ANALYSIS OF PSYCHOLOGICAL AND PHYSIOLOGICAL VARIABLES OF NATIONAL AND STATE LEVEL SOCCER REFEREES

By

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Certificate

This is to certify that the work entitled **"ANALYSIS OF PSYCHOLOGICAL AND PHYSIOLOGICAL VARIABLES OF NATIONAL AND STATE LEVEL SOCCER REFEREES"** is a bonafide work of **Bestine C. Michael** under my guidance and supervision for the Degree of Philosophy in Physical Education of Calicut University, Calicut. The completed research study by the scholar is original of its kind and has not been carried out by any scholar in any other university.

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Declaration

I do hereby, declare that the thesis entitled **"ANALYSIS OF PSYCHOLOGICAL AND PHYSIOLOGICAL VARIABLES OF NATIONAL AND STATE LEVEL SOCCER REFEREES"** submitted to University of Calicut, for the award of the Degree of Doctor of Philosophy in Physical Education, is a record of bonafide research work done by me under the guidance and supervision of **Dr.Sakeer Hussain V.P.**, Director, University of Calicut, Calicut, and it has not previously formed the basis for award of any degree, diploma, associateship, fellowship or other similar title or recognition of any other University.

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Dedicated to

My Family Members

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Table of Contents

List of tables

List of figures

Chapter I
Introduction

Sports is a social phenomena. Sports is as old as human society and it has achieved a universal following in modern times. Every human being has a desire to run faster, jump higher and farther, throw farther and exhibit greater strength, endurance and skill. The aim of sports is to develop these instincts in a productive manner for the overall development of a person and society.

During the last few decades the standard of sports and games has improved to its extremes. The cause of this tremendous improvement is the introduction of scientific approach. Due to the innovations brought by different sports sciences, recent days there are a number of scientific methods to improve each and every quality which determines the performance in all games and sports. At the same time the development is based on the rate of demand of each sport.

Physical, physiological and psychological fitness are essential for all human beings irrespective of their age. A body may possess extra ordinary skill in football. But if he does not keep himself in the game till the end of the match, he may not find a place in the team. Fitness becomes the first and foremost factor to enjoy the life fully; be it a sports person or a layman. Fitness involves inter relationship between intellectual, emotional and physical factors.

Due to the improvement in the standard of sports and games, the scientific approaches and the implementation of most modern sophisticated equipments play a pivotal role to improve the overall performance of the participants. Likewise, physiological and psychological fitness have become extremely important for excellence in sports.

The spectatorship of major games has reached its peak amounting to thousands in the gallery and millions glued in to the television sets vying for their team's victory. This has created intense pressures, anxieties, and stressors for the teams and referees involved A referee will have to possess a lot of physiological as

well as psychological potential to tackle the huge amount of pressure and scrutiny associated with officiating any sport. Soccer officials are more involved in these kind of situations than any other sport. Developmental and professional levels carry different degree of pressures. Different sports demands different styles of referees with unique skills and abilities.

Refereeing a game of soccer has become a difficult task that only strong and firm personalities can hope to cope with the huge pressure that comes with being an efficient referee. Referees are usually responsible for the interpretation of the laws and behaviour of the game in a fair and firm manner, and to control the play behaviour of soccer players. They scrutinize the play every second and bring the understanding of the laws of the game to bear on the pattern of play of the teams.

A soccer referee takes a large number of decisions in each and every minute during a match, is very important to the game (Helsen&Bultying, 2004). A lot of factors such as a team's reputation for aggressiveness, crowd noise, experience and anxiety (Balmer et al., 2007), a preceding foul judgment (Plessner&Betsch, 2009), the haughtiness and arrogance of the players involved in a foul, individual differences in referee's ability to cope under pressure, and social pressure and nationality etc. (Dawson& Dobson, 2010) may act upon soccer referees decision-making. Using a qualitative method, Lane, Nevill, Ahamad and Balmer (2006) identified four categories of themes affecting soccer referee decision-making: ideal decision-making (accuracy–error, regulations, and professionalism), individual factors (opinion, concentration, and control), experience factors (experience, personality, personal life) and situational factors (crowd interaction, environmental factors, player reaction, crowd factors). These authors proposed that a quantitative method could be used to test the impact of these themes on referees' decision-making. Apart from these researchers, no one else has looked into the impact of observers on referees' decision-making during a match.

However, referee decision-making can have an effect on the course of a game and on sports actors' behavior. Indeed, some decisions can inflame a match, get supporter or coach exited or lead players to behave in such a way that their

misconduct cannot be made up for. Otherwise, referees can also calm down various social tensions and diminish excessive behavior. No thought was given to the positive or negative outcome of such decision-making since, in principle, it was only used to regulate players' acts. And yet, sometimes, referees went too far with that type of decisions.

The arena of sports offers a great opportunity for the study of decision-making, for a large number of reasons. Within the topical scope of sports decision-making, there are a number of different decision making agents such as coaches and players, tasks such as play-calling, ball allocation, etc., and contexts such as during play, during half time interval, etc. This provides the chance to evaluate a number of interesting decisions. Yet, each combination of the above elements results in a unique interaction of added time. The important feature of sports decisions is that they are naturalistic, implies here that they are created by factors with some degree of task familiarity, in the environment with which they usually encounter the decision (Orasanu& Connolly, 1993). The difference between the study of decision-making in the rule book and in the real field is an important distinction that has only recently been accepted and appreciated in decision research. Compare and contrast three decision scenarios facing a forward in soccer: selecting the recipient of a pass in real soccer match; selecting the recipient of a pass in a computer simulation of soccer; and selecting from among a group of gambles. Clearly, if they are very particular in how this agent actually makes decisions, then those who usually faces should give the most valid proofs. In situations where the experimenter tries to recreate the natural environment, there is the danger of incorrectly specifying the given structures like programming computer players different from the way real players behave. If the experiment uses another domain altogether, even if the underlying abstract structure is the same, performance often does not move to the new domain (Ceci& Ruiz, 1993; Raab, 2005; see Goldstein & Weber, 1997). Secondly, the majority of sports decisions are dynamic. Decisions in sports, as well as in many other domains, develop over time. The influence of this dynamic aspect is at least in two-fold.

There are internal dynamics, means there is not so much a single point of decision as there is a course of deliberation. Information is not instantaneously collected and processed; rather a decision maker must accrue information over time, and subsequent processing of this information takes.

They then apply their knowledge in a more controlled environments. Each referee's tool box carry materials which help them in future situations that can't be taught to help them in handling high pressure situations during a match. Physiological and psychological attributes are analysed through hundreds of studies at the same time less number of studies are made to analyse the interrelation between them. The twomajor components associated with a successful official are related to physical and psychological aspects. Physical fitness and training, injuries and injury prevention associated with physical challenges whereas, fine tuning of decision making skills and learning to overcome anxiety related to psychological challenges. The present study aims to identify the physiological and psychological challenges examined throughout the literature review with participants through a survey questionnaire. This will lead to a better understanding of the amount of pressure and stress which soccer officials are vulnerable to and which is the most important attribute of the referee. Factors such as field size, intensity of the match and duration of play are the specialized physiological requirements of a soccer referee. Refereeing soccer include two main physiological components physical fitness and training, injury and injury prevention. D'Ottavio and Castagna (2001), pointed out that, the normal soccer referee takes up throughout the match running at medium to high intensity and the most of the physical exercise, both on and off the field should relate to both short and long distance interval training. These fast and instant movements are followed with another physical attribute related to injuries to the referee.These types of directional changes and rotational loads result in lower leg strains and injury which are very common in soccer officials'(Weston et al., 2011).The officials will have to meet with these major physical attributes, or lack thereof, can either directly or indirectly lead to physical stresses throughout the course of their career. The cognitive abilities of the referees have got affected by various psychological attributes that can be present from a variety of internal and

external sources. These cannot be ignored while examining and understanding the pressures, officials need to overcome before, during, and after matches.

Low confidence in decision making abilities as well as the way referees cope with the anxieties associated with officiating results Psychological pressures. Lane, Nevill, Ahmad, and Balmer (2006) outline thirteen themes associated with stresses and pressures that referees experienced over the course of a typical match. According to Scoppa (2008) external factors exist and contribute to subconscious referee biases.A series of stress factors and the psychological effects noticed by individual referees' wereanalysedby Wolfson and Neave (2007).

Football

In 2003, around 220 million people were active members of the Federation Internationale de football Association (FIFA), of which 150 million were active players (both male and female) at any competitive level. In order to depict a more comprehensive figure of the global soccer movement, a further 200–300 million of non FIFA affiliated active players should be taken into account. Consequently, it is estimated that there are around 400-500 million active soccer players worldwide.

Football, which is also known as Soccer, is probably world's most popular sport, played in practically every nation at varying levels of competence. Football may be played competitively or for fun, as a career, a means of keeping fit or simply a recreational pursuit. The most popular and exciting sport in the world is soccer. It is performed by men and women, children and adults with various levels of expertise. The popularity of the game is reflected in the millions who participate in Soccer in lower levels of play. Soccer is now being played in more than 210 countries throughout the world. Soccer is popular because of the fact that it is a simple game requiring very minimum infrastructure and equipment. Success in soccer is dependent upon a variety of factors including the physical characteristics and physiological capacities of the players, their level of skill, their degree of motivation, and tactics employed by them against the opposition. Some of these factors are not easily measured objectively, but others can be tested using

standardized methods and can provide useful information for coaches (Mosher, 1985).

In soccer refereeing, speed plays an important role; the accelerated pace of the game calls for rapid execution of typical movements by every member. In many instances, successful implementation of certain technical or tactical maneuvers by different team members is directly related with the degree of velocity deployed (Kollath&Quade, 1990).

In soccer refereeing, in addition to mental, psychological, physiological and coordination features, the improvement of conditional features is important as well. Analysis of the specific movements and activities performed by football players/referees during games can provide much relevant information on which suitable training programs can be designed (Dawson, 2003). According to the Dawson (2003), the large majority of sprints performed in soccer take six seconds or less to complete, over distances of only 10-30 meters, and many of the sprints involve at least one change of direction. As running speed increases, longer strides are taken. In this instance, the swing phase involves greater knee flexion and hip extension, and greater hip flexion in the latter part of the phase (Howe, 1996).

During soccer games, many actions affect the decisions of the referees. These actions are characterized by intermittent and multi-directional movements, as well as the movements of changing intensity and time. Reilly and Ball (1984) stated that each game typically involves about 1000 changes of activity by each individual in the course of play, and each change requires abrupt acceleration or deceleration of the body or an alteration in the direction of motion.

Characteristics of referees and football players

During the last two decades soccer has increasingly attracted the interests of researchers investigating the various aspects of this multifaceted sports. However, almost all the research efforts have been devoted to soccer players. Interest in the performance of soccer players can be seen by the number of reviews published.

Every competitive soccer match must be regulated by a referee, two assistant referees and a reserve referee. During a competitive season, almost 1.3 million referees take to the field with the aim of regulating the behavior of the players and enforcing the rules of the game each week.

The decisions of referees can have profound effects on the outcome of the game. With the introduction of the three points for a win rule and the increasing number of professional soccer teams being listed on the stock exchange, it is easy to understand the importance of winning or losing in modern professional soccer. Despite the field soccer referee being considered the 23rd player of the football game and they are inevitable to ensure that, players follow the laws of the game. At the same time limited scientific literature is available on soccer referees analysis particularly available with the national and state level referees.

Soccer is the most widely acclaimed sport which is performed by all, irrespective of their age and gender. The performance is based on a variety of factors such as technical/ bio-mechanical, tactical, mental and physiological areas. The main reason why soccer is so popular worldwide is that an extraordinary capacity is not required for the players within any of these performance areas, still they need to have a reasonable skill level within all areas. However, there are trends towards more systematic training and selections influencing the anthropometric profiles of players who compete at the highest level. Even though, soccer is not a science, the performance can be improved with the help of science. Efforts to improve soccer performance often focus on technique and tactics at the expense of physical fitness.

Outstanding players run almost 10 K.M. at an average intensity near to the anaerobic threshold (80–90% of maximal heart rate) in a 90-minute game.Within this fortitude, plenty of explosive bursts of activity like jumping, kicking, tackling, turning, sprinting, changing pace, and pertainingdynamic contractions to obtain balance and control of the ball against defencive pressureare required. The world's best teams constantly improve their physical potentials, whilst the less well ranked havn't got that consistency of improvement in physical standards. They follow similar values as reported 30 years ago. The probable reasons of their lower rankings

are the improper assessment methods and training resources. In addition to that, selling the best players and lack ofproper and effective training regimens worsen the situation. As there do exist teams from lower divisions with as high anaerobic and aerobic capacity as professional teams, the latter factor probably plays an important role.

Distance covered by soccer referees during a match

While analyzing a soccer match, the distance covered by a referee is the most important factor. In order to judge the soccer game properly, the referee should run around the field. The different types of locomotion at the time of match are walking, running, jogging, back walking,sprinting and back running. Soccer referees will have to change their movementsswiftly in accordance with the movements of the ball and players. The quantity and quality of the movement and physical requirements can be understood through an analysis of the distance covered, types of locomotion and heart rate of soccer referees. A proper training programme can be scientifically devised by determining physiological aspects of a soccer referee. But, unfortunately, there has been little work conducted on the distance covered of them. The modern studies have found that,an efficient soccer referee may cover 9–13 K.M. obtainingabout 85–90% of maximal heart rate and almost 70–80% maximal oxygen uptake (VO^2 max)during a competitive match.Almost 4–18% is covered at high intensity out of the total distance covered.

Sports Science and football refereeing

Sports science plays a critical role in performance of the Football refereeing. The game Football is a team based sport and it demands number of external and internal factors like anthropometrical, physical, physiological and psychological characteristics to play or to regulate the game at elite level. Hence, a thorough knowledge in sports science is essential for all those who are associated with the game of football.

Physiological characteristics and football

Introduction to exercise physiology

Exercise physiology is the study of how the body responds and adapts to physical stress. Sport physiology is the application of exercise physiology principles to guide training and enhance sports performance. Exercise and sports physiology overlap significantly and therefore are generally considered together. Exercise is an intentional physical stress placed upon the body, producing both acute and chronic effects that can be studied. (David, 1971).

The physiological characteristics of football referees have received an increasing amount of focus in the scientific literature over the past decades. Studies have examined referee profiles, both physiological and anthropometric (Rontoyannis, 1998) as well as the movement patterns and physiological load experienced during actual match play. D'Ottavio and Castagna (2007) analyzed and depicted that referees cover a mean ± SD distance, during an average 95-minute match, of 11469 ± 983 m. with walking constituting 957 m. 4174 m. of low-intensity running, 2585 m. of medium-intensity running, and a total of 1556 m. of high intensity running. Maximal pacerunning accounted for 608 m. and non-orthodox directional modes, that is, sideways and backward running—results in 181 m. and 1315 m. respectively. (D'Ottavio, 2001).

Heart rate recordings collected during matches demonstrated that the mean cardiovascular strain imposed on referees during match is approximately 85% of maximal heart rate (HR max). However, as referees have been reported to spend approximately 75% of their total match time either standing, walking, or jogging, and the amount of high-intensity activity, performed at speeds of more than 15 km/hour during a match, is a better indicator of the physical demands of the matches. Given the high physical load imposed on top-class referees during actual match play, fitness levels need to be sufficient enough for the referees to be able to cope with the demands of their games through keeping up with play at all times and ensuring optimal viewing positions. This in itself is a challenge. On the other hand, when considering the fact that referees are on average 10 to 15 years older than

players and aging affects fitness levels negatively, referees have to work extremely hard in training to ensure that they attain, and maintain, an appropriate level of fitness. Also, in most countries referees still work full-time, and their physical training sessions often have to be arranged around work commitments. Therefore, to ensure referees can attain an optimal level of match fitness, emphasis within their fitness preparation programmes have to be firmly placed on quality structured training sessions that provide an appropriate training stimulus to enable the attainment of such fitness levels, especially with training time being at such a premium.

Castagna (2007) stated that, the significance of the refereesshould not beunderestimated in the economy of soccer, as it is very common, especially in professional soccer, a misjudgment may have serious implications on the end result of the game. Hence, a better knowledge of the laws of the game and its application on the field can obviously benefit the game. Present studies revealed that, during a high spirited match, an excellent soccer referee usually covers 9–13 K.M. obtaining almost 85–90% and approximately 70–80% of maximal heart rate and maximal oxygen intake (VO2max), respectively. Out of the total distance covered,almost 4–18% is covered at high intensity. It is observed that, during competitive matches, blood lactate concentrations have been reached as high as 14 mmol/L to the normal range of range of 4–5 mmol/L. Soccer players, especially midfield players have shown strong similarity to the above figures.But while comparing with players, referees are 15–20 years older, usually have a non-professional status and who cannot be substituted during a match. Moreover, this significant physical stress accentuates onto a high perceptual-cognitive workload during the whole match. In connectionwith the fitness status, VO2 max values of referees are rather lower than the players in a match they officiate, with mean values in the range of 44–50 mL/kg/min.

Psychological characteristics and football referees

Introduction to sports psychology

Psychology deals with aspects of behaviour and with the feelings, thoughts and motivations underlying that behaviour (LaiYeung, 2011; Carr, 2011; Nezhad&Vahedi, 2011). It is an important subject with academically useful aspects along with research and professional significance. Psychology is an applied field of science and it is used to study behavioural pattern of players in sports at different competitive levels (Wann, 1997). It has become a major discipline lately and lots of academicians and researchers are working in this field.

Sports psychology

Sports psychology is concerned with psycho regulative analysis of sports ability and performance, sports ability relationship with training and competition, psychology of different sports and physical exercise, psychological effect of subjective and objective environments, formation of personality through sports ability and participation, utilizing psychological principles in preparing the athletes and application of socio psychological findings (Yusof, Chuan, & Shah, 2013; Zekan, Peronja, & Russo, 2012; Zhang & Li, 2012). Sports psychology is a branch of study of sports men's behaviour scientifically in various sports settings. Sports are typically understood as recreational activity, physical activities as well as highly organized competitive athletic events and games such as Volleyball and Basketball etc.

Educational psychology is concerned with youth and children in education. Educational psychologists are equipped to resolve various learning problems, emotional problems; disability and multifarious developmental disorders. Educational psychologists try to understand the issues through observations, personal interactions and input from friends (Fazio, Isidori, &Bartoll, 2015; Granero-Gallegos, BaenaExtremera, Gaemez-Laepez, &Abraldes, 2014; Honari, Goudarzi, Heidari, &Emami, 2010). They assess the issue in terms of its severity and effects and offer expert opinion and help. These inputs from the psychologists

play an important role. Modern methods adopted by these experts help vulnerable young people to restore balance. They train teachers, assistants and people working with children at various levels including sports (Khalkhali&Golestaneh, 2011; Kolayis, Turan, &Ulusoy, 2012; Lese, 2014).

In recent century "stress" is one of the most important fields of research in different disciplines. This subject has drawn attention of many, including medical practitioners, psychologists, physiologists, biologists, sociologists and even common public too. In recent decades the term “stress” is applied to a stimulus that can create a change in cognition behaviour, emotion and physiology of a person. Scientists could prove negative effects as well as side effects of stress on human. In competitive sport situations, the factors like the importance of sport events, and individual factors like trait anxiety, self believe and self-sufficient of the concerned person cause stress.

Football is one of the popular sports that have many fans all over the world and millions of people enjoy it, and is the most popular sport in the world. Throughout the world people play football, spectate football matches, watch football games on TV and discuss them with friends and read updated football news. The games of elite football groups attract thousands of people. Football has always maintained a foothold in the fans enthusiasm. Football has become one of the most attractive, popular and beautiful events in the world. Referee's role, is a basic role in a match. The referees and assistant referees are involved in a competitive match. In each football competition, two teams are involved. Referees' function is to control the game in implementing rules and regulations. For this, they must be physically fit and mentally alert. They must have balanced personality to tackle all situations. To an extent the outcome of all the players and coaches’ efforts are depend up on the referee’s decisions in the match. When referees see an incident, they should consider their role in that and based on the situation and justice, they should make a decision. Hence, physical and mental readiness, as well as their personal traits and the level of their stress and anxiety are decisive factors in their judgments. Not many studies have been done on referees. It seems that a study to assess the relation between the

level of stress and their performance is relevant. In this study, the level of stress in referees before and after the match and its relation with their performance have been investigated. Many reports indicate that along with footballers and coaches, the referees are sometimes victimized of related stress which may affect any judgment given by them during competitive match. Such a situation may damage the total environment of the game.

Today stress defines like a pressure that effects on mental condition and causes sleeplessness, sweat nervousness and touchy. The stress could have positive effect like increasing of self–stimulation condition and more commitment for finishing. This important factor had typical effect on referees' judgment during the period of play. The personal characteristics of referees like referees' age, background, referees' education and marriage conditions could have influenced in decreasing or increasing stress before competition.

It is a fact that, referees are under tremendous pressure before, during and after the match. The ability to cope up with the stress and anxiety and to make correct decisions and to conduct the game within the framework of the rules and regulations is very much demanding. The studies on psycho-physiological analysis before and after the match of soccer referees are few. A research gap exists in this area and hence the need for the study.

Statement of the problem

The purpose of the study was to analyze the psychological and physiological variables of national and state level soccer referees before and after the match.

Objectives of the study

1. To find out the differences in the psychological and physiological factors of national and state level soccer referees from Kerala state, namely anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate, at four different times: six hours before the match, fifteen minutes before the match, fifteen minutes after the match and six hours after the match.

2. To make a comparison between national and state level soccer referees in their psycho - physiological variables namely., anxiety, stress, vital capacity, blood pressure, body temperature, heart rate and respiratory rate.

3. To identify the personality of national and state level soccer referees.

Delimitations

The study was delimited to the following:-

1. The study was delimited to 25 national and 50 state level soccer referees randomly selected from different districts of Kerala State.

2. The subjects' age ranged from 25 - 45years.

3. The study was restricted to the following psychological & physiological variables.

1. Personality.
2. Anxiety
3. Stress
4. Blood pressure.
5. Heart rate.
6. Vital capacity
7. Body temperature
8. Respiratory rate

4. The study was delimited to the selected matches of Kerala state senior inter districts championships and inter club championships.

Limitations

The following were considered as the limitations of this study:-

1. Individual differences in the functioning of the body and mental control which were beyond the control of investigator were considered as a limitation of the study.
2. Experience of the referees was not considered in this study.

Hypotheses

On the basis of the reviews of related literature and research findings, it is hypothesized that:-

1. There would be significant difference in the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 6 hrs before the match and 15 minutes before the match.
2. There would be significant difference in the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 6 hours before the match and 15 minutes after the match.
3. There would be significant difference in the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 6 hours before the match and 6 hours after the match.
4. There would be significant difference in the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level

soccer referees at two different times: 15 minutes before the match and 15 minutes after the match.

5. There would be significant difference in the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 15 minutes before the match and 6 hours after the match.

6. There would be significant difference in the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 15 minutes after the match and 6 hours after the match.

7. There would be significant difference between the national and state level soccer referees on study variables namely, personality, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate at four intervals of time: 6 hours before the match, 15 minutes before the match, 15 minutes after the match, 6 hours after the match.

8. There would be significant difference between the national and state level soccer referees on vital capacity.

9. It is hypothesized that soccer referees would be extroverts.

Definition and the explanation of the terms

Personality

Personality is "the dynamic organization on within the individuals of those psycho-physical systems that determine his unique adjustment to the environment"- (All Port- 1937).

Anxiety

"Anxiety is a subjective feeling of apprehension and heightened physiological arousal. It is accompanied with an elevated level of arousal and feeling of tension and apprehension" (Levitt, 1985).

State-anxiety

State anxiety is characterized by a state of heightened emotions that develop in response to a fear or danger of a particular situation. (Wikipedia).

Trait-anxiety

Trait anxiety refers to a general level of stress that is characteristic of an individual, that is, a trait related to personality. Trait anxiety varies according to how individuals have conditioned themselves to respond to and manage the stress. (Wikipedia).

Stress

Stress is a state of mental or emotional strain or tension resulting from adverse or demanding circumstances. (Wikipedia).

Body temperature

Bodytemperature is the difference between the amount of heat produced by the body processes and the amount of heat lost to the external environment. (Potter and Perry-2001).

Heart rate

Heart rate is actually the frequency of pressure waves (waves per minute) propagated along the peripheral arteries such as carotid or radial arteries. (Evlin C Pearce – 1985).

Respiratory rate

The respiratory rate is the rate at which breathing occurs in a minute. This is usually measured in breaths per minute and is set, and controlled by the respiratory center. (Wikipedia).

Blood pressure

Blood pressure is the force exerted by blood against the arterial walls and determined by how much blood is pumped and the resistance to blood flow. (David A. Myshne, 1971)

Systolic blood pressure

The highest level to which the arterial blood pressure rises following the systolic ejection of blood from the left ventricle. (David A. Myshne, 1971)

Diastolic blood pressure

The lowest level in which the arterial blood pressure falls in between the successive heartbeat. (David A. Myshne, 1971)

Vital capacity

Vital Capacity is the maximum amount of air a person can expel from the lungs after a maximum inhalation. (The world book encyclopedia).

Referee

Each match is controlled by a referee, who has full authority to enforce the laws of the game in connection with the match to which he has been appointed. (FIFA - Laws of the Game).

Significance of the study

1. The findings of the study will provide a new dimension in this area and will be beneficial for referees, and referee trainers.

2. The conclusion of the study may also keep encouraging the referees, and referee trainers to use appropriate techniques to maintain an optimum level of anxiety among referees for better performance.

3. It will help in identifying the psychological & physiological variables that could be used for encouraging the selection of soccer referees.

4. The study results may lead to an encouragement for the promoters of referees of other games.

5. This study may also provide further information to the existing body of knowledge.

Chapter II

Review of Related Literature

Refereeing is a challenging profession which demands passion as well as dedication .An elite soccer referee must be a perfect blend of physiological and psychological skills. Realising the aspects of scientific refereeing the soccer world could strengthen the structure and quality of referee training .Sport literature often gives less importance to refereeing. Recently researchers took more important on the deeper aspects of this particular profession. The following sections will analyse a series of studies which investigator the progression of refereeing over the years and the interrelationship of psychological and physiological attributes.

Studies related to physiological requirements and referees assessment

Choi and Roh (2018) examined and compared the activity profile and physiological reactions of amateur football referees during competitive matches of high school and college students. The study covered 30 matches (High school -15 and college-15). A GPS enabled wireless heart rate monitor measured the heart rate, movement speed, and the total distance covered. Lactate concentration was also calculated soon after the first and second half of the match. Considering the total distance covered by football referees, it is noted that college referees did better than their high school counterparts (7,547 m vs. 6,719 m). The maximal heart rate of college football referees was low in the first half only, and the percentage of the heart rate within the "maximum" range was low all over the game. Refereeing inflicts remarkably high physical strain on the body while chasing the game. This study put forward the necessity of developing and distributing physical training programs designed for refereeing.

Schenk, et al. (2018) stated that referees are an integral part of soccer, and their performance is limited to basic principles for regular matches regardless of the competition level or age classes. The aspects of exercise physiology and match performance of soccer referees are only considered scientifically and nutrition

recommendations were take on from professional soccer's. Body composition, aerobic capacity, and training volume of elite referees and soccer players are different. It can be seen that comparing to active soccer players, caloric needs and recommended daily carbohydrate intake of, referees' commonly low. While officiating in severe climate condition sufficient fluid intake, pre-match and in-match hydration strategies are advised for referees to avoid cognitive and physical performance loss. The study implies that it is not advisable to follow the same nutritional factors of active soccer for referees.

Gaoua de Oliveira and Hunter (2017) conducted a study on different professional realms require high levels of physical performance alongside fast and accurate decision-making. In this study, football refereeing took as an example to analyse the correlated effect of passionate physical activity, extreme temperatures on decision-making. For example, in professional football, matches can be played in temperatures ranging from -5°C in Norway to 30°C in Spain. Despite of these situations, the responsibility of referee's should be remain consistent in administering the laws steadily and impartially and to make sure that the rules are followed without adversely affecting the competitiveness of the game. However, vigorous exercise in acute environments accelerated the physiological and psychological stress which can influence decision-making. Accurate decision making capacity of the referees may be influenced by the physical exertion required to control the match and the thermal strain from the extreme temperatures. Here, in review literature on the physical and cognitive requirements of football refereeing and how extreme temperatures may affect referees' decisions. The research emphasize that both hot and cold environments have a negative impact on decision-making. A theoretical model of decision-making under the restriction of intense physical activity and thermal stress is recommended.

Brightmore, et al. (2016) analysed the movement and physiological demands of Australasian National Rugby League referees, officiating with a 2-referee system, and to compare the demands of the lead and pocket referees. Global positioning system devices (10 Hz) were applied to acquire 86 data sets on 19 NRL referees.

Total distance, relative distance covered, and heart rate per half and across match play were evaluated among and between referees using ‘t’ tests. Distance, time, and number of movement "efforts" were calculated in 6 velocity classifications using analysis of variance. Cohen d effect sizes are reported. There were no significant differences between the lead and pocket referees for any movement or physiological variable. There was an overall significant effect for distance and time ($P < .001$) between velocity classifications for both the lead and pocket referees. Both roles covered the largest distance and number of efforts at velocities of 0.51-2.0 m/s and 2.01-4.0 m/s, which were interspersed with efforts >5.51 m/s. Findings highlight the fragmentary nature of rugby league refereeing, but shown that there were no variations in the movement and physiological demands of the two refereeing roles. Results are valuable for those responsible for the preparation, training, and conditioning of NRL referees and to ensure that training prepares for and replicate match demands.

Emmonds, et al. (2015studied the physiological movement demands of Rugby League (RL) referees is limited, with only one study in the European Super League (ESL).The goal of this study was to identify penalty accuracy scores of RL referees and to find out the relationship between penalty accuracy and total distance covered, high-intensity running, and heart rate per ten minute duration of match play. Time motion analysis was taken on eight referees over 148 European SL games during the 2012 season applying ten-Hz global positioning system analysis and heart rate monitors. The number and timing of penalties given was determined using Opta Stats. Decisions of referees were accurate on 74 ± 5% of instances. Lowest accuracy was found in the last ten minute duration of the match (67 ± 13%), with an average drop (effect size = 0.86) in accuracy examined between 60-70 minutes and 70-80 minutes. In spite of this, there were only small correlations observed between mean heart rate, TD, HIR efforts, and penalty accuracy. A moderate correlation was found between maximum velocity and accuracy. Notwithstanding, only minor correlations observed, physiological movement demands of refereeing have noteworthy influence on decision making. Possibly,

other confounding variables influence referee decision-making accuracy, needs more investigations.

Ogabor, (2015) measured selected physiological fitness profile of football referees in Cross River and Akwa Ibom States. Physiological fitness profile calculated was, resting systolic and diastolic blood pressures and compared maximum oxygen uptake max vo2, resting heart rate to measure cardiovascular endurance. The study used an experimental research design in which Standardized equipments and procedures were followed.. By applying stratified random sampling technique total of twenty subjects were selected. Descriptive and inferential statistics were applied to analyse the collected data. The statistical techniques used for data processing protocol were the mean, range, standard deviation and the independent "t" test used to test significant difference between the mean scores of subjects from the two states. The level of significance was set at 0.05 with 18 degree of freedom. Findings of the study revealed that referees from Cross River and Akwa Ibom states were alike in resting heart rate, resting systolic and diastolic pressures.

O'Hara, et al. (2013) measured the movement and physiological demands of professional rugby league referees using GPS tracking analysis. The utilization of global positioning systems technology within referees of any sports is limited. The goal of the present study, Time-motion analysis was conducted on 8 referees employing 5-Hz GPS devices and heart rate monitors throughout the series of Super League matches.44 data sets were collected with results identifying similar total distance covered between first and second half periods with a significant (P=0.004) reduction in the number of high velocity efforts performed between 5.51-7.0 m.s-1 (1st=21±8, 2nd=18±8). Heart rate was significantly (P<0.001) greater in the first (85.5±3.4% maxHR) measured to the second (82.9±3.8% maxHR) half. This brings out the irregular nature of rugby league refereeing, comprised of low velocity activity interrelated with high velocity efforts and recurrent changes of velocity. Referee training should be designed in such a way that consists interval training interspersing high velocity efforts of altering distances with low velocity activity

while trying to attain the average heart rates of 84% max HR to replicating the physiological demands.

Weston, et al. (2012) stated that soccer referees are required to keep up with play at all times to make sure most advantageous positioning in making key decisions. While the physiological aspects of soccer refereeing have been extensively analysed.A modern analysis of methodological deliberations for the interpretation of referees' match activities, the validation of fitness testing and training protocols, match and training injury portrait, and the understanding and development of perceptual-cognitive expertise are introduced. A referee covers nearly 11 km during a match, with 900 m of high-speed running .The evaluation of within-match activity profiles have strive to note the possible occurrence of referee fatigue, with indefinite results. Researchers have indicated that referees' physical performances are interconnected with those of the players during the same game. The evaluation of referees' match activity profiles should be made in the similar situation of the players' performances. When analysing the physical performances of the referees, high match-to-match variability in lead variables, namely, high-speed running and sprinting, along with age-related reductions in match running should be considered. Fitness test of the referees required to ensure the physical task of refereeing, yet for the recent fitness tests suggested by the Federation International de Football Association 20 × 150 m high-intensity and 6 × 40 m repeated-sprint test . Only the repeated-sprint test is in possession of the appropriate construct validity for calculation of match-related running capacity. Researchers have indicated that high-intensity training protocols are constructive for enhancing fitness and match running performance. Severe training loads associated with increasing age could, in part, describe an incidence of non-contact match injuries similar to players, with lower leg muscle strains being the most common type of non-contact injuries in referees. The perceptual-cognitive needs of soccer refereeing are remarkable, yet there remains little research analysing the perceptual and cognitive processes addressing referees' decisions. It is suggested a three-step approach for the study of competence in soccer referees. Objective and reliable factors of decision making should be enforced with remarkable consideration to the improvement of naturalistic test

circumstances while retaining experimental control. Process-tracing measures can be applied to point out the non-cognitive and cognitive mechanisms comprised in perfect decision making. The study summarised that, the validity of the standardized FIFA sprint and interval testing does not sufficiently bounce back the distinct match activity of the officials.

Weston, (2011) analysed the relationship between intensities of exercise during match-play of elite-standard soccer referees with those of the players from the same match. Match analysis data were collected for 18 elite-standard soccer referees age 26-49 years on FA Premier League matches during the 2008-09 English FA Premier League season 236 observations. Following running categories were measured for referees and players ie. total distance covered, high-speed running distance speed and sprinting distance. While examining the distance-time regression coefficients, no variations were noted between the players and referee within-match rates of change for total distance covered, high-speed running; and sprinting. Moreover, that, there were no specific variations in across-season rates of change for total distance. The finding of the study reinforces the existence of an interrelationship between soccer referees' and players .In case of intensive exercises during matches and disclosed that referees can keep pace with the players during FA Premier League matches.

Silva, et al. (2011) determined the effect of volume and composition of fluid replacement on the physical performance of male football referees. During three official matches, ten referees were treated as subjects of the study. The participants drank mineral water and libitum, in one match and they had a specific volume of mineral water or a carbohydrate electrolyte solution which is equal to 1% of their baseline body mass .(half before the match and half during the interval). Overall water loss, rate of sweat and physiological performance in the match were calculated. When rehydrate ad libitum (pre-match and at half time) participants lost 1.97 ± 0.18% of their pre-match body mass (2.14 ± 0.19 L). When they drink a pre-determined volume of fluid sudden decrease of this limiting factor can be noted. The level of sweat rate was clearly reduced after the consumption of a pre-determined

volume of a carbohydrate electrolyte solution, 0.72 ± 0.12 vs 1.16 ± 0.11 L/h ad libitum. The high percentage (74.1%) of movements at low speed (walking, jogging) noted when they consumed fluid ad libitum was significantly reduced to 71% with mineral water and to 69.9% with carbohydrate solution. An acceleration in percent movement expended in backward running was noted when they take a pre-determined volume of carbohydrate solution, 7.7 ± 0.5 vs 5.5 ± 0.5% ad libitum. The enhanced hydration status gained with the carbohydrate electrolyte solution reduced the duration of time spent in activities at low-speed movements and raised the time spent in activities requiring high-energy expenditure.

Ruiz Caballero, et al. (2011) analyzed through echo-cardiography, the structure and functional cardiac profile of national category Spanish soccer referees. The sample consisted of 54 licensed referees, who belonged to the Football Inter-Insular Federation of Las Palmas. The sample presented a mean age of 28.52 ± 6.39 years, a height of 1.76 ± 0.07 m, a body mass of 77.26 ± 10.74 kg and a Body Mass Index of 24.90 ± 2-73 kg/m2. The diastolic and systolic dimensions of the left ventricle were 50.03 ± 4.79 mm and 33.74 ± 5.23 mm, respectively. The thicknesses of the inter-ventricular septum and the posterior wall of the left ventricle were 9.77 ± 1.53 mm and 9.47 ± 1.54 mm, respectively. The left ventricular mass was 112.80 ± 26.53 g/m2, the diastolic volume of the left ventricle 135.09 ± 39.63 mL and the ejected volume 47.34 ± 12.44 mL/m2. This study shows that the echo-cardio graphic profile of football referees is characterized by presenting an increase in the left ventricular mass caused by an expansion of the cardiac chambers and a normal systolic and diastolic function. The values obtained by football referees were higher than those found in inactive people and lower than in professional football players. These differences may be due to the different physical training workloads employed by football players and referees.

Weston, (2010) analyzed the soccer referees are required to keep up with play at all times despite occupying an age bracket of on average 10-15 years older than their playing counterparts. Therefore, the aim of the present study was to examine the effect of age upon the physical match performances and match

physiological loads of elite-level soccer referees. Match analysis data was collected, Leeds, UK from 22 professional soccer referees age ranged from 31 to 48 years on FA Premier League matches over four consecutive seasons 778 observations. Physical match performance categories were total-distance covered; high intensity running distance, sprint count (>7.0 ms (-1), SC); top sprinting speed (TS); average distance from the ball (DB) and average distance from fouls (DF). Significant age effects were found for TD ($r=-0.52$, $p<0.001$), HIR ($r=-0.53$, $p<0.001$) and SC ($r=-0.53$, $p<0.001$). No age effect was found for DB and DF ($p>0.05$). Despite covering less TD, HIR and performing fewer sprints the older referees 43-48 years were able to maintain an average distance from fouls that was comparable to that recorded by the young 31-36 years referees. Therefore, the decreased physical match performances associated with increasing referee age did not appear to impact upon the older referees' ability to keep up with play. In light of these findings, refereeing governing bodies may wish to review their age-based retirement guidelines.

Weston, (2009) investigated present-time issues within the applied physiology of football refereeing. 1) Training performance. The influence of a high intensity training regime was evaluated in a group of top-level football referees. It was followed with a 16-month training duration the referees' performance on the Yo-Yo Intermittent Recovery Test improved by 46.5%. 2) Match Demands. The influence of match standard and referees' experience on the objective and subjective match loads of referees was examined. The standard of competition is related to match heart rates and ratings of perceived endeavour. The referees' match responses will not be influenced by referees' experience. The referees' match activities and elements influencing these activities were also examined using a semi-automatic, video match analysis system. Physical performances were related in part to the physical performances of the players; whilst the distances covered during the first half were related to second half coverage. 3) Aging and performance. The influence of aging on referees' fitness levels and physical match performances was addressed. A trend towards an age related reduction in physical fitness as determined by the referees' fitness test was observed in regression analysis. An age-related decline in physical match performance was observed in match activity, although this decline

did not impair the referees' capacity to keep up with play. 4) Fitness and match performance. The validity of the FIFA referees' fitness tests was scrutinised. Interval test HR load was significantly correlated to the referees' match coverage, both total distance and high intensity running. Sprint test scores also displayed a notable relationship with the referees' match sprinting distances. Even though, given the strength of the relationships only the sprint test showed enough construct validity for the physical assessment of football referees.

Weston, (2009) evaluated the extent to which measures derived from the new FIFA referees' fitness tests can be used to monitor a referee's match-related physical capacity. Match-analysis data were collected from 17 soccer referees for 5.0 (s = 1.7) FA Premier League matches per referee throughout the first 4 months of the 2007-08 season. Physical match performance classifications included total distance covered, high-intensity running distance (speed >5.5 m x s (-1)), and sprinting distance (>7.0 m x s(-1)). The two tests were a 6 x 40-m sprint test and a 150-m interval test. On the other hand, in order to establish suitable validity for physical assessment of soccer referees, only the sprint test and in particular the fastest 40-m time should be conducted.

Krustrup, et al. (2009) examined time-motion and physiological measurements were executed to identify the physiological needs of soccer referees and assistant referees in international games and to examine if high-intensity running correlates to the referees' capacity to keep up with play. Even though, sprinting distance was not different, total distance covered and high intensity running was higher for referees than the assistant referees. Referees covered 0.89 +/- 0.37 km by backwards running and assistant referees covered 1.54 +/- 0.66 km by sideways running. Mean heart rate was higher ($P < 0.05$) for referees than assistant referee, whereas blood lactate was not different. Backwards/sideways running decreased ($P < 0.05$) from the first to the last 15-min period for referees and assistant referees, whereas high intensity running was unaltered. High intensity running was negatively correlated with the five longest distances from infringements in both halves ($r = -0.60$ and -0.58, $P < 0.05$). In conclusion, international match officials

carry out an important amount of high intensity running throughout games, while low-intensity and non-traditional running activities are reduced during the matches. Referees performing the most high-intensity work are better to keep up with play. The match activities which should be considered in training and testing procedures, differ remarkably between referees and assistant referees.

Weston, (2007) examined the impact of first half activity, overall match intensity and seasonal changes on the physical match performances of English Premier League soccer referees. Data of match analysis was collected using the Prozone match analysis system from 19 full-time professional referees from a total of 254 matches during 2004-2005 season. Three separate categories were classified from physical match performances: 1, total distance covered; 2, high-intensity running distance, average distance from violation of the laws. Using these match activity attributes, the impact of first half TD and high intensity running distances on second half activities and also the impact of players' match activities upon the referees' physical match performances were examined. The major finding of the present study was that, the physical match performances of the referees were partly related to those of the players, in that the referees' high intensity running correlated with players' high intensity running ($r=0.43$, $p<0.0001$, $n=212$). Furthermore, first half TD and high intensity running distances were found to be related to second half coverage in referees. These results indicated a need to evaluate the overall match intensity prior to scrutinising the physical match performance of the referee. More examination is essential as to whether reduced physical performances in the second half of matches are a result of referee fatigue, tactical strategies on behalf of the referee or reduced player match activities resulting in a slower rhythm of match.

Castagna and D'Ottavio (2007) the referees have got an important role in the economy of soccer, as very frequently, especially in professional football, a misjudgement may result in serious implications on the outcome of the game. As a result, a clear and better understanding of soccer refereeing can clearly benefit the game. Present studies have indicated that, in a competitive match, an excellent football referee has to cover 9-13 km reaching almost 85-90% and approximately

70-80% of maximal heart rate and maximal oxygen intake (VO2max), respectively. 4-18% of the total distance completed is covered at high intensity. During competitive matches, blood lactate concentration have been observed as high as 14 mmol/L, while normal blood lactate concentration has been reported to be in the range of 4-5 mmol/L. The given figure shown similarity to soccer players especially to midfield players. At the same time, when compared with players, referees are 15-20 years older, often have a non-professional status and it is very difficult to substitute during the match. Moreover, this significant physical stress will result in a high perceptual-cognitive workload during the entire game. Referees normally possess VO2max values which is lower than the players they officiate in connection with fitness level with mean values in the range of 44-50 mL/kg/min. Since the present fitness tests do not relate to match performance, the methods used by the Federation Internationale de Football Association and the Union of European Football Associations to test referee fitness need to be changed. More task-specific tests such as the Yo-Yo Intermittent Recovery Test have been devised and validated for use with referees. At the same time, it is important that referees should be given training to increase their capacity to cover long distances at the time of a match and to repeat high-intensity efforts. Large improvements in YYIRT performance following both short-term (12 weeks) and long-term (16 months) high-intensity interval training has been observed through number of studies. Future studies should focus on a number of important areas such as decision-making ability of referees while officiating under different conditions, like high thermal pressure, and the influence of age on both physical and mental performance.

Weston, et al. (2006) examined the influence of match level and experience of referees on the unbiased and subjective workload of referees during English Premier League and Football League matches. They also examined the connection between heart rate and ratings of observed exertion for identifying match intensity in soccer referees. Short-range telemetry were used to record the heart rate responses and 10-point scale were used to collect RPE scores. Analysis opened a significant relationship between mean match HR and match RPE scores. The experience of referees had no influence on match HR and RPE responses to Premier League and

Football League matches. The outcome of the said study pointed out the validity of using HR and RPE as a tool of global match intensity in soccer referees. The referees' objective and subjective match workload assessments would not be influenced by referees' experience, at the same time, match intensity was corresponded to competition standard. These observations have great role in making of fitness preparation and assessment of soccer referees. In order to enable them to cope with an increase in physical match demands, referees should ensure that appropriate levels of fitness are developed when progressing to a higher level of competition,.

Castagna, (2005) reported that top level football referees normally attain the excellence of their officiating careers at an average age that is notably older than that considered in competitive matched football players. As aging has been reported to inversely affecting physical performance, this study aimed to examine the influence of aging on fitness performance in top-level football referees. 36 top-level football referees were classified into young (Y, n = 12), average (A, n = 14), and old (O, n = 10) groups, as per their age and examined for field test performance, (50-m and 200-m sprints, and 12-minute running for distance). Though senior referees performed acceptable fitness levels, younger officials should make sure that, they maintain enough levels of aerobic and anaerobic fitness to be able to cop with the requirements placed upon them during refereeing throughout their careers. Test standards should be age related to promote the fitness level.

Weston, (2004) examined the match demands of football refereeing, there has been little attempt to assess the impact of high-intensity training. The main goals were to get a better understanding of the long-term effect of specific fragmentary training. The authors examined the cardiovascular strain of specific high-intensity training sessions and also their impact on referees' fitness levels. To examine the physical workload during intensive fragmentary training sessions, heart rates were recorded and analysed relative to the referees' maximum heart rate. To assess the referees' fitness levels, the Yo-Yo intermittent recovery test was used. Both the pitch- and track-training sessions were triumphant in imposing an appropriate high

intensity load on the referees, at 86.4 +/- 2.9% and 88.2 +/- 2.4% HR (max), respectively. Following 16 months of fragmentary high-intensity training, referees improved their performance on the Yo-Yo intermittent recovery test by 46.5%, to a level that is comparable with professional players. As match officials are subjected to a high physical load throughout matches, they should follow structured weekly training plans that have an emphasis on intensive, intermittent training sessions.

Kay and Gill (2004) assessed whether any characteristic patterns of heart rate (HR) responses could be identified in National Rugby League referees (n= 6) during matches played in the 2001 season. The data have been organised and discussed, in order that, exercise programme planning practitioners may gain improved understandings of the physiological requirements for referees. Some specific training proposals have also been made. The HR was recorded every five seconds throughout six competition NRL matches; using a heart rate monitor with a built-in memory. The specific magnitudes of referees' heart rate mean values varied between individuals, possibly due to specific game intensities, referee fitness, and age. All referees however exhibited similar heart rate response patterns; characterised by frequent (13-20 per match) large transient upward and downward shifts (>20 beats per minute (-1)). Periods of elevated heart rate extended for between five sec and eight min at a time, and were further characterised as a typical cyclic wave of heart rate elevation and recovery (ranging from 99.2+/-12.4 beats/minute(-1) to 176.5+/-11.8 beats/minute(-1) [mean +/-95% CI]), with a work to rest ratio of 2:1. Steady state heart rate was not achieved at any time throughout any match. The findings of the present study taken together with a recent motion analysis, indicate that Rugby League refereeing is a highly intermittent, variable intensity activity. Remarkable anaerobic contribution to performance appears likely. It is suggested that, training and fitness assessment of athletes should reflect their specific demands; some specific recommendations have therefore been provided.

Bestine (2004) conducted a study on analysis of psychological and physiological variables of soccer referees. The purpose of the study was to analyse the psychological and physiological variables of soccer referees. The following

variables had chosen for his study namely blood pressure, heart rate, personality and anxiety. He reported that there was no significant difference between 6 hours before the match and 15 minutes before the match on trait anxiety of soccer referees.

Martin, et al. (2001) limited findings about the physiological requirements placed on referees during soccer matches. The present study aimed to identify the movement activities of referees during English Premiership football matches, and to find out the number of occurrences and span of these activities. Out of the top 20 referees in England, 9 were selected and videotaped during 19 matches. At the time of the playback of the videotapes, a single observer using a computerised video editing system coded the referees' activities into one of six distinct classifications. For the modes of locomotor activity, the referees were timed over 20 M. distance and to calculate the total distance covered in each type of activity throughout the matches, the average velocity of each activity was used. The maximum distance covered in a game was (chi +/- SD) 8581 +/- 668 m. The mean percentage of total duration of the match spent in each activity was: standing still, 37.0 +/- 11.0%; walking forward, 29.5 +/- 7.2%; walking backward, 9.9 +/- 3.2%; jogging, 12.8 +/- 3.2%; running, 9.8 +/- 2.3%; and sprinting, 1.0 +/- 0.4%. During a match, in between modes of activities there were altogether 672 changeovers. The outcome of this study indicates that, refereeing top English football matches is physically challenging. Even though, the important physiological load is placed on the oxygen transport system, frequent sprint bouts and the targeted necessities for acceleration and deceleration force supplementary metabolic requirements on referees. These findings can be implemented in the preparation of physical training programmes to maximize performance in referees.

D'Ottavio and Castagna (2001) described the work-rate profile and cardiovascular pressure of Italian high level soccer referees (n = 18). The referees were examined during official games of the 1992-1993 first division Italian championship. Subjects were all experienced top level referees enrolled in the CAN and thus officiating in the series A e B Italian championships. Mean age of the referees contemplated here was 37.5 +/- 2.14 years. Heart rates were monitored by

short-range radio telemetry. Match analysis was executed with methodologies similar to that reported by Ohashi, et al. (1988). Average match distance was 11376 +/- 1600 m (7818-13063) and no overall differences were observed between halves ($p > 0.05$). Nevertheless less distances were covered running backward and side-wards during the second half compared to the first half ($p < 0.05$).Referees, on average, covered 41.7% of the whole match distance at speeds faster than 13.1 km x h(-1). Heart rates attained 89.1% of the approximated maximal over the duration of a full game and no difference was observed between halves ($p = 0.72$). Mean heart rates of the first 15 min of play were lower than the other two sections of the first half ($p < 0.05$). Match analysis disclosed the intermittent nature of the referees' activities. Their intensity varied from situation to situation, often reaching near maximal intensity. However, sprint bouts never lasted for more than few seconds (2-4 sec). Top level soccer refereeing places high physiological demands on the official thus specific training and fitness assessment are needed.

Catterall, Reilly, Atkinson and Coldwells (1993) this study proposed to point out the work-rate descriptions of referees throughout soccer matches and record heart-rate responses during these matches. Using video-recordings 14 referees were examined with short-range radio telemetry by which their heart rates during the games were monitored. 11 football league matches were included in this study. The exercise intensity was largely sub-maximal with a fluctuation in activity every 6 seconds. 9.44 K.M. was the mean distance covered during the game. In the second half, a significant fall in work rate was noted. During the first and second halves the mean heart rate of 165 beats min-1 did not change. A change in work rate and heart rate was observed between individuals than with the importance of the match, but this fluctuation was small. It was observed that, refereeing elite level soccer places high physiological demands on the referee. This has more significance for training and fitness assessment.

Studies related to psychological requirements and referees assessment

Friesen A.P.et al. (2017) studied about the role of emotion regulation in lacrosse officiating. Emotions can affect the accurate decisions of referees that urge

the need of examining the emotions and regulation strategies of referees. The conducted study studied the emotions and emotion controlling techniques of 19 referees who officiate at an Under-19 Lacrosse World Championship. The officials responded to five questions through survey and group interviews, i.e., What kind of emotions were felt? , What are the events which evoke emotions? , How did lacrosse officials control their own emotional states before and after the match? , How did referees cope with the emotions of others'? , What were the expected results of these techniques? Studies indicated that, emotions varied throughout the matches and referees met with intrapersonal and interpersonal emotion-evoking incidents. These variations are believed to be arise from a consequent decreasing ability for emotion control. Participants used emotion regulation strategies that could be classified into Gross' (1999) families of emotion regulation strategies, often relying on suppression, emotion contagion, and preventative refereeing. Collectively, the results offer new insights into referee emotion regulation at national and international level matches.

Morris G.I., et al. (2017) conducted a study on the key characteristics of expert NRL referees. In order to determine the key characteristics leading to expert officiating performance, the experimental knowledge of elite National Rugby League (NRL) referees were investigated. Fourteen contemporary first-grade NRL referees were asked to identify the chief characteristics they considered to their expert refereeing performance. The modified Delphi method consisted a three-round process of an initial semi-structured interview and two questionnaires to confirm the opinion. The data stated that 25 characteristics which were considered as most significant that support expert NRL refereeing performance. Findings revealed the significance of the cognitive category, with the top 6 ranked characteristics at all cognitive skills. The decision-making accuracy was ranked as the highest characteristics by the referees, followed by reading the game, game understanding, communication, comprehensive awareness of the rules and the game management. The top ranked game skill characteristics like player rapport, positioning and teamwork which act as the backbone of elite performance. A lot of psychological characteristics like concentration, composure and mental toughness which were

significant to performance were highlighted by expert referees. There were only 2 physiological characteristics such as fitness and aerobic endurance which were identified as significant to elite officiating performance. In conclusion, experts agreement was attained that successfully established a hierarchy of the most important characteristics of expert NRL refereeing performance.

Ritchie J. (2017) studied about the Situation criticality and basketball officials' stress levels. A situation criticality is the stressor that officials most frequently reported. It is comprised of score differential and time remaining in a game which influence stress level of players. This study revealed the consequences of situation criticality on stress level of officials. The selected subjects were high school basketball officials (n = 108) with an average of 18.1 (SD = 11.2) years of officiating experience were given a survey packet consists game situations that varied in criticality. For each situation of games (n = 9) officials went through the overall stress and appraisal portions of the Stress Appraisal Measure (SAM). Data explored that situation criticality has an impact on perceived stress levels of officials. The results revealed that the stress levels of officials fluctuate within the match depending on score differential and time of match. The findings of the study boosted the officials to identify and overcome their stress, possibly through their appraisals. Overall, the results could prompt the urgency of rule changes that accelerated the situational demands on officials in critical situations.

Gouttebarge V et al. (2017) conducted a study on the Symptoms of common mental disorders among professional football referees: a one-season prospective study across Europe. The aim of this study was to determine the prevalence and one-season incidence of symptoms of common mental disorders among European professional football referees and to explore the view of European professional football referees on consequences, support and needs related to these symptoms. An observational prospective cohort study with three measurements over a follow-up period of one season (2015-2016) was conducted among central or assistant professional football referees from Belgium, Finland, France, Germany, Norway, Russia, Scotland and Sweden. To assess symptoms of common mental

disorders (self-reported and not clinically diagnosed), an English and French electronic questionnaire was distributed by the eight football federations. A total of 391 referees (mean age of 33 years old; mean career duration of 7 years) were enrolled, and 292 completed the follow-up period. Baseline 4-week prevalence rates were 6% for distress, 12% for anxiety/depression, 9% for sleep disturbance, 19% for eating disorders and 17% for adverse alcohol use. The one-season incidence of symptoms of common mental disorders was 10% for distress, 16% for anxiety/depression, 14% for sleep disturbance, 29% for eating disorders and 8% for adverse alcohol use. The study concluded that symptoms of common mental disorders occur among professional football referees and the development of specific support measures for referees are needed in order to manage properly these symptoms of common mental disorders.

Spitz, et al. (2016) reported that expert athletes have concentrated perceptual-cognitive skills and fixate on more informative areas during representative tasks. These perceptual-cognitive skills are also crucial to performance within the domain of sports officials. We examined the visual scan patterns of elite and sub-elite association football referees while judging foul play situations. These foul play situations were presented on a Tobi T120 Eye Tracking monitor. The elite referees made more accurate decisions and differences in their visual search behaviours were observed. For the open play situations, referees in the elite group spent remarkably more time fixating the most informative area of the attacking player and less time fixating the body part that was not involved in the violation of the laws of the game. Furthermore, the average total fixation time in the contact zone and non-contact zone tended to differ between the elite and sub-elite referees in corner kick situations. In conclusion, elite level referees have learned to perceive relevant from less-relevant information in the same way as expert athletes. Findings have involvements for the development of perceptual training programs for sport officials.

Furley P et al. (2016) conducted a study on the Nonverbal Communication of Confidence in Soccer Referees: Which is an Experimental Test of Darwin's Leakage

Hypothesis. The paper was aimed to investigate if soccer referees' nonverbal behavior (NVB) varied in accordance with the difficulty of their decisions and if perceivers could identify these systematic variations. Referee trainings are emphasized with communicating confidence through nonverbal behavior. It seems possible from a theoretical point of view that, especially following relatively while making relatively difficult decisions, it seems that referees have problems in controlling their nonverbal behavior. To investigate this question, three experiments were conducted. Experiment 1 (N = 40) and Experiment 2 (N = 60) come out with the conformation that, perceivers consider referees' nonverbal behavior indicates less confidence after ambiguous decisions when compared with unambiguous decisions. Experiment 3 (N = 58) indicates that, perceivers were more likely to argue with the referees when referees nonverbally communicated less confidence. The study also discussed consequences for referee training.

Ferudun Dorak (2015) examined the relationship and interaction between personality traits and sportsmanship orientations according to gender differences. 510 (235 female, 275 male) professional athletes from various team sports voluntarily participated in this study. The revised version of Eysenck's Personality Questionnaire and Multidimensional Sportsmanship Orientations Scale were used to collect data. The results of this study revealed that female athletes obtained higher scores when compared to males in extroversion-concern and respect for social conventions, respect for rules and officials and commitment towards sport participation sub-scales. In conclusion, the results of this study indicated that there was a significant relationship between personality sub-scales and sportsmanship orientation. In addition, personality sub-scales significantly affected sportsmanship orientations according to gender.

Anshel M.H. et al. (2014) conducted a study on a model linking sources of stress to approach and avoidance coping styles of Turkish basketball referees. Aim of this study was to externally validate and test a conceptual transient model involving six paths that linked sources of acute stress to avoidance and approach coping styles among Turkish basketball referees. The sample includes 125 Turkish

basketball referees ranging in age from 18 to 36 years (mean = 25.58. σ = 3.69). The analysis tested the relationships simultaneously from stressors, in consecutive order, distractions, subpar performance and verbal abuse, to coping styles, first both avoidance-cognitive and approach-cognitive, and then approach-behaviour. Findings explored that the model achieved a good fit and that all paths tested simultaneously were significant. The distractions stressor was positively related to subpar performance, which, in turn, was positively related to verbal abuse. Verbal abuse was negatively associated with an avoidance-cognitive coping style and positively related to the approach-cognitive coping style. The results underpinned a crossover impact of both avoidance-cognitive and approach-cognitive on approach-behaviour. One specification of this study is that coping should be studied in naturally occurring stages, a process-oriented approach. Another specification is that approach and avoidance coping styles, each sub-divided into cognitive and behavioural categories, provide a meaningful framework which provides sports officials a coherent structure for learning and developing ways to cope with drastic stress experienced during the contest.

Cavallera (2013) used the Big Five Questionnaire BFQ; Caprara, Barbaranelli, & Borgogni, 1993 with swimmers engaged in indoor practice at the leisure level 50 male, 50 female to measure whether personality traits are associated with swimming. We also evaluated the concept that scores on some personality traits can have a reciprocal closely intermingled influence on other personality traits, and that gender can play a role in harmonizing personality. We found that the swimmers were characterized by evidence of personality traits distributed within moderate middle scores in personality factors, contributing to well-being and satisfaction with life. We also found correlations within factors and sub factors, showing a close relationship among personality characteristics. Gender also plays a role in the measurement of personality characteristics as gender has a statistically significant effect on extroversion.

Lane, Nevill, Ahmad and Balmer (2006) recognised that, a decision made by a referee could be affected by thirteen associated attributes. The important identified

themes throughout the study include accuracy/error, crowd noise, regulations, experience, opinions and concentration/avoidance. The authors reached in a conclusion that, many of the influencing factors are interrelated and have the capacity to convince a decision making throughout the match. Any decision may or may not be affected by external biases which will affect the end result of a match.

Zoran Valdevit, (2001) stated that, the necessity of incorporating psychological knowledge into the science of sport has a strong grounding in the fact that, through participation in sports, one strives to actualize, develop, and enhance one's physical and biological potentials, to enrich the natural deter-mi-natives of one's behavior employing one's psychological features. Information that is needed for performing technical elements, about the environment in which they are performed, expectations and their consequences, the way in which success or failure are accepted, etc., all this is determined by the processes belonging to the cognitive personal aspects. The role of cognitive capabilities are reflected in the fact that, there is no such sport that doesn't require the capability of perceiving time and space, rapid distinctness, deduction and decision making. Referees make one distinct group of athletes. They are a building block of team competitions, and as such they draw the attention of both athletic and public in general. This is a transversal research verifiable in character, encompassing 85 respondents divided in four sub-samples by the criterion of each referee's achieved ranking for the season 2003-2004. The subject of this research is the psychological characteristics of team handball referees, on one hand, and their achieved rating in the list of referees for the given competition rank, on the other. The goal of the research is to analyse the psychological features of team handball referees and to determine their relation to the achieved rating in refereeing. By doing this research, we have analysed the psychological characteristics of a very distinct athletic group represented by handball referees, and we have determined effects that some psychological characteristics have on the achieved rating in refereeing.

Kaissidis Rodafinos A1et al. (1997) conducted a study on the Personal and situational factors that predict coping strategies for acute stress among

basketball referees. The aim of this study was to establish the ways in which coping style and situational appraisals are related to the consistency of using approach and avoidance coping strategies for skilled Australian basketball referees (n = 133) after three game-related stressful events. The events, 'making a mistake', 'aggressive reactions by coaches or players' and 'presence of important others', were determined from previous research on sources of acute stress among basketball officials. Our findings indicated that: referees exhibited consistent avoidance, but not approach, coping styles; they used more avoidance than approach strategies; and they perceived stress to be positively correlated with approach, and negatively associated with avoidance, coping strategies. These findings suggest that individual differences exist in perceptions of stress (i.e. situational appraisals), controllability and coping styles among moderately and highly skilled basketball referees. The implications for teaching cognitive and behavioural strategies for effective coping with acute stress in basketball officiating are discussed.

Rainey DW, Hardy L. (1997). Analysed the stress rating of rugby referees. 682 rugby referees from Wales, Scotland, and England rated their stress associated with refereeing on a 3-item scale. Mean ratings for the total sample and each group were between "very little" and "a moderate amount." Results support earlier studies, recommending that most sport officials do not experience much stress while officiating.

Summary

A typical match demands specific psychological and physiological attributes of a soccer referee. While officiating the match, referee faces many critical situations which require defect less solutions. The literature review analysed the above mentioned Physiological and Psychological factors. Various means of training and methods of coping should be introduced for the referees to overcome such crucial moments of judgment. A referee should have to be as physically fit as the players or more than that of them. Without proper training, one can run or walk throughout the game but it may affect their decisions. Elite referees are supposed to undergo different methods of training and fitness testing in order to be successful in

keeping up with play. Body temperature, vital capacity, respiratory rate etc. are also counted as the major physiological factors of being a referee. Successful career of an elite referee owes to the physical fitness training. On the other hand, a fascinating relationship can be seen between the physiological and psychological aspects of refereeing .Not only the mastery over the rules of the games but a number of personal qualities also create a good referee. While officiating a match a referee has to cope with the major psychological components i.e. quality decision making and the effect of internal and external factors on the decisions. For acquiring the skill of decision making, on-field experience contributes much more than the indoor trainings. As every decision of a referee can have a specific impact on the result of the match .Single impartial judgment demands high level of concentration and confidence. Impact of this split second decision may cause associated anxieties and pressures experienced by internal and external factors, which can be considered as the second major Psychological aspect deals with refereeing. Individual difference can be marked in the level of stress, anxiety, aggression etc, as it depends upon the self-confidence and on-field experience. It can be seen that elite referees can easily reduce the stress and pressure using their mastery of individual coping mechanism .Referees never yield to the stress and pressures .Passion for the game of soccer lifts up the minds in such a way to perform under any stressful situations. The study holds together the major components of refereeing that have been previously identified in the literature by various authors. It is significant to analyse the psychological and physiological attributes of the referees as it has direct influence on the match performance.

Chapter III

Methods

Research methodology involves the systematic procedure by which the researcher begins from the primary identification of the problem to its final conclusion. The methodology plays a vital role in performing the research work in a scientific, systematic and valid manner. This chapter of this thesis narrates the methods used in this study which includes selection of subjects, selection and justification of the variables, pilot study, orientation process, tools, collection of data, administration of the tests and statistical methods in this study.

Selection of subjects

The purpose of the study was to conduct an in-depth study on the psychological and physiological variables of national and state level soccer referees. To achieve this purpose, 25 national and 50 state level soccer referees were randomly selected from different districts of Kerala state. The age of the subjects ranged from 25 - 45 years. The subjects had past officiating experience of at least three years.

Selection of variables

The present study specially focused on selected psychological and physiological variables. The investigator reviewed a number of journals, books, e-resources, unpublished thesis, dissertations and coaching manuals from which he understood that the standard performance of football referees are depended on psychological and physiological variables. Based on this analysis, the investigator chose the following independent variables for this research.

Independent variables

The study was restricted to the following psychological variables namely personality, anxiety, stress and physiological variables namely blood pressure, heart rate, vital capacity, body temperature and respiratory rate.

Research design

The data was based on true randomized group design. The data collected were subjected to various statistical analysis. All the psychological and physiological variables except vital capacity and personality of selected national and state level soccer referees will be tested 6 hours before the match, 15 minutes before the match, and 15 minutes after the match and 6 hours after the match. The vital capacity and personality tests are taken only at 6 hours before the match.

Table 3.1

Selection of Tests

The table given below shows the tests / tools and the unit of measurements of selected psychological and physiological variables used in this study

Sl.No	Variables	Tools used	Measuring Units
Psychological variables			
1	Personality	Eysenk Personality Inventory (Eysenk, H.J., 1997)	Score
2	Anxiety	State-Trait Anxiety Inventory, (Spielberg, et al., 1970)	Score
3	Stress	Cohen's Perceived stress Scale (Cohen, 1983)	Score
Physiological variables			
1	Blood Pressure	Sphygmomanometer and Stethoscope	MmHg.
2	Heart Rate	Manual Method	In Beats per minute (BPM)
3	Body Temperature	Digital Thermometer Fahrenheit	Degrees Fahrenheit
4	Respiratory Rate	Manual Method	Breaths per minute (BPM).
5	Vital capacity	Digital Spiro meter	Milliliters per breath

Validity of the questionnaire

The questionnaire used to measure the psychological variables namely personality, anxiety and stress were developed by Eysenk, H.J., (1997), Spielberg, et al., (1970) and Cohen, (1983) respectively.

Reliability of the questionnaire

A trial run of the inventory was made to ensure the reliability of the inventory and also to fix a time-limit so that the subjects responded much thought. Subjects were given Eysenk Personality Inventory (Eysenk, H.J., 1997), Anxiety - State and Trait Anxiety Inventory (Spielberg, et al., 1970) and Stress - Cohen's Perceived Stress Scale (Cohen, 1983) to evaluate their psychological factors. Thus the reliability of the test was confirmed by test and retest method and the results have been shown in table 3.2.

Table 3.2

Reliability coefficient of the referees in psychological and physiological variables by test and re-test methods

Sl.No	Variables	Coefficient of Correlation
1	Personality	0.89*
2	Anxiety	0.86*
3	Stress	0.81*
4	Blood Pressure	0.91*
5	Heart Rate	0.92*
6	Body Temperature	0.95*
7	Respiratory Rate	0.85*
8	Vital capacity	0.89*

** Established reliability ranged from 0.80 to 0.95*

Tester's reliability

The researcher was well equipped in the techniques of conducting the tests, the researcher had so many practice sessions in the testing procedures. Tester competency and reliability of tests were confirmed by test and retest method. High

correlation was seen, the tester competency in taking measurement and test reliability were established.

Reliability of the subjects

The subject reliability was fixed by test and re-test coefficient of correlation for the scores in each of the criterion measures. To obtain data for calculating test and re-test coefficient of correlation for reliability of the subjects, re-testing was done within a period of a week of initial tests in each of the criterion measures.

Pilot study

Prior to the formal study, a pilot study was carried out to validate the research procedures, to determine the feasibility of the study and to identify the time constraints of the study. For this, the researcher chose the subjects from youth under 21 inter district state football championship 2015 at Thodupuzha from 10^{th} to 16^{th} April 2015. They were assessed on the physiological and psychological parameters and totally 5 national level and 10 state level football referees were subjected to the selected criterion variables by the investigator. Based on the responses and performance ability of the Kerala football referees during the pilot study, a proposed model was designed. The results of the pilot study confirmed the appropriateness of the proposed methods. However, the low participation rate was a primary matter of concern. The pilot study designed to focus 75 football referees to complete physiological and psychological tests, consisting 8 test items, altogether. Methods to minimize the number of items and time necessary to complete the overall instruments were explored in order to increase the participation rate.

Orientation of the subjects

The researcher organised a meeting with the subjects prior to the administration of tests. The purpose of the study, the significance of this study and the requirements of the testing procedures were narrated to them in detail. All the selected subjects voluntarily came forward to co-operate in the testing procedures to put in their endeavors in the interest of the scientific investigation and in order to

make better their own performance. The subjects were very inquisitive, enthusiastic and co-operative during the study.

Collection of data

The methods of data collected from the national and state level football referees on selected psychological and physiological variables are explained below.

Administration of the test

Psychological variables

Personality

Purpose: To assess the level of personality traits of the subjects.

Tool: Eysenk Personality Inventory (Eysenk, H.J., 1997).

Testing procedure:

The two dimensions were extroversion, introversion (E - Scale) and neuroticism stability (N - Scale). The inventory consists of 57 Yes or No responses with the scale. The subjects were administered with the EPI – Questionnaire with 57 test items. The investigator used the E - Scale item (24 questions) and N – Scale item (24 questions). A copy of the questionnaire is attached in the appendix - II.

Scoring:

The scoring of the response forms were done in accordance with the instructions contained in the manual of the test. The prescribed key was used for the purpose. There were 57 questions in all on the form A of the EPI; 24 questions pertains to 'E' factor and 24 to 'N' while the remaining 9 questions show the presence or absence of 'L', example “faking good” (in the sequence of questions E and N are shown alternatively and every sixth question is a 'lie'). For those with E – score below 8, they considered as the introvert group while those scoring above 17 formed the extrovert group, and those scoring between 8 and 16 formed the ambivert group. Those scored more than 5 in the lie scale were not selected for this investigation.

Anxiety

Purpose: To analyse the level of state anxiety and trait anxiety of the subjects at four different times in relation to a match.

Tool: State and Trait Anxiety Inventory (Spielberg, et al. 1970).

Testing procedure:

The inventory scale contained 40 statements. The statements 1 to 20 measure the trait anxiety and statements 21 to 40 measure the state anxiety. There are no "Right" or "Wrong" answer, as everyone has a right to express his or her own views. There are three possible answers to each question. The respondent should answer either "Yes" or "No" (or "A" or "B"), making a (X) in the appropriate box. The last answer or "C" should be marked only when it is impossible to say "Yes" or "No". A copy of the questionnaire is attached in the appendix - III.

Scoring:

Before starting the scoring procedure, the scholar ensured the subjects had answered the entire questions in the booklet. Those who skipped more than 5 questions in the test were considered invalid and were excluded. Each answer scores either 2 or 1 or 0. Add the score of questions 1 to 20 and 21 to 40 separately which will serve as the total score for the trait anxiety and state anxiety respectively.

The following interpretations of the scores denote the level of the state and trait anxiety among subjects:

Score	Level	Interpretations
0-15	Low	State or Trait anxiety
16-21	Average	State or Trait anxiety
22-40	High	State or Trait anxiety

Stress

Purpose: To assess the level of stress of the subjects at four different times in relation to a match**.**

Tool: Perceived Stress Scale (PSS) Cohen, (1983)

Procedure:

The tools were designed to find out how unpredictable, uncontrollable, and overloaded respondents find their lives. This scale assessed the amount of stress in one's life rather than in response to a specific stressor and has been used widely in studies of both mental and physical health. The PSS is a 10-item self-report tool used to provide a global measure of perceived stress in daily life. The PSS was designed for use with community samples with at least a junior high school education and the items are easy to understand and the response alternatives are simple to grasp. A copy of the questionnaire is attached in the appendix - IV.

Scoring:

Responses ranged from "never" to "very often" on a 5-point scale. PSS scores were obtained by reversing the scores on the four positive items (items 4, 5, 7 and 8) and then summing all 10 items. PSS scores are obtained by reversing responses (e.g., 0 = 5, 1 = 4, 2 = 3, 3 = 2, 4 = 1 & 5=0) to the four positively stated items (items 4, 5, 7, & 8) and then summing across all scale items.

Physiological variables

Blood pressure

Purpose: To assess the systolic and diastolic blood pressure of the subjects at four different times in relation to a match.

Equipment: A standardized sphygmomanometer and a stethoscope.

Procedure:

The subject was asked to sit comfortably on a chair before the measurement was taken. The cuff of the sphygmomanometer was wrapped around the arm evenly with the lower side about one inch above the antecubital space. After that, the bell of the stethoscope was placed on the antecubital space to get a firm contact with the skin. The cuff was inflated till the artery was completely collapsed to the extent that no arterial pulse could be heard. The cuff pressure was then slowly released as the investigator watched the gauge. When sound of the blood flow (Korotkoff sound) became audible the reading in millimeters of mercury (mm of Hg) at that instant was recorded as the systolic pressure. The pressure of the cuff was further released gradually as the sound of the pulse changed in intensity and quality. The index of the diastolic pressure was noted in mm of Hg, when the heart beat sound completely ceased.

Scoring:

Systolic pressure (SP) was applied by means of the pressure ball, and with the left hand palpating the pulse, the pressure was continued for about a further 10 mm Hg, above the point of pulse disappearance. The stethoscope was applied to the brachial artery and releasing the pressure in the rubber compressor bag slowly and evenly by means of slight movement of the release screw of the control valve, care was taken to listen intently for the blood flow sounds. It was recorded in MmHg.

Heart rate

Purpose: To measure the heart rate of the subjects at four different times in relation to a match.

Equipment: Score sheet and stop watch.

Procedure:

To obtain the accuracy in this study, the resting heart rate was measured in the subject's room. They were instructed to sit comfortably in a chair. The researcher

palpated the radial artery to measure the heart rate of the subjects. Simultaneously, the stop watch was started and arterial heart beat for one minute was recorded.

Scoring:

Number of beats per minute was scored.

Vital capacity

Purpose: To assess the vital capacity of the subjects.

Equipment: Digital spirometer, nose clip, and mouth pieces.

Procedure:

The subject was asked to sit comfortably on a chair and to take a maximum inhalation away from the spirometer. Then the subject was asked to hold the mouthpiece between the lips to create a good seal and exhale as fast and as hard as possible, as long as possible until no breath was left. The subject had to be encouraged continuously to ensure the best effort. For an acceptable test, the effort should be maximal, smooth and cough free and exhalation time of at least 6 seconds. Each maneuver had to be performed thrice and the best value out of the three was noted. Before going to the next subject, the disposable mouth piece was changed. When the subject was ready to blow out, the unit had to be switched on and reset using the reset switch.

Scoring:

The vital capacity of the subjects were obtained from the reading displayed on the monitor of the spirometer was recorded in liters.

Body temperature

Equipment: Digital thermometer and score sheet.

Purpose: To measure the body temperature of the subjects at four different times in relation to a match.

Procedure:

The subject was asked to sit comfortably on a chair and to take a normal respiration. The subject was asked to hold the thermometer in the arm pit till a beep sound was heard.

Scoring:

The measurement recorded in the digital thermometer was noted in degree Fahrenheit.

Respiratory rate

Purpose: To measure the respiratory rate of the subjects at four different times in relation to a match.

Procedure:

The subject was asked to sit comfortably on a chair and to take a normal respiration. The respiratory rate of the subject was measured by counting the number of the upward and downward movement of the chest.

Scoring:

With the help of a stop watch, the number of upward and downward movement of the chest was observed and counted for one minute and noted.

Statistical techniques

Paired 't' test was applied to analyse the psychological and physiological variables of the subjects at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. Independent 't' test was applied to analyse the psychological and physiological variables of the subjects between state and national level. One sample 't' test was applied to analyse the personality trait of the subjects. All the cases were fixed at 0.05 level of confidence.

Chapter IV

Analysis and Interpretations of the Data

The collected data on selected criterion variables has been analysed and presented in this chapter. The purpose of the study was to analyse psychological and physiological variables of national and state level soccer referees from Kerala state. The selected variables are anxiety, stress, systolic blood pressure, diastolic blood pressure, heart rate, body temperature, and respiratory rate at four different times: 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. In addition to this, the was to find out find out the difference between national and state level soccer referees in the personality and vital capacity, which are measured 6 hours before the match.

To achieve the purpose of the study, 25 national and 50 state level soccer referees randomly selected from different districts of Kerala state. The age of the selected subjects ranged from 25 to 45 years. The data was based on true purposive randomized group design. The data collected were subjected to various statistical analysis. The first factor consisted of level, as national level and state level, second factor consisted of psychological and physiological changes measured at four different times of the day in relation to a match (6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match). The following variables such as personality, anxiety, stress, systolic blood pressure, diastolic blood pressure, heart rate, vital capacity, body temperature and respiratory rate were selected as independent variables.

Level of significance

The level of significance to test ‘t’ ratio, obtained by the 't' test (paired, independent and one sample 't' test) was fixed at 0.05 level of confidence which was considered to be appropriate in view of the fact that very highly sophisticated equipments were not used for more stringent levels of significance.

Analysis of the data

In the present study, the data were analysed in different stages. (a). Paired 't' test was applied to analyze the selected psychological and physiological variables among national and state level soccer referees with reference to 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. (b) Independent 't' test was applied to find out the significant difference between national and state level soccer referees at various intervals of time on selected psychological and physiological variables. (c) Independent 't' test was applied to find out the significant difference between national and state level soccer referees on personality and vital capacity at 6 hours before the match. (d). To find out national and state level referees' personality, to predict the extroversion quality, one sample 't' test was used. All the cases were fixed at 0.05 level of confidence.

The data on descriptive statistics of national level soccer referees in selected psychological and physiological variables at four different times in relation to a match: 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match are presented in table – 4.1.

Table 4.1

Descriptive statistics of national level soccer referees on selected psychological and physiological variables at four different times in relation to a match: 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match (N=25)

Variables	Time taken	Range	Min.	Max.	Mean	Std. Deviation
Personality - Extroversion	6 Hr. B.Match	10	11	21	17.20	3.00
Personality - Neuroticism		13	8	21	15.20	3.51
Trait Anxiety	6 Hr B.Match	17	9	26	16.8	4.42
	15 Min B.Match	13	13	26	17.48	4.21
	15 Min A.Match	19	9	28	16.28	5.08
	6 Hr. A.Match	17	9	26	16.44	3.85
State Anxiety	6 Hr B.Match	17	11	28	17.52	3.60
	15 Min B.Match	16	15	31	22.92	5.11
	15 Min A.Match	18	11	29	20.4	4.98
	6 Hr. A.Match	11	10	21	15.56	3.23
Stress	6 Hr B.Match	13	14	27	19.68	4.13
	15 Min B.Match	21	18	39	30.44	5.47
	15 Min A.Match	11	14	25	16.88	2.42
	6 Hr. A.Match	11	6	17	12.16	3.08
Diastolic Blood Pressure	6 Hr B.Match	9	80	89	84.36	2.45
	15 Min B.Match	17	82	99	88.6	4.54
	15 Min A.Match	12	80	92	86.96	3.42
	6 Hr. A.Match	15	74	89	79.64	3.60
Systolic Blood Pressure	6 Hr B.Match	26	119	145	131.16	8.49
	15 Min B.Match	15	134	149	139.6	4.11
	15 Min A.Match	11	128	139	135.08	3.45
	6 Hr. A.Match	18	110	128	119.48	4.25
Heart Rate	6 Hr B.Match	21	68	89	76.24	5.15
	15 Min B.Match	11	92	103	97.12	2.15
	15 Min A.Match	37	95	132	104.8	8.55
	6 Hr. A.Match	22	62	84	68.72	5.97
Body Temperature	6 Hr B.Match	4.6	96.9	101.5	97.94	1.18
	15 Min B.Match	2.2	98.1	100.3	99.34	0.67
	15 Min A.Match	2.8	97.1	99.9	98.59	0.81
	6 Hr. A.Match	1.1	96.9	98	97.36	0.28
Respiratory Rate	6 Hr B.Match	8	12	20	17.24	2.13
	15 Min B.Match	13	14	27	20.88	4.26
	15 Min A.Match	11	14	25	19.44	2.43
	6 Hr. A.Match	8	12	20	15.6	1.91
Vital Capacity	6 Hr. B.Match	1.73	2.95	4.68	3.67	0.54

Table – 4.1 presents the descriptive statistics of the obtained values of national level soccer referees on selected psychological and physiological variables at four different times namely 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. Also, the descriptive statistics of the obtained values of national level soccer referees on personality and vital capacity of the subjects were taken 6 hours before the match are included.

The data on descriptive statistics of state level soccer referees in selected psychological and physiological variables at four different times in relation to a match: 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match are presented in table – 4.2.

Table – 4.2

Descriptive statistics of state level soccer referees on selected psychological and physiological variables at four different times in relation to a match: 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match (N=50)

Variables	Time taken	Range	Min.	Max.	Mean	Std. Deviation
Personality - Extroversion	6 Hr. B.Match	12	8	20	14.68	3.13
Personality - Neuroticism		19	2	21	13.38	4.11
Trait Anxiety	6 Hr B.Match	44	9	53	20.72	8.88
	15 Min B.Match	58	9	67	19.66	12.03
	15 Min A.Match	29	9	38	19.52	6.48
	6 Hr. A.Match	43	9	52	19.98	8.96
State Anxiety	6 Hr B.Match	16	13	29	20.96	4.05
	15 Min B.Match	21	16	37	26.76	5.00
	15 Min A.Match	26	11	37	23.34	5.55
	6 Hr. A.Match	17	11	28	17.98	3.53
Stress	6 Hr B.Match	15	14	29	22.2	4.28
	15 Min B.Match	18	21	39	33.26	4.78
	15 Min A.Match	11	15	26	19.96	3.72
	6 Hr. A.Match	7	10	17	13.7	2.22
Diastolic Blood Pressure	6 Hr B.Match	12	81	93	87.76	2.68
	15 Min B.Match	14	85	99	93.06	4.31
	15 Min A.Match	19	80	99	89.76	4.65
	6 Hr. A.Match	17	74	91	80.76	4.21
Systolic Blood Pressure	6 Hr B.Match	25	120	145	134.56	4.86
	15 Min B.Match	22	134	156	143.68	6.67
	15 Min A.Match	42	114	156	139.38	9.34

	6 Hr. A.Match	11	114	125	121.46	2.24
Heart Rate	6 Hr B.Match	30	68	98	80.16	6.00
	15 Min B.Match	58	68	126	103.9	14.62
	15 Min A.Match	36	89	125	110.18	8.50
	6 Hr. A.Match	22	62	84	70.62	7.07
Body Temperature	6 Hr B.Match	3.2	97.1	100.3	98.55	0.97
	15 Min B.Match	2.6	98.1	100.7	99.74	0.59
	15 Min A.Match	3.2	97.1	100.3	99.14	0.72
	6 Hr. A.Match	2.1	96.9	99	97.40	0.38
Respiratory Rate	6 Hr B.Match	13	12	25	18.16	3.40
	15 Min B.Match	11	16	27	23.46	2.67
	15 Min A.Match	10	16	26	20.86	2.98
	6 Hr. A.Match	8	12	20	15.74	2.18
Vital Capacity	6 Hr. B.Match	2.14	2.36	4.50	3.55	0.37

Table – 4.2 presents the descriptive statistics of the obtained values of state level soccer referees on selected psychological and physiological variables at four different times: 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. Also, the descriptive statistics of the obtained values of state level soccer referees on personality and vital capacity of the subjects were taken 6 hours before the match are included.

The data on analysis of paired 't' test among national level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes before the match are presented in table – 4.3.

Table – 4.3

Analysis of paired 't' test among national level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes before the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	6 hours before the match	16.8	4.42	0.68	0.51
	15 minutes before the match	17.48	4.21		
State Anxiety	6 hours before the match	17.52	3.60	5.40	5.16*
	15 minutes before the match	22.92	5.11		
Stress	6 hours before the match	19.68	4.13	10.76	6.86*
	15 minutes before the match	30.44	5.47		
Diastolic Blood Pressure	6 hours before the match	84.36	2.45	4.24	3.51*
	15 minutes before the match	88.6	4.54		
Systolic Blood Pressure	6 hours before the match	131.16	8.49	8.44	5.18*
	15 minutes before the match	139.6	4.11		
Heart Rate	6 hours before the match	76.24	5.15	20.88	17.20*
	15 minutes before the match	97.12	2.15		
Body Temperature	6 hours before the match	97.944	1.18	1.40	5.13*
	15 minutes before the match	99.344	0.67		
Respiratory Rate	6 hours before the match	17.24	2.13	3.64	3.66*
	15 minutes before the match	20.88	4.26		

** Significant at 0.05 level (table value t (0.05, 24) = 2.06)*

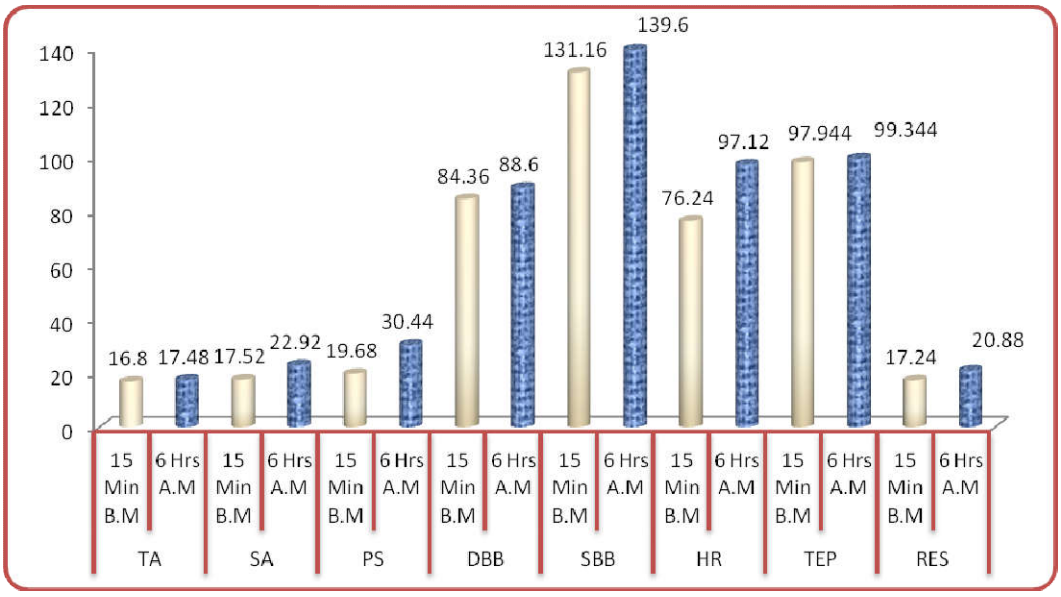
Table – 4.3 presents the results on analysis of paired 't' test between the scores at 6 hours before the match and 15 minutes before the match among national level soccer referees on selected criterion variables.

It indicates that except trait anxiety (obtained 't' value = 0.51), all the selected criterion variables are statistically significant with respect to the mean values at 6 hours before the match and 15 minutes before the match. Since the obtained 't' values are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the national level soccer referees on selected criterion variables except trait anxiety at 6 hours before the match and 15 minutes before the match.

The mean values on selected variables of national level soccer referees at two different times in relation to a match: 6 hours before the match and 15 minutes before the match are graphically presented in figure – 4.1

Figure – 4.1

Mean values of national level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes before the match



The data on selected variables of state level soccer referees at 6 hours before the match and 15 minutes before the match was analysed by paired 't' test and is presented in
table – 4.4.

Table – 4.4

Analysis of paired 't' – test among state level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes before the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	6 hours before the match	20.72	8.88	1.06	0.76
	15 minutes before the match	19.66	12.03		
State Anxiety	6 hours before the match	20.96	4.05	5.8	6.26*
	15 minutes before the match	26.76	5.00		
Stress	6 hours before the match	22.2	4.28	11.06	12.44*
	15 minutes before the match	33.26	4.78		
Diastolic Blood Pressure	6 hours before the match	87.76	2.68	5.3	7.69*
	15 minutes before the match	93.06	4.31		
Systolic Blood Pressure	6 hours before the match	134.56	4.86	9.12	7.78*
	15 minutes before the match	143.68	6.67		
Heart Rate	6 hours before the match	80.16	6.00	23.74	10.67*
	15 minutes before the match	103.9	14.62		
Body Temperature	6 hours before the match	98.548	0.97	1.196	7.62*
	15 minutes before the match	99.744	0.59		
Respiratory Rate	6 hours before the match	18.16	3.40	5.3	9.19*
	15 minutes before the match	23.46	2.67		

** Significant at 0.05 level (table value t (0.05, 49) = 2.01)*

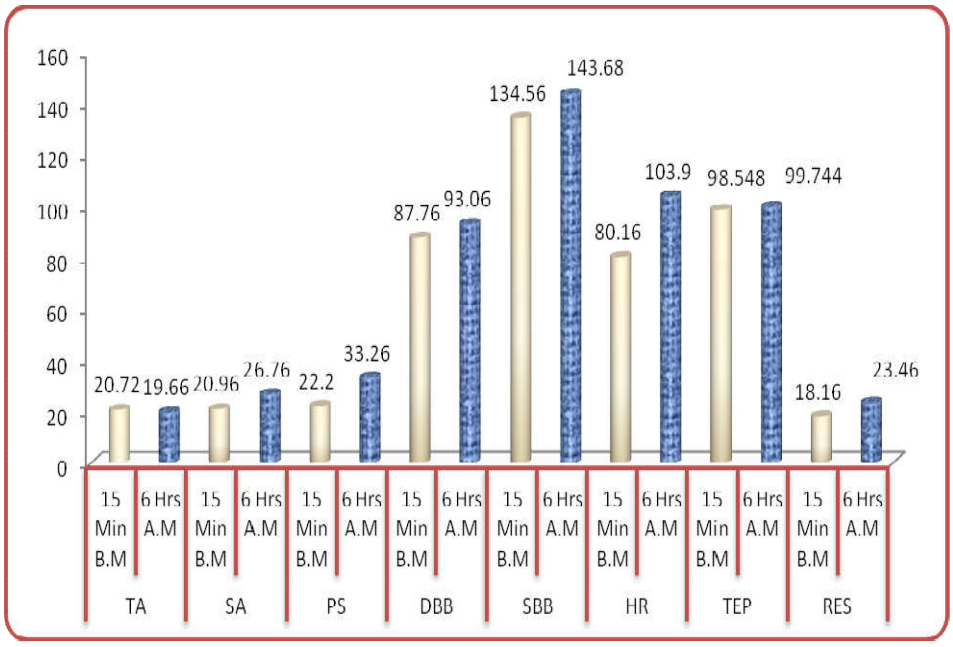
Table – 4.4 presents the results on analysis of paired 't' test between the scores at 6 hours before the match and 15 minutes before the match among state level soccer referees on selected criterion variables.

It indicates that except trait anxiety, (obtained 't' value = 0.76), all the selected criterion variables are statistically significant with respect to the mean values at 6 hours before the match and 15 minutes before the match. Since the obtained 't' values are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the state level soccer referees on selected criterion variables except trait anxiety at 6 hours before the match and 15 minutes before the match.

The mean values on selected variables of state level soccer referees at two different times in relation to a match: 6 hours before the match and 15 minutes before the match are graphically presented in figure – 4.2

Figure – 4.2

Mean values of state level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes before the match



The data on selected variables of state level soccer referees at 6 hours before the match and 15 minutes after the match was analysed by paired 't' test and is presented in table – 4.5.

Table – 4.5

Analysis of paired 't' test among national level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	6 hours before the match	16.8	4.42	0.52	0.44
	15 minutes after the match	16.28	5.08		
State Anxiety	6 hours before the match	17.52	3.60	2.88	2.59*
	15 minutes after the match	20.4	4.98		
Stress	6 hours before the match	19.68	4.13	2.8	2.69*
	15 minutes after the match	16.88	2.42		
Diastolic Blood Pressure	6 hours before the match	84.36	2.45	2.6	2.56*
	15 minutes after the match	86.96	3.42		
Systolic Blood Pressure	6 hours before the match	131.16	8.49	3.92	2.14*
	15 minutes after the match	135.08	3.45		
Heart Rate	6 hours before the match	76.24	5.15	28.56	17.25*
	15 minutes after the match	104.8	8.55		
Body Temperature	6 hours before the match	97.944	1.18	0.65	2.11*
	15 minutes after the match	98.592	0.81		
Respiratory Rate	6 hours before the match	17.24	2.13	2.2	3.65*
	15 minutes after the match	19.44	2.43		

** Significant at 0.05 level (table value t (0.05, 24) = 2.06)*

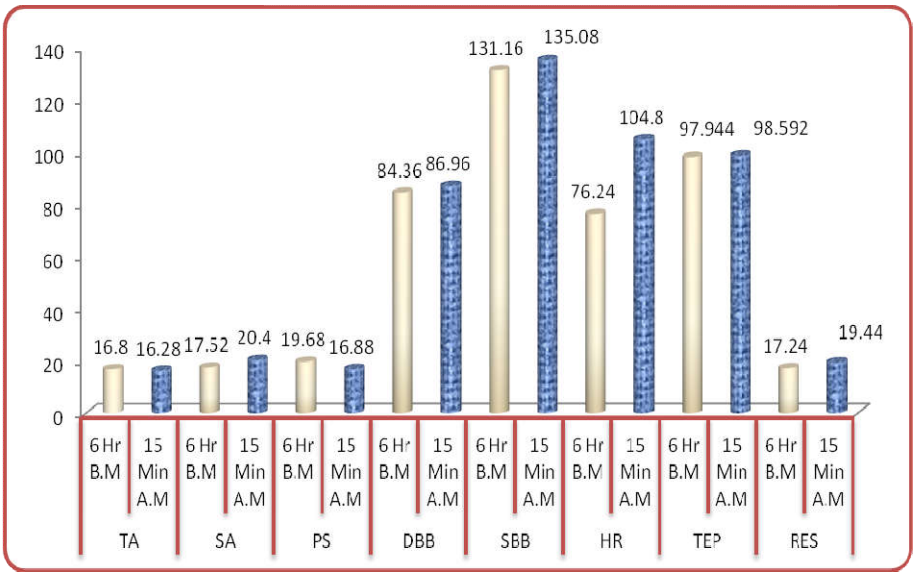
Table – 4.5 presents the results on analysis of paired 't' test between the scores at 6 hours before the match and 15 minutes after the match among national level soccer referees on selected criterion variables.

It indicates that except trait anxiety, (obtained 't' value = 0.44), all the selected criterion variables are statistically significant with respect to the mean values at 6 hours before the match and 15 minutes after the match. Since the obtained 't' values are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the national level soccer referees on selected criterion variables except trait anxiety at 6 hours before the match and 15 minutes after the match.

The mean values on selected variables of national level soccer referees at two different times in relation to a match: 6 hours before the match and 15 minutes after the match are graphically presented in figure – 4.3

Figure – 4.3

Mean values of national level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes after the match



The data on selected variables of state level soccer referees at 6 hours before the match and 15 minutes after the match was analysed by paired 't' test and is presented in table no – 4.6.

Table – 4.6

Analysis of paired 't' test among state level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	6 hours before the match	20.72	8.88	1.20	0.69
	15 minutes after the match	19.52	6.48		
State Anxiety	6 hours before the match	20.96	4.05	2.38	2.21*
	15 minutes after the match	23.34	5.55		
Stress	6 hours before the match	22.2	4.28	2.24	2.87*
	15 minutes after the match	19.96	3.72		
Diastolic Blood Pressure	6 hours before the match	87.76	2.68	2.00	3.10*
	15 minutes after the match	89.76	4.65		
Systolic Blood Pressure	6 hours before the match	134.56	4.86	4.82	3.06*
	15 minutes after the match	139.38	9.34		
Heart Rate	6 hours before the match	80.16	6.00	30.02	21.58*
	15 minutes after the match	110.18	8.50		
Body Temperature	6 hours before the match	98.548	0.97	0.59	3.21*
	15 minutes after the match	99.14	0.72		
Respiratory Rate	6 hours before the match	18.16	3.40	2.7	3.94*
	15 minutes after the match	20.86	2.98		

** Significant at 0.05 level (table value t (0.05, 49) = 2.01)*

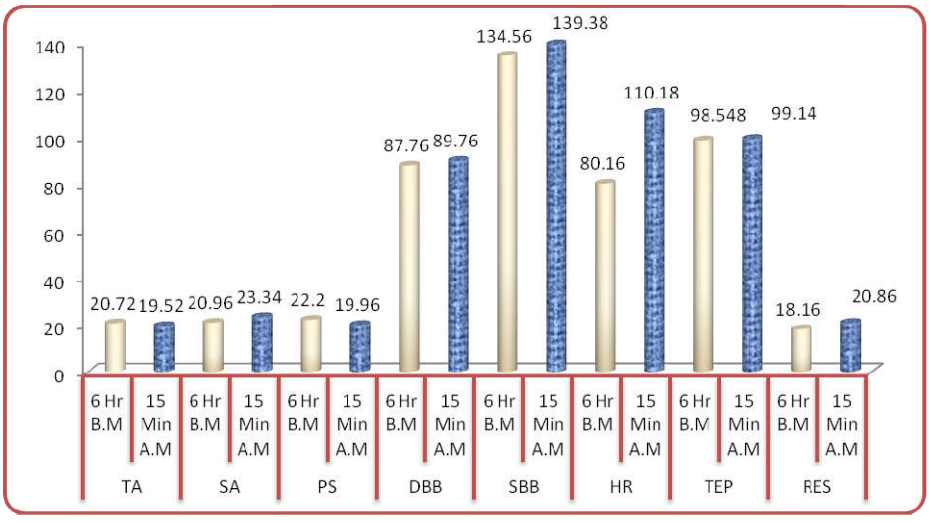
Table – 4.6 presents the results on analysis of paired 't' test between the scores at 6 hours before the match and 15 minutes after the match among state level soccer referees on selected criterion variables.

It indicates that except trait anxiety, (obtained 't' value = 0.69), all the selected criterion variables are statistically significant with respect to the mean values at 6 hours before the match and 15 minutes after the match. Since the obtained 't' values are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the state level soccer referees on selected criterion variables except trait anxiety at 6 hours before the match and 15 minutes after the match.

The mean values on selected variables of state level soccer referees at two different times in relation to a match: 6 hours before the match and 15 minutes after the match are graphically presented in figure – 4.4

Figure – 4.4

Mean values of state level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 15 minutes after the match



The data on selected variables of national level soccer referees at 6 hours before the match and 6 hours after the match was analysed by paired 't' test and is presented in table no – 4.7.

Table – 4.7

Analysis of paired 't' test among national level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 6 hours after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	6 hours before the match	16.8	4.42	0.36	0.30
	6 hours after the match	16.44	3.85		
State Anxiety	6 hours before the match	17.52	3.60	1.96	2.02*
	6 hours after the match	15.56	3.23		
Stress	6 hours before the match	19.68	4.13	7.52	6.31*
	6 hours after the match	12.16	3.08		
Diastolic Blood Pressure	6 hours before the match	84.36	2.45	4.72	6.80*
	6 hours after the match	79.64	3.60		
Systolic Blood Pressure	6 hours before the match	131.16	8.49	11.68	6.86*
	6 hours after the match	119.48	4.25		
Heart Rate	6 hours before the match	76.24	5.15	7.52	4.58*
	6 hours after the match	68.72	5.97		
Body Temperature	6 hours before the match	97.944	1.18	0.58	2.43*
	6 hours after the match	97.368	0.28		
Respiratory Rate	6 hours before the match	17.24	2.13	1.64	2.92*
	6 hours after the match	15.6	1.91		

** Significant at 0.05 level (table value t (0.05, 24) = 2.06)*

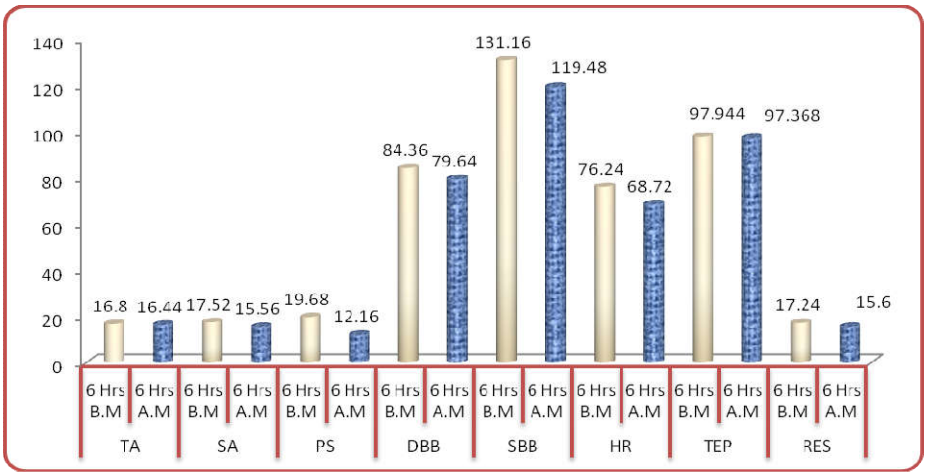
Table – 4.7 presents the results on analysis of paired 't' test between the scores at 6 hours before the match and 6 hours after the match among national level soccer referees on selected criterion variables.

It indicates that except trait anxiety, (obtained 't' value = 0.30), all the selected criterion variables are statistically significant with respect to the mean values at 6 hours before the match and 6 hours after the match. Since the obtained 't' values are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the national level soccer referees on selected criterion variables except trait anxiety at 6 hours before the match and 6 hours after the match.

The mean values on selected variables of national level soccer referees at two different times in relation to a match: 6 hours before the match and 6 hours after the match are graphically presented in figure – 4.5

Figure – 4.5

Mean values of national level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 6 hours after the match



The data on selected variables of state level soccer referees at 6 hours before the match and 6 hours after the match was analysed by paired 't' test and is presented in table no – 4.8.

Table – 4.8

Analysis of paired 't' test among state level soccer referees on selected criterion variables at two different times: 6 hours before the match and 6 hours after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	6 hours before the match	20.72	8.88	0.74	0.62
	6 hours after the match	19.98	8.96		
State Anxiety	6 hours before the match	20.96	4.05	2.98	4.37*
	6 hours after the match	17.98	3.53		
Stress	6 hours before the match	22.2	4.28	8.5	12.38*
	6 hours after the match	13.7	2.22		
Diastolic Blood Pressure	6 hours before the match	87.76	2.68	7.0	10.20*
	6 hours after the match	80.76	4.21		
Systolic Blood Pressure	6 hours before the match	134.56	4.86	13.1	17.50*
	6 hours after the match	121.46	2.24		
Heart Rate	6 hours before the match	80.16	6.00	9.54	6.51*
	6 hours after the match	70.62	7.07		
Body Temperature	6 hours before the match	98.548	0.97	1.15	7.43*
	6 hours after the match	97.402	0.38		
Respiratory Rate	6 hours before the match	18.16	3.40	2.42	4.63*
	6 hours after the match	15.74	2.18		

** Significant at 0.05 level (table value t (0.05, 49) = 2.01)*

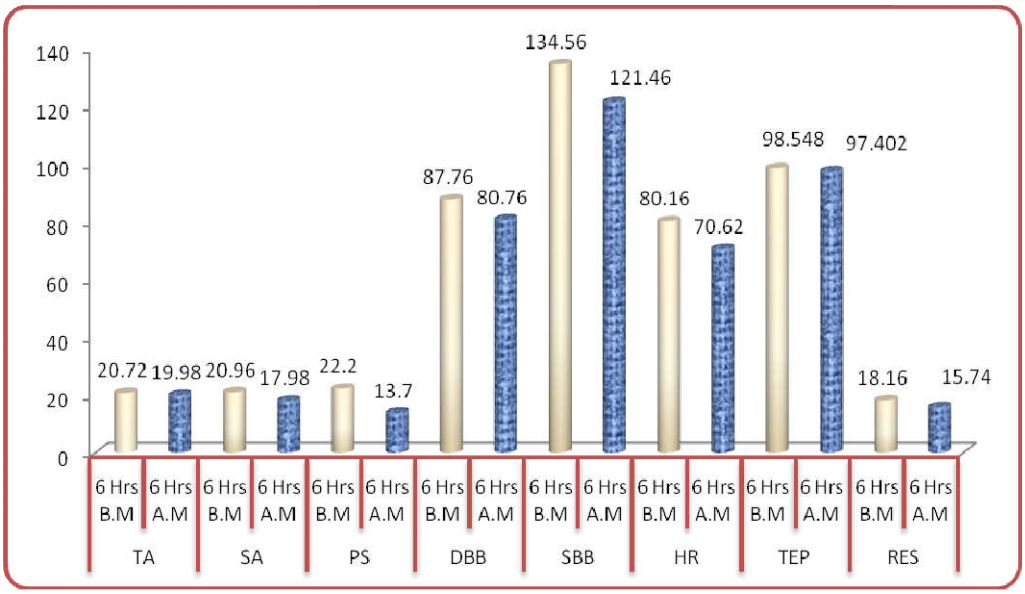
Table – 4.8 presents the results on analysis of paired 't' test between the scores at 6 hours before the match and 6 hours after the match among state level soccer referees on selected criterion variables.

It indicates that except trait anxiety, (obtained 't' value = 0.62), all the selected criterion variables are statistically significant with respect to the mean values at 6 hours before the match and 6 hours after the match. Since the obtained 't' values are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the state level soccer referees on selected criterion variables except trait anxiety at 6 hours before the match and 6 hours after the match.

The mean values on selected variables of state level soccer referees at two different times in relation to a match: 6 hours before the match and 6 hours after the match are graphically presented in figure – 4.6

Figure – 4.6

Mean values of state level soccer referees on selected criterion variables at two different times in relation to a match: 6 hours before the match and 6 hours after the match



The data on selected variables of national level soccer referees at 15 minutes before the match and 15 minutes after the match was analysed by paired 't' test and is presented in table no – 4.9.

Table – 4.9

Analysis of paired 't' test among national level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes before the match and 15 minutes after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	15 minutes before the match	17.48	4.21	1.20	0.83
	15 minutes after the match	16.28	5.08		
State Anxiety	15 minutes before the match	22.92	5.10	2.52	5.32*
	15 minutes after the match	20.40	4.98		
Stress	15 minutes before the match	30.44	5.47	13.56	13.49*
	15 minutes after the match	16.88	2.42		
Diastolic Blood Pressure	15 minutes before the match	88.60	4.53	1.64	1.90
	15 minutes after the match	86.96	3.42		
Systolic Blood Pressure	15 minutes before the match	139.60	4.11	4.52	4.29*
	15 minutes after the match	135.08	3.45		
Heart Rate	15 minutes before the match	97.12	2.14	7.68	4.41*
	15 minutes after the match	104.80	8.55		
Body Temperature	15 minutes before the match	99.34	0.66	0.75	5.32*
	15 minutes after the match	98.59	0.81		
Respiratory Rate	15 minutes before the match	20.88	4.25	1.44	1.47
	15 minutes after the match	19.44	2.43		

** Significant at 0.05 level (table value t (0.05, 24) = 2.06)*

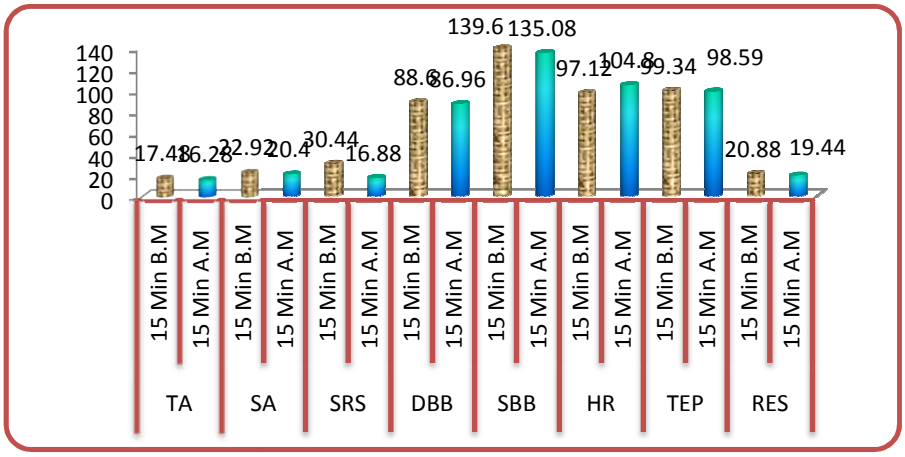
Table – 4.9 presents the results on analysis of paired 't' test between the scores at 15 minutes before the match and 15 minutes after the match among national level soccer referees on selected criterion variables.

It indicates that except trait anxiety, diastolic blood pressure and respiratory rate (obtained 't' value = 0.83, 1.90 and 1.47), all the selected criterion variables are statistically significant with respect to the mean values at 15 minutes before the match and 15 minutes after the match. Since the obtained 't' values are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the national level soccer referees on selected criterion variables except trait anxiety, diastolic blood pressure and respiratory rate at 15 minutes before the match and 15 minutes after the match.

The mean values on selected variables of national level soccer referees at two different times in relation to a match: 15 minutes before the match and 15 minutes after the match are graphically presented in figure – 4.7

Figure – 4.7

Mean values of national level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes before the match and 15 minutes after the match



The data on selected variables of state level soccer referees at 15 minutes before the match and 15 minutes after the match was analysed by paired 't' test and is presented in table no – 4.10.

Table – 4.10

Analysis of paired 't' test among state level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes before the match and 15 minutes after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	15 minutes before the match	19.66	12.03	0.14	0.07
	15 minutes after the match	19.52	6.48		
State Anxiety	15 minutes before the match	26.76	5.00	3.42	4.12*
	15 minutes after the match	23.34	5.55		
Stress	15 minutes before the match	33.26	4.78	13.30	16.19*
	15 minutes after the match	19.96	3.72		
Diastolic Blood Pressure	15 minutes before the match	93.06	4.31	3.30	4.01*
	15 minutes after the match	89.76	4.65		
Systolic Blood Pressure	15 minutes before the match	143.68	6.67	4.30	2.38*
	15 minutes after the match	139.38	9.34		
Heart Rate	15 minutes before the match	103.9	14.62	6.28	3.00*
	15 minutes after the match	110.18	8.50		
Body Temperature	15 minutes before the match	99.74	0.59	0.60	6.10*
	15 minutes after the match	99.14	0.72		
Respiratory Rate	15 minutes before the match	23.46	2.67	2.60	4.83*
	15 minutes after the match	20.86	2.98		

** Significant at 0.05 level (table value t (0.05, 49) = 2.01)*

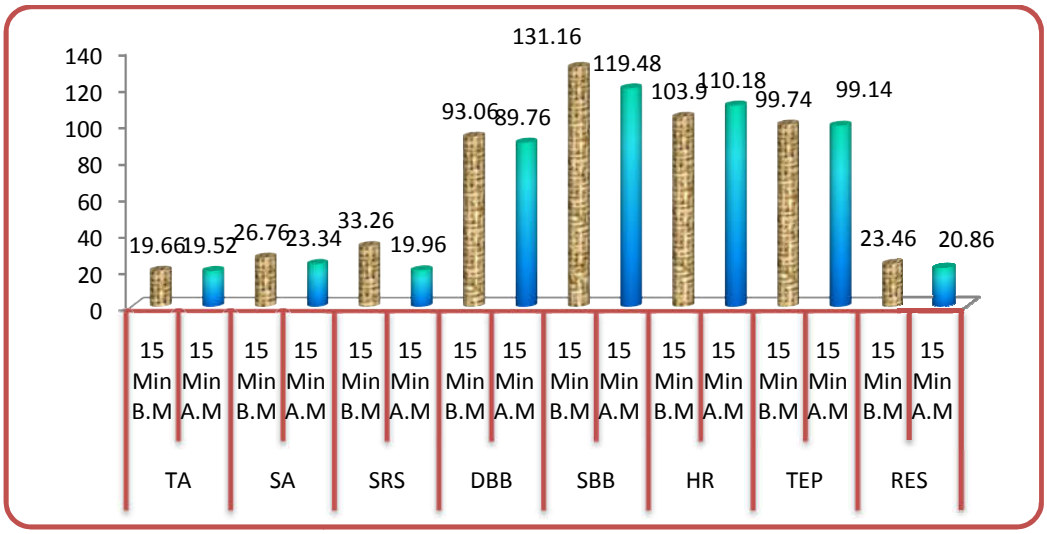
Table – 4.10 presents the results on analysis of paired 't' test between the scores at 15 minutes before the match and 15 minutes after the match among state level soccer referees on selected criterion variables.

It indicates that except trait anxiety, (obtained 't' value = 0.07), all the selected criterion variables are statistically significant with respect to the mean values at 15 minutes before the match and 15 minutes after the match. Since the obtained 't' values are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the state level soccer referees on selected criterion variables except trait anxiety at 15 minutes before the match and 15 minutes after the match.

The mean values on selected variables of state level soccer referees at two different times in relation to a match: 5 minutes before the match and 15 minutes after the match are graphically presented in figure – 4.8

Figure – 4.8

Mean values of state level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes before the match and 15 minutes after the match



The data on selected variables of national level soccer referees at 15 minutes before the match and 6 hours after the match was analysed by paired 't' test and is presented in table no – 4.11.

Table – 4.11

Analysis of paired 't' test among national level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes before the match and 6 hours after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	15 minutes before the match	17.48	4.21	1.04	0.92
	6 hours after the match	16.44	3.85		
State Anxiety	15 minutes before the match	22.92	5.11	7.36	6.68*
	6 hours after the match	15.56	3.23		
Stress	15 minutes before the match	30.44	5.47	18.28	19.29*
	6 hours after the match	12.16	3.08		
Diastolic Blood Pressure	15 minutes before the match	88.6	4.54	8.96	6.93*
	6 hours after the match	79.64	3.60		
Systolic Blood Pressure	15 minutes before the match	139.6	4.11	20.12	21.52*
	6 hours after the match	119.48	4.25		
Heart Rate	15 minutes before the match	97.12	2.15	28.4	23.64*
	6 hours after the match	68.72	5.97		
Body Temperature	15 minutes before the match	99.344	0.67	1.98	13.44*
	6 hours after the match	97.368	0.28		
Respiratory Rate	15 minutes before the match	20.88	4.26	5.28	4.98*
	6 hours after the match	15.6	1.91		

** Significant at 0.05 level (table value t (0.05, 24) = 2.06)*

Table – 4.11 presents the results on analysis of paired 't' test between the scores at 15 minutes before the match and 6 hours after the match among national level soccer referees on selected criterion variables.

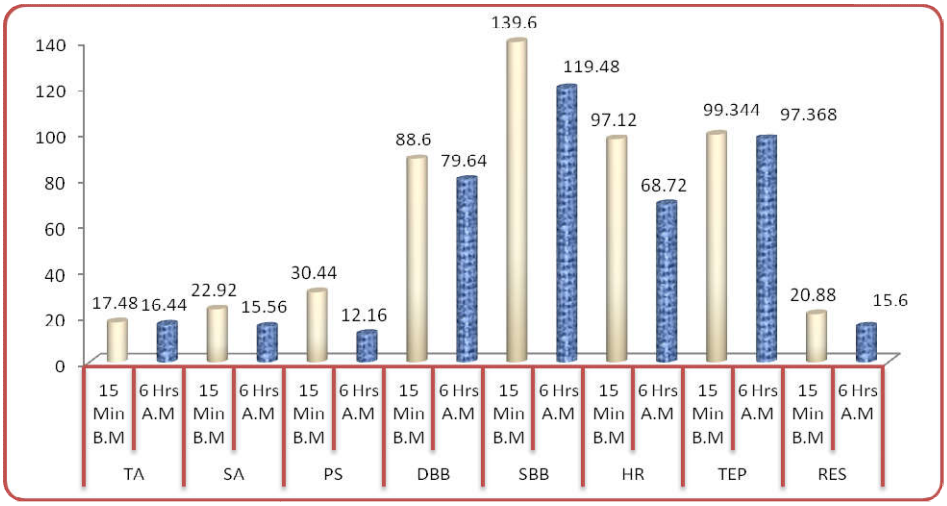
It indicates that, except trait anxiety, (obtained 't' value = 0.92) all the selected criterion variables are statistically significant with respect to the mean values at 15 minutes before the match and 6 hours after the match. Since the obtained

't' values are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the national level soccer referees on selected variables except trait anxiety at 15 minutes before the match and 6 hours after the match.

The mean values on selected variables of national level soccer referees at two different times in relation to a match: 15 minutes before the match and 6 hours after the match are graphically presented in figure – 4.9

Figure – 4.9

Mean values of national level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes before the match and 6 hours after the match



The data on selected variables of state level soccer referees at 15 minutes before the match and 6 hours after the match was analysed by paired 't' test and is presented in table no – 4.12.

Table – 4.12

Analysis of paired 't' test among state level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes before the match and 6 hours after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	15 minutes before the match	19.66	12.03	0.32	0.27
	6 hours after the match	19.98	8.96		
State Anxiety	15 minutes before the match	26.76	5.00	8.78	10.13*
	6 hours after the match	17.98	3.53		
Stress	15 minutes before the match	33.26	4.78	19.56	25.44*
	6 hours after the match	13.7	2.22		
Diastolic Blood Pressure	15 minutes before the match	93.06	4.31	12.3	18.12*
	6 hours after the match	80.76	4.21		
Systolic Blood Pressure	15 minutes before the match	143.68	6.67	22.22	24.07*
	6 hours after the match	121.46	2.24		
Heart Rate	15 minutes before the match	103.9	14.62	33.28	13.16*
	6 hours after the match	70.62	7.07		
Body Temperature	15 minutes before the match	99.744	0.59	2.34	23.80*
	6 hours after the match	97.402	0.38		
Respiratory Rate	15 minutes before the match	23.46	2.67	7.72	16.85*
	6 hours after the match	15.74	2.18		

** Significant at 0.05 level (table value t(0.05,49) = 2.01)*

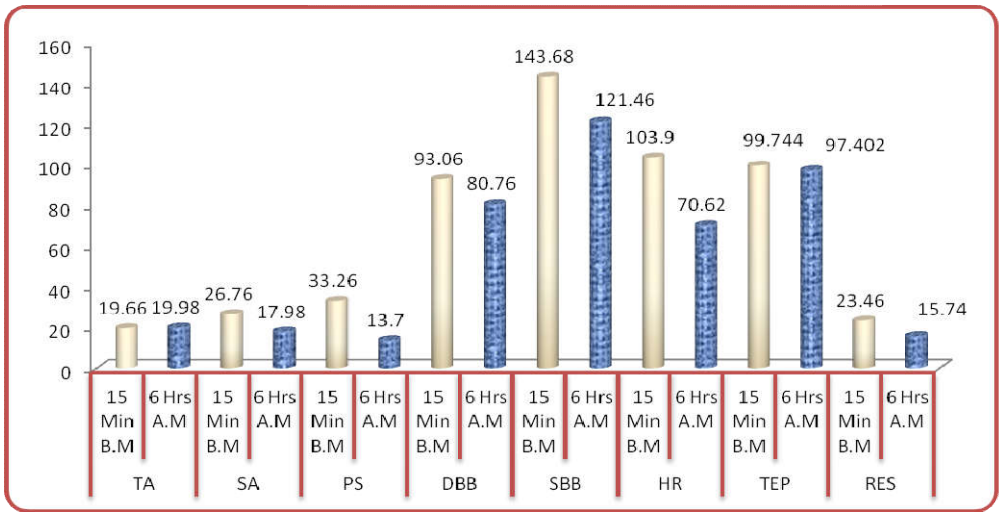
Table – 4.12 presents the results on analysis of paired 't' test between the scores at 15 minutes before the match and 6 hours after the match among state level soccer referees on selected criterion variables.

It indicates that, except trait anxiety, (obtained 't' value = 0.27) all the selected criterion variables are statistically significant with respect to the mean values at 15 minutes before the match and 6 hours after the match. Since the obtained 't' values are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the state level soccer referees on selected criterion variables at 15 minutes before the match and 6 hours after the match.

The mean values on selected variables of state level soccer referees at two different times in relation to a match: 15 minutes before the match and 6 hours after the match are graphically presented in figure – 4.10

Figure – 4.10

Mean values of state level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes before the match and 6 hours after the match



The data on selected variables of national level soccer referees at 15 minutes after the match and 6 hours after the match was analysed by paired 't' test and is presented in table no – 4.13.

Table – 4.13

Analysis of paired 't' test among national level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes after the match and 6 hours after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	15 minutes after the match	16.28	5.08	0.16	0.14
	6 hours after the match	16.44	3.85		
State Anxiety	15 minutes after the match	20.4	4.98	4.84	4.41*
	6 hours after the match	15.56	3.23		
Stress	15 minutes after the match	16.88	2.42	4.72	6.78*
	6 hours after the match	12.16	3.08		
Diastolic Blood Pressure	15 minutes after the match	86.96	3.42	7.32	5.71*
	6 hours after the match	79.64	3.60		
Systolic Blood Pressure	15 minutes after the match	135.08	3.45	15.6	14.14*
	6 hours after the match	119.48	4.25		
Heart Rate	15 minutes after the match	104.8	8.55	36.08	15.97*
	6 hours after the match	68.72	5.97		
Body Temperature	15 minutes after the match	98.592	0.81	1.22	7.04*
	6 hours after the match	97.368	0.28		
Respiratory Rate	15 minutes after the match	19.44	2.43	3.84	5.89*
	6 hours after the match	15.6	1.91		

** Significant at 0.05 level (table value t (0.05, 24) = 2.06)*

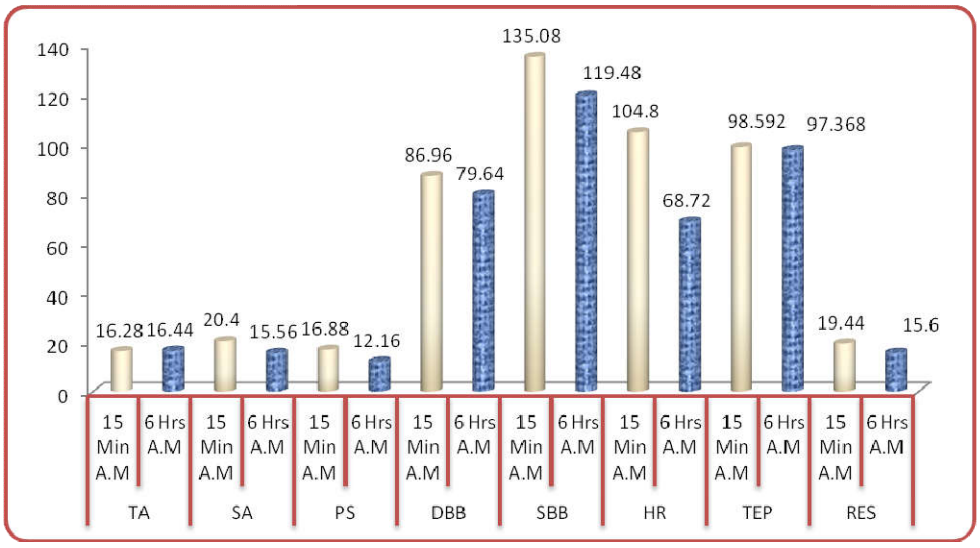
Table – 4.13 presents the results on analysis of paired 't' test between the scores at 15 minutes after the match and 6 hours after the match among national level soccer referees on selected criterion variables.

It indicates that except trait anxiety, (obtained 't' value = 0.14), all the selected criterion variables are statistically significant with respect to the mean values at 15 minutes after the match and 6 hours after the match. Since the obtained 't' values are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the national level soccer referees on selected criterion variables except trait anxiety at 15 minutes after the match and 6 hours after the match.

The mean values on selected variables of national level soccer referees at two different times in relation to a match: 15 minutes after the match and 6 hours after the match are graphically presented in figure – 4.11

Figure – 4.11

Mean values of national level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes after the match and 6 hours after the match



The data on selected variables of state level soccer referees at 15 minutes after the match and 6 hours after the match was analysed by paired 't' test and is presented in table no – 4.14.

Table – 4.14

Analysis of paired 't' test among state level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes after the match and 6 hours after the match

Variables	Time taken	Mean	Std. Deviation	Mean diff.	't'
Trait Anxiety	15 minutes after the match	19.52	6.48	0.46	0.29
	6 hours after the match	19.98	8.96		
State Anxiety	15 minutes after the match	23.34	5.55	5.36	6.11*
	6 hours after the match	17.98	3.53		
Stress	15 minutes after the match	19.96	3.72	6.26	11.71*
	6 hours after the match	13.7	2.22		
Diastolic Blood Pressure	15 minutes after the match	89.76	4.65	9	10.24*
	6 hours after the match	80.76	4.21		
Systolic Blood Pressure	15 minutes after the match	139.38	9.34	17.92	12.89*
	6 hours after the match	121.46	2.24		
Heart Rate	15 minutes after the match	110.18	8.50	39.56	21.36*
	6 hours after the match	70.62	7.07		
Body Temperature	15 minutes after the match	99.14	0.72	1.74	16.04*
	6 hours after the match	97.402	0.38		
Respiratory Rate	15 minutes after the match	20.86	2.98	5.12	9.25*
	6 hours after the match	15.74	2.18		

** Significant at 0.05 level (table value t (0.05, 49) = 2.01)*

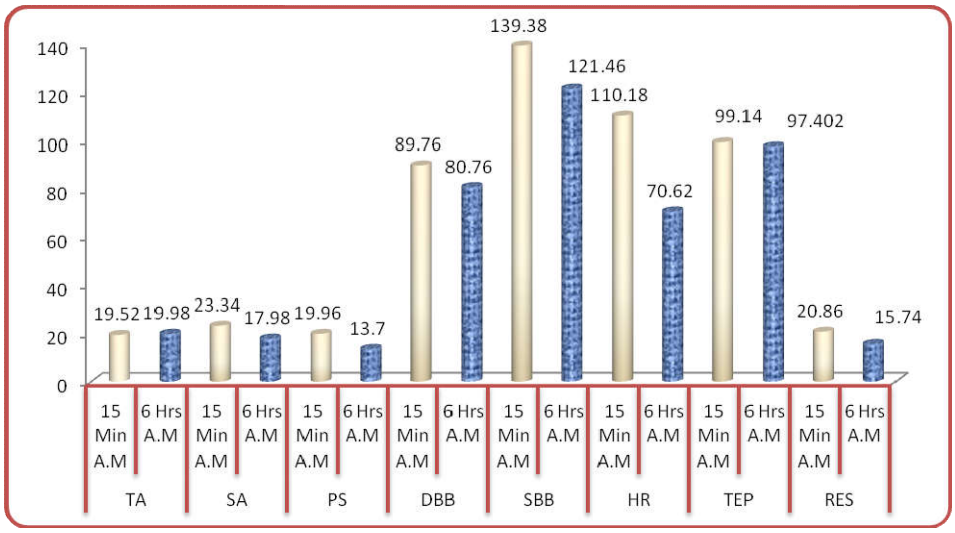
Table – 4.14 presents the results on analysis of paired 't' test between the scores at 15 minutes after the match and 6 hours after the match among state level soccer referees on selected criterion variables.

It indicates that, except trait anxiety, (obtained 't' value = 0.29) all the selected criterion variables are statistically significant with respect to the mean values at 15 minutes after the match and 6 hours after the match. Since the obtained 't' values are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance, it clearly indicates that, significant mean differences exist among the state level soccer referees on selected criterion variables except trait anxiety at 15 minutes after the match and 6 hours after the match.

The mean values on selected variables of state level soccer referees at two different times in relation to a match: 15 minutes after the match and 6 hours after the match are graphically presented in figure – 4.12

Figure – 4.12

Mean values of state level soccer referees on selected criterion variables at two different times in relation to a match: 15 minutes after the match and 6 hours after the match



The data on trait anxiety between national and state level soccer referees at various intervals of time in relation to a match was analysed by independent 't' test and is presented in table no – 4.15.

Table – 4.15

Analysis of independent 't' test between national and state level soccer referees at various intervals of time in relation to a match on trait anxiety

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	16.8	4.42	3.92	2.08*
	State level referees	20.72	8.88		
15 minutes before the match	National level referees	17.48	4.21	2.18	0.88
	State level referees	19.66	12.03		
15 minutes after the match	National level referees	16.28	5.08	3.24	1.15
	State level referees	19.52	6.48		
6 hours after the match	National level referees	16.44	3.85	3.54	1.88
	State level referees	19.98	8.96		

** Significant at 0.05 level (table value t(0.05,74) = 1.99)*

Table – 4.15 presents the results on analysis of independent 't' test of the scores between national and state level soccer referees at different intervals of time on trait anxiety.

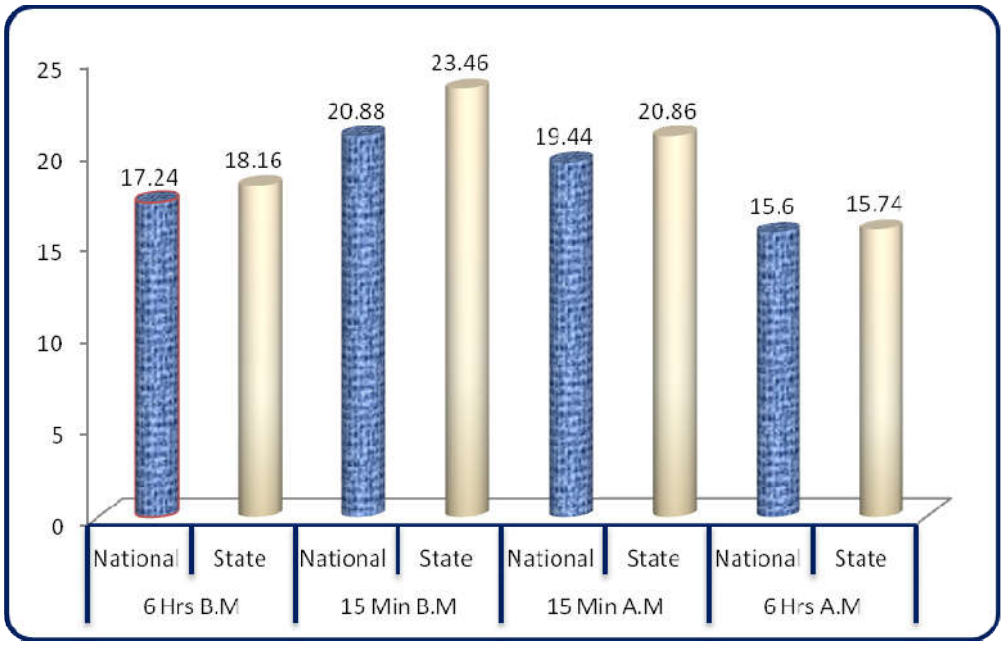
It indicates that the obtained 't' value 2.08 between national and state level soccer referees at 6 hours before the match on trait anxiety is greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. It clearly indicates that, a significant mean difference exists between the national and state level soccer referees on trait anxiety with reference to 6 hours before the match. The obtained 't' values 0.88, 1.15 and 1.88 at 15 minutes before the match,15 minutes after the match and 6 hours after the match respectively are lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, no significant mean difference exists between the national and state

level soccer referees on trait anxiety with reference to 15 minutes before the match,15 minutes after the match and 6 hours after the match.

The mean values on trait anxiety between national and state level soccer referees at various intervals of time in relation to a match are graphically presented in figure – 4.13

Figure – 4.13

Mean values of national and state level soccer referees at various intervals of time in relation to a match on trait anxiety



The data on state anxiety between national and state level soccer referees at various intervals of time in relation to a match was analysed by independent 't' test and is presented in table no – 4.16.

Table – 4.16

Analysis of independent 't' test between national and state level soccer referees at various intervals of time in relation to a match on state anxiety

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	17.52	3.60	3.44	3.59*
	State level referees	20.96	4.05		
15 minutes before the match	National level referees	22.92	5.11	3.84	3.11*
	State level referees	26.76	5.00		
15 minutes after the match	National level referees	20.4	4.98	2.94	2.23*
	State level referees	23.34	5.55		
6 hours after the match	National level referees	15.56	3.23	2.42	2.88*
	State level referees	17.98	3.53		

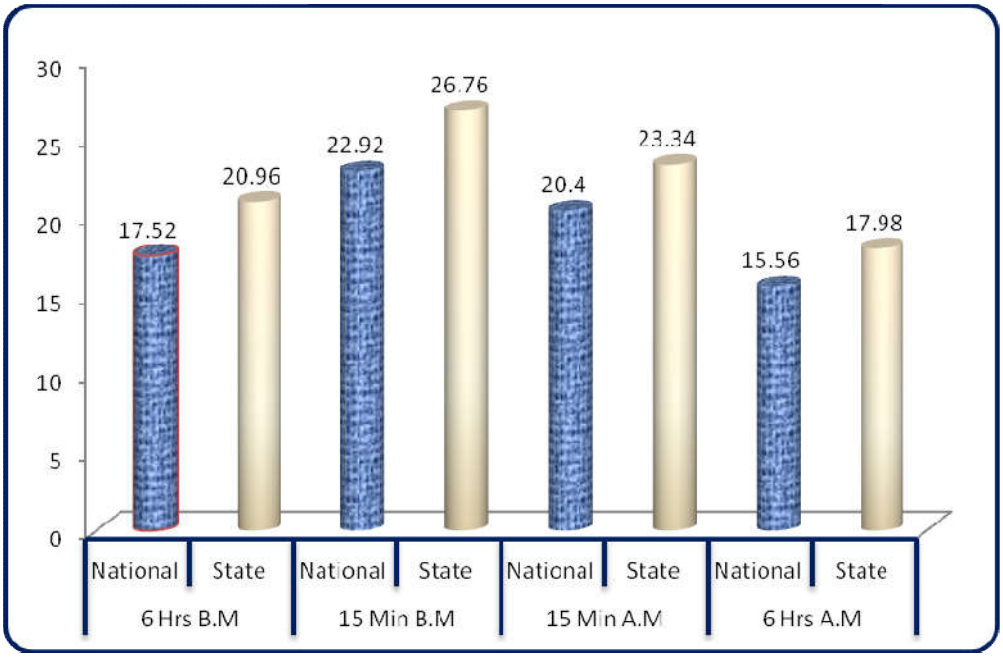
** Significant at 0.05 level (table value t(0.05,74) = 1.99)*

Table – 4.16 presents the results on analysis of independent 't' test of the scores between national and state level soccer referees at different intervals of time on state anxiety. The obtained 't' values are 3.59, 3.11, 2.23 and 2.88 at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match respectively on state anxiety. Since the obtained 't' values are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, significant mean difference exists between the national and state level soccer referees on state anxiety with reference to various intervals of time in relation to a match.

The mean values on state anxiety between national and state level soccer referees at various intervals of time in relation to a match are graphically presented in figure – 4.14

Figure – 4.14

Mean values of national and state level soccer referees at various intervals of time in relation to a match on state anxiety



The data on stress between national and state level soccer referees at various intervals of time in relation to a match was analysed by independent 't' test and is presented in table no – 4.17.

Table – 4.17

Analysis of independent 't' test between national and state level soccer referees at various intervals of time in relation to a match on stress

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	19.68	4.13	2.52	2.43*
	State level referees	22.2	4.28		
15 minutes before the match	National level referees	30.44	5.47	2.28	2.29*
	State level referees	33.26	4.78		
15 minutes after the match	National level referees	16.88	2.42	3.08	3.76*
	State level referees	19.96	3.72		
6 hours after the match	National level referees	12.16	3.08	1.54	2.48*
	State level referees	13.7	2.22		

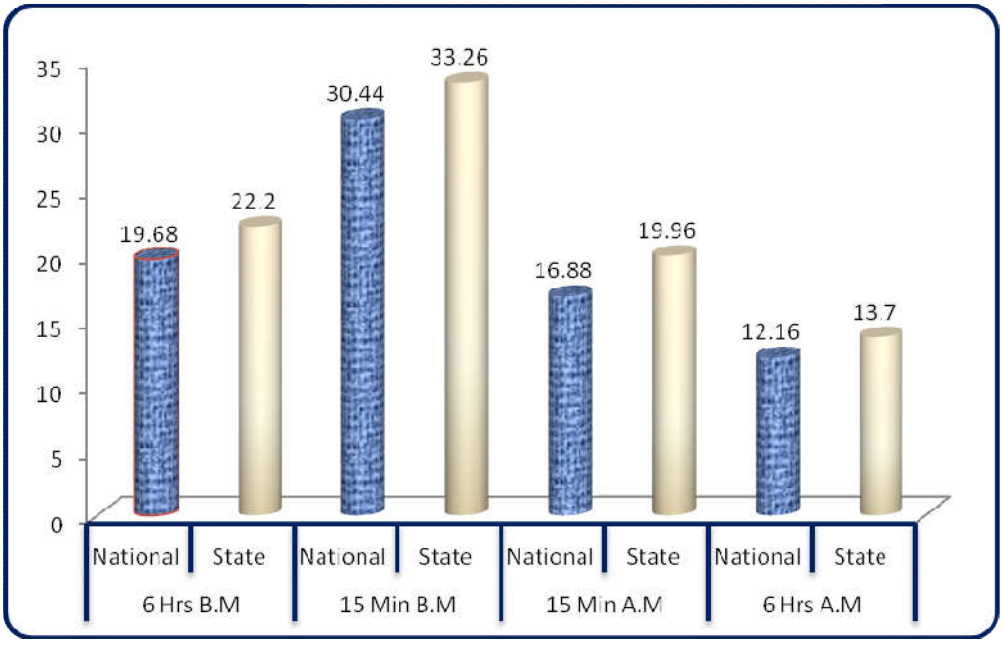
** Significant at 0.05 level (table value t (0.05, 74) = 1.99)*

Table – 4.17 presents the results on analysis of independent 't' test of the scores between national and state level soccer referees at different intervals of time on stress. The obtained 't' values are 2.43, 2.29, 3.76 and 2.48 at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match respectively on stress. Since the obtained 't' values are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, significant mean differences exists between the national and state level soccer referees on stress with reference to various intervals of time.

The mean values on stress between national and state level soccer referees at various intervals of time in relation to a match are graphically presented in figure – 4.15

Figure – 4.15

Mean values of national and state level soccer referees at various intervals of time in relation to a match on stress



The data on diastolic blood pressure between national and state level soccer referees at various intervals of time in relation to a match was analysed by independent 't' test and is presented in table no – 4.18.

Table – 4.18

Analysis of independent 't' test between national and state level soccer referees at various intervals of time in relation to a match on diastolic blood pressure

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	84.36	2.45	3.4	5.33*
	State level referees	87.76	2.68		
15 minutes before the match	National level referees	88.6	4.54	4.46	4.15*
	State level referees	93.06	4.31		
15 minutes after the match	National level referees	86.96	3.42	2.8	2.67*
	State level referees	89.76	4.65		
6 hours after the match	National level referees	79.64	3.60	1.12	1.14
	State level referees	80.76	4.21		

** Significant at 0.05 level (table value t (0.05, 74) = 1.99)*

Table – 4.18 presents the results on analysis of independent 't' test of the scores between national and state level soccer referees at different intervals of time on diastolic blood pressure.

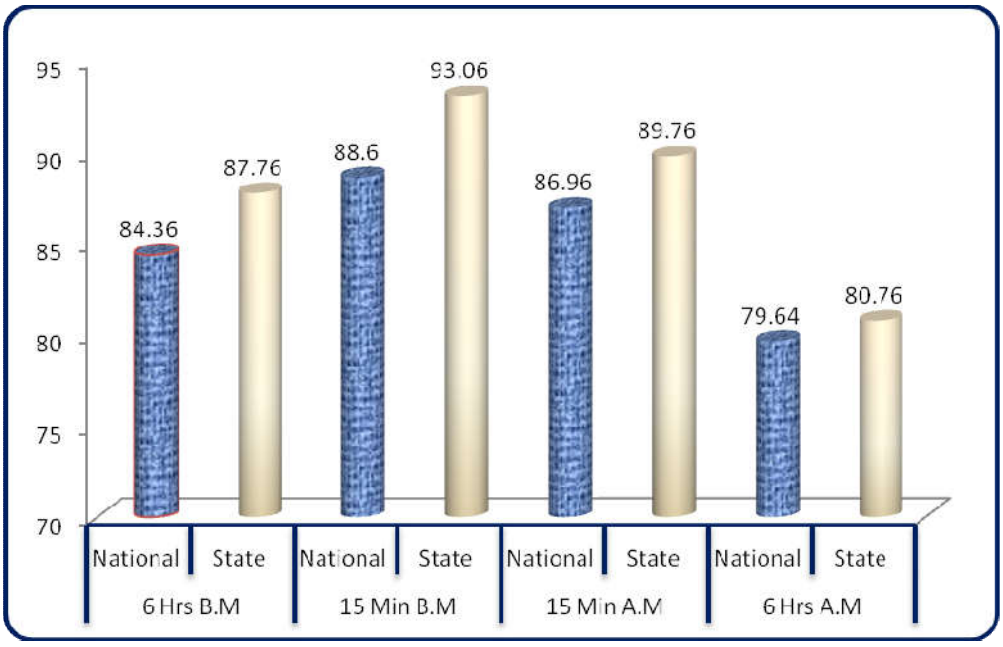
It indicates that, the obtained 't' values are 5.33, 4.15 and 2.67 at 6 hours before the match, 15 minutes before the match and 15 minutes after the match respectively. Since the obtained 't' values are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, significant mean differences exist between the national and state level soccer referees on diastolic blood pressure with reference to 6 hours before the match, 15 minutes before the match and 15 minutes after the match. On the other hand, the obtained 't' value 1.14 at 6 hours after the match is lesser than the table value, hence it clearly indicates that, no significant difference exists between national and state

level soccer referees on diastolic blood pressure with reference to 6 hours after the match.

The mean values on diastolic blood pressure between national and state level soccer referees at various intervals of time in relation to a match are graphically presented in figure – 4.16

Figure – 4.16

Mean values of national and state level soccer referees at various intervals of time in relation to a match on diastolic blood pressure



The data on systolic blood pressure between national and state level soccer referees at various intervals of time in relation to a match was analysed by independent 't' test and is presented in table no – 4.19.

Table – 4.19

Analysis of independent 't' test between national and state level soccer referees at various intervals of time in relation to a match on systolic blood pressure

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	131.16	8.49	3.4	2.21*
	State level referees	134.56	4.86		
15 minutes before the match	National level referees	139.6	4.11	4.08	2.80*
	State level referees	143.68	6.67		
15 minutes after the match	National level referees	135.08	3.45	4.3	2.22*
	State level referees	139.38	9.34		
6 hours after the match	National level referees	119.48	4.25	1.98	2.65*
	State level referees	121.46	2.24		

** Significant at 0.05 level (table value t (0.05, 74) = 1.99)*

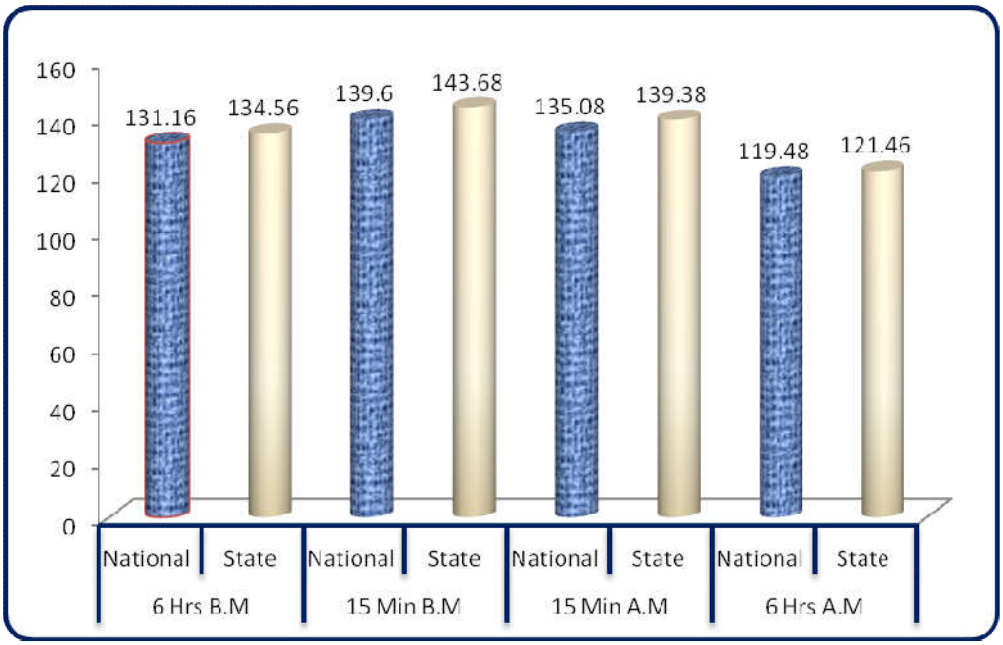
Table – 4.19 presents the results on analysis of independent 't' test between national and state level soccer referees at different intervals of time on systolic blood pressure.

The obtained 't' values are 2.21, 2.80, 2.22 and 2.65 at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match respectively on systolic blood pressure. Since, the obtained 't' values are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, significant mean differences exist between the national and state level soccer referees on systolic blood pressure with reference to various intervals of time.

The mean values on systolic blood pressure between national and state level soccer referees at various intervals of time in relation to a match are graphically presented in figure – 4.17

Figure – 4.17

Mean values of national and state level soccer referees at various intervals of time in relation to a match on systolic blood pressure



The data on heart rate between national and state level soccer referees at various intervals of time in relation to a match was analysed by independent 't' test and is presented in table no – 4.20.

Table – 4.20

Analysis of independent 't' test between national and state level soccer referees at various intervals of time in relation to a match on heart rate

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	76.24	5.15	3.92	2.79*
	State level referees	80.16	6.00		
15 minutes before the match	National level referees	97.12	2.15	6.78	2.30*
	State level referees	103.9	14.62		
15 minutes after the match	National level referees	104.8	8.55	5.38	2.58*
	State level referees	110.18	8.50		
6 hours after the match	National level referees	68.72	5.97	1.9	1.15
	State level referees	70.62	7.07		

** Significant at 0.05 level (table value t (0.05, 74) = 1.99)*

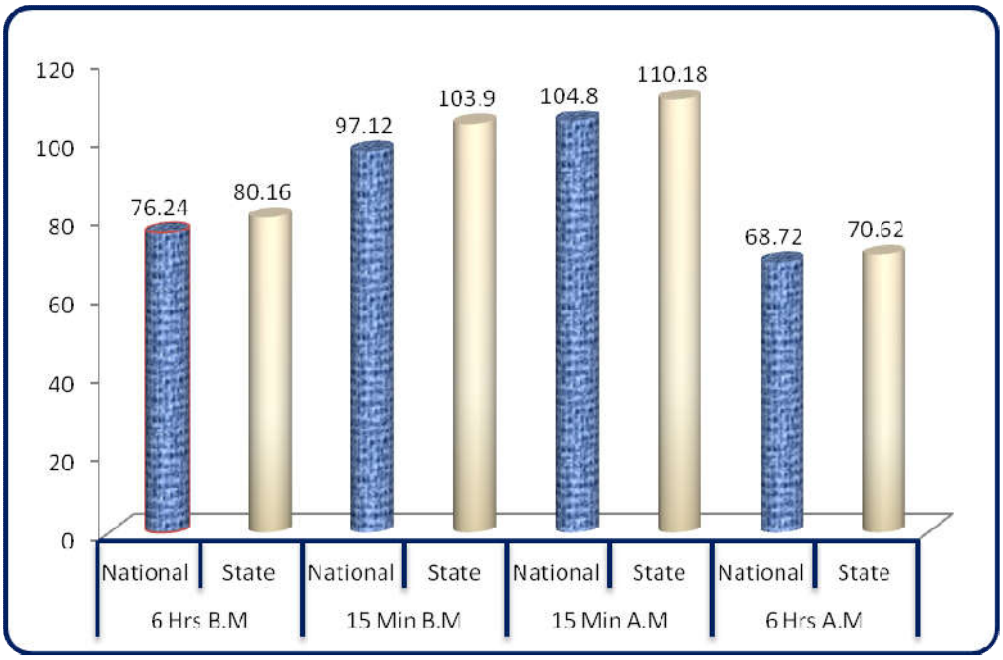
Table – 4.20 presents the results on analysis of independent 't' test between national and state level soccer referees at different intervals of time on heart rate.

It indicates that, the obtained 't' values are 2.79, 2.30 and 2.58 at 6 hours before the match, 15 minutes before the match and 15 minutes after the match respectively. Since, the obtained 't' values are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, significant mean differences exist between the national and state level soccer referees on heart rate with reference to 6 hours before the match, 15 minutes before the match and 15 minutes after the match. On the other hand, the obtained 't' value 1.15 at 6 hours after the match is lesser than the table value, hence, it clearly indicates that, no significant difference exists between national and state level soccer referees on heart rate with reference to 6 hours after the match.

The mean values on heart rate between national and state level soccer referees at various intervals of time in relation to a match are graphically presented in figure – 4.18

Figure – 4.18

Mean values of national and state level soccer referees at various intervals of time in relation to a match on heart rate



The data on body temperature between national and state level soccer referees at various intervals of time in relation to a match was analysed by independent 't' test and is presented in table no – 4.21.

Table – 4.21

Analysis of independent 't' test between national and state level soccer referees at various intervals of time in relation to a match on body temperature

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	97.94	1.18	0.60	2.36*
	State level referees	98.55	0.97		
15 minutes before the match	National level referees	99.34	0.67	0.40	2.66*
	State level referees	99.74	0.59		
15 minutes after the match	National level referees	98.59	0.81	0.55	2.98*
	State level referees	99.14	0.72		
6 hours after the match	National level referees	97.37	0.28	0.03	0.40
	State level referees	97.40	0.38		

** Significant at 0.05 level (table value t(0.05,74) = 1.99)*

Table – 4.21 presents the results on analysis of independent 't' test between national and state level soccer referees at different intervals of time on body temperature.

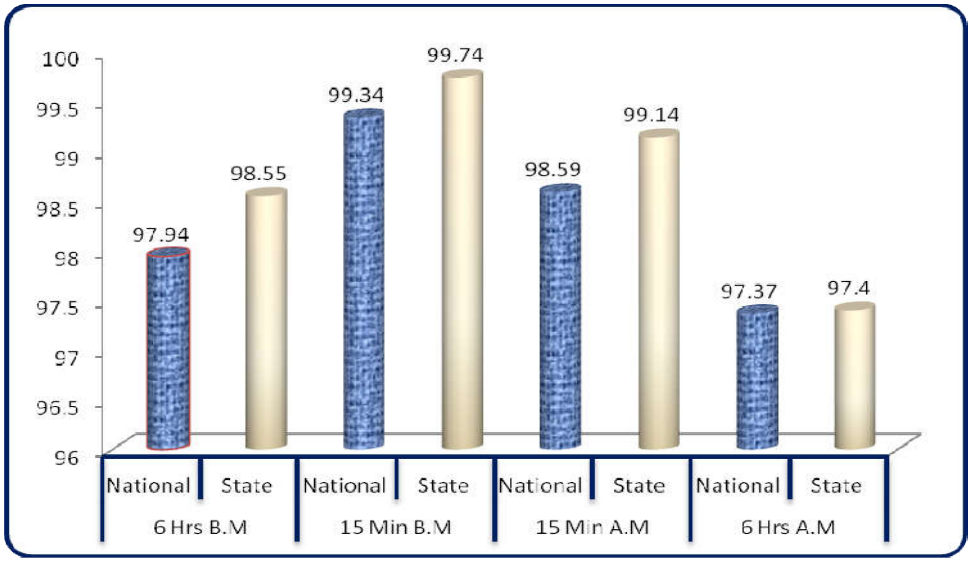
It indicates that, the obtained 't' values are 2.36, 2.66 and 2.98 at 6 hours before the match, 15 minutes before the match and 15 minutes after the match respectively. Since, the obtained 't' values are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, significant mean differences exist between the national and state level soccer referees on body temperature with reference to 6 hours before the match, 15 minutes before the match and 15 minutes after the match. On the other hand, the obtained 't'

value 0.40 at 6 hours after the match is lesser than the table value, hence it clearly indicates that, no significant difference exists between national and state level soccer referees on body temperature with reference to 6 hours after the match.

The mean values on body temperature between national and state level soccer referees at various intervals of time in relation to a match are graphically presented in figure – 4.19

Figure – 4.19

Mean values of national and state level soccer referees at various intervals of time in relation to a match on body temperature



The data on respiratory rate between national and state level soccer referees at various intervals of time in relation to a match was analysed by independent 't' test and is presented in table no – 4.22.

Table – 4.22

Analysis of independent 't' test between national and state level soccer referees at various intervals of time in relation to a match on respiratory rate

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	17.24	2.13	0.92	1.23
	State level referees	18.16	3.40		
15 minutes before the match	National level referees	20.88	4.26	2.58	3.22*
	State level referees	23.46	2.67		
15 minutes after the match	National level referees	19.44	2.43	1.42	2.06*
	State level referees	20.86	2.98		
6 hr after the match	National level referees	15.6	1.91	0.14	0.27
	State level referees	15.74	2.18		

** Significant at 0.05 level (table value t (0.05, 74) = 1.99)*

Table – 4.22 presents the results on analysis of independent 't' test between national and state level soccer referees at different intervals of time on respiratory rate.

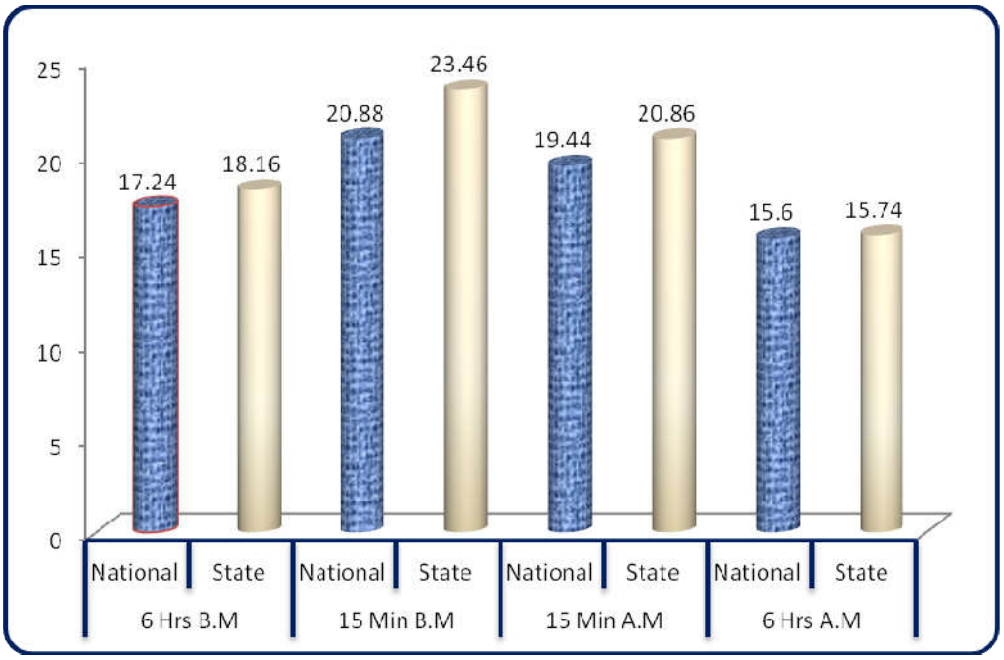
It indicates that, the obtained 't' values are 3.22 and 2.06 at 15 minutes before the match and 15 minutes after the match respectively. Since, the obtained 't' values are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, significant mean differences exist between the national and state level soccer referees on respiratory rate with reference to 15 minutes before the match and 15 minutes after the match. On the other hand, the obtained 't' value 1.23 and 0.27 at 6 hours before the match and 6 hours after the match respectively are lesser than the table value, hence, it clearly indicates that, no significant differences exist between national and state level soccer

referees on the respiratory rate with reference to 6 hours before the match and 6 hours after the match.

The mean values on respiratory rate between national and state level soccer referees at various intervals of time in relation to a match are graphically presented in figure – 4.20

Figure – 4.20

Mean values of national and state level soccer referees at various intervals of time in relation to a match on respiratory rate



The data on vital capacity between national and state level soccer referees at 6 hours before the match was analysed by independent 't' test and is presented in table no – 4.23.

Table – 4.23

Analysis of independent 't' test between national and state level soccer referees on vital capacity at 6 hours before the match

Time taken	Group	Mean	Std. Deviation	Mean Diff.	't'
6 hours before the match	National level referees	3.67	0.54	0.12	1.14
	State level referees	3.55	0.37		

** Significant at 0.05 level (table value t (0.05, 74) = 1.99)*

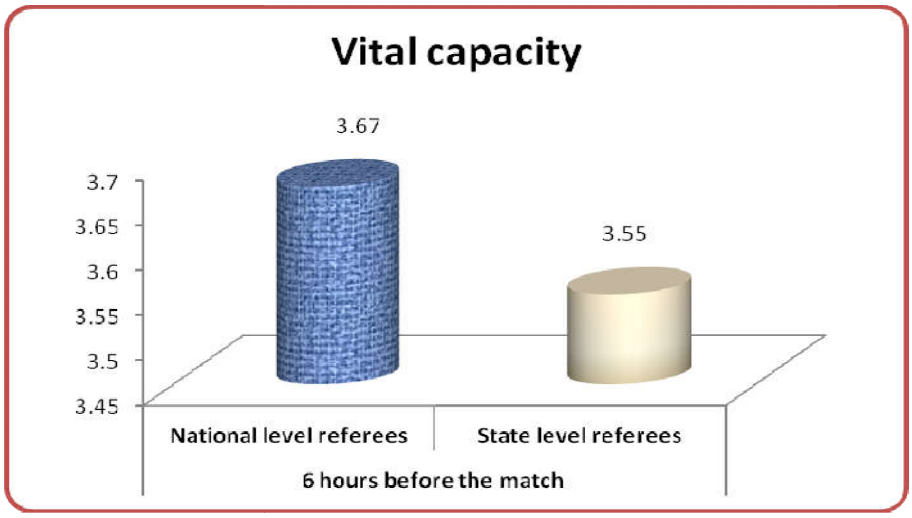
Table – 4.23 presents the results on analysis of independent 't' test between national and state level soccer referees on vital capacity at 6 hours before the match.

Since the obtained 't' value 1.14 is lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, no significant mean difference exists between the national and state level soccer referees on vital capacity with reference to 6 hours before the match. The result reveals that there is no significant difference exists between national and state level soccer referees on vital capacity.

The mean values on vital capacity between national and state level soccer referees at 6 hours before the match are graphically presented in figure – 4.21

Figure – 4.21

Mean values of national and state level soccer referees at on vital capacity at 6 hours before the match



The data on personality between national and state level soccer referees at 6 hours before the match was analysed by independent 't' test and is presented in table no – 4.24.

Table – 4.24

Analysis of independent 't' test between national and state level soccer referees on personality (extroversion and neuroticism) at 6 hours before the match

Variables	Group	Mean	Std. Deviation	Mean Diff.	't'
Extroversion	National level referees	17.20	3.00	2.52	3.33*
	State level referees	14.68	3.13		
Neuroticism	National level referees	15.2	3.51	1.82	1.89
	State level referees	13.38	4.12		

** Significant at 0.05 level (table value t(0.05,74) = 1.99)*

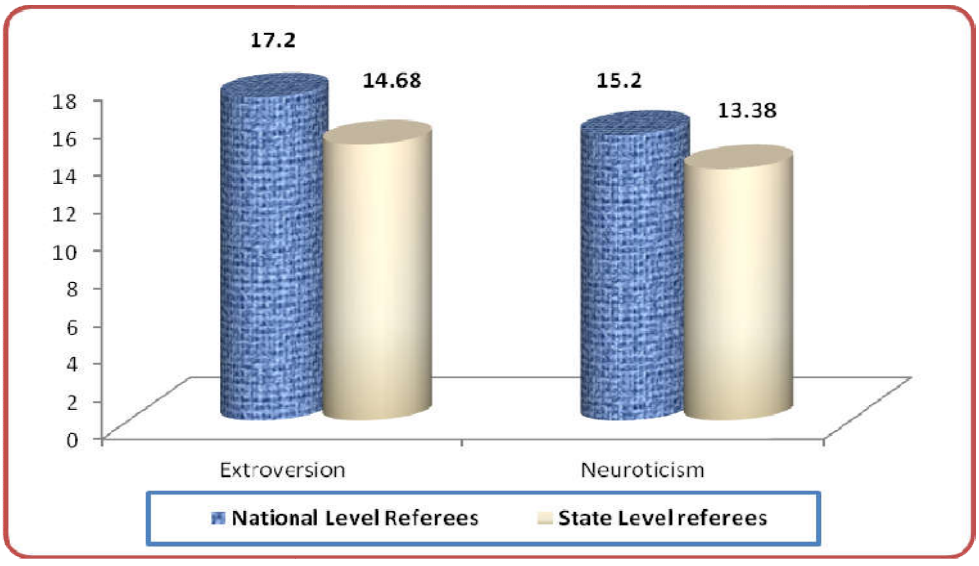
Table – 4.24 presents the results on analysis of independent 't'- test between national and state level soccer referees on extroversion and neuroticism at 6 hours before the match.

Since the obtained 't' value 3.33 on extroversion is greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, significant mean difference exist between national and state level soccer referees on extroversion with reference to 6 hours before the match. The result reveals that, there is significant difference exists between national and state level soccer referees on extroversion. And the obtained 't' value 1.89 on neuroticism is lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance, it clearly indicates that, no significant mean difference exists between the national and state level soccer referees on neuroticism with reference to 6 hours before the match. The result reveals that there is no significant difference between national and state level soccer referees on neuroticism.

The mean values on personality between national and state level soccer referees at 6 hours before the match are graphically presented in figure – 4.22

Figure – 4.22

Mean values of national and state level soccer referees on personality (extroversion and neuroticism) at 6 hours before the match



The descriptive statistics of scores on personality (extroversion and neuroticism) of soccer referees taken at 6 hours before the match is presented in table – 4.25.

Table – 4.25

Descriptive Statistics of scores on personality of soccer referees

Variables	N	Range	Minimum	Maximum	Mean	Std. Deviation
Extroversion	75	13.00	8.00	21.00	15.52	3.29
Neuroticism	75	19.00	2.00	21.00	14.37	4.09

Table 4.25 shows that the mean scores of extroversion and neuroticism of soccer referees.

The Analysis of one sample 't' – test among the national and state level soccer referees on extroversion are presented in table – 4.26.

Table – 4.26

Analysis of one sample 't' – test among the national and state level soccer referees on extroversion

Variable	Test Value = 12			
	Mean	**Std. Deviation (±)**	**Mean Diff.**	**'t'**
Extroversion	15.52	3.29	3.52	9.267

** Significant at 0.05 level (table value t (0.05, 74) = 1.99)*

Table – 4.26 shows the result of one sample 't' test among the national and state level soccer referees on extroversion. Since out of 24, the referee's scored more than 12 indicates that, soccer referees are extrovert in nature. The test value was fixed at 12, to testify the obtained extrovert results of national and state level soccer referees belong to the characteristics of extroversion. The obtained 't' value 9.27 is greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance and the mean value 15.52 is greater than the set value of 12, it clearly indicates that, a significant mean difference exists among the national and state level

soccer referees on extroversion, hence most of the soccer referees are extrovert in nature.

Discussion on findings

National level soccer referees on selected criterion variables at two different times: between 6 hours before the match and 15 minutes before the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 5.16 and 6.86 respectively, which are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that they are significantly different among the national level referees with reference to 6 hours before the match and 15 minutes before the match. This may be due to the fact that, intense competition tends to create at least some anxiety in every one, but not everyone express increased anxiety in the same way. The results of this study are in line with the similar study done by Bestine, (2004) reported that anxiety increases when the referees are looking forward to an exciting event and persons worried about results or their mistakes.

The obtained 't' values of the selected physiological variables namely diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 3.15, 5.18, 17.20, 5.13 and 3.66 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 6 hours before the match and 15 minutes before the match. The results of this study are in line with the similar study done by Weston, et al. (2006) reported that physiological parameters like blood pressure, heart rate and body temperature may increase significantly from the first to last period of the second half and match situations.

The obtained 't' value of psychological variable on trait anxiety is 0.51 which is lesser than the table value of 2.06 with degree of freedom 24 at 0.05 level of significanceand are statistically insignificant. The results of the study indicate

that, there is no significant difference on trait anxiety among national level soccer referees with reference to 6 hours before the match and 15 minutes before the match. The results shows conformity with another study done by Bestine (2004) reported that there is no significant difference between 6 hours before the match and 15 minutes before the match on trait anxiety of soccer referees.

State level soccer referees on selected criterion variables at two different times: between 6 hours before the match and 15 minutes before the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 6.26 and 12.14 respectively, which are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 6 hours before the match and 15 minutes before the match. The results shows conformity with another study done by Wolfson and Neave (2007) stress and pressures are more easily alleviate by elite referees due to their mastery of utilizing individual coping mechanisms.

The obtained 't' values of the selected physiological variables such as diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 7.69, 7.78, 10.67, 7.62 and 9.19 respectively, which are greater than table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 6 hours before the match and 15 minutes before the match. The results are in line with other study done by D'Ottavio and Castagna (2001) stated that high level soccer referees places high physiological demands on the match situation and specific training programme, because the referees intensity varied from situation to situation, normally the top level referees reach their maximum physiological intensity.

The obtained 't' value of psychological variable on trait anxiety is 0.76, which is lesser than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that,

there is no significant difference on trait anxiety among state level soccer referees with reference to 6 hours before the match and 15 minutes before the match. The results shows conformity with another study done by Sini Thomas (2006) reported that there is no significant difference between the scores at 6 hours before the match and 15 minutes before the match on trait anxiety of volleyball referees.

National level soccer referees on selected criterion variables at two different times: between 6 hours before the match and 15 minutes after the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 2.59 and 2.69 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 6 hours before the match and 15 minutes after the match. The results shows conformity with other study done by Catterall et al. (1993) suggests that, the soccer referees psychological factors are higher than the players of during the match times.

The obtained 't' values of the selected physiological variables namely diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 2.56, 2.14, 17.25, 2.11 and 3.65 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 6 hours before the match and 15 minutes after the match. These results are consistent with the findings of similar study Catterall et al. (1993) reported that, the soccer referee's physiological factors like heart rate is very higher than the players. The first period of the match after the warm up, performance capacity would reach highest level of each individual, if there is no delay between the warm up and the .

The obtained 't' value of psychological variable on trait anxiety is 0.44, which is lesser than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that, there is no significant difference on trait anxiety among national level soccer

referees with reference to 6 hours before the match and 15 minutes after the match. The results of this study are in line with the similar study done by Ferudun Dorak (2015) stated that athlete with extroversion personality traits are likely to display sportsmanship behaviour. If the referees are introvert and psychotic in nature they may face the difficulties to enforce the rules and not may not give due respect to coaches and players.

State level soccer referees on selected criterion variables at two different times: between 6 hours before the match and 15 minutes after the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 2.21 and 2.87 respectively, which are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 6 hours before the match and 15 minutes after the match. This may be due to the fact that, intense competition tends to create at least some anxiety in every one, but not everyone express increased anxiety in the same way. The results shows conformity with another study done by Sini Thomas (2006) reported that anxiety increases when the referees are looking forward to an exciting event and persons worried about results or their mistakes.

The obtained 't' values of the selected physiological variables such as diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 3.10, 3.06, 21.58, 3.21 and 3.94 respectively, which are greater than table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 6 hours before the match and 15 minutes after the match. The results of this study are in line with the similar study done by Krustrup & Bangsbo (2001) stated that, subjects that have an energetic style of life possess a pressure, systolic and diastolic, smaller in comparison to the sedentary ones. The results are in line with another study done by D'Ottavio and Castagna (2001) stated that, high level soccer referees places high physiological

demands on the match situations and specific training programmes, because the referees intensity varied from situation to situation, normally the top level referees reach their maximum physiological intensity.

The obtained 't' value of psychological variable on trait anxiety is 0.69, which is lesser than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that, there is no significant difference on trait anxiety among state level soccer referees with reference to 6 hours before the match and 15 minutes after the match. The results of this study are in line with the similar study done by Valdevit, et al. (2001) measurements of anxiety in the observed sample showed that, the team handball referees had no tendency towards anxiety, because, all of the referees showed "an optimal level of anxiety".

National level soccer referees on selected criterion variables at two different times: between 6 hours before the match and 6 hours after the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 2.02 and 6.31 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 6 hours before the match and 6 hours after the match.

The obtained 't' values of the selected physiological variables namely diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 6.80, 6.86, 4.58, 2.43 and 2.92 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 6 hours before the match and 6 hours after the match. This may be due to the fact that, the soccer referees execute less low intensity run but in the second half they cover more distance, so normally the referee's heart rate goes high level, when compared with

the first half. These findings are in accordance with D'Ottavio and Castagna (2001) Krustrup.

The obtained 't' value of psychological variable on trait anxiety is 0.30 which is lesser than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that, there is no significant difference on trait anxiety among national level soccer referees with reference to 6 hours before the match and 6 hours after the match. The results of this study are in line with the similar study done by Valdevit, et al. (2001) measurements of anxiety in the observed sample showed that the team handball referees had no tendency towards anxiety, because, all of the referees showed "an optimal level of anxiety".

State level soccer referees on selected criterion variables at two different times: between 6 hours before the match and 6 hours after the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 4.37 and 12.38 respectively, which are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 6 hours before the match and 6 hours after the match. This may be due to the fact that, intense competition tends to create at least some anxiety in every one, but not everyone express increased anxiety in the same way. The results shows conformity with other study done by Sini Thomas (2006) reported that anxiety increases when the referees are looking forward to an exciting event and persons worried about results on their mistakes.

The obtained 't' values of the selected physiological variables such as diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 10.20, 17.50, 6.51, 7.43 and 4.63 respectively, are greater than table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 6 hours before the match and 6 hours after

the match. The results line with other study done by D'Ottavio and Castagna (2001) stated that, high level soccer referees places high physiological demands on the match situations and specific training programmes, because the referees' intensity varied from situation to situation, normally the top level referees reach their maximum physiological intensity.

The obtained 't' value of psychological variable on trait anxiety is 0.62, which is lesser than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that, there is no significant difference on trait anxiety among state level soccer referees with reference to 6 hours before the match and 6 hours after the match. The results of this study are in line with the similar study done by Ferudun Dorak (2015) stated that athlete with extroversion personality traits are likely to display sportsmanship behaviour. If the referees are introvert and psychotic in nature, they may face the difficulties to enforce the rules and may not give due respect to coaches and players.

National level soccer referees on selected criterion variables at two different times: between 15 minutes before the match and 15 minutes after the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 5.32 and 13.49 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 15 minutes before the match and 15 minutes after the match.

The obtained 't' values of the selected physiological variables namely systolic blood pressure, heart rate and body temperature are 4.29, 4.41 and 5.32 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 15 minutes before the match and 15 minutes after the match. This may be due to the fact that, the soccer referees execute less low intensity run but in the second half they cover more distance, so normally the referee's heart rate goes high level, when

compared with the first half. These findings are in accordance with D'Ottavio and Castagna (2001) Krustrup.

The obtained 't' value of selected variables on trait anxiety, diastolic blood pressure and respiratory rate are 0.83, 1.90 and 1.47 respectively, which are lesser than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically insignificant. The results reveal that, they are insignificantly different among the national level referees with reference to 15 minutes before the match and 15 minutes after the match. The results of this study are in line with the similar study done by Valdevit, et al. (2001) stated that, measurements of anxiety in the observed sample showed that the team handball referees had no tendency towards anxiety, because, all of the referees showed "an optimal level of anxiety".

State level soccer referees on selected criterion variables at two different times: 15 minutes before the match and 15 minutes after the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 4.12 and 16.19 respectively, which are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 15 minutes before the match and 15 minutes after the match. This may be due to the intense competition tends to create at least some anxiety in every one, but not everyone express increased anxiety in the same way. The results shows conformity with other study done by Sini Thomas (2006) reported that, anxiety increases when the referees are looking forward to an exciting event and persons worried about results on their mistakes.

The obtained 't' values of the selected physiological variables such as diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 4.01, 2.38, 3.00, 6.10 and 4.83 respectively, are greater than table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 15 minutes before the match and 15 minutes

after the match. The results are in line with other study done by D'Ottavio and Castagna (2001) stated that, high level soccer referees places high physiological demands on the match situations and specific training programmes, because the referees' intensity varied from situation to situation, normally the top level referees reach their maximum physiological intensity.

The obtained 't' value of psychological variable on trait anxiety is 0.07, which is lesser than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that, there is no significant difference on trait anxiety among state level soccer referees with reference to 15 minutes before the match and 15 minutes after the match. The results of this study are in line with the similar study done by Ferudun Dorak (2015) stated that, athlete with extroversion personality traits are likely to display sportsmanship behaviour. If the referees are introvert and psychotic in nature, they may face the difficulties to enforce the rules and may not give due respect to coaches and players.

National level soccer referees on selected criterion variables at two different times: between 15 minutes before the match and 6 hours after the match.

The result of the study shows that the obtained 't' values of the selected psychological variables namely state anxiety and stress are 6.68 and 19.29 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 15 minutes before the match and 6 hours after the match. This may be due to the fact that, referees experience can be an impact on the heart rate response during the match situation and psychological factors like stress may be reduced as officials gained high experience. These findings are in accordance with Wilkins et al. (1999).

The obtained 't' values of the selected physiological variables namely diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 6.93, 21.52, 23.64, 13.44 and 4.98 respectively, which are

greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 15 minutes before the match and 6 hours after the match. These findings are in accordance with D'Ottavio and Castagna (2001) revealed that, the first half of the game situation being more globally speaking active. The soccer referees execute less low intensity run but in the second half they cover more distance, so normally the referee's heart rate goes high level, when compared with the first half.

The obtained 't' value of psychological variable on trait anxiety is 0.92, which is lesser than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that, there is no significant difference on trait anxiety among national level soccer referees with reference to 15 minutes before the match and 6 hours after the match. This study are in line other study done by Valdevit, (2001) found that, the test of competitive anxiety, has a greater predictive potential for pre-competition anxiety mood than all of the other tests so far used in sports, though the statistically significant difference was not obtained.

State level soccer referees on selected criterion variables at two different times: between 15 minutes before the match and 6 hours after the match.

The result of the study shows that, the obtained 't' values of the selected psychological variables namely state anxiety and stress are 10.13 and 25.44 respectively, which are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 15 minutes before the match and 6 hours after the match.

The obtained 't' values of the selected physiological variables such as diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 18.12, 24.07, 13.16, 23.80 and 16.85 respectively, which are greater than table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are

significantly different among the state level referees with reference to 15 minutes before the match and 6 hours after the match. These findings are in accordance with D'Ottavio and Castagna (2001) revealed that, the first half of the game situation being more globally speaking active. The soccer referees execute less low intensity run but in the second half they cover more distance, so normally the referee's heart rate goes high level, when compared with the first half.

The obtained 't' value of psychological variable on trait anxiety is 0.27, which is lesser than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that, there is no significant difference on trait anxiety among state level soccer referees with reference to 15 minutes before the match and 6 hours after the match. The results of this study are in line with the similar study done by Valdevit, et al. (2001) revealed that trait anxiety, showed no statistically significant differences between the categories of differently ranked referees. Anxiety in particular, is the psychological trait, or personality feature, defined as the state of suffering, nervousness, worry, tension or unidentified fear.

National level soccer referees on selected criterion variables at two different times: between 15 minutes after the match and 6 hours after the match.

The result of study shows that the obtained 't' values of the selected psychological variables namely state anxiety and stress are 4.41 and 6.78 respectively, which are greater than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 15 minutes after the match and 6 hours after the match. This may be due to the fact that referees experience can be an impact on the heart rate response during the match situation and psychological factors like stress may be reduced as officials gained high experience. These findings are in accordance with Wilkins et al. (1999).

The obtained 't' values of the selected physiological variables namely diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 5.71, 14.14, 15.97, 7.04 and 5.89 respectively, which are greater

than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the national level referees with reference to 15 minutes after the match and 6 hours after the match. The results of this study are in line with the similar study done by Helsen and Bultynck, (2009) stated that, there is a significant variation in heart rate response across the match situation. Based on the game intensity, the physiological factors such as blood pressure, body temperature and respiratory rate may change. These findings are in accordance with Bangsbo (1994).

The obtained 't' value of psychological variable on trait anxiety is 0.14, which is lesser than the table value of 2.06 with degree of freedom 24 at 0.05 level of significance and is statistically insignificant. The results of the study indicate that, there is no significant difference on trait anxiety among national level soccer referees with reference to 15 minutes after the match and 6 hours after the match. This may be due to the fact that, the test of competitive anxiety has a greater predictive potential for pre-competition anxiety mood than all of the other tests so far used in sports, though the statistically significant difference was not obtained. These findings are in line with similar study done by Valdivia, (2001).

State level soccer referees on selected criterion variables at two different times: between 15 minutes after the match and 6 hours after the match.

The result of the study shows that the obtained 't' values of the selected psychological variables namely state anxiety and stress are 6.11 and 11.71 respectively, which are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are significantly different among the state level referees with reference to 15 minutes after the match and 6 hours after the match.

The obtained 't' values of the selected physiological variables such as diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate are 10.24, 12.89, 21.36, 16.04 and 9.25 respectively, which are greater than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and are statistically significant. The results reveal that, they are

significantly different among the state level referees with reference to 15 minutes after the match and 6 hours after the match. The results shows conformity with another study done by Helsen and Bultynck (2009) stated that, there is a significant variation in heart rate response across the match situation. And in another study, based on the game intensity the physiological factors such as blood pressure, body temperature and respiratory rate may change (Bangsbo 1994).

The obtained 't' value of psychological variable on trait anxiety is 0.29, which is lesser than the table value of 2.01 with degree of freedom 49 at 0.05 level of significance and is statistically insignificant among the state level referees. The results of the study indicate that, there is no significant difference on trait anxiety among state level soccer referees with reference to 15 minutes after the match and 6 hours after the match. The results of this study are in line with the similar study done by Valdevit, et al. (2001) revealed that, anxiety trait, showed no statistically significant differences between the categories of differently ranked referees. Anxiety in particular is the psychological trait, or personality feature, defined as the state of suffering, nervousness, worry, tension or unidentified fear.

Discussion on findings between national and state level soccer referees at various intervals of time on trait anxiety

The result of the study shows that, the trait anxiety between national and state level referees at 6 hours before the match. The obtained 't' value is 2.08, which is greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The result indicates that, state level referees have more trait anxiety compared with national level referees with reference to 6 hours before the match. The results are in line with that of Dell, Ghervis, and Rhind (2014) shows that, anxieties that new referees experience officiating youth or amateur adult leagues are vastly different from the anxieties experienced by a referee who may be stepping into the pitch to officiate a world cup match.

The obtained 't' value on trait anxiety between national and state level referees at 15 minutes before the match, 15 minutes after the match and 6 hours after the match are 0.88, 1.15 and 1.88 respectively, which are lesser than the table

value of 1.99 with degree of freedom 74 at 0.05 level of significance. It is found that there are no significant difference between the scores of national and state level referees with reference to 15 minutes before the match, 15 minutes after the match and 6 hours after the match. This may be due to the fact that, any referee will likely experience a certain amount of anxiety associated with the criticism and degree of difficulty before, during, and perhaps after a match. These anxieties can be brought on by a variety of factors. The types of anxieties experienced by these officials will vary across many different grades, or levels of the official. These findings are in accordance with Dell, Ghervis, and Rhind (2014).

Discussion on findings between national and state level soccer referees at various intervals of time on state anxiety

The result of the study shows that, the state anxiety between national and state level referees at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. The obtained 't' values are 3.59, 3.11, 2.23 and 2.88 respectively. The obtained 't' value on all the selected intervals of time are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The result indicates that, state level referees have more state anxiety compared with national level referees with reference to all the said intervals of time. The results shows conformity with another study done by Chu, Nadarajah, Afuecheta, Chan, and Xu (2014) reported that, the psychological pressures are great when officiating any sport, every call or decision that is made will most likely upset one team or the other and some players often feel that they are targeted by the referee crew. A high degree of psychological security and confidence must exist in order to be successful in overcoming the many criticisms referees will continue to face.

Discussion on findings between national and state level soccer referees at various intervals of time on stress

The result of the study shows that, the stress between national and state level soccer referees at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. The obtained 't' values are 2.43, 2.29,

3.76 and 2.48 respectively. The obtained 't' value at all the selected intervals of time are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance.

The result indicates that, state level referees have more stress compared with national level referees in the said intervals of time. It may because of they are having more experience in the field of officiating. The results shows conformity with another study done by Krustrup and Bangsbo (2001) analysed between top class referees and high standard referees. The results reveals that, few significant difference is observed during the match situation of referees. The results shows conformity with other study done by Wolfson & Neave, (2007) stated that, stress and pressures are more easily lessen by elite referees due to their mastery of utilizing individual coping mechanisms.

Discussion on findings between national and state level soccer referees at various intervals of time on diastolic blood pressure

The result of the study shows that, the diastolic blood pressure between national and state level soccer referees at 6 hours before the match, 15 minutes before the match and 15 minutes after the match. The obtained 't' values are 5.33, 4.15 and 2.67 respectively which are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The results indicate that, state level referees are having more diastolic blood pressure, when compared with national level soccer referees with reference to 6 hours before the match, 15 minutes before the match and 15 minutes after the match. For the resting periods the blood pressure seem to be normal, but when they are in training periods or competition periods the blood pressure may varied. These lines confirmed with Scooby (2012).

The results of the obtained 't' value on diastolic blood pressure of national and state level soccer referees at 6 hours after the match is 1.14, which is lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. It is found that there is no significant difference between the national and state level soccer referees in the diastolic blood pressure with reference to 6 hours after the match. The result shows conformity with other study done by Krustrup and bangsbo

(2001) analysed between top class referees and high standard referees, the results reveals that few significant difference are observed during the match situation of referees.

Discussion on findings between national and state level soccer referees at various intervals of time on systolic blood pressure

The result of the study shows that, the systolic blood pressure between national and state level soccer referees at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. The obtained 't' values are 2.21, 2.80, 2.22 and 2.65 respectively which are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The results indicate that, state level referees are having more systolic blood pressure, when compared with national level referees at all the intervals of time. The result shows conformity with another study done by Scooby (2012) stated that, for the resting periods the referees blood pressure seem to be normal, but when they are in training periods or competition periods the blood pressure may varied depends on the psychological stress. Because, physiological and psychological factors are predominant characteristics for the soccer referees. The high level percentage of physiological factors depends on the match time. Abass, et al. (2011) observed for this study indicating their superior fitness status. Referees should increase their physiological parameters to cope with the demands imposed by the players.

Discussion on findings between national and state level soccer referees at various intervals of time on heart rate

The result of the study shows that the differences in the heart rate between national and state level soccer referees at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. The obtained 't' values of the scores at 6 hours before the match, 15 minutes before the match and 15 minutes after the match are 2.79, 2.30 and 2.58 respectively . The obtained 't' values at the selected intervals of time are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The results indicate that, state level referees are having higher heart rate when compared with national

level referees with reference to 6 hours before the match, 15 minutes before the match and 15 minutes after the match. The result shows conformity with another study done by Wilkins et al. (1999) stated that, high heart rate during the match is due to the high level of physiological stress, when the official's psychological stress is going high, simultaneously, the heart rate can be increased.

The results of obtained 't' value on heart rate between national and state level soccer referees at 6 hours after the match is 1.15, which is lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. It is found that there is no significant difference in heart rate between national and state level soccer referees with reference to 6 hours after the match**.** The results agree with the study done by Wilkins et al. (1999) which proved that, when the official's psychological stress is going high, simultaneously, the heart rate can be increased. The result shows conformity with another study done by Krustrup and Bangsbo (2001) analysed between top class referees and high standard referees, the results reveal that only few significant differences are observed during the match situation of referees.

Discussion on findings between national and state level soccer referees at various intervals of time on body temperature

The result of the study shows that, the differences in the body temperature between national and state level soccer referees at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. The obtained 't' values of the scores at 6 hours before the match, 15 minutes before the match and 15 minutes after the match are 2.36, 2.66 and 2.98 respectively. The obtained 't' values at the selected intervals of time are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The result indicates that, state level referees are having higher body temperature, when compared with national level referees at first three intervals of time. The results indicate that, state level referees are having elevated body temperature when compared with national level referees with reference to 6 hours before the match, 15 minutes before the match and 15 minutes after the match.

The results of obtained 't' value on body temperature between national and state level soccer referees at 6 hours after the match is 0.40, which is lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. It is found that, there is no significant difference on body temperature between national and state level soccer referees with reference to 6 hours after the match**.** These results are in accordance with Bard et al. (1980) found that, the top level referee faces high level of physiological parameters. The result reveals the differences between elite and novice gymnastic referees, when they measured physiological and psychological behaviour and performance of the referees.

Discussion on findings between national and state level soccer referees at various intervals of time on respiratory rate

The result of the study shows that, the differences in the respiratory rate between national and state level soccer referees at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. The obtained 't' values of the scores at 15 minutes before the match and 15 minutes after the match are 3.22 and 2.06 respectively. The obtained 't' values at the selected intervals of time are greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The result indicates that, the state level referees are having faster respiration when compared with national level referees with reference to 15 minutes before the match and 15 minutes after the match. The result shows conformity with another study done by Castagna (2004) analysed that, high level of match requires high technical and tactical capabilities. In state level matches, the players run slowly during the match situation but in national level competitions the players run fast, so referees also run fast and cover more distance, when the person's cover more distance, his body's physiological function goes high level.

The results of the obtained 't' value on respiratory rate between national and state level soccer referees at 6 hours before the match and 6 hours after the match are 1.23 and 0.27 respectively, which are lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. It is found that, there is no significant difference on respiratory rate between national and state level soccer

referees with reference to 6 hours before the match and 6 hours after the match**.** The result shows conformity with another study done by Helsen and Bultynck, (2009) stated that, there is a significant variation in heart rate response across the match situation and Bangsbo (1994) stated that, based on the game intensity the physiological factors such as blood pressure, body temperature and respiratory rate may change.

Discussion on findings between national and state level soccer referees on vital capacity at one time: 6 hours before the match.

The result of the study shows that, the differences in the vital capacity between national and state level soccer referees at 6 hours before the match. The obtained 't' value of the scores at 6 hours before the match between national and state level soccer referees is 1.14, which is lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The result indicates that, there is no significant difference between national and state level referees on vital capacity. Ogabor, J.O. (2015) observed between Cross River and Akwa Ibom state level referees cardiovascular endurance. The result reveals that, there is no significant difference in the maximum oxygen up-take (VO_2 max) values of referees. With this submission above may conclude that referees from two levels such as national and state soccer referees' physiological parameter of VO_2 Max is similarly same. Referees should compulsorily increase their physiological parameters to be able to cope with the demands of the players.

Discussion on findings between national and state level soccer referees on personality at one time: 6 hours before the match.

The result of the scores in extroversion at 6 hours before the match between national and state level soccer referees and its obtained 't' value is 3.33, which is greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The result indicates that there is significant difference between national and state level referees on extroversion.

The result of the scores in neuroticism at 6 hours before the match between national and state level soccer referees obtained and the obtained 't' value is 1.89, which is lesser than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance. The result indicates that, there is no significant difference between national and state level referees on neuroticism. Since the extroversion quality is dominating in national referees than state level referees, national referees are more extrovert than state level referees. The results of this study are in line with the similar study done by Zoran Valdevit, (2001) stated that, in the dimension of neuroticism, the tested referees achieved scores distributed around the lower scale values, which means that they are of a balanced and emotionally stabile behaviour.

Discussion on findings on personality among national and state level soccer referees at one time: 6 hours before the match.

The result of one sample 't' test among the national and state level soccer referees on extroversion at 6 hours before the match. Since out of 24, the referees scored more than 12 indicates that, soccer referees are extrovert in nature, the test value was fixed at 12, to testify the obtained extrovert results of national and state level soccer referees belong to the extroversion.

The obtained 't' value 9.27 is greater than the table value of 1.99 with degree of freedom 74 at 0.05 level of significance and the mean value 15.52 is greater than the set value of 12, it is clearly stated that, there is a significant mean difference exists among the national and state level soccer referees on extroversion, so most of the soccer referees are extrovert in nature. The results of this study are in line with the similar study done by Zoran Valdevit, (2001) stated that there are no significant differences for the referees of different ranking. Based on the obtained results, it may be concluded that referees belong to extrovert personality type, are helpful, venturous, bold and be inclined to have the reactions of controlled anger.

Discussion on hypotheses

1. The first hypothesis stated that, there would be significant difference in the selected psychological and physiological variables namely, anxiety, stress,

blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 6 hrs before the match and 15 minutes before the match.

The results of the study reveal that, there were significant differences among national and state level soccer referees on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate at two different times in relation to a match: 6 hours before the match and 15 minutes before the match. And also there is no significant difference among national and state level soccer referees on trait anxiety. Hence, the first hypothesis was partially accepted.

2. The second hypothesis stated that, there would be significant difference on the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 6 hours before the match and 15 minutes after the match.

   The results of study reveal that, there were significant differences among national and state level soccer referees on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate at two different times in relation to a match: 6 hours before the match and 15 minutes after the match. And also there was no significant difference among national and state level soccer referees on trait anxiety with reference to 6 hours before the match and 15 minutes after the match. Hence, the second hypothesis was partially accepted.

3. The third hypothesis stated that there would be significant difference in the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 6 hours before the match and 6 hours after the match.

The results of the study reveal that, there were significant differences among national and state level soccer referees on state anxiety, stress, blood pressure (diastolic blood pressure and systolic blood pressure), heart rate, body temperature and respiratory rate at two different times: 6 hours before the match and 6 hours after the match. And also there was no significant difference among national and state level soccer referees on trait anxiety with reference to 6 hours before the match and 6 hours after the match. Hence, the third hypothesis was partially accepted.

4. The fourth hypothesis stated that, there would be significant difference in the selected psychological and physiological variables namely, anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate among state and national level soccer referees at two different times: 15 minutes before the match and 15 minutes after the match.

   The results of the study reveal that, there were significant differences among national and state level soccer referees on state anxiety, stress, systolic blood pressure, heart rate and body temperature at two different times: 15 minutes before the match and 15 minutes after the match. And also there was no significant difference among national and state level soccer referees on trait anxiety, diastolic blood pressure and respiratory rate with reference to 15 minutes before the match and 15 minutes after the match. Hence, the fourth hypothesis was partially accepted.

5. The fifth hypothesis stated that there would be significant difference in the selected study variables namely anxiety, blood pressure (diastolic blood pressure and systolic blood pressure), stress, body temperature, heart rate and respiratory rate among national and state level soccer referees at two different times in relation to a match: 15 minutes before the match and 6 hours after the match.

   The results of study reveal that, there were significant differences among national and state level soccer referees on state anxiety, stress, blood pressure (diastolic blood pressure and systolic blood pressure), heart rate,

body temperature and respiratory rate at two different times in relation to a match: 15 minutes before the match and 6 hours after the match. And also there was no significant difference among national and state level soccer referees on trait anxiety with reference to 15 minutes before the match and 6 hours after the match. Hence, the fifth hypothesis was partially accepted.

6. The sixth hypothesis stated that there would be significant difference among national and state level soccer referees on the selected study variables namely anxiety, blood pressure (diastolic blood pressure and systolic blood pressure), stress, body temperature, heart rate and respiratory rate at two different times in relation to a match: 15 minutes after the match and 6 hours after the match.

   The results of study reveal that, there were significant differences among national and state level soccer referees on state anxiety, stress, blood pressure (diastolic blood pressure and systolic blood pressure), heart rate, body temperature and respiratory rate at two different times in relation to a match: 15 minutes after the match and 6 hours after the match. And also there was no significant difference among national and state level soccer referees on trait anxiety with reference to 15 minutes after the match and 6 hours after the match. Hence, the sixth hypothesis was partially accepted.

7. The seventh hypothesis stated that, there would be significant difference between national and state level soccer referees on the selected psychological and physiological variables namely personality, anxiety, blood pressure, stress, heart rate, body temperature, and respiratory rate at four intervals of time: 6 hours before the match, 15 minutes before the match, 15 minutes after the match, 6 hours after the match.

   The results of the study reveal that, there were significant difference between national and state level soccer referees on the selected psychological and physiological variables namely personality, trait anxiety, state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate.

Also there was no significant difference between national and state level referees on trait anxiety with reference to 15 minutes before the match, 15 minutes after the match and 6 hours after the match. There is no significant difference on diastolic blood pressure, heart rate and body temperature at 6 hours after the match. There is a no significant difference between national and state level referees on respiratory rate with reference to 6 hours before the match and 6 hours after the match. Hence, the seventh hypothesis was partially accepted.

8. The eighth hypothesis stated that, there would be significant difference between national and state level soccer referees on vital capacity.

   The result of the study reveals that, there was no significant difference between national and state level soccer referees on vital capacity. Hence, the eighth hypothesis was rejected.

9. The ninth hypotheses stated that, the soccer referees would be extroverts.

   The result of the study reveals that, the mean and standard deviation of the scores of extroversion is 15.52 and ± 3.29 (Table - 26), it is concluded that most of the soccer referees are extroverts. Hence, the ninth hypothesis stated, the soccer referees are extrovert in nature is accepted.

Chapter – V

Summary, Conclusions and Recommendations

Summary

A game is a social wonder. Sports are as old as human culture and it has accomplished a widespread following in present day times. Each person has the executioner nature in him. He wants to run quicker, hop higher and more remote, toss more distant and display more prominent quality and ability. The point of games is to build up this executioner sense to its boundaries in a general public acceptable way.

Amid the recent couple of decades the standard of games and amusements have improved to its boundaries. The reason for this enormous improvement is the presentation of logical methodology. Because of the advancements brought by various game sciences, presently there are number of logical techniques to improve every single quality which decides the execution in all diversions and in sports. In the meantime, the improvement is as per the rate of interest of each game.

Physical, mental and physiological wellness are fundamental for every single individual of their age. A body may groups' additional common expertise in football. In any case, on the off chance that he doesn't keep himself in the amusement till the finish of the match he may not discover a spot in the group. On the off chance that wellness turns into the first and foremost factor to appreciate the life completely. Because of the improvement of standard of games, the prevalence and significance of games have expanded over the most recent couple of decades and physiological and mental wellness has turned into a matter of first importance factor to end up incredible in games.

Football, which is also known as soccer, is probably world's most popular sport, played in practically every nation at varying levels of competence. Football may be played competitively or for fun, as a career, a means of keeping fit or simply a recreational pursuit (Reilly, 1996). In soccer, in addition to mental, psychological,

physiological and coordination features, the improvement of conditional features are important as well. Peak conditional features in soccer players provide an advantage. Much of what affects the results of a match occurs during or after the high intensity sprint. Analysis of the specific movements and activities performed by football players during games can provide much relevant information on which suitable training programmes can be designed (Dawson, 2003).

The purpose of the study was to analyze the psychological and physiological variables of national and state level soccer referees. The sub purpose of the study was to find out the differences in the psychological and physiological factors of national and state level soccer referees from Kerala state - namely anxiety, stress, blood pressure, body temperature, heart rate and respiratory rate, at four different times in relation to a match: six hours before the match, fifteen minutes before the match, fifteen minutes after the match and six hours after the match.

To achieve the purpose 25 national and 50 state level soccer referees randomly selected from different districts of Kerala state and their age ranged from 25-45 years. The researcher proposed to collect data from these subjects as the scores would be more applicable to the study. The referees who had past officiating experience at least three years were only taken as subjects.

All the psychological and physiological variables except personality and vital capacity of selected national and state level soccer referees were tested 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. The personality and vital capacity of the subjects were tested at 6 hours before the match.

The participating referees were requested to fill the questionnaires describing their psychological variables such as personality, anxiety and stress. The physiological parameters were assessed by the invigilator himself with the help of experts. Blood pressure - recorded with the help of sphygmomanometer, body temperature - measured with the help of digital thermometer, heart rate - taken by counting redial pulse for one minute, respiratory rate - taken by counting the number

of breaths per minute and vital capacity - recorded with the help of digital spirometer.

In the present study paired 't' test was applied to analyse the psychological and physiological variables of the subjects at 6 hours before the match, 15 minutes before the match, 15 minutes after the match and 6 hours after the match. Independent 't' test was applied to analyse the psychological and physiological variables of the subjects between state and national level. One sample 't' test was applied to analyse the personality trait of the subjects. All the cases were fixed at 0.05 level of confidence.

Conclusions

On the basis of the results of the study, the following conclusions are drawn,

1. It was concluded that there was significant difference on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of national level soccer referees: 6 hours before the match and 15 minutes before the match.

2. It was concluded that there was no significant difference on trait anxiety of national level soccer referees: 6 hours before the match and 15 minutes before the match.

3. It was concluded that there was significant difference on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of state level soccer referees: 6 hours before the match and 15 minutes before the match.

4. It was concluded that there was no significant difference on trait anxiety of state level soccer referees: 6 hours before the match and 15 minutes before the match.

5. It was concluded that there was significant difference on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature

and respiratory rate of national level soccer referees: 6 hours before the match and 15 minutes after the match.

6. It was concluded that there was no significant difference on trait anxiety of national level soccer referees: 6 hours before the match and 15 minutes after the match.

7. It was concluded that there was significant difference in state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of state level soccer referees: 6 hours before the match and 15 minutes after the match.

8. It was concluded that there was no significant difference in trait anxiety of state level soccer referees: 6 hours before the match and 15 minutes after the match.

9. It was concluded that there was significant difference in state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of national level soccer referees: 6 hours before the match and 6 hours after the match.

10. It was concluded that there was no significant difference in trait anxiety of national level soccer referees: 6 hours before the match and 6 hours after the match.

11. It was concluded that there was significant difference in state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of state level soccer referees: 6 hours before the match and 6 hours after the match.

12. It was concluded that there was no significant difference in trait anxiety of state level soccer referees: 6 hours before the match and 6 hours after the match.

13. It was concluded that there was significant difference in state anxiety, stress, systolic blood pressure, heart rate and body temperature of national level soccer referees: 15 minutes before the match and 15 minutes after the match.

14. It was concluded that there was no significant difference in trait anxiety, diastolic blood pressure and respiratory rate of national level soccer referees: 15 minutes before the match and 15 minutes after the match.

15. It was concluded that there was significant difference on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of state level soccer referees: 15 minutes before the match and 15 minutes after the match.

16. It was concluded that there was no significant difference on trait anxiety of state level soccer referees: 15 minutes before the match and 15 minutes after the match.

17. It was concluded that there was significant difference on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of national level soccer referees: 15 minutes before the match and 6 hours after the match.

18. It was concluded that there was no significant difference on trait anxiety of national level soccer referees: 15 minutes before the match and 6 hours after the match.

19. It was concluded that there was significant difference on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of state level soccer referees: 15 minutes before the match and 6 hours after the match.

20. It was concluded that there was no significant difference on trait anxiety of state level soccer referees: 15 minutes before the match and 6 hours after the match.

21. It was concluded that there was significant difference on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of national level soccer referees: 15 minutes after the match and 6 hours after the match.

22. It was concluded that there was no significant difference on trait anxiety of national level soccer referees: 15 minutes after the match and 6 hours after the match.

23. It was concluded that there was significant difference on state anxiety, stress, diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate of state level soccer referees: 15 minutes after the match and 6 hours after the match.

24. It was concluded that there was no significant difference on trait anxiety of state level soccer referees: 15 minutes after the match and 6 hours after the match.

25. It was concluded that there was significant difference between national and state level soccer referees at 6 hours before the match on selected psychological variables such as trait anxiety, state anxiety, and stress and physiological variables namely diastolic blood pressure, systolic blood pressure, heart rate and body temperature. National level soccer referees are better when compared with state level soccer referees in the above said variables.

26. It was concluded that there was no significant difference between national and state level soccer referees at 6 hours before the match on respiratory rate.

27. It was concluded that there was significant difference between national and state level soccer referees at 15 minutes before the match on selected psychological variables such as state anxiety and stress and physiological variables namely diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate. National level soccer referees are

better when compared with state level soccer referees in the above said variables.

28. It was concluded that there was no significant difference between national and state level soccer referees at 15 minutes before the match on trait anxiety.

29. It was concluded that there was significant difference between national and state level soccer referees at 15 minutes after the match on selected psychological variables such as state anxiety and stress and physiological variables namely diastolic blood pressure, systolic blood pressure, heart rate, body temperature and respiratory rate. National level soccer referees are better when compared with state level soccer referees in the above said variables.

30. It was concluded that there was no significant difference between national and state level soccer referees at 15 minutes after the match on trait anxiety.

31. It was concluded that there was significant difference between national and state level soccer referees at 6 hours after the match on selected psychological variables such as state anxiety and stress and physiological variable namely, systolic blood pressure. National level soccer referees are better when compared with state level soccer referees in the above said variables.

32. It was concluded that there was no significant difference between national and state level soccer referees at 6 hours after the match on selected psychological variable on trait anxiety and physiological variables such as diastolic blood pressure, heart rate, body temperature and respiratory rate. National level soccer referees and state level soccer referees are almost similar in the above said variables.

33. It was concluded that there was significant difference between national and state level soccer referees on extroversion. National level soccer referees exhibit more extrovert personality than the state level soccer referees.

34. It was concluded that there was no significant difference between national and state level soccer referees on neuroticism.

35. It was concluded that there was no significant difference between national and state level soccer referees on vital capacity.

36. It was concluded that most of the soccer referees are extrovert in nature.

Recommendations

1. A similar study may be conducted in greater detail to assess the changes on other psychological and physiological variables of referees.

2. A similar study might be conducted on players to assess their fitness level in the selected variables.

3. A similar study could be conducted on different games and sports events.

4. Similar types of studies could be undertaken for different age groups and also for colleges and university level players.

5. A similar study can be conducted to know the changes during the match.

6. It is recommended that similar study may be conducted on FIFA referees.

7. Further study can be done by including more variables.

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