CHAPTER-I
INTRODUCTION

1.1 THEORETICAL BACKGROUND OF THE STUDY

The last quarter of the twentieth century has seen childhood obesity emerging as an epidemic in developed countries and a cause of concern worldwide as it is being reported in significant numbers from nations previously considered poor or developing. It is no longer a problem of only the affluent countries. (Popkin and Doak 1998).¹

The World Health Organization (WHO) describes Obesity as one of today’s most important ‘Public Health Problems’, and has designated Obesity as a ‘Global Epidemic’ and also one of today’s most neglected Public Health Problems (WHO, 2000).²

In India obesity is emerging as an important health problem particularly in urban areas, paradoxically co-existing with under-nutrition imparting ‘Double Burden of Disease (Kapil, U., Singh, P., Pathak, P., Dwivedi, S.N. and Bhasin,

Adolescent Obesity is increasingly being observed with the changing life style of families, with increased purchasing power and increasing hours of inactivity and dietary and cultural transition (Khadilkar, V.V. and Khadilkar, A.V., 2004). The consequences which are associated with adolescent obesity include increased incidence of hypertension, obstructive sleep apnea, psychological dysfunction, decreased self esteem, coronary artery diseases, Type 2 diabetes, metabolic syndrome and overall increase in morbidity and mortality in later life (Harrison’s).

The current increase in the prevalence of pediatric obesity has fostered a multi-disciplinary discourse on the most appropriate strategy for reducing this epidemic. While no consensus has been reached, it is likely that preventive efforts will prevail, with interventions likely to target all children at a young age. Among children, as well as adults, obesity has an etiology which is multidimensional in nature. The principle of energy balance suggests that when energy intake is higher than energy expended, weight gain is the result. Although energy intake depends solely on dietary consumption, energy expenditure is dependent on several components, with the major modifiable aspect being physical activity. Thus, both dietary and physical activity patterns have been emphasized as appropriate interventions for the prevention of obesity. However,


among children, a reduction in energy intake may compromise growth and essential energy acquisition. In addition, attempts to modify the eating patterns of children may exacerbate the risk of introducing eating disorders.

Physical inactivity can have serious implications for people’s health, said the World Health Organization. Approximately two million deaths per year are attributed to physical inactivity, prompting WHO to issue a warning that a sedentary lifestyle could very well be among the 10 leading causes of death and disability in the world. Health and physical fitness have maintained the motto of a man from ancient times. Now-a-days people become almost sedentary and physically inactive because of very limited movement caused by scientific innovation. Sixty to eighty percentages of people in the world from both developed and developing countries are obese because of sedentary lifestyles, making it one of the more serious and insufficiently addressed public health problems of our time.

The marked deterioration in health and physical automation has mechanized in our day-to-day life. Sedentary lifestyles increase all causes of mortality, double the risk of cardiovascular diseases, diabetes, increase the risk of colon cancer, high blood pressure, osteoporosis and lipid disorders. The main root cause for all these is believed to be the issue of obesity.

Recent studies suggest that it is not only the relative body fatness related to an increased risk of CVD, but the distribution of that fatness must also be considered. Individuals with a large waist circumference compared hip
circumference are at high risk of sudden death. Ratios of waist to hip circumference >0.95 for men and >0.8 for women are associated with the CVD risk factors of insulin resistance, high cholesterol, hypertension, and such individuals are treated even if only borderline obese. Obesity and overweight are significant public health problems leading to chronic diseases and health conditions such as heart disease and diabetes.

The weight loss may be an important consideration in reducing these morbidity factors. The need for treatment far exceeds the capacity of the health care system to provide care on an individual basis. Moreover, the most effective method for the delivery of treatment, and the best ways to induce and sustain client adherence to such a programme, remain elusive. Obesity stands in the ignominious position of being the only epidemic in the latter decades of the twentieth century and into new millennium that clinician, academicians, and investigators alike seem to have virtually ignored. With the ever increasing prevalence of obesity and its related diseases, the burgeoning expansion of health care delivery in outpatient care, and the growing emphasis on health promotion, it is imperative that academicians in all roles give their long overdue and concerted attention to grappling with this unrelenting epidemic. In fact, though exercise has been found to have many benefits in the treatment of obesity, competitive nature of the present living conditions is keeping the obese people off from the participating in physical exercises. The main reason behind the lack of participation of such obese people in physical activity could be
accommodated to lack of time, since the nature of the traditional exercise
prescription takes lengthy session of 30 to 40 minutes. So the timely need is to
modify the existing traditional exercise prescription into the exercise program
that underlies the life style of people in the view of increasing the rates of
adoption and compliance as far as exercise prescription towards the treatment of
obesity is concerned.

The physical activity in childhood serves as the foundation for a lifetime
of regular physical activity. Physical activity is also an ideal focus because it has
many other benefits in addition to body weight regulation and improving body
composition such as psychological and social well-being; moreover, even in
childhood, physical activity is closely linked to other health behaviours such as
smoking, diet, drug use, sexual activity and academic performance. These
associations suggest that physical activity plays a role, not merely in the
development of childhood obesity, but also in numerous health consequences,
lifestyle patterns and psycho-social well-being.

1.1.1 Obesity

It is defined as a significant increase above the ‘idyllic weight’ caused by
the gather of fat so that health is adversely affected. Obesity is the term used for
extreme overweight. Obesity is a heavy accumulation of fat in the body’s fat
cells to such a serious degree that it rapidly increases the risk of obesity-
associated diseases and mortality. The fat may be equally distributed on the
body, on the stomach or on the hips and thighs. Being obese and being
overweight is not exactly the same thing. An obese person has a large amount of extra body fat, not just a few extra pounds. The World Health Organization defines ‘obesity’ as a Body Mass Index of >30. A person with a BMI above the 95th percentile is generally considered overweight. With a BMI of more than 25, it is advisable to change lifestyles and lose weight.

Childhood obesity is an increasing problem in Turkey (Tuna et al., 2003). Effective early strategies for the prevention of obesity are needed. Although the physical activity is one of the widely accepted strategies for the treatment of obesity; the role of physical activity in the prevention of obesity is still unclear (Steinbeck, 2001). Pediatric obesity tends to be more severe and is associated with more extreme psychosocial and physical morbidity, which may contribute disproportionately to the cost of adult obesity. Earlier prevention strategies for kids may decrease obesity in their later life (Nassis et al., 2005).

Obesity is associated with increased systemic blood pressure, decreased aerobic fitness, cardiopulmonary function, increased rate of Type 2 diabetes

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Mellitus and cardiovascular diseases (Rahmouni et al., 2005).\textsuperscript{8} Earlier studies showed that highly active children had higher HDL cholesterol and/or lower total cholesterol levels when compared to their inactive peers.

Although there are several reports in the literature regarding the effects of exercise on health related physical components and blood lipids in obese girls (Karacabey, 2009)\textsuperscript{9}, the effect of exercise on preventing obesity should be highlighted with more specific research.

The prevalence of obesity in children and adolescents is increasing rapidly worldwide (WHO, 1998).\textsuperscript{10} A rising rate of obesity in epidemic proportions also brings about economic consequences and substantial healthcare costs. The early onset of obesity leads to an increased likelihood of obesity into adulthood and links to increased prevalence of obesity related disorders such as coronary diseases, insulin resistance, diabetes mellitus, hypertension, sleep apnoea, arthritis, cancer, stroke and heart failure in later life.

Strategies aimed at treating long-term established obesity in adults have not been effective. In view of the alarming rise in physical inactivity in children and adolescents worldwide, and even possible trends of decreasing physical


fitness (Malina, 2007)\textsuperscript{11} primary prevention should be emphasized as early as childhood to prevent the link between obesity in early life with obesity in later life. It is therefore important to encourage sustainable physical activity habits in children, and further reinforcing these habits in adolescents, which will help establish desirable healthy lifestyle patterns that continue into adulthood (Schonefeld-Warden, Warden, 1997).\textsuperscript{12}

Obesity is an independent risk factor for CVD. Obesity is associated with an increased risk of morbidity and mortality as well as reduced life expectancy. The last two decades of the previous century have witnessed dramatic increase in health care costs due to obesity and related issues among children and adolescents (Wang and Dietz, 2002).\textsuperscript{13}

For children and adolescents, overweight and obesity are defined using age and sex specific normograms for body mass index (BMI). Children with BMI equal to or exceeding the age-gender-specific 95th percentile are defined obese. Those with BMI equal to or exceeding the 85th but are below 95th


percentiles are defined overweight and are at risk for obesity related co-
morbidities (Donohoue, 2004).¹⁴

**Epidemiology**

Childhood obesity affects both developed and developing countries of all socio-economic groups, irrespective of age, sex or ethnicity. It has been estimated that worldwide over 22 million children under the age of 5 are obese, and one in 10 children is overweight (Kosti, Panagiotakos, 2006).¹⁵

In developed countries, children of low socio-economic status are more affected than their affluent counterparts. The opposite is observed in developing countries: children of the upper socio-economic strata are more likely than poor children to be obese. Indian data regarding current trends in childhood obesity are emerging. Socio-economic trends in childhood obesity in India are also emerging. A study from northern India reported a childhood obesity prevalence of 5.59 per cent in the higher socio-economic strata when compared to 0.42 per cent in the lower socio-economic strata (Marwaha et al., 2006)¹⁶

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Causes of Obesity

Obesity is generally found in the form of lack of physical exercise, genetically susceptibility, life style, biological problems, psychological impacts, irregular vicious cycle, saturated foods, and parental attitude. The roles of these in obesity are individually discussed in the following.

1. Genetic Factors: Studies published in the New England Journal of Medicine indicate that certain genetic processes are an important and powerful underlying factor in the development of obesity and binge eating. Genes - small parts of the DNA that people inherit from their parents and that determine traits like hair or eye color - can play an important role in this weight gain. Some of the genes directs body how to metabolize food and how to use extra calories or stored fat. Some people burn calories faster or slower than others do because of their genes. The body weights of adopted children shows no correlation with the body weight of their adoptive parents, who feed them and teach them how to eat. Their weight does have an 80 percent correlation with their genetic parents, whom they have never met. Identical twins, with the same genes, show a much higher similarity of body weights than do fraternal twins, who have different genes. People probably have a number of genes directly related to weight just as some genes determine eye color or height, others affect our appetite, our ability to feel full or satisfied, our metabolism, our fat-storing ability, and even our natural activity levels.
Numerous scientific studies have established that genes play an important role in tendency to gain excess weight.

2. **Life style and Environment**: People are much less active today than they used to be, with televisions, computers, and video games filling their spare time. Cars dominate our lives, and fewer people walk or ride bikes to get somewhere. As lives become busier, there is less time to cook healthy meals; people eat at restaurants, or buy quick foods at the grocery store or food market to heat up at home. All of these can contain lots more fat and calories than meals prepared from fresh foods at home. All of these situations can contribute to weight gain; besides weight gain is influenced by changing social structure whereby fewer adults and children include physical activity as part of their daily routine. One of the most important factors in weight gain is a sedentary lifestyle. Computers, fast food, TV, and other technological advances have made lives easier.

3. **Psychological problems**: People tend to eat more when they are upset, anxious, sad, stressed out, or even bored. Psychologically sometimes emotions can fuel obesity as well. Then after they eat too much, they may feel bad about it and eat more to deal with those bad feelings, creating a tough cycle to break. Other obese people may be able to trace their obesity to a neurochemical predisposition. A predisposition is generally caused from heavily abusing addictive foods. This type of abuse causes an elevation of psycho-stimulants in the brain. This results in an
elevated mood change. Purposefully engaging in eating addictive foods continually can cause addiction.

4. **Lack of Aerobic Exercise**: The lack of aerobic exercise makes one more prone to being overweight or obese. Overweight people tend not to do aerobic exercise. They can eat the same amount of fats and calories but it adds up to more stored fat. A regularly-exercised body treats fat differently than an unexercised body does. When cholesterol (fat) comes through the blood stream it enters the liver. The liver wraps strands of protein around the cholesterol so the body can use it. The fit body’s liver grabs the cholesterol and quickly wraps many strands of protein around it. This forms HDL or high-density cholesterol. HDL cholesterol is easily used by the body (Bailey, 1991). The unfit body’s liver is too tired to do much with the cholesterol. It slowly wraps a few proteins strands around the cholesterol and sends it back into the blood stream. This cholesterol is called LDL or low-density cholesterol. LDLs are harder for the body to break down. LDL cholesterol is hard to get rid of. When the liver is finished with the cholesterol it sends it back into the blood stream to find a fat storage cell. There are two enzyme systems within the fat cells; each with a different job to do. The first is a lypo-genesis enzyme. Its job is to capture LDLs or HDLs and glue them together so they are too big to get out of the storage cell. The second type of enzyme is the lypo-lysis. Its job is to unglue the cholesterol and release it for the body to use for
energy. The exercised body has more lypo-lysis enzyme than lypo-genesis, whereas the unexercised body has the opposite. When there are more enzymes binding cholesterol than those releasing it, the person has a lot of fat deposits. Once stored, these deposits are difficult to release it for use. This is how the fat gets fatter and the thin stay thin even though they eat the same kinds and amounts of foods.

5. **Eating Disorders**: Leisurely steady weight loss is the best way to take off weight. Slow weight loss helps the individuals learn how to keep their eating under control by learning how to deal with stresses in healthy ways instead of covering them up with food. These individuals learn to adapt their diet to help them stay trim the rest of their lives, not just for the short time they are on the diet.

6. **Sedentary behaviour patterns**: Youth are more sedentary than ever with the widespread availability of television (TV), videos, video games, computers and multimedia phones. Social networking and entertainment through newer technologies also play a role (Kaiser). Using accelerometers, the 2007 to 2009 Canadian Health Measures Survey (CHMS) found that youth spend an averaged 8.6 h sedentary time and four h light-intensity PA/day during waking hours, which increased and reduced with age respectively. Early childhood sedentary behaviour patterns worsen with age. Sedentary behaviours are associated with reduced PA, increased body mass index (BMI) and adiposity (Tremblay
et al. 2011). Children logging >2 h screen time/day are twice as likely to be overweight or obese than peers watching ≥1 h/day.

7. **Socio-Economic Status**: Children of lower socioeconomic status (SES) and who have a TV set in a bedroom are at even higher risk. Factors implicated in the relationship between screen time and obesity risk include the displacement of PA, a reduced resting metabolism, and higher consumption of low-nutritive value foods regularly encouraged by advertising. Youth with more sedentary behaviours (especially long hours of TV viewing) may also develop – independent of PA time – metabolic syndrome, hypertension, inattention, poor school performance and reduced self-image.

8. **Inadequate physical activity**: Youth fitness has declined significantly and adiposity has increased since 1981. The CHMS demonstrated that only 7% of Canadian youth accumulate at least 60 min of moderate-to-vigorous PA (MVPA) six or more days/week. Childhood MVPA decreases over time. Non-exercise activity thermogenesis (NEAT) levels (eg, standing, fidgeting, walking, stair-climbing), are low. Inactive role models and lower parental education levels and SES may also affect pediatric PA negatively. Although participating in organized sport or recreation programs increases PA, issues of cost, accessibility and parental time commitment often reduce participation (Active Healthy Kids, Canada (2010); Council on Sports Medicine and Fitness, 2006)
Local parks and recreational facilities are often underutilized because of maintenance or safety issues. Children who are older, female, Aboriginal, ‘overscheduled’ or not involved in – or who dislike – sport and recreation programs are less active than their peers. Youth who are disabled or who live in public housing commonly have less access to affordable, quality recreational facilities. Extremes of climate, heavy traffic and local crime rates may further inhibit outdoor ambulation and play. Lack of green space and urban sprawl that favors vehicular over other modes of transportation, further reduce PA.

The sedentary behaviours and insufficient unstructured free-play in the early years have negative impacts on healthy growth and development. Older children spend most of their daytime hours in schools where academic programming has gradually displaced PA, a trend driven by the perceived negative effect of nonacademic time on scholarly performance. However, research suggests that school-based PA and physical education (PE) do not interfere with, and may improve, student grades (Castelli, et al., 2007). Exercise has been shown to improve executive function and math scores in overweight children. PE promotes ‘physical literacy’: moving with competence, increasing fitness, discovering how to play, and learning through physical and

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health-related curriculums (Active Healthy Kids, Canada, 2010). Only 24% of young Canadians actively commute (e.g., bicycle or walk) to school daily. Since 2000, school transportation by car has increased for younger children, especially those from families with higher incomes and better-educated parents. All age groups have played less outdoors after school over the past decade (Canadian Fitness and Lifestyle Research Institute, 2006). School sports participation drops by an estimated 14% (for boys) and 26% (for girls) between grades six and 12 (Active Healthy Kids, Canada, 2010). Policy requiring equal PA or sport participation for all students is lacking in 58% of Canadian schools, with other possible barriers being disability, chronic illness, ethnicity, and female gender. While the United States mandates gender equity for school-based sport participation no comparable federal regulation exists in Canada.

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20 Ibid.
1.1.2 Health Related Physical Fitness

The people today are becoming more health centered. There has been a tremendous increase in the number of people participating in physical fitness programs. This is attributed primarily to scientific evidence linking exercise and positive life style habits to better health and improved quality of life.

All over the world, irrespective of caste, colour, creed, race and religion are aware about the importance of fitness in day-to-day life. In any nation, the citizen who keep fit are the assets of the country and the weakness are the liability. Hence, it is responsibility of every country to give prime priority to attain the total fitness of each citizen. The progress of the country depends upon the promotion of democratic values and social qualities and the genesis through are to lead a happy and healthy life, which rests on the standard of health and fitness. Fitness means it is a state of a degree to which a person is able to functions his bodily system efficiently and smoothly.

In recent years more and more attention has been paid to nature of health related physical fitness. As a result of current work, particularly in the field of physical education, it is becoming increasingly obvious, though not generally appreciated that the achievement and maintenance of high levels of physical fitness produce significant efforts on the working of the human body. Health related physical fitness is important to everyone and should be stressed by physical educators and medical people alike. Health related fitness is defined as the ability to perform strenuous activity without excessive fatigue showing
evidence of traits that limit the risk of developing diseases and disorders which affect a person’s functional capacity. Component of health related physical fitness is identified as muscular strength, muscular endurance, flexibility, cardiorespiratory endurance and body composition.

To enjoy an optimum state of health and physical fitness, exercises or physical training or physical workouts are quite necessary. Training is helpful in maintaining the sound body throughout life. Health and fitness afford the people an opportunity to live longer and they add to the quality of every day life.

The components of Health related fitness are a basis from which to measure our general wellbeing. It is the aim of exercise to improve our capabilities in each of these areas. Different sports will be more demanding in some, and less demanding in others, but athletes usually strive to achieve a reasonable level of health fitness in each area. There are five health related components of fitness. These are Cardiovascular Endurance, Muscular Strength, Flexibility, Muscular Endurance, Body Composition.

Cardiovascular endurance is very important because the more cardiovascular fitness indicates the healthier of lungs, heart and vascular system, those who demonstrate high levels of cardiovascular endurance during exercise have more efficient heart, lungs and vascular system while at rest which takes up the bulk of our time. This means less stress is put on the heart and lungs around the clock which enables to avoid illness and live a long healthy life. Many argue
that cardiovascular endurance is the most important of the components to physical fitness.

Muscular strength is the amount of force of muscle can exert against resistance for short duration, anaerobic (without oxygen) activities. Resistance includes external objects such as free weights or household objects as well as own body weight.

While muscular strength may be subjective, the primary reason why muscular strength is important is our efficiency at Activities of Daily Living (ADLs). ADLs one of the most important reasons why being proficient at all 5 components of physical fitness is important. Even though each of the components of fitness depends on one another, poor muscular strength can also effect aerobic fitness and muscular endurance negatively, while muscular strength deals with short duration muscle contractions muscle endurance deals with sustained muscle contractions and other anaerobic activities lasting less than about 90 seconds. Muscular endurance is the bridge between muscular strength and cardiovascular endurance. In order to be cardiovascular fit must involve in regular and systematically in the aerobic activities.

Flexibility is the range of motion possible for each of our joints or groups of joints. To some degree, flexibility determines how efficiently muscles. The increased flexibility has also been associated with decreased risk of acute and chronic (overuse) injuries. Poor flexibility can directly affect cardiovascular endurance, muscle strength and muscular endurance.
**Health Related Benefits**

The all children should be encouraged to participate in regular physical activity such as sport and other recreational activities due to their inherent benefits to the growth and development of young children (Faigenbaum, 2000).\(^{21}\) However, in conjunction with this, the implementation of a supervised resistance training session may also prove to be of great benefit, with numerous studies suggesting improvements in areas such as cardiovascular risk, bone mineral density, body composition, as well as noted improvements in their psychological well being. (Faigenbaum, 2009).\(^{22}\)

### 1.1.3 Body Composition

Another potential benefit that resistance training offers children is its assistance in improving body composition and health related effects. Although obese youth have traditionally been encouraged to participate in aerobic activities, excess body-weight can effect performance, and activities involving high amounts of running or jumping can increase the risk of developing musculoskeletal overuse injuries (Faigenbaum, 2009).\(^{23}\) Therefore due to the simplicity of a lot of the movements, and low impact associated with those movements, introducing these children to a supervised resistance training


\(^{23}\) Ibid.
program instead, has been found to produce the same desired effects. One such study conducted by Yu and colleagues (2005), noted an increased attendance in a 6-week exercise program for obese and overweight children when they put the emphasis on Resistance Training, they also noted increases in lean body mass.

Another study by McGuigan and colleagues (2009), noted a significant decrease in absolute percent body fat of 2.6% (p = 0.003) and a significant increase in lean body mass of 5.3% over just 8 weeks of resistance training. One study that investigated the effects of different durations of resistance training on body composition and power in children, found that after 24 weeks of training, the total fat mass of a group of 7-12 year old children was significantly reduced by 8.1%, and from these results was able to conclude that an 8-week resistance training program is sufficient enough time to significantly change body composition in children who are overweight or obese.

1.1.4 Anthropometric Measurements

Anthropometry deals with the study of man that is the study of body and mind and their interrelationship. It is the science of measuring the human body and its parts. It is used as an aid to study of human evolution and variations.

The simplest anthropometric measurements included the ratio of the breadth to the length of the skull [the cephalic index] that of the width to the length of the nose, the proportion of the upper arm to the lower arm and soon. These measurements could be made with such familiar pieces of equipment as
meter, sticks, calipers and measuring tapes by selecting reliable measuring points or landmarks on the body and standardizing the measuring techniques used, measurements could be made with great accuracy.

The measurement of the human body with anthropology, it is the basic technique of physical anthropology, Quantitative traits finds application in studies of evolution, race, genetics, growth and aging.

The purpose of an actual stature, weight and body measurement (including skin folds and circumferences) will be collected for purposes of assessing growth and body fat distribution.

The purpose of an anthropometric study will determine what measurements are required beyond height and weight, length and diameters for studies of race, growth and skin folds for nutrition and body composition, stature generally correlates with body and limb lengths and weight with body breaths, depths, girths and skin folds. The anthropometric researches of today usually focus their attention on children and adolescents.

Human life focuses on physical, mental, social and spiritual aspects. Human health is divided into physical, mental and social dimensions. Our daily life is a last and luxuries due to people are not physically fit and strong. They faced so many problem related to health. To cure those problems everyday requires exercise physical fitness and health are the integral parts of human life fitness and wellness of a person are correlated to each other. In fitness body
composition and anthropometric measurements are important parameters and which has roles relevant with health related fitness.

Body composition is an important morpho-physiological characteristic. The methodology for the measurement of body composition has been explained by several scientists. Fat fold measurement can provide fairly consistent and meaningful information related to body fat and its distribution.

The sum of ‘fat fold’ is an indicator of relative degree of fatness among individuals. McArdle (1991) pointed out that exercise-induced change in fat fold values can be evaluated either as absolute or an percentage basis. Peterson (1996) pointed out that body fat is a very personal datum and it is strongly recommended that this information be presented discreetly.

Anthropometric measurements were central concerns of the first phase of the scientific area of measurements, which have been began in the 60’s current, interest in anthropometric measurements focus in three areas, girth measures, body type and body composition. To assess of such measures include classification. Prediction of growth patterns and prediction of success in motor activities as well as assessment of ability.\(^\text{24}\)

The lift of our modern civilization due to scientific development enjoys the high level of physical comforts even know to men. Modern technology is trying hard to make our life easier, more luxurious more comfortable but less

vigorou s. Yoga and Physical fitness are the most vital element of human life because for many people, women and children like the courage of modern living is stress can institute a whole host of physical disorders, headache, migraine, back trouble, overweight, obesity etc. In the present study the researcher intended to study the effect of yogasanas on body composition and selected anthropometric measurements.

The term “yoga” and the English word “yoke” are derived from Samskrit root “yuj” which means union. Yoga is a psycho-somatic-spiritual discipline for achieving union and harmony between our mind, body and soul and the ultimate union of our individual consciousness with the Universal consciousness. Yoga is mind-body technique which involves relaxation, meditation and a set of physical exercises performed in sync with breathing.\textsuperscript{25}

Yoga is useful to the modern man in relieving stress and tension (Arambula et al. (2001)).\textsuperscript{26} The purpose of any research should be to solve the existing complications of the human being. Research should help the society not only to create good health and happiness among human beings, but also to improve the quality of life.

\textsuperscript{25} Madanmohan ‘Introducing Yoga to Medical Students.’ The JIPMER Experience: Advanced Centre for Yoga Therapy, Education and Research.

For many physically inactive people who are overweight, any kind of physical activity appears difficult, and this often prevents people who are obese from initiating and adhering to a specific form of physical activity. The ancient Indian science of yoga is a way of life which includes changes in mental attitude, diet, and the practice of specific techniques such as yoga postures (asanas), breathing practices (pranayamas), and meditation. Among different yoga techniques, breathing practices (pranayamas) can be performed while seated, and are less challenging for people who are physically inactive. A combination of yoga practices which emphasized breathing techniques was shown to reduce the body fat % in 177 obese persons after 7 days of a yoga intervention.

Until now there has been no study which has examined impact of yoga programme which included a change in diet in obese boys on variables other than Body Fat Percentage and anthropometric measures. Hence the present study was aimed at assessing the impact of a 12 weeks yoga postures (asanas) on the body composition and selected anthropometric measurements in secondary school obese boys.


1.2 STATEMENT OF THE PROBLEM :

The purpose of the study was entitled “EFFECT OF YOGASANAS ON BODY COMPOSITION AND ANTHROPOMETRIC MEASURES OF SECONDARY SCHOOL OBESE BOYS”

1.3 DELIMITATIONS :

The present study was delimited in the following ways:

1. The study was delimited to a total of 80 secondary school obese boys.
2. The study was delimited to age group of 14-16 years obese boys.
3. The study was delimited to 12 weeks training classes. Six days a week.
4. The randomly selected 80 subjects from different schools were divided into two groups namely control group of 40 students and experimental group (Yogasanas group) of 40 students.
5. The study was delimited to the following criterion variables.

*Body Composition Variables (four site skinfolds):*

a. Triceps
b. Abdomen
c. Suprailiac
d. Thigh
e. Body Fat %

*Anthropometric Measures :*

f. Height
g. Weight
h. Upper Arm Girth
i. Calf Girth

6. All the subjects were given daily practice of one hour duration and the experimental treatment continued for six days of a week.
1.4 LIMITATIONS:

The following factors were considered as limitations in the study:

1. The study is limited to the secondary school obese boys of selected secondary schools of Vijayapura town, Devanahalli Taluk, Bangalore Rural district of Karnataka only.

2. The subjects who are practicing in Yogasanas pranayama and Physical exercises at present and earlier days will not be taken into consideration.

3. Socio-economic background of the subjects will not be taken into consideration.

4. The day to day activities, rest period, food habits and life styles of the subjects may not be considered as the limitations of the study.

5. The variations in meteorological status like atmospheric, temperature and relative humidity etc. which are considered as the limitations of this study.

6. The subjects are not involved in any other physical activities during the experimental treatment for the present study.

1.5 HYPOTHESES:

Based on the available literatures, the following hypotheses were framed.

1. It was hypothesized that there may be significant improvement on body composition variables namely Triceps, Abdomen, Suprailliac, Thigh, (four site skinfolds) Body Fat % by practicing of Yogasanas.

2. It was hypothesized that there may be significant improvement on anthropometric measurements namely weight, upper arm girth and calf girth by practicing of Yogasans.
1.6 **SIGNIFICANCE OF THE STUDY**

The present study may be significant in the following ways.

1. The study analyses the present status of body composition and anthropometric measures of the secondary school obese boys.

2. The study may be helpful to find out the influence of selected yogasanas on the body composition and anthropometric measures of the secondary school obese boys. The study analyses and assesses to what extent body composition and anthropometric measures can be enhanced through yogasanas.

3. The study may help to know the variations and similarities in yogasanas on body composition and anthropometric measurements of secondary school obese boys.

4. The study may help the physical education teachers, especially at the secondary schools to have an idea about the effect of Yogasanas on secondary school obese children.

5. The study may also help the children of the age group of 14-16 years to know the importance of Yogasanas.

6. The study throws a light on the institutions which don’t have the ground facilities to carry out the regular physical activities to switch on to the yogasanas practices.
7. The results of the study will also be of great value in designing and administering yoga camps for those who need such special attention.

8. The study may be helpful to the school authorities for enhancement of yoga in the school curriculum for the overall development of the children.

9. The study may also be helpful to people in general to understand the benefit of yogasanas and adopt the same in their daily life.

1.7 OPERATIONAL DEFINITIONS AND EXPLANATIONS

**Obesity**

Obesity is nominal form of ‘obese’ which comes from Latin ‘Obsus’ which means ‘stout, fat or plump’. Esus is the past participle of ‘edere’ which means ‘to eat’.

The definition of obesity varies depending on what one reads, but in general, it is a chronic condition defined by an excess amount body fat. A certain amount of body fat is necessary for storing energy, heat insulation, shock absorption, and other functions. (Fox, 2002)

**Secondary School Obese boys**

The students between the age group of 14 to 16 and studying in the standards of 8 to 10 belongs to secondary section. Psychologically they belong to the adolescent stage i.e. they are neither children nor adults.
**Training:**

The process of bringing a person to an agreed standard of proficiency, etc., by practice and instruction.\(^{30}\)

The act, manner, or method of handling or dealing with someone or something.

**Asanas:**

According to B.K.S. Iyengar, “Asanas are not merely gymnastic exercises they are postures and by practicing them one develops agility, balance, endurance and great vitality.”\(^{31}\)

**Body Composition:**

Body composition is the component part of the body or otherwise it refers to fat and muscle weight.

“Body composition is a component of physical fitness. The body fatness and fat distribution are the most important aspect of body composition. The relative proportion of fat weight with in the total body, weight expresses body fatness. The body fat can be estimated accurately by simple measures of substances fat thickness.”\(^{32}\)


\(^{31}\) B.K.S. Iyengar. ‘Light on Yoga’ (London: George Allen, and Unwin Ltd. Ruskin Home, Museum Street, 1975), P5

\(^{32}\) Pekka Oja and Bill Tux Worth, ‘Euro Fit for Adults” (Finland Council of Europe, 1995), P.25.
Anthropometry:

Anthropometry is the science of measuring the human body and its parts. It is used as an aid to the study of human evaluation and variations.

According to Philips and Hornok the measurement of the structure and proportion of the body is called anthropometry.\textsuperscript{33}

\textsuperscript{33} Philips D. Allen and Harnak James E. ‘Measurement of Evaluation in Physical Education’ (John Willey and Sons, 1979), P.11.