Chapter - I

INTRODUCTION

Human body is one of the most beautiful as well as the most complicated systems that God has created. The intelligent ways with which this unique creation acts, reacts and interacts is a mere phenomenon. Not only should it look out-worldly “beautiful” but also “work” efficiently to enable man to achieve the ultimate goal of life. Neglect of the body leads to decay, disintegration and destruction whereas its proper care enables a man “to live most and cherish best”.¹

In today’s age of scientific knowledge man is making rapid progress in all walks and it is true in the area of games and sports also. Scientific knowledge has revolutionised the standards of human performance in sports disciplines. The athletes are now trained on scientific lines and using highly sophisticated technology for top performance in their specific sport, to get optimum performance with, minimum expenditure of energy and time.²

The human body works exactly like an engine. It obeys the laws of physics, principally the Law of Conservation of Energy. The energy that translates into work must first enter the body as food. When a person uses more energy than he receives in caloric food content, he loses weight. It is a physical principle. On the other hand, when a person takes in more caloric food content than he expands in energy, he gains weight. The average sized adults eat about 2,400 calories a day.

Promotion of health and Physical fitness have been the main objectives of Physical education from ancient times world over. Physical fitness has been defined by Clarke (1976) as, “the ability to carry out daily tasks with vigour and alertness without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies”. Physical fitness is commonly understood as the optimum fitness, pertaining to the body that is required of athletes for competitive sports. The word “Physical” tends to misinterpret the meaning of the term, as fitness confined to the physique only. Many youngsters and adults do not seem to bother about their physical fitness status.

There has been considerable thinking among Physicians, Physiologists and Physical educationists to evolve a term which would indicate the totality of man and his fitness, involving his physical, mental and social aspects. The
term “Health Related Fitness” or “Health Fitness” is now being used frequently to give a better understanding of the concept.

Modernisation, urbanisation and consequent social changes due to scientific inventions have reduced the fitness of man. Modern youth lack the basic Physical fitness. The main cause may be the excess of fat in the body, lack of exercises, unbalanced diet and so on. The youth living in the urban society use less body segment and locomotion and thus to fall under obesity. Obesity imposes a great strain on the pelvis, knees, ankles and feet and has a deleterious effect on the nervous and respiratory systems. Excessive weight, besides giving a person an uncouth figure, could also lead to so many health hazards. It is natural for everyone to be concerned about his or her appearance. A broad chest, a narrow waist, shapely thighs, calves, shoulders, biceps, triceps and forearms - a man with these attribute the maiden’s dream.

Physical development and the role of schools:

Physical fitness can be achieved through physical activities in different forms. The lives of students of today are full of activities in and out of school. The school which provide lunch for their pupils can set an example by including some low calorie but nutritious snacks. The schools can also
make students aware of high calorie snacks and suggest alternatives. The dietary counsel, students receive at school should be applicable for the rest of their lives. When schools help students to become physically fit, they are laying a foundation for life-long well-being. Regular physical activity and exercise is beneficial to good health. Parents must be involved in whatever the schools attempt to do to help the children. Education in school aims at the all-round development of personality of all the students and make them fit for life for contribution to the society and the nation. Our schools must develop and implement programmes promoting life-time fitness for the young students.

**Physique and Sports and Games:**

With the advancement of scientific knowledge, the physical educationists have designed test procedures for evaluating the fitness of young children. The performance structure for different games and events is being worked out.

The role of physique is of utmost importance. The physique which includes the evaluation of size, shape and form of an individual is of prime importance as to know how far an individual can succeed in becoming a top

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3 Philip M. Vishon, *Student Obesity, What can the schools Do?* (Indiana, Phi Delta Kappa Educational Foundation, 1990), pp. 24-27.
athlete. Researches have established correlation between the physique or build of the body and motor capacity.

The Physique and Obesity:

Studies on physique may be useful in choosing a suitable physical activity for an individual whose main objective is competition.

Obesity has long been recognised as an important aspect of human health and recently the AAHPER has included it in the body composition assessment in its health-oriented physical fitness test.

It is generally believed that a high percentage of fat in relation to total body weight is detrimental and leads to obesity. Research has indicated that the relative degree of "fat free" body weight (lean body weight) is not only important from the health point of view but it also apparently plays an important role in obtaining high levels of human performance in activities where the body weight must be actually moved from one place to another.

Obesity is the condition of the body characterised by an over accumulation of the body fat under the skin and around certain internal organs. Obesity is a problem that concerns both children and adults.

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Frequently in the modern society, fat reduction is undertaken for aesthetic reasons. There are many important reasons for doing so; complications associated with obesity are far reaching, being associated with unfortunate peer relationship, with inefficiency of physical movement and with ineffectiveness in motor and athletic performance; body segments deviating from normal structure cause deformity like lordosis, scoliosis, knock-knees and other joint restrictions. Obesity is consistently encountered as a cause of physical unfitness among boys and girls, men and women and obese individuals score low on physical and motor tests.5

Obesity is a serious problem. Excess weight and long life are not well associated. Overweight persons are more susceptible than their ones to many fatal diseases and tend to die younger than those of normal or less than normal weight. In addition, obesity detracts from one's aesthetic appearance and hinders effective participation in Sports and other physical activities.6

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5 Harrison H. Clarke, "Exercise and Fat Education" Physical Fitness Research Digest 2 (April 1975), 1
**Required Fat:**

Fat content in one's body is for good. The body fat of average healthy, young man is 15% and the fat of average healthy woman is 20%. Adipose or fat, is a type of connective tissue cushioning and lubricating the anatomy. The stored fat meets the energy requirements of the body.

**Fat cells:**

Fat cells occur in singles or in groups but not all connective tissues especially numerous in adipose tissue.

"Doubts exist as to whether fat cells are specific cells concerned exclusively with the storage and perhaps they are the synthesis of fat. Prior to the storage of fat within, they are stellate in shape and difficult to distinguish from fibroblast and when depleted of fat, they revert to their appearance. As fat accumulates, the cells enlarge and become rounded, the fat first appearing as an isolated small let."^7

The rate of formation of new fat cells is especially rapid in the first few years of life, and the greater the rate of fat storage, the greater is the formation of fat cells. In obese children, the number of fat cells is often as

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much as three times in normal children. However, after adolescence, the number of fat cells remain almost identically the same throughout the remainder of life. Therefore, it has been suggested that overfeeding children, especially in infancy and to a lesser extent during the older years of childhood, can lead to a lifetime of obesity. The person who has excess fat cells is throughout to have a higher setting of fat storage by the hypothalamic feed back autoregulatory mechanism for control of adipose tissues.8

In less obese persons, especially those who become obese in middle or old age, most of the obesity results from hypertrophy of already existing fat cells.9

Advantage of Obese Sportsmen:

1. The athletes who are strong but heavy because of well developed musculature found to be superior in performance in certain competitive sports activities such as foot-ball, weightlifting, shot-put and wrestling.

2. While fat may be detrimental to most physical activities that require either horizontal or vertical type of movements on land, it is

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9 Ibid.,
apparently an asset to swimmers, who need the fat for insulation purposes (specially channel swimmers) and for buoyancy purposes. The increased buoyancy and decreased heat loss due to the subcutaneous fat offset the disadvantage of the greater weight to be moved.

Disadvantages of Obese Sportsmen:

1. Athletes with substantial amount of adipose tissues have increased energy demands owing to the inert weight of fat, thus rendering the work more difficult to perform in endurance activities, where the body has to move longer with greater weight. It may be for this reason they could not compete successfully in the long-distance running.

2. Though the obese and weak students have skill and strength, they hesitate to participate in the physical activities and performance. They are shy, afraid of mockery and ridicule and unwilling to undergo the heavy training schedule.
Causes of Obesity:

Imbalance between energy in-take and energy expenditure:

The average daily caloric needs of adolescents are 2200 for girls and 2800 for boys. These will vary, of course, depending on size and activity level of the individual. It is generally accepted that adipose tissue accumulation is simply due to a disequilibrium in energy balance, resulting from energy in-take exceeding energy expenditure.

1. Obesity is invariably caused by an intake of calories beyond the body's need for energy.\textsuperscript{10}
2. Food habits: Eating too much becomes a habit for many people. Sometimes this is the result of ignorance of calorie value. Eating too much result from having to maintain social relationships including rich party foods in addition to usual meal time eating.\textsuperscript{11}
3. Activity patterns: The many labour-saving devices in homes and in industry reduce the energy requirement. Riding rather than walking to school or work is common practice even for short distances. Periods of quiet relaxation and sleep is increased. Disabling illness may reduce markedly the need for calories.\textsuperscript{12}

\textsuperscript{11} Ibid.,
\textsuperscript{12} Ibid.,
4. Genetic influence: Several investigations have shown that there is a high degree of positive correlation between obesity in parents and their children. If both parents are of normal weight, researches show, only 7% of children will be obese. If one parent is obese, the incidence in children is 40% and it shoots up to 80% if both parents are obese.13

5. Metabolic abnormalities: In some cases, obesity can be attributed to endocrine disorders. Clinical features of endocrine or hypothalamic syndromes are usually obvious. Traumatic, inflammatory, or neoplastic lesions of hypothalamic and pituitary glands may cause an increase in appetite and lead to obesity.14

6. Television viewing: It is one passive sedentary activity. Time spent on viewing television is directly related to the prevalence of obesity in adolescents. Children watching television are prone to between-meals-snacking and they often tend to eating the high caloric foods, they see advertised on the television screen.15

7. Night eating: Some by habit do not sleep till late at night. They have snack after their dinner till they fall to sleep.16

13Ibid.
15Vishon, Student Obesity What can the schools Do? p. 12.
8. Emotional instability: Often we allow negative emotions such as anger, anxiety, hatred, jealousy, frustration, depression to rule our lives. Indulgence in or bottling up our feelings results in the imbalance of metabolism. It makes one resort to snacking and causes overweight.\textsuperscript{17}

Studies of obese patients show that a large proportion of obesity results from psychogenic factors. Perhaps the most common psychogenic factor contributing to obesity is the prevalent idea that healthy eating habits require three meals a day and that each meal must be filling. Many young children are forced into this habit by overly solicitous parents, and the children continue to practice it throughout life. In addition, persons are known often to gain large amounts of weight during or after stressful situations such as the death of a parent, a severe illness, or even mental depression. It seems that eating is often a means of release from tension.\textsuperscript{18}

Body types and physical activities:

Kretschmer, a German Psychiatrist, described three constitutional types, the picnic (fat), the leptosome (thin and lean) and athletic.\textsuperscript{19}

\textsuperscript{17}Shape up, "The key to a Healthier Life", \textit{Femina}, (September 23), 1992, \textsuperscript{17}.


Kohirausch arranged all his athletes into fifteen different groups, but these again could be grouped into three major classes:

1. Slender types: These include runners, jumpers, hurdlers with relatively long legs and slender bodies.
2. Medium types: These include decathlon and pentathlon athletes, boxers, ball-players and swimmers and
3. Massive types: These includes - throwers, weight lifters and upto a point gymnasts.\textsuperscript{20}

Reason for choosing this Study:

Any research study should convey a message to the society to solve the problems and kindle others for further investigations.

Personally my kith and kin in both sexes are obese and overweight due to genetical cause and affluent status. They are good natured, cheerful, kind and pleasure loving. But still they feel shy in the presence of the others because of the structure of their body. They do not want to tax their bodies in physical activities. In general, physical fitness is very essential to everybody. This study aims at finding out the areas in which the obese and

\textsuperscript{20}Ibid., p.27.
overweight adults perform better when compared to the idealweight and underweight categories and select the physical activities suitable for them.

As per the observation of the investigator, the activity patterns of our categories, namely obese, overweight, idealweight and underweight of both boys and girls of the higher secondary schools in Tirunelveli district area are enumerated as follows:

1. Obese boys: Weight lifting, wrestling, Boxing, shotput, Judo, Discus throw and Hammer throw.
   Obese girls: Weight lifting, Judo, Shotput and Discus throw
3. Idealweight boys: All the Athletic events except throwing events. All indoor and outdoor games, Rhythmic activities and Yogasanas.
   Idealweight girls: All the Athletic events except throwing events. All indoor and outdoor games. Rhythmic activities and Yogasanas.
4. Underweight boys: Chess, Carom, Table-Tennis, Teenikoit, Yogasanas and Rhythmic activities.
Underweight girls: Chess, Carom, Table-Tennis, Teenikoit, Yogasanas and Rhythmic activities.

Mankind is the roof and crown of all creations. We can "best fulfil the work which God has assigned us", only if we have a good physique. In developing the Physical fitness of the Higher Secondary School boys and girls, obesity poses a common problem. However, each category of the four types of either sex - obese, overweight, idealweight and underweight - can make a mark in the performance of activities that suit each type and an analysis of it will prove that through the relative merit goes to the idealweight, the other categories also have their own sphere to excel others and no category can be rejected absolutely unfit to bring credit in sports and games.

Statement of the problem

Success in any performance depends upon strength, speed, explosive power and agility. It also depends upon the students who are obese, overweight, idealweight and underweight categories. It is a known fact that men are better in strength and motor qualities than women (only after the
tenth year of age). However, no clear evidences are available whether idealweight female are better than obese and underweight male of same age group.

The purpose of the study was to analyse the motor and strength performances of obese, overweight, idealweight and underweight higher secondary school boys and girls.

The subordinate purpose of the study was to present norms for motor and strength performance variables separately for obese, overweight, idealweight and underweight categories.

**Delimitations**

1. The study was confined to higher secondary school boys and girls of Tirunelveli Education District.

2. The subjects were selected in the age groups ranging from 17 to 20 years.

3. This study consists of four categories obese, overweight, idealweight and underweight. In each category 300 boys and 300 girls were selected at systematic random sampling method.
4. Obese, overweight, idealweight and underweight were classified by using standard skinfold equation.

5. Number of subjects selected in each category in proportion to the population following systematic random sampling are given below:

<table>
<thead>
<tr>
<th></th>
<th>Male %</th>
<th>Subjects selected Male</th>
<th>Female %</th>
<th>Subjects selected Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese</td>
<td>12</td>
<td>36</td>
<td>16</td>
<td>48</td>
</tr>
<tr>
<td>Overweight</td>
<td>25</td>
<td>75</td>
<td>34</td>
<td>102</td>
</tr>
<tr>
<td>Idealweight</td>
<td>45</td>
<td>135</td>
<td>38</td>
<td>114</td>
</tr>
<tr>
<td>Underweight</td>
<td>18</td>
<td>54</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td>300</td>
<td>100</td>
<td>300</td>
</tr>
</tbody>
</table>

6. The following dependent variables such as speed, agility, leg explosive power, relative arm strength and relative leg strength were tested.

7. Speed, agility, leg explosive power, relative arm strength and relative leg strength were measured by 50 yard run, 4x 10 yards shuttle run, standing broad jump, Bench press test and Bench squat test respectively.
Limitations

1. No effect was made either to control or assess the quality of the food ingested, the quantum of physical exertion, life style, psychological stresses and other factors that affect metabolic function, as this was recognised as a limitation.

2. Changes in atmospheric pressure, temperature, relative humidity and such other meteorological factors during the period of administering the test could not be controlled or assessed, and their possible influence on the selected motor and strength variables and the test performance was also regarded as a limitation.

3. Though the subjects were motivated verbally, no attempt was made to differentiate their motivation level during testing.

Hypotheses

1. It was hypothesised that boys would be better than the girls on the selected strength and motor and strength performance variables.

2. It was also hypothesised that idealweight group would be better in motor and strength performance variables than other weight categories.
3. It was further hypothesised that there would not be any significant variation in interaction between gender and bodyweight categories on the selected motor and strength performance variables.

**Definition and Meaning of the Terms**

**Obesity**

Obesity is a condition of the body in which there is an excessive deposit of fat. The condition may be either slight (overweight) or gross (obese). However, 25% above the fixed standard of weight in the normal individual is considered as obesity.\(^{21}\)

**Overweight**

The term overweight is applied to persons who are 15 to 20% above desirable weight. It usually represents excessive fat stores.\(^{22}\)

**Idealweight**

It is a best weight for a given individuals' height, age, bone structure and muscular development. The idealweight for one's height and build at the age of 25 should be maintained throughout adult life.\(^{23}\)

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\(^{22}\) Ibid.,

\(^{23}\) Ibid.,
The term idealweight applied to the person who are all desirable weight with plus or minus 5%.

**Underweight**

Persons who weigh below the idealweight are underweight.\(^\text{24}\)

The term underweight is applied to persons who are 15 to 20% below desirable weight.

**Strength**

Strength may be defined as "the capacity to exert force or the ability to do work against resistance."\(^\text{25}\)

**Speed**

"The ability to move the whole body or parts of it from one point to another as quickly as possible."\(^\text{26}\)

\(^{24}\)Ibid.,


Power

Power is a function of force and time \((Power = \frac{Work}{Time})\) and is defined as the rate of performing.\(^{27}\)

Agility

"Agility is the physical ability which enables an individual to change body position and direction rapidly in a precise manner"

Explosive Power

Power may be identified as the ability to release maximum force in the fastest possible time as is exemplified in the vertical jump, the broad jump, and the shot-put, and other movements against a resistance in a minimum of time.\(^{28}\)

Higher secondary school

The school which is imparting XI and XII standards of academic education is called Higher Secondary School. Formally these classes were attached to the college and named as intermediate course, junior college or pre-university course respectively as in some other states at present.


Significance of the study

1. The study would assess the status of motor and strength performance among obese, overweight, idealweight and underweight of boys and girls.

2. The study would help to compare the motor and strength variables among obese, overweight, idealweight and underweight of boys and girls.

3. The study would assess the status of motor and strength variables between boys and girls who are underweight.

4. The findings of the study would provide guidance to physical education teachers and fitness experts to prepare fitness training schedules for specific body type on the basis of the motor and strength performance.

5. The findings of this study would add to the quantum of knowledge in the area of fitness development, sports training and exercise physiology.