of jhalawar city. Mishra (2008) also studied that modern lifestyle incorporated nuclear system. (16).The results were significant with $P \leq 0.05$. The preference for nuclear families is the new trend and is the result of search for new economic opportunities. Although 14.4 per cent of boys and 10.2 per cent girls were from joint families, however differences were no significant $P > 0.05$.

Table 4.5.1

Prevalence of overweight and obesity in boys' on the basis of Body Mass Index (BMI) categories

BMI Classification of Boys	Number	Percentage	Prevalence
Normal (18.5 – 24.9)	181	36.2	0.181
Overweight (25 – 29.9)	213	42.6	0.426
Obese (30- 39.9)	106	21.2	0.106
Total	500	100	0.5

Figure 4.5.1

Prevalence of overweight and obesity in boys on the basis of Body Mass Index (BMI)
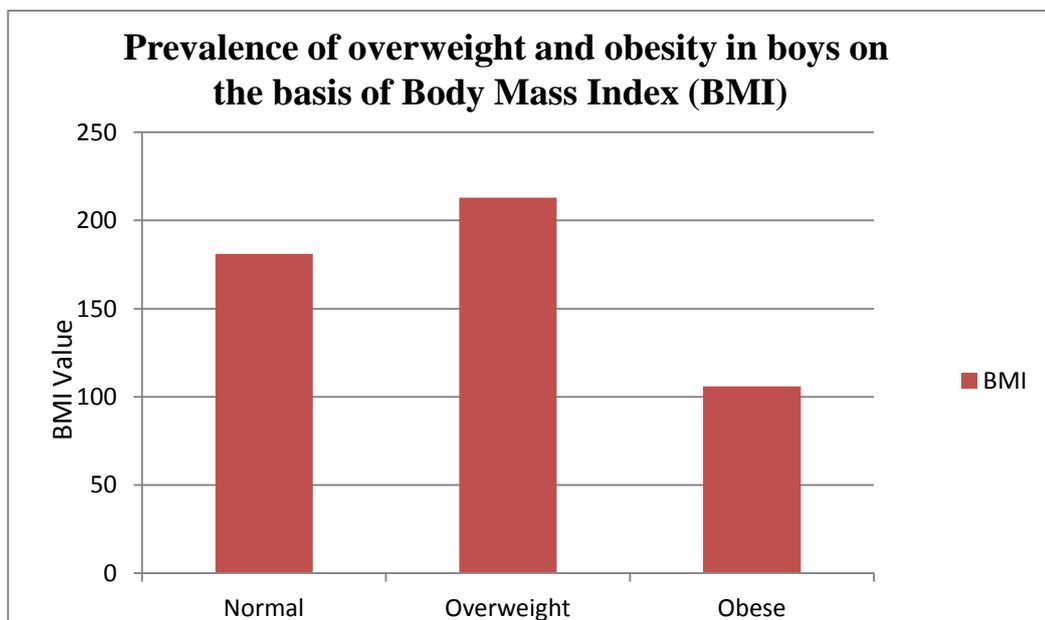
Analysis:

The above table 4.5.1 depict the prevalence of overweight and obesity in boys on basis of Body Mass Index (BMI). It is clear that majority (42.6%) boys were overweight. Thirty six percent boys were normal and only 21.2% were found to be obese.

Table 4.5.2

Prevalence of overweight and obesity in girls' on the basis of Body Mass Index (BMI) categories

BMI Classification of Girl	Number	Percentage	Prevalence
Normal (18.5 – 24.9)	144	28.8%	0.141
Overweight (25 – 29.9)	227	45.4%	0.227
Obese (30- 39.9)	129	25.8%	0.129
Total	500	100%	0.5

Figure 4.5.2

Prevalence of overweight and obesity in girls on the basis of Body Mass Index (BMI)
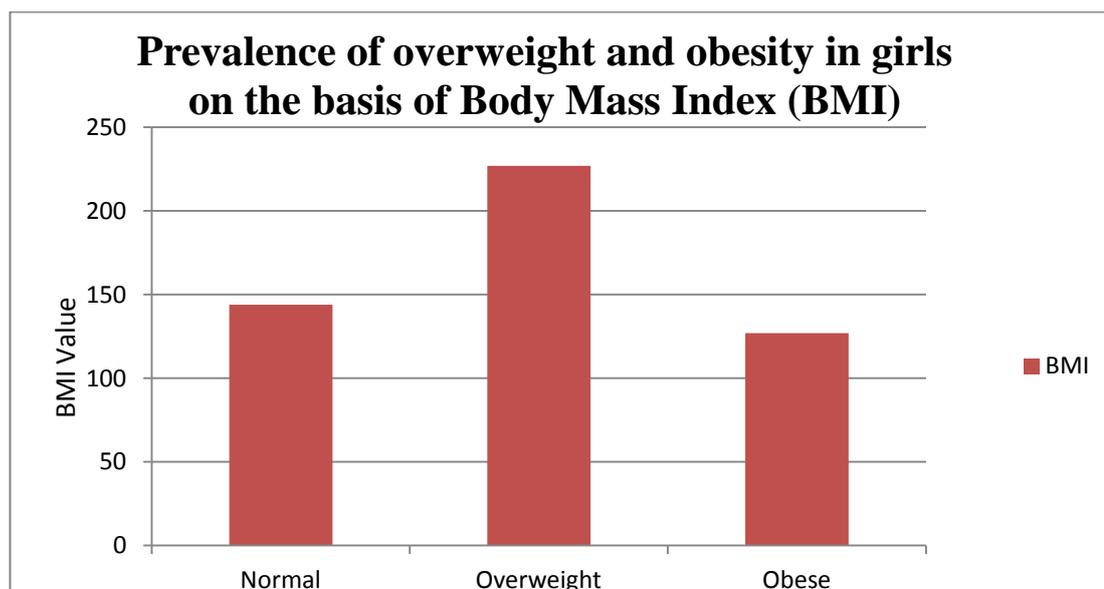
Analysis:

The above table 4.5.2 shows that almost same percentage of girls (28.8% and 25.8%) was normal and obese respectively. But 45.4% girls' were found to be overweight. It can be thus concluded that prevalence of overweight was more as compared to obesity among girls. Prevalence of obesity was among one fourth (25.8%) sample of girls.

Table4.5.3

Comparison of Body Mass Index (BMI) status of adolescent boys' and girls

BMI Classification of adolescent boys' and girls	Boys			Girls			P. Value
	No.	%	Prevalence	No.	%	Prevalence	$x^2 = 6.9088$
Normal (18.5 – 24.9)	181	36.2	0.181	144	28.8	0.141	$P \leq 0.05$
Overweight (25 – 29.9)	213	42.6	0.426	227	45.4	0.227	Significant
Obese (30 – 39.9)	106	21.2	0.106	129	25.8	0.229	
Total (N = 1000)	500	100	0.5	500	100	0.5	

Figure 4.5.3

Comparison of Body Mass Index (BMI) status of adolescent boys and girls
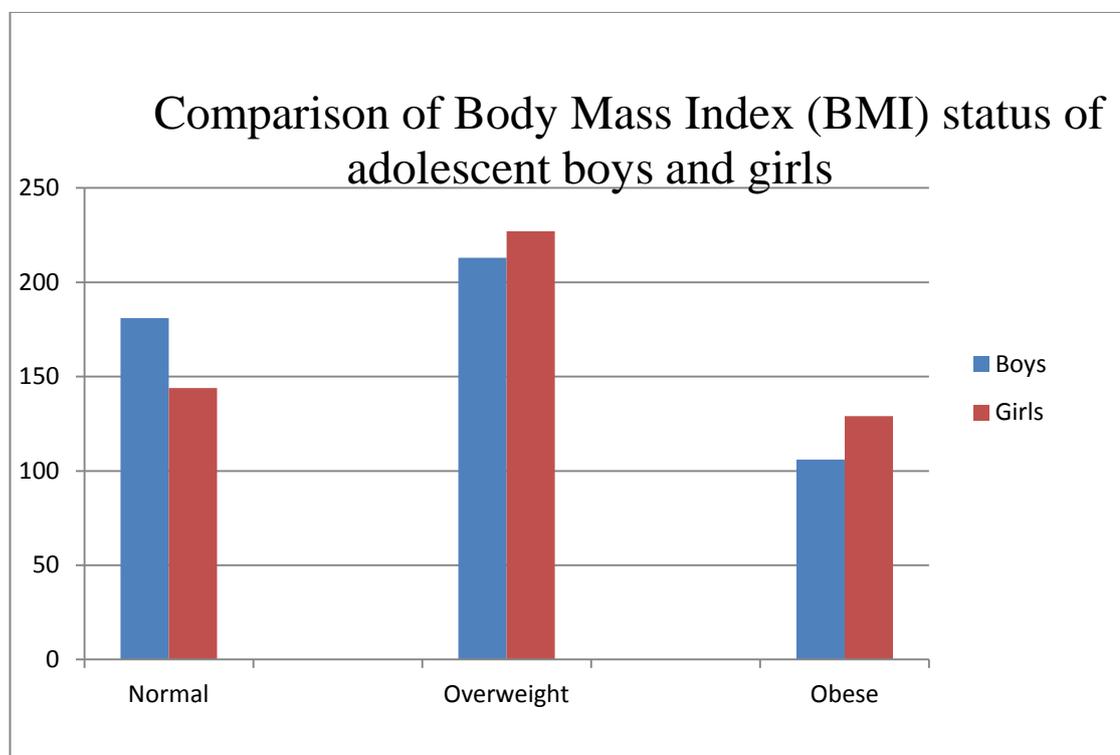
Analysis:

The above table 4.5.3 depict the distribution of adolescent boys and girls by Body Mass Index (BMI). It is clear that 36.2% boys and 28.8% girls were normal respectively. In the same order 42.6% boys and 45.4% girls were overweight. It is clear that majority (42.6% boys and 45.4% girls) were overweight. The obesity percentage of boys was 21.2% and girls were 25.8%. It can be thus concluded that girls were significantly more overweight than boys at $P \leq 0.05$.

Table 4.5.4

Body Mass Index of adolescent boys' with reference to age

Age Group	BMI Categories of Boys								
	Normal			Overweight			Obese		
	No	%	Prevalence	No	%	Prevalence	No	%	Prevalence
13+ (N=73)	31	6.2	0.031	37	7.4	0.037	5	1.0	0.005
14+ (N=81)	30	6.0	0.030	38	7.6	0.038	13	2.6	0.013
15+ (N=89)	37	7.4	0.037	31	6.2	0.031	21	4.2	0.021
16+ (N=75)	24	4.8	0.024	25	5.0	0.25	26	5.2	0.26
17+ (N=97)	27	5.4	0.027	45	9.0	0.045	25	5.0	0.25
18+ (N=85)	32	6.4	0.032	37	7.4	0.037	16	3.2	0.016
N = 500	181	36.2	0.181	213	42.6	0.213	106	21.2	0.106

Figure 4.5.4

Distribution of boys on the basis of Age group and Body Mass Index (BMI) categories
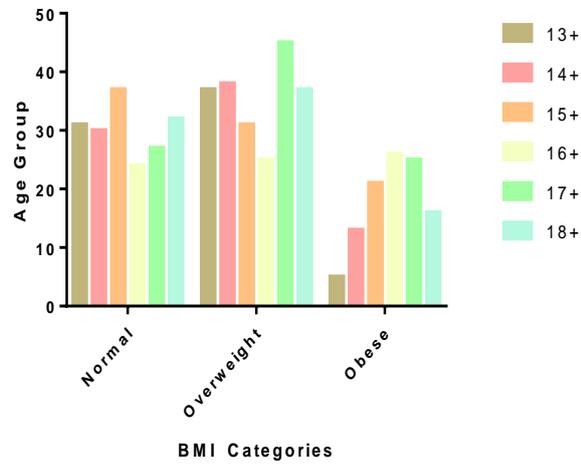
Analysis:

The data of above BMI (table 4.5.3) of adolescent boys with reference to age shows that the prevalence of overweight among boys peaks at the age of 17+ and obesity peaks at the age of 16+ years.

Table 4.5.5

Body Mass Index of adolescent girls' with reference to age

Age Group	BMI Categories of Girls								
	Normal			Overweight			Obese		
	No	%	Prevalence	No	%	Prevalence	No	%	Prevalence
13+ (N=61)	18	3.6	0.018	31	6.2	0.031	12	2.4	0.012
14+ (N=75)	31	6.2	0.031	31	6.2	0.031	13	2.6	0.013
15+ (N=89)	21	4.2	0.021	42	8.4	0.042	26	5.2	0.026
16+ (N=79)	19	3.8	0.19	33	6.6	0.033	27	5.4	0.027
17+ (N=97)	30	6.0	0.030	43	8.6	0.043	26	5.2	0.026
18+ (N=99)	32	6.4	0.032	43	8.6	0.043	26	5.2	0.026
N =500	144	28.8	0.144	227	45.4	0.227	129	25.8	0.129

Figure 4.5.5

Distribution of Girls on the basis of Age group and Body Mass Index (BMI) categories
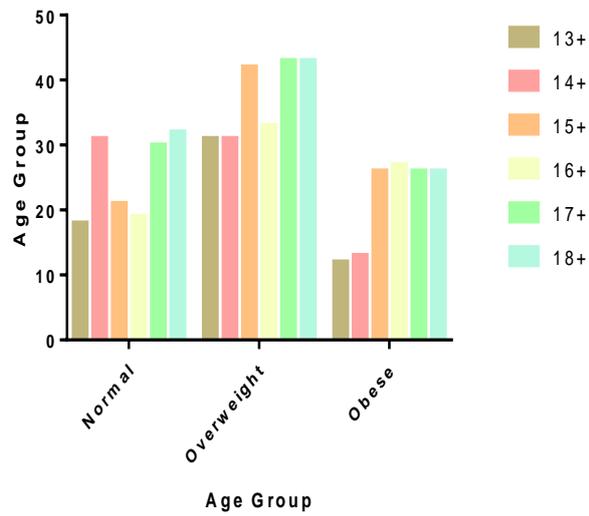
Analysis:

The percentage of obesity among different age groups of girls shows that the prevalence of overweight among girls peaks at the age of 17+ and 18+ and obesity peaks at the age of 16+ years.

Table 4.6.1

Prevalence of overweight and obesity in adolescent boys' on the basis of skin fold measurements

Skin fold classification	Boys' (N = 500)	Percentage (%)	Prevalence
Fit (14 % -17 % Body Fat)	181	36.2	0.362
Overweight (18% - 25 % Body Fat)	213	42.6	0.426
Obese (26 % + Body Fat)	106	21.2	0.212
Total	500	100	1

Figure 4.6.1

Prevalence of overweight and obesity in boys on the basis of Skin fold measurement
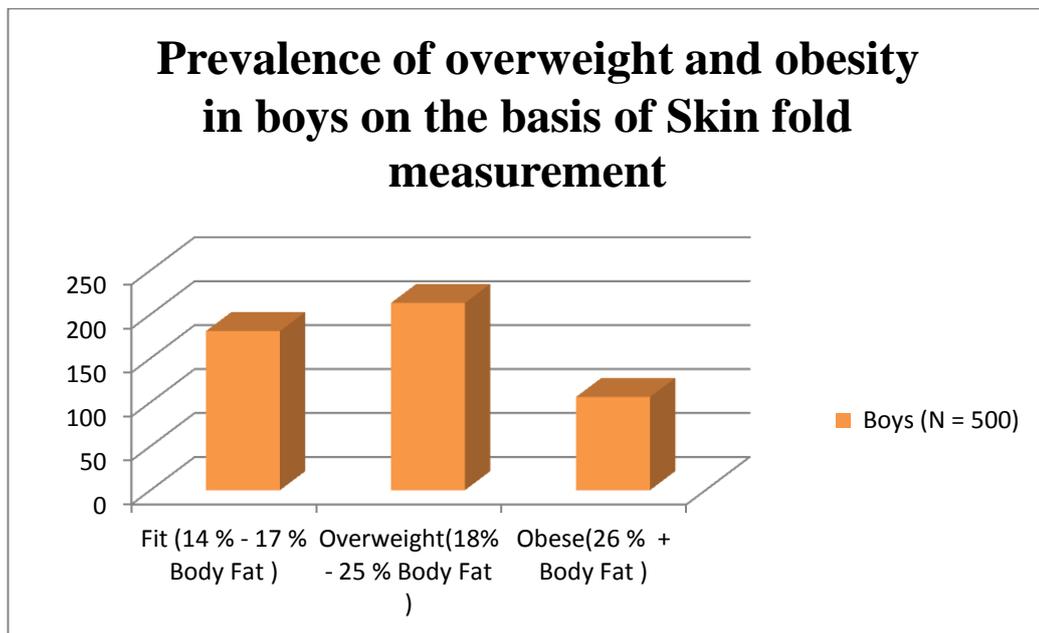
Analysis:

Table 4.6.1 shows the prevalence of overweight and obesity among 500 boys on the basis of Skin fold measurement. The skin fold thickness was measured from the three main sides (Triceps skin fold site, Sub scapular skin fold site, abdominal skin fold site). According to Stettler (2002) skin fold measurement at triceps was considered as mainly efficient index for judging the calorie stores and obesity in an individual.(27) In the table 4.7, the fat percentages of 500 boys were calculated. According to skin fold measurement 36.2% boys were fit, 42.6% boys were overweight and 21.2 % boys were obese.

Table4.6.2

Prevalence of overweight and obesity in adolescent girls' on the basis of Skin fold measurement

Skin fold classification	Girls' (N = 500)	Percentage (%)	Prevalence
Fit (21 % - 24 % Body Fat)	144	28.8	0.288
Overweight (25 % - 31 % Body Fat)	227	45.4	0.454
Obese (32 % + Body Fat)	129	25.8	0.258
Total	500	100	1

Figure 4.6.2

Prevalence of overweight and obesity in boys on the basis of Skin fold measurement
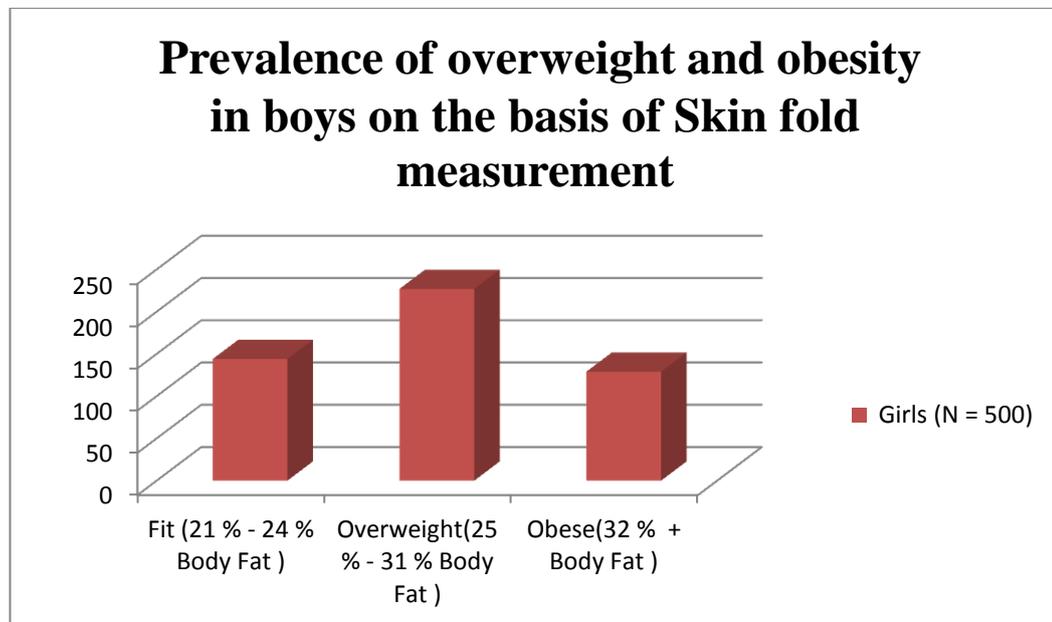
Analysis:

The prevalence of overweight and obesity among 500 girls on the basis of Skin fold measurement categories is shown in table4.6.2 below. The skin fold thickness was measured from the three sides (Triceps skin fold site, Sub scapular skin fold site, abdominal skin fold site). In the table 4.8, the fat percentages of 500 girls were calculated. According to skin fold measurement 28.8% girls were fit, 45.4% girls were overweight and 25.8% girls were obese.

Table 4.7.1

Prevalence of overweight and obesity in boys' on the basis of Waist to Hip Ratio (WHR) categories

WHR classification	Boys' (N = 500)	Percentage (%)	Prevalence
WHR (Normal : < 0.93)	181	36.2	0.362
WHR (Overweight : 0.93 – 1.0)	213	42.6	0.426
WHR (Obese : < 1.0)	106	21.2	0.212
Total	500	100	1

Figure 4.7.1
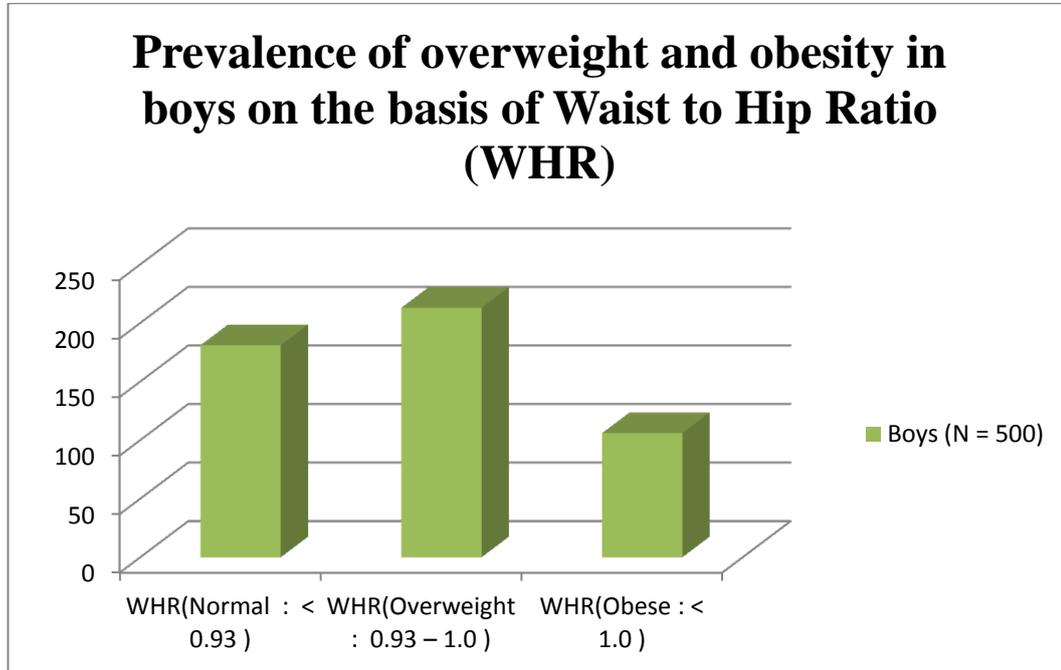
Prevalence of overweight and obesity in boys on the basis of Waist to Hip Ratio (WHR)

Analysis:

The prevalence of overweight and obesity among 500 boys on the basis of Waist to Hip Ratio (WHR) categories is shown in table4.7.1. According to Staveren (2000), Waist – to – Hip ratio is greater than 1 in obese man and greater than 0.85 in obese women. (26) The table shows that as high as 42.6% adolescent boys were found to be overweight on the basis of Waist to Hip Ratio (WHR). Whereas only 21.2% were obese rest 36.2% were found to be normal.

Table4.7.2

Prevalence of overweight and obesity in girls' on the basis of Waist to Hip Ratio (WHR) categories

WHR classification	Girls' (N = 500)	Percentage (%)	Prevalence
WHR (Normal : < 0.81)	144	28.8	0.288
WHR (Overweight : 0.81 – 0.89)	227	45.4	0.454
WHR (Obese : > 0.89)	129	25.8	0.258
Total	500	100	1

Figure 4.7.2

Prevalence of overweight and obesity in girls on the basis of Waist to Hip Ratio (WHR)
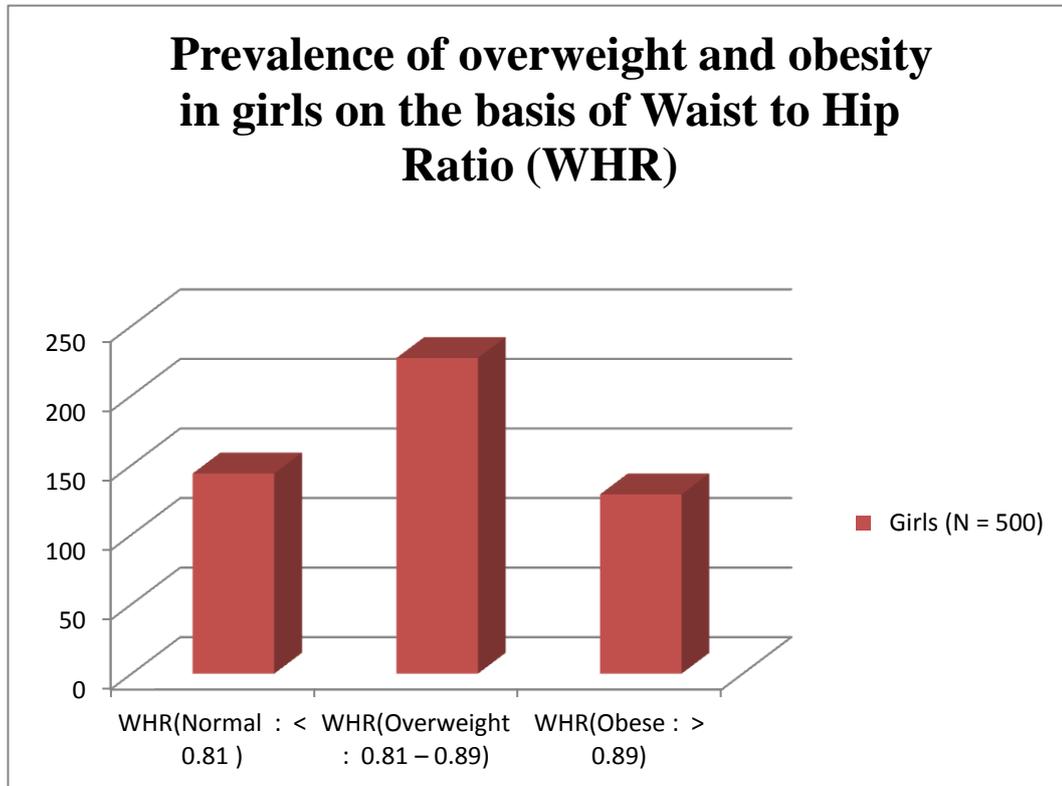
Analysis:

The Waist to Hip Ratio (WHR) of adolescent girls depicts the fact that as high as 45.4% were found to be overweight. About one fourth part of the sample (25.8%) was found to be obese. The remaining 28.8% adolescent girls were found to be normal on the basis of Waist to Hip Ratio (WHR). According to Staveren (2000), Waist – to – Hip ratio is greater than 1 in obese men and greater than 0.85 in obese women. (26)

Table 4.8.1

Distribution of the Boys' sample according to their socioeconomic status

Age	Boys' (N = 500)								
	HSES	%	Prevalence	MSES	%	Prevalence	LSES	%	Prevalence
13+	3	0.6	0.06	32	6.4	0.064	19	3.8	0.038
14+	11	2.2	0.022	49	9.8	0.098	17	3.4	0.034
15+	11	2.2	0.022	46	9.2	0.092	23	4.6	0.046
16+	23	4.6	0.046	41	8.2	0.082	21	4.2	0.042
17+	21	4.2	0.042	63	12.6	0.126	14	2.8	0.028
18+	14	2.8	0.028	57	11.4	0.114	29	5.8	0.058
Total (500)	89	17.8	0.17	288	57.6	0.576	123	24.6	0.0246

HSES – High Socioeconomic Status

MSES – Middle Socioeconomic Status

LSES – Low Socioeconomic Status

Figure 4.8.1
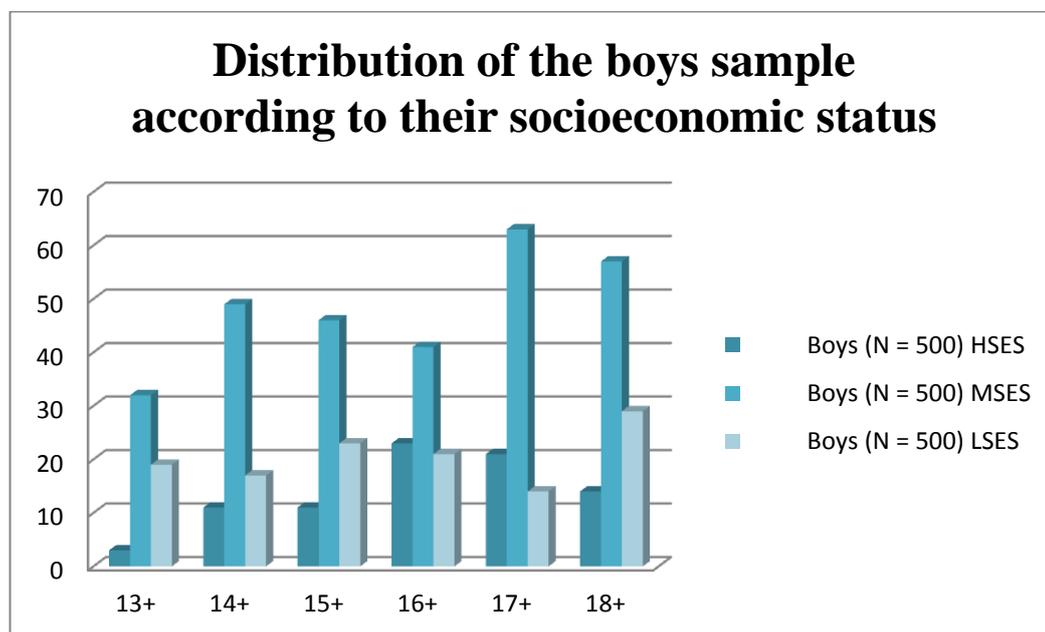
Distribution of the boys sample according to their socioeconomic status

Analysis:

The percentage distribution of high socioeconomic status (HSES) in 500 adolescent boys was 17.8%, the percentage distribution of middle socioeconomic status (MSES) in adolescents boys was 57.6 %. The percentage distribution of low socioeconomic status (LSES) in adolescent boys was 24.6%.In the same order the percentage distribution of high socioeconomic status (HSES). The prevalence of overweight among adolescent boys was high in high SES group as compared to middle SES group however prevalence of overweight was the lowest in the low SES group. Therefore, socioeconomic status was related to adolescent's risks of being obese or overweight and high SES groups were at a higher risk of obesity, while middle SES groups were at higher risk of overweight. The association between SES and prevalence of overweight and obesity was not significantly related to age. The impact on SES did not seem to vary much by age. It has been reported previously that BMI is influenced by different SES backgrounds. (15) These data are consistent with previous studies in different countries.

Table4.8.2

Distribution of the Girls' sample according to their socioeconomic status

Age	Girls' (N = 500)								
	HSES	%	Prevalence	MSES	%	Prevalence	LSES	%	
13+	11	2.2	0.02	42	8.4	0.084	13	2.6	0.026
14+	12	2.4	0.024	47	9.4	0.094	21	4.2	0.042
15+	16	3.2	0.032	51	10.2	0.102	19	3.8	0.038
16+	23	4.6	0.046	34	6.8	0.068	17	3.4	0.034
17+	20	4.0	0.04	54	10.8	0.108	23	4.6	0.046
18+	21	4.2	0.042	52	10.4	0.104	24	4.8	0.048
Total (500)	103	20.6	0.206	280	56.0	0.56	117	23.4	0.234

HSES – High Socioeconomic Status

MSES – Middle Socioeconomic Status

LSES – Low Socioeconomic Status

Figure 4.8.2
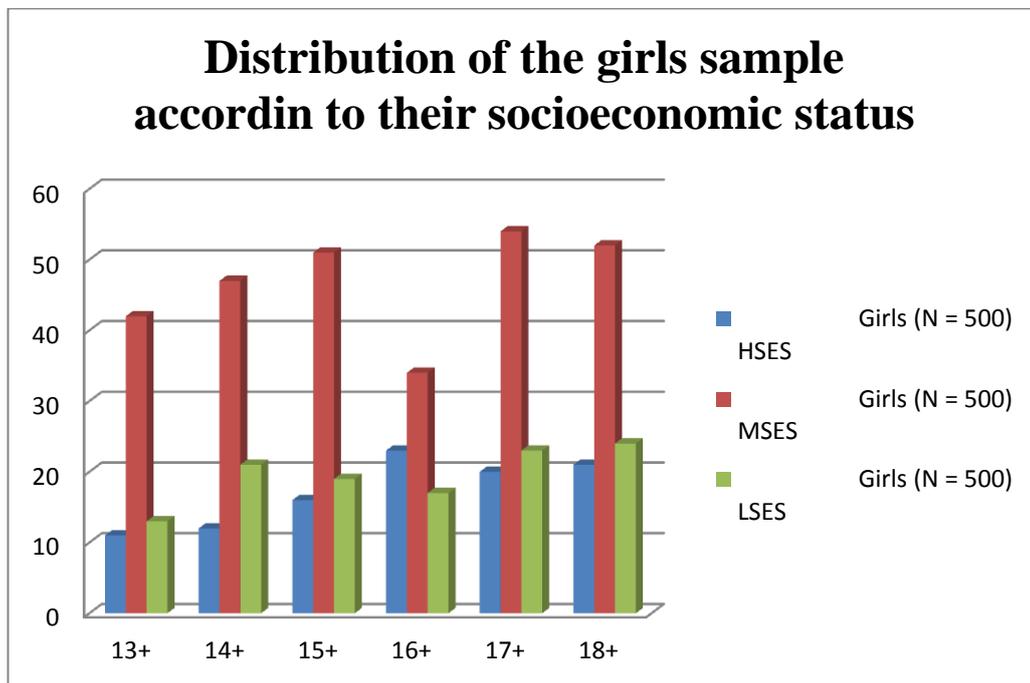
Distribution of the girls sample accordin to their socioeconomic status

Girls (N = 500) HSES

Girls (N = 500) MSES

Girls (N = 500) LSES

Analysis:

The percentage distribution of high socioeconomic status (HSES) in 500 adolescent girls was 20.6%, the percentage distribution of middle socioeconomic status (MSES) in adolescent girls was 56.0 %. The percentage distribution of low socioeconomic status (LSES) in adolescent girls was 23.4%. The prevalence of overweight among adolescent girls was high in high SES group as compared to middle SES group however prevalence of overweight was the lowest in the low SES group. Therefore, socioeconomic status was related to adolescent's risks of being obese or overweight and high SES groups were at a higher risk of obesity, while middle SES groups were at higher risk of being overweight. The association between SES and prevalence of overweight and obesity was not significantly related to age. The impact on SES did not seem to vary much by age. Moreover our analysis stratified by gender indicates that boys and girls are at different risks even if they have the same SES. Girls from high SES group tend to have high risk of obesity as compared to boys; similarly those from middle SES groups were

found to have high risk of overweight as compared to boys. In general our findings regarding the relationships between obesity and SES are consistant with findings from many previous studies. (18, 24, 11, 20) .One possible description for the different SES-overweight and obesity relationship in developing countries such as India is that the influence of SES on people's lifestyles such as diet, food consumption patterns, and public services such as health care and transportation and physical activity may vary. Wealthier persons have high and easy access to nonvegetarian and other energy-dense foods (which are much more expensive than other foods such as vegetables) than the poor. (6)

Table4.8.3

Comparison between boys' body weight and socioeconomic status

BMI classification of boys			Socioeconomic classification of boys		
	Number	%		Number	%
Normal weight	181	36.2	LSES	123	24.6
Overweight	213	42.6	MSES	288	57.6
Obese	106	21.2	HSES	89	17.8
Total	500	100	Total	500	100

HSES – High Socioeconomic Status

MSES – Middle Socioeconomic Status

LSES – Low Socioeconomic Status

Figure 4.8.3

Comparison between boys body weight and socioeconomic status
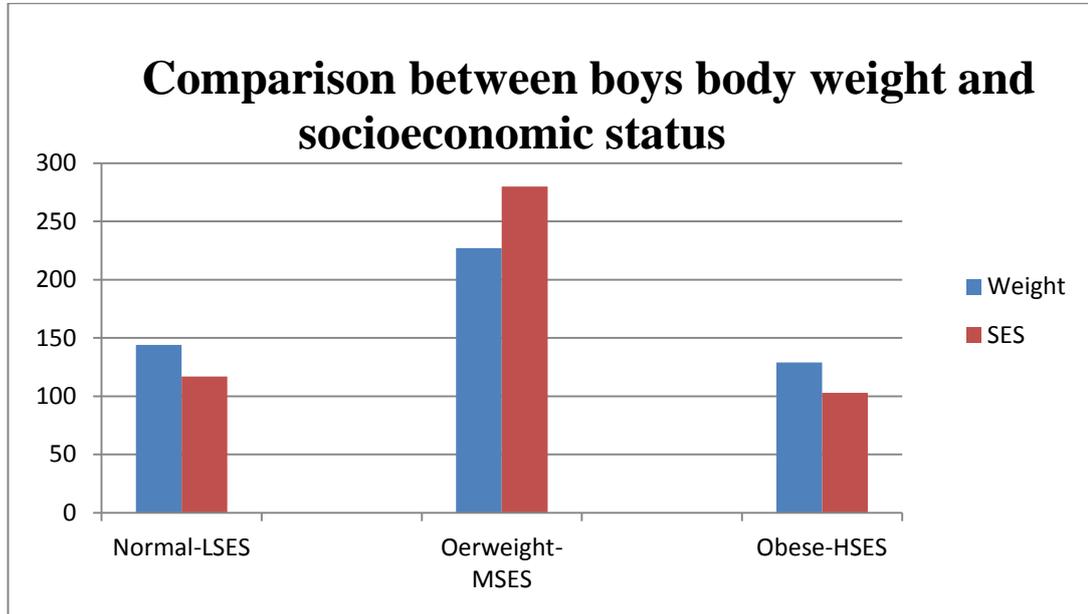
Analysis:

The percentage distribution of normal weight boys in LSES boys was 36.2% and 24.6 %.The percentage of overweight boys' in MSES boys' was 42.6 % and 57.6 % respectively. In the same order the percentage distribution of obese boys and HSES boys was 21.2% and 17.8%. Therefore, socioeconomic status was related to adolescent's risk of being obese or overweight. High socio economic groups of boys were at a higher risk of obesity, while middle socioeconomic group of boys were at higher risk of overweight.

Table 4.8.4

Comparison between girls body weight and socioeconomic status

BMI classification of girls			Socioeconomic classification of girls		
	Number	%		Number	%
Normal weight	144	28.8	LSES	117	23.4
Overweight	227	45.4	MSES	280	56.0
Obese	129	25.8	HSES	103	20.6
Total	500	100	Total	500	100

HSES – High Socioeconomic Status

MSES – Middle Socioeconomic Status

LSES – Low Socioeconomic Status

Figure 4.8.4

Comparison between girls body weight and socioeconomic status
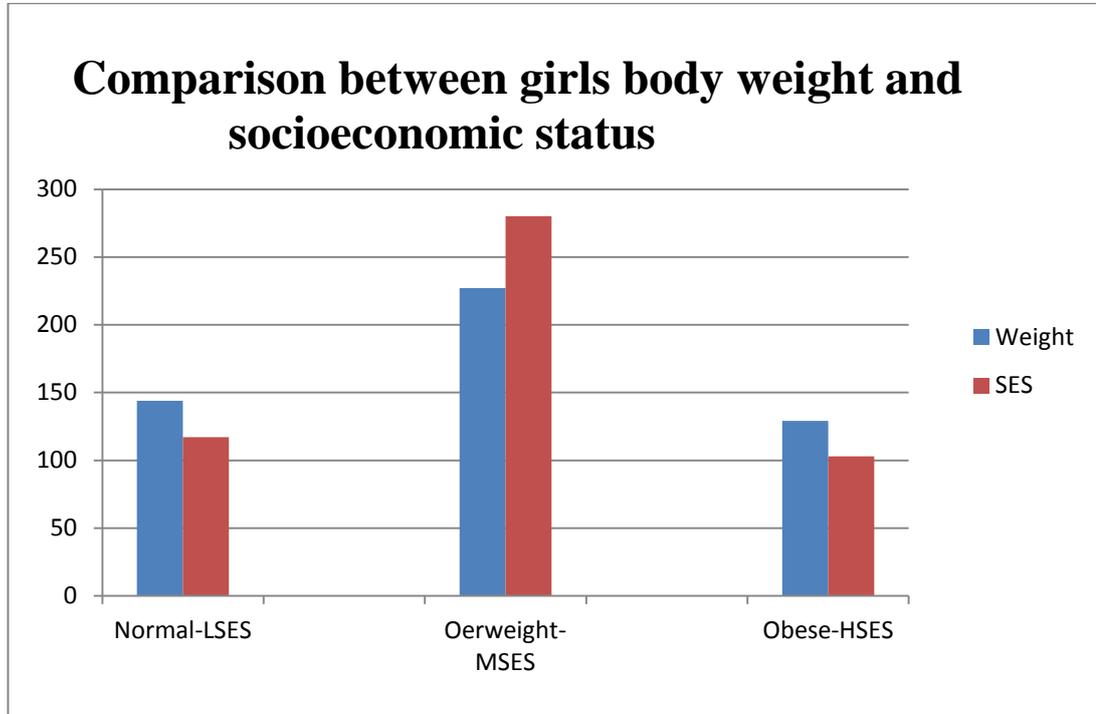
Analysis:

The percentage distribution of normal weight girls and LSES girls was 28.8% and 23.4%.The percentage of overweight girls and MSES girls was 45.4% and 56.0% respectively. In the same order the percentage distribution of obese girls and HSES girls was 25.8% and 20.6%. Therefore, socioeconomic status was related to adolescent's risk of being obese or overweight. High socio economic groups of girls were at a higher risk of obesity, while middle socioeconomic group of girls were at higher risk of overweight.

Table 4.9

Distribution of the samples according to their eating habits

4.9.1 EATING HABITS

(1)	Eating Habits	Boys' (N = 500)			Girls' (N = 500)		
		No.	%	Prevalence	No.	%	Prevalence
A.	Vegetarian	227	45.4	0.454	273	54.6	0.546
B.	Eggetarian	149	29.8	0.298	130	26.0	0.26
C.	Non-vegetarian	124	24.8	0.248	97	19.4	0.194
	Total	500	100	1	500	100	1

Figure 4.9.1

Distribution of the samples according to their eating habits (Eating Habits)
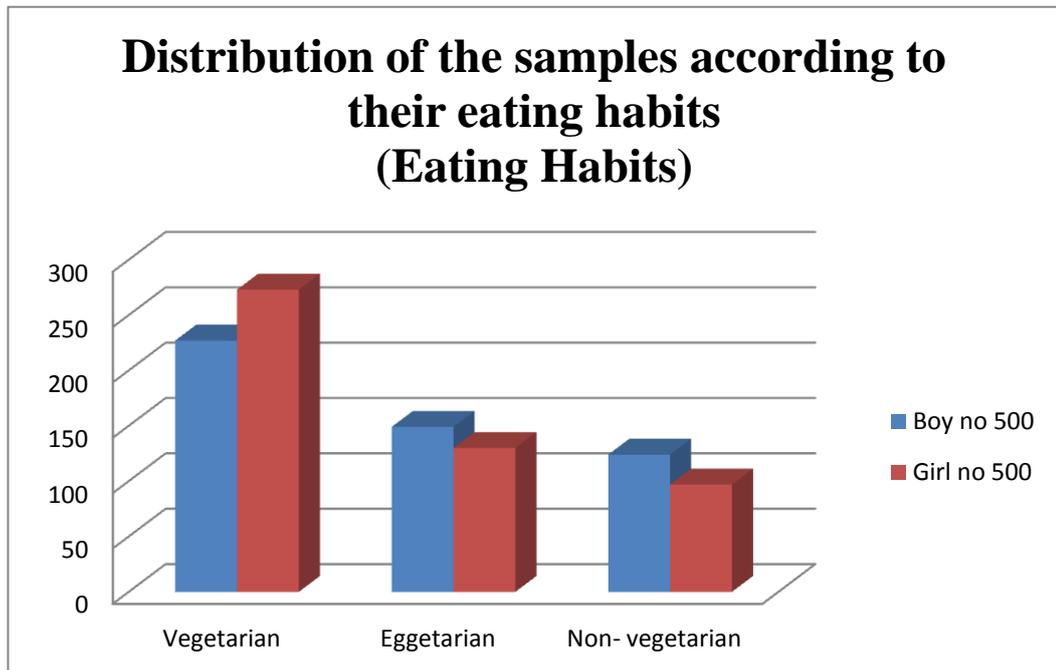
Analysis:

This table 4.9.1 shows the type of eating habits among the respondents. In 500 adolescent boys 45.4% were vegetarian, 29.8% were eggetarian and 24.8% were non – vegetarian. Further more in 500 adolescent girls 54.6% were vegetarian, 26.0% were eggetarian and 19.4% non – vegetarian.

4.9.2 HOW OFTEN DO YOU EAT IN RESTAURANTS?

(2)	How often do you eat out in restaurant?	Boys' (N = 500)			Girls' (N = 500)			P. Value
		No.	%	Prevalence	No.	%	Prevalence	$x^2 =$ 4.1285
A.	Rarely	89	17.8	0.178	74	14.8	0.148	
B.	1-3 Times in a month	179	35.8	0.358	164	32.8	0.328	P > 0.05
C.	Once a week	157	31.4	0.314	183	36.6	0.366	Not
D.	2-4 times in a week	75	15.0	0.15	79	15.8	0.158	Significant
	Total	500	100	1	500	100	1	

Figure 4.9.2

Distribution of the samples according to their eating habits (How often do you eat out in restaurant?)
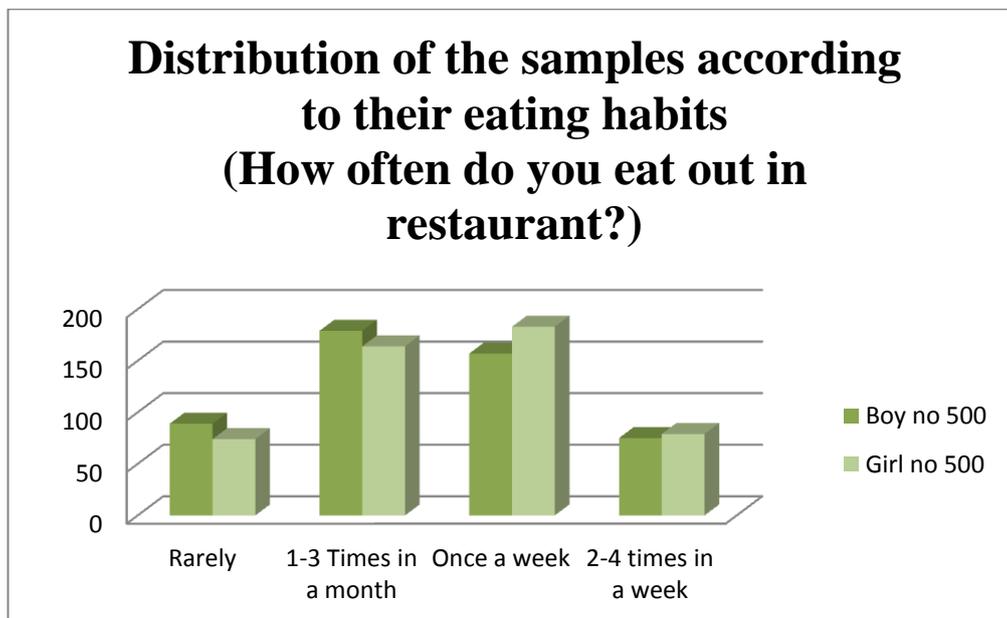
Analysis:

The percentages of adolescent boys and girls of Jhalawar city who were eating out rarely were 17.8% and 14.8% respectively. The percentages of boys and girls who were eating out 1-3 times in a month were 35.8% and 32.8% respectively. The percentages of adolescent boys and girls that were eating out once a week were 31.4% and 36.6% respectively. The percentages of boys and girls who were eating out 2-4 times in a week were 15.0% and 15.8% respectively. The present study was in accord with Bowman (2004) who stated that today our young age group is more prone to eat out more often due to non-accessibility of time and taste factors.(3) These results are consistent with other studies which show a relationship between regularity of restaurant visit and obesity.

4.9.3 MEAL PATTERN IN SCHOOL.

(3)	At school, you usually?	Boys' (N = 500)			Girls' (N = 500)			P.Value
		No.	%	Prevalence	No.	%	Prevalence	$x^2 =$ 0.5038
A.	Skip lunch	43	8.6	0.086	39	7.8	0.078	
B.	Bring lunch from home	189	37.8	0.378	187	37.4	0.374	P < 0.05
C.	Buy a meal from Cafeteria	116	23.2	0.232	113	22.6	0.226	Not
D.	Buy Fast Food	152	30.4	0.304	161	32.2	0.332	Significant
	Total	500	100	1	500	100	1	

Figure 4.9.3

Distribution of the samples according to their eating habits (At school, you usually)
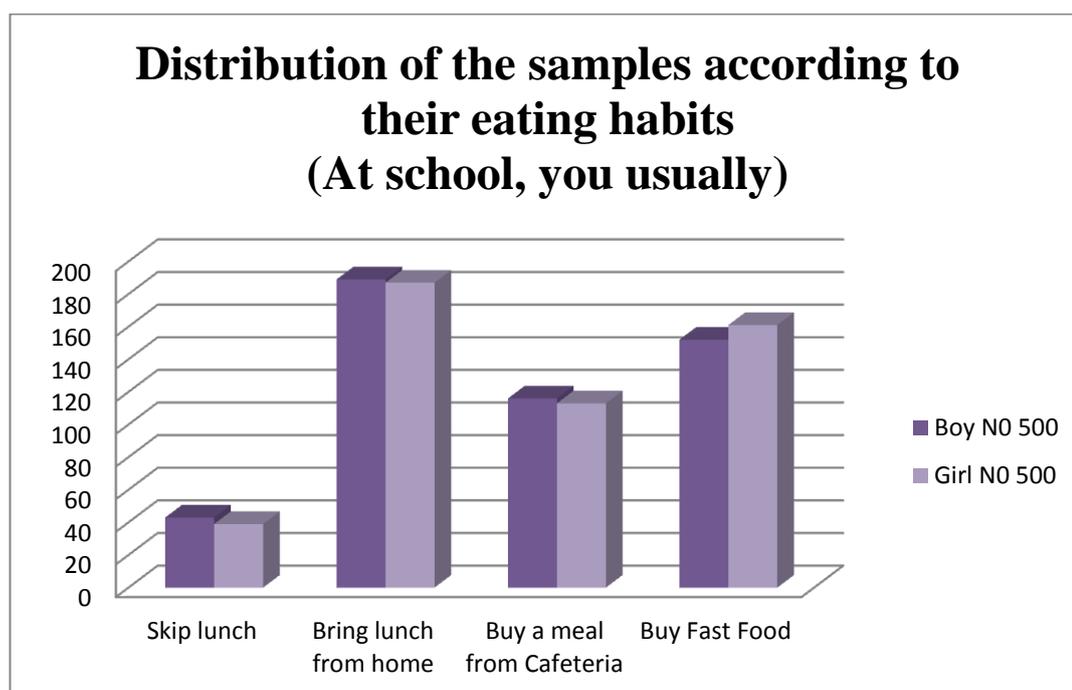
Analysis:

The percentages of adolescent boys and girls of Jhalawar city according to their school lunch activity that skipped lunch were 8.6% and 7.8% respectively. The percentages of boys and girls subjects who bring lunch from home were 37.8% and 37.4% respectively. The percentages of boys and girls that bought a meal from cafeteria were 23.2% and 22.6% respectively. The percentages of boys and girls who were bought fast food were 30.4% and 32.6% respectively. The data shows that most of the students buy their lunch from cafeteria or bought fast food. It seems like for today's working parents and modern adolescents it looks easy to buy their food from outside rather than bring lunch from home.

4.9.4 WHAT YOU DO WHILE EATING

(4)	When you are eating, which	Boys' (N = 500)			Girls' (N = 500)			P. Value
	of the following do you do?	No.	%	Prevalence	No.	%	Prevalence	x^2 = 5.5846 $P < 0.05$
A.	I don't do anything	15	3.0	0.03	11	2.2	0.022	Not
B.	Read	57	11.4	0.114	39	7.8	0.078	
C.	List to my iPod	52	10.4	0.104	48	9.6	0.096	Significant
D.	Study or Home work	86	17.2	0.172	83	16.6	0.166	
E.	Watch T.V.	290	58.0	0.58	319	63.8	0.638	
	Total	500	100	1	500	100	1	

Figure 4.9.4

Distribution of the samples according to their eating habits
(When you are eating, which of the following do you do?)
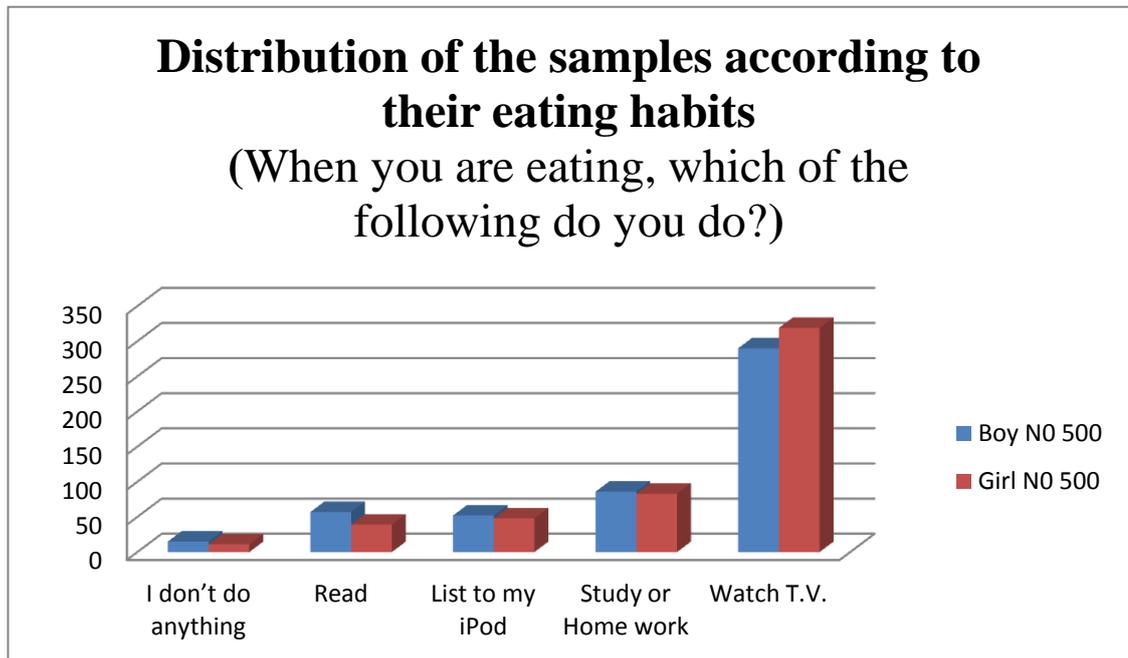
Analysis:

The percentages of adolescent boys and girls of Jhalawar city regarding to their lifestyle what they do when they have food at home. In this order 3.0% boys and 2.2% girls don't do anything when they eat. Only 11.4% boys and 7.8% girls read when they eat. Furthermore 10.4% boys and 9.6% girls listen to music. In these order 17.2% boys and 16.6% girls do their homework while they eat. Maximum number of students 58.0% boys' and 63.8% girls watched television when they eat. Television watching does affect their eating habits as they cannot focus at their food while they were watching TV so they eat more unhealthy food and it causes increase in their weight.

4.9.5 FOOD PREFERENCE

(5)	What type of food do you prefer?	Boys' (N = 500)			Girls' (N = 500)			P. Value
		No.	%	Prevalence	No.	%	Prevalence	$x^2 =$ 2.0272
A.	Boiled Food	0	0	0	0	0	0	
B.	Less Spicy Food	97	19.4	0.194	81	16.2	0.162	P > 0.05
C.	Roasted Food	60	12.0	0.12	57	11.4	0.114	Not
D.	Very Spicy Food	126	25.2	0.252	133	26.6	0.266	Significant
E.	Fried Food	217	43.4	0.434	229	45.8	0.458	
	Total	500	100	1	500	100	1	

Figure 4.9.5

Distribution of the samples according to their eating habits (What type of food do you prefer?)
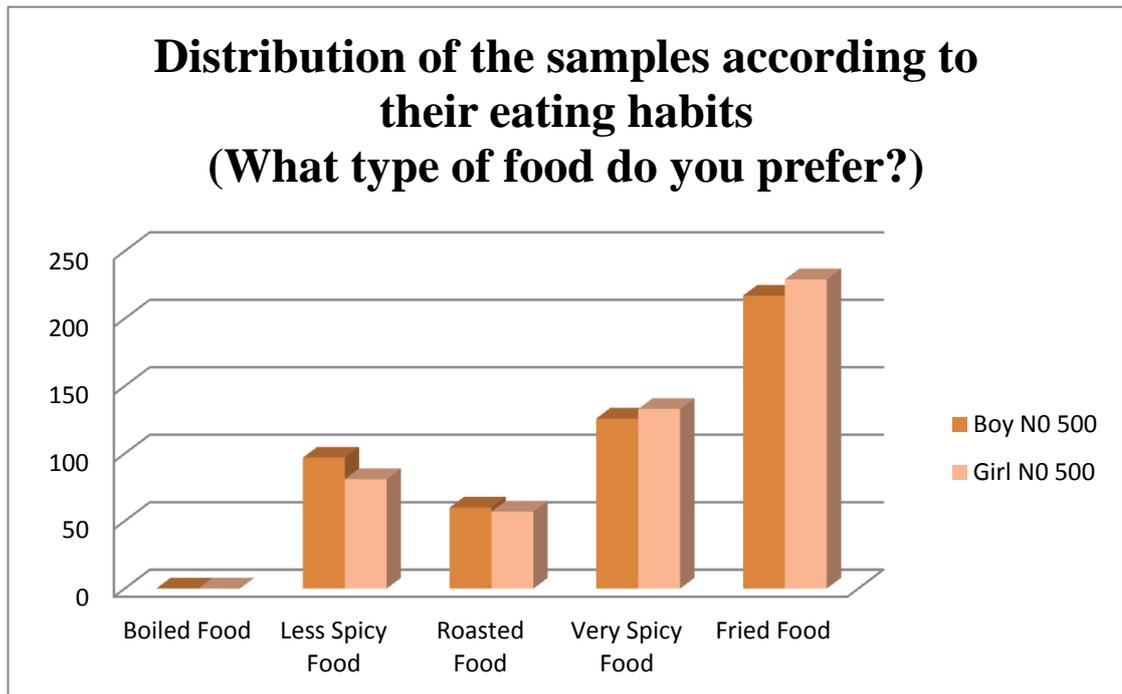
Analysis:

The percentages of adolescent boys and girls of Jhalawar city who preferred less spicy food were 19.4% and 16.2% respectively. The percentages of boys and girls subjects who preferred roasted food were 12.0% and 11.4% respectively. The percentages of adolescent boys and girls who preferred very spicy food were 25.2% and 26.6% respectively. The percentages of boys and girls subjects who preferred fried food were 43.4% and 45.8% respectively. Data indicates that adolescent don't like boiled food and most of the subject preferred fried food.

4.9.6 ROLE OF MASS MEDIA IN FOOD COMMERCIALS

(6)	Do you get tempted by food commercials in mass media and insist on buying them?	Boys' (N = 500)			Girls' (N = 500)			P. Value
		No.	%	Prevalence	No.	%	Prevalence	$x^2 =$ 26.3292
A.	No	213	42.6	0.426	177	35.4	0.354	$P \leq 0.05$
B.	Yes	287	57.4	0.574	323	64.6	0.646	Significant
Total		500	100	1	500	100	1	

Figure 4.9.6

Distribution of the samples according to their eating habits
(Do you get tempted by food commercials in mass media and insist on buying them?)
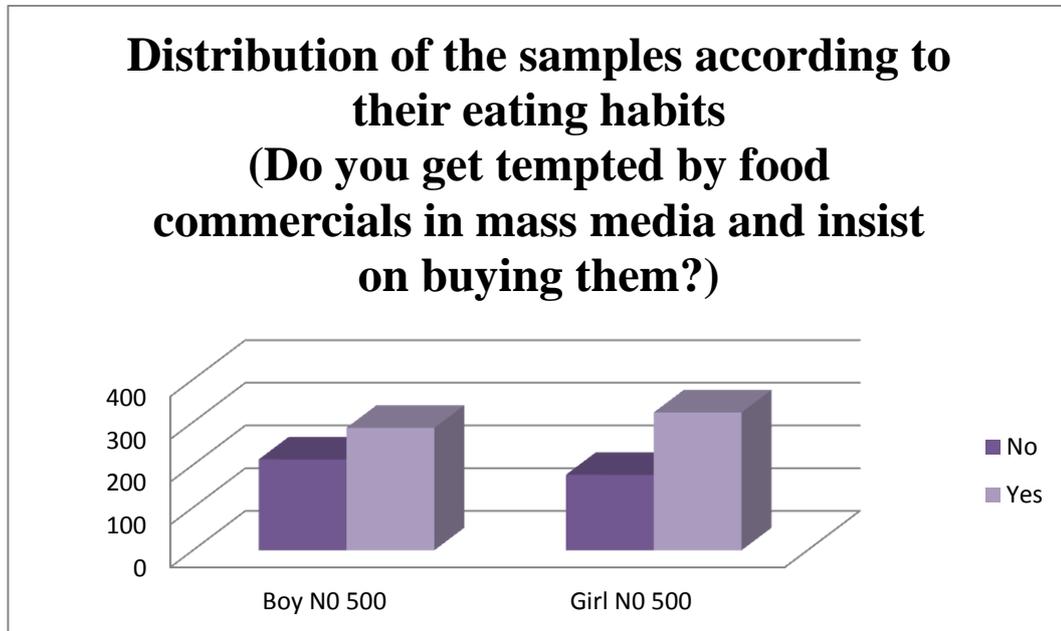
Analysis:

The percentage of adolescents boys of Jhalawar city who don't get tempted by food commercials in mass media and were 42.6%. The percentage of boy subjects who get tempted by food commercials in mass media and insist on buying them were 57.4 %. The percentage of adolescents girls who don't get tempted by food commercials in mass media were 35.4%. The percentage of girl subjects who get tempted by food commercials in mass media and insist on buying them were 64.6 %. Adolescent get tempted by food commercials and they bought most of the calories laden unhealthy food.

4.9.7 DO YOU EAT SNACKS BEFORE BED TIME

(7)	Do you eat snacks just before bed time?	Boys' (N = 500)			Girls' (N = 500)			P. Value
		No.	%	Prevalence	No.	%	Prevalence	$x^2 = 1.9606$
A.	No	233	46.6	0.446	211	42.2	0.422	P > 0.05
B.	Yes	267	53.4	0.534	289	57.8	0.578	Not
Total		500	100	1	500	100	1	Significant

Figure 4.9.7

Distribution of the samples according to their eating habits
(Do you eat snacks just before bed time?)
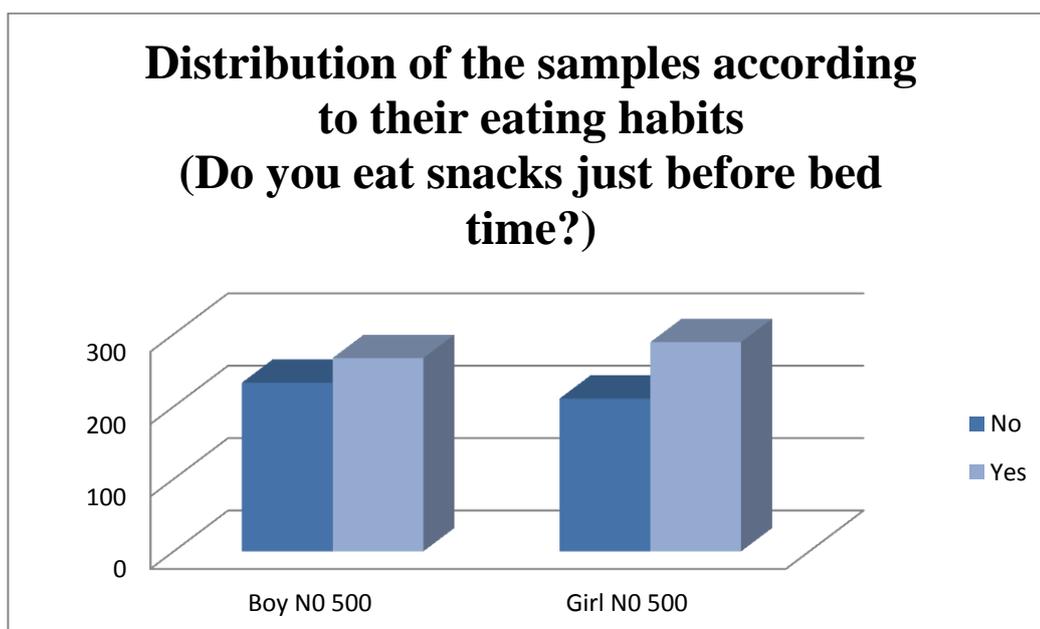
Analysis:

The percentages of adolescent boys of Jhalawar city who don't eat snacks just before bed time were 46.6% and 53.4% boys eat snacks before bed time. The percentages of adolescent girls who don't eat snacks just before bed time were 42.2% and 57.8% girls eat snacks before bed time. Our study concluded that number of students who eat snacks before bed time was higher than those who do not eat snacks before bed time. This causes higher energy intake while resulting.

4.9.8 HOW MANY MEALS DO YOU HAVE DAILY

(8)	How many meals do you have daily?	Boys' (N = 500)			Girls' (N = 500)			P. Value
		No.	%	Prevalence	No.	%	Prevalence	$x^2 = 2.252$
A.	2	37	7.4	0.074	28	5.6	0.056	P > 0.05
B.	3	173	34.6	0.346	189	37.8	0.378	
C.	4	211	42.2	0.422	201	40.2	0.402	Not
D.	5	79	15.8	0.158	82	16.4	0.164	Significant
Total		500	100	1	500	100	1	

Figure 4.9.8

Distribution of the samples according to their eating habits
(How many meals do you have daily?)
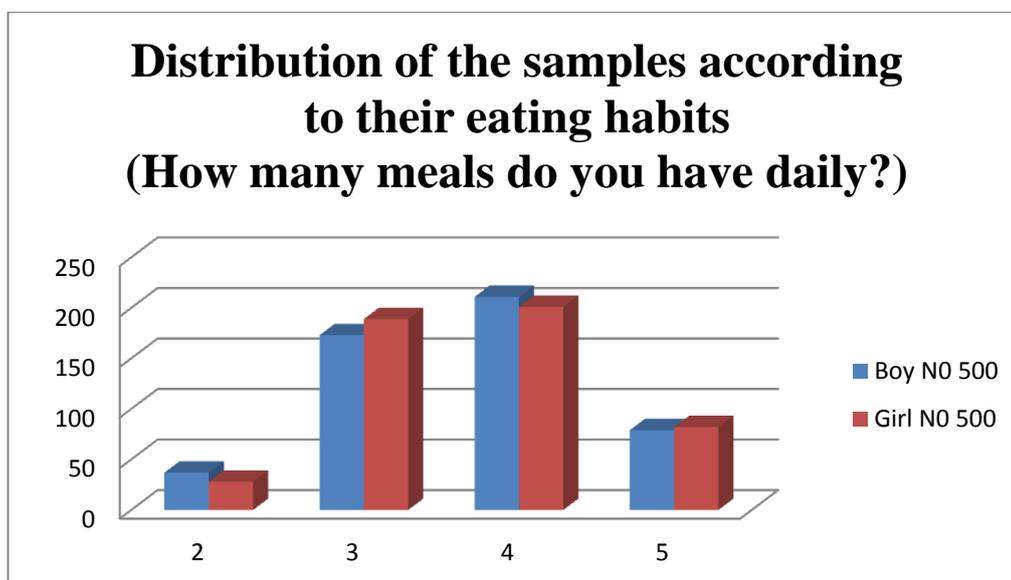
Analysis:

Further the data shows that 7.4% of boys and 5.6% of girls were consuming 2 meals per day. There were 34.6% of boys and 37.8% of girls of jhalawar city had three meals per day. While 42.2% boy subjects and 40.2% girl subjects had four meals per day. While 15.8% of boy subjects and 16.4% of girl subjects had five meals per day. O'Dea (2003) stated that body adiposity increases with age as the people grow older their metabolic rate falls and energy expenditure decreases so eating more frequently unhealthy food. The obese young adults were unaware about their eating habits and were eating whenever they found time to have food. (17)

Table4.10

Distribution of the sample based on duration of sleep

S. No.	Sleep	Boys(N = 500)			Girls(N = 500)			P. Value
		No.	%	Prevalence	No.	%	Prevalence	$x^2 = 5.9385$
1.	< 8 hours	197	39.4	0.0394	223	44.6	0.0446	P < 0.05
2.	8 hours	183	36.6	0.0366	187	37.4	0.374	Not
3.	> 8 hours	120	24.0	0.024	90	18.0	0.018	Significant
	Total	500	100	1	500	100	1	

Figure 4.10

Distribution of the samples based on duration of sleep
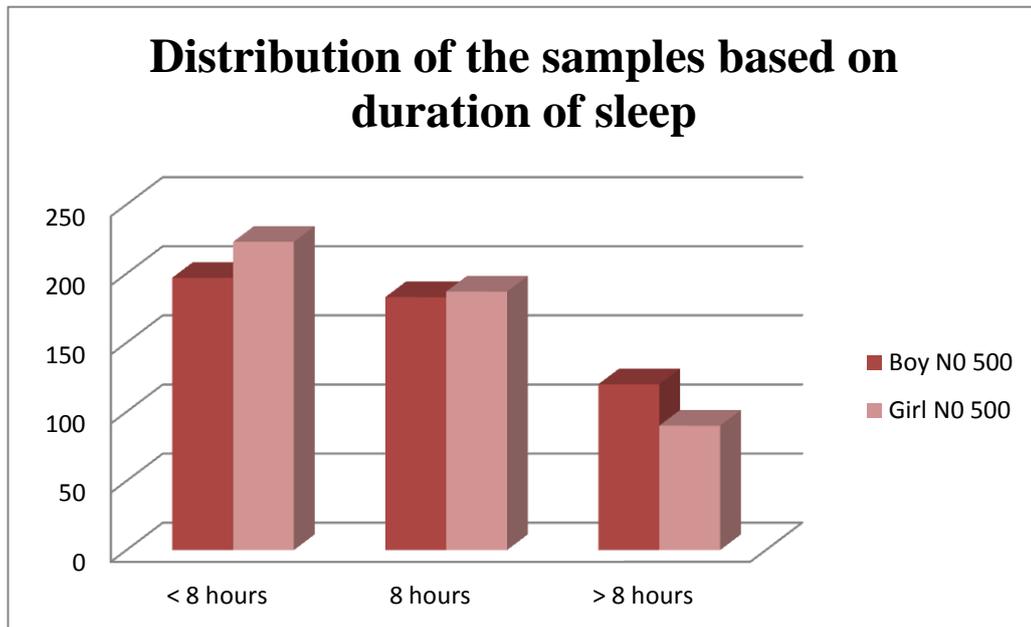
Analysis:

The percentages of adolescents boys and girls of Jhalawar city who had less than 8 hours sleep were 39.4% and 44.6% respectively. The percentages of boys and girls who had 8 hours sleep were 36.6% and 37.4% respectively. The percentages of adolescents boys and girls who had more than 8 hours sleep were 24.0% and 18.0% respectively. The data shows that most of the student boys and girls having less than 8 hours sleep. In today's busy schedule adolescents do not have enough time for sleep indirectly it's related to overweight and obesity. If they don't have enough sleep they will get stressed than they will eat more it will increase their weight.

Table4.11

Distribution of adolescents according to food frequency (Once in a month)

S. No.	Type of Food	Once in a Month					
		Boys			Girls		
		No.	%	Prevalence	No.	%	Prevalence
1.	Sweet	12	2.4	0.024	17	3.4	0.034
2.	Pizza				9	1.8	0.018
3.	Burger						
4.	Chips	17	3.4	0.034	21	4.2	0.042
5.	Samosa						
6.	Pakori						
7.	Cake	7	1.4	0.014	11	2.2	0.022
8.	Ice - Cream	13	2.6	0.026	22	4.4	0.044
9.	Mathri						
10.	Laddu						
11.	Chole Bhature				12	2.4	0.024
12.	Kheer						
13.	Namkeen	21	4.2	0.042	23	4.6	0.046
14.	Kurkure	9	1.8	0.018	13	2.6	0.026
15.	Frankie's						
16.	French Fries						

17.	Chocolates	24	9.0	0.09			
18	Bakery Items	14	7.0	0.07			

Figure 4.11

Distribution of adolescents according to food frequency (Once in a Month)
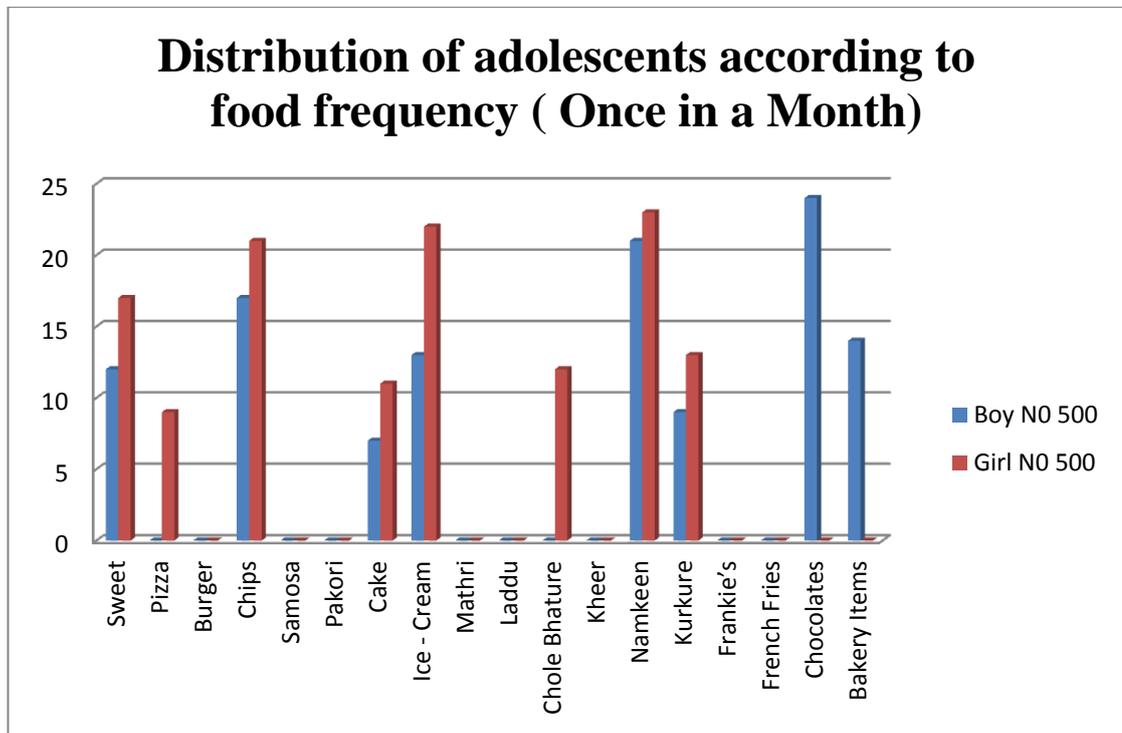
Table4.11

Distribution of adolescents according to food frequency (3 – 4 times in a month)

S. No.	Type of Food	3 – 4 times in a Month					
		Boys			Girls		
		No.	%	Prevalence	No.	%	Prevalence
1.	Sweet						
2.	Pizza						
3.	Burger						
4.	Chips				14	2.8	0.028
5.	Samosa				11	2.2	0.022
6.	Pakori	9	1.8	0.018			
7.	Cake	16	3.2	0.032	12	2.4	0.024
8.	Ice - Cream						
9.	Mathri	12	2.4	0.024			
10.	Laddu						
11.	Chole Bhature	18	3.6	0.036	23	4.6	0.046
12.	Kheer						
13.	Namkeen						
14.	Kurkure						
15.	Frankie's						
16.	French Fries						
17.	Chocolates						
18	Bakery Items						

Figure 4.11

Distribution of adolescents according to food frequency (3 – 4 times in a month)
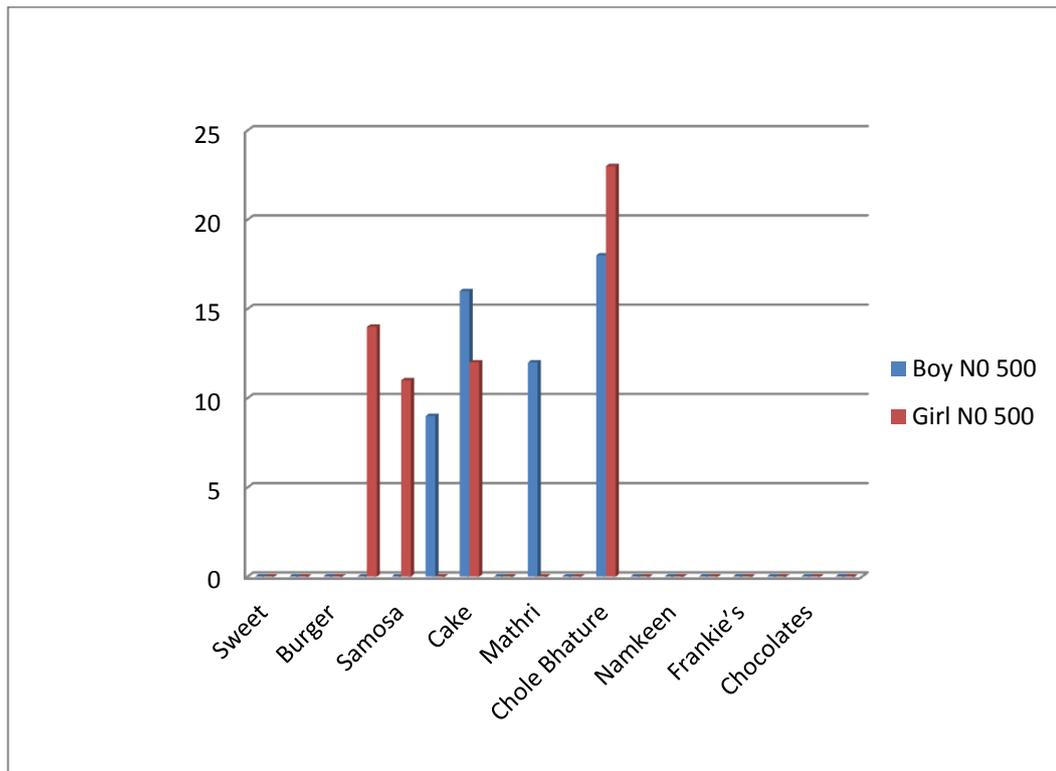
Table4.11

Distribution of adolescents according to food frequency (Once in a week)

S. No.	Type of Food	Once in a Week					
		Boys			Girls		
		No.	%	Prevalence	No.	%	Prevalence
1.	Sweet	19	3.8	0.038			
2.	Pizza	13	2.6	0.026			
3.	Burger				13	2.6	0.026
4.	Chips	21	4.2	0.042			
5.	Samosa						
6.	Pakori						
7.	Cake						
8.	Ice - Cream				14	7.0	0.07
9.	Mathri						
10.	Laddu						
11.	Chole Bhature						
12.	Kheer						
13.	Namkeen						
14.	Kurkure						
15.	Frankie's						
16.	French Fries						
17.	Chocolates	23	4.6	0.046			
18	Bakery Items	11	2.2	0.022			

Figure 4.11

Distribution of adolescents according to food frequency (Once in a Week)
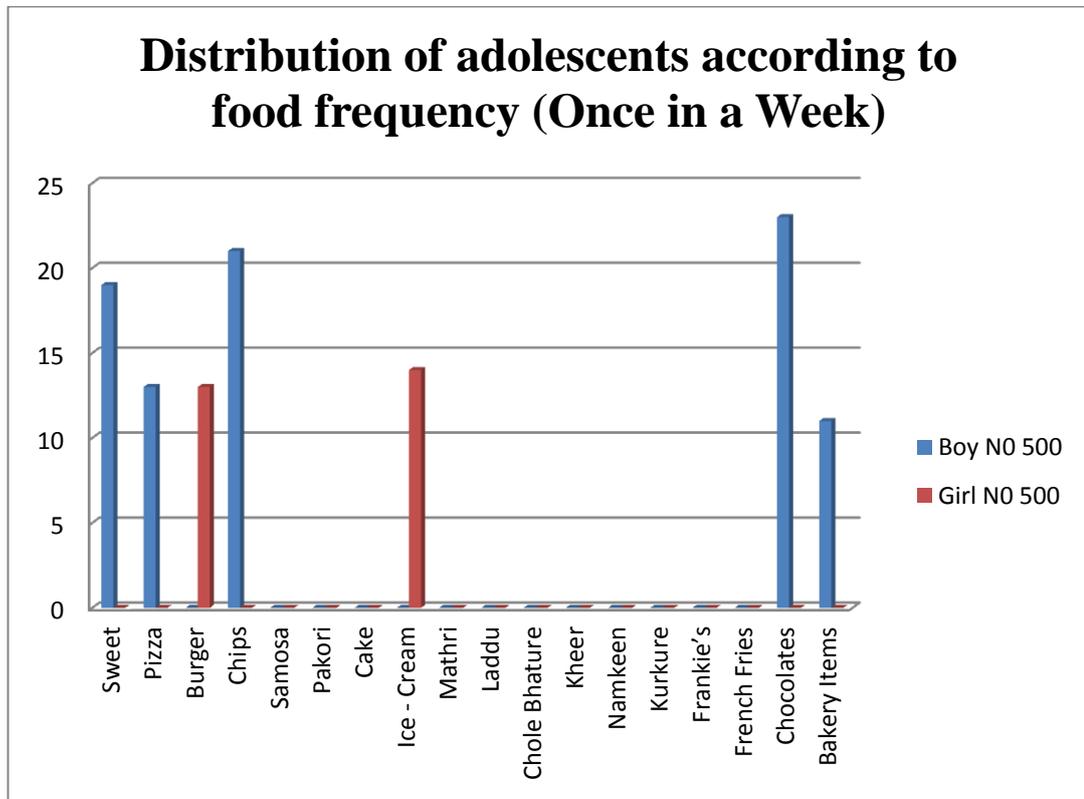
Table4.11

Distribution of adolescents according to food frequency (Twice in a weekly)

S. No.	Type of Food	Twice weekly					
		Boys			Girls		
		No.	%	Prevalence	No.	%	Prevalence
1.	Sweet				16	3.2	0.032
2.	Pizza				9	1.8	0.018
3.	Burger						
4.	Chips	37	7.4	0.072			
5.	Samosa	17	3.4	0.034	18	3.6	0.036
6.	Pakori						
7.	Cake						
8.	Ice - Cream	29	5.8	0.058	21	4.2	0.042
9.	Mathri						
10.	Laddu						
11.	Chole Bhature						
12.	Kheer						
13.	Namkeen						
14.	Kurkure				21	4.2	0.042
15.	Frankie's						
16.	French Fries						
17.	Chocolates	25	5.0	0.05	71	14.2	0.142
18	Bakery Items	15	3.0	0.03			

Figure 4.11

Distribution of adolescents according to food frequency (Twice weekly)

Legend: Boy N0 500, Girl N0 500
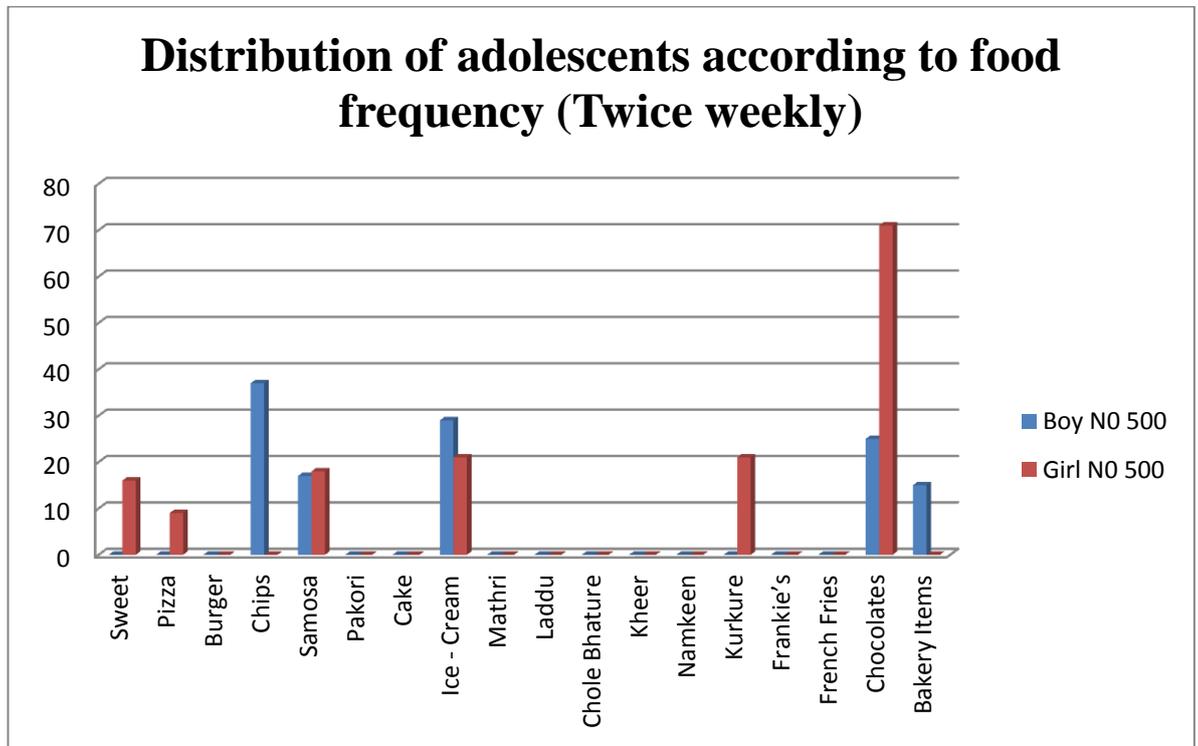
Table4.11

Distribution of adolescents according to food frequency (Daily)

S. No.	Type of Food	Daily					
		Boys			Girls		
		No.	%	Prevalence	No.	%	Prevalence
1.	Sweet						
2.	Pizza						
3.	Burger						
4.	Chips	11	2.2	0.022	17	3.4	0.034
5.	Samosa						
6.	Pakori						
7.	Cake						
8.	Ice - Cream						
9.	Mathri						
10.	Laddu						
11.	Chole Bhature						
12.	Kheer						
13.	Namkeen	33	6.6	0.066	47	9.4	0.094
14.	Kurkure	14	7.0	0.07			
15.	Frankie's						
16.	French Fries						
17.	Chocolates	49	9.8	0.098			
18	Bakery Items	11	2.2	0.022	49	9.8	0.098

S. No.	Type of Food	Daily					

Figure 4.11

Distribution of adolescents according to food frequency (Daily)
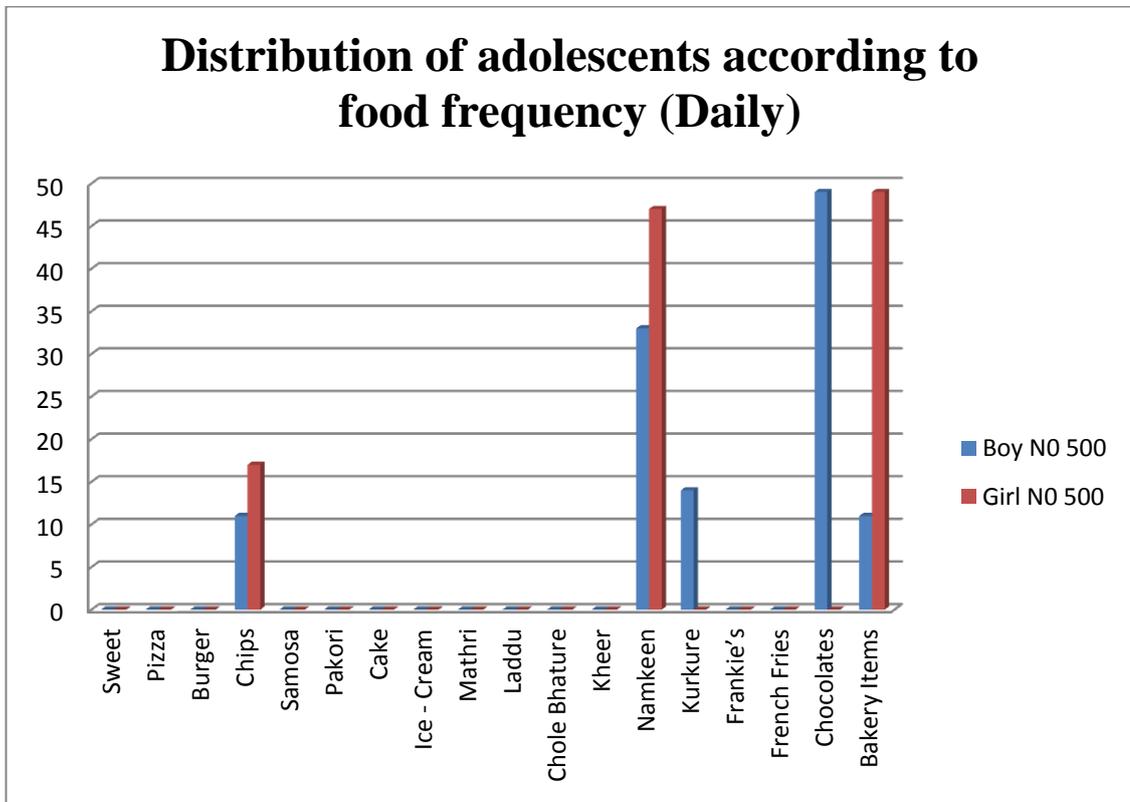
Analysis:

In our study we have focused analysis on frequency of intake of various fast foods, junk foods and chocolate consumption habits by the selected adolescents because that they have special roles in overweight and obesity. The percentage of adolescent boys of Jhalawar city who eat sweet once in a Month was 2.4%, once in a Week was 3.8%. . The percentage of adolescent girls who eat sweet once in a Month was 3.4%, twice weekly was 3.2%. The percentage of adolescent boys who eat pizza once in a Week was 2.6%. The percentage of adolescent girls who eat pizza once in a Month was 1.8%, twice weekly was 1.8. The percentage of girls who eat burger once in a Week was 2.6%. while Adolescent boys who eat chips once in a Month was 3.4%, once in a Week was 4.2%, Twice weekly was 7.4%, daily was 2.2%. Adolescent girls who eat chips once in a Month were 4.2%, 3 – 4 times in a Month was 2.8%, and daily was 3.4%. The percentage of adolescent boys who eat samosa twice weekly was 3.4 %. The percentage of girls who eat samosa 3 – 4 times in a Month was 2.2%, twice weekly was 3.6%. %. Adolescent boys who eat pakori 3 – 4 times in a Month were 1.8%. The percentage of adolescent boys who eat cake once in a Month was 1.4%, 3 – 4 times in a Month was 3.2%. The percentage of girls who eat cake once in a Month was 2.2%, 3 – 4 times in a Month was 2.4%. Adolescent boys who eat ice cream once in a Month was 2.6%, twice weekly was 5.8%. Adolescent girls who eat ice cream once in a Month were 4.4%, once in a Week 7.0%, twice weekly was 4.2%. The percentage of adolescent boys who eat Mathri 3 – 4 times in a Month was 2.4%. Adolescent boys who eat chole bhature 3 – 4 times in a Month were 3.6%. Adolescent girls who eat chole bhature once in a Month was 2.4%, 3 – 4 times in a Month was 4.6%. The percentage of adolescent boys who eat namkeen once in a Month was 4.2, daily was 6.6%. The percentage of girls who eat namkeen once in a Month was 4.6%, daily was 9.4%. Adolescent boys who eat kurkure once in a Month was 1.8%, daily was 7.0%. Adolescent girls who eat kurkure once in a Month were 2.6%, twice weekly 4.2%. The percentage of adolescent boys who eat Chocolates once in a Month was 9.0%, once in a Week was 4.6%, twice weekly 5.0%, daily was 9.8%. The percentage of girls who eat Chocolates Twice weekly was 14.2%.

Adolescent boys who eat Bakery Items Once in a month was 7.0%, Once in a Week was 2.2%,Twice weekly was 3.0%, Daily was 2.2%. Adolescent girls who eat Bakery Items Daily were 9.8%. These results associate well with earlier reports which suggest that junk food (bakery items, pizza, burger, cheese, butter, oily items) chocolate intake tends to be more common among overweight and obese adolescents than among normal-weight adolescents.(14,29)

Junk food contains more amounts of fat than carbohydrate and protein.(2) Similarly irregular food intake deleteriously affects nutritional health, reduces energy levels and promotes the expenditure of high caloric food later in the day.(28) Consumption of junk/ fast foods was found to be most prevalent on alternate days. Briefel and Johnson (2006) observed that adolescents do not consume the recommended number of servings of fruits, vegetables and dairy products; and they consume excessive amounts of added sugar, fat and saturated fat.(4) These figures correlate very well with the present study and indicate a growing trend of adolescents succumbing to poor eating habits.

Nutrition education has a very important role to play in creating awareness about the balanced diet and healthy food choices amongst adolescents and their parents in improving the health status of adolescents.

Table4.12

Distribution of the adolescents according to their Physical activity

S.No	Particulars	Boys(N = 500)			Girls(N = 500)		
		No	%	Prevalence	No	%	Prevalence
1	**Type of Exercise**						
	Walking	23	4.6	0.046	17	3.4	0.034
	Jogging	8	1.6	0.016			
	Cycling	47	9.4	0.094	29	5.8	0.058
	Sports	38	7.6	0.076	34	6.8	0.068
	Aerobics						
	Swimming	13	2.6	0.026			
	Yoga				14	2.8	0.028
	Dance				23	4.6	0.046
	Total	129	25.8	0.258	117	23.4	0.234
2	**Frequency of Exercise**						
	Rarely	23	4.6	0.046	25	5.0	0.05
	Twice a Week	55	11.0	0.11	63	12.6	0.126
	Thrice a Week	39	7.8	0.078	22	4.4	0.044
	Daily	11	2.2	0.022	7	1.4	0.014
3	**Duration of Exercise**						
	< 30 minute	129	25.8	0.258	117	23.4	0.234
	30-60 minute	72	14.4	0.144	54	10.8	0.108
	> 60 minute	57	11.4	0.114	63	12.6	0.126

Figure 4.12

Distribution of the adolescents according to their Physical activity (Type of Exercise)

Distribution of the adolescents according to their Physical activity (Frequency of Exercise)
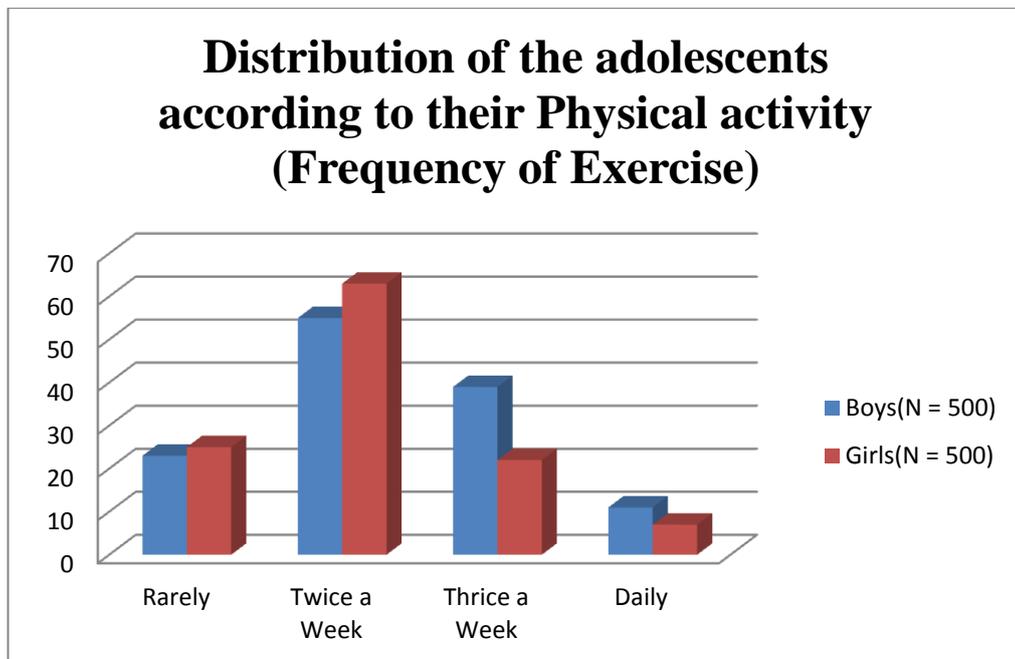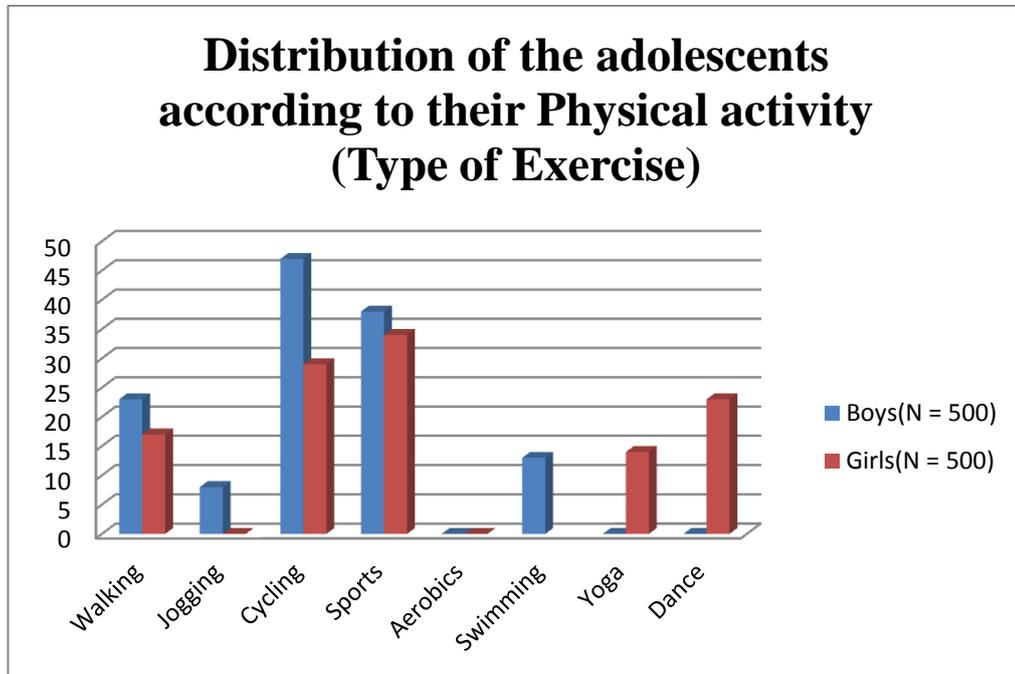
Distribution of the adolescents according to their Physical activity (Duration of Exercise)
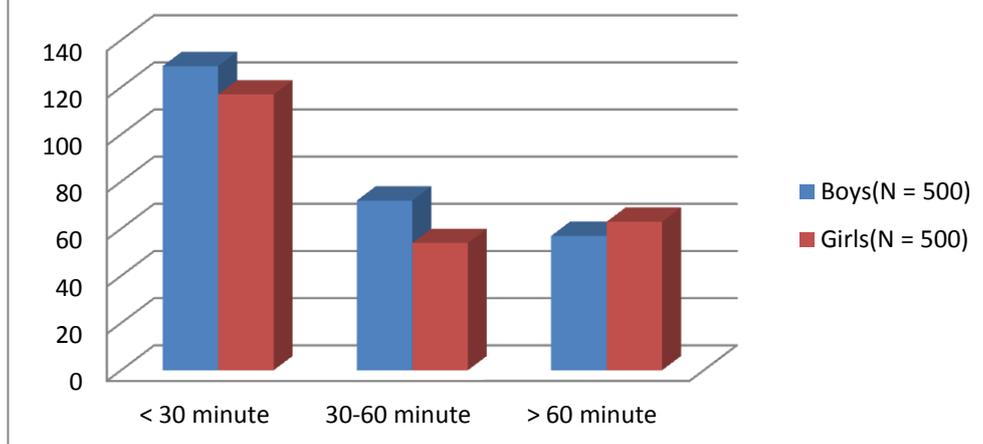
Analysis:

Data indicates that adolescent boys of jhalawar who were walking were 4.6% and adolescent girls who were walking were 3.4%. Adolescent boys who were jogging were 1.6%. Boy subjects who were cycling were 9.4% and girls were 5.8%. While the boy subjects who were participate in sports were 7.6% and girls were 6.8%. Boys who were swimming were 2.6%. Adolescent girls who were doing yoga were 2.8%.The girl subjects who were adopted dance were 4.6%. Data indicates that frequency of exercise in boy subjects rarely was 4.6% and 5.0% was in girl subjects. Frequency of boys exercise twice a week was 11.0% and 12.6%was in girl subjects. Frequency of boys exercise thrice a week was 7.8% and 4.4% was in girls. Frequency of exercise in boys subjects daily was 2.2% and 1.4% was in girls subjects. The adolescent boys who were doing exercise <30 minutes were 11.4% and 12.6% was in girls. The duration of exercise in boys was 30 – 60 minutes were 14.4% and 10.8% was in girls. Duration of exercise in boys >60 minutes were 25.8% and 23.4% was in girls. Sports were most preferred form of exercise by the subjects followed by walking, cycling and yoga among subjects. Majority of subjects did exercise for less than 30 minutes only. According to Popkin

(1994), Evidence suggests those modern inactive lifestyles are at least as important as diet in the aetiology of obesity and possibly represents dominant factor. So exercise routine was not found more among subjects. (21)

Table4.13

Distribution of Adolescent boys' and girl by overweight and obesity related complications

	Boys			Girl		
	No	%	Prevalence	No	%	Prevalence
Without complain	414	82.8	0.83	393	78.6	0.79
Diabetes	3	0.6	0.01	4	0.8	0.01
Day time sleep	7	1.4	0.01	4	0.8	0.01
Snoring	7	1.4	0.01	9	1.8	0.02
Back pain	20	4	0.04	19	3.8	0.04
Ankle & foot pain	18	3.6	0.04	23	4.6	0.05
Asthma	3	0.6	0.01	7	1.4	0.01
Headache	22	4.4	0.04	27	5.4	0.05
migraine	10	2	0.02	3	0.6	0.01
kidney diseases	15	3	0.03	11	2.2	0.02

Figure 4.13

Distribution of Adolescent boys and girl by overweight and obesity related complications
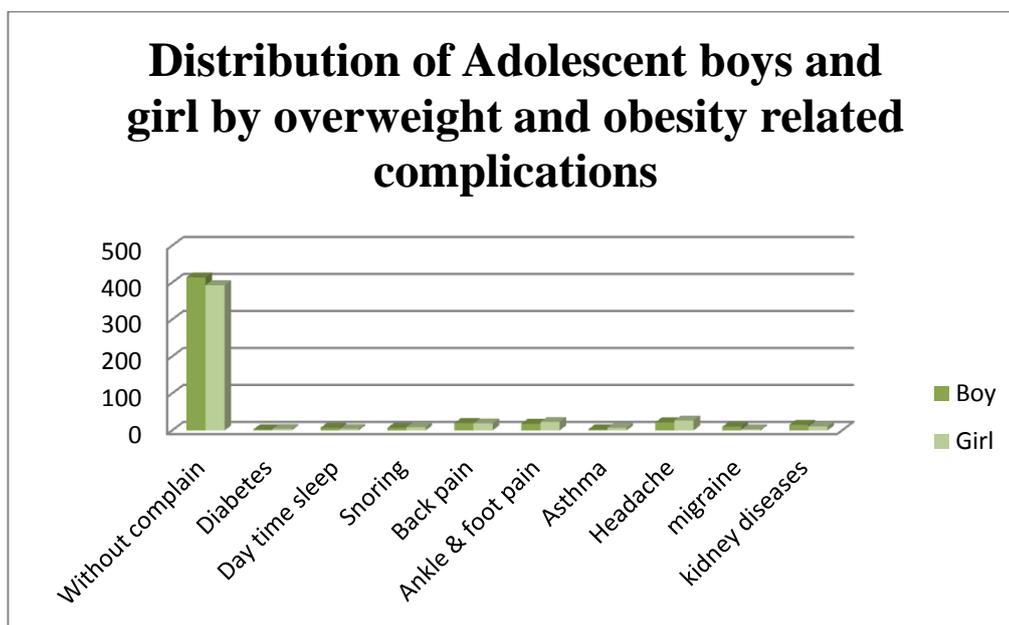
Analysis:

Table gives the present complaint of health of adolescent boys. The number of adolescent boys without any health complaint was 82.8%. while 0.6% of adolescent boys complained of diabetes, 1.4%day time sleep, 1.4% snoring, 4.0% back pain, 3.6% ankle and foot pain, 0.6% asthma, 4.4% headache, 2.0% migraine and 3.0% kidney diseases. The observations in the study were better to the findings of King (1996) who reported 24% of boys' in 13-15 years complained of headache.(12) Starfield (1995) also reported health problems in adolescents of all age groups.(25)This finding highlights the need for arrangement of adolescent at home and in schools also.

Table 4.14 gives the present complaint of health of adolescent girls. The number of adolescent girls without any health complaint was 78.6%. While 0.8% of adolescent girls complained of Diabetes,0.8% day time sleep, 1.8% snoring, 3.8% back pain, 4.6% Ankle & foot pain, 1.4% asthma, 5.4% headache, 0.6% migraine and 2.2% kidney disease. The findings of present study are comparable to W H O

report which revealed many deceases were seen in girl adolescents. Apley (1975) also reported Ankle & foot pain problems in adolescents. (1) The findings of Pati (2004) reported a significant section of adolescent girls had kidney diseases. (19)

Table 4.14

Three day dietary analysis

Nutrients	Adolescents Boys	Adolescents Girls	RDA (g/day)	
			Boys	Girls
Energy (kcal)	2676 ± 248.6	2551 ± 252.6	2500	2200
Proteins (g)	56.6 ± 4.54	49.02 ± 9.7	55	50
Fat & Oils (g)	60.1 ± 5.27	63.22 ± 14.63	50	50
Carbohydrates (g)	447.1 ± 79.5	426.4 ± 67.92	250 - 400	250 - 400
Dietary Fibre (g)	19.8 ± 4.10	23.3 ± 4.87	25 - 40	25 - 40
Calcium (mg)	1238.6 ± 39.6	1263.1 ± 59.04	1300	1300
Iron (mg)	24.86 ± 11.4	20.9 ± 6.65	28	30
Beta carotene (mcg)	2126.4 ± 48.17	1929.5 ± 51.9	2400	2400
Thiamine (mg)	0.686 ± 0.26	0.748 ± 0.23	1.2	0.9
Riboflavin (mg)	0.82 ± 0.32	0.87 ± 0.21	1.4	1.2
Niacin (mg)	9.44 ± 2.77	9.54 ± 2.20	10	12
Ascorbic Acid (mg)	31.4 ± 6.35	32.8 ± 5.65	40	40

Ref. Gopalan et al (2004)(7)

Sidak's multiple comparisons test	Mean Diff.	95.00% CI of diff.	Significant?	Summary	Adjusted P Value
Adolescents Boys' - Adolescents Girls					
Energy (kcal)	125	110.8 to 139.2	Yes	****	<0.0001
Proteins (g)	7.58	-6.577 to 21.74	No	ns	0.8011
Fat & Oils (g)	-3.12	-17.28 to 11.04	No	ns	0.9999
Carbohydrates (g)	20.7	6.543 to 34.86	Yes	***	0.0004
Dietary Fibre (g)	-3.5	-17.66 to 10.66	No	ns	0.9996
Calcium (mg)	-24.5	-38.66 to -10.34	Yes	****	<0.0001
Iron (mg)	3.96	-10.2 to 18.12	No	ns	0.9987
Beta carotene (mcg)	196.9	182.7 to 211.1	Yes	****	<0.0001
Thiamine (mg)	-0.062	-14.22 to 14.1	No	ns	>0.9999
Riboflavin (mg)	-0.05	-14.21 to 14.11	No	ns	>0.9999
Niacin (mg)	-0.1	-14.26 to 14.06	No	ns	>0.9999
Ascorbic Acid (mg)	-1.4	-15.56 to 12.76	No	ns	>0.9999

Analysis:

The mean daily energy and nutrient intake of the subjects was calculated. In table no. 4.15 the values are elaborated and are compared with the Recommended Dietary Allowance (RDA). The total subjects were 1000 in number and were divided into boys and girls subject from Jhalawar city as 500 each.

Energy:

The mean daily intake of energy of boy subjects of Jhalawar was 2676 Kcal ± 248.6 Kcal while the mean value of girl subjects was 2551Kcal ± 252.6 Kcal. Due to sedentary lifestyle, the human body is not able to splurge the calorie load in the body. (Kopelman, 2006). The modern lifestyle adopted by the subjects was responsible for their excess energy intake. (Richards 2007) reported that a change in dietary habits and increased consumption of energy dense food is one of the major causes of obesity among young adults. Two minutes noodles and other junk foods are responsible for distorting dietary habit in young generation.(17)

Proteins:

The mean value of proteins of boys belonging to Jhalawar city was 56.6 g/day ± 4.54 g/day. Similarly the mean value of girls from Jhalawar was 49.02 g/day ± 9.72 g/day. The proteins contribute to 4kcal/gm and a combination of proteins, fats and carbohydrates gives that total energy value.

Fat:

The fat intake of both boys and girls was quite high as compared to RDA of 50g/day. The mean value of fats of males belonging to Jhalawar city was 60.1 g/day ± 5.27 g/day. Similarly the mean value of girls from Jhalawar city was 63.22 g/day ± 14.63 g/day. Mishra (2008)stated that modern societies are

fascinated with a diet high in saturated fats sugar and refined foods but low in fibre often termed as '' western diet''. One gram of fat in body contributes 9kcals so fats are energy dense foods. A change in dietary habits and increased consumption of energy dense food is one of the major causes of obesity among young adults.(16)

Carbohydrates:

The mean value of carbohydrates of boys belonging to Jhalawar city was 447.1 g/day ± 79.5 g/day . Similarly the mean value of girls from Jhalawar was 426.4 g/day ± 67.9 g/day. Richards (2007) stated that two minute noodles and other junk foods are responsible for distorting dietary habits in young generation and these food products contain simplest form of carbohydrates with high glycemic index. The foods with high glycemic index were converted to fatty acids more easily. The intake of carbohydrate of both boys and girls subject was quite high.(17)

Dietary Fibre:

Most studies reviewed a lower fibre intake in the overweight and obese individuals (Sharma, 2004). The mean value of dietary fibre of boys belonging to Jhalawar was 19.8 g/day ± 4.10 g/day. The mean fibre intake of girls from Jhalawar city was 23.3 g/day ± 4.87 g/day. Leslie (2007) stated that the food changes include greater saturated fats and less fibre causing accumulation of fats in the body leading to the condition of overweight and obesity. The digestion of fibre requires calorie consumption i.e. about 1 gm of fibre digestion in the body requires use of 10kcals. (5)

Calcium:

The intake of calcium of both boys and girls subject was quite high as compared to RDA of 400mg/day as the consumption of full cream milk and milk products was more prevalent among the subjects. The mean value of calcium of boys was

438.6 mg/day ± 39.6 mg/daywhile the mean value of girls was 333.1 mg/day ± 59.04 mg/day. According to Kalsi (1989), a large number of studies with obese North Indians have found high calcium intake. (3)

Iron:

The mean value of Iron of boys belonging to Jhalawar city was 24.86 mg/day ± 11.4 mg/day while the mean value of girls was 20.9 mg/day ± 6.65 mg/day. The intake of Iron of both boys and girls subject was quite low compared to RDA of 28/30 mg/day. The low levels of iron in the subjects were due to low intake of green leafy vegetables which shows lack of healthy food intake among the subjects.

Beta Carotene:

The intake of Beta Carotene intake of both male and female subjects was average as compared to RDA of 2400 micrograms/day. The mean value of Beta Carotene of boys was 2126.4 mg/day ± 48.17 mg/day while the mean value of girls was 1929.5 mg/day ± 51.9 mg/day. The subjects were including in intake of mangoes and carrots so the value almost matched to RDA'S.

Thiamine:

The thiamine intake of both boys and girls was low as compared to RDA of 1.2 mg/day in boys and 0.9 mg/day in girls. The mean value of thiamine of boys in Jhalawar city was 0.686 mg/day ± 0.26mg/day while the mean value of girls was 0.748 mg/day ± 0.23 mg/day.

Riboflavin:

The mean value of riboflavin intake of boys was 0.82 mg/day ± 0.32 mg/day while the mean value of girls from Jhalawar city was 0.87 mg/day ± 0.21 mg/day. the intake of riboflavin of both boy and girls subjects was quite low as compared to RDA 1.4 mg/day in boys and 1.2 mg/day in girls.

Niacin:

The niacin intake of both boy and girl subjects was low as compared to RDA of 10 mg/day in boys and 12 mg/day in girls. The mean value of niacin of boys from Jhalawar city was 9.44 mg/day ± 2.77 mg/day while the mean value of girls was 9.54 mg/day ± 2.20 mg/day.

Ascorbic Acid:

The ascorbic acid intake of both boys and girls subject was low as compared to RDA of 40 mg/day. The mean value of ascorbic acid of boys was 31.4 mg/day ± 6.35 mg/day while the mean value of girls from Jhalawar city was 32.8 mg/day ± 5.65. Thus it was found that the subjects consumed excess of fats, proteins and carbohydrates but the vitamins and minerals were deficient in their daily diet. According to leslie (2007) a change in dietary habits and increased consumption of energy dense food is one of major cause of overweight and obesity among adults.(5)

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CHAPTER- 5

CHAPTER 5 CLASSIFIED INTO THE SUBSEQUENT CATEGORIES

5.1 HYPOTHESIS TESTING

5.2 RECCOMENDATION

5.3 APPENDIX

5.4 SUMMARY

5.1 HYPOTHESIS TESTING

(1) In hypothesis 1 it was hypothesized that there is prevalence of overweight and obesity among school going adolescents boys and girls. In order to verify this hypothesis, a comparison between the means scores of the subjects of these two groups on body mass indices was made. The body mass index of subjects was quite higher than normal ratio .This fact is statistically verified. Thus hypothesis 1 is accepted.

(2) In hypothesis 2, it was hypothesized that the subjects belonging to high socio economic status would score significantly higher on body mass indices than the subjects from low socio economic status group. In order to verify this hypothesis, a comparison between the means scores of the subjects of these two groups on body mass indices was made. The body mass index of subjects belonging to high socioeconomic status is significantly higher than the subjects belonging to low socioeconomic status beyond .01 levels of significance. This fact is statistically verified. Thus hypothesis 2 is accepted.

(3) In hypothesis 3, it was hypothesized that the obesity is more prevalent among school going adolescent girls as compared to school going adolescent boys. In order to verify this hypothesis, a comparison between the means scores of the subjects of these two groups on body mass indices was made. The BMI of girls are significantly higher than boys. This fact is statistically verified Thus hypothesis 3 is accepted.

(4) In hypothesis 4, it was hypothesized that the obesity is associated with dietary pattern of school going adolescents. In order to verify this hypothesis, a comparison between the means scores of the subjects of these two groups on body mass indices was made. Body mass index of subjects consuming excessive food is Significantly higher than the subjects who consume less amount of food beyond .01 levels of significance. Thus hypothesis 4 is accepted.

5.2 RECCOMENDATION

In the current study, the bulk of adolescents were overweight and obese. The diets of the youngsters were missing in most of nutrients. Therefore need of hour is to assist adolescents through health support to stop common infections, facilitate them to pick out right kind of food for consumption and create psychosocial awareness and support for higher improvement. Evenly it's necessary to take advantage of their potential to form them as productive individuals. Those in academics, parents, society and their peers have to be compelled to play a crucial role. Adolescent fitness and nutrition programs and school health programs are meant for keeping watch on adolescent health. However, they're not in place in most of the states together with our state. The role of primary health care through varied peripheral institutions until date wasn't adolescent friendly and adolescents belonged to no-man's-land.

In order to line up the activities following is recommended: -
(1). It is recommended that the awareness regarding overweight and obesity must be created in schools through awareness programme.   (2). It is recommended that the Government should insist on all schools to provide playground facilities and mandatory physical education programme.   (3). It is recommended that physical education teacher must be appointed in every school in keeping with the student teacher ratio. The physical education teacher play an important role in transportation a healthy life applies among the adolescents with the assistance of the school management and parents.

(4). Adolescents are a nutritionally and psychologically vulnerable group and should be of special preference and addressed as a special target category in developmental programmes.

(5). The health observance of youngsters whether at home or in schools is very important and arrangement for "special adolescent health clinics" at outer boundary as a element of primary health care or school health program can go a protracted manner in improving the health of our adolescent. Further female

health workers need to be appointed for taking care of the health of adolescent girls.

(6). Media must come to forward in providing the right data and shaping the higher future lines of adolescents and may contain such programs or literature to adolescents which might spoil his/her future.

(7). Regular exercise is effectively related to health status, feeling assured making friends and utilizing time properly. Thus physical exercises must be promoted in schools and participation of all students be created necessary as a result on improved physical mental and socio psycho behaviour of youngsters. (8). School prospectus must have a lot of age-relevant education on nutrition, sleep hygiene, peer victimization and physical activity to target the needs of adolescents, targeted towards them.

(9).The parents must play an important role in forming the healthy life style in their kids and develop good exercise habits that are continued throughout their lives.

(10). It absolutely was recommended that a similar study could also be conducted with larger samples, which would support the findings of this study.

(11). It absolutely was recommended that there is a necessity for a lot of research in this field. Obesity awareness week could also be conducted annually throughout the State in order to have fit citizens.

5.3 APPENDIX

QUESTIONAIRE

Prevalence of Overweight and obesity
In School Going Adolescents:
It's Relationship with Socioeconomic Status
And Gender Difference

This data is needed for the purpose of research and shall be kept confidential kindly fill all the details honestly, without leaving out any details.

A. <u>STUDENT DETAIL</u>

1. Student's Name:............................   2. Class: ....

3. Date of Birth:....../......./...............   4. School's Name:.......................

5. Residential

Address:...

....

....

6. **Sex: Male** ☐   **Female** ☐

7. **Type of Family: Joint** ☐   **Nuclear** ☐

Scoring: Joint - O, Nuclear - 1

B. <u>ANTHROPOMETRIC PARAMETERS</u>

1. Hight (Cm)   :

2. Weight (Kgs)   :

3. Waist Circumference (Cm) :

4. Hip Circumference (Cm)   :

5. Skinfold thickness   :

a. Biceps   :   b. Triceps :

c. Sub scapular :   e. Abdominal :

C. <u>SOCIO - ECONOMIC STATUS</u>

"√" Tick appropriate columns:

Category	Father	Mother	Score
A. Education			
1. Professors			7
2. Graduate or Post Graduate			6
3. Post high school diploma			5
4. High school certificate			4
5. Middle school certificate			3
6. Primary school certificate			2
7. Illiterate			1
B. Occupation			
1. Profession			10
2. Semi – profession			6
3. Clerical, Shop-owner, Farmer			5
4. Skilled worker			4

5. Semi Skilled worker			3
6. Unskilled worker			2
7. Unemployed			1
C. Family income per month in Rs.			
1. 34830			12
2. 17415 – 34829			10
3. 13029 – 17414			6
4. 8707 – 13028			4
5. 5224 – 8706			3
6. 1744- 5223			2
7. 1743			1

KUPPUSWAMY'S SOCIO-ECONOMIC STATUS SCALE

CATEGORY	SCORE
A. Education	
Professors or honors	7
Graduate or post graduate	6
Intermediate or post high school diploma	5
High school certificate	4
Middle school certificate	3
Primary school certificate	2
Illiterate	1
B. Occupation	
Profession	10
Semi-profession	6
Clerical, shop-owner, farmer	5
Skilled worker	4
Semi-skilled worker	3
Unskilled worker	2
Unemployed	1
C. Family income per month in Rs.	
34830	12
17415 – 34829	10
13029 – 17414	6
8707 – 13028	4
5224 – 8706	3
1744 – 5223	2
1743	1

SOCIO – ECONOMIC CLASS	TOTAL SCORE
Upper (I)	26-29
Middle (II)	11-25
Lower (III)	5 -10

From : Kuppuswamy B., Manual of socio – economic status scale (urban). Delhi ;Manasyan; 1981.

D. <u>DIETARY HISTORY</u>

"√" Tick appropriate columns:

1.	Food Habits		Score
	Vegetarian		0
	Eggetarian		1
	Nonvegetarian		2

2.	How often do you eat out in restaurant?		Score
	Rarely		0
	1-3 times in a month		1
	Once a week		2
	2-4 times in a week		3

3.	At school, you usually?		Score
	Skip lunch		0
	Bring your lunch from home		1
	Buy a meal from cafeteria		2
	Buy fast food.		3

4.	When you're eating, which of the following do you do ?		Score
	I don't do anything else while I eat		0
	Read		1
	List to my iPod		2
	Study or do Home work		3
	Watch tv		4

5.	What type of food do you prefer ?		Score Vad
	Boiled		0
	Less Spicy		1
	Roasted		2
	Very Spicy		3
	Fried		4

6.	Do you get tempted by food commercials in mass media and insist on buying them ?		Score
	No		0
	Yes		1

7.	Do you eat snacks just before bed time ?		Score Vad
	No		0
	Yes		1

8.	How many meals do you have daily?		Score
	2		0
	3		1
	4		2
	5		3

9- Intake of calorie dense foods please indicates the quality tick "√" for frequency?

S.No.	Name of Food	Once in a Month	3-4 time in a Month	Once a week	Twice weekly	Daily
1.	Sweets					

2.	Pizza					
3.	Burger					
4.	Chips					
5.	Samosa					
6.	Pakori					
7.	Cake					
8.	Ice-cream					
9.	Mathri					
10.	Laddu					
11.	Chole Bhature					
12.	Kheer					
13.	Namkeen					
14.	Kurkure					
15.	Frankies					
16.	French Fries					
17.	Chocolates					

18.	Bakery items					318

Scoring Instructions : Once in a month - 0,   3-4 time in a month -1

Once a week - 2,   Twice weekly -3,   Daily-4

E. INDICATE THE FREQUENCY OF EXERCISE THAT YOU DO

S.No.	Name of exercise	Time in Minute	Rarely	Twice a week	Thrice a week	Daily
1.	Walking					
2.	Jogging					
3.	Cycling					
4.	Stretching					
5.	Sports					
6.	Aerobics					
7.	Swimming					
8.	Yoga					
9.	Dance					
10.	Gym					

Scoring Instruction:

Rarely - 0,   Twice a week - 1,   Thrice a week - 2,   Daily - 3

F. __OBESITY RELATED COMPLICATIONS__

Please "√" all that applies to you………………………..

Condition	Past	Now	Score
High blood pressure			1
Diabetes			1
Sleep Apnea			1
Day time sleepiness			1
Snorring			1
Joint Pain			1
Back pain			1
Ankle & Foot pain			1
Swelling of feet			1
Asthma			1
Headches			1
Migraines			1
Kidney disease			1

Arthritis			1	
Depression			1	
Other			1	

	HOW MANY HOURS DO YOU SLEEP DAILY "√" ALL APPROPRIATE BOXED		Score Vad
H.			
	Less than 8 hours		0
	8 Hours		1
	Greater than 8 hours		2

I. THREE DAY DIETARY RECALL

Details regarding the intake of particular food tick "√" for frequency.

Food Items	Quantity 1 Cup = 200ml 1 Tsp = 5gm 1 Tbsp = 15 gm No/Cups	First working day	Second working day	Non-working day
1. MILK AND MILK PRODUCTS				
Milk Cow				
Milk Buffalo				
Skimmed Milk				
Curds				
Cheese				
Paneer				
2. FLESHY FOODS:				
Mutton				
Chicken				
Egg				

Fish				
3. FATS AND OIL				
Oil				
Ghee				
Butter				
4. DRY FRUITS				
Almond				
Cashewnut				
Walnut				
Pistacho				
5. SUGAR				
JAGGERY				
6. CEREALS Cooked volume				
Boiled Rice				
Chapaati				

Idli				
Dosa				
Bread				
Corn Flakes				
Noodles				
Poha				
Parantha				
Poori				
7. PULSES : COOKED VOL				
Lentil				
Red Gramdhal				
Horse gram				
Green Gram				
8.GREEN LEAFY VEGETABLES				
Corriander leaves				

Cabbage				
Spinach				
9. OTHER VEGETABLES				
Ladies finger				
Bottle Gourd				
Cauliflower				
Parwal				
Torai				
Colocasia				
Bitter gourd				
Potato				
Tomato				
Brinjal				
Raddish				
Onion				

Pumpkin				
Beet Root				
Peas				
10. FRUITS				
Mango				
Pear				
Apple				
Banana				
Melon				
Guava				
Orange				
Grapes				
Pappaya				
Pineapple				
11. PREPARED FOODS				
Pickles				

Biscuits				
Pappad				
Chips				
Cutlets				
Maggi				
Samosa				
Jam				

SUMMARY OF THE PhD THESIS

ENTITLED

"Prevalence of Overweight and Obesity in School Going Adolescents: It's Relationship with Socioeconomic Status and Gender Differences"

University of Kota, Kota
In the Faculty of Social Science (Home Science)
By
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SUBMITTED TO

Under the supervision of
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GOVERNMENT GIRLS P.G. COLLEGE, JHALAWAR
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2017

SUMMARY OF THE STUDY

Adolescence is a middle stage of physical and emotional human being development usually taking place during the period from teenage years to legal adulthood.[1] Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health[27]. It is generally recognized that increase in body weight over the normal is due to the fat deposition in the body[2].Overweight and obesity are the fifth leading risk factors for global deaths[3]. At least 2.8 million adults die each year as a result of being overweight or obese. Overweight and obesity are linked to more deaths worldwide than underweight[4]. For examples 65% of the world's population live in countries where overweight and obesity kill more people than underweight (this includes all high income and most middle income countries)[4]. The prevalence is higher in the urban than in the rural areas. Urbanization, industrialization and socioeconomic factors are the main culprits for the country to witness the prevalence of overweight and obesity among adolescents. Life style has greatly contributed to obesity among adolescents over the last five years and obese children have been reported to be physically less active, more home bound, spending more time on internet, playing video games and watching TV, as well as having easy access to fast food in urban settings.5

There are very restricted studies conducted on overweight and obesity. This study is simply a new effort to alert adolescent towards their health. The aim of the study was to research the body mass index status and to see the result of overweight and obesity at school going adolescents and its relationship with socioeconomic status and gender differences among school going adolescents boys' and girls'. Thus in the present study, an effort has been created to get baseline information regarding the present prevalence of overweight and obesity and factors related to it among school going adolescents of Jhalawar city (Rajasthan).

One thousand adolescents between 13- 18 years of age were selected by purposive random sampling. The height and weight of all the subjects was calculated to find

overweight, obese and normal subjects among all of them. The general information of the subjects on their age, type of school, family type, parents occupation and education, eating habits and like and dislikes, dietary consumption, physical activities of adolescents was collected. Statistical analysis was done using Statistical Package for Social Sciences.

The conclusion of the study is summarized as follows: - (1) In our study 50% of the sample were boys' and the rest 50% were girls. Prevalence was 0.5 and 0.5 for each.

(2) The analysis of the data showed that 14.4% boys' and 10.2%girls' were from joint family and 85.6% boys' and 89.8% girls' were from nuclear family system.

 (3)The anthropometry measurements of adolescents' shown that they had extra weight for height as compared to standards.

(4). The BMI analysis of adolescent boys' shows 36.2 % boys' were from normal weight, 42.6 % boys' were overweight and 21.2 % boys' were obese.

(5) The BMI analysis of adolescent girls' shows 28.8 % girls' were from normal weight, 45.4 % girls' were overweight and 25.8 % girls' were obese.

(6) Due to overweight and obesity in the both subjects few of were suffering from different ailments such as the percentage of the common ailments of the boys' and girls' belonging to jhalawar city were diabetes 0.6% and 0.8% respectively in both boys' and girls', snoring 1.4% and 1.8% respectively in both boys' and girls', back pain 4.0% and 3.8% in both boys' and girls' subjects, ankle & foot pain 3.6% and 4.6% in both boys' and girls' subjects, asthma 0.6% and 1.4% respectively in both boys' and girls' subjects, headache 4.4% and 5.4% in both boys' and girls' subjects, migraine 2.0% and 0.6% in both subjects and kidney disease 3.0% and 2.2% respectively in both boys' and girls' subjects.

(7) The physical activity pattern was also studied among the adolescents and the results showed that the percentage of boys' who were walking was 4.6% and adolescent girls' who were walking were 3.4%. Adolescent boys' who were jogging were 1.6%. Boy subjects who were cycling were 9.4% and girls' were

5.8%. While the boy subjects who participated in sports were 7.6% and girls' were 6.8%. Boys' who were swimming were 2.6%. Adolescent girls' who were doing yoga were 2.8%.The girl subjects who adopted dance were 4.6%. Data indicates that frequency of doing exercise rarely in boy subjects was 4.6% and 5.0% was in girl subjects. Frequency of boys' exercise (Twice a week) was 11.0% and 12.6%was in girl subjects. Frequency of boys' exercise (Thrice a week) was 7.8% and 4.4% was in girls. Frequency of exercise in boys' subjects (Daily) was 2.2% and 1.4% was in girls' subjects. The adolescent boys' who were doing exercise <30 minutes were 11.4% and 12.6% was in girls. Fourteen point four percent boys' and 10.8% girls' were doing exercise 30-60 minutes exercise. Percentage of boys' doing exercise >60 minutes was 25.8% and 23.4% was for girls. Sports were most preferred form of exercise by the subjects followed by walking, cycling and yoga among subjects. Majority of subjects did exercise for less than 30 minutes only.

(8). Adolescents with high socioeconomic status are additional overweight and obese compared to middle or low socioeconomic status. Socio-economic data exposed different standard of living in adolescents. Due to sedentary activity a clear gradient in the prevalence of overweight and obesity was seen. Prevalence of overweight and obesity was significantly higher among high socioeconomic group. Hence it is inferred that overweight and obesity is more in high income group and middle income group. These results show consistency with results from other Indian studies. The major correlates for the overweight/obesity among children were physical inactivity in high socioeconomic status of parents. The percentage of adolescent boys' belonging to high socio economic status was 17.8% whereas the percentage belonging to middle socioeconomic status was 57.6%. Adolescent boys' belonging to low socioeconomic status were 24.6%. Likewise the percentage of adolescent girls' belonging to high, middle and low economic status was 20.6%, 56.0% and 23.4% respectively. The prevalence of overweight among adolescent girls' was high in high SES group as compared to middle SES group however prevalence of overweight was the lowest in the low SES group.

(9). The Nutrient Intake of each group of adolescents was high as compared to standard value. The mean calorie intake of adolescent boys' were 2676 ± 248.6 and for girls' 2551 ± 252.6 against RDA 2500 kcal for boys' and 2200 kcal for girls' severally. The protein intake of adolescent boys' were 56.6 ± 4.54 and for girls' 49.02 ± 9.7 against RDA 55 gm for boys' and 50 gm for girls. The intake of fats and oils of adolescents boys' were 60.1 ± 5.27 and for girls' 63.22 ± 14.63 it was high compared to RDA 50 gm for both. The Carbohydrates intake of adolescents boys' were 447.1 ± 79.5 and for girls' 426.4 ± 67.92 against RDA 250 – 400 gm for both. The mean value of dietary fibre of boys' belonging to Jhalawar was 19.8 ± 4.10. The mean fibre intake of girls' from Jhalawar city was 23.3 ± 4.87 against RDA 25 – 40 gm for both. The intake of calcium of both boys' and girls' subject was quite low as compared to RDA of 1300 mg/day .The mean value of calcium of boys' was 1238.6 ± 39.6 while the mean value of girls' was 1263.1 ± 59.04 against RDA 1300 mg/day each. The mean value of Iron of boys' belonging to Jhalawar city was 24.86 ± 11.4 while the mean value of iron consumed by girls' was 20.9 ± 6.65. The intake of Iron of both boys' and girls' subject was quite low compared to RDA of 28/30 mg/day. The intake of Beta Carotene intake of both boy and girl subjects was average as compared to RDA of 2400 micrograms/day. The mean value of Beta Carotene of boys' was 2126.4 ± 48.17 while the mean value of Beta Carotene for girls' was 1929.5 ± 51.9. The thiamine intake of both boys' and girls' was low as compared to RDA of 1.2 mg/day in boys' and 0.9 mg/day in girls. The mean value of thiamine of boys' in Jhalawar city was 0.686 ± 0.26 while the mean value of girls' was 0.748 ± 0.23.The mean value of riboflavin intake of boys' was 0.82 ± 0.32 while the mean value of girls' from Jhalawar city was 0.87 ± 0.21. The intake of riboflavin of both boy and girls' subjects was quite low as compared to RDA 1.4 mg/day in boys' and 1.2 mg/day in girls. The niacin intake of both boy and girl subjects was low as compared to RDA of 10 mg/day in boys' and 12 mg/day in girls. The mean value of niacin of boys' from Jhalawar city was 9.44 ± 2.77 while the mean value of girls' was 9.54 ± 2.20. The ascorbic acid intake of both boys' and girls' subject was low as compared to RDA of 40 mg/day. The mean value of ascorbic acid of

boys' was 31.4 ± 6.35 while the mean value of girls' from Jhalawar city was 32.8 ± 5.65. (6)

(10). The food liking of adolescents shows that 19.4% boys' and 16.2% girls' like less spicy food and 12.0% boys' and 11.4% girls' like roasted food 43.3% and 25.2% boys' and 26.6% girls' like Very Spicy Food boys' and 45.8% per cent girls' like fried foods it's clear that most of the adolescents likes fried and spicy foods. (11). Lots of the factors are related to increase in adolescent's overweight and obesity but two main factors are responsible for the increase in adulthood obesity.

(a) The changing food consumption pattern of the adolescents is the main cause.

(b) It's additionally combined with the inactive lifestyle of the adults. In most developing countries the kids live in areas which don't have any open space for physical sports. Schooling takes up the major part of their day.

(12). The result of the present study further proves that adolescents girls' are additional overweight and obese as compared to adolescents' boys.

Adolescence is an important time for current and future health of boys' and girls'. The results of the study are attention-grabbing and helpful for framing programme in the direction of adolescent development. The suggestions of the study require interventions to be initiated through Government, parents, teachers, NGO's, educational institutes and health staff.

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