Chapter - II

REVIEW OF RELATED LITERATURE

"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, and such a review brings about a deep and clear perspective of the overall field" (Thirumalaiswamy 1985).

Literatures on Basketball Skill Test

L. William Johnson (1934) Johnson Experimented with nineteen basketball test items, checking each for validity and reliability. two batteries of tests were finally proposed, to measure the following (a) basketball ability, composed of three test items : field-goal speed test, basketball throw for accuracy, and dribble ;(b) potential basketball ability, composed of four test items, none of which requires ball handling : footwork, jump and reach, dodging run, and Iowa Revision of the Brace test. The battery reliability and validity for the ability test were 0.89 and 0.88, respectively; for the potential ability test, 0.93 and 0.84, respectively, individual items on the ability test, however, had reliability coefficient ranging from 0.73 to 0.80. In securing validity, a biserial correlation of 0.88 was obtained between test scores and ‘good’ and ‘poor’ group of basketball players; the good group was composed of those who did not make squad
Robert D. Knox (1947) Knox developed a basketball battery composed of a speed dribble, wall bounce, dribble-shoot and "penny-cup" tests. In 1947 and correlated the results obtained with success at making a ten-man high school varsity squad in Oregon. The final correlation coefficient was .88 while it was also noted that there was an eighty-nine percent agreement between the results from the basketball tests and squad membership for tournament play, and six members of the "all-star" team achieved scores on the test that were not reached by ninety five percent of the subjects. Although perfectly valid, the Knox Basketball Test only distinguishes between varsity and non-varsity players, and not between the ability levels of the actual squad members.

Harrison (1969) Developed a four-item basketball test for boys in grades seven through ten. The four items are field goal shooting, speed pass, dribble and rebounding, the subjects were one hundred boys in each of the grades. Test-retest correlations for the separate tests range from .72 to 96; for the total battery, the coefficients clustered between scores of the test and three criterion measures, as follows: 82 with the Johnson basketball test, 86 with peer rating of basketball playing ability and 77 with expert jury rating. A correlation of 89 was reported between the test and the average of the three basketball criterion measures.
Each of the test items is performed for thirty seconds: two trials are given with the scored recorded as the best of the two. T-scale norms of Harrison basketball test were constructed for each of the four items for each of the four grades; seven through ten the subjects tested for the norms had received a unit of basketball instruction prior to the administration of the battery

**AAHPERD developed a norm-referenced basketball skill test in 1984.** This test is applicable to both boys and girls and separate norms, age-wise and Sex-wise, have prepared for one yearly age groups ranging in age from 10 years to 15 years; 16-17 years and college age students. A committee of experts identified the essential skills of basketball tests to measure four basketball skills namely speed shot shooting, passing and recovering the basketball accurately while moving; handing and dribbling the ball while moving and defensive movement skill, fifth to eight grade boys and college men were used as subjects for conducting the pilot studies. Large numbers of reliability coefficients for the four test items by test retest method were computed on elementary, junior high school, senior high school and college range meals and females. Quite high values of reliability coefficient were recorded and all the values range between 0.84 to 0.98. AAHPERD developed basketball skill testing percentile
norms on ten thousand pupils for the testing of American School Children and adults men and women.

**Emersenzi, Reis and Guidetti (2009)** conducted a basketball test battery to monitor players with Mental retardation across 2 sports seasons. Although sports for athletes with mental retardation (MR) are achieving an important role, literature concerning basketball test and training is still poor. The aims of this study were to assess basketball ability before (PRE) and after (POST) six month training in athletics with MR across 2 sports seasons (SS) and to analyze the variation of basketball abilities by subjects of MR level. 15 trained basketball players with MR participated, (11 men and 4 women, age range 19-45 yrs, MR 3 mild, 8 moderate, 3 severe and 1 profound). Athletes were tested PRE and POST six month training during two consecutive sports seasons SS1 and SS2. The tests assessed 4 ability levels, each one characterized by the analysis of 4 fundamental areas (ball handling, reception, passing and shooting), divided into 5 specified components. The athletes’ global score improved after training in both SS1 (41.5 + 12.0 vs. 48.6 + 15.4; P <0.01) and SS2 (41.7 + 12.4 vs. 50.8 + 16.2; P <0.01). Levels II, III, and IV showed an increase both after each SS and two following SS. (P <0.01). No significant difference was found between Post SS1 and Post SS2 due to score decrease during the resting period between
the 2 SS. In both SS, global and level scores were negatively correlated to MR levels indicating that athletes with a lower MR obtained higher ability scores. In conclusion, a 6 month training caused a general improvement especially evident in levels II and III in both SS. Global and level scores were negatively correlated to MR levels (P <0.05) indicating that athletes with lower MR obtained higher scores. Therefore the basketball test battery could be useful for improving and monitoring training. The test battery has a high reliability (intra class correlation co-efficient range 0.995 – 0.999).

Guidetti (2009) conducted a study to assess the basketball ability before and after 4 month training performed before championship for athletics with mental retardation and to correlate ability variations with MR levels. 15 trained basketball players with MR (11Men and 4 Women; age range 21-43; MR 3 mild, 8 moderate, 8 severe and 1 profound). Athletes were tested before (pre) and after (post) 4 months training preceding the championship. The tests were assessed 4 levels of ability, each one characterized by fundamental areas of this game, ball handling and reception, passing and shooting. Each area was divided into 5 specific components. The team average score, based on the score of each athletes 4 levels improved by 6.6 points 41.6 (SD 11.9) vs. 48.2 (14.7). The comparison between
pre and post scores in each level showed increases (P<0.01), especially in level II 14.4 (3.5) vs. 16.5 (3.3) and in level III 7.1 (5.7 vs. 9.2 (6.6). Within level II, ball handling (3.67 (1.2) vs. 4.37 (0.5); and passing 3.20 (1.2) vs. 3.97 (1.3); P<0.01) improved; in level III reception (3.21 (1.1) vs. 3.73 (1.1) P=0.01) and shooting (1.82 (1.1) VS. 2.45 (1.3); P<0.05) increased. A four months training caused a general improvement, especially evident in levels II and III. Total score reached in level II was negatively correlated with MR level (r=-0.56; P<0.05) indicating that athletes with lower MR obtained higher score 0.976.

Origan motor fitness test batteries were constructed separately for boys and girls each at the upper elementary junior high school and senior high school level in 1962. Motor fitness components and test items to represent each component were proposed by a state wide committee. The components were arm and shoulder girdle muscular endurance, abdominal muscular endurance, muscular power, running speed, circulatory respiratory endurance and trunk hip flexibility. Construction of the tests followed essentially the same pattern for both the sexes at the three levels. The ‘t’ scale scoring tables for the above for the boys and girls, the origans motor fitness test was developed separately.
**Barfield (2007)** conducted a Performance Index Evaluation (PIE) which 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 (intra-class correlation co-efficient (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 high 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, which 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.

**Palani Swamy (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 1, 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 dribble & pace dribble (dribbling), restricted area, star defense movement, stop & pivot and shuffling (footwork & rebounding). The findings of the study showed that the test namely long shot, star defense 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.

Cinii (2000) conducted a “Study of an Easy Skill Test battery in Basketball – Selection of Items”. As the opportunities for school education and lifelong sports increase, the demand for
measuring motor skill objectivity is easily increasing. This paper is intended as an investigation of content validity of 21 items of basketball skill test by factor analysis. These items measured for reliability and criterion-related validity by Taken chi and Yamasaki. As a result of the investigation of these validities the following two points were clarified: - Basketball skills which have been studied so far can be classified into three types; ‘quick ball moving ability’, ‘ball throwing ability and jumping ability’, and ‘dribble return’ are outstanding items for use in a simple basketball skill test battery in investigating each skill by both construct validity and criterion related validity.

Brandao et al. (2000) conducted their study to identify the degree of relationship between team final standings and individual skills performance and to compare individual skill of basketball players of different performance level. They have selected the samples of 246 basketball players, 12 to 14 years of age belonging to 21 teams. They played in Official Competitions of Porto Basketball Association in 1998-99. Teams were presented in 4 series of competition (A, B, C, & D) of different performance level according to their standing in a preview tournament. Technical skills were evaluated according to basketball test battery from AAHPERD. Pearson correlation and ANOVA were used as data analysis technique. ANOVA showed
significant differences between series A, B, C and D; Pass (F=34.426, p=0.000), Dribbling (F=23.986, p=0.000), Shooting (F=14.763, p=0.000), Different movement (F=6.131, p=0.000). Schaffer’s post hoc test confirmed the previous differences among the competing groups. Pearson correlation between indicators and team final standings were: Pass (r=0.741, p=0.000, r²=55%), Dribbling (r=0.641, p=0.001, r²=41%), Shooting (r=0.722, p=0.000, r²=52%), and Different movements (r=0.219, p=0.341, r²=48%). The study revealed that there is strong relationship between offensive technical indicators (pass, dribbling and shooting) and team final standings. The result presents important criterion-referenced values for pre-selection purposes in this age group.

**Shanmugam Vairamani (1996)** constructed an agility test for boys of age ranging from 11 years to 15 years belonging to Kendriya Vidyalayas of Madras region in the state of Tamilnadu. For this purpose four thousand eight hundred and eight boys were selected from all Kendriya Vidyalaya School of Tamilnadu state. It was hypothesized that the new agility test might not be reliable and valid. For establishing reliability and validity of the newly constructed test the scores of the constructed test were correlated with the scores of the existing valid and reliable test that measured the same trait. The two criterion test selected
were one Boomerang (Right) 1946 and the second the zigzag run test (The texasran 1973). The test scores were correlated by applying the Pearson product moment correlation and intra class correlation method. He has obtained a reliability coefficient of different group and total population ranging from 0.75 to 0.99 which were highly significant and a validity coefficient ranged from 0.85 to 0.93 which shows a high validity. He had constructed a norm scale by using Hull scale.

**Hassrani (1987)** analyzed skills, motor abilities and psychological components as predictive factors of basketball playing ability at different levels of achievement. Fifty four female basketball players from university level and fifty one female basketball players from national level were selected as subjects. Sixteen skill, motor abilities and psychological variables were statistically evaluated and prediction equation was developed. It was concluded that, the skill variables, namely dribble, push-pass for accuracy, front shot, jump and reach and vertical jump are significantly related to basketball playing ability.

**Clarke and Clarke (1987)** devised twelve items to evaluate the four essential skills in basketball such as speed spot shooting, accuracy speed passing, control dribbled and defensive movement. A pilot study on twelve test items was carried out to determine the administrative feasibility of the test
and provide estimates of their reliability and validity. From a preliminary six-item battery, a four-item model was selected and by intra-class correlation and multiple correlation methods, their reliability and validity estimates were affirmed. The intra-class reliability of the four items for each sex and at each school were 90 and above. Using multiple correlations the validity estimates were determined between subjective ratings of basketball playing ability as the criterion and various skill tests. For constructing the norms data collected from 10,000 samples. The collected data were evaluated by percentile and T-score for each sex and each age from ten through sixteen to seventeen in order to obtain the battery score. Further this basketball skills test battery of four items speed spot shooting, accuracy speed passing, control dribble and defensive movement replaced the pretest of nine test items published in 1966 as separate manuals for boys and girls in 1984.

**Latchway (1986)** cited by Safrit, introduced the test to measure the ability of fourth, fifth and sixth grade students. For this purpose the basketball wall pass test was used. The student's stand behind the restraining line, on signal the ball is thrown against the wall. As it bounces off the wall, the student attempts to hit the ball repeatedly against the target. Any type of hit may be used. Allow one 10 second practice trial and four 15
second test trials. The test score is the number of correct hits in the 15 second period. The test score is the best of four trials. The initial throw against the wall is not score, only balls that are hit count. If a student throws or carries the ball, it is not counted as score. If the control of the ball is lost, it is the responsibility of the student to recover it. Then the ball must again be put into play with a throw against the target.

Face Validity

Reliability of Boys \( r_{xx} \) =

- 0.89 IV grade, 0.84 IV grade
- 0.89 V grade, 0.85 V grade
- 0.89 VI grade, 0.79 VI grade

Hudson (1985) conducted a study on “prediction of basketball skills using biomechanical variables”. The study was aimed at examining the utilization of selected biomechanical variables in order to predict basketball skills by using a CR measurement. Students were U. S. college women basketball players who were divided into three groups (excellent, good and poor) according to skill levels. Such Discriminate Analysis (DA) was employed to predict the ability of students. These DA came from accuracy, stability as well as the height of release. Results revealed that using Discriminate Analysis (DA) along with biomechanical variables could be a useful technique in the prediction of basketball ability.
Toner (1982) investigated the relationship of selected physical fitness and mood variables to success in female high school basketball candidates. McNair’s profile of mood states, Cooper’s 12 minute run test, AAHPER jump and reach test, AAHPER Shuttle run test, AAHPER under basket test, 30 yard dash, and speed dribble test were administered to 81 female high school basket candidates. Each of the three teams was treated on three separate occasions during the regular afternoon practice time for the teams. At the end of the testing and evaluation period, the coaches on the basis of their observations during drills and scrimmage competition independently related each candidate as either a successful or unsuccessful performer. Discriminate analysis procedure supported the following hypothesis:

a) The fitness factor, skill testing and personal factors were successful indicators of a group membership while the POMS variables were to a lesser extent.

b) The battery of tests pre-season and POMS did correlate with coach’s rating.

Hahn (1980) conducted a study on Knox basketball test as a predictive measure of overall basketball ability in female high school basketball players. The Knox basketball four test items were administered to 198 girls from 9 MOS Higher Secondary
School during basketball tryouts and prior to any students being cutout from the team. The stepwise multiple regression procedure was used to analyze the predictive value of 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 players and varsity players. The speed pass and speed dribble significantly predicted the division between the junior varsity and varsity players. Although the comparisons were significant, the skill tests accounted for only 11.1 percent to 28.3 percent of the total variation in the dependent variables.

Garden (1978) predicted basketball playing ability of college women by selected tests. The purpose of this study was to determine the value of cardiovascular capacity measure (Cooper’s 12 minutes run), a leg power measure (Modified Sargent Jump Reach) or upper body muscular strength and endurance (Flexed arm hang), a percentage of body fat measure (Skin fold thickness), and measure of body height as predictors of basketball playing ability and to develop a statistical equation for predicting success in playing college basketball. The basketball playing ability or criterion measures were an ability rating, a personality ability rating, composite ability/personality
rating, the Null Comparative Rating Scale and a ranking of the players by the coaches. The sample was 20 female basketball players from the 1976-77 University of Arkansas and North Eastern Oklahoma State University teams. Ten players from each college participated in the study. The stepwise multiple regression programmer was utilized to form prediction equations by the five tests or predictor variables being correlated with each of the five basketball playing ability measures. The prediction equations were selected using a criteria only those variables which had the lowest standard error of estimate and the greatest ‘F’ value. The equation produced a correlation coefficient of 0.786 and a standard error of estimate of + 0.392. The prediction equation from stepwise multiple regression programmes was, Basketball Playing Ability is 9.0532 +1.36421 (12 minute run) is 0.11303 (height).

From the results of this study the following conclusions were drawn;

a) The Cooper’s 12 minute run and Height are the best measures for predicting basketball ability in this study
b) Measures of leg power and upper body strength and endurance are of the limited value when the 12 Minute Run is used to predict basketball playing ability.
c) Body composition measures have some value in predicting basketball playing ability of college women.

Hopkins David (1977) conducted a study on factor analysis of selected basketball skill test. The primary purpose was to investigate the factor structure of human motor performance in the sports skill domain of basketball and to identify the robust factor in that domain. After reviewing the literature a theoretical model of the hypothesized dimensions of basketball playing ability was developed. The hypothesized factors were

1) Shooting
2) Passing
3) Jumping
4) Movement without the ball
5) Movement with the ball.

Twenty-one experimental variables were selected to sample these hypothesized factors. The variables were administered to seventy boys ranging from grades 7 to 12 enrolled in the University of Minnesota. The findings of this study shows that

1) The hypothesized dimensions of jumping was identified and found to be best measured by jump and reach.
2) The hypothesized dimensions of movement without the ball and movement with the ball were found to be
consolidating into one dimension. The best measures of this factor are zigzag run and zigzag dribble.

3) The hypothesized dimensions of passing was identified and found to be best measured by the speed pass and wall pass.

4) The hypothesized dimensions of shooting was identified and found to be best measured by the side shot, front shot and the foul shot.

**Dhal (1975)** investigated the jump shooting ability in basketball to selected measurable traits. College basketball players (N=24) were tested on eleven independent variables and three criterion variables, accuracy from 10 feet, 21 feet, and total accuracy. Wrist strength and flexibility correlated significantly with 10 feet accuracy; wrist strength, hand size, and hand reaction correlated significantly with 21 feet accuracy. Jump shooting ability from basket 10 to 21 feet can be predicted from the developed regressive equations.

**Clarke (1974)** developed a study of validation of a basketball potential skill test. The study was concerned with the development of basketball potential skill test and the examination of its validity, reliability and objectivity. A subjective analysis of the game and a review of pertinent literature resulted in the identification of three player success factor area: -
anaerobic power, hand and eye coordination and agility. Seven tests of these areas were administered during the year 1971-72 to forty-four basketball-oriented students who had divided themselves into subgroups of twenty-five candidates and nineteen noncandidates by individual decisions regarding intercollegiate basketball candidacy. Bi-serial correlation was utilized to determine validity coefficient for each test with the most valid in each area comprising the final battery. Those retained were jump and reach (work) anaerobic power, 30 second under basket shot, hand-eye coordination, four-way boomerang agility. Validity, objectivity, and reliability were computed and they were 0.915, 0.994, and 0.896 respectively. A multiple regression equation was developed.

**Childress (1972)** conducted a study, the purpose of which was to identify the components of high school basketball playing ability and to construct an evaluative tool for classifying high school basketball players into populations identified as successful and unsuccessful. Twenty-four test items were selected through a review of related literature as valid measures of the components of high school basketball ability. The test items were administered to 106 high school basketball players and the resultant data were analyzed through the utilization of the principle axes method of factor analysis with various
criterions for rotation. Seven factors were isolated and six factors were identified as agility, speed, relative muscular endurance, basketball speed manipulation, gross muscular strength, total body movement time and manual dexterity. One factor was unidentifiable in terms of common test items with high factor of loadings. The test batteries were constructed first consisting of 7 items loading highest on the isolated factors; the second was composed of 10 test items. The first battery utilized in a discriminate function analysis effectively classified the 106 subjects into two populations identified as successful and unsuccessful basketball players. The results of this study indicated that the components of basketball ability could be isolated, measured and utilized to construct an evaluative tool for classifying players into populations identified as successful and unsuccessful.

_Antrim (1972) _designed a continuous test item using 26 college women in a beginning basketball class. The test included 3 phases: dribbling, shooting and rebounding, and finally passing and catching. She used judge’s rating as a criterion score and found that the time for the total test related to the criterion score and found that the time for the total test related to the criterion more highly than the separate parts. Agreement among the judges was 0.87. A validity co-efficient of 0.74
resulted when the player rankings were correlated with the total time of 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 these conditions, the reliability coefficient was estimated to be 0.82.

Ellen-burg (1971) conducted a study to predict the value of selected physical variables in determining performance. The purpose of this study was to determine the value of a battery of ten skill tests and the personal factors of age, height and weight in predicting game performance of High School Basketball Players based on one season of play, to determine which of these tasks and personal factors are most useful for high school coaches and physical educators in predicting performance and to develop a method for predicting player performance in high school basketball competition. The data was collected on 110 selected high school basketball players in the year 1969-70 basketball seasons. The performance data was collected by using a performance rating chart designed by the writer.

The statistical analysis revealed that –

1. The 30 seconds shooting test and vertical jump were the most reliable predictors for the performance variables used in the study,
2. Height, hand grip, vertical jump, wall volley, and 30 seconds shooting tests were the most important variables contributing to a player’s performance in this study. The five item test battery consisting of height, hand grip, vertical jump, wall volley, and 30 second shooting test can be a practical and useful instrument in predicting some performance for high school basketball players.

Raymond (1970) investigated the characteristics of potential college basketball players. Basketball coaches from four classes of institutions were surveyed in an attempt to identify those characteristics which coaches demanded as most important in recruiting school athletes. The four classes of institutions were state colleges and private colleges, state universities and private universities. Thirty six characteristics were analyzed under five categories: attitude and personality, playing experience, physical qualities, mental ability and financial need. Mean ratings were determined for each characteristic for each category. No significant difference was found between the types of institutions and the qualities looked for in recruiting practices.

Gallagher (1970) conducted a study of agility relationship to performance in Women’s Inter Collegiate Basketball. The hypothesis that high positive relationships would exist between
items of the test (Mc-Caniff Agility Components Test) and performances, were not supported. The lack of evidence to support the hypothesis was attributed to some unexpected peculiarities of the sample and several recommendations were made for continued investigation.

**Literatures on Volleyball Skill Test**

Somasundaram Bascaran conducted the study on “Construction of volleyball skill tests and computation of norms for school boys of different age groups in Pondicherry State.” This study was designed to construct new skill tests for service placement skill, under hand pass skill, and to construct norms for the school boys in the age group of 13 to 15 years. One thousand five male students in each age group were selected as subjects. For establishing the reliability of test, the intra class correlation co-efficient was used, and for validity concurrent validity and Pearson product moment correlation was employed for construction of norms, mean, standard deviation and hull scale were used as statistical technique. In the performance of under hand pass of 13 years, 52 subjects were in failing category, 159 subjects below average 595 subjects in average, 520 subjects in above average, 148 subjects in good and 31 in outstanding category. In performance of 14 years boys in under hand pass, 71 subjects in failing category, 128 subjects in below
average 579 subjects in average category, 584 subjects in above average, 135 subjects in good category, 8 subjects in outstanding category. In the performance of 15 years boys in under hand pass, 80 subjects in failing category, 209 subjects in below average, 408 subjects in average, 640 subjects in above average, 160 subjects in good category, 8 subjects in outstanding category. In the performance of 13 years subjects in service placement, 73 subject in failing category, 194 subjects in below average, 544 subjects in average, 180 subjects in good category and 31 subject in outstanding category. In the performance of 14 years subjects in service placement, 86 subjects in failing category, 170 subjects in below average category, 543 subjects in average category, 522 subjects in above average, 138 subjects in good category and 46 subjects in outstanding category. In the performance of 15 years subject in service placement, 12 subjects in failing category, 82 subjects in below average category, 321 subjects in average, 320 subjects in good category and 128 subjects in outstanding category.

Bala Kumararaja (1990) constructed a test of forearm pass wall volley in volleyball for High and Higher Secondary School girls in Tamilnadu. For this study he has selected thousand female students as subjects. For this study forearm pass was taken into consideration for the construction. He had
established a validity 0.80 and a reliability \( y=0.896 \). This shows the new constructed test was better than the criterion test which is already in use.

**Basaran (2001)** conducted a research on construction of Volleyball skill test and computation of norms for school boys of different age groups in Pondicherry state. For this purpose 4515 boys were selected ranging from the age group of 13, 14 and 15 years. It was hypothesized that the newly constructed test might not be reliable valid.

For establishing reliability and validity of the newly constructed test the scores of the constructed test were correlated with the scores of the existing valid and reliable test that measured the same trait. The two criterion test selected were Brumbach Fore Arm pass wall Volley test and Glady’s Scoot and Esther French’s service placement test. The test scores were correlated by applying the Pearson product moment correlation and intra class correlation method. He has obtained a reliability co-efficient of different age groups ranging from 0.75 to 0.99 which were highly significant and a validity co-efficient ranging from 0.90 to 0.95 which shows a high validity. He had also constructed a norm scale by using Hull scale.

**Thirumurugan (1991)** had conducted a study on the construction of service test in volleyball for the Higher Secondary
and High School Boys in Tamilnadu. One thousand male students in the age group of 12 to 18 years were selected as subjects for this study. The criterion test score in two forms namely the average of trials and the best of trials (ACT and BCT) were correlated with the equivalent form of new test (ANT and BNT) by using the Pearson Product Moment Correlation. The average and best in each group achieved a coefficient ranged from 0.748 to 0.956. He obtained a coefficient of reliability for the total sample was 0.96 and the coefficient of validity for the total sample was 0.911.

Milder and Mayhew (1991) conducted a study on the selection and classification of high school volleyball players from performance tests. The purpose of this study was to determine the accuracy of general and specific tests for identifying the players like Freshmen (FR), Junior Varsity (JV) and Varsity teams (VR) and the precision of tests to differentiate between starters and non-starters at each level of play. 50 numbers of high school volleyball players were tested during the first week of practice for six general and four specific motor performance tests. The specific test includes the overhead volley, forearm pass, wall spike, and self-bump/set test. The general test includes height, weight, present body fat, agility run, vertical jump and two flexibility exercises. (VR) players were significantly
better in vertical jump, agility and all specific ball handling tests than the (FR) and (JV) players. The combination of forearm pass, overhead volley, vertical jump and weight, correctly classified 68 percentages of players to their team level. The combination of bump set, height and weight, and shoulder flexibility allowed correct classification of 78 percentages of the starters and non-starters. General and specific tests can successfully select and can classify the high school volleyball players.

Relationship of performance parameters with selected anthropometric measurement of volleyball players (N=86) of Czechoslovakia, represented top league men’s teams, was established (Miloslove, 1988). The selected players realized totally 93% of observed fundamentals thus no deviation of data by lower level of remaining players was allowed. Anthropometric data was measured according to Martin Performance Parameters: Attack hit, block, serve and serve-reception were recorded in a qualitative grades each. Measurements and observations were performed well-trained personnel. Matrix of Pearson Correlation coefficients was further elaborated by factor analysis using method of Principal axes and Kalval’s Orthogonal rotation. Factorization of all players matrix resulted in extra action of 8 factors, while factor structures corresponding to samples of respective special playing functions – spikers,
blockers and setters were created by 7, 8 and 7 factors respectively. 5 of these factors: power of lower limbs, lankiness attack, playing experiences and locomotion abilities were common to all player’s functions, even though with different weight in each structure.

Margaret (1986) discussed the Brumbach Volleyball service test in her book. The test was measure the ability to serve the volleyball low and deep into the opponent's court. The subject stands behind the baseline and serves the ball attempting to hit it between the net and the rope and deep into the back court of the opposite side. The test consists of twelve trials in two sets of six in numbers each. The equipment are volleyball, regular court with standard extensions, rope, floor tape, or chalk powder, measuring tape, scoring cards.

A ball hit between the net and the tied rope lands in the target area which already marked, receives the high score of the two scores assigned to that area. A ball passing over the rope and landing in the target area shall be given the low score of the two scores. The total test scores is the sum of the ten best trials. The foot faults, ball hitting the net and lands outside the target area shall be give the zero score. No validity and reliability have been reported for this specific test.
Barry and others (1982) referred AAHPER Volleyball Skill Test. This test contains four test items. They are volleying, passing, serving and attack. These tests are designed to cover the fundamental skills of Volleyball. In this test the server was given ten trials. The score was the total points made according to the value of the zone in which the serve lands. For children below twelve years of age, the serving lines should be twenty feet from the net instead of thirty feet.

John (1980) conducted a study on an evaluation of objective skill test in volleyball. The purpose of the study was to evaluate objective skill test in the game. He took two tests for evaluation purpose. One was Brady volleyball test and the second AAPHER volleyball test. He selected 40 volleyball players from different colleges affiliated to Jiwaji University as test subjects for this study and for computation of norms for Bachelor of Physical Education students. Total 72 students, who had undergone general course in volleyball were taken to this study. For computing reliability coefficient 15 subjects were selected at random and test was repeated on two days in between. The reliability of coefficient obtained in both the tests significant at 0.01 level of confidence. The tests were validated by correlating performance in tests to the rating of three experts. The validity coefficient obtained was found to be significant at
Helmen (1971) developed tests for three skills crucial to power volleyball. 76 college women who were enrolled in volleyball classes saved as subjects. Four pilot studies were used to establish the face validity of the items. The final battery selected from the experimental tests included the overhead volley test (face pass) the bump-to-self test (forearm pass), and the wall spike test. Three experienced volleyball players rated the 76 students on their general playing ability using a 9-point rating scale. Holmen reported a sufficient degree of consistency among the ratings of the 3 judges to consider their scores as criterion measures. The validity coefficients were 0.5 for the bump-to-self, 0.56 for the wall spike 0.69 for the overhead volley, and 0.73 for the battery. The test re-test method was used to estimate reliability. The coefficients were 0.66 for the wall spike, 0.76 for the overhead volley and bump-to-self pass, and 0.84 for the test battery. Kronavist and Brumbach revised the Brady test, which had been developed for college men, to fit secondary school bodies. Seventy-one tenth and eleventh – grade boys were involved. There judges used the rating scale suggested by Laveage to form the validity criterion. There inter correlations were 0.776, 0.804 and 0.903. The validity coefficient was 0.767 and the reliability, established the test-retest method was 0.817.
Literatures on Handball Skill Test

Lidor et al. (2005) testing for selection is one of the most important fundamentals in any multiple step sport programme. In most ball games, coaches assess motor, physical and technical skills on a regular basis in early stages of talent identification and development. However, selection processes are complex, are often unstructured, and lack clear-cut theory-based knowledge. For example, little is known about the relevance of the testing process to the final selection of the young prospects. The purpose of the study was to identify motor, physical, and skill variables that could provide coaches with relevant information in the selection process of young team hand ball players. In total, 405 players (12-13 years of age at the beginning of the testing period) were recommended by their coaches to undergo a battery of tests prior to selection to the junior national team. This number is the sum of all players participating in the different phases of the programme. However, not all of them took part in each testing phase. The battery included physical measurements (height and weight), a 4x10-m running test, explosive power tests (medicine ball throw and standing long jump), speed tests (a 20-m sprint from a standing position and a 20-m sprint with a flying start), and a slalom dribbling test. National team 2-3 years later those not selected
demonstrated that only the skill test served as good indicator. In all other measurements, a wide overlap could be seen between the results of the selected and non-selected players. It is suggested that future studies investigate the usefulness of tests reflecting more specific physical ability and cognitive characteristics.

Relative contribution of skill and physical fitness domain of handball players was studied by Man-Won (1988). The investigator selected some physical fitness and handball skill measures from physique (5 items), muscular strength (5 items), muscular endurance (3 items), muscular power (5 items), agility (3 items), balance (2 items) and handball skill (4 items) domain were tested on national representative (n1\(=21\)), university (n2=34) and high school (n3=30) handball players. Product moment correlations between 33 measures were computed separately for each group and principal component factor analysis and normal criteria procedure of the orthogonal rotation were applied. In order to investigate the relative contribution, communalities of 9 physical fitness and handball skill domains were evaluated for each different skill level group. The results indicated that degrees of contribution to total variance were increasing tendency from 17% as the handball skill level increased. It implies that higher skill level groups are
more explainable from 33 measures chosen than the lower skill level groups. In mean contribution to total variance for physical fitness was relatively high (11.5% to 14.45%) than the handball skill domain.

**Johnson and Nelson (1982)** described this test in their book. Cornish constructed a test for the measurement of Handball ability. For this purpose five test items were selected, thirty second volley, the front wall placement, the back wall placement, the service placement and the power test. The subjects were all college men. A criterion consisting of the total points scored by each student and the points scored by his opponents was used in the statistical procedure for the test selection. The correlation r for the first five test with the criterion was calculated to 0.69. Among the five test the power test slightly high in correlation with the criterion r = 0.58.

**Sattler (1973)** constructed a test for handball players of beginning stage, with 102 college men in six handball classes as subjects. From eight skill tests, there were selected as having greatest validity as related to a criterion of round robin play within each of the six classes. Highly skilled players were not included in the sample. The three tests were dominant overhand return. One minute continuous Back-wall volley and thirty second alternate hand front wall volley. The respective
objectivity coefficients were 0.89, 0.85 and 0.90 and 0.81, 0.78 and 0.80. The multipliable correlations with the criterion were 0.91.

**Literatures on Kabaddi Skill Test**

**Devaraju and Kalidasan (2012)** predicted the Kabaddi playing ability from selected anthropometric and physical variables among college level players. One hundred and forty four male intercollegiate Kabaddi players were randomly selected from various colleges in Tamilnadu State, India and their age ranged between 18 and 28 years. The subjects had past playing experience of at least 3 years in Kabaddi and only those who represented their respective college teams were taken as subjects. A series of anthropometric measurements was carried out on each participant. These included standing height measured by stadiometer, body weight measured by weighing machine, two length measurements-arm length, leg length, measured by Lufkin Anthropometric tape. The data were collected by following standard testing protocol of international society for the Advancement of Kinanthropometry. Physical fitness components were measured by the following tests. Speed were assessed by 50 m dash, flexibility assessed by Sit and Reach test, leg explosive strength assessed by Standing broad jump, Muscular power assessed by modified sit-ups and
muscular endurance assessed by 2.4 km run. The playing ability which was taken as the performance factor was subjectively assessed by three qualified Kabaddi coaches. All testing was done 2 days before inter-collegiate competition by using scientifically approved equipment. Mean and Standard deviations were calculated for each of the selected variables. The inter-relationship among the selected anthropometrical, physical variables and Kabaddi playing ability were computed by using Pearson' product-moment correlation coefficients. All selected anthropometrical and physical variables that statistically correlated with performance were used to form respective linear predictive models (step-wise argument selection). The results revealed that an Inter-relationship exists significantly between the anthropometrical, physical and performance variables among male inter-collegiate Kabaddi players. The results also revealed that speed, agility, weight and flexibility become the common characteristics which can predict the playing ability in Kabaddi players.

Abhishek Verma, Devpal Rana and Abhimanyu Singh (2011) conducted a study to develop the physical profile of Kabaddi players. For this study, the investigators selected 100 male Kabaddi players from West-Zone Inter-University championship as the subjects of the study. Their age ranged
between 18 to 23 years. Keeping the feasibility in mind speed, agility & explosive power had been selected for this study. Speed & agility were assessed by administering 50 yard dash and the performance was recorded in seconds & shuttle run respectively. To determine for the explosive power, standing board jump was used and the reading was recorded in meters. To develop the physical profile of Kabaddi players, descriptive analysis was applied. The results of study indicates that in case of 50 yard dash, standing broad jump and shuttle run Kabaddi Players were having average in scores. In case of standing broad jump kabaddi Players scored above average. It was concluded that West-Zone University Kabaddi players were average in speed and shuttle run and in case of standing broad jump were above the average.

Vishal Thakur (2010) revealed that scientific approach for talent identification is of utmost importance for superior performance in sports. It is very important that every sportsman is aware of his or her standard of performance and where he or she stands in comparison to other players. Measurement will show the coach how effective his training is and how well the player has assimilated the skill taught. If tests are administered during the training process, the evaluation becomes a motivating factor for the trainees, leading to self-improvement. In kabaddi
the need for a scientific approach in talent identification of players at a young age can be nurturing, in a systematic manner to bring out their potential in full and for best performance. The selected tests must be objective, reliable, and valid should be applied in correct norms.

**Khanna and others (1996)** determined the physical and physiological profile of kabaddi players and the physiological demands of playing a kabaddi match. Maximum aerobic capacity (V02max), maximum ventilation (V02max), pulse, respiratory equivalent (RE), maximum heart rate, and O2 debt were assessed on 16 players. The somatotype of the players was calculated by the Health and Carter method. Heart rate was monitored during a selection trial match on eight players who represented India in the Asian Games, 1994. From the playing heart rate, oxygen consumption (VO2) was computed through a heart rate v V02 regression equation. Maximum lactate was evaluated from the blood samples collected at the end of the match. The average heart rate and oxygen consumption during the match were 146.5 (5D 9.25) beats min⁻¹ and 2.25(0.59) liters min⁻¹ respectively. During raiding the maximum heart rate attained varied from 162.4(11.3) to 177.4(4.2) beats min⁻¹. Out of 40 min of match play a raider raided on average on 8.13(2.03) occasions. The average time per raid was 20.8(6.26) s. The match heart rate
and oxygen consumption was 72.3-83.3% of the maximum heart rate, and 43.5-70.5% of V02max respectively. Maximum lactate at the end of the match was 6.13(2.53) min litre-1. Kabaddi players had the somatotype of 2.68-4.71-1.83, with absolute back strength of 175.0 kg. V02max and 02 debt were 3.59(0.36) liter min-1 [47.82(3.68) ml kg-1 min-1] and 5.3(1.85) liters (70 ml kg-1) respectively.

Kabaddi is an intermittent sport. The rest pause during the game is sufficient for recovery. During raiding the main source of energy is anaerobic.

Dey, Khanna and Batra (1993) investigated physical characteristics, body fat, lean body mass (LBM) and somato type of Twenty-five national kabaddi players (Asian gold medalists 1990), mean age 27.91 years, who attended a national camp at the Sports Authority of India, Bangalore before the Beijing Asian Games in 1990. The physiological characteristics assessed included back strength, maximum oxygen uptake capacity and anaerobic capacity (oxygen debt) and related cardio respiratory parameters (oxygen pulse, breathing equivalent, maximum pulmonary ventilation, maximum heart rate). Body fat was calculated from skinfold thickness taken at four different sites, using Happened skin fold calipers. An exercise test (graded protocol) was performed on a bicycle ergo meter (ER-900) using a
computerized EOS Sprint (Jaeger, West Germany). The mean (S.D) percentage body fat 17.56 (3.48) of kabaddi players was found to be higher than normal sedentary people. Their physique was found to be endomorphic mesomorph (3.8-5.2-1.7). Mean (S.D) back strength, maximum oxygen uptake capacity (V02max) and oxygen debt were found to be 162.6 (18.08) kg, 42.6 (4.91) ml kg-1 min-1 and 5.02 (1.29) liter respectively. Physical characteristics, percentage body fat, somatotype, maximum oxygen uptake capacity and anaerobic capacity (oxygen debt) and other cardiorespiratory parameters were compared with other national counterparts. Present data are comparable with data for judo, wrestling and weightlifting. Since no such study has been conducted on international counterparts, these data could not be compared. These data may act as a guideline in the selection of future kabaddi players and to attain the physiological status comparable to the present gold medalists.

De and others (1982) explained about the participants of inter-university "Kabaddi" competition showed higher values of height, weight and surface area than average Indian population, indicating better attainment of growth in them. Further, the values of respiratory efficiency tests like, FEV1, MEFR and PEFR were also observed to be more in these players, probably due to training effect. The grip strength values were high in comparison
to those of Indian football goalkeepers and hockey players.

**Literatures on Hockey Skill Test**

Kirubakaran (1986) conducted a study on the construction of a battery of objective skill test in Hockey for Madras University students. For the purpose of this study he has selected 32 men college students belonged to the age group of 19 to 25 years and they had enough experience in the game as players representing the college or the University. He conducted the following test to them. 1) Speed, 2) dribble test and 3) ball carrying dodging, passing ability test and target hitting test. The scientific authenticity of the battery of skill tests was established by computing the correlation coefficient. The battery of skill tests constructed by the investigator measures the offensive Hockey playing ability of the Madras university students. It is found that 1. The battery of objective skill tests satisfies the criterion of scientific authenticity in reliability, objectivity, validity and administrative feasibility, 2. These have a significant correlation between the total scores of the test battery and the hockey playing ability assessed by the experts subjectively, 3. The multipliable correlation between hockey playing ability assessed by the experts and the scores of the test battery is also highly significant.
SAI Hockey Skill Testing For Talent Spotting at Young Age:
The three items of the hockey skill test are: (i) Shooting in the
target (goal); (ii) Balancing the ball on the stick (iii) Moving with
the ball, (i) Shooting in The Target:- This test item is aimed at
measuring the ball shooting ability of the hockey player.
Equipment: Hockey sticks, hockey cork balls, two flag posts,
measuring tapes and measuring powder. Test/Target Dimension:
A target is formed by pegging two flag posts (each of two meters
height) at a distance of one meter from each other. A restraining
line at a distance of ten meters from the target is marked on the
ground. Ten balls are placed near the shooting spot on the
restraining line. The subjects are asked to hit all the ten balls
into the target one by one. Scoring and Evaluation: The number
of accurate hits is evaluated with the help of S.A.I prescribed
standards. (ii) Balancing the Ball on The Stick: This test item IS
aimed to measure the balancing ability of the hockey player.
Equipment: Hockey stick and cork balls. Test Procedure: The
subject is asked to balance the, ball on the blade of the hockey
stick continuously for the maximum duration possible. Up to the
11 years age group, the subject is allowed to place the ball on
the stick with hand. While in case of the subject of 12 years and
above, the ball is to be lined from the ground by the subject with
the help of the hockey stick and continue balancing. The
subject may move around, if need be to maintain the balance for the longest duration. The moment the ball is placed on the stick or lifted from the ground and brought under control on the stick, a stopwatch is started and the moment the ball falls down from the stick the stopwatch is stopped and the time is recorded accurate only up to seconds. Two trials may be given. Scoring and Evaluation:- Out of the two trials, the better one, longer duration time is converted to points with the help of SAI prescribed standards, (iii) Moving With The Ball:- This test item is aimed to measure the ball controlling ability of the hockey player when moving with the ball. Equipment: A stopwatch, hockey stick, cork balls, tape and marking powder. Test Dimensions:- Two horizontal lines, one called starting line end the other end line, are marked at a distance of 20 meters.

Test Administration:

The subject must stand behind the starting line by holding the hockey stick in both the hands, the hockey ball must be placed on the start line. On the signal Ready? Go!, the subject must start moving forward by rolling the ball with the stick without breaking the contact of the blade of the stick on the ball and try to cross the finish line with the ball as early as possible. The forward movement of the ball with the blade of the stick should be rolling movement. A stopwatch is started simultaneously to
the signal 'go' and is stopped as soon as the ball and the subject cross the finish line. Each subject is given two trials and better of the two is considered for evaluation. Evaluation: The minimum time taken to reach the end line with the ball is evaluated with the help of SAI prescribed standards.

**Chapman (1982)** designed this test to assess the player's ability to combine the quickness of the wrist and the hand movements needed to manipulate the stick with ability to control the force when contacting the ball. He conducted a pilot study on 23 women inter-collegiate hockey players of Illinois state university.

The test is a timed one in which the subjects were asked to send the ball in and out of the centre circle by tapping it with the stick. A point is scored each time the ball is clearly tapped into or through from the centre, outside the larger circle, provided it can be sent out through a segment other than that through which it entered. No point is awarded for a ball that is tapped. (1) While it is in the orange area or (2) with sound in the side of stick. Total points can be made out of three 15 seconds trials of the subject scores. The test administration should include a demonstration of the scoring techniques. One way ANOVA was conducted on the scores of the first day trials (total of three) and from that an estimate of reliability of the sum was made by
means of an Intra class correlation (Baumgartner and Jackson, 1975), r=0.89. To find out validity the first trial scores (Total of three) were subjected to T test and revealed a statistical difference between the means of scores of members on the two teams significant at 0.01 level. The sample size, mean and standard deviation for team I and team II were respectively. N=11, X=57.45, S.D. = 14.79 and N=12, X=39, S.D=15.94. The totals of rank order values for the 11 varsity players and the 12 junior’s varsity players and their ball control test scores were treated by P.P.M. method correlation. The scores were significantly correlated (r=0.63, n=11, r=0.63, N=12 and r²=0.40).

The findings were the ball control test designed by the tester appears to be reliable and valid and that can be used as assessment tool for the individual skill of all control in women's field Hockey.

Friedal (1974) constructed a test in Hockey for field control and drive while moving. The subject runs from the starting end of 10 by 25 yard rectangle and fields as ball rolled from a corner on the starting end towards the target 1 by 2 yards centered 15 yards away. After fielding the ball it has to be dribbled to the end. Ten trials are given with the ball rolled from the right corner and ten from the left. The elapsed time is totaled separately for each side and then combined for the final score. A
validity coefficient of 0.87 was reported with Schmitt French ball control test. Reliability estimates were 0.90 and 0.787 on left and right side stepped up from split half coefficients.

**Literatures on Lawn Tennis Skill Test**

**Kajohn and others (1992)** studied 111 college students enrolled in the beginning tennis classes at a large mid-western university. The collection of data was incorporated into the normal skills testing procedures conducted in each class and was approved by the departmental human subjects committee. Because the data were collected as a part of the normal evaluation procedures for each class, informed consent was deemed unnecessary.

**Krishna Swamy Panneer selvam (1990)** conducted a research on construction of a service test in tennis for college tennis players in Tamil Nadu. 925 college men players from 86 colleges were selected as subjects. The criterion test scores in two forms namely the average of trials and best of trials (ACT and BCT) were correlated with the equivalent form of the new test. (ANT and BNT) using the Pearson's product moment correlation method. In both the cases of average and best in each group the co-efficient ranged from 0.892 to 0.934.
Bosco and William (1983) referred this test in their book. The Hewitt's Tennis achievement test consists of forehand, backhand and service elements and is categorized according to beginners, advance and varsity levels. The equipment were a seven foot and two inch by two inch measured two wooden poles are installed at each side of the net post and one quarter inch (6.35m.m) rope is strung between the poles at a height of 7 feet (2.13 m) above the net, thirty six number of heavy duty tennis balls, tennis racquets and the court markings were needed for the conduction of this test. The test-retest method, over two successive class periods was used to obtain reliability coefficients of 0.75, 0.78, 0.94; for forehand, backhand, and Service tests respectively. Validity co-efficient was obtained by correlating the test scores with the test criterion, namely ranking of all players from the results of the round robin tournaments. For beginners, the validity coefficients 0.67, 0.62 and 0.72 and for advanced players 0.61, 0.61 and 0.62 for varsity level players 0.57, 0.52 and 0.92 were obtained for forehand, backhand and service tests respectively.

Literatures on Badminton Skill Test

Johnson (1972) have constructed Badminton skill test utilizing the Johnson Badminton Set-up Machine to measure the ability of the smash skill. This is meant for boys and girls of
Junior high school through college. Reliability is $r$ of 0.77 was reported by Bill Parker, 1973 and an objectivity $r$ of 0.94 was obtained between the scoring of an experienced tester and an inexperienced tester. Face validity was accepted for this test. A Johnson Badminton Set-up Machine (motor or manual) is needed along with a tightly strung badminton racket and several birdies. Figure 16-2 shows lines and points that should be marked with chalk or tape on the court. The machine should be placed 13 feet from the net, with the arm rotating belt parallel to the net. The subject will stand below the dropping point of the machine and facing the net. After seven practice trials, the student is to smash the bird into the scoring areas along, either side line. Trials taken without reasonable speed and force are incorrect and must be repeated for scoring purposes. Ten trials are allowed for score and the maximum score possible is ten points. The additional pointers were (a) The student should be informed immediately when an incorrect stroke is to be repeated, (b) If a repeated trial is also incorrect, the trial is scored as zero, (c) The shuttle skirt should be placed skirt down in the cups of the machine so as to allow the bird a quick rotation to the tip down position for the smash shot.
Pooles (1972) have constructed badminton skill test to measure the ability to serve high and deep to the rear of the court. This test may be used with high school and college students of both sexes. The validity of the test correlated were 0.51 with the results of tournament play. The reliability of test-retest coefficient was 0.81. The court is marked, four lines have to be drawn which are indicated by the dotted lines. One line is drawn 2 inches behind and parallel to the back boundary line. A second line is drawn parallel to and 16 inches closer to the net than the first drawn line. This places the second drawn line 14 inches from the back boundary line and 16 inches in back of the doubles long service line. The third line is drawn 16 inches closer to the net and parallel to the doubles long service line. It should be noted that the 5-point zone extends 2 inches beyond the back boundary line. A 15-by-15-inch square is drawn 11 feet from the net in the middle of the service court (0). Two rackets and preferably twelve shuttles, in good condition, are needed for the test. The subject stands anywhere in the right service court (X) and serves twelve shuttles. The server attempts to serve over the extended racket of a student who stands in the square (0) in the target court. This student acts as the "opponent" and assists in the scoring by yelling "low" for any shuttle which does not go over his racket. The scorer stands at point Z. Each serve is
scored according to the zone in which the shuttle hits. The best ten out of twelve serves are totaled. A perfect score would be fifty. Shuttles hitting on the line are given the higher point values. One point is deducted for any shuttle that fails to clear the upheld racket of the player at 0. The following are the additional pointers: Only legal serves are scored. Height of the player '0' who extends the racket over his head is of little consequence. Naturally, extremes should be avoided. Poole believed that this represented a more game like situation than the use of a rope and that it sacrificed very little objectivity. In addition, if the tester wishes to use a rope, Poole recommends that it be 9 feet high and placed 11 feet from the net. The 2 inch zone beyond the back boundary line was included in the maximum point zone because it was believed that an opponent would ordinarily play any shot that close to the base line.

a. In test could be shortened to the best six out of eight trials.

It was found that this scoring method correlated 0.95 with the ten out of twelve scoring system.

b. If desired, the test can be shortened to the best six out of eight trials. This correlated 0.94 with the best ten out of twelve score.

Scott and Fox (1972) have constructed badminton skill test to measure ability to serve high and deep to the rear of the
court. Test is meant for College men and women and also to the high school boys and girls. The validity of the test correlated 0.54 with subjective ratings by judges on forty-five university women. The reliability coefficients of 0.68 and 0.77 were obtained by Scott and Fox using the odd even trials method and the Spearman- Brown Prophecy Formula. Extra standards are needed from which a rope can be stretched across the court at a height of 8 feet and at a distance of 14 feet from the net. A tightly strung racket and at least five shuttles in good condition are needed for the test. With chalk or washable paint, arcs are drawn outward from the intersection of the left singles side line and the long service line. The arcs are drawn at distances of 22, 30, 38 and 46 inches from the midpoint. Each distance includes the width of the 2-inch lines. The subject (a) Stands in the service court diagonally opposite the target and attempts to serve over the rope into the corner of the court containing the target zones that were the point values. Twenty shuttles are served. Any shuttle falling on a line is given the higher point value. The score for the entire test is the total of the twenty trials. Fouls are repeated. The scorer should stand so the he can determine whether or not the shuttle passed over the rope as well as to see where the shuttles hit. Scores are called out to a recorder.
**French and others (1972)** have constructed badminton skill test to measure the ability of the clear shot in badminton. This is only meant for College women. The validity coefficient was reported to be 0.60 when correlated with tournament rankings. Reliability may be the odd-even method stepped up by the Spearman-Brown prophecy Formula resulted in a correlation of 0.96. A clothesline rope is stretched across the court at a height of 8 feet, at a distance of 14 feet from the net. At least five shuttlecocks; a tightly strung racket, and floor markings with lines 1½ inches wide drawn on the floor. The subject stands behind the short service tine on the court opposite the target. Small marks are drawn in each service court 11 feet from the net and 3 feet from the center line. An experienced player serves to the subject who stands between the two marks. A total of twenty shuttles are served to each subject, who attempts to return each shuttle with a clear shot that goes over the rope and, preferably, lands near the end line. The twenty shuttles may be given consecutively or in groups of ten. A serve to the subject should fail between the two marks. If it does not go that far, it falls outside the marks, the subject is not supposed to return it. Thus, the subject does not have to play a poorly placed shuttle; only those shuttles played by the subject count as trials. The subject repeats any
trial in which a foul is committed, such as when a stroke is carried or slung, or in the event that the shuttle hits the rope. The instructor demonstrates, and two practice trials are then gibe. The target extends from side to side, thus the subject does not have to confine his shots to half the court. The point values are given.

**Literatures on Soccer Skill Test**

Rosch and others (2000) constructed the battery for the most important variables for measuring performance in team sports such as football are physical condition and technical and tactical performance. However, because of the complexity of the football it is difficult to ascertain the relative importance of these variables. The aim of his study was to develop a standardized test battery to evaluate physical performance in football players. The F-MARC test battery was designed to closely relate to the football player's normal activity and comprised a functional structured training session of approximately 2.5 hours it included a “quality rating” of the warm-up procedure, test of flexibility football skills, power, speed and endurance. The players finished with a cool-down. A total of 588 football players underwent the F-MARC test battery. Mean values for performance on each test are presented for groups of differing age and skill levels. The test battery proved
to be a feasible instrument to assess both physical performance and football skills. This study supports the fact that analysis of an individual player’s physical profile, in relation to mean values for a similar age group and skill level, might be of assistance to the coach in objectively evaluating the effects of a specific training programme. It may also be of use to the physician and physical therapist responsible for monitoring progress during rehabilitation after football injuries.

**Reginold Varghese** conducted a study on construction of norms for the predicted skills, physical and anthropometrical variables for college men soccer players in Kerala. Accordingly 2000 soccer players were chosen from in University in Kerala, as the subjects for norm construction. The age group of the subjects was between 18 and 25 years. Totally a variable were selected for the study variables selected under fundamental skill were

1. Kicking
2. Dribbling
3. Ball Control

Variables selected under physical characteristics were

1. Speed
2. Power
3. Endurance
Variables selected under anthropometric characteristics were

1. Standing Height
2. Leg Length
3. Thigh Girth

To construct the norms for the predicted variables, mean, standard deviation and the hull scale were used as the statistical technique the predicted variables in the order of their importance were ball control power dribbling and endurance.

In the performance of ball control among the 2075 players, 317 were found to be in the failing group, 873 were in the below average group, 748 were in the average group, 137 were good. None among them were in outstanding category.

In the performance of endurance among the 2075 players 101 subjects were found to be in the failing group, 90 were in the below average 767 were in the average, 813 were above average 276 were good and 28 were outstanding.

**Baumgartner and Jackson (1987)** discussed the Yeagley Soccer battery test in their book. The main objective of this test is to measure the basic soccer skills of the beginners. The validity of each of the four test items were examined with two different criteria. The ratings of four judges on the soccer judging skill and,
1. The composite standard score of the four tests, and the concurrent validity co-efficient were as follows:

2. For dribbling the correlation is 0.80, for wall volley correlation is 0.81, for juggling correlation is 0.74 and for heading correlation is 0.61.

A multiple correlation of 0.76 was reported between the criterion (the judge’s ratings) and dribble and juggling tests. The addition of the wall volley and heading tests increased the multiple correlations to only 0.78. Thus they recommended that dribble and juggling be used if a short form is wanted. With a sample of male physical education major who were beginning as soccer players the following internal consistency coefficients were also reported. The dribble 0.91, wall volley 0.90, juggling 0.95 and heading 0.64 respectively.

**Studies on Norms Construction**

Pitchaiappa (1999) constructed norms for the predicted fundamental volleyball skills of Tamilnadu School Boys at different age level. To achieve these purpose 100 volleyball players in each age group were selected as subjects for the prediction of the fundamental skills. Underhand pass, overhead pass, service, setting, spiking, block were selected as independent variables, and the dependent variable was the volleyball playing ability. All the skills were measured using
standardised tests, the block and playing ability were assessed by subjective rating by a panel of three judges. To choose the minimum number of independent variables in the order of contribution wherry Doolittle method of variable selection was used. When the multiple correlation computed four different fundamental volleyball skills in each age group were predicted. In the construction of norm 2000 volleyball players were selected as subjects for each age group. The Helmen volleyball test was used to test the overhead and underhand pass skill, Russellange volleyball service test was used for serving skill, was spike test by Harold and Mc Gee AAPHER volley ball set up test was used to measure the skill. Blocking was measured by the judge’s ratings. The collected data were statistically analysed for computing mean, standard deviation and hull scale value. Then the norms were constructed for the predicted fundamental volleyball skill for each age group. Among the skill variables service and underhand pass were found to be significantly related with playing ability for all the age groups. Spiking with 16 and 17 years. Setting with 16 and 18 years overhead pass and blocking in the 17 and 18 years. The hull scale norms on the performance of service, underhand pass, setting and spiking shows out of 2000 subjects in the entire selected variable can be identified according to their index in
the norm table such as failing category below average, average, good and outstanding category.

**Grace Helina (1997)** constructed norms for the AAHPERD youth fitness test for the physical education professional college men and women students in Tamilnadu for the purpose of the study, men and women students who studied during the year 1995-96 and 96-97 in all the Physical education colleges in Tamilnadu to taking 1064 men and 500 women were selected as subjects. The age of the subjects ranged from 19 to 25. AAHPERD youth fitness variable were selected for the norm construction. Pull ups, sit ups, 4 x 10 yards shuttle run, standing broad jump, 50 meter, 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 all the selected variable can be identified according to their index in the norm table, such as failing category, Average, above average and outstanding category.

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

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. He selected 1005 subjects from various schools 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 norm, 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 58 subjects were excellent. In flexibility 170 were poor, 259 were fair, 242 were average, 210 were good, 72 were very good 52 were excellent. In muscular strength/endurance, 334 were poor, 249 were fair,
202 were average, 97 were good, 68 were very good and 55 were excellent.

**Mohinder Singh (1986)** had prepared physical fitness norms for high school boys of Punjab state. Data were collected from five thousand subjects from various schools in the state. The test administered consists of eight items that is standing broad jump, sit and reach test, agility run, knee bent sit ups, 50 meters dash, push ups (chairs), cricket ball throw and 600 meters run/walk test. The percentile norms for physical 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.

**Bitecon** have constructed a norm table for the grades of 9 – 12 by taking the following test. Pull – ups, two minutes sit ups, standing broad jump and 300 meters run. He showed the comparison of the validity of the test against with AAPHER youth fitness test. The obtained validity and the reliability co-efficient were 0.934 and 0.961 respectively.

**Kesavan** conducted a study on construction of norms for health related physical fitness tests for high school boys in Dharmapuri, Salem, Periyar and Nilgiris Districts. Two thousand and thirty eight students were selected as subjects for this study. In sit-ups as per the qualitative grading for constructed norms, 298 students were poor, 345 students were
average, 499 students were good, 265 students were very good and 51 students were excellent.

**Dhandapani** conducted a study on construction of physical fitness norms for school boys of eleven to sixteen years of age of South Arcot and Trichy Districts and critical analysis of the selected physical variables for the purpose of the study 7300 boys were selected as subjects. He selected arm / shoulder muscular endurance, abdominal / hip muscular endurance, agility, explosive power of legs, speed and circulatory / respiratory endurance variables. Percentile scale was used to construct norms. As a result he concluded poor performance in school boys in the above variables.

**Muthusamy** conducted a study on construction of norms for physical fitness for school girl of the union territory of Pondicherry. He selected the school girls between the age of 13 and 15 years. AAHPERD youth fitness tests were administered. Mean, Standard deviation and hull scale were computed for the construction of norms. He conducted the test on 100 girls of 13 years of age of which 64 were poor, 10 were good and 3 were excellent. In 14 years of age as per the qualitative grading for the constructed norms, 24 were poor, 34 were good and 7 were excellent. In 15 years of age as per the qualitative grading for the
constructed norms, 27 were poor, 28 were good and 4 were excellent.

Rajasree conducted a study on the construction of norms physical fitness for school girls of the age ranging from 12 to 15 years. 100 subjects were selected as subjects. They were administered the European physical fitness test. The selected variables were shuttle run, sit-ups, standing broad jump, sit and reach and vertical jump. Mean, standard deviation and hull scale were employed for statistical analysis. In shuttle run as per the qualitative grading for the constructed norms, 2 were poor, 12 were good and 71 were excellent. In sit-ups as per the qualitative grading for the constructed norms 19 were poor, 9 were good and 7 were excellent. In standing broad jump as per the qualitative grading for the constructed norms 32 were poor, 13 were good and 3 were excellent. In sit and reach 22 were poor, 20 were good and 5 were excellent and in vertical jump 79 were poor no one was good and 19 were found to be excellent.

Rao 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. He selected 1005 subjects from various schools in Andhra Pradesh. The following variables were selected for this study. Aerobic endurance, body composing, muscular strength and upper in this study. As per
the qualifications grading after the constructed norm, 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 58 subjects were excellent. In flexibility 170 were poor, 259 were fair, 242 were average, 210 were good, 72 were very good and 52 were excellent. In muscular strength endurance 334 were very good and 55 were excellent.

Alex conducted a study on computation of norms for the playing ability among college football players. He had computed the norms for kicking skill test based on the hull scale for 150 players were above the average level. Thus it was proved that the performance of the Warner soccer kicking skill test for college players were good.

Summary on Literatures
The development of sports skill test had a long and productive history. Skill tests reflect the ability of the pupil to perform in a specified sport such as badminton, hand ball or basketball. By knowing the level of ability of a player in a particular sport, it becomes possible to use his ability score for purposes of classification determining progress and marking. It clearly showed the trend of present study. Further the literatures collected for this study helps to know the merits and demerits of
the existing skill tests and helps to construct the new skill test in basketball.