Chapter II

REVIEW OF RELATED LITERATURE

The related literature reviewed for better understanding of the problem and to interpret the results is presented in this chapter. The review collection was confined to the libraries of Dr. M.G.R. Educational and Research Institute University, Chennai, Tamil Nadu Physical Education and Sports University, Chennai and the Central Library of Velammal Engineering College, Chennai and the internet and web resources. The literature in any field forms the foundation upon which all future work will be built. If we fail to build upon the foundation of knowledge provided by the review of literature, the scholar might miss some work already done on the same topic. The reviews are classified under the following headings.

2.1 Studies on motor variables

Physical fitness is the total of various independent variables. Generally these variables are performance oriented and depend upon the functioning of different systems of the body. Different sports events demand a combination of different physical variables for high quality performance. There are certain physical fitness components, which are discussed at various levels in relation to the performance. Some of them are speed, endurance, strength, power, agility, flexibility, and coordination. The physical performance factors are ones most influential parameters deciding the winner and loser. Among them certain factors that are basic to all performance and highly specialized movements are the result of training and experience, which are found in high caliber games and sports.

2.1.1. Agility

Agility is a necessary prerequisite for all physical exercises requiring the participation of the whole body and the interplay of all groups of muscles. Agility plays a significant role in the
training of technique. The aim in training skills is to bring the athlete closer to the ideal form of the sequences of the movement during the competitive period. In any physical activity or in a game situation, the controlled ability to stop, to start and to change direction rapidly and more quickly is a very essential factor and this quality decides one’s performance level and the speed of acquiring any skill. The absence of that ability among the participants would spoil the original game score.

Mahalingam and Vairamani (2015), in their extensive investigation had indicated the advantageous effect of physical activity on physical fitness and activities of daily living in older adults, but none had delved into the effects on the health of the women who had all along their life been helping everyone to enjoy life. This exploration studied the effect of an exercise program on Body Mass Index, Flexibility and Agility in women of age ranging from 40 to 50 years. Ninety (mean age 42.5 ± 5.5 years) women were randomly assigned to two treatment groups (n = 30) and a control group (n = 30) group and were evaluated before and after training. The treatment group completed an 8-week walking and guided yoga programs. Assessments included body weight and height, Boomerang Run Test (Right) for measuring agility and Sit and Reach Test for measuring Agility. ANCOVA revealed significant differences between groups (p < .001) for all measurements. Post-hoc test revealed that walking program had a higher effect in all the three fitness measures than yogic program.

Mahalingam, and Vairamani (2015), were of the opinion that school boys were under the influence of television, computer games and junk food and are not interested in any type of physical activity. Even during the games periods, they stayed under the shades of trees and just chat and play games through their mobile apps. It was a very dangerous situation that requires immediate attention. Before defining any program, the author tested the levels of agility and flexibility of 60 school boys of 9th standard (Age 15 years) in a Chennai city school. Since agility was considered as an important movement skill necessary for successful participation in any kind of games that demand rapid change of direction and flexibility was needed to perform everyday activities with relative ease. It was astonishing to note that their levels of agility and flexibility were comparatively very low to their age and hence the scholar devised an aerobic exercise program and Suryanamaskar routine. He divided the 60 boys into
three groups as Experimental Group - I, Experimental Group – II and administered aerobic exercise program for Experimental Group I and conducted the suryanamaskar for Experimental Group – II, 6 weeks, five days in a week. The control group did not have any physical activity. After the experimental period of 6 weeks, the measurements on Agility and Flexibility were taken and the results were analyzed through the application of ANCOVA. It was found that the Experimental group I and Experimental Group-II had shown significant improvement in their levels of Agility and Flexibility and the Experimental Group – II which performed the Suryanamaskar Program showed better levels of improvement over the Experimental Group – I which performed the Aerobic Exercises. It was concluded that the passive Suryanamaskar if performed 12 times daily with breathing control as described, would definitely improve the general fitness and specifically the Agility and Flexibility. It was recommended that Yoga teachers might be appointed in schools and they teach Suryanamaskar along with their regular yoga program which will go a long way in maintaining the general fitness of school boys.

Ho et al. (2015), realized that the agility T-test and countermovement jump test had long been used to examine the agility of athletes. However, for some sports, newer systems of evaluation were being designed for specific movements. The goal of their study was to design a blocking agility system and apply it to analyzing the efficiency of 6 weeks of plyometric training on volleyball players. A total of 26 male volleyball players in Taiwan participated in the study. The participants were divided into a plyometric training group and a control group. The agility T-test, countermovement jump test, and blocking agility test were used to examine the influence of plyometric training on the blocking agility of volleyball players. A single-factor analysis of covariance was applied to obtain the variables for the two groups. There was no significant difference between the groups on the agility T-test. On the countermovement jump test and blocking agility test, the plyometric training group performed significantly better than the control group. Also, the power values of blocking agility were higher than 90%, which demonstrated very good validity. The results of this study indicate that appropriate plyometric training can increase the rate of force development for vertical jumps and significantly enhance the combined agility of volleyball players in terms of lateral-movement speed and quickness, which enable players to rapidly perform blocking actions.
Mishra and Das (2015), illustrated that the word 'Sport' came from the old French word called Desport which meant "Leisure", but this word had changed its connotation with the passing time. Now sports were no longer believed to be practiced only in leisure time. Today they were one of the major parameters to judge a country's development and growth and are fast becoming great career options for the future generations. The purpose of the study was to observe the Difference in Hand - Eye Co-Ordination, Accuracy, Agility Hand Explosive Strength, and Leg Explosive Strength between Female Basketball Players & Volleyball Players. A total of Twenty Two (22) Female subjects were selected for this study. Out of them 11 were from Basketball, 11 were from Volleyball. The ages of the subjects were 13-19 years old. Selected Fitness Components of the subjects were the criterion measure for the present study. Selected Fitness Components were: This included- leg Explosive Strength, Hand Explosive Strength, Hand Eye Coordination, Agility and Accuracy. The leg Explosive Strength was measured by Vertical jump. Hand Explosive Strength was measured by putting the Shot. Hand Eye Coordination was measured by Rebound Ball Test. Accuracy was measured by Accuracy test. Agility was measured by (4x10 mts.) Shuttle Run. In respect of Accuracy, Agility, Hand Explosive Strength, leg Explosive Strength, there were no significant difference Between Female Basketball and Volleyball Group. In respect of Hand – Eye coordination Female group of Basketball players were better than the volleyball players of Female group.

Shaikh (2015), meant that functional training was the action of training “function,” a general term that meaning ‘role or duty.’ Functional training was the science of training the body to meet the specific demands of life and sports. The aim of this study was to find out the effect of functional training programe on speed and agility on college male handball players. Subject: Thirty college male handball players of Dr. Meghnad Saha College were randomly selected for final study. Method: A pre-test, mid-test and post-test groups design was used and measures were the following; 50 Yards Dash test and 4×10 Yards Shuttle Run used of agility. For experimental group were alternative 3 days per week functional training schedule used for 8 weeks, whereas the active control group did individual game practices. Statistics: In the present study, the Mean, SD, ANOVA, LSD post hoc test for data analysis. Result: The results
of this study after 8 weeks functional training period in the experimental group’s speed and agility significantly improved. It was concluded that functional training were beneficial for increasing speed and agility on college male volleyball players.

2.1.2 Speed

Speed is directly or indirectly of high importance in all sports and games. In sports, speed ensures optimum motor actions. To maintain pace or tempo of an exercise during a competition is possible only with the requisite level of speed. A faster movement also ensures high quality or skill of movement execution, which finds expression in accuracy, precision, rhythm and consistency. Speed is one of the most important physical qualities required for successful performance in jumps, especially in horizontal jumping and in pole vaulting. The amount of speed required is slightly different in these events and is due to the difference in the application of mechanical principles in the take off. It is said that sprinters are born not made and it is certainly true that natural ability will always play a major role. However, the standard is high and the competition is so fierce at present that no sprinter can achieve real success without correct techniques and intensive training. It has been established that running speed can be improved through training. Essential for successful performance in many motor activities is speed. The requirement differs from situation to situation. Running speed is an athletic event and is also very important in numerous other sports activities.

Rodríguez-Ruiz, et al (2014), had the aim of their study to evaluate the normalized response speed (Vrn) of the knee musculature (flexor and extensor) in high competitive level volleyball players using tensiomyography (TMG) and to analyze the muscular response of the vastus medialis (VM), rectus femoris (RF), vastus lateralis (VL), and biceps femoris (BF) in accordance with the specific position they played in their teams. One hundred and sixty-six players (83 women and 83 men) were evaluated. They belonged to eight teams in the Spanish women’s superleague and eight in the Spanish men’s superleague. The use of Vrn allowed avoiding possible sample imbalances due to anatomical and functional differences and demands. We found differences between Vrn in each of the muscles responsible for extension (VM, RF, and VL) and flexion (BF) regardless of the sex. Normalized response speed differences seem to be larger in setters, liberos and outside players compared to middle
blockers and larger in males when compared to females. These results of Vrn might respond to the differences in the physical and technical demands of each specific position, showing an improved balance response of the knee extensor and flexor musculature in male professional volleyball players.

Díez Vega et al. (2015), asserted that the true effectiveness in volleyball was related to the ability to perform quick displacements and jumping-related techniques (1). The monitoring of the muscular response had been related to functional capacity of the knee flexor and extensor muscles in other population. It was of utmost importance to the study the muscular structures that enhance volleyball performance (2). The aim of this study was to analyze the responses of the normalized response speed and jumping-related techniques in a group of professional female volleyball players. A total of 16 professional female volleyball players were assessed (age: 20.32 ± 1.68; body weight: 67.75 ± 9.13; height: 178.26 ± 7.12; BMI: 21.41 ± 1.75) from two Spanish Superleague teams. Normalized response speed (Vrn) was measured using the Tensiomyography (TMG) on Vastus Medialis (VM), Rectus Femoris (RF), Vastus Lateralis (VL), Biceps Femoris (BF) and Semitendinous (ST) previous to the season and after 4 months of training and physical conditioning. A balakov jump test including volleyball specific arm movement (BLQ) and three steps approach-attack jump (ATT) were also assessed using a contact platform. The Vrn resulted improved for all the muscles except VM in both limbs were Vrn was maintained, but only Vrn results shown significant improvements on VL (Right: p<0,001; Left: p<0,05 ) in both lower limbs and RF (p<0,05) in right leg. Height reached after training was significantly greater in both jump test BLQ (p<0,05) y ATT (p<0,001). Height gains support that the training and physical conditioning (adaptation, hypertrophy, maximal strength and transfer) results in improved jumping-related techniques. TMG-related results also show that there are mechanical adaptations in VL that are related to the requirements of volleyball. Moreover, the results obtained on VM in females reinforce the important role of these muscles in the stabilization of the knee joint during jumping-related techniques. ST behavior should be studied further.

Kasabalis et al. (2005), aimed their present study to evaluate the anaerobic power of elite male volleyball players, using the Wingate Anaerobic Test to examine the relationship
between anaerobic power and jumping performance. Athletes (n = 56) and Nonathletes (n = 53) were divided into three age groups: Adults (18–25 yr.), Juniors (15–16 yr.), and Youth (10–11 yr.). Measurements of height, body mass, vertical jump and Wingate scores indicated higher values for athletes. The specific training effects of anaerobic power were more pronounced at the age of 10–11 years than for Non-athletes. A significant correlation coefficient between peak power and vertical jump was found for Athletes (r = .86) and for the total group (r = .82). These results indicated that vertical jump may predict the maximal anaerobic power and could be used by coaches as a practical and easy-to-apply field screening test for evaluation in volleyball training.

Smith, Roberts and Watson, (1992), believed that volleyball had been described as an ‘interval’ sport with both anaerobic and aerobic components. At the higher skill levels, technical performance might be limited by physical characteristics as well as physical fitness, and performance characteristics such as speed and vertical jump. This investigation compared teams at the two uppermost levels of men's volleyball in Canada for differences in physical, physiological and performance characteristics. The subjects were members of the national (n= 15) and Universiade teams (n = 24). The parameters examined included percent body fat, maximal oxygen uptake (VO₂ max), anaerobic power, bench press, 20-m sprint time and vertical jumping ability. The only significant difference in physical characteristics between the two teams was in age. Despite similarities in standing and reach height, the national team players had significantly higher block (3.27 vs 3.21 m) and spike (3.43 vs 3.39 m) jumps. An evaluation of anaerobic power measures produced similar power outputs during a modified Wingate test, yet the national team members had higher scores (P<0.05) for spike and block jump differences as well as 20-m sprint time. The large aerobic component of elite volleyball play was supported by the high VO₂ max value recorded for the national team players (56.7 vs 50.3 ml kg⁻¹ min⁻¹). The results suggest that either years of specific physical conditioning and playing or the selection of individuals for the national team who possess more desirable characteristics as a consequence of genetic endowment, plays a significant role in the preparation of international calibre volleyball players.
Dalrymple, et.al., (2010), studied to determine the effect of stretching on peak jump height during a series of vertical jumps, specifically focusing on a) static stretching (SS), b) dynamic stretching (DS) and c) no stretching (NS) performed immediately before a series of countermovement vertical jumps (CMJ). Twelve female collegiate volleyball players (mean ± SD; age 19.5 ± 1.1 yr; height 1.71 ± 0.06 m; mass 71.3 ± 8.54 kg) volunteered for this study. Data collection lasted a total of 3 weeks, and each subject performed all 3 stretching protocols, 1 session per week, with 1 week between sessions. The order of the stretching protocols was randomized for each subject. During each testing session, all subjects performed a 5-minute light jog as a warm-up, followed by 8 minutes of 1 of the stretching protocols. One minute after the completion of each protocol, 5 maximal CMJ were performed on a force platform, with each jump separated by 1 minute of passive recovery. Jump heights were calculated by integrating the vertical force trace. There were no significant differences between the SS, DS, and NS conditions for any of the jumps (p > 0.05). Despite the lack of significant effects for the group, there were notable individual responses to each of the warm-up conditions. Practitioners should be aware of the individual responses of their athletes to different types of warm-up protocols before athletic performance and the possible impact of prescribing or eliminating certain exercises.

2.1.3 Leg explosive power

Power, the explosive aspect of strength, is the product of strength and speed of movement. Although absolute strength is an important component of performance, power is even more important for most of the activities. The important components of the pole vault program are strength, power, speed, endurance, flexibility, technique, coordination, recovery, mental preparation and diet.

Drusch et.al., (2015), were of the judgment that architectural and physical performance measurements were commonly implemented to identify various physical capacities in many populations. However, previous research had suggested architectural measures, notably in the leg extensors, were ineffective predictors of vertical jumping (VJ) performance. Given the functional relevance of rapid strength development on explosive dynamic tasks, further research was warranted examining, a) the presence of associations of maximal (e.g., peak
torque; PT) and, in particular, explosive (e.g., rate of torque development; RTD) strength-related characteristics with jumping performance in the leg extensors, and b) the extent to which PT and RTD either uniquely, or synergistically contribute to VJ performance. The purpose of this study was to examine the relationships between isometric maximal and explosive strength measures of the leg extensors and VJ peak power (PP) output in female youth volleyball athletes. Thirty (mean ±SD, range: age= 13.73±1.11, 12-17 years, height=162.53±6.39 cm, body mass=57.84±12.05 kg) female youth competitive volleyball players reported to the laboratory on two occasions, with the first visit being a familiarization session. The second visit involved experimental testing, in which participants performed two isometric maximal voluntary contractions of the leg extensors on a dynamometer at a leg angle of 60º, followed by three countermovement VJ trials. Subjects performed countermovement jumps, starting in a standing position and feet firmly on the ground. Following the descent to the midpoint position and without pause, the subjects exploded upward as hard and fast as possible. PT and RTD were calculated as the highest 500ms epoch and the slope of the rise in torque in the first 200ms from onset, respectively. Lower-body PP was assessed using a linear velocity transducer, which was attached to the posterior side of a belt that was securely fastened to the subjects’ waistline. Pearson correlation (r) and stepwise linear regression analyses were performed to examine the relationships. Results indicated that both PT (r=0.7) and late RTD (r=0.62) were significantly correlated to PP (p≤0.01). However, linear regression analysis revealed that PT was the only variable entered into the stepwise regression model (R=0.71; R²=0.50). These findings showed that while both maximal and explosive strength variables correlated with VJ performance, only PT was necessary to effectively predict PP output with no additional explained variance from RTD. Thus, training regimens aimed at development of high force production of the leg extensors may enhance PP production during explosive vertical jump tasks more so than enhancing early rapid force production.

Sattler et al. (2015), Vertical jump performance of professional male and female volleyball players: effects of playing position and competition level. J Strength Cond Res 29(6): 1486–1493, 2015—Vertical jump (VJ) performance is an important element for successful volleyball practice. The aims of the study were (a) to explore the overall VJ
performance of elite volleyball players of both sexes, (b) to explore the differences in VJ performance among different competition levels and different playing positions, and (c) to evaluate the sex-related differences in the role of the arm swing and 3-step approach with arm swing on the jump height. We assessed the VJ capacity in 253 volleyball players (113 males and 140 females) from Slovenian first and second Volleyball Division. The height of squat jump (SJ), countermovement jump, block jump, and attack jump was tested using an Optojump system. We observed significant differences ($p \leq 0.05$) in VJ height between different levels of play that were most pronounced in the SJ. Position-related differences in VJ performance were observed in male players between receivers and setters ($p \leq 0.05$), whereas in females, VJ performance across different playing positions seems equal. Finally, we found that male players significantly better use the arm swing during VJ than females ($p \leq 0.05$), whereas the use of eccentric part of the jump and approach before the spike to improve VJ performance seem to be equally mastered activity in both sexes. These results could assist coaches in the development of jumping performance in volleyball players. Furthermore, presented normative data for jump heights of elite male and female volleyball players could be useful in selection and profiling of young volleyball players.

Lu, (2015), selected 10 volleyball young athletes and 10 badminton young athletes as the object of study, randomly dividing into control group and experimental group. The normal strength training was used in control group and plyometric training was used in experimental group. After eight weeks, the results show that firstly, plyometric training significantly improved the explosive effect of lower limbs for young athletes, especially on the indicators of vertical jump to touch and single vertical jump; secondly, plyometric training cannot significantly improve biggest strength of lower limbs for young athletes. It also indicates that the improvement of explosive power of lower limbs does not depend on the improvement of biggest strength of lower limbs for young athletes. The normal strength training is better than plyometric training for biggest strength training for young athletes. Therefore, we suggest that the plyometric training for young athletes should be gradual and limited load. There is a difference between young and adult athletes for the intensity and measurement of plyometric training that will not take adverse reactions in the body for young athletes.
Kumar and Anbalagan (2014), had a purpose to find out the influence of varied combinations of complex training on the explosive power of school volleyball players. To achieve these purpose 60 school volleyball players with an age group of 14-17 years were selected from boys Higher Secondary School, Coimbatore as subjects. They were randomly divided in to four equal groups of 15 subjects each and assigned to experimental group-I, experimental group-II, and experimental group – III and control group. The Experimental group:-I (n=15, RTPT group) performed resistance training followed by plyometric training, Experimental group:-II (n=15; PTET group) performed plyometric training followed endurance training the Experimental group:-III (n=15; RTET group) performed resistance training followed by endurance training (n=15; control group) did not practice any specific training. The training period was 12 weeks. All the subjects underwent test namely vertical jump. They were assessed before and after the training period of twelve weeks. The ‘t’ ratio was used to find out the significant pre and post mean difference between the groups to analysis the data. The study revealed that the above said variables were significantly improved due to the influence of resistance training followed by plyometrics training.

2.2 Studies on psychological variables

Sport psychology as an emerging field of psychology, is viewed as an attempt to understand, describe and explain the behaviour of sports persons in athletic setting both in practice and in competition, with a view to enhance performance. During the early twentieth century, few farsighted individuals recognized the importance of psychological factors in sport and initiated sport psychology research.

Driskell, Copper and Moran (1994), illustrated that mental practice was the cognitive rehearsal of a task prior to performance. Although most researchers contend that mental practice is an effective means of enhancing performance, a clear consensus is precluded because (1) mental practice is often defined so loosely as to include almost any type of mental preparation and (2) empirical results are inconclusive. A meta-analysis of the literature on mental practice was conducted to determine the effect of mental practice on performance and to identify conditions under which mental practice is most effective. Results indicated that mental practice had a positive and significant effect on performance, and the effectiveness of
mental practice was moderated by the type of task, the retention interval between practice and performance, and the length or duration of the mental practice intervention.

Although sport psychology had not yet emerged as a distinct discipline, the pioneering work of these early sport psychologists have raised numerous issues and paved the way for much of our current work and research. In modern competitive sports, psychological preparation of a team is as important as teaching them different skills of a game using scientific methods. Nowadays, teams are prepared not only to play, but to win the competition, for coaches feel that good mental and psychological preparation for competition is a necessary component for success.

2.2.1 Sports Competition Anxiety

Anxiety plays an important role in athletic performance. Whether its effect is positive or negative depends on how an individual perceives the situation. Athletes with low anxiety level have been known to perform better in sprinting performance. A moderate level of anxiety is seen as less for the acquisition and performance of skills. The levels of anxiety either too high or too low tend to inhibit learning and performance in sprinting. Anxiety is a natural part of competition at any level. But in the case of young and immatured athletes, anxiety can have a harmful effect on performance. It is the challenge in sports participation, which produces anxiety. Anxiety may be a positive motivating force or it may interfere with successful performance in sports. Anxiety is likely to be greater in higher competitive sports than relatively in non-competitive sports, participants are expected to win and great demands are made upon them to succeed.

Shilpi, Singh and Kumar (2015), examined the mental skill and competitive anxiety level as well as their relationship in Indian athlete’s performance during competition. The totals of thirty eight (38) athletes of International and National level were selected to measure the correlation between variables of Ottawa Mental Skills Assessment Tools (version 3) with one weak difference and the relationship between Competitive State Anxiety Inventory-2D and Ottawa Mental Skills Assessment Tools (version 3) with the help of Pearson’s Correlation. The responses given by athletes on mental skills questionnaire in Hindi and English language, which assessed 48 questions based on foundation skills, psychosomatic
skills and cognitive skills. In other hand the responses of athletes on mental skills and competitive anxiety questionnaire in Hindi and English language assessed cognitive anxiety, somatic anxiety and self confidence. According to the results and finding of this study, it is recommended that coaches must use mental skills during training for their athlete’s performance which helpful for the athlete’s to facilitate the performance and reduce the anxiety level during competition and create a positive approach’s for their goal attainment. This study revealed that Mental Skills are helpful to established positive approaches in athletes in relations to their performance. The statistical analysis uses define the Reliability of Ottawa Mental Skills Assessment Tool -3 skills and relationship between OMSAT-3 and CSAI-2D on Indian population. The Pearson’s Correlation method used with Test-Retest on athletes which measures significant relationship between 3 skills of mental skill tool and Person’s Product Moment Correlation also used on Indian athlete’s performance which measures the significant relationship between mental skills and competitive anxiety.

The increase in the performance has been the basic need or what dreamed by all athletes to stand out in their respective sports. Athletes train hard to improve their skills and talents regardless of the time they take to do so. A few years ago, athletes only enroll themselves in a few sports in the school level as a routine. Now, athletes choose to compete in one of may be two types of sport. In certain cases, some athletes in secondary school focus on only one particular sport. Psychology is the newest science, what needs to be trained and taught to well known or understand. Psychology is the service which provides step-by-step process for training the positive mental skills and reducing anxiety that will improve capabilities using the convenience of individual’s. Psychological skills or mental skills have been essential to organized interventions, typically in health and their supporting contexts, where in systematic training of psychological skills takes place.

Gaetano, Paloma and Gaetano (2015), tried to address and define whether the sport was stressful for young athletes. Anxiety and stress affecting both young people and adults, either team sports or individual although with different effects. What was the role of the coach in reading and management of emotional states of anxiety- based, knowing the causes of anxiety allows us to understand how coaches can help their young athletes and make it
bearable. The importance that the athlete learns to recognize and manage the anxiety to improve it to their advantage and finally, are some suggested tips to better manage anxiety competitive. Aim was to investigate on the phenomenon and establish some significant aspects and give relationships with the sport in physical education.

Saudagar (2015), compared the Sports Competition Anxiety between Volleyball and Soccer male players. The subjects for this study were (N=60) male were 30 each from Volleyball and Soccer male players and age ranged from 18 to 25 years were purposive selected from Bilaspur district (C.G.). For the Acquisition of Sports Competitive Anxiety questionnaire developed by Martin (1990) was used. The independent’t’ test was used to analyze data. Results indicated that there is no significant difference was found between Volleyball male players and Soccer male players in their Sports Competition Anxiety.

Gould, Greenleaf and Krane, (2002), explained that anxiety was defined as feelings of nervousness and tension which caused by the environment or surrounding expectation that was related to ‘arousal’. Those demands were usually so stressful and thus causing an imbalance between the demands and the athlete’s ability to fulfill the expectation.

Jaakkola, Ntoumanis, and Liukkonen (2015), made a study to investigate the relations among situational motivational climate, dispositional approach and avoidance achievement goals, perceived sport ability, and enjoyment in Finnish male junior ice hockey players. The sample comprised 265 junior B-level male players with a mean age of 17.03 years (SD = 0.63). Players filled questionnaires tapping their perceptions of coach motivational climate, achievement goals, perceived sport ability, and enjoyment. For the statistical analysis, players were divided into high and low perceived sport ability groups. Multigroup structural equation modeling (SEM) revealed an indirect path from task-involving motivational climate via task-approach goal to enjoyment. Additionally, SEM demonstrated four other direct associations, which existed in both perceived ability groups: from ego-involving motivational climate to ego-approach and ego-avoidance goals; from ego-approach goal to ego-avoidance goal; and from task-avoidance goal to ego-avoidance goal. Additionally, in the high perceived sport ability group, there was an association from task-involving motivational climate to enjoyment. The results of this study reveal that motivational climate emphasizing effort, personal
development and improvement, and achievement goal mastering tasks are significant elements of enjoyment in junior ice hockey.

Yadav (2015), felt that many athletes who performed well during training or practice could suffer from performance anxiety on game day. The purpose of the study was to find out the correlation between Anxiety and Mental skill among University male volleyball players. A total of 15 university Volleyball male players were selected as subjects from different colleges affiliated to Karnataka University, Dharwad St: Karnataka, The ages of players were between 20 to 25 years. All the subjects completed Ottawa and SCAT questionnaire for measuring their mental skill and competitive anxiety. Results: t’ test was employed to evaluate the SCAT questionnaire and Pearson correlations method was used to assess the correlation between anxiety and mental skill. The results showed that there was a significant correlation between mental skill and competitive anxiety in university volleyball male players (p<0.05). The present study findings showed that it was important that sportsmen were classified according to the type of sport & type of event in order to judge the differences between different games and to identify methods by which they can achieve high levels of performance in their sports. The psychological training needs to be provided by the coaches along with the physical training and under psychological training, it is imperative that players are trained how to face stressful situations occurring during the competitions.

Anderson (2015), described that in addition to the Group Environment Questionnaire (GEQ), Social Networking Analysis (SNA) has recently emerged as a promising research approach to measuring team cohesion. However, little to no research has simultaneously used both measures to compare and contrast their unique benefits. Thus, the present study sought to examine the relationship between SNA (friendship and efficacy) and the GEQ, as well as their relationships with team performance, anxiety, retention, and satisfaction. Players and coaches from four NCAA Division-I Women’s Volleyball teams (N = 49) completed an online survey at preseason, midseason, and postseason. Findings indicated that the GEQ and SNA are likely measuring different constructs. While the GEQ was a better global measure of team cohesion, SNA was able to offer unique contributions in exploring how specific dyadic relationships among team members evolve over the course of the season and contribute to performance,
anxiety, retention, and satisfaction. Visual inspections of the SNA networks revealed that the team with fewer friendship connections was more successful in terms of team performance. In addition, SNA efficacy was associated with lower levels of competitive somatic anxiety. The GEQ subscales that focused on individual attractions to the group (ATG-T and ATG-S) and SNA friendship and efficacy were moderately related to later intentions of returning to the team the following season. Finally, lower levels of cohesion, as measured by both the GEQ and SNA, were associated with lower levels of satisfaction later in the season. The results of this study help to highlight the positive outcomes variables associated with team cohesion, while also further positioning SNA and the GEQ as important, yet unique, tools for athletic administrators and coaches to use to better understand the functioning, or lack thereof, of their teams. Acknowledgements of practical applications and recommendations for future research are provided.

Coetzee, Jooste and Mostert (2014), explained that currently, knowledge was limited about how high school rugby players experienced cognitive and somatic anxiety when playing competitive rugby. The first aim of the study was to determine if high school rugby players displayed significant differences in cognitive and somatic anxiety before and after an important rugby match. The second aim sought to determine to what extent the important rugby match alters the cognitive and somatic anxiety experienced by high school rugby players. In order to realize these aims, high school rugby players were compared to male adolescents who were not participating in any type of sport. A purposeful sample of 10 first team high school rugby players and 10 male adolescents not participating in any type of sport was drawn from a high school situated in the Gauteng Province of South Africa. Cognitive anxiety was measured through the administration of the State and Trait Anxiety subscales of the State-Trait Personality Inventory Form Y (STPI-Y) and the Sport Competition Anxiety Test (SCAT). Somatic anxiety was measured by investigating the salivary cortisol levels of the rugby players. A baseline measure, along with measures on the day of an important rugby match and one week after the important rugby match were taken. Statistical analysis within the group of rugby players revealed that significant differences occurred in the state anxiety and SCAT scores. No significant differences occurred within the cortisol measures. When the rugby players were compared to adolescents not participating in any type of sport, significant
differences were observed between the two groups on state anxiety and SCAT scores. No differences with regards to cortisol levels had occurred. It was concluded that the rugby players had experienced cognitive but not somatic anxiety.

Esfahani and Gheze Soflu (2010), made a study with a purpose to compare pre-competition anxiety and state anger between female and male volleyball players (university students). The statistical population consisted of all male and female volleyball players (n=214) who participated in Iran volleyball university matches. It must be noted that the questionnaires were distributed among whole statistical population either 30 minutes before competition started in the hall where competition was supposed to be held or at the time the athletes went to the hall to start the competition and finally 88 questionnaires were collected from male volleyball players and 82 questionnaires were collected from female ones. In this research, the CSAI-2R questionnaire was used to measure cognitive state anxiety, somatic state anxiety and self-confidence on a scale ranging from 1 = not at all to 4 = very much so in a competitive setting. The State-Trait Anger Expression Inventory (STAXI; Spielberger, 1991) was also used to provide a measure of the anger experience as an emotional state (state anger), the disposition towards anger as a personality trait (trait anger) and the expression of anger. K-S (P=0.05) was used to ascertain data normality. Descriptive statistics (mean, standard error), t test and Pearson coefficient were used to analyze the data (P=0.05). The results showed a significant difference in all pre-competition anxiety subscales: cognitive state anxiety (t=3.62), somatic state anxiety (t=4.76) and self-confidence (t=3.06) (P=0.05). Although there was no significant difference in trait anger (t=1.41, sig>0.05), there was a significant difference in state anger (t=2.15) and the expression of anger (3.67) (P=0.05). Key words: Pre-competition anxiety % State anger % Volleyball players % Students

2.2.2 Achievement Motivation

Pelletier et al. (1995), described the sport motivation scale (SMS); was developed to measure an athlete’s motivation toward sport participation. However, the SMS did not measure the most autonomous form of extrinsic motivation, integrated regulation, which was inconsistent with self-determination theory upon which the instrument was based. Moreover, several studies had questioned the factorial validity of the SMS. Hence, the purpose of this
study was to develop a revised version of the SMS, including integrated regulation. In Stage 1, the factorial validity of the SMS was examined using confirmatory factor analysis (CFA) on data collected from 614 Australians (elite athletes and university students). In Stage 2, the scale was revised by including integrated regulation items and replacing problematic items through an iterative process using CFA for data collected from 557 Australian university students. Concurrent validity of the revised scale was examined by evaluating correlations with the dispositional flow scale-2 (DFS-2). The revision led to development of a six-factor 24-item scale (SMS-6) that indicated a more parsimonious and improved fitting model consistent with SDT. Correlations between the SMS-6 and DFS-2 factors support the concurrent validity of the revised scale. Conclusion: From statistical and theoretical viewpoints, the revised SMS-6 was preferable to the original SMS, except for the discriminant validity issue of identification regulation. Further examination of the instrument is necessary by cross-validating the findings from this study.

Vansteenkiste (2014), in the current study aimed to examine the antecedents and outcomes associated with the variability in competitive volleyball players’ (N = 67; Mage = 19.45; SD = 5.13) situational achievement goal pursuit and its underlying autonomous and controlling reasons. Players were followed during six consecutive games and data were analyzed through multilevel modeling. Players’ dominant contextual goal pursuit reported at the onset of the study related to their situational (i.e., game-specific) goal pursuit. Further, variation in gameto-game mastery-approach goal pursuit, as compared with the pursuit of other achievement goals, related to variation in prosocial behavior. Finally, autonomous reasons underlying situational mastery-approach goal pursuit related positively to game-specific prosocial behavior, enjoyment, and performance satisfaction. The discussion emphasized the necessity to study players’ game-to-game motivational dynamics and the reasons underlying players’ achievement goal pursuit.

Bester (2014), in his study examined how athletes were generally motivated as well as during practice and competitions. He identified two types of motivation, failure avoidance and the pursuit of success. Athletes (hockey, athletics and rugby) took part in the investigation. The results of the investigation revealed that: Failure avoidance is significantly more
prominent than the pursuit of success when it comes to sport in general and during training sessions. As far as competition is concerned, the pursuit of success as a motivational approach was significantly higher than the avoidance of failure. The avoidance of failure as a motivational approach was significantly higher for males compared to female athletes. Grade 10 athletes displayed significantly less failure avoidance than Grade 12 athletes. Athletes who participated in team sport showed a significantly higher level of failure avoidance as a motivational approach compared to individual athletes.

Vink, Raudsepp and Kais (2015), felt that there was limited understanding of how sport motivation is associated with deliberate practice in youth team sport athletes. Therefore, the aim of this study was to examine prospective associations between intrinsic motivation and individual deliberate practice in specializing team sport athletes. Estonian adolescent team sport athletes (N = 163; M_age = 13.6 years at the beginning of study) completed the Sport Motivation Scale and training diary across a 12-month period. Both individual deliberate practice and intrinsic motivation increased over the 1-year period. Greater baseline intrinsic motivation predicted subsequent individual deliberate practice and greater initial individual deliberate practice predicted greater subsequent intrinsic motivation. The bidirectional relationship between athletes intrinsic motivation and individual deliberate practice were replicated across both time lags. The findings have significant implications for the importance placed on intrinsic motivation as a means of increasing of individual deliberate practice as well being an important outcome variable in specializing team sport athletes.

2.2.3 Self confidence

Gist, Bavetta and Stevens (1990), contrasted goal setting and self-management training designs for their effectiveness in facilitating transfer of training to a novel task. Behavioral measures of performance were used to assess transfer in terms of skill generalization, skill repetition and overall performance level. Skill generalization was more limited among the goal-setting trainees as compared to the self-management trainees. While goal-setting trainees generalized fewer skills to the novel task context, these skills tended to be used more repeatedly. In contrast, self-management trainees exhibited higher rates of skill generalization
and higher overall performance levels on the transfer task, even after the effects of outcome goal level were controlled. Implications are discussed for future research on training transfer.

Bull (1991), elucidated that adherence to mental-skills training had received little empirical investigation despite the recent growth and development in applied sport psychology services. The present study was designed to identify personal and situational variables influencing adherence to a mental training program. Volunteer athletes (N=34) were given a 4-week educational program before being left to train on their own for an experimental period of 8 weeks. Subjects were randomly assigned to one of three treatment intervention conditions (control, written reminders, and group meetings) designed to influence adherence behavior. Results demonstrated the influence of self-motivation in predicting mental-training adherence, but the interventions had no significant effect. Adherence levels were generally low but variable between athletes. Interviews with the athletes indicated the need for individualization of training programs, and problems of time constraints were identified as being influential in the adherence process. Comparable athletes (N=18) who chose not to volunteer for the mental training program were psychometrically tested and demonstrated lower sport motivation than the volunteer athletes but greater skill in concentration.

Shoenfelt and Griffith (2008), made a preseason mental skills program for serving was implemented for the 11 members of an intercollegiate volleyball team (M age = 20.0 yr.; SD= 1.1; years of intercollegiate volleyball experience M = 2.6; SD = 0.9). Key mental skills taught were relaxation, imagery, intentional focus, goal setting, behavioural modelling, and performance routine. A videotaped behavioural model articulated and demonstrated technical performance keys to effective serving. Players utilized a three-phase service routine to increase automaticity of performance and to incorporate key mental skills. End-of-season reported use of imagery was significantly correlated with Good Serve Percentage, as was reported use of a service routine. The mean Good Serve Percentage for the season was 49% (SD = 7); the team goal was 50%. Serve-specific self-efficacy significantly increased from the pertaining program to the end of the season. Results indicated that implementing the mental skills training program was associated with enhanced service performance.
2.3 Studies on volleyball skills

The study of Yiannis, and Panagiotis (2005), compared the effectiveness of the five principal skills in men’s Volleyball (serve, reception, attack, block and dig) between the Sydney 2000 and the Athens 2004 Olympic Games and examined to what extent the observed changes were connected with the implementation of the new rules in Volleyball. The findings revealed a universal tendency of the elite men’s volleyball teams to enhance their defence by reducing their block and dig faults. On the contrary there was an increase of the reception faults as a result of the improvement of the service effectiveness. The above changes reflected the teams' shift of tactics to win more points from their own serve. This tactical development became more imperative after the introduction of the rally-point system, which reduced the number of points played per set, and hence the teams' opportunities of gaining the minimum two-point advantage in order to win the set. Nonetheless, the Athens gold-medallist team of Brazil showed, in addition to the above, remarkable reception effectiveness which led to an outstanding attack capability, thus re-establishing the attack as the most important skill in volleyball.

Ciccarone et al. (2008), concluded that volleyball was an open skill sport with predominant anaerobic lactic acid power. At higher skill levels, performance characteristics were mainly determined by speed and vertical jumping ability. The aim of this study was to compare anthropometric parameters and jumping ability in a group of elite male volleyball players in relation to technical skills required by player position. The study population included 36 elite male volleyball players (coming from the Italian First and Second Division Championships). Subjects were grouped by playing position on the court: setters (7); blockers (10); hitters (16); liberos (3). Assessment included anthropometric parameters such as height, weight, body mass index (weight in kg/height in m2), indirect calculation of body fat mass by means of the Katch method (%BFM), measurement of reach with one hand (R1) and two hands (R2); and indirect measurement of explosive strength by means of the Bosco method: squat jump, countermovement jump (CMJ), CMJ with arm swing (CMJas), and repeated jumps for 15 s (R15”); measurement of motor coordination and jumping ability by means of the Vertec test combined with specific offense (Vertec attack [VA]) and defense (Vertec block
[VB]) skills. Results. Significant differences were observed between player specialization and anthropometric parameters (height, weight, BMI, R1 and R2). Results of the Bosco (SJ, CMJ, CMJas) and Vertec tests (VA and VB) also differed significantly among the player groups. Functional assessment protocols that evaluate anthropometric characteristics and jumping ability by means of two different unrelated methods, confirming that the two measure different aspects of the same performance, provide more complete indications for selecting players, workload planning and monitoring of player development during training.

Thissen-Milder and Mayhew (1991), determined the accuracy of general and specific tests for identifying the players on freshmen (FR), junior varsity (JV), and varsity (VR) teams and the precision of tests to differentiate between starters and nonstarters at each level of play. Fifty high school volleyball players were tested during the first week of practice for six general and four specific motor performance tests. The specific tests included the overhead volley, forearm pass, wall spike, and self bump/set test. The general tests included height, weight, percent body fat, agility run, vertical jump, and two flexibility maneuvers. VR players were significantly better in vertical jump, agility, and all specific ball-handling tests than FR and VJ players. The combination of forearm pass, overhead volley, vertical jump, and weight correctly classified 68% of the players to their team level. The combination of bump-set, height, weight, and shoulder flexibility allowed correct classification of 78% of the starters and nonstarters. General and specific tests can successfully select and classify high school volleyball players.

Kountouris et al, (2015), compared the differences in effectiveness of the five volleyball skills (serve, reception, attack, block, and dig) between men and women in high-level tournament games played at the last four consecutive Olympics. Results showed that men's and women's volleyball games are completely differentiated by two outcome measures. The first one is the higher proportion of faulty serves performed by men which is essentially attributable to the 19 cm difference in net height, while the second one derives from the fact that men outperform women at the execution of the attack.

Gabbett and Georgieff (2006), developed a skill assessment for junior volleyball players and to evaluate the reliability, validity, and sensitivity of the test for detecting training-
induced improvements in skill. Thirty junior volleyball players (mean ± SD age, 15.5 ± 1.0 years) participated in this study. Subjects performed tests of spiking, setting, serving, and passing skills on 2 separate occasions to determine test–retest reliability of accuracy. Two expert coaches evaluated the players’ technique and reevaluated it 1 month after the initial evaluation to determine the intra-tester reliability for technique measurements. A third expert coach determined the inter-tester reliability for technique measurements. The validity of the test to discriminate players of different playing abilities was evaluated by testing junior national, state, and novice volleyball players. Finally, each player participated in an 8-week skill-based training program. Accuracy measurements and intra-tester and inter-tester ratings of players’ technique proved to be highly reproducible (intra-class correlation coefficient, r, .85 to .98, range of typical error of measurement 0.2% to 10.0%). A progressive improvement in skill was observed with increases in playing level, while training-induced improvements were present in all skill tasks. These results demonstrate that skill-based testing offers a reliable method of quantifying development and progress in junior volleyball players. In addition, the skill-testing battery was useful in successfully discriminating playing ability among junior volleyball players of varying levels, and it was sensitive to changes in skill with training. These findings demonstrate that skill-based testing is useful for monitoring the development of junior volleyball players. The reliability, validity and objectivity of the following the test were established by the authors of the study and it had been used to test the skill of spiking in volleyball in the present study.

Palao and Valadés (2012), studied with the purpose a) to provide reference values for the standing spike test for female volleyball players and b) to study whether the standing spike test is valid for assessing the theoretical differences between female volleyball players. The sample included 83 players from the first nine teams of the Spanish women's first volleyball division (52 Spanish players and 31 from other nationalities). The variables studied were the ball speed of the standing spike test, the age of the players, the player's role (outside hitter, opposite, middle-blocker, libero, or setter), height, and nationality of the players (Spanish or foreign). The results demonstrate the ranges for the standing spike among female performance volleyball players (70-82 km · h⁻¹). The differences regarding nationality, player role, height,
and age seem to indicate that the test is a valid instrument for monitoring the performance of female volleyball players.

Jayakumar and Vairamani (2015), tried to find out the effect of Resistance Training, Aerobic Training and Combined Training on Leg Explosive Power, Anxiety and Volleyball Serving Skill among women Volleyball players. For this study, 60 College Volleyball players were randomly selected as subjects from Velammal Engineering College, Chennai, Tamil Nadu, India. The selected players were divided into three groups namely Experimental Group-I, Experimental Group-II, Experimental Group-III and Control Group. Experimental Group-I was given only Resistance Training (n=15). Experimental Group-II underwent only a set of aerobic exercises (n=15). Experimental Group-III was subjected to the Combined programme of Resistance Training and Aerobics Training (n=15). The Fourth Group, the Control Group was not allowed to undergo any rigorous training other than playing regular volleyball games (n=15). All the 60 players were measured for their Vertical Jump Ability using Seargents Jump Test in centimetres, the anxiety level through SCAT questionnaire and the Volleyball service Skill through an apt test. All the Experimental groups performed their programmes for 8 weeks and daily they played volleyball game with the control group. After the experimental period of 8 weeks, again all the 60 players were measured for their vertical jump ability, the anxiety level, and the service ability through the same methods as done in the beginning. By subjecting the collected data to statistical analysis, it was concluded that the Leg Explosive Power had been found significantly improved at 0.01 level of confidence with the Experimental Group-II and the Experimental Group-III. All the three Experimental Groups had a significant improvement in Anxiety levels. It was concluded that the Combined Training with Resistance and Aerobics would significantly improve their jumping ability and Volleyball Service Skill in Volleyball.

Jayakumar and Vairamani (2015), had a purpose to investigate the effect of resistance training, motivational training and combined training on selected physical variables (Explosive Power), psychological variable (Achievement motivation) in their service ability among volleyball players. 60 male volleyball players of age between 18 and 23 years were randomly selected from the Velammal Engineering college, Surapet, Chennai, Tamilnadu
volleyball players among those who had represented the college in the open tournaments and those who expressed their willingness to participate in the current study. Three groups at random were formed, as Resistance Training Group (RTG) (n=20), Motivation Training Group (MTG)(n=20) and Combined Training Group (CTG)(n=20). RTG underwent selected volleyball specific resistance training for 6 weeks, MTG underwent motivation training and the CTG performed the resistance training and motivation training. The obtained Data were analyzed using ANCOVA. Based on the obtained results it was concluded that Combined Training Group (CTG) has the highest potential for improving the explosive power and volleyball serving ability. Resistance Training Group (RTG) contrary to the expectation added excellently enhanced the Achievement Motivation. Motivation Training has helped the players to achieve the necessary motor fitness and serving ability in general.