CHAPTER II

REVIEW OF RELATED LITERATURE

This study examined the status of psychological characteristics of elite players in basketball and volleyball. To achieve this goal researcher has consulted various databases, books, periodicals etc. to locate the related studies. The abstracts of these studies are presented in this chapter as follows:

Kirchner (1981) established a relationship between state anxiety and trait anxiety with basketball shooting proficiency among high school male basketball players. The results of this study revealed that the state anxiety and trait anxiety are significantly correlated with free throw shooting performance.

Ziv and Lidor (2009) reviewed various research studies to explore physiological characteristics, physical attributes, performance and nutritional status of male and female basketball players. The findings of this review indicate that according to playing positions physical attributes and skill levels differ. The players with higher skill levels tend to show higher vertical jump and are more agile than the less skilled players. Guards can perform high intensity movements as compared to forwards and centres. Further, it was observed that deficit in water content can reduce physical and mental performance during actual game.

Ostoiic, Mazic and Dikic (2006) evaluated whether basketball players in different positional roles have different physical and physiological profiles. To achieve this purpose 60 male basketball players were selected and according to positional roles they were categorized as guards, forwards and centres. The results of this show that guards were older and more experienced as compared to forwards and centres. Further, centres were taller and heavier
than guards and forwards. Centres had more body fat and lower VO2 max as compared to forwards and guards. The vertical jump power was significantly higher in centres as compared to guards. From the results it was concluded that strong relationship exists between body composition, aerobic fitness, anaerobic power and positional roles in elite basketball.

The physical demands of modern basketball were assessed by investigating 38 elite under-19-year-old basketball players during competition. Computerised time-motion analyses were performed on 18 players of various positions by Ben Abdelkrim, El Fazaa and El Ati (2007). The findings of this study shows that changes in the rules of basketball have increased the cardiac efforts involved during competition. The physical demands differ according to the playing position and the guards require to perform high intensity movements.

In another study Ziv and Lidor (2009) reviewed observational and experimental studies to explore vertical jump performances in male and female basketball players. After reviewing various studies it was noticed that vertical jump performances in basketball players can be enhanced with short plyometric training sessions with strength conditioning programme.

Delextrat and Cohen (2008) examined whether the changes in the rules of basketball game have impact on the physiological factors. For this purpose they examined the performances of eight skilled male players and eight average-level players were compared. The results of this study revealed significantly higher level of performance among skilled players in the agility, vertical jump, peak torques, and bench press tests compared to average level players. However, no significant difference was observed in 20-m sprint, and suicide run test. The results, as obtained in this study, emphasized the importance of anaerobic power in modern basketball and recommended to focus on short tests such as vertical jump, sprint and agility.
Delextrat and Cohen (2009) investigated the effect of playing position on strength, power, speed, and agility performances among thirty women basketball players. The subjects were divided into three groups (Gr. I Guards; Gr. II Forwards & Gr. III Centers), according to their playing positions. Each subject was asked to complete eight tests such as Wingate anaerobic test, sprint, agility, suicide run, knee extensor, jump test and chest pass. Results revealed that guards performed significantly better than centers in case of Wingate test, jump, suicide run and agility test. These results indicate that according to playing positions specific fitness training should be implemented.

Apostolidis et al., (2004) conducted a study to describe the physiological and technical characteristics of elite young basketball players. Various tests such as Wingate test and basketball skill tests were performed on thirty male basketball players. The results showed significant correlation between control dribble, speed dribble, shuttle run and dribble shuttle run with mean power. Further, body fat was negatively correlated with all the field tests used in this study. In fact, from the results it can be concluded that the field tests used in this study can be used to assess anaerobic capacity of basketball players.

Tsunawake et al., (2003) evaluated various physiological parameters in twelve volleyball and eleven basketball female players who won the inter high school championship. The results were compared and it was found that the female volleyball players and basketball players had similar physical abilities i.e. aerobic anaerobic capacities needed to win the championship. Further, it was observed that basketball players require higher aerobic and anaerobic work capacities than volleyball players.

Bale (1991) examined and compared the body composition and physique of female basketball players according to their playing positions. Further, vertical jump, anaerobic power, grip strength and laterality was also
measured. The results showed that Centres had the largest measures of physique and body composition followed by the forwards and then the guards.

Carter et al., (2005) compared the somatotype and size of elite female basketball players in terms of playing position and team performance among one hundred sixty eight players from fourteen different countries. The findings of this study shows that differences occur in somatotypes according to position. It was seen that, guards were more ectomorphic and taller, forwards with lower mesomorphy and taller, while centres did not differ.

Chaouachi et al., (2009) conducted a study with a view to examine the relationship between squat 1 repetition maximum and basketball-relevant tests in elite male professional basketball players. The results revealed significant negative correlation between agility and jump test performance. Further, significant relation was observed in squat 1RM and sprint times. The findings of this study suggested that agility should be regarded as a per se physiological ability for elite basketball players and squat exercises should be main component of basketball conditioning.

Jelicic, Sekulic and Marinovic (2002) assessed the relationship between anthropometric characteristics and the players playing at different positions. Results indicate that centers had prominent longitudinal and transversal skeletal dimensions and circumference measures but they do not have significantly larger skinfold measures in relation to forwards. However, guards are predominantly mesomorphic.

Bogdanis et al., (2007) evaluated and compared the effectiveness of two different off-season, short-term basketball training programs on physical and technical abilities of young basketball players. For this purpose twenty-seven basketball players average age 14.7 were randomly divided into a specialized basketball training group (n=10), a mixed basketball plus
conditioning training group (n=10) and a control group (n=7). The results indicate that a special training and mixed basketball plus conditioning training group showed improvement in aerobic and anaerobic fitness. In conclusion, both the training intervention are equally effective to limit or reverse the detraining effects that may occur during the off-season in basketball.

Carvajal et al., (2012) compared the kinanthropometric profiles of women volleyball players with the positions they played. The results showed that centers had greater absolute size and higher average adipose and bone mass. Further, spikers and setters presented an average mesomorphic-ectomorphic somatotype. Centers were significantly taller than players in other positions. Centers' percent adipose tissue mass was significantly higher than that of setters.

Kioumourtzoglou et al., (2000) examined the cognitive, motor, and perceptual abilities of elite volleyball players. The subjects were divided into two groups (Gr. 1 national volleyball players) and (Gr. II physical education students). The results showed significant differences between the abilities of the two groups of athletes.

Newby and Simpson (1996) compared scores on the Profile of Mood States Inventory of 15 volleyball players at a small southwestern university by means of regression analysis to the players' final season statistics. The analysis showed that Vigor as measured was related to several volleyball statistics.

Trajkovic et al., (2012) determined the changes in physical performance after a 6-week skill-based conditioning training program in male competitive volleyball players. From the results it was concluded that a preseason skill-based conditioning program does not offer a sufficient stimulus for volleyball players. Therefore, to develop lower body strength,
agility and speed a general conditioning and hypertrophy training along with specific volleyball conditioning is necessary during the preseason period in volleyball players.

**Marques et al., (2009)** conducted a study with a view to investigate the anthropometric and strength characteristics of elite male volleyball athletes and to determine if differences exist in these characteristics according to playing position. Thirty five players were categorized according to the playing position (middle blockers n = 9, opposite hitters n = 6, outside hitters n = 10, setters n = 6, and libero sn = 4) and were assessed for height, body mass, muscular strength, and muscular power. The results indicated that the middle blockers and opposite hitters were the tallest and heaviest players, whereas the libero players were the lightest. In case of maximal strength it was observed that the middle blockers and opposite players were significantly stronger (p < 0.05) than the setters and libero s. The results of this study indicate that significant anthropometric and strength differences exist among playing positions in elite male volleyball players.

**Kasabalis, Douda and Tokmakidis (2005)** evaluated the anaerobic power of elite male volleyball players, using the Wingate Anaerobic Test and examined the relationship between anaerobic power and jumping performance. The results indicated that vertical jump may predict the maximal anaerobic power.

**Sutton (1979)** undertaken an investigation to determine if there were any significant difference in missed field goal attempts in basketball falling short or long of the basket in selected men’s college basketball games, and whether those errors were different in the first half, second half, or the complete game. Films and videotapes of the home games of 3 North Carolina college basketball teams were studied, and data were recorded. Shots were recorded as short or long for each 3 periods: first half, second half, and the
complete game. There were 1353 shots recorded from 36 games, and these
data were analyzed using a chi Square test. It was concluded that shooting
errors in men’s college basketball games appeared to be mixed in terms of
missing short or missing long, similar in type during each half and for the
entire game, and similar in type for both the home and visiting teams.

Grimmett (1979) compiled psychological and physiological profiles for
female varsity volleyball and basketball players and non-athletes. Three
groups (n=12) from the 1977 California State University, Long Beach, womens
volleyball and basketball teams, along with non-athletes who volunteered from
physical education service classes, were measured on 21 physiological and
18 psychological components. ANOVA revealed significant difference in the
following psychological traits between volleyball and basketball players:
capacity for status, sociability, social presence and tolerance. The only
physiological significant difference noted between volleyball and basketball
players was weight. Between volleyball players and non-athletes, significant
difference were recorded in pain tolerance, strength, and resting heart rate.
Between non-athletes and basketball players, differences appeared in weight,
power, strength, height, estimated vo2, working and resting heart rate, lung
function and reaction time.

Leadership styles as measured by Fiedler’s contingency model of
leadership effectiveness, of women volleyball coaches was correlated with
team success by Lewis (1978). 48 coaches and team members in selected
2A, 3A and 4A SHS in Utah participated. The least preferred co worker scale,
the group atmosphere questionnaire, the task structure rating scale and a
coach’s personal data questionnaire were administered. There was no
significant relationship found between the leadership styles of women
volleyball coaches and team success. The most important variables that
accounted for team success. The most important variables that accounted for
team success were: GA team score, LPC score, and years of coaching.
Hoehn (1979) administered 4 item Knox basketball test to 198 girls from 9 MO SHSs during basketball tryouts and prior to any students being cut from the team. The step-wise multiple regression procedure was used to analyze the predictive value for this test. The only test item that significantly predicted (p<0.05) the selection of players to the varsity and junior varsity teams was the dribble shoot test. The dribble shoot test also correlated significantly with the coaches rankings of junior varsity and varsity players. Although the comparisons were significant, the skill tests accounted for only 11.1% to 28.3% of the total variation in the dependent variables.

Peterson (1979) conducted a study to predict basketball performance using psychomotor, cognitive and anthropometric measures. Female members (n=43) of the top 4 teams in the 1979 Missouri Small college basketball tournament served as subjects. The contributions of GPA, anaerobic leg power, 15 yard dash, 30 yard dash, total body RT, TRT, ht, and wt to basketball performance were determined. Basketball performance was determined by a specially designed formula by H.K. Kay. Ht (r=0.388) was the only significant (p<0.05) predictor. The 15 yard dash, total body RT, and power were next. The R for the 4 top variables was 0.56 (p<0.01).

Iselin (1979) investigated the effectiveness of programmed relaxation exercises in conjunction with mental practice on the performance of shooting basketball free throws. Subjects were (n=24) female intercollegiate basketball players from the University of Wi-La Crosse. Audio tapes were utilized for the administration of 2 parts of the study: the mental practice section and the programmed relaxation exercises. Subjects in the experimental group participated in 10 sessions of relaxation training combined with mental and physical practice. Subjects in the control group experienced 10 sessions with only mental and physical practice. An ANOVA with the pre test being used as the covariate, was utilized. Results indicated a significant (p<0.05) difference in the performance of shooting free throws by female intercollegiate basketball
players who participated in the programmed relaxation exercise and those not using relaxation.

The EPPS test of personality traits was administered by Gallop (1979) to 24 female subjects enrolled at E.C.U., Greenville, NC. Comparisons were made between intercollegiate basketball players (n=8), intercollegiate field hockey players (n=8) and non athletes (n=8). A two factor ANOVA with repeated measures revealed non significant (p<0.05) difference between groups on the full scale 15 traits (order, exhibition, achievement, endurance, change, autonomy, affiliation, dominance, deference, intraception, heterosexuality, aggression, nurturance, abasement). Interaction between groups and specific traits were also non-significant (p<0.05). significant difference (p<0.01) existed between traits. For increased statistical sensitivity, an additional calculation of 15 separate one way ANOVAs to compare groups on each trait was conducted, revealing a significant difference only on the change trait, but lack of other difference suggests that this single difference was due to chance factors. Comparison of ECU subjects with the original national standardization sample resulted in of +0.82 (p<0.01) in their distribution over the 15 traits. At between ECU subjects and the standardized sample on the full scale test was non significant (p>0.05). this study failed to identify personality trait difference between selected female athletes and non athletes. Also, ECU subjects were very similar to the standardized sample.

Best (1980) administered Cattell 16 PF among a sample of 35 undergraduate students representing five groups. The groups represented the female varsity athletic teams in volleyball, basketball, softball, tennis, and a group of non athletes. Each group was compared on each factor with ANOVA. Intelligence and apprehensiveness were the only traits that varied among the groups. Although not significant, the non athletes established the highest score on the intelligence factor followed b the volleyball, tennis, basketball, and softball groups. The volleyball group scored highest on apprehensiveness
followed by the basketball, non-athletes, tennis, and softball groups. However, the groups were not significant difference (p>0.05) and scored similarly to Cattell’s standard population of female college students on each of the 16 factors.

The history and growth of sports in Brazil were examined (Figueiredo 1976). A brief history of Brazil and its development as a nation in a changing world is presented. The main points discussed are those concerned with governmental influence in the growth and development of sports. Included in this process is the role of sports in Brazilian culture. This research examines the importance of sports in Brazil’s quest for international recognition. The philosophical concepts that have evolved are examined.

The nature of nationalism and evidence of nationalism in international sport were examined. An investigation was conducted by Levin (1975) to develop a theory of nationalism which established the following components of nationalism: fatherland, national identification, national unity, national prestige, national mission, national security, economics, communication, politics, and international relations. Upon this theoretical base, evidence of nationalism in sport was examined in 20th century international sport. An analysis of this evidence revealed the following conclusions: international sport priorities are reflected in national economics; international sport has been infiltrated by politics making it national policy; political leaders have discovered personal benefits from sport affiliations; Olympicism has illuminated the conflict between nationalism and internationalism; communication is vital to nationalism in sport; and international sport is a symbol used to propagate nationalism and system priority.
This thesis by Lupcho (1977) examined the concept of culture and developed a synthesis of essential components categorized as the: nature, universals, processes, and dynamics of culture. The 1st category reveals the paradoxical essence of culture; the 2nd encompasses elements common to each diverse culture; the 3rd includes those elements related specifically to development of the individual within a culture; and the last presents the processes by which cultures change. Thus, a theoretical base was established through which sport as a function of culture was examined. Evidence of sport from a cultural perspective revealed the normative and structural relationship distilled from the ongoing cultural processes resulting in that human behaviour identified as sport. This evidence demonstrated the inextricability of sport and culture as an abstraction and as operant social behaviour, and further revealed that sport exists only when the normative base of culture incorporates value orientations inherent in sport.

The Beusay Exp survey of Temperament was used to identify 5 traits: persistence, competiveness, confidence, mental toughness, and self-control by Tomocik (1975). Basketball players (N=18), gymnasts (N=9), swimmers (N=9), and track and field competitors (N=21) were compared to a general population (N=422). No significant differences were found among the small groups. Basketball, swimming and track and field athletes were lower (p<0.05) than the general population in competiveness; basketball and track and field, lower (<0.05) in mental toughness; and gymnasts higher (p<0.05) in persistence.

The Allport, Vernon, and Lindzey Study of Values Test was administered to male (N=20) and female (N=22) varsity and jr varsity college basketball players (Walley 1976). The t-test of significance was used to determine significant differences (p<0.05) for the subcategories; theoretical, economic, aesthetic, social, political, and religious. The women scored
significantly higher on the social sub-category; the men scored significantly higher on the political sub-category.

To determine the relationship of key factors in basketball (field goal attempts, field goals made, free throw attempts, free throws made, total rebounds, and home court advantage) to winning, the 1971-76 basketball seasons of teams in the Western Athletic Conference were studied by Asmussen (1976). Each category studied, except for home court advantage, was evaluated by the t-test. The relationship of home court advantage to winning was evaluated by the $\chi^2$ technique. The 0.05 level of confidence was selected. Conclusions were: field goals made, free throws attempted and made, total rebounds and home court advantage were all significant to winning; each of the 8 conference teams had at least 1 of the 6 key factors significant to winning; and total rebounds and free throws made were significant to winning more often than any of the other selected factors.

To determine if there was significant differences in certain personality traits between those who participated in high risk vs. Low risk sports at CSU during Spring Quarter, 1975, and to determine if there were significant differences in the same personality traits between those who did travel vs those who did not travel to represent CSU in intercollegiate competition, as study was conducted by McCluskey (1975). The Personality Research Form A was administered to 18 female tennis players, 4 male tennis players, 4 female ski-racers, and 11 male ski-racers. A 2-way factorial design was used to determine if any significant differences (0.05 level) existed between each group. The selected personality traits were found for neither the high risk vs low risk group, or the travel-no travel group. The aggression trait in the travel-no travel segment did approach significance.
This study by McNulty (1976) examined the factors and qualities that characterize CO Northern Conference HS basketball officials, and obtained information from the state HS activity associations concerning characteristics and criteria for an on-going evaluation of basketball officials in their respective states. 15 officials were given the 16 PF Questionnaire, Form A. In addition, a questionnaire was sent to the executive officers in the 50 state HS basketball associations requesting information on the no. of basketball officials in each state, type of rating system used, requirements for certification, and requirements for maintaining the status of a certified official. The statistical analysis supported the hypothesis that there was no difference in personality traits between high, low, and least known officials. The results of the questionnaire supported the conclusion that state HS associations should, in conjunction with the National Federation of State HS Associations, cooperatively establish standard officiation procedures, rules interpretations, rating and certification standards, and evaluation procedures to eliminate the vast disparity that now exists among the states.

The Athletic Motivation Inventory and Cattell's 16 PF were administered to the top 13 intercollegiate basketball players at Boise State University during the spring of 1976 to determine if there are personality trait differences between men and women basketball players at the college level (Montogomery 1976). The raw data from both tests were compiled and computer programs run to tabulate correlations and t-values for the AMI and Cattell’s 16 PF. The results of this study showed that for the traits of drive, aggression, determination and self-confidence on the AMI, significant differences were found between men and women basketball players at the 0.05 level. There were no significant differences found for the traits of guilt-proneness, leadership, emotional control, mental toughness, coachability, conscientiousness, or trust on the AMI. The results on the 16 PF revealed significantly higher scores for men on Factors E (humble vs assertive) and H (shy vs venturesome). The correlation matrix revealed significant relationships
between all of the traits on the AMI with factors on the 16 PF except coachability.

Varsity baseball coaches (N=74) in randomly selected SHS in IL were surveyed to investigate the relationship between the use of selected hitting drills to team batting average (TBA) and to determine the contribution of each hitting drill to X TBA (Sherwood 1976). Sub purposes involved determining the hitting drill that varsity baseball coaches used most frequently and the % of hitting practice that was devoted to each of the hitting drills. The following conclusions appear warranted. There was a slight r between the selected hitting drills, Down Swing and Hitting the Curveball, to TBA X. Some of the selected hitting drills seemed to measure the same aspect of what was being measured by about 21% of what was being measured by TBA X. All 11 selected hitting drills contributed less that 50% of what was being measured by TBA X. Over 50% of the TBA X must be attributed to something other than the contribution of the selected hitting drills. The selected hitting drill, Pepper, was most frequently used by varsity baseball coaches in IL, accounting for over 11% of hitting practice.

Rosenstein and Reuben (1964) had taken the project on physical fitness programme on senior high school row rated performance. The New York Physical Fitness Test was administered in October and May to pupils of 13 senior high schools whose physical education program were rated low by members of the Bureau of Physical Education and 16 whose programs were rated high. The LaPurte Score Card was utilized to validate these ratings. Each pupil recorded the amount of physical activity outside of class and the effects were analyzed. Pupils participating in good programs improved significantly more in physical fitness than participants in poor programs. The greatest improvement was in strength with some gain in agility, balance, and endurance.
Johnson (1972) has done the research on before and after planned programme of Physical Education regarding physical fitness, on ninth and eighth grade boys. The eight-grade sample scored about the 50\textsuperscript{th} percentile on the final test, as a group. The 9\textsuperscript{th} grade sample scored highest on speed, agility, flexibility, and cardiovascular endurance, and lowest on arm strength. The 9\textsuperscript{th} grade sample scored at the 90\textsuperscript{th} percentile on the final test, as a group. The difference between the means of the field tests of these 2 groups was significant (p<.01).

Andersen (2007) associate professor of medicine, Department of Medicine, Division of Geriatric Medicine and Gerontology at The John Hopkins University School of Medicine, it addressed the current increased prevalence of obesity in the U.S. and around the world. The potential causes of this public health threat were explored in addition to the health threats of obesity and a sedentary lifestyle. The importance of sensible eating and meal planning was discussed. The role that physical inactivity plays in promoting weight gain was reviewed. New strategies that health, physical education, recreation and dance professionals, researchers, and scholars can use to promote more active lifestyles and reduce sedentarism among the people they work with was shared. Future research directions to address the obesity epidemic were also explored.

Bryan and Solomon (2007) recommended children to be physically active 60 min each day, with bouts of continual activity lasting at least 15 min. They highlight the fact that although the importance of physical activity (PA) for children is recognized, there is little empirical evidence concerning how activity levels relate to children’s health. Several measurement difficulties are inherent in the examination of this relationship. One is the valid and reliable assessment of PA, and another is the separation of performance based fitness indicators from those that reflect optimal health. The purpose of this study was to investigate the complex relationship between children’s engagement in PA and health-related fitness indicators by employing a design
that encompassed multiple indicators of these constructs. It was hypothesized that children with higher levels of cardiovascular endurance and lower (healthier) levels of body mass index (BMI) and percent body fat would have higher levels of PA. Participants were 827 middle school physical education students. Health related fitness measures were percent body fat estimated from skin folds, and the Hoosier endurance shuttle run (Safrit, 1995) as an indicant of cardiovascular fitness. Engagement in physical activity was assessed using three data sources: a self report questionnaire (PAQ-C, Crocker et al., 1997), intention to be active physical education classes. Simple correlations revealed a negative relationship between cardiovascular fitness and percent body fat (r = -.62), as well as BMI (r = -.59). BMI and percent body fat had a strong positive relationship (r = -.78). Self reported PA and intention to be active were positively associated (r = .48), but both of these measures were unrelated to pedometer counts. A canonical correlational analysis was used to assess the multivariate relationship between engagement variables and health-related fitness indicators. The first function of the canonical correlation was significant (observed correlation = .30, Wilks’ Lambda = .89, F(9,1210) = 6.36 p < .001) Average steps taken during physical education and intention to engage were significant contributors to the canonical vitiates for engagement. Cardiovascular fitness was the most powerful influence among the health indicators, with BMI emerging as a significant contributor. These findings provide insight concerning the affect to PA on children’s health-related fitness. They support the assertion that active children are leaner and demonstrate higher levels of cardiovascular fitness, but the relationships among the variables also illustrate that accurate assessment of children’s PA is a challenge.

Butterfield et al., (2007) reported that the notion that all children need to achieve adequate levels of physical fitness finds few dissenters. Recently, concern has again shifted to school physical education programs and the time/budget/space constraints imposed on them. Given these constraints, questions arise as to the efficacy of physical education to influence children’s
fitness. Therefore, insights on the factors that influence fitness over time could lead to clearer priorities and more efficient program planning. The purpose of this study was to examine growth rates (i.e. change) in fitness performance by children in grades 4-8 during two consecutive school years. The basic design of this study was multicohort (i.e., grades 4-8, N=91) with six repeated measurements taken over 21 months. We used the FITNESSGRAM to test each child’s aerobic capacity, muscular endurance, and flexibility at the beginning (September) midpoint (February) and end (May) of two school years (2004-05, 2005-06). (Note: Children received two physical education classes/week.) We used hierarchical linear modeling (HLM) to analyze the data. HLM is a special type of regression that models intercept and slope for each participant and permits hypothesis testing about rate of change over time, as well as factors associated with change. In addition to growth rates in each fitness parameter, we examined the association of anticipated predictor variables including age, sex, body mass index, and sports participation. Our results varied considerably across the three areas of fitness, but four principal findings emerged. (a) Very substantial gains occurred in aerobic capacity (i.e. PACER) score by .67/month or by 14 laps over 21 months. (b) We found significant (p .05) but minimal gains in muscular endurance (i.e., push ups and curl ups) and flexibility. (c) High levels of BMI exerted an negative pull (p .05)on aerobic capacity (-1.09), push ups (.30), and curl ups (-.90) (d) Participation in after school sports was positively (p<.05) associated with higher PACER scores; that is, children in sports exceeded non participants by .33 laps per month or 7 laps over 21 months. These results suggest that PE—especially in combination with sports—might foster aerobic capacity among children in grades 4-8. However, meaningful gains in flexibility and muscular endurance may require specific, targeted programs or interventions.

Effects of competitive anxiety on before and after the game and the rest, and the relation between anxiety and win or lose by selecting 29 (18 male and 11 female) hockey players who took part in the 69th national sport games,
Korea were investigated by Eun and Shin (1988). All subjects participated voluntarily in this test and they won the semifinal game. The measurements were executed 3 times by dividing 3 situations: 1) just after warm up (within 5 min before the game), 2) within 5 min after the game, and 3) rest (within 2 hours before the sleep) using the impatience reaction timer after a semifinal game, and the SCAT was taken only 1 time before the final game. The basic time for the impatience reaction time (IRT) was 5 seconds. The correlation between the SCAT and the IRT were analyzed using the Pearson formula and mean of difference was tested using ANOVA by VAX-11/750 computer in the Korea sport science institute. The SCAT scores of female athletes displayed that mean of row scores and SD scores representing only 22% from lower anxiety level. But male athletes showed that mean of row scores and SD scores representing only 61% from lower anxiety level. The IRTs of male players recorded mean: on the rest, before the game and after the game, the differences of the mean were very significant (p<0.01). But female players IRTs mean were not significant. And the male players showed great differences of mean of the IRT according to the situations, who lost in the final game and female showed no differences according to the situations, who won in the final game.

Personality characteristics and performance areas of women basketball players were studied (Carlisle, 1985) studied. Performance statistics and personality measures (Cat, 16 PF) were obtained from 49 women intercollegiate basketball players in the Big state conference. Stepwise discriminant analysis resulted in one significant function (p<0.05), which explained 44% of group differences. High and low performance groups were differentiated from the middle group but not from each other. High and low performers scoring indicates higher on the factors of intelligence and self-assurance than the middle group.
Wallace (1982) also found the relationship of personality and motivation factors to free throw performance. The subjects for this research were 65 SHS and collegiate women’s varsity basketball players; determine using the 16-PF and AMI index. Multiple regression was used to select the most important psychosocial predictors to estimate free throw performance.

Relationship among intelligence, gender, aspiration level, and level of achievement in motor skill activities was studied by Blundell (1981). 54 boys and 50 girls Australian 8th grade students aged between 12-14 years, with no previous field hockey experience, participated in this study. During the initial three weeks of the study students were provided with instruction and practice on four field hockey skills. The student had four weeks of self-structured practice on the skill task. During the seventh and eighth weeks they were evaluated on the 4 skills. Intelligence was measured by the “inter D” test, administered statewide by school counselors just prior to student participation in this study. Kendall’s correlation, Pearson product moment, one-way MANOVA, and ANOVA these statistical techniques was used to determine the statistical significance.

Jackson et al., (1999) examined psychological links to optimal performance. This study utilised recently developed psychological inventories validated to assess flow (Flow Scales), psychological skills (Test of Performance Strategies), and athletic self-concept (Elite Athlete Self-Description Questionnaire). The inventories were given to athletes to complete in two stages: the dispositional assessments were completed away from competition, and the event-based measures were answered after a competitive performance. The 236 male (66%) and female (34%) athletes who participated in this study were drawn from three sports: orienteering (n=112), surf life saving (n=92), and cycling (N = 32). Their ages ranged from 16 to 73, with a mean age of 29.8 (SD = 13.9). Patterns of relationship were found which demonstrated that the optimal mental state of flow was
associated with perceiving one is skilled both physically and mentally. In addition to finding a positive association between flow and perceptions of performing well, small amounts of variance in finishing position were accounted for by the flow and self-concept measures. The relationships found in this study contribute to the growing knowledge base of psychological links to optimal athletic performance.

Klodecka-Rózalska (1999) aimed to determine if there are sex-related differences in psycho-behavioural reactions to exertion and recovery. A group of 82 male and female athletes (mean age 16 years), active in individual sports (badminton, judo, orienteering, tennis) were studied. Psychological observations were made in conjunction with laboratory physiological tests performed to exhaustion. The athletes completed psychometric scales three times: before, and then 4 and 30 minutes after exercise. Perceived self-feeling scale (PSS) measuring the physical self-feeling and mood, STAI (state anxiety level) and psycho-motor fitness (complex reaction time, motion velocity, visual-motor coordination) were assessed on each occasion. Significant differences between male and female in the dynamics of adaptation were found. Female athletes responded to effort with a higher increase in psychophysical activation and tension than did the male athletes. Even 30 minutes after exercise the arousal and the lowered self-feeling did not return to resting level for the female athletes, despite their psychomotor fitness being equal to that of the male athletes. The obtained results indicate that young women may require special assistance in the post-exercise recovery period, due to their higher emotional "costs" of physical effort.

This study (Li et al., 1999) evaluated relationship Swimmers sleep quality with physical and psychological health. The participants (n=56) belong to Chinese synchronized swimming Team, who were divided into two groups: the elite and the common. Using the Pittsburg Sleep Quality Index (PSQI) and the Self-Report Symptom Inventory, Symptom Check-List 90 (SCL-90), test the sleep-quality and mental health of these girls. PSQI is separated into
seven parts: Subjective Sleep Quality (SSQ), Sleep Latency (SL), Sleep Duration (SD), Sleep Efficiency (SE), Sleep Disturbance (SDD), Use of Sleep Medication (USM) and Day-Time Dysfunction (DTD). SCL-90 testing scale includes nine groups of symptoms: Somatization (SM), Obsessive-Compulsive (OC), Interpersonal Sensitivity (IS), Depression (DP), Anxiety (AX), Hostility (HT), Phobic anxiety (PA), Paranoid Ideation (PI) and Psychotism (PSY). Comparison with the two groups of PQSI and SCL-90 scores, the difference was very obvious. The difference of two groups was very obvious in SSQ, SL, SE, SDD of PSQI. The SCL-90 scores of SM, OC, IS, DP, PI, PSY of the elite players was lower than that of the common players. The relative coefficient of testing result between PSQI and SCL-90 was an obvious positive relation •P<0.05•. It indicated sleep quality of elite athletes was better. The scores of SCL-90 also appeared the states of SM, OC, DP, PI of elite players were better than that of common players. But comparing with the common athletes, the scores of IS, HT, PA of elite players were not very good. Result revealed that good-quality sleepers appeared vigourness, energeticness, extrovert, ambition, attackness, busyness and self-satisfactory, but bad-quality sleepers appeared shameface, nervousness, anxiety, depression, and social introversion. It showed that that sleep disorders could affect many aspects of psychological health.

Concentration is a psychological variable that is directly associated with sport performance and psychological functioning (Wenger & Janssen, 2000). Concentration is operationally defined in miniature situations, which are defined sport tasks and standardized situational demands. The research program combines several interrelated laboratory and field experiments that are conducted in the sport game team handball. On the one hand they test conditions in which concentration causes behavioral changes. On the other hand they evaluate the efficiency of a psychological training program. The empirical results confirm hypotheses. The validity of the miniature situations can be ensured by the correlation with the competition scores.
Thorpe (1967) found intelligence and skill have relation to success in singles competition in badminton and tennis. 375 college women were studied in relation to their success in round-robin singles competition. Intelligence was measured by the Otis quick scoring mental ability test, whereas skill was determined by standardized tests of badminton and tennis skills. Success in tournament expressed by the percentage of points won out of the number possible during tournament play. Correlation coefficients between skill and success in badminton and tennis were 0.65 and 0.60 respectively, and coefficients between intelligence and success were essentially zero.

Ridini (1968) established relationships between psychological functions tests and selected sports skills of boys in junior high school (n=181). There were 91 athletes and 90 non-athletes who took five psychological functions tests and eight sport skills tests. Significant differences existed on all psychological function tests and sport skills tests between athletes and non-athletes, in favor of athletes. The short form psychological functions test could moderately predict sports skill performance in the sports skill areas selected.

Kirker (2000) aims to construct a theoretically coherent and ecologically valid framework for research on processes underlying sports aggression and to contribute to the advancement of knowledge in the area. An exploratory method using computer observational analysis as the primary research method, along with complementary questionnaires and personal reflections, considered aggression in two comparison sports: ice hockey and basketball. Data were compiled and classified by involved and independent experts relative to factors and behaviors associated with sports aggression derived from a comprehensive review of the literature. Among the study’s finding were that: 1) aggression was instrumental in nature two thirds of the times; 2) Aggressive acts typically occurred in clusters and varied in frequency according to game circumstances; and 3) multiple variables and aggression theories were related to severely aggressive acts.
Ebbeck and Becker (1994) examined the extent to which perceived social, contextual, and personal factors predicted the goal orientations of youth sport participants (166 male and female adolescent soccer players), who completed self-report measures at the end of seven-week competitive season. A canonical correlation analysis revealed that the set of predictor variables accounted for 24% of the variance in player goal orientations. Higher scores on perceived soccer competence, perceived parent task orientation, and particularly perceived parent ego orientation were primarily associated with higher scores on player ego orientation. In addition, higher scores on perceived performance climate were associated with a higher level of player task orientation.

Physical, psychological, and perceptual visual variables related to elite archers’ shooting performance were examined by Landers (1986). Complete data on 62 variables were obtained on male (n=44) and female (n=35) archers, who were tested during the years 1982-1984. In order to reduce number of variables, only those that correlated significantly with performance (r>0.25, p<. 005) were retrained. This yielded seven variables. These variables were then combined into an overall hierarchical regression model. The overall model was significant (p<0.001, adjusted R2=0.53). This analysis indicated that relative leg strength, reaction time, depth perception, endomorphy, imagery usage, confidence, and focus on past mistakes were variables associated with archery performance. Finally total sample was classified into two groups on the basis of shooting scores. Discriminate function analysis indicated that 81% of the archers were classified correctly on the basis of these significant predictors.

Analysis of physiological and anthropometric profiles of players from selected sate school teams was done by Vattoly (2001). A total of sixty female subjects were selected from the games Basketball (U19 and U17), Handball (U19 and U17), and Volleyball (U19), who were selected to represent Kerala school teams at national level. The variables were standing height, body
weight, fore leg length, thigh length, arm length, pondered index (PI), crural index (CI), body surface area (BSA), systolic blood pressure, diastolic blood pressure, resting pulse rate, vital capacity, Body fat, and hemoglobin. F-ratio followed by Scheffe’s post hoc test revealed that Volleyball players U19 group had significantly higher profiles as compared to their own age groups in other games as well as lower groups of other selected games. This higher level of anthropometric and physiological profile was much supportive factors in putting up a good performance in their team competitions. Handball U17 group showed very low level in their anthropometrical and physiological profile, which is not at all supportive to higher-level performance of the team. The other selected game groups were with better mean score on their anthropometrical and physiological variables to support their bodily qualities for good performance.

Relationship between selected fundamental skills and team success in intramural junior college basketball was studied by Bettencourt (1971). Players (n=72) on 12 junior college intramural basketball teams were used as Ss. The ranking of 12 teams at the completion of league play were used as the criterion of team success. The 9 items of the AAHPERD basketball skills test was served as the independent variables. A mean score for each team on each test item was compute. The correlation for each test item was performed with the criterion of ranking. All correlations, with the exception of those for the under basket shot and jump and reach, were significant (p<0.05).

Linear discriminate models of six coaches’ team selection were constructed from measures of basketball and athletic skills, strength, physical measures, and competition anxiety obtained during the first week of practice (Gabril et al., 1988). These models provided greater than chance agreement with coaches’ player selection for each team (87%-93% correct classification). A cross modeling procedure revealed that the six coaches selections could be modeled in terms of one of three approaches to selection: 1) Select the aspirants who possess the best basketball skills (3 teams). 2) Select the
aspirants with greatest size and strength and least competition anxiety (2
teams). 3) Select only the aspirants with both types of attributes (1 team). The
results indicate that it may be difficult to identify a single set of measures to
select skillful or potentially skillful basketball players, because of differences in
how coaches might choose to define these terms.

Relationship between selected volleyball skill components and team
performance of men’s Northwest “AA” volleyball teams was established by
teams in each of 9 northwest volleyball tournaments was charted. The results
of the study indicated that; consider together, the volleyball skills studied were
significantly related to team performance. Further analysis of nature of the
relationship revealed that the order of the volleyball skills most influential in
predicting team success.

Engstrom (2007) determined the physical activity levels that students'
acquire during recess, physical education, the school day and the total day,
measured by pedometers. Additionally, this study investigated whether there
were gender differences among students regarding physical activity levels
and if the physical activity engaged in during recess and physical education
was of sufficient quantity to contribute to the National Association of Sport and
Physical Education (NASPE) standards for healthy living. The participants in
this study were fifth-grade students in the Spring-FordSchool District; Physical
activity was measured using pedometers. Each student’s steps were
recorded at the start and end of the total day, the school day, recess, and the
physical education class. The students wore the pedometers for three
consecutive days. The dependent variables for this study were the steps
recorded in recess, in physical education, in the school day and steps during
the total day. The independent variables were gender and NASPE standards
for physical activity. SPSS version 10 was used to analyze the data..
Pearson correlations were computed between all variables. Analysis of
variance was also computed. All data was confidential and no names were
used. A total of 303 fifth-grade students successfully participated in the study. The mean steps for boys for the entire day was 11,168 steps and for girls 9,487 steps. There was a significant difference between boys and girls. During a typical school day the boys acquired an average 4,997 steps, and the girls acquired 3,960 steps, again a significant difference statistically between the boys and girls. During recess the male students accumulated 2,514 steps, and the girls accumulated 1,849 steps. During physical education the students acquired an average 1,711 steps. It is important to note that during the 3-day study only 47 students recorded the participated in physical education and the steps accumulated in physical education were lower than recess. The mean steps for both boys and girls all 3 days were 10,625, 10,480 steps. There was no significant difference between days. The fifth-grade students in the Spring-Ford School District on average attained a low-level of healthy activity in a typical school day. The Spring-Ford students were about 2000 steps below the recommended steps for their age group.

Santiago (2007) examined the effects of participation in physical education on health-related fitness components in Hispanic school children. Fifty six girls and 62 boys from the fourth (n=41) and fifth (n=77) grade in an urban elementary schools in southeast Texas participated in the study. Participants ranged in age from 9 to 13 years. Body composition and cardio respiratory endurance were assessed on all participants by the same teacher at the beginning and end of the academic year 2003-03. Height and weight were also measured as part of testing. Body composition was assessed using body mass index (BMI) and estimating percent fat through triceps and calf skinfolds. (Slaughter and Lohman, 1988). Cardio respiratory endurance was assessed using the FITNESSGRAM® Pacer test. Dependent t tests were used to analyze differences, with separate analysis for boys and girls. All tests were done at the .05 level of significance. Boys exhibited significant differences for: weight t(1.61) = -5.61, p<.05, height, t (1.61) = -13.64, p<.05; BMI t(1,61) = 4.42, p, .05 and Pacer test, t(1,60) =-5.89, p< .05. Significant
differences were found in girls for weight, \( r(1,55) = -5.74, \ p< 0.05 \). height, \( t(1,55) = -11.57, \ p<0.05 \); BMI,\( t(1,55) = 4.27, \ p<0.05 \) and Pacer test, \( t(1,55) = -3.84, \ p<0.05 \). These results suggest that regular participants in physical education can effect changes in health-related fitness. Although the results may be related in part to the normal growth process; the functional changes in aerobic capacity are important when they occur in the usual time frame of the school year. This is more important when these changes are in those variables that are associated with the prevention of obesity in Hispanic children.

The research studies presented above indicates that there are numerous research studies conducted to see the physiological and fitness status of basketball and volleyball players. Further, various training strategies were evolved for the improvement in physiological and fitness levels of players. Moreover, numerous studies are conducted to establish the anthropometrical, physiological and fitness characteristics of the volleyball and basketball players according the positions of play. Ample of studies are also available on utility of psychological aspects in sports. However, little information is available in examining the emotional intelligence and mental health characteristics of basketball and volleyball players which seems to the important factors for the success. Hence, the present investigation is logical and justified.

**Sodhi et al. (2000)** conducted a study on the north Indian junior volleyball players aged between 16 to 18 years. The results were based on the cross-sectional data of 90 volleyball players and 94 control subjects. The data were divided age-wise into three subgroups of each category. The results of the study revealed that the volleyballers in each age group were significantly taller and heavier than the controls. But amongst volleyballers the difference in height were found to be statistically non-significant between the three age group. The possibilities of developing national and international level aspirants from amongst the players in the study were also discussed.
The volleyballers in each age group possessed considerably greater length of their trunk, broader shoulders and hips, wider humerus and femurs, greater size of hand span, larger chest, upper arm, thigh and calf circumference than the controls. The differences were statistically significant in most of the cases. The skin fold showed almost similar status except the biceps and sub-scapular skin folds showing significantly greater value than the controls in the 16 years age group. In somatotype the 16 years volleyballers were significantly more endomorphic than the controls of same age. But the other groups showed similar status. In mesomorphy the 16 and 18 years volleyballers were considerably better developed than the controls. On the other hand in ectomorphy the sporting children had lower score than the latter. On average, the volleyballers were found to be meso-ectomorph.

**Phul et. al, (2002)** determined the basic physical characteristics of male volleyball players and found that they were taller, heavier, had a higher body density and lean body weight and lower body fat. They also concluded that the volleyball players achieved greater absolute height in jump and reach and a greater jumping height above the standing reach. Considering as a percentage of the net height (2.43m for men and 2.24m for women measured from each court), the absolute jump and reach values were 130% and 124% of the respective net heights.

**John et al., (2008)** studied the physique of elite volleyball players of different countries and found that among these volleyball groups, the U.S.A. group was tallest, heaviest and largest in measures of upper and lower limb lengths. The Korean group was largest in stem height and calf girth.

**Mokha and Sidhu (2008)** took anthropometric measurements of Indian female volleyball players having International level of participation. They found that the volleyballers were taller and heavier than the controls. The taller
stature of volleyball players was mainly due to the longer lower extremity because the mean values of the sitting height in both the groups were almost comparable. Upper extremities were also longer for volleyball players and they also possessed broader shoulders, wider knees and wrist.

Heimerand Medved (2008) in similar study reported that the performance in volleyball was largely influenced by anthropometric parameters, leg explosive strength and anaerobic capacity.

Sodhi et al. (2007) studied the somatotype and body composition of one hundred twenty two different level volleyball players. They found average values of somatotype components for national, state, university and district level players. Different group of volleyball players exhibited significantly lesser amount of percentage of body fat than the controls.

Abel et. al, (2007) compared basketball players and volleyball players in selected anthropometric parameters. They found that the basketball players were significantly taller and having larger humerus diameter than the volleyball players. Volleyball players were found to be significantly taller than the non-athletes. The somatotype distribution of the subjects showed that both basketball and volleyball players were significantly more ectomorphic than non-athletes.

Shamim Parvez (2002) carried out a study to ascertain the difference between physical and physiological variables of high and low performance basketball players and found that the high performance basketball players had greater height, weight, lower leg, thigh, upper arm and lower arm length. They had greater shoulder and hip width and greater calf and biceps muscle girth with greater diameter of humerus and femur biepic condyle. They are meso-ectomorph and their sitting height is greater than low performance
basketball player. They had lesser sum of four-skin folds measurement than that of low performance basketball players.

High performance basketball player had better body proportionality in relation to mechanical advantage. They also had lesser heart rate and greater vital capacity. However there was no significant difference in the blood pressure of high and low performance basketball players.

Monyeki M. et al. (2008) designed a study to describe and compare the somatotype characteristics of first division college basketball players of South Africa with their counterparts in other parts of the world. College basketball players of Nigeria were reported to be mesomorphic, while Sam Diego state university players were reported to be ectomorphic. The rationale of the study was that regular participation brings somatotype similar to top basketball player in the world.

Sodhi (2000) studied the top-ranking national basketball players and found that with the increasing standard of the participants the average stature was greater. The top class teams in the world have a greater average height than the teams of lower standard. A significant correlation was seen between the stature and performance in the competition. The value of correlation was very high with the field basket scores. Thus greater the stature of a basketballer, the better will be his performance.

The Olympic basketball players are the tallest followed by the national team, the state level and district level players (Sodhi & Sidhu, 2004). The controls were shortest among all. In general there was a gradient of decreasing body viz from the national team players to states level players through the district level players and the controls. The first mentioned were found to have proportionally long upper and lower extremities, shorter trunk, broader hips and more slender chest. The somatotype indicated that the rating of ectomorphic component was greater in the case of the state level players than in the case of other groups. However, it is interesting to note that the rating of mesomorphic component was not greater in these players. The Indian basketballer were, therefore, less muscular than their olympic
counterparts. The lack of ecto-mesomorphic physique among Indian may be a limiting factor for their better performance in the international competitions.

In body composition, the basketballer had less of body fat than the controls. The state level players seemed to be less fatty, with more strongly developed knees and a better-developed musculature in the limbs.

Garay et. al., (2004) observed that the Mexican Olympic basketballers were 189.1 cm tall and 79.7 Kg heavy. Many of their players were ectomorph or mesomorphs. One player had a rating of 1.5-2.5-5.6.

Carter (2000) reported a sample of ten USSR female basketball players somatotyped by Heath. They were found to be fairly tall (173.0 cm) and heavy (71.2kg), with a mean somatotype of 4.3-4.5-3.0. The close balance between endomorphy and mesomorphy and the lack of physiques dominant in ectomorphy characterised this sample.

Malhotra et al. (2002) studied functional capacity and body composition of the throwers, jumpers, sprinters and the middle and long distance runners. The jumpers were found to have a higher lean body mass with less fat content than the throwers who were tall and heavily built. The middle and long distance runners had highest and the throwers, the lowest maximum O₂ intake capacity values in terms of body weight and lean body mass. Similarly, the trackmen had lower maximum heart rate than the other groups of athletes. The jumpers and throwers had stronger muscle power however; the later were strong in arm and shoulder muscle strength too.

Cureton (2004) tested 55 middle age athletic champions and compared them with 400 middle-aged men and with normal young men. The founder champions were more mesomorphic (3-5-4), more linear-in glutial- and abdominal girths. They also had stronger dynamometric strengths and better cardiovascular tests.

Telka and his associates (2001) Studied 245 finish top ranking track and field athletes and wrestlers. They did not find any appreciable differences in respect of constitution among the athletes of different branches, except in certain extreme groups. However they found them different from the control sample. They stated that the material body builds.
Vujovic D. and Lozovina V. (2009) examined the differences between two groups of elite athlete’s anthropometrics measurements. The groups were from sports of water polo and rowing. Subjects were measured with set of 18 anthropometric measurements. Multivariate analyses on manifested measurements as well as on scores on latent dimensions were employed to analyse the differences between the groups. Differences were based on differences in measurements that can be attributed to muscle tissue and fat tissue, which were both in favor of water polo players. There were no differences in measurements of skeleton except for the measurements of bicristal width and leg length. Different training procedures and different surroundings in which activities were taking place cause the differences. No differences in skeleton measurements were the consequence of the selection process.

Mokha and Sidhu (2001) from Punjabi university Patiala examined the six-skin fold measurements (biceps, triceps, forearm, Sub-scapular, suprailliac and calf) were made on 157 track and field athletes (42-throwers, 35-jumpers and 80-runners). The range of ability (Highest level) from states through intervarsity to district (lowest-level), 81 subjects acted as controls. The throwers possessed significantly more fat at all six measurements sites than the jumpers and runners. The jumpers and runners did not differ much from each other. With the increasing levels of competition a trend of an increase in fat was observed in throwers and a decrease in jumpers and runners.

Stepnica J. (2005) studied the relationship between somatotype and motor manifestation. The relationship between somatotype components and motor performance in adult is expressed by means of correction analysis. Youths were categorized into zones with regard to motor performance. The most physically efficient were in fourth zone with whom was recorded the best body posture and the high motor activity. There were more motor-talented individuals among them. Most of the children attending training in top sports centers are included in the fourth zone. The pupils included in the first (endomorphs) and the second (ectomorphs) zones score the lowest physical
performance and appear to have poor body posture. It was concluded that somatotype is a morphological predisposition of motor and sports efficiency, as well as body posture.

Singh and Malhotra (2006) conducted a study on Indian national cyclists. Anthropometric measurements were taken on 34 male and 9 female Indian cyclists who were attending a national coaching camp at Patiala with a view to evaluate their body composition, morphology and somatotype. The measurements were taken in the mornings to avoid any possible effects of fatigue on height and other body dimensions. Body fat was calculated from skin folds using the formulae devised by Durnin and Womersley (2004) and somatotype were assessed by using the Heath and Carter (2007) method. The male and female cyclists were significantly heavier and possessed greater limb girths and skeletal diameters than their control counterparts. The percentage of body fat was similar in female cyclists and controls. The cyclists showed a greater development of musculo-skeletal tissue of the lower extremity relative to height than controls. The somatotypes of male and female cyclists were 2.76-3.90-3.21 and 5.17-3.22-2.56, respectively. Compared to the control groups, the cyclists of both sexes were more mesomorphic and stocky. Since the maximum share of the power transfer to the pedals is that of the lower extremities, therefore, highly developed muscles of calf, thigh, buttocks and hips of the cyclist seem to have a definite advantage.

Pavicic (2006) defined the degree of physical activity in sports events on the three samples of subjects. The sample with normal activity with moderate and versatile physical activity and the third group consist of elite athletes in water polo and rowing. Subjects were measured with a set of 18 anthropometric measures. The Hypothesis predicted significant difference between the given groups. The principal component analysis is used to analyse the differences on the talent structure. Studying the results of multivariate analysis of variance and discriminative analysis on the measure and on the scores of subjects on principal components, statistically significant
difference between given groups can be stated. The difference in groups can be explained by recession and by the influence of training process.

Heath et. al. (2007) carried out a study to compare the genotypic and phenotypic photoscopic somatotype ratings of 54 young adults (23 males and 31 females) aged 14-22 yrs. (Tanner and Whitehouse, 2002). Genotype rating was made by Tanner (T) criteria of Sheldon (2004). Phenotype ratings were made by Heath (H) using the Heath and Carter (2007) method. Means for males were; age = 19.1yr; Somatotype (T) = 2.9 - 4.2 - 3.6; SAM. (T) = 1.9; Somatotype between somatotype means, somatotype by category. The r’s were 0.91 (endomorphy), 0.78 (mesomorph) and 0.86 (ectomorphy). Means for female were; age = 18.2 yrs; Somatotype (T) = 4.7 - 2.8 - 3.7; SAM. (T) = 1.5; Somatotype (H) = 4.6 - 3.6 - 2.7; SAM. (H) = 1.6. There were difference between Somatotype means, Somatotype by category and H rating were higher than T rating. Component means were 0.80 (endomorphy), 0.46 (mesomorph), and 0.84 (ectomorphy). It is concluded that there are greater differences between methods for young females than males.

Sodhi et al. (2007) In another study by 97 Indian volleyball players were divided into four groups-National men (N = 12), State (N = 21), National University (N = 27) and District (N = 25) groups. The volleyballers in each group were compared with control group (N = 25), as well as the champion reported elsewhere. Each subject was examined with 12 anthropometric measurements and 10 tests of performance. The results of the study revealed the three groups of volleyball players and the controls, with a persistent decreasing gradient in most of the variables, in the order as mentioned.

In Somatotype the volleyballers on the whole possessed less rating of endomorphic component than the controls. Among volleyballers only district level players had shown significantly higher value of endomorphic component than that of the state. In the mesomorphic component the control sample showed rather higher rating than the volleyballers of each group. In the ectomorphic component volleyball players were observed to be more lean and thin than the controls. Contrarily among the different groups of volleyballers the ectomorphic component showed non-significant results with the sole
exception of national volleyballers who scored more on ectomorphic scale than the state. However, on average the volleyballers in each group were meso-ectomorphic in their somatotype.

In all the physical performance tests, except 2.4 km run the national players were the best, followed by the state, the university, the district players, and the controls with a descending gradient of performance. Overall the national level players were the best among the volleyball players and volleyballers as a whole were better than the controls in this regard. The information provided there in can be used as a criterion for evaluating the performance status of different levels of volleyballers in India.

Puhl et al. (2002) conducted a study to examine the absolute and relative physical and physiological characteristics of elite men and women volleyball players. They tested eight members of U.S. men national team and 14 members of women university world game volleyball team. The Parameter measured indicated percent body fat, $V_o_2$ Max, post exercise blood Lactic acid measures of vertical jumping ability and peak isokinetic torque for knee flexion and extension shoulder extension and planter flexion at 80, 180, 240, and 300 degree per second and they established following findings (1) As expected, the men were taller, heavier had a higher body density and lean body weight and lower body fat, (2) For gross measures of jumping ability the men achieved greater absolute height for the standing reach.

Curton (2000). Conducted study on flexibility as an aspect of physical fitness. Flexibility exercises have been studied intensively since some of the necessary aspects are not measurable in the living human subject. Research in the area would probe such aspect as.

1. The specific anatomical relation in the joints.
2. The physical characteristics of the tissue.
3. The case of the so called muscle bound condition.
4. The influence of reciprocal innervations and in specific exercise.
5. The balance of the muscle tension over any particular joint.
6. The influence of age.
7. The influence of injuries.
8. Relationships to skill warm-up and endurance, and
9. Relationship to posture and corrective work.

**Berger and paradise (2000)** conducted the AAHPERD physical fitness tests on 15 boys of junior high school to compare the physical fitness scores of white and black seventh grade boys of similar socioeconomic level. The two racial groups were matched. It was concluded that black male students in the seventh grade have higher level of physical fitness than whites.

Flexibility and vertical jump ability are associated with patellar tendinopathy and the findings warrant consideration when managing young, jumping athletes.

**Choudhuri et.al (2002).** Conducted the physical fitness index test (PFI) on the fifty residential School children. The Mean +/- SD 13.18 +/-0.48. And forty four non-residential school children. The results indicated that the non-residential school children heated poor physical anthropometry and showed a less PFI.

Mean the +/- D 13.14 +/- 0.65 years of Bidar, Karnataka. Was assessed by Harvard Step Test. Their height and weight, chest circumference and mid arm circumference were recorded as physical anthropometry. Body mass index- BMI was also calculated in kg / m2.

**Manna et.al (2011).** The study was carried out on 4457 primary school going children to investigate the physical growth as well as nutritional status of
Darjeeling and Jalpaiguri districts (part of North Bengal) of West Bengal. Standard anthropometric methods were applied to measure the height and weight of the children. The children were selected randomly from the low socio economic group as per guideline of our State Government. Our study shows that average height of the girls was more than the boys. From the view of weight for age, nutritional status shows poorer when it was compared with the nutritional status from the light of height for age as per Waterlow’s classification.

The weight of children was not increasing with the advancement of age. Physical growth as well as nutritional status of boys was affected more than the girls. Children of higher age group were more affected nutritionally. The weight for age classification shows that no child of 12+ year age was normal. Only 5.14 % children of 12+ year age were found with normal physical growth considering the nutritional status from the view of height for age.

**Falls (2000).** Four new fitness-related tests was added to the manual. They are

1. A mile or nine minute runs for aerobic capacity.
2. The sum of the triceps and sub scapular skin folds for body composition.
3. Flexed – knee crossed –arm –sit ups

**KoKo (2008).** In his study felt that the response of heart muscle to exercise training is similar to that of skeletal muscle. After such training the heart can contract more strongly and in a better co-ordinate fashion, so as to pump out more blood with each contraction. The coronary circulation increase as a result of the exercise, increasing the endurance of the heart. The lungs are little affected by exercise since their capacity to ventilate air is not taxed even during maximum efforts.

**Oded (2001).** In his recent work carried out in Czechoslovakia and the United States, shows at the beginning of physical efforts oxygen capacity
rises faster among adolescents than among adults. Thus, for example, the oxygen capacity of ten to eleven year old boys even in the first thirty seconds of maximal efforts reaches fifty five percent of its maximum attainable value. Among men aged twenty to twenty two years, the corresponding value is thirty three percent. This clearly shows that at the beginning of effort the initial oxygen deficit of children is considerably less than that of adult.

Khanna and Ahuja (2003). They conducted the study of to determine the level of physical fitness of trained university athletes from body composition. static strength and cardio-vascular efficiency and come to the conclusion that Indian sportsman of university /state / national level had optimum body fat which is lower than the normal sedentary persons.

Slaughter et. al. (2007). Conducted a physical fitness study in relation to somoto type and body composition on seven to twelve year old boys. They concluded that the somoto type was not highly related to physical fitness.

Jackson and Baker (2001). Conducted a study on 825 young females with the AAHPED health related fitness and test to measure back and hamstring flexibility of subject. The measurements included the sit and reach test and passive hamstring flexibility. The co-relations between the sit and reach test and total back flexibility, upper back flexibility and lower back flexibility were low. These findings indicate that the sit and reach test has moderate criterion-related validity, when used as an assessment of hamstring flexibility in the health related fitness test.

Amusa and Udoh (2006). They conducted a study to find out the physical fitness status of the university of Borden female member and staff especially as it related to the level of participation. The awareness of the health problems due to inactivity, early exposure and influence of physical exercise, economic status and the influence of education. A total of two hundred females made up of one hundred non academic members of staff responded to questions built around the above objective. The result indicated that half of the respondents were not engaged in any form of physical
exercise since after leaving school. However, 75.7 percent indicated that they had early exposure to well as economic factors contributed to some of the subjects continued participation in physical exercise.

**Gostin and Burden (2003).** Conducted a study on AAHPER test battery and the AAHPER battery was used to evaluate fitness levels in south African school children. This battery of field tests of various aspects of physical fitness was conducted on white (N=98), Colored (N=92) and black (N=32) senior high school pupils which subjects scored higher on tests of aerobic and anaerobic power, and speed sit-ups. Black subjects were stronger than the other two groups. There were no differences between the subject groups on tests of balance; upper body endurance and agility, than female result on all tests except flexibility male results were higher than female result on all tests except flexibility where the trend was reserved. It was felt that social and economic factors and the intensity of habitual physical activity played a significant role in the result of this study.

**Amusa and Udoh (2006).** Conducted a study on physical fitness using the AAHPERD position paper as a guide. South Carolina published a health-related fitness test and state wide norms. One unique feature of the test visits inclusion of both criterion and norms referenced standards. The battery includes the following components:

1. Cardio respiratory function
2. Body composition
3. Abdominal and low back muscular skeletal function and.

The test provides norms for boys and girls of age sixteen to nineteen years. Oriterian-referenced standards are also included to evaluate the physical fitness status of teacher, encouraging teachers to demonstrate the importance of fitness through participation.
Falls (2000). Established norms on the AAHPERD youth physical fitness. The norms were corrupted for more than 10,000 young subjects those who fall below the fifteenth percentile in any were advised to participate in a fitness development program.

Hincon and Waddell (2000). Conducted a study on two samples of fifty tenth erode girls were administered. Six items of AAHPER youth fitness test and were matched according to scores. Both the conditioning exercise and sports method groups scored higher on strength, power and flexibility of the arm muscle on both the initial and final test. Both groups made the largest percentile gain in speed, agility, flexibility and endurance. The difference between the means of the retest scores for the two groups was not statistically significant.

Lowry and Fletcher (2008). Conducted study on physical fitness using AAHPER test. In his study the selected subject of 1400 senior high school boys from fifty nine schools throughout Arkansas. It was found that six of the twelve factors investigated had a significant relationship.

To the fitness level of the subject’s percentile ratio for senior high school boys in Arkansas on each item of the Youth fitness test were also developed.

Alston and Dorothy (2001). Conducted physical fitness test using the Virginia physical fitness test, AAHPER youth fitness test and north Carolina physical fitness test were administered to sixty girls in grade nine, ten and eleven. The correlation between the Virginia and the AAHPER test was 0.89, between AAHPER test and North Carolina test was 0.79, and between the two state tests was 0.80. The main difference of the three tests in standard score items were not significant at the 0.01 level. The three tests gave essentially equivalent results for assessing physical fitness of high school girls.

Anderson (2009). Conducted physical fitness test on the selected District school children who studied with Rogers physical fitness index. The subjects were 551 boys and girls from nine to sixteen years of age of
seventeen schools. Raw data for each subject were converted to physical fitness index. Means were determined for each school, each district represented by the sample and for the entire sample. In addition, mean scores were calculated in the separate test items for boys and girls of each age level. The average physical fitness index was 79.45 A statistically significant differences were found between the districts with highest and lowest means. High scoring age groups for boys were thirteen and fifteen. The scoring age group for girls was eleven.


Field and Arthur (2001). Conducted AAHPER physical fitness test on fifty seven male university students. The test was administered four times in four weeks.

An analysis of variance was prepared for each item. Fishers’t ratio and co-relation coefficients were calculated for all possible combination between trails. The results indicated the amount of practice necessary to raise the reliability of individual items to a satisfactory level. Standard errors of measure- ment were reported for each item.

In 2001, the AAHPER Youth fitness test was proposed and percentile norms were established from a national sample of school children in grades four through twelve. In 2005 and in 2006, American samples were again tested and normative comparisons for the different years were made. The results showed that United States children made substantial improvement in motor fitness between 2005 and 2006, but removed essentially the same between 2007 and 2008.

Lane (2003). Conducted a study using the AAHPERD youth physical fitness test and the Hamilton motor ability test on sixty nine girls aged fourteen years. Before and after a planned physical fitness programme the group improved on both the test and the co-relation between physical fitness and motor ability was higher after the planned fitness programme.