Chapter I

INTRODUCTION

Change and challenges are twin laws of nature as they effect every aspect of human life. Changes are taking place all around and because of these changes new challenges present themselves. Man is constantly trying to meet these challenges and excel his previous performance every time\(^1\).

Sports by their very nature are enjoyable, challenging, absorbing and require a certain amount of skill and physical condition\(^2\). In the order of human values conquest in field of sports hold a unique place. It is a combination of success, victory, triumph and domination of some over other team mates and friends. The sublimity of competition lies in the loser's acclaim for the winners, which along with the friendly and shake acknowledge both defeat and triumph\(^3\).

Technology covers all aspects of life and sports is no exception to it. Sports science has enabled modern youth to develop physical capacities beyond any time imagined. Sports have become highly competitive and records are being broken with greater rapidity\(^4\).

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Performance in physical activity or sports not only demands systematic training to develop physical and physiological variables but also demands training and consideration of psychological characteristics for success in this field. The success or failure of an individual athlete depends on the blending of physical ability, conditioning, training mental preparation and the ability to perform well under pressure. It is not uncommon to hear coaches and athlete express disbelief on how poorly their team performed against a certain opponent or how they fared in the crucial situation\(^5\).

Anthropometric measurements were central concerns of the first phase of the scientific era of measurements, which had began in the 1860’s. Current interest in anthropometric measurements focus in three areas - girth measures, body type and body composition. The assessment of such measures includes classification, prediction of growth patterns and prediction of success in motor activities as well as assessment of ability\(^6\).

Within certain limits body types may be used as an indication of athletic ability. For example, the pyknic type usually will be interested in a sports such as football or hockey. Where as the athletic type will choose running or tennis classifications based on body types, however, there are not always reliable and physical educationist should be careful as to how much they rely on them as a basis for classifying groups for physical education activities, age, physiological maturity, interests, skill size, strength, physical fitness and other similar criteria should be used with the various body type classification in making such judgement\(^7\).


Physical characteristics include such descriptive information as height, weight, leg length, thigh length. It has been found that top athletes in some sports tend to have those proportions that bio-mechanically aid the particular performance required. For the selection of players rough assessment of their physical condition were made. No attempt whatsoever was made to relate the players physique with their playing ability and assigning of players to different positions on the basis of their body type and fitness in terms of speed, strength etc. The permanent striving towards achieving top performance and improving upon it linked to the term “sport”. You select your game to choice according to your constitution, deposition and choice. Thus not only you play it well, you enjoy it also and feel at ease. You find it suitable because your ability makes it possible for you to produce movements and behaviour required by the game\(^8\).

The sun is the ultimate source of all energy on earth, for it is through solar radiation that carbohydrates in plants are formed, humans and animals eat plants and other animals for food. In the human body, food energy is used to manufacture adenosine triphosphate or ATP – the chemical compound that, when broken down, supplied energy for muscular contraction and other biological processes\(^9\).

The production of ATP involves both anaerobic (without oxygen) and aerobic (with oxygen) metabolism (chemical reactions). There are two anaerobic systems: the phosphogen, or ATP-PC system; and Anaerobic Glycolysis, or the Lactic Acid System\(^10\).

Anaerobic capacity is the ability to mobilise energy during activities of intense nature i.e. executing intensive work with explosive action in short duration of time,


\(^10\) Ibid.
such as kicking the football faster, 50 meter dash, explosive take-off in jump etc. The phosphagens (ATP-PC, a chemical compound similar to ATP) are stored within the contractile mechanisms of muscle and provide the most rapidly available source of ATP for use by muscle. This energy system is the major one used for ATP production during high intensity, short duration exercise, such as sprinting 50 meter, aerobic glycolysis releases energy for ATP synthesis through the partial break-down of carbohydrates (glycogen and glucose) to lactic acid causes muscular fatigue when it accumulates in the blood and muscles. Anaerobic glycolysis is also a major supplier of ATP during high intensity short duration activities such as sprinting 200 and 400 meters. Activities that depend heavily on the phosphogen system and anaerobic glycolysis are called anaerobic activities\textsuperscript{11}.

Aerobic capacity is the ability to mobilise energy for continuous performance of specific movement for prolonged time. The aerobic or oxygen system release energy for ATP production from the breakdown mainly of carbohydrates and fats, and sometimes of protein, to carbondioxide or water. Although the oxygen system yields by far the most ATP, it requires several series of complex chemical of reactions, called aerobic glycolysis, glycogen is broken down to pyruvic acid then in the Krebs cycle, carbondioxide is produced and electrons, in the form of hydrogen atoms (electrons) are “transported” to the oxygen we breath, water is formed and ATP is synthesized. With fats as the fuel, the reactions are the same with the exception of the first series which in this case is called beta oxidation. The oxygen system is used predominantly during low intensity, long duration exercise, such as the marathon, 12 minute run/walk etc\textsuperscript{12}.

Both aerobic and anaerobic play an important role in influencing the performance not only in soccer but also in other various games and sports. In activities which involve working with maximum intensity for a short period of time such as

\textsuperscript{11} Ibid.

\textsuperscript{12} Ibid.
sprinting, kicking a football fast, explosive jumping etc. where anaerobic capacity plays an important role. In game and sports where a sportsman has to resist fatigue relatively for a longer period without effecting skill proficiency, for example long distance running, Copper's 12 minute run/walk and even some team sports such as football hockey, aerobic capacity of the individual plays an important part. Under anaerobic conditions a soccer player has to work including oxygen debt. So the body would be able to supply the required amount of oxygen to enable a person to continue activity for relatively longer duration.

Sports scientists and physiologists have been of the view that anthropometric and physical components of an athlete have a lot to do with the performance, more than the techniques and tactics of a player or a team. The research findings show that a high level of technique perfection alone has nothing to do with the success in the competitive sports. Most of the games demand a greater amount of speed, strength, endurance, flexibility, coordination and maximum fitness of the organism\textsuperscript{13}.

Football is essentially a team game. It has developed into a fast and highly skilful area. In football generally players are divided into two categories. Offensive and defensive players are meant for scoring by combining their techniques, tactics and efforts and different times.

All physical and anthropometric measures are required for offensive and defensive football players without which it is impossible for a player to play efficiently. It may be said that the dominance of different fitness factors varies from players to players. Generally it is assumed that defensive football players should be tall and heavy with more muscular power, whereas ideal offensive players should be short, light, agile, fast and have more endurance. Offensive players need agility to dodge the opponents, speed to reach the ball, strength for performing the skill efficiently and good height and weight to keep themselves steady in the field.

Football is the most popular and most attended spectacular game in the world. It is not merely a game, it is a part of one’s life. It is a vigorous, fast and skilled game for the well conditioned sportsmen, who must possess strength, speed, agility, balance, flexibility, endurance, coordination and many other undefined qualities required for dribbling, kicking, passing and shooting at the goal. For playing better football, physical fitness is needed, but there is need for good strength in respect of good height and weight.

In the modern game of football a team may be defending with 6, 7 and 8 players one minute and then setting up counter attack with 4, 5 and 6 players the next.

The modern 4:4:2, 3:5:2 and 5:4:1 systems mean that the midfield players must have exceptional stamina with high skill. The defender must be possessed with a sense of great anticipation for tackling an opponent. The attackers should have the quality to penetrate and dodge the defenders with a great control for shooting at goal.

Football game has two main systems, namely the defence zone system and the man-for-man system. The zone play calls for each players to guard a definite area. Any opponent who enters this particular area, with or without the ball, becomes his responsibility. The zone play requires a high degree of understanding between the defenders. This is especially so when attacking players pass from one zone to another. The zone system reverts to man-for-man in the penalty area, where the vast majority of goals are scored. The nearer the goal the tighter must be the guarding. However when the defenders are out numbered, the defenders cannot guard man-for-man. Even than, the man with the ball can be closely guarded in many cases.

Man-for-man guarding calls for a player to follow his assigned opponent whenever he goes in the field of play. This is as per the strict interpretation of man-for-man guarding. Well organized teams will place a tighter guard on the opponent in possession of the ball, while continuing to play under zone system with the remaining
defenders, who, in turn, will place defensive cover on the non-ball side (s). In essence, a degree of man-to-man defences is mixed with zone defence system\textsuperscript{14}.

In modern game, it is imperative that the midfield players should work as unit and cover as much ground as possible. To achieve this, dual defensive and attacking functions the players must strike a sensible midfield balance. Since some midfielders attack more than others, they must aim at a high percentage of completed passes, besides a good amount of attacking runs (often without the ball) and shoot at goal. The others who are not so adopt at going forward, they should compensate through defensive availability. An optimum mixture of both attacking and defensive midfielders is beneficial for the team\textsuperscript{15}.

Attacking play, like soccer, has witnessed tremendous change in the last 30 years, the attacker does not passively wait at the up field for the ball to come for him to score goal, he has to create openings for his team-mates. He has to defend when necessary, as well as score goals. By all definition the modern striker is for more of a team player than in years past, which is good because the work load becomes more evenly distributed\textsuperscript{16}.

To score goal, the team in possession must seek to advance toward (attack) their opponent's goal with the ball. Advancement without penetration, however, is usually ineffective, because the attacking team fell to pressure their opponents by getting man or the ball behind defenders, thereby attempting to take them out of immediate play\textsuperscript{17}.

Penetration with the ball is an important aspect of the game that every team must work at. Without penetration, a team become fairly easy to guard, because the


\textsuperscript{15} \textit{Ibid}, p. 74.

\textsuperscript{16} \textit{Ibid}, p. 86.

\textsuperscript{17} \textit{Ibid}. 
ball will usually be played in front of the opposition defenders, enabling them to easily see the man and the ball in front of their goal. They are not turned and pass in front of them offer time for defensive organizations and consolidation. But penetrations are not easily obtained\(^\text{18}\).

Unfortunately the Indians still believe in magic formulas for transforming limited trained (technically as well as tactically) players into world class champions. These limitations can only be reached through proper selection of players and research findings.

In this present advanced and computerized world, the research and product oriented sports authorities throughout the world would very much prefer to investigate, analyse and find out the various components desired to be developed in young athletes for various sports competitions from club to international level.

In this study the research scholar is keenly interested to find out the comparison of selected anthropometric measurements, and motor fitness components of football players in relation to position play.

**Statement of the Problem**

The purpose of the study was to compare the selected anthropometric measurements, aerobic, anaerobic and selected haematological variables of West Bengal women soccer players at different field positions.

**Delimitations**

1. The study was delimited to the seventy two (72) women soccer players from West Bengal who participated in the West Bengal State championships for the sessions 2004-05 and 2005-06.
2. The study was delimited to the following anthropometric measurements:

\(^{18}\text{Ibid, p. 87.}\)
a. Height,
b. Weight,
c. Leg Length, and
d. Thigh Length.

3. For the purpose of measuring aerobic and anaerobic performances of subjects, the study was confined to Cooper’s 12 Minute Run/Walk Test and 50 meter dash respectively.

4. The study was further delimited to the following selected haematological variables:
   a. Haemoglobin content,
   b. Red Blood Cell, and
   c. White Blood Cell.

**Limitations**

The daily routine, dietary habits, socio-economic conditions, physical and social environments were considered as limitations of the study.

**Hypothesis**

It was hypothesised that there will be no significant differences on the anthropometrical measurements, aerobic, anaerobic and selected haematological variables of West Bengal women soccer players at different field positions.
Definition and Explanation of the Terms

Soccer

Soccer is a football game, played under terms of 11 players on a side and using a round leather/synthetic football. The designations “soccer” is derived from “Association Football” to distinguish from American Football, Canadian Football, Rugby and several other sports in the historical development of the game. It is now played under the overall supervision of the Federation International de Football Association\textsuperscript{19}. It is popularly known as football in India.

Anthropometry

Anthropometry is the science of measuring the human body and it’s parts. It is used as an aid to the study of human evaluation and variation.

According to Philips and Hornak the measurement of the structure and proportion of the body is called anthropometry\textsuperscript{20}.

\textsuperscript{19} New Encyclopaedia of Sports, S.V. “Soccer” by Ralph Hickok.

Aerobic Work

Physical activity in which metabolic demands can be met by the oxygen transport system, i.e., oxygen supplied by respiration during activity provides sufficient energy for executing the activities\textsuperscript{21}.

Anaerobic Work

The activity which exceeds the ability of the oxygen transport system to supply necessary energy. Energy liberated by breakdown substances not involving consumption of oxygen is necessary for completion of the activity\textsuperscript{22}.

Haemoglobin Content

Haemoglobin is the complex protein rich in iron. It has an affinity for oxygen combines within forming oxyhaemoglobin in the red cells\textsuperscript{23}.

Red Blood Corpuscles (RBC)

Red blood corpuscles or erythrocytes are small circular biconcave disc so called because they are concave at both sides so that looked as they appear like two


\textsuperscript{22} Ibid.

crescents place back to back. These are above 5,000,000 red cells in cubic millimetre of blood\textsuperscript{24}.

**White Blood Corpuscles (WBC)**

White blood cells are transparent and not coloured, are larger and fewer than the red. Granulocytes or polymorphonuclear cells form almost 75 percent of the total white cell count; they are formed in the red marrow of the bone\textsuperscript{25}.

**Significance of the Study**

1. The findings of the study will help to compare the anthropometric measurements of women football players in relation to positional play.
2. The result of the study will also help to compare the aerobic and anaerobic capacities among the women football players in relation to position play.
3. The study will further help to compare the selected haematological variables of women football players among goalkeepers, defenders, midfielders and forwards.
4. The present study will help to find out what anthropometrical measurements are required for women goalkeepers, defenders, mid-fielders and forwards soccer players.
5. It may be helpful for giving conditioning programme and selecting scientific training methods according to their positional play.

\textsuperscript{24} Ibid., p. 164.

\textsuperscript{25} Ibid., p. 163.