CHAPTER II

REVIEW OF RELATED LITERATURE

The investigator has made an honest and sincere attempt to locate the similar studies made by various scholars, through internet, and text books, such collected references have been presented in logical order of importance and sequence of merit in this chapter.

“A study of relevant literature is an essential step to get a full picture of what has been done with regards to the problem under study”, Thirumalaisamy (1985).

The reviews of related literature are generally used as a basis for inductive reasoning for locating and synthesizing all the relevant literature on a particular topic. The purpose of this study is to construct a battery of physical fitness and skill tests for standardization of selection tests for physical education courses in Tamil Nadu physical education and sports university. The test is to measure the physical fitness and skill performance efficiency of the candidates for physical education training courses. A number of researchers have constructed various objective skill tests, rating scales and performance charts to measure skills. The research scholar has gone through the related literature available which are relevant to the preset study. The relevant studies from the various sources, which the investigator has come across, are enumerated below for the background of this study.
2.1. STUDIES ON CONSTRUCTION OF TESTS FOR MEASURING PHYSICAL FITNESS

Vybornaia (2011), made an assessment of actual nutrition and physical fitness of athletes of the Russian national sleigh team are presented, and the need to develop for them the individual well-balanced diet that will reimburse the amount of consumed energy and nutrients and help athletes to obtain high results.

Milde (2006), to assess the physical fitness of short-statured boys aged 7-20 years by applying fitness norms established for the Polish population in relation to calendar or growth age. The results of EUROFIT fitness tests recorded in 3517 short-statured (below percentile 10 for body height) boys, aged 7-20 years, selected from a large (n=37 000) representative male cohort, were analysed. Individual results were confronted with the respective percentile norms related to calendar age (CA) or growth age (GA), since body height deficiency at given CA could have affected the results of fitness tests expected for that CA. The percentages of subjects below, the percentile 3 or above percentile 97 for given fitness test and CA or GA for the Polish population, were determined. No differences between the percentages computed for CA and GA were noted in case of the following tests: sit-and-reach (SAR) and bent-arm hang (BAH). Significant differences in percentages for both percentiles were found for the following tests: standing broad jump (SBJ), endurance shuttle run (ESR), handgrip (HGR) and
plate tapping (PLT). In case of sit-ups (SUP) significant differences in percentages between CA and GA norms were found below the percentile 3, and in case of shuttle run (SHR) and flamingo balance (FLB) -- above percentile 97. Fitness tests were classified into two categories according to the differences between the results related to norms for calendar or growth age: those independent of whether CA or GA norms were applied (SAR and BAH), and those susceptible to the kind of norm (SBJ, HGR, PLT, SHR, FLB and SUP). The results of tests from the latter category should thus be evaluated by confronting them with the norms established for the growth age, and not calendar age.

Peters and others (2005) qualitative approach was used to investigate relevant beliefs and norms associated with ephedra initiation and perceived addiction to the drug among 43 primarily minority athletes, attending a historically Black university in the southwestern region of the United States, who self-identified as past users. In general, participants stated that their second ephedra use event occurred on the same day as or the day after initiation. The majority of participants perceived that addiction was established by routine and eccentric behavior. Male athletes stated they used ephedra for improved athletic performance while females stated they used the drug for weight loss. Male participants stated it is difficult to quit ephedra use because of the resulting decrease in athletic performance, sickness, and weight gain. Female athletes were more concerned with their appearance. These findings are important in determining the early extent to which addiction is self-identified.

Meyers, Sterling (2000) Physiological testing is extensively used to assess current physical status, target strength/deficiencies, and determine predisposition
to injury in athletes. No studies exist regarding these issues on equestrian athletes. The purpose of this study was to quantify the physical, hematological, and exercise response of female equestrian athletes in order to provide greater insight into the health fitness of this unique competitor, and to compare results to other better studied sport athletes.

METHODS: Following written informed consent, physiological assessments were performed on 24 collegiate female equestrian athletes (23.6+-1.8 yrs; ht = 161.8+-5.0 cm; wt = 64.9+-9.3 kg) to quantify aerobic power (VO2max, VEmax, Timemax), anaerobic power (peak power, total work output, fatigue index), body composition (%BF, LBM), muscular strength (curl-ups, reverse sit-ups, pushups, handgrip strength), blood chemistries, and coronary risk profile.

RESULTS: Data indicated that mean (+/SD) LBM (49.0+-4.5 kg) and BMI (24.8+-1.7 wt/ht2) fell within reported athletic norms for females. Percent body fat (24.5+-6.0%), however, was above average. Mean VO2max (33.9+-4.5 ml/kg/min), treadmill time (10:06+-36 min:sec), and VEmax (90.3+-16.0 l/min) were lower than predicted values. Observed peak power (5.3+-0.9 w/kg), total work output (315.9+-48.1 j/kg), fatigue index (66.9+-7.9%), and handgrip strength (27.8+-6.6 kg) were also lower than established norms for young females. Mean curl-up, reverse sit-up, and pushup responses (56.5+-15.8, 36.6+-13.2, 32.1+-10.6, reps/min, respectively) were considered average to above average for this age group. Mean resting blood chemistry values were within normal ranges. When analyzing the blood pressure, body composition, and serum lipid data, results indicate an average to low risk for coronary heart disease in this population. Wide variation in lipid profiles in this group as compared to athletes in other sports is a concern.
CONCLUSIONS: Although working with equine poses a constant danger, the lack of adequate physical conditioning of the equestrian may be a contributing factor in the growing number of injuries. When compared to female athletes in other sports, exercise performance was found to be lower. Equestrian athletes need to supplement conventional sport activity with traditional aerobic and anaerobic training regimens.

Robson (1978), conducted a study on simple physical fitness test battery for elementary school children. About 152 boys and 150 girls students of Kendriya Vidyalaya, Gwalior from grade 1 to 5 were acted as the subjects and assistants were oriented to the test battery comprising of 50 meter dash, 600 meter run / walk, straight leg sit-up, vertical jump, shuttle run and modified push-up. The subjects were given practice in these items so that they were able to give the correct performance in each item. Assistants were properly oriented to record measurements accurately so that mistake could be avoided. The test items were administrated to the subjects on two days administering three items each day. After a day’s rest the same students on the fourth and fifth day for finding out the reliability. The value of ‘r’ obtained was 0.97, which showed that the subjects had achieved consistency of performance in the test items. The readings were taken during s for forenoon sessions. Norms were computed for the six physical fitness test items separately.

Holding and Jackson (1980) had conducted a on physical fitness, the norm reference standards were developed from scores of over 1500 men and
women who were tested at different Young Man’s Christian Association throughout United States. The standards were included the test scores associated with selected percentile. The maximal up-take of 54 mg/kg fell in the ninety fifth and below. This means that all men tested who were thirty-five years and younger.

The Vermont (1982) Governor’s Council on physical fitness had provided a motor fitness test battery for students from kinder garden to grade twelve for use by the school in the state. To keep school levels intact and to utilise the AAHPERD battery when applicable the modified test were recommended for the elementary school and AAHPERD tests for secondary school. The modified test battery composed of standing long jump, bent knee sit-ups, desk push ups and a figure-8 run are optional for secondary school boys and girls in order to enter achievement is for special Vermont fitness awards. Norms for the test items were available separately for boys and girls at each age from five to eighteen years, they took the form of performance required for four award levels knows as Certificate, 30th percentile standard, 5th percentile merit 80th percentile, governor 85th percentile.

James and William (1983) constructed norms for boys. AAPHPER softball test consisting of underhand pitching for accuracy for boys was constructed. Percentile tables were constructed from approximately 700 scores for boys aged from 10 to 18 years. Thus the abilities of boys the same age can be
compared. This is practical, easily administered test can be used for measuring present ability in underhand pitching.

Singh (1986) had prepared physical fitness norms for high school boys of Punjab state. Data were collected from 5000 subjects from various schools in the state. The test consists of eight items that is standing broad jump, sit and reach test, agility run, knee bent sit ups, 50 meters run, push ups (chairs), cricket ball throw and 600 meters run / walk test. The percentile norms for physical fitness test were found to be valid and suitable to assess the physical fitness level of the high school boys of 12 to 15 years of age.

Montogomery and Connolly (1987) conducted a criterion referenced tests. The purpose of this article is (1) To compare the similarities and differences between norm-referenced and criterion-referenced tests and (2) To summarise how each should be used in the assessment Specific developmental assessments, the populations they address, and the information they provide are described briefly. The need for additional criterion-referenced tests in physical therapy is discussed and an example of how task analysis can be applied to movement or motor skills in the development of a criterion-referenced test is provided. Physical therapists can enhance the credibility of their assessments by appropriate use of norm-referenced and criterion-referenced tests.
Athicha Pillai (1991) had conducted a study on computation of norms for twelve minutes run and walk among school boys. The data were collected from 20 districts except in the Nilgris district in Tamil Nadu. Two way analysis of variance was applied to find out whether there was any significant difference between the district and age group in 12 minute run/walk performance. It was found that no difference between district and age group by using hull scale.

Hanumantha Rao (1993) had conducted a study on construction of norms for health related physical fitness variables for high school boys of 15 years of age in Andhra Pradesh. The following variables were selected for this study, aerobic endurance, body composition, muscular strength and upper body strength. Calculation of mean standard deviation and hull scale were the statistical techniques used in this study. As per the qualification grading after the constructed norms in aerobic endurance 182 subjects were poor, 194 subjects were fair, 319 subjects were average, 182 subjects were good, 84 subjects were very good and 54 subjects were excellent. In flexibility 170 subjects were poor, 259 subjects were fair, 242 subjects were average, 210 subjects were good, 72 subjects were very good, 52 subjects were excellent. In muscular strength 334 subjects were poor, 249 subjects were fair, 202 subjects were average, 197 subjects were good, 68 subjects were very good and 55 subjects were excellent.

Gowda (1995) conducted a study on construction of norms in selected athletic events for the under graduate physical education men students in
Karnataka state. The study was conducted in 645 undergraduate physical education men students. The data collected from the selected athletic events were 100 meters run, 800 meters run, 1500 meters run, long jump and shot put. The data were statistically analysed with the help of mean and standard deviation. The raw scores were converted into hull scale norm scores. As per the norm scores, 102 subjects were poor, 120 subjects were fair, 160 subjects were average, 186 subjects were good, 73 subjects were very good, 4 subjects were excellent.

Singh (1996) had conducted a study on establishing norms for physical fitness of primary school children of Punjab and Haryana states. The data related to Punjab / Haryana Male / Female Rural / Urban elementary school children of age group 6 – 11 years were collected by using Groover (1962) physical test battery on (N=2500) each from Punjab and Haryana. To assess physical fitness of elementary school children of age group (6 – 11) mean, standard deviation were computed and to eliminate the difference in selected variables among five levels, one way analysis was computed. ‘T’ ratio was computed to see significance of differences if any existing in inter groups as well as on physical fitness test battery. Further Schefte Post Hoe Test mean pair difference was applied to see significances in pairs and finally percentile scale, T scale and Hull scale were computed for norms for various age groups and in different variables physical fitness of Punjab / Haryana Male / Female Rural / Urban elementary school
children. Based on the findings and within the limitations of the study the following conclusions may be drawn.

1. The subjects belonging to the age group 6 -11 years of Punjab / Haryana showed varied performance in standing broad jump, shuttle run, sit ups and seal crawl.

2. There were variations in performance in Punjab Male / Female Rural / Urban elementary school children in ages 6 -11 years in standing broad jump, shuttle run, sit-ups and seal craw.

3. There were variations in performance in Haryana Male / Female Rural / Urban elementary school children in ages 6 -11 years in standing broad jump, shuttle run, sit-ups and seal craw.

Helina (1997) constructed norms for the AAHPERD Youth Fitness Test for the physical education professional college men and women students in Tamil Nadu. For the purpose of the study, men and women students who studied during the year 1995 – 1996 and 1996 – 1997 in all the physical education colleges in Tamil Nadu totalling 1064 men and 500 women were selected as subjects. The age of the subjects ranged from 19 to 25. Pull ups, sit ups 4 x 10 yards shuttle run, standing broad jump, 50 meters run, 600 yard run / walk were conducted for men and except pull up other tests were conducted for women. After collecting the raw score, the mean standard deviation for each test were computed. Then the scores
were converted into Hull scale norm for the selected variables. Hence the performance of the subjects in the entire selected variable can be identified according to their index in the norm table, such as failing category, average, above average and outstanding category.

Chen, et.al. (2002) computed current body mass index (BMI) norms for children and adolescents are developed from a reference population that includes obese and slim subjects. The validity of these norms is influenced by the observed secular increase in body weight and BMI. We hypothesized that the performance of children in health-related physical fitness tests would be negatively related to increased BMIs, and therefore fitness tests might be used as criteria for developing a more appropriate set of BMI norms. We evaluated the existing data from a nation-wide fitness survey for students in Taiwan (444,652 boys and 433,555 girls) to examine the relationship between BMI and fitness tests. The fitness tests used included: an 800/1600-m run/walk; a standing long jump; bent-leg curl-ups; and a sit-and-reach test. The BMI percentiles developed from the subgroup whose test scores were better than the 'poor' quartile in all four tests were compared with those of the whole population and linked to the adult criteria for overweight and obesity. The BMIs were significantly related to the results of fitness testing. A total of 43% of students had scores better than the poorest quartile in all of their tests. The upper BMI percentile curves of this fitter subgroup were lower than those of the total population. The 85th and 95th BMI
percentile values of the fitter 18-year-old-students (23.7 and 25.5 kg m \((-2)\) for boys; 22.6 and 24.6 kg m\((-2)\) for girls) linked well with the adult cut-off points of 23 and 25 kg m\((-2)\), which have been recommended as the Asian criteria for adult overweight and obesity. Hence, the BMI norms for children and adolescents could be created from selected subgroups that have better physical fitness. We expect that the new norms based on this approach will be used not only to assess the current status of obesity or overweight, but also to encourage activity and exercise.

Payne, et.al. (2000) studied Canadian musculoskeletal fitness norm is to provide representative norms for measurements of musculoskeletal fitness (partial curl-ups, vertical jump, and leg power) for which Canadian norms are not currently available. Partial curl-ups, vertical jump, trunk flexion (sit and reach), grip strength, muscular endurance (push-ups), body mass index, and subcutaneous adiposity (sum of five skin folds) were assessed, and leg power was calculated in 571 self-reportedly healthy participants (312 females and 259 males) aged 15-69 yr. The representativeness of the sample was confirmed by statistically comparing the fitness characteristics of the participants in the present study to those in the Canada Fitness Survey of 1981 and the Campbell's Survey of 1988. Normative data for partial curl-ups, vertical jump, and leg power were generated for males and females in six age groups (15-19, 20-29, 30-39, 40-49, 50-59, 60-69) for use in fitness appraisal protocols for the Canadian population.
2.2 TESTS FOR SKILLS OF DIFFERENT GAMES

Barfield, et.al. (2007) reported that the Performance Index Evaluation (PIE) is a basketball-specific assessment of physical performance. The battery consists of items typically included in sport assessments, such as agility and power, but also addresses an often-overlooked performance component, namely, core strength. The purpose of this study was to examine the reliability (test-retest, inter rater), validity (criterion-related, construct-related), and practice effect of the PIE among men's and women's college basketball players. Test-retest estimates were moderate for men (intraclass correlation coefficient [ICC] = 0.79) and poor for women (ICC = 0.35), but inter rater reliability was high (ICC = 0.95). Criterion-related validity evidence (i.e., relationship between PIE and playing time) was weak, but construct-related evidence was acceptable (i.e., college players had higher scores than high school players). A practice effect was also demonstrated among men. In conclusion, reliability of the battery should be improved before its use is recommended among college basketball players. Additionally, the battery does not appear to be a predictor of performance but does appear to distinguish between skill levels.

Shoenfelt, et.al. (2002) documented that the proposition that variable practice may be superior to constant practice even for consistent transfer situations was tested on a prototypical consistently performed skill, the basketball free throw. There were 94 participants matched on free-throw shooting, then
randomly assigned to one of four practice conditions, a constant condition, i.e., at the free-throw line, and three variable conditions. Under supervision participants practiced shooting free throws four days a week for three weeks. Three substantially different variable practice conditions produced significant improvement similar to that of constant practice on tests during each week of practice and on a delayed retention test. Consistent with the proposition, the most variable practice group performed as well as the other groups on the retention test despite lower practice performance.

Tzetzis, et.al. (1997) evaluate the effectiveness of three practice methods, (a) feedback as knowledge of performance (KP), (b) feedback as knowledge of results combined with the goal-setting method, and (c) a combination of knowledge of performance and results with the goal-setting method on the performance and learning of basketball skills of different complexity. Three groups (n = 26) of children followed the practice methods and the performance (result), and technique of simple and complex basketball skills (dribble, pass, shoot, and lay-up) were assessed for their effectiveness. Subjects practiced using four exercises for each skill, three times a week, for eight weeks. A performance and a retention test (two weeks later) were conducted. A multivariate analysis of variance with repeated measures on the last factor indicated that knowledge of performance with results of goal-setting significantly improved the techniques of the more complex skills but it was significantly better than the knowledge of
results and goal-setting method for passing. Giving knowledge of results and setting goals improved performance and proved to be better than the knowledge of performance method. Finally, the combined method was as good as the knowledge of performance and as good as the knowledge of results plus goal setting in performance but improvement was delayed mostly for the more complex skills. Attention needs for the analysis of information given determined the success in skills execution and the effectiveness of the methods. The different content of the information given to the athletes may improve different aspects of motion or execution of the skills.

Currell and Jeukendrup (2008) documented that performance testing is one of the most common and important measures used in sports science and physiology. Performance tests allow for a controlled simulation of sports and exercise performance for research or applied science purposes. There are three factors that contribute to a good performance test: (i) validity; (ii) reliability; and (iii) sensitivity. A valid protocol is one that resembles the performance that is being simulated as closely as possible. When investigating race-type events, the two most common protocols are time to exhaustion and time trials. Time trials have greater validity than time to exhaustion because they provide a good physiological simulation of actual performance and correlate with actual performance. Sports such as soccer are more difficult to simulate. While shuttle-running protocols such as the Loughborough Intermittent Shuttle Test may
simulate physiology of soccer using time to exhaustion or distance covered, it is not a valid measure of soccer performance. There is a need to include measures of skill in such protocols. Reliability is the variation of a protocol. Research has shown that time-to-exhaustion protocols have a coefficient of variation (CV) of $>10\%$, whereas time trials are more reliable as they have been shown to have a CV of $<5\%$. A sensitive protocol is one that is able to detect small, but important, changes in performance. The difference between finishing first and second in a sporting event is $<1\%$. Therefore, it is important to be able to detect small changes with performance protocols. A quantitative value of sensitivity may be accomplished through the signal: noise ratio, where the signal is the percentage improvement in performance and the noise is the CV.

Kenneth (1987), constructed Golf Skill Test Battery for college males and females was administered to over 1,000 college students of varying ability levels. It was used predominantly, however, with students enrolled in beginning level of Golf classes. Reliability was determined for each of the test items using the intra class correlation method. A group of 146 subjects were administered each item of the test battery on two separate days near the conclusion of a one semester beginning level of Golf class. The reliability co-efficient were calculated for a criterion score which was based on the sum of the trials for each test item.

Yilla and Scherrill (1998), for a valid and reliable battery of Rugby skills tests, the participants were 65 adult male rugby athletes. Construct validity was
established in two modified Delphi rounds by a panel of international experts. Spearmen Rank Correlation between Coaches’ rankings of players’ skills and scores ranged from 0.63 to 0.98 for the total battery. For construct validity, principal factor analysis with oblique rotation revealed two factors, intra class reliability co-efficient ranged from 0.94 to 0.99. The battery includes five tests maneuverability with the ball, pass for accuracy, picking, sprinting and pass for distance.

Antrim (1972), studied the relationship of power, agility, flexibility and measurements of selected body segments to Volleyball playing ability testing thirty volleyball players found that power was the most reliable single variable in predicting playing ability in volleyball. Arm length and leg length were also reliable when the player rankings were correlated with the total time on the test. The reliability was estimated in several ways, but was highest when the test was preceded by 2 practice trials followed the next day by 2 trials, which were totaled. Under this condition the reliability co-efficient was estimated to be 0.82.

Illiner (1969), for the construction and validation of a skill test for the drive in field hockey, high school players, physical education major and association players were tested on their ability to drive the ball to the left and to the right after 5 weeks of instructions and practice. Speed and accuracy were considered to be the important aspects of the drive and were therefore included in the skill test. Scores were obtained for each component and were then combined.
into a single score by means of additive and multiplicative techniques. Statistical evidence presented included studies of objectivity, reliability, validity, target adequacy and scoring. The test was found to be objective (r=.97 and higher), reliable (r=0.72 and higher) and valid as measured of an individual’s ability to execute the drive.

Kowert (1962), constructed a badminton ability test battery for men was constructed where the judges’ rating scale yielded a reliability co-efficient of 0.88 when correlated with the class rankings of the subject’s playing ability. An ‘r’ of 0.97 was obtained for the reliability of judges’ rating scale as determined by the inter class correlation between the sum of three judges’ rating and the scores obtained for the diagonal run. It was found that the Badminton playing ability of the male college students (N=46) could by successfully measured by the multiple regression equation containing the variables of the diagonal run test, French’s Long Serve Test and Miller’s Wrist Volley Test

Singh (1959), constructed a two items test, which included “Dribbling and Hitting” and “Dribbling and Goal Shooting” was constructed. The subjects for the study were 107 students of two Arts Colleges of Punjab. He validated the tests against the subjective rating of the two experts, who were national umpires in Hockey. The dribbling and hitting test gave a validity of 0.78. He correlated the two tests in order to determine if they measured different aspects and the result was 0.41. He also prepared – scores for college men
Chaudhary (1999), to find out the relationship of speed, strength and agility with playing ability in soccer, twenty male soccer players of Kendraya Vidyalaya, Calcutta were selected as subjects. The finding of the study indicated that speed of the subjects was a very reliable variable for predicting players’ ability of male soccer players as the correlation value between speed and playing ability (rating judged by a panel of 3 experts for each subject during the game) obtained was 0.597. It further revealed that the correlation values between standing broad jump, agility and playing ability was 0.444 and 0.526 respectively. All the above mentioned values were found significant at 0.05 level of confidence. Further, the correlation values between sit-ups, pull-ups, push-ups and playing ability obtained were 0.102, 0.258, and 0.130 respectively. These values indicated low positive relationship.

Singh (1996), to construct a specific test battery of motor fitness for football players, the subjects were 50 male football players of LNIPE, Gwalior. The Pearson’s Product Moment Correlation (r) was used to know the contribution of all items of motor fitness to football performance. The result of the study showed that kicking for distance, 70 meters run, 1 mile run and WM agility run with ball contribute much to the playing ability in football among motor fitness.

A test was developed by Sports Authority of India (1992) known as SAI Football Skill Test. This test is used by SAI for spotting talent football players young age and consists of the following three test items:
1. 30 running with the ball

2. Kicking for accuracy


Beitor (1981), for constructing an objective skill test battery in soccer for professional students in physical education, the subjects were 130 men students of Bachelor of Physical Education. The test battery consisted of 4 items, namely kicking for distance, kicking for accuracy, heading for distance and dribbling the ball. The reliability of 0.96, 0.92 and 0.92 were obtained for performance tests. The 18 tests included measurements of strength, power, speed, agility and body composition. All raw data were converted to T scores. Multiple regression analysis selected the top 14 tests to estimate the sum of 18 T scores. Neither the 14 nor the 18 item profile significant predicted starters in the spring game. Multiple regression to predict coaches’ rating (mean of 5 coaches) produced R = 0.66 using 1 RM bench press, power clean, 7 skinfolds, blocking RT and Margaria – Kalamen anaerobic power. Contrary to the results of other studies to predict success in Football, the test battery developed in this study did not distinguish between the starters and the non starters. Possession of speed, strength and size did not guarantee success in highly skilled game such as soccer.

McDonald (1987), conducted a study to find out the use of volleying a soccer ball against a backboard as a test of general soccer ability. With college
men as subjects, the study obtained the following correlations between scores on the test and the ratings of playing ability by their coaches: 0.94 for varsity players, 0.63 for junior varsity players, 0.76 for freshmen varsity players and 0.85 for the combined group.

Yeagley, (1990) constructed a test battery for measuring basic soccer skills of beginning players was constructed. Four test items were selected namely, dribble, wall volley, juggling and heading. The validity of each of the four test items was examined with two different criteria: (1) the ratings of four judges on the soccer juggling skill and (2) the composite standard score for the four tests. A multiple correlation of 0.76 was reported between the criterion (the judges’ ratings) and the dribble and juggling tests. The addition of the wall volley and heading tests increased the multiple correlations to only 0.78; thus recommended that dribble and juggling be used if a short form is wasted. With a sample of male physical education majors who were beginning soccer players, the following internal consistency co-efficients were reported: dribble 0.91, wall volley 0.90; juggling 0.95 and heading 0.64.
2.3. METHODS OF VALIDATING SKILL TESTS

Sunderland, et.al. (2006) reported that high test retest reliability is essential in tests used for both scientific research and to monitor athletic performance. Thirty-nine (20 male and 19 female) well-trained university field hockey players volunteered to participate in the study. The reliability of the in house designed test was determined by repeating the test (3 - 14 days later) following full familiarisation. The validity was assessed by comparing coaches’ ranks of players with ranked performance on the skill test. The mean difference and confidence limits in overall skill test performance was 0.0 +/- 1.0 % and the standard error (confidence limits) was 2.1 % (1.7 to 2.8 %). The mean difference and confidence limits for the "decision making" time was 0.0 +/- 1.0 % and the standard error (confidence limits) was 4.5 % (3.6 to 6.2 %). The validity correlation (Pearson) was r = 0.83 and r = 0.73 for female players and r = 0.61 and r = 0.70 for male players for overall time and "decision making" time respectively. We conclude that the field hockey skill test is a reliable measure of skill performance and that it is valid as a predictor of coach-assessed hockey performance, but the validity is greater for female players.

Turner and Martinek, (1999) test the validity of the games for understanding model by comparing it to a technique approach to instruction and a control group. The technique method focused primarily on skill instruction where the skill taught initially was incorporated into a game at the end of each lesson.
The games for understanding approach emphasized developing tactical awareness and decision making in small game situations. Two physical education specialists taught field hockey using these approaches for 15 lessons (45 min each). The control group did not receive any field hockey instruction. Data were collected from 71 middle school children. Pretests and posttests were administered for hockey knowledge, skill, and game performance. Separate analyses of variance or analyses of covariance were conducted to examine group differences for cognitive and skill outcomes. The games for understanding group scored significantly higher on passing decision making than the technique and control groups during posttest game play and significantly higher than the control group for declarative and procedural knowledge. The games for understanding group scored significantly higher on control and passing execution than the other groups during posttest game play. For hockey skill, there were no significant differences among the treatment groups for accuracy, but the technique group recorded faster times than the control group on the posttest.

Ali, et.al. (2007) selected twenty-four players from the 1st/2nd (elite) and 24 players from the 3rd/4th (non-elite) university football teams were recruited to evaluate the Loughborough Soccer Passing Test (LSPT) and Loughborough Soccer Shooting Test (LSST) as tools to assess soccer skill. The LSPT requires players to complete 16 passes as quickly as possible. The LSST requires players to pass, control, and shoot the ball to targets on a full-sized goal. Participants
completed two main trials each separated by at least one day. During both trials, the participants were given practice efforts before recording the mean of the next two (LSPT) or 10 (LSST) attempts as the performance score. For the LSPT, the mean time taken, added penalty time, and overall performance time were less in the elite players (elite: 43.6 s, s = 3.8; non-elite: 52.5 s, s = 7.4; P= 0.0001). For the LSST, there was no difference in the mean points scored per shot between groups (elite: 1.34, s = 0.46; non-elite: 1.28, s = 0.53). However, the elite players had higher mean shot speed (elite: 80 km h(-1), s = 4.5; non-elite: 74 km h(-1), s = 4.2; P < 0.0001) and performed each shot sequence faster (elite: 7.87 s, s= 0.29; non-elite: 8.07 s, s= 0.35; P= 0.037) than the non-elite players. Performance on both tests was more repeatable in elite players. In conclusion, the LSPT and LSST are valid and reliable protocols to assess differences in soccer skill performance.

Sheppard, et.al. (2006) evaluated the reliability and validity of a new test of agility, the reactive agility test (RAT), which included anticipation and decision-making components in response to the movements of a tester. Thirty-eight Australian football players took part in the study, categorized into either a higher performance group (HPG) (n=24) or lower performance group (LPG) (n=14) based on playing level from the previous season. All participants undertook testing of a 10m straight sprint (10mSS), a 8-9m change of direction speed test (CODST), and the RAT. Test-retest and inter-tester reliability testing measures were conducted with the LPG. The intra-class correlation (ICC) of the
RAT was 0.870, with no significant (p<0.05) difference between the test results obtained on the first and second test sessions using a t-test. A dependent samples t-test revealed no significant (p<0.05) difference between the test results of two different testers with the same population. The HPG were significantly (p=0.001) superior to those of the LPG on the RAT, with no differences observed on any other variable. The RAT is an acceptably reliable test when considering both test-retest reliability, as well as inter-rater reliability. In addition, the test was valid in distinguishing between players of differing performance level in Australian football, while the 10mSS and CODST were not. This result suggests that traditional closed skill sprint and sprint with direction change tests may not adequately distinguish between players of different levels of competition in Australian football.

Mirkov, et.al. (2008) documented that the soccer-specific field tests are popular among coaches due to their simplicity, validity, and minimal use of equipment. Nevertheless, there is a general lack of data about their reliability, particularly regarding the tests of anaerobic performance. Twenty professional male soccer players performed 3 consecutive trials of the tests of throwing-in and standing-kick performance (the distance measured) as well as on timed 10-m sprint, flying 20-m sprint, running 10 x 5 m, zigzag running with and without the ball, and the skill index (i.e., the ratio of the zigzag running without and with the ball). With the exception of the throwing-in and standing kick, the evaluated tests
revealed high intraclass correlation coefficients (i.e., >0.80), small within-individual variations (coefficient of variation, <4%), and sample sizes for detecting a 2% change in the tested performance that are either close to or below the standard size of a professional soccer squad. In addition to simplicity and face validity, most of the evaluated tests revealed high reliability. Therefore, the evaluated tests are recommended for sport-specific profiling and early selection of young athletes as well as for routine testing procedures that could detect effects of various intervention procedures. Regarding the throwing-in and standing-kick tests, direct measurement of the ball velocity (e.g., with a standard radar gun) is recommended.

Vergauwen, et al. (2004) studied the Fore Ground test, a new procedure to assess forehand groundstroke performance in rally patterns authentic to low- and intermediate-level tennis play, was evaluated as to its value for research purposes. The Fore Ground protocol was enacted on a midi tennis court. It consists of 18 programmed rallies, reproducing neutral and offensive situations as they occur during midi tennis game play, driven by a test leader. Quality of the forehand ground strokes was determined from simultaneous measurements of success rate, precision of lateral and longitudinal ball placement, and ball velocity. A velocity-precision (VP) and velocity-precision-success (VPS) index were calculated to reveal interactive effects. The validity and sensitivity of the Fore Ground procedure in the target population were determined by verifying whether test
scores reflected minor differences in tennis experience. More experienced players scored significantly higher than beginning players for success rate, ball velocity, precision of ball placement, VP, and VPS. High to moderate intraclass correlation coefficients in this open skill test indicated satisfactory test reliability. It was concluded that the Fore Ground procedure is a concise, authentic, sensitive, accurate, reliable, and valid instrument for the assessment of forehand groundstroke quality in low- to intermediate-level tennis players.

Rinne, et.al. (2001) evaluate the test-retest and inter-rater reliability of nine selected tests for the following basic motor skills: balance, orientation, sense of rhythm, kinaesthetic precision and flexibility. Twenty-five healthy, non-sporting volunteers (14 men, 11 women, aged 36-72 years) were tested in three sessions at one-week intervals by two raters. For the tests of balance on a bar, tandem walking backwards and forwards and ball bouncing, the within-participant and between-session repeatability, as assessed by the intraclass correlation coefficient (ICC), was high (ICC 0.83-0.96), and for the rhythm test it was fair (ICC 0.70). The inter-rater reliability was also high for all the tests (ICC 0.88-0.96) except that for rhythm (ICC 0.76). In a test-retest design, these tests were sensitive enough to produce sufficient variation between participants in terms of differentiating between individuals. The learning effect was the most remarkable between the pretest and test sessions, and the reliability was better for the test-retest session although a statistically significant difference existed only for
tandem walking forwards (p<0.02) and balance on a bar (p<0.004). The tests with quantitative scores had a smaller margin of error than those with qualitative scores. These tests provide reliable alternatives for assessing basic motor skills of non-sporting adults in the context of physical activity promotion.

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. Methods: 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 intratester reliability for technique measurements. A third expert coach determined the intertester 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. Results: Accuracy measurements and intratester and intertester ratings of players' technique proved to be highly reproducible (intraclass 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. Conclusions: 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.

Palaniswamy (2001) conducted a research on “construction of Basketball skills test for college men in the age group of 20 to 25 years. The study was conducted in 3 phases, namely selection of arbitrary test items, extracting the most appropriate test and establishing the final battery test items and construction of norms for the final battery items. In phase I, 20 arbitrary tests in various skills were selected and the most appropriate test was selected by using two-way ANOVA with repeated measures design used. Then in the phase II the criterion test was compared with the most appropriate test items by using product moment correlation. The reliability, objectivity and subjectivity was established for the newly constructed test items such as moving pass and speed pass (passing & receiving), long shot zigzag layup & alternate layup shot (shooting), alternate dribbling & pace dribbling (dribbling), restricted area, star defence movement, stop & pivot and shuffling(footwork & rebounding).

The findings of the study showed that the test namely long shot, star defence moment, alternate layup shot, alternate dribble and moving pass were evolved as the final battery to find out the playing ability of the Inter collegiate Basketball players in fundamental skills. For that it was concluded that the norms evolved in the present study for the final test battery was more appropriate.
Ratnabai, (1988) has conducted a study on construction of norms for basketball skill test. To achieve her purpose 100 girls in Perriyar district in the age group of 13, 14 and 15 were selected. The subject was basketball players who represented the school for inter school competitions. The AAPHER basketball skill test was administered to all the students. The test battery consists of the following items, front shot, side shot, foul shot, speed pass, under basket, jump and reach, over arm pass for accuracy and dribble. The test measured the fundamental skill of basketball and each one of the tests was intended to measure a single component of basketball skills. Based on the percentage scale the norms were constructed.

A study was undertaken in order to develop norms for the Wingate test for physically active young men and women and also to compare mean power measures obtained from the Wingate test with those obtained from another similar cycle ergo meter test. A total of 112 males and 74 females’ age 18 to 28 years comprised the subject pool. Data collected from the Wingate test included mean power for 30 seconds, peak power for five seconds and percent fatigue index data from the second test included mean power for both 80’s and 40’s. Percentile norms and descriptive statistics were generated as were multiple regression equations for prediction of mean power between the two tests ranged from zero point six six to zero point eight seven. Comparisons among data derived from this study and those reported for other athletic groups are also given.
Schmithals and French, (1940) suggested a battery of skills tests which consisted of three items namely dribble, dodge, circular take, and drive, goal shooting straight, right, left and fielding and drive. They suggested fielding and drive and combined goal shooting were the best single test statistically. But the most economically administered single test was dribble, dodge, circular tackle and drive which and reliability of zero point nine two and validity of zero point four four. This test had high correlation with the other tests, indicting that it included elements of other test as well.

Friedel, (1967) proposed a single item field hockey test for high school girls who she called as pass receiving, fielding and driving while moving. There are ten trials from each side, right and left and each trial is timed with stopwatch. By the split-half method correlated by use of the Spearman Brown formula, reliability coefficients were zero point nine zero for the left side and zero point seven seven for the right side. For validation, the test correlated zero point eight seven with Schmithals – French ball control test.

Strait, (1961) constructed and evaluated a field hockey skill test. The test required the use of a backboard and included the skills of fielding, dodging, dribbling and driving. The test had a reliability coefficient of zero point eight seven for smith college students and of zero point eight six for members of the Hampshire field hockey association. Using the rating of three judges as a criterion of the validity for the students was zero point six one, for the members of
Hampshire field hockey association was zero point six zero and for members of north east field hockey association sectional team members was zero point seven six. The test was equally suitable for evaluation of attack and defense position players.

Whartan (1982) did the investigation of the youth fitness test as predictive measures of skill development in field hockey: AAHPER youth fitness test was studied as a predictor of skill development in field hockey. One hundred and seven senor high school girls who had no previous field hockey training were used subjects. A significant relationship was found between the scores of the youth fitness test and field hockey achievement as measured by the schmithals French field hockey achievement tests.

Stewart (1968) gave a test for measuring field hockey skill of college women students. Field hockey classes or members of the intercollegiate field hockey team were tested on five items during the seventh week of school in three institutions. The backboard test was found to be objective and reliable. The fielding and drive goal shooting and ball control were unsatisfactory.

Chapman’s (1982) ball control test was found reliable and valid assessment tool for the individual skill of ball control in women field hockey. Although the sample size of the pilot study using inter-collegiate players was relatively small, the reliability of data (total of three trials) was acceptable (R=...
zero point eight nine). The description of the Chapman ball control test suggested logical validity a special case of content validity. There was also a significant difference in the means of the two team’s performances, which indicated that the test had construct validity. Positive correlation of the total of the players assigned rankings in stick work ability and ball control scores established concurrent validity in the test. Predictive validity was determined by results from the separate unvaried F test in the further study by the investigator Chapman (1979).

Mc Donald (1951) proposed a single item for practicing general soccer ability and it was validated with American University students against subjective ratings of their playing ability. It is a single item test, which employs very little equipment and can be administered easily and quickly. In its original form, a kick board is used as the target. The target is 30’ long and 11.5’ high, and a restraining ling is drawn nine feet form and parallel to this target well. Three soccer balls were used inflated to the correct pressure and one is placed on the restraining line and opposite to the centre of the target. The validity coefficients range from zero point six three for third year team members to zero point seven six for first year team members and zero point nine four for university team members. The coefficient for the combined groups was zero point eight five.

An experimental study has been made by Health and Rodgers (1932) from an analysis of skills in soccer by a group of twenty-five physical education teachers four representative sampling of worthwhile technique in the game of
soccer were selected. Skills were dribbling, throw-in, place kick for goal and kicking of the rolling ball. The tests were given to a little over 2500. Fifth and sixth grade boys and scaled by Mc Call ‘t’ scale. The criterion of success in soccer playing ability was established by increase of a judgment criterion. A further criterion was used namely, success in making school and intramural teams. The correlation co-efficient between judgment ratings and composite score were $r=0.60$ for fifth grade boys and $r=0.62$ for sixth grade boys, while the reliability co-efficient for the test battery reached zero point eight zero in the sixth grade. Though no criterion of validity was set up for the soccer knowledge test, it was regarded as valid because of the selection of material test.

Crew (1987) related several soccer skills to the soccer ability of college men. The criterion of soccer ability consisted of the opinions of competent judges formed during competitive play. Correlations of test item with this criterion were zero point nine six for ball control, zero point nine five for aerial accuracy, zero point nine two for dribbling, and zero point eight eight for wall volley. A multiple correlation of zero point nine seven was reported with ball control and dribbling tests.

Conner (1963) made comparison of objective and subjective testing methods on selected swimming skills for elementary school children. In this study, the student’s performance was assessed in swimming 50 yard from the
push of in the water. The first test involved swimming prone without stopping. After five minutes of rest, the subject swam 25 yards prone and 25 yards using back strokes. Three expert instructors also assure them subjectively during each test. Rank difference correlations were computed between the number of strokes and time. The result showed that the objective methods used to rank the students has not significant in determining a more desirable grading procedure in either test.

Walton (1966) proposed a ten item skill test to be used for drill purposes in water polo. A graduate student attempted to validate this test while fulfilling a requirement for a research methods class. The following are presented below: reversal, five shot accuracy, dribble sprint, ball handling, kick-reach, 200 yard (182-88 m) head high sprint, push pass for distance, renouncing, distance throw, three shot accuracy. Reliability and validity: no usually reliability co-efficient of the test retest or split halves variety were obtained. But objectivity co-efficient (simultaneous testing by the author and the coach) were calculated from data on 13 highly skilled college-age male water polo players. Internal validity co – efficient were obtained by correlating each item with a composite score for all items. External validity co-efficient were obtained by correlating each item with the coaches ranking of the players in overall ability. The entire above items total co-efficient was zero point six zero. Normative information, no norms were included in this study.
French and Cooper (1936) studied achievement tests in volleyball for high school girls for the classification of players of similar ability, to diagnose individual difference and for daily practice of skill elements. The tests were administered on score, set up pass, repeated volley and recovery form the net. Individually all the results of them were compared with subjective ratings to determine the extent to which these test measure volleyball playing ability. Before any test was given, the rating was computed by four judges. The reliability of rating of two judge’s against the sum of the rating of the other two.

Bovard (1949) formulated achievement in volleyball for high school girls after analyzing the skills used in volleyball by girls in game situations. Directions of administering the following tests were formulated repeated volleyball scoring set up and pass and recovery from the net. Rating was made by four judges. The rating as determined by correlating the sum of rating of the two judges with the sum of ratings of the other two were found to be consistent.

A study was conducted by Chun (1970) to construct a reliable and valid skill test for the overhead volleyball for college women. A secondary problem was to compare this test with chitten test, a typical wall volley test. Both the newly constructed tests termed the Chun test are administered on 141 university women students were randomly selected and rated subjectively in game play by three judges. Reliability and validity co-efficient for the test were computed. A chi-square test was used to determine the distribution of the scores as related to
the normal curve. Analysis leads to the conclusions that both the Chun and the chitten tests were valid and reliable and reliable than the other.

The validity of the individual test employed for assessing the skill ability was determined by correlating the performance in each test with a criterion of playing ability by Young and Moser (1934). It was agreed by these experts that this group of tests measured all of the fundamental skills, and therefore the sum of the test scores might be considered as an index of all round playing ability. They had recommended the total score as criteria of playing ability was an objective criterion, and was more economical as far as time is concerned than other criteria. The criterion expert opinion was also used by Young and Moser (1934) to validate the selected battery three judges independently rated the ability of each player in a game.

Using different method, the validity of the tests was checked by the relationship found between each test item and a subjective ranking of playing ability by Colum and Glossow (1938).

Using game result as a criterion for validating basketball skill tests Stroup (1955) found out that 83.87 percent of the 38 games players were won by the teams that had the higher skill scoring.
Whitley and Smith (1963) having conducted a study on strength and vertical jump had suggested that average score of several trials in the tests is better than using the best score of all the trials.

The validity of modified Brady volleyball skill test for high school boys was determined by comparing the instructor’s rank order of the class members according to his assessment of their overall playing abilities and the performance in skill tests by Brumbach and Kronovist (1968).

2. 4. SUMMARY OF THE LITERATURE

After going through a number of related researches, the investigator has got a clear understanding of construction of the battery tests for physical fitness components, especially for the age group of 18 to 25 years and skill tests for selected games. In order to avoid many drawbacks which were found in the earlier research work the investigator has given due weightage to the fundamental physical fitness components and skills of the games, which are very important for the game. The investigator felt that speed, leg explosive power, abdominal strength and muscular endurance along with fundamental skills such as dribbling, passing and shooting of basketball, football and hockey. The combination of these four physical fitness components and three skills from any of the game would form the battery of physical fitness and skill efficiency test. Therefore an effort was made in this study to standardize the physical fitness tests and skills for
selected games of an individual by considering all the components contributing to the physical efficiency and skills.