CHAPTER I

INTRODUCTION
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Human beings are created with a natural urge for physical activity. Even the child inside the womb of mother exhibits physical activity in the form of stretching his limbs. As a child grows this urge manifests itself in activities like Games and Sports. However the modern technological progress in the field of electronics (TVs, Video’s and Computers) and the present competitive restless classroom oriented educational system has reduced the amount of time the child engages in vigorous physical activity.

Physical activity has played a positive role in the lives of people even in pre-historic times either directly or indirectly. Some times this activity has been motivated by a factor such as the necessity for earning livelihood whereas in other instances it has reduced from a desire to live long. This physical activity is also necessary for searching food, protection against animals and fear, dancing and play, involving sports and games evolved as a result of inherent tendencies.

1 Ram Croce and Barry lavay, “Now more than even, Physical Education for elementary school age child” The physical educator Vol.42, 1985, p52
2 Eraj Ahamad Khan, History of physical education (Patna Scientific book Co., 1964) pp 5-8
Competition is a natural phenomenon and being integral part of nature, human beings are no exception for this. They aspire for excellence for every given field including sports and games. Not only individuals but nations also want to show their supremacy in the arena of Sports and Games. This friendly rivalry has inspired all and motivated them to sweat and strive to run faster, jump higher, throw longer and exhibit greater strength, endurance and skill in the field of competition. Today sports and physical education are considered as international disciplines because they develop national integration, international understanding and universal brotherhood. In this present politically, socially and religiously mismanaged times, sports are considered to be one of the major binding forces to patch up the differences.

Fitness today has become the fashion of 21st century. It is good to be healthy, trim and fit. Physical activity like games and sports is the happiest and acceptable way than any other exercises to keep up one physically fit. In modern age in every field of human activity systematic objectives and scientific procedures are followed in accordance with principles based on experience understanding and application of the
knowledge of science. The field of Games and sports is no exception to this.

Man is making rapid progress in all walks of life including the area of Games and Sports and other physical exercises. The progress of Games and sports may be attributed to the contribution of Science for the performance of Sports persons, improved scientific and specific training methods and also to the better understanding of great biological machine, human being.

Now-a-days active research has been taken up in bio-mechanics, sports psychology, exercise physiology, training methods, sports medicine and also in various other areas related to sports all over the world\(^4\). Exercise physiology is an inter-disciplinary area which has taken a prominent place in contributing knowledge to physical education and Sports. Scientific studies on Physiological adaptation resulting from physical exercises are becoming increasingly important with the growing realization of the relationship of exercise to health and physical fitness. Movement and growth are thus contributing to the physical fitness.

\(^4\) E. Simon, “Scope and function of research in Sports and Physical Education”, *FIEP Bulletin* 34 (1964) P 98
Fitness is based upon good health. Healthy living implies freedom from disease, enough strength, endurance, skill, agility, capacity to meet daily demands and sufficient reserves to meet extra-ordinary stress without undue fatigue besides mental development and emotional balance according to the maturity level of the individual.

Physical fitness is a reflection of physiological fitness and this may be defined as the efficiency of Oxidation of food in the working muscles. At present more and more physical work is being replaced by machines and automation which makes man unfit physically and physiologically and this is not a good sign for younger generations. In any type of work an employer would like to find workers with high level of strength, quickness of movement or endurance.

Usually there are two kinds of endurance – Muscular and Cardio-respiratory. Cardio-respiratory endurance is characterized by contractions of number of muscles during which adjustment of cardio-respiratory system are necessary as in sustained running, swimming, climbing, cycling etc.,

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6 J. Kieval, Limiting factors of physical education (New York: George Thieme Publishers, 1973), p1
7 H. Harrison Clarke, ed. Physical fitness, Research Digest V (Jan. 1975) p 7
Cardio-respiratory endurance is again exists in two forms- Aerobic and Anaerobic. Aerobic endurance is the ability of the metabolic machinery that require Oxygen to resist fatigue. Aerobic exercises are more than anaerobic exercises in developing Cardio-respiratory endurance. Further aerobic exercises can be performed for longer periods leaving the exerciser fresh rather than exhausted. Aerobic exercise includes jogging or slow running, swimming, skipping, cycling, brisk walk etc.

Aerobic exercises for achieving benefits are done under increased heart rate (130 to 150 beats/minute). To effect this process the heart has to be strong and the stroke volume has to be more to reduce the stress on the heart. By methodical aerobic exercises the heart muscles become thicker and stronger and the stroke volume also increases. Hence a trained heart has an increased stroke volume during exercise and reduced pulse rate at rest. In fact peripheral muscles of the body are more benefited than the heart itself due to continuous aerobic exercises. Hence Physiologically fitness refers to the amount of Oxygen that the

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8 Clearance F. Robinson et.al Modern techniques of Track and field (Philadelphia: Lea and Febiger, 1974) pp 13-14
body is capable of extracting from the inhaled air and transporting it to the muscles during all out physical effort\(^9\).

**STATEMENT OF THE PROBLEM**

In India without realizing nation’s physiological fitness we are expecting Gold medals in International Sports arena. Keeping the importance of Physiological fitness in mind the Investigator has undertaken this piece of Research work, so as to change the concept of General Public.

The purpose of the Study is to find out the Physiological Profiles in relation to aerobic capacities and body compositions of male College Students.

**DELIMITATIONS**

a) The study is restricted to under graduate male students of SSBN Degree College, Anantapur with different aerobic capacities.

b) The study is delimited to the following physical variables, Physiological profiles and clinical parameters keeping in view the limited time available and the equipment.

PARAMETERS
A. Physical Variables
1. Body Composition
2. Body fat percentage
3. Lean body mass
4. Total body weight

B. Physiological Profiles
1. Resting Cardiac rate
2. Resting respiratory rate
3. Blood Pressure(Systolic/Diostolic)
4. Vital Capacity of Lungs

C. Clinical Parameters
1. Haemoglobin estimation
2. RBC Count
3. WBC Count

LIMITATIONS
1. Non availability of sophisticated instruments is a limitation. So percentage of body fat is calculated by using skin fold measurement.
2. The food habits and financial background of student is considered as a limitation for the study.
DEFINITIONS AND EXPLANATIONS OF THE TERMS

A. PHYSICAL VARIABLES:

Physical variables refers to the athlete's status on those components which are essential for efficient functioning in the Psychomotor domain. These are dependent upon the function of difference systems of the body in an integrated manner.

1. BODY COMPOSITION

The proportion of the lean body mass and deposited fat is defined as body composition. It is one of the most important Morphological features characterizing the human being\(^\text{10}\).

2. BODY FAT

Fat is the reserve, inert stored food in adipose tissue in the body and it is distributed throughout the body more or less. Particularly in the abdomen cavity underneath the skin\(^\text{11}\).

Skin fold thickness gives and estimation of total body fat, as about


50% of total body fat lies underneath the skin\textsuperscript{12}.

3. LEAN BODY MASS

The total body weight minus the weight of the total body fat is called Lean Body Mass\textsuperscript{13}.

\[ \text{LBM} = \text{Total Body Weight} - \text{Weight of total body fat}. \]

4. TOTAL BODY WEIGHT

Total Body weight is measured by any simple weighing machine in Kilograms. It includes both the total body fat and lean body mass.

B. PHYSIOLOGICAL PROFILES

Physiological profiles refers to those physiological functions of different systems of the body which are liable to vary across age, sex or as a result of exercise etc.,

1. RESTING CARDIAC RATE

When a man is under complete physical and mental rest the resting heart rate can be taken.

The distensions of the arterial walls at the beginning of the systolic ejection of blood is not confined to dorsal aorta only but travels down the arteries as a wave followed by a wave of recoil. The arteries that lie close to the surface of the body such as the radial artery at the

wrist, the arrival of the wave of distension and subsequent recoil may be felt as a distinct throb, the pulse which affords a convenient method of counting the heart rate or cardiac rate\textsuperscript{14}.

2. RESTING RESPIRATORY RATE

Respiration is the act or function of breathing by using the diaphragm and abdominal muscles\textsuperscript{15}. Respiration includes two movements- Inspiration and Expiration. Inspiration is active movement where as Expiration is a passive movement. The respiration goes on with alternate inspiration and expiration movement and is about 14-18 per minute\textsuperscript{16}.

3. BLOOD PRESSURE

Blood pressure is the lateral pressure exerted by blood on the vessel wall while flowing through it\textsuperscript{17}.

Blood pressure is the force with which the blood distance the walls of the vessel and with which it would escape if the vessel was cut\textsuperscript{18}. It includes both the Systolic and Diastolic Blood Pressure.

\textsuperscript{14} Morehouse and Miller, \textit{Physiology of Exercise}(1971), p69
\textsuperscript{15} Nancy nepar A pocket medical Dictionary 13\textsuperscript{th} edition S.V. "Resting Respiratory rate"
\textsuperscript{16} C.C.Chatarjee, \textit{Human Physiology}(Calcutta:Medical allied Agency Pvt. Ltd.,1980) p 368
\textsuperscript{17} ibid p297
\textsuperscript{18} Laurance E. Morehouse and Augustus T. Miller \textit{Physiology of Exercise 7\textsuperscript{th} Ed.}(St.Louis:The C.V.Mosby Co., 1976)p159
4. VITAL CAPACITY

The maximum volume of air that can be expelled from the lungs following a maximal inspiration is called vital capacity\textsuperscript{19}

C. CLINICAL PARAMETERS

The physical fitness and physiological activity of a person depend upon Oxygen carrying capacity and defense mechanism of blood. Hence Clinical parameters like Hemoglobin, RBC and WBC counts are considered here.

1. ESTIMATION OF HEMOGLOBIN

The Oxygen and Carbon dioxide transport depend almost totally on the presence of Red Respiratory pigment Hemoglobin. Hemoglobin increases the ability of the blood to carry Oxygen by 60-fold\textsuperscript{20}

2. RBC COUNT

The Hemoglobin, Red Respiratory pigment is packed in Red Blood Corpuscles as a concentrated solution. The number of RBC is directly proportional to the Quantity of Hemoglobin and thus to the transport of respiratory gases\textsuperscript{21}

\textsuperscript{19} Per-Olof Astrand and Kware Rodahi, Text book of work physiology (McGrawhill Kogakusha, New Delhi 1970) p 199
\textsuperscript{21} Ibid.
3. WBC COUNT

WBC are called soldiers of the body. WBC: RBC exists in 1:700 ratio. WBC count reflects the defence mechanism of the body and health of the body. 22

SIGNIFICANCE OF THE STUDY

1. The results of the study will quantitatively show the aerobic capacity and body composition of Indian youth of selected age group of particular background region like Anantapur in South India.

2. These findings will be helpful from Physiological angle in various programs of the Sports talent search especially in educational institutions.

3. The findings of this investigation assist the physical educationalist and coaches in classifying the subjects(or)trainees under their disposal for selecting an appropriate sport.

4. This study will also help to prepare standard norms for selected physiological parameters of a particular region of India.