CHAPTER V
SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

Science and soccer are closely related. In the modern days soccer is not only a recreational game; it has a strong scientific base and its further development is also closely related with scientific development. Good soccer player must have a genetic potential, with this a scientific training protocol should have to introduce. Standard soccer field is a 120 x 90 meter and players have to move with the ball and without the ball normally 90 minutes in a game if extra time being added and then 30 minutes be included. In this time of play the players used their physical potentialities such as endurance, speed, agility, strength, flexibility, balance, coordination, etc.

Soccer is a game where anaerobic and aerobic energy both are equally important. In a game a player on an average a player runs 10-12 km per match. Other scientist reported soccer player on an average 47% walk, slow run 38%, quick sprint 12% and stand without moving 3%. The soccer player used different actions with and without ball within a single match are about 1431±206. All these movements are may be aerobic in nature or anaerobic in nature or the combination of both of these two energy source.

In soccer aerobic energy production appears to counts more than 90% of total energy consumption. Never the less the anaerobic energy production plays an essential role during soccer matches. During a competitive soccer match a top class player perform intense action as demonstrated by reduced muscle creatine phosphate and pH level and by increased muscle lactate concentrations. Thus the anaerobic energy system is heavily stimulated during periods of game. Muscle glycogen is reduced 40-90% during a game and is probably the most important substrate for
energy production. Muscle triglyceride, blood glucose, blood free fatty acid are also progressively utilized as substrates for oxidative metabolism in soccer. An average maximum oxygen uptake 60 ml/kg/min suggested a moderate an overall aerobic demand in soccer. There is still much uncertainty and debate in the anaerobic requirements because of the methodological limitations and difficulties. Only around 1960 the aerobic and anaerobic capacity has been identified as the important factors determining sports performance to a large extent, soccer is not expectation.

Aerobic capacity is defined as the maximum amount of O$_2$ (oxygen) the body can use during specified period, usually during intense exercise. Aerobic activities depend upon a continuous and sufficient supply of O$_2$ in order to burn fats and carbohydrates to support endurance for sustain activity. In soccer aerobic capacity is very important for the maintenance of same pace. Anaerobic capacity is a short duration energy production is extremely important as it provide energy in a very high rate during periods of intense exercise in a match. However both the aerobic and anaerobic energy demand and supply plays a significant role in a soccer match. Thus the players have to fulfil the demand in soccer and trained them accordingly.

Composition of the body plays a very vital role in the anaerobic and aerobic power of soccer player, particularly the cellular body composition recently being identified as an important aspect for sports performance development. The total body composed approximately with 70% of water and 30% of solid mass. In solid body mass there are different types of minerals, carbohydrate, protein, fat and other chemicals. For the production of energy these carbohydrate, fat and to some protein is very important. The minerals are providing support to the function of nerve, muscle, blood and other functional activities. So the cellular body composition has a positive role on aerobic and anaerobic capacity of a soccer player. The scientific evidence
related to these three aspects are very less and needs further study for the establishment of relationship between cellular body composition, aerobic and anaerobic power. The present study wants to measure aerobic and anaerobic power of district level Indian soccer player and to collect data on cellular body composition. This study also has an aim to establish a relationship cellular body composition, aerobic and anaerobic power of soccer player.

In the Chapter II, the present researcher reported scientific literature in this area with critical analysis. From 1976 – 2014 relates research report has been incorporated in this chapter. Most of the abstract research report collected from best biomedical data sources (Pubmed.gov). The full paper has been collected from different internet sources and by requesting the author form their personal collection. After reviewing relevant available scientific data present scholar realise that there are many research work on the area of aerobic capacity of soccer player less research was done on anaerobic capacity and soccer performance. In cellular body composition very less information was available in the standard internet sources. To establish the relationship between cellular body composition, anaerobic and aerobic power, the present researcher formulated hypothesis and started searching for standard method and procedure for data collection.

In Chapter III, the methodology is an area from where the total research being guided and controlled. In this Chapter, the present research describe study location in detail. The data was collected in the Exercise and Sports Physiology Laboratory and the play field of Department of Physical Education, Vinaya Bhavana, Visva–Bharati, Santiniketan, West Bengal, India. Before going to final study the research arrange pilot study of different parameter. The subjects of these studies were inter departmental level football players, University level football player (pilot study) and
District level football player (final study). The mean age of the final study subjects was 20±2 years, mean body weight was 58±3 kg and mean height 164±7.27 cm. All the subjects were generally healthy and regular football player. They were willing to participate in this study voluntarily. The Departmental Committee, Board of Studies, University research Board gave approval for this project.

All the subjects aerobic power was measured by Queen’s College Step Test and 12 min run and walk test. Whereas anaerobic power was measured by 300 meter run test and vertical jump test. The body composition was measured by Bio Scan analyser and only cellular body composition data was incorporated in this study.

It should be mention here that the present researcher previously did similar type of study in M. Phil thesis. Here in the Ph. D level study, he desire to collect the data from sophisticated scientific machine, for that a scholar tried to collect aerobic power data by Vista VO₂ equipment with the help of a Bio medical engineer from the supplier company. The scholar successfully measured resting VO₂ through Vista VO₂ machine. However the exercise VO₂ and VO₂ max could not be measured due to some mechanical limitation and instrumental difficulty. In the statistical procedure mean, SD, F and t-test were applied and the p-value was set at 0.05 level.

In the Chapter IV, the result has been reported and discussion was made accordingly. In the beginning of the results chapter, previous study results were reported. In the pilot study (10 University level football players) on resting VO₂ and VO₂ max was measured by a sophisticated scientific instrument (Vista VO₂: Lab, USA). The sittings mean VO₂ was reported with graph and picture. Also the exercise VO₂ was reported with picture. But the VO₂ max data of this pilot study could not established due to some mechanical error of that Vista VO₂ machine. The cellular body
composition was measured in the pilot study with the Bio Scan Analyser. Also VO\textsubscript{2} max data (field method) was collected from inter departmental level football players in the other pilot study. However, due to similarity of the results of the final study the pilot study results were not presented in the final report.

In the final study total 18 district level Indian football players were selected all of them were represented Birbhum district of West Bengal. The mean age of this group was 20±2 years. The mean body weight and height was 48±3 kg and 164.89±7.27 cm. In the final study, cellular body composition, aerobic, anaerobic capacity was reported. In cellular body composition the following parameters were recorded: total body water, total body water %, extra cellular water (ECW), extra cellular water %, intra cellular water (ICW), intra cellular water %, ECW / ICW, extra cellular fluid, plasma fluid (intra vascular), interstitial fluid (extra vascular), dry weight mass, extra cellular solid, protein mass, glycogen mass, mineral mass, total body potassium, total body calcium. The anaerobic power was measured 300 meter run test and Sergent vertical jump with the use of Sayer method. Aerobic power was measured by Cooper test and Queen’s college test. In the correlation study the researcher observed a positive correlation with intra cellular water, extra cellular solid, total body potassium and total body calcium. Also in this research it was revealed that Queen College test is much more reliable field test for measuring aerobic capacity than Cooper test. The results of the Queen College step test (VO\textsubscript{2} max) was compared with the national international football players data. In the discussion part all the results of cellular body composition anaerobic and aerobic results were analysed and supported with the authentic scientific research. This study results may provide a status of district level Indian football player’s cellular body composition aerobic and anaerobic capacity.
5.2 CONCLUSION

Football is a game where different types of activities such as walking, jogging, running, sprinting with ball and without ball movement are require. For all these movements anaerobic and aerobic energy are the two important source of energy. For the production of this energy body composition, especially the cellular body composition is very much important. In this study the present researcher measured district and university level football players’ cellular body composition, aerobic and anaerobic power through standard scientific methods. In the pilot study the scholar assessed university level football players and in the final studies the district level football players was analysed. The aerobic and anaerobic power data was compared with the available national and international scientific data. However for the cellular body composition data there was no standard normal level was found in the available internet sources. Researcher also found a positive correlation between total body potassium and total body calcium and with aerobic power. In the following precise results of this study is presented for ready reference.

5.2.1 CELLULAR BODY COMPOSITION

i) Mean total body water of Indian soccer player was recorded 33.35±5.86 liter.

ii) Mean total body water % was recorded 61.86±8.07%

iii) Mean extra cellular water was 16.21±5.95 liter.

iv) Mean extra cellular water % was 47.84±8.29%

v) Mean intra cellular water was 71.14±35.37 liter.

vi) Mean intra cellular water % was recorded 52.15±8.28%

vii) Mean extra cellular water / intra cellular water was recorded 1.30±0.75

viii) Mean extra cellular fluid was 17.18±6.29 liter.
ix) Mean plasma fluid (intra vascular) was 3.43±1.16 liter.
x) Mean interstitial fluid (extra vascular) was recorded 12.01±4.41 liter.
xi) Mean dry weight mass was recorded 50.54±6.19 kg.
xi) Mean extra cellular solid 50.54±0.74 liter.
xi) Mean protein mass was recorded 10.83±2.30 kg.
xiv) Mean glycogen mass was recorded 435.72±44.82 gram.
 xv) Mean mineral mass was 3.80±0.81 kg.
xvi) Mean total body potassium was recorded 113.44±17.82 gm.
xvii) Mean total body calcium 919.61±146.78 gm.

5.2.2 ANAEROBIC POWER

i) Anaerobic power (measured by 300 meter run test) was recorded from the district level Indian soccer player. The mean was 1.50±0.16 minute.

ii) Anaerobic power was also measured by Sergent vertical jumps with Sayer Method. The mean was 2584±278 watt.

5.2.3 AEROBIC POWER

i) Aerobic power (VO$_2$ max) was measured by Cooper test and the mean was 41.48±4.70 ml/kg/min.

ii) Aerobic power (VO$_2$ max) was also measured by Queen’s College Step test and the mean was 51.32±5.18 ml/kg/min.

The researcher measured correlation between all of cellular body composition parameters and anaerobic and aerobic power. The scholar observed a positive relationship between VO$_2$ max (aerobic power) with intra cellular water, extra cellular solid, total body potassium and total body calcium.

This study is a profile study or status study of district level Indian football player. The region was West Bengal and the selected district was a remote under developed
district of India. From this data one can understand the aerobic, anaerobic power and cellular body composition of football players. From under develop district in India. This study also found that Queen’s college step test is more reliable field test for measuring VO$_2$ max. This study might be in the first time measured the cellular body composition of Indian football player. Other very important observation of this study was positive relationship with aerobic power and two very important mineral potassium and calcium. So for the improvement of aerobic power the concentration of total body potassium and calcium is very important. To confirm the reports of the above results further in depth scientific study is recommended.

5.3 RECOMMENDATIONS

Soccer is a game which requires combination of aerobic and anaerobic energy sources for that energy the proper cellular body composition is require. Because the energy is actually release from the cell with the help of different chemicals, minerals, water and air. For high level of football performance cellular body composition may play a very vital role. In this study only district level Indian football player was evaluated, for further study a following recommendation is stated.

i) No of homogenous subjects should be increased in the future study.

ii) Measurement of cellular body composition through Bio Scan analyzer be standardized with the other similar machine.

iii) The normal value of cellular body composition should be incorporated and compare the data with normal level.

iv) This study may be recommended for the analysis of mechanism of positive relationship between aerobic power and total body potassium and total body calcium of football players.
v) This study also recommends the analysis of the mechanism of intra cellular water, extra cellular solid with aerobic power of football player and its application.

vi) This study recommend Queen’s College Step test as field test for measuring VO$_2$ max for more reliability.

vii) This study recommends more reliable anaerobic power measurement (Wingate test, etc.) for further investigation.

viii) Aerobic power of Indian soccer player was observed below the International standard. So the proper training method for further improvement be recommended.

ix) The result of aerobic, anaerobic and cellular body composition data of district level Indian football players is recommended as reference data for further study.

x) The study opens a new area of cellular body composition of soccer player.