Chapter II

REVIEW OF RELATED LITERATURE

The research scholar has made every possible effort to go through the literatures related to the problem in the game of soccer wherever available. The scholar has gleaned through almost every source like Research Quarterly, journals of various kinds, periodicals, encyclopedias, relevant books and websites of soccer and physical education in the Internet to pick up the related materials. While going through the various sources of literature, it has been observed that very little work has been done on specific skill test related to the game of soccer. However, the scholar also has gone through the literatures of allied studies that are related with other games and sports to collect the necessary informations for making a proper shape of the study.

A brief review of the studies related to the present study which the research scholar had come across are cited below in two categories:

1. Studies related to soccer.

2. Studies related to other games
Studies Related to Soccer

An early and inclusive test of soccer skill of girls was described by Venderhoof\(^1\), which, while not scientifically devised, covered important elements of soccer, including dribble; trapping; place kick for accuracy; dropped ball kick for distance; volley for distance with forehead, shoulder, hip, or knee; throw-down (securing ball from opponent within a 6-yard circle); tackling; corner kick; and goalkeeper’s test. The test description includes a suggested scoring graph to facilitate analyzing an individual’s ability and to afford a basis for assigning team positions.

The first scientifically devised soccer skill test was constructed by Heath and Rodgers\(^2\) for fifth and sixth-grade boys and girls based on teacher analysis of the game. The test items include (1) dribble – over a course of four chairs spaced on a line 3 yards apart; (2) throw-in – ten trials to 2 and 4 foot diameter target centered 6 yards away; (3) place

---


kick for goal – 10 trials from 12 yards; and (4) kicking and rolling ball – five trials on ball rolled from each side of goal. T-scales are available for fifth and sixth-grade boys. Coefficients of 0.60 and 0.62 for the two grades were obtained with teacher judgement. Reliability was reported as 0.72 to 0.74 for composite scores.

Nelson and Cozens\textsuperscript{3} describe four soccer tests – dribble, kick for distance, place kick for accuracy, and throw-in for distance – complete achievement scales for boys and girls in elementary and junior high school.

Cozens and his associates\textsuperscript{4} devised a test for high school and college girls involving place kicking for distance, punting, dribbling, the throw-in, and the goal kick. T-score tables are available, and satisfactory validity and reliability are reported.


Shaufele\textsuperscript{5} devised the following soccer tests for ninth and tenth grade girls:

1. Volleying (validity – 0.57, reliability – 0.67, subjective – 0.68 with other tests).

2. Passing and receiving (validity – 0.50, reliability – 0.56 odd-even, subjective – 0.68 with other tests).

3. Judgement in passing (validity – 0.34, reliability – 0.69 odd-even, subjective – 0.65 with other tests).

Bontz\textsuperscript{6} constructed some skill test items of soccer to measure the important skills of dribbling, passing and trapping. If one has the time and space, this would make an excellent second test. The test was administered to 125 5\textsuperscript{th} and 6\textsuperscript{th} grade children from two school systems, yielding reliability co-efficient of 0.33 by the odd-even method. The


validity coefficients were 0.92 for one group of 92 subjects & 0.53 for the remaining 32 subjects with a criterion of subjective rating.

Warner⁷ developed a test of soccer skills. The purpose of the study was to measure the fundamental skills of soccer. The study was designed for Junior and Senior High School boys and for High School Varsity soccer players. Soccer coaches who rated them according to their importance and the degree of difficulty to learn evaluated the test items. The test includes of following items:

1. Kicking for distance (right foot)
2. Kicking for distance (left foot)
3. Corner kicking for accuracy
4. Heading for accuracy
5. Throw-in for distance
6. Penalty kick for accuracy
7. Dribbling for time.

The uses of the test were, to help in the grading procedures, to increase interest in the activity by reporting quickly and to help the beginner see that skill with both feet should be developed.

McDonald⁸ studied the use of volleying a soccer ball against a backboard as a test of general soccer ability. With college men as subjects, he 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.

Crawford⁹ constructed a battery of soccer skill tests yielding a multiple correlation of 0.80 with the criterion of judge’s rating by using 30 women majors in physical education. The tests are — (1) Dribbling, (2) foot passing and receiving, and (3) passing and trapping.

The respective coefficients for validity and estimated reliability from split-half correlations were – (1) 0.73, 0.89; (2) 0.58, 0.84; and (3) 0.45, 0.88. As noted, the best single test was the dribble test. The multiple regression equation for the battery was: 1.5 test 1 + test 2 + 1.8 test 3 – 132.

Annarino\textsuperscript{10} compared the two methods of soccer instruction. The measures of initial and final status in soccer skill ability and soccer knowledge were obtained for each of the students in the drill and game methods groups by the administration of a standardized soccer knowledge test for college men and a four item soccer skill battery (volley, dribble, heading and distance kick). No significant differences were found between the final measures for the game and drill groups in terms of soccer skill and knowledge except for heading ability. The game group was superior to the drill group in terms of heading ability. A correlation of 0.627 was found between the subjective and objective estimates of soccer ability. The correlation between the results of the

objective test of soccer skill and objective test for soccer knowledge was insignificant.

Johnson\textsuperscript{11} also developed a wall volleying soccer test for college men. The test area or the target dimensions are same as the regulation soccer goal. The restraining line is 15 feet away from the wall. The reliability co-efficient for the test was 0.92 for consecutive trials. Validity was determined by rank-difference correlation between scores on the test investigators’ rankings of soccer ability at various levels. The correlation 0.98 for college men in required physical education classes, 0.94 for physical education major students, and 0.81, 0.84 and 0.58 respectively, for 3\textsuperscript{rd}, 2\textsuperscript{nd} and 1\textsuperscript{st} team varsity soccer players.

Crew\textsuperscript{12} related several soccer skills to the soccer ability for college men. The criterion of soccer ability consisted of the opinions of competent judges’ formed during competitive play. Correlation of test

\textsuperscript{11} Joseph R. Johnson, “The Development of a Single Item Test as a Measure of Soccer Skill Test”, 1963 (Cited by Clarke & Clarke, Application of Measurement to Physical Education, PP. 243-244).

objective test of soccer skill and objective test for soccer knowledge was insignificant.

Johnson\textsuperscript{11} also developed a wall volleying soccer test for college men. The test area or the target dimensions are same as the regulation soccer goal. The restraining line is 15 feet away from the wall. The reliability co-efficient for the test was 0.92 for consecutive trials. Validity was determined by rank-difference correlation between scores on the test investigators' rankings of soccer ability at various levels. The correlation 0.98 for college men in required physical education classes, 0.94 for physical education major students, and 0.81, 0.84 and 0.58 respectively, for 3\textsuperscript{rd}, 2\textsuperscript{nd} and 1\textsuperscript{st} team varsity soccer players.

Crew\textsuperscript{12} related several soccer skills to the soccer ability for college men. The criterion of soccer ability consisted of the opinions of competent judges' formed during competitive play. Correlation of test

\textsuperscript{11} Joseph R. Johnson, "The Development of a Single Item Test as a Measure of Soccer Skill Test", 1963 (Cited by Clarke & Clarke, Application of Measurement to Physical Education, PP. 243-244).

items with this criterion were 0.96 for ball control, 0.95 for aerial accuracy, 0.92 for dribbling and 0.88 for wall volley. A multiple correlation of 0.97 was reported with the ball control and dribbling test.

Garry\textsuperscript{13} conducted a study on the relationship of college football player's strength, speed and agility to the coaches' ranking. Playing position were combined into offensive backs, defensive backs, offensive linemen, defensive linemen and into group I & group II. Correlation was then computed between objective test scores & the coaches' subjective evaluations. It was concluded that arm strength and agility were not valid predictors of football ability and leg strength and speed were significant predictors of football ability.

Mackenzie\textsuperscript{14} has conducted a study on the evaluation of a battery of soccer skill tests as an aid to classification of general soccer ability. 38 subjects from general physical education classes and 10 subjects from the varsity soccer team were selected. Each subject was tested and

\begin{flushright}

\end{flushright}
evaluated by 5 judges on his ability to perform the skills of trapping, dribbling and kicking a lateral moving ball, in addition to the McDonald Kickboard Test. Data were processed using the Smillie Stepwise Multivariate Regression. Formulas were determined which explained 68.97% of the variability as seen by the experts, and when used with data in the range of this study; they present a resultant useful on the 1-100 point scale of general soccer ability.

Yeagley\textsuperscript{15} constructed a test battery for measuring basic soccer skills of beginning players. 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 of 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 correlation to only 0.78; thus recommended that

\textsuperscript{15} J. Yeagley, Soccer Skills Test”, (Unpublished Paper, Indiana University, Bloomington, IN. (Cited by Ted A. Baumgartner and Andrew S. Jackson, Measurement for Evaluation in Physical Education and Exercise Science, P. 390).}
dribble and juggling be used if a short form is wanted. With a sample of male physical education majors who were beginning soccer players, the following internal-consistency coefficients were reported: dribble, 0.91; wall volley, 0.90; juggling, 0.95 and heading, 0.64.

Kovacs\(^\text{16}\) evaluated the "Bounce-Drill Soccer Test" which is known as McDonald Soccer Test. The purpose of the study was to measure the general soccer ability. He used both McDonald kicking skill test and Judges' ratings as criteria with the assistance of 38 soccer players comprising of members of a freshmen soccer team, varsity team and 1 professional player.

The reliability, figured on the Split-Halves method was 0.97 for the total group, 0.94 for varsity groups and 0.95 for the freshmen group. The test is more for the freshmen level players than varsity level players. Reliability, however, is high for both groups. The use of this test is to consider with other measures to assess overall playing ability.

and improvements, to motivate students as they practice this skill unique to soccer.

Furness\textsuperscript{17} developed a test for penalty-kicking performance for SHS boys, 14 to 16 years of age. The Ss (N=78) were members of a varsity soccer team (N=21), J.V. soccer team (N=22) and a randomly drawn group of non-soccer players (N=35). To make the test game-like, a regulation soccer goal (24 ft. X 8 ft.) was divided into three different scoring areas depending on their distance from the centre of the goal. The test items consisted of accuracy and velocity measures. Multiplying the M velocity score of the 20 trials derived a penalty kick index (PKI) by the total accuracy point value. The validity of the test was establishing by utilizing deductive reasoning, divergent groups and judges' ratings. Reliability of the test was established by the intraclass V method. The three divergent groups differed significantly (p<.05) in velocity and in PKI but not on accuracy. The velocities co-efficient for

intracllass V were 0.95 for tester 1 and 0.93 for tester 2. The accuracy V
for tester 1 and tester 2 were 0.31 & 0.28 respectively.

Christian\(^{18}\) had designed a study to identify the contribution of
selected variables to the game performance of 30 members of the 1973
South Eastern State College Football Team. Each subject was tested on
12 variables, and a step-wise multiple regressions were used to
determine the weight of each of these variables to the ultimate criterion.
The ultimate criterion was the percentage of plays executed correctly as
determined by grading the film of the regular season football games.
From the multiple correlations co-efficient, the variable, which
contributed most to the game percentage scores, was determined. In
this manner, those variables, which were more predictive of football
performance, could be identified. It was hoped that by identifying these
variables, variable information could be provided of coaches.

\(^{18}\) Ronald G. Christian. "The Contribution of Selected Variables to College
McDavid\textsuperscript{19} constructed a battery for predicting potential in football players. He selected 67 football players and was predicted from their score on the football potential test. The test battery consisted of motor ability items as well as football skill items (Mcclay's Classification Index, strength, power, time to hit audio-visual, agility, speed, work output). Substantial correlations were obtained between most test items and the test criterion, the sum of 't' scored, size as depicted by Mcclay's classification index (C.I) had a negative non-significant correlation with the criterion. The discriminative power of the battery was evidenced by the highly significant correlation between the test criterion and the coaching staffs ranking of individual players (rho=0.840). It was concluded that athletic potential in football could be predicted by testing.

Michele\textsuperscript{20} developed a test battery for predicting football ability at the college level. The major purpose of the study was to explore the


possibility of developing a regression equation whereby football ability could be predicted from an analysis of selected orthopedic measures, strength tests, power measures, balance, standing height and body weight. 14 measures were determined on each of the 56 scholarship football players at the University of Arkansas, who were selected for the study. In addition, 6 assistant football coaches, 3 offence and 3 defense, rated each offensive and defensive player, respectively. The rating on football ability was used as the criterion.

The results of the study seem to justify the following conclusions for the predictions of football ability for scholarship football players at the University of Arkansas: (1) Tibial torsion, bow legs, standing height, body weight, Margaria-Kalamen Anaerobic Power Test & knee flexion are the best measures for the prediction of football ability in this study, (2) Strength tests using a cable tensiometer, are not good predictors of football ability, (3) Fleishmann’s Static Balance Test is not a good indicator of football ability, (4) Tibial torsion and bow legs indicate that orthopedic measuring are of value in predicting football
ability & (5) Margaria-Kalamen Anaerobic Power Test is a good measure of football ability.

Mor and Christian\textsuperscript{21} developed a skill test battery to measure general soccer ability. Forty-five male college students participated in this study. They were classified into three groups: varsity team players, intramural divisional championship players and physical education soccer class players.

Five tests were investigated in this study. The three test items namely dribbling, passing and shooting together made up a battery with acceptable reliability and validity, and the other two tests required special equipment that would rarely be found in schools and added little to the overall battery. The criterion measure was rating scale developed and used by three soccer experts. Each subject was evaluated during actual matches played. Each test was correlated with criterion measure. The coefficients obtained were: dribbling, 0.731; passing, 0.776 and

shooting, 0.912. Using the test-retest method, the reliability coefficients were: dribbling, 0.795; passing, 0.961 and shooting, 0.984. The objectivity coefficients were: dribbling, 0.998; passing, 1.0 and shooting, 0.999. A multiple correlation analysis was used to select the test battery. The following multiple correlation co-efficients were obtained for the various test battery combinations: passing, 0.776; passing + dribbling, 0.790 and passing + dribbling + shooting, 0.913.

Amusa\textsuperscript{22} selected 46 subjects, who were well-conditioned soccer players with at least two years playing ability experience on the college level. They were tested for running speed, power, agility, VO2 max. strength, anaerobic capacity and flexibility. In additional, all anthropometric measurement consisting of skinfolds and body diameters were taken. Soccer playing ability served as the criterion and was measured by rating of three-experienced soccer coaches' based on selected soccer skill and strategies. Analysis of data was by zero order

correlation and multiple “R” analysis resulting in the following conclusions:

Age is the best single predictor of playing ability; weight LBW and weight are considered good predictors of playing ability, Max. VO2 and running speed were considered important factors in soccer performance. Speed, strength and agility locate concentration and leg power is not considered as valid indicators of playing ability.

Beitor\textsuperscript{23} constructed a study for the prediction of football playing ability. 46 players served as subjects and using general and specific motor 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 4 tests to estimate the sum of 18 T-scores. Neither the 4 nor 18-item profile sig 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-

Kalomen anaerobic power. Contrary to results of other studies to predict success in football, the test battery developed in this study did not distinguish between starters and non-starters. Possession of speed, strength and size does not guarantee success in highly skilled game such as soccer.

Bhattacharya\textsuperscript{24} constructed an objective skill test battery in soccer for professional students of 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, 0.92 were obtained for the above test items respectively. The validity co-efficient obtained was 0.94.

Ozkan\textsuperscript{25} determined the physical, physiological and motor skill in male high school soccer players. The purpose of this study was to investigate the physical, physiological and motor skill characteristics of

\textsuperscript{24} P.K. Bhattacharya, “Construction of an Objective Skill Test Battery in Soccer” (Unpublished Master’s Thesis, Jiwaji University, 1984).

77 male volunteer high school soccer players between the ages of 15 & 18 years old. Test items consisted of age, height, weight, percentage of body weight, resting heart rate, 1.5-mile run, 50-yd. sprint, vertical jump, South-East Missouri State College (SEMO) agility test, trunk extension & flexion, ball control, wall volley and obstacle dribble skill tests.

The statistical analysis revealed an average height & weight of 174.92 cm & 64.74 kg for the entire group of players. Average resting heart rate and body fat were 70.07 bpm, and 10.38%, respectively. On the 1.5-mile run, the subject scored in the excellent category, whereas they scored fair on the 50-yd. Sprint and the vertical jump. Results of the SEMO agility run indicated that the subjects had similar levels of agility as that of college soccer players. In terms of trunk extension and flexion, subjects scored below average and good on the two tests, respectively. On the three soccer skill tests, the players scored between the 85th, 100th percentiles of norms established for high school & college age soccer players.
Correlation indicated that weight, aerobic endurance, anaerobic power, and ball control skill are essential factors in high school soccer.

Ahrari\(^{26}\) analysed the effects of three types of approach run on distance and accuracy in two styles of instep kick in soccer. The 2-step, 3-step and 4-step approaches and pivot instep kick and full instep kick of a soccer ball were compared in terms of distance and accuracy. SS were 15 players from the western Illinois soccer team. Each S was given 5 trials for each of the conditions in such a way that the order of the conditions was recognised. The data were analysed with a 3X2 ANOVA with repetitive measures. The Scheffe method of multiple comparison of Ms was used when sig F values were found. The longest distance was produced by use of the four-step approach of either 1 of the 2 types of kick, and the greatest accuracy was produced by use of the two-step approach of the pivot instep kick.

Kansal\textsuperscript{27} described about a football skill test in his book, "Test and Measurement in Sports and Physical Education". The test was developed by Sports Authority of India (1992) and known as SAI Football Skill Test. This test is used by SAI for spotting talent football players at young age and consists of following three test items:

1. 30 m running with the ball
2. Kicking for accuracy
3. Juggling

Singh\textsuperscript{28} constructed 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 football-to-football performance. The result of the study shows that kicking for distance, 70 metre run, 1-mile run and WM agility run with ball contribute much to playing ability in football among motor fitness.

Chaudhary\textsuperscript{29} investigated the relationship of speed, strength and agility with playing ability in soccer. 20 male soccer players of Kendriya Vidyalaya, Calcutta, were selected as subjects. The finding of the study indicated that speed of the subjects was very reliable variable for predicting players’ ability of male soccer players as the correlation value between speed and playing ability (ratings judged by a panel of 3 experts for each subject during the game) obtained was 0.597. It further reveals that the correlation values between standing broad jump, agility and playing ability was 0.444 & -0.526 respectively. All the above-mentioned three values were found significant at .05 level of confidence. Further the correlation values between sit-ups, pull-ups, push-ups and playing ability obtained were 0.102, 0.258 & 0.430 respectively. These values indicated low positive relationship.

\textsuperscript{29} Dipesh Chaudhary, “Relationship of Speed, Strength and Agility of School Level Football Players with Total Football Ability”, (Unpublished Master’s Thesis, LNIPE, Gwalior, 1999).
Studies Related to Other Games

Johnson\textsuperscript{30} 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 coefficients 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' groups of basketball players; the good group was composed of boys who made a high school basketball squad and the poor group was composed of those who did not make the squad.

Brace\(^\text{31}\) proposed a football achievement test to predict likely success of players. The test includes (1) forward pass for distance; (2) punting for distance; (3) forward pass at a target of 2, 4 and 6 ft diameter concentric circles, 15 yards restraining line; (4) dodging run with ball; (5) 50 yd dash with football; (6) charging – with harness connected to back and leg dynamometer; (7) pull out – time to run around post 9½ ft to the left and across line 5 yards forward; and (8) blocking – time to knock over three dummies and complete a 15 yd course. One practice trial is allowed for each item except 5. No scoring tables are available. Low but acceptable validity with judgement criterion was reported.

Brady\(^\text{32}\) constructed a repeated volleys test as a measure of general volleyball playing ability for college men.

In this test, a single target is marked on a wall. A 5 ft long horizontal line, 11½ ft from the floor is marked on a smooth side of a


wall. Vertical line is extended upward towards the ceiling at the ends of the horizontal line. Subject stands where he wishes and throw the ball as many times as possible in one minute. Only legal volleys are counted i.e. they must be volleys not thrown balls and must hit the wall within the boundaries of the target.

In this test 522 college men and 15 YMCA expert players were used. Reliability co-efficient of 0.93 was calculated between repeated tests by the subjects during the same testing period. For validity, a coefficient of 0.86 is repeated between the scores on the tests and the combined subjective judgement of four qualified observers.

The first scientifically devised test of handball skill was developed by Cornish. Using a criterion of the differences of points scored by a subject as compared to points scored against him in 23 games and involving 134 different subjects, a validity coefficient of 0.694 was obtained with a multiple correlation of five skill tests. The tests include the following:

---

1. 30 second volley
2. Front-wall placement
3. Back-wall placement
4. Power test
5. Placement service

He suggests a two-test battery of items 1 and 5, which correlated 0.667 with the criterion. The power test appears to be the best single tests in view of its correlation with the other tests. Neither norms for reliability are reported.

Singh\textsuperscript{34} prepared a two items test, which included “dribbling and hitting”, and “dribbling and goal shooting”. The subjects for the study were 107 were students of two Arts College 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 and the validity of dribbling and goal-shooting test was .80. He correlated the two tests in order to determine if they measured different

\begin{footnote}
\end{footnote}
aspects and the result was 0.41. He also prepared t-scores for college men.

Kowert\textsuperscript{35} constructed a badminton ability test battery for men. 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 the judges’ rating scale as determined by the inter-class correlation between the sum of the three judges’ rating and the scores obtained for the diagonal run. Millar’s Wrist Volley and French’s Long Serve Tests, was 0.84. It was found that the badminton playing ability of the male college students (N=46) could be 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.

Holland\textsuperscript{36} conducted a study on the predictive value of selected variables in determining the ability to play basketball in small high

\footnotesize

\textsuperscript{36} Kenneth A. Holland, “The Predictive Value of selected Variables in Determining the Ability to Play Basketball in Small High Schools”, Completed Research in Health, Physical Education & Recreation, 7 (1965): 37.
schools. Measures included speed, agility, upper arm strength, power, ball-handling ability, reaction time, shooting ability, passing ability, height, weight, age and previous experience. The criterion was the rating of basketball playing ability of each squad member of his coach. The most important variables were experience, ball-handling ability, passing ability and shooting ability. The weighted index with $R=0.76$ was basketball ability score ($-1.54$); number of years experience ($1.23$); score on speed dribble ($0.26$); score on wall volley ($0.15$); score on shooting test $(10.11)$.

Illner\textsuperscript{37} suggested the construction and validation of a skill test for the drive in field hockey. Beginning 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 instruction and or practice. Speed and accuracy were considered to be the important aspect 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 = .72 and higher) and valid measures of an individual's ability to execute the drive.

Antrim\textsuperscript{38} designed a continuous test item to predict and evaluate basketball playing ability 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 judges' ratings as a criterion score and found that the time for the test related to the criterion more highly than the separate parts. Agreement among the judges was 0.87. A validity coefficients of 0.74 resulted when the player rankings were correlated with the total time on the test. The reliability was estimated 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 conditioned the reliability coefficient was estimated to be 0.82.

The purpose of the Dangwal study was to measure specific element constituting the playing ability of state level hockey players. The subjects were Netaji Subhash National Institute of Sports regular trainees and three experts working as coaches were appointed as experts for ranking the players. The test were:

1. Speed of the ball
2. Stopping and shooting
3. Interception and clearance
4. Receiving and passing
5. Tapping with only left hand or,
   Tapping through wooden blocks
6. Dribbling through wooden blocks
7. Speed with optimum ball control
8. Dodging towards right and left

---

9. Running with ball while changing direction
10. Specific speed endurance
11. Test of relative performance.

Reliability – Through test retest method Product Moment Method between two sets of scores.

Validity – Spearman’s Rank Correlation Co-efficient between rank of the subjects and corresponding rank of the subject according to the scores. The test was able to rank the subject for their attacking and defending ability separately. The test for dodging and test for specific endurance requires further investigations.

Phipps\(^{30}\) assessed a comparison of selected factors predictive of volleyball playing ability. The purpose of this study was to compare selected general ability tests, specific skill tests and personality traits as predictors of volleyball performances in high school girls. It was a further purpose of this study to determine which of these variables had the highest relationship with overall performance. It was also the

purpose of this investigation to develop prediction equations from the three variables or combinations of the variables that proved worthwhile and to determine the validity of the selected equations.

Three general ability tests, three specific volleyball skill tests and a personality test were administered to 120 high school girls trying out for varsity teams in sixth schools. The coaches of each team assigned a subjective pre and post-season score to each of their respective players. The post-season score was used as the criterion measure. The data from three of the schools were used to develop prediction equations using a general linear model procedure. The data from the remaining schools were used to validate the equations.

In the result it was indicated that the specific skill tests model had the highest correlation with overall performance. The variables of general ability and personality trait were not related to volleyball performance. The combined equation of general and specific had the highest relationship of any combined model to the criterion score. The specific model was the most valid predictor of criterion scores followed by the combined general and specific model.
Joseph\textsuperscript{41} studied the relationship of power, agility, flexibility and measurements of selected body segments to volleyball playing ability testing thirty volleyball players and found that power was the most reliable single variable in predicting playing ability in volleyball. Arm length and leg length were also reliable. Flexibility and agility showed significant relationship to the playing ability.

Yilla & Sherrill\textsuperscript{42} validated the Beck battery of quad rugby skill tests. The purpose was to develop a valid and reliable battery of quad rugby skill tests. Participants were 65 adult male, quad rugby athletes. Construct validity was established in two modified Delphi rounds by a panel of international experts. For Concurrent validity, Spearman rho 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. Intraclass reliability co-efficient ranged from 0.94 to 0.99. The battery


\textsuperscript{42} Abu B. Yilla & Claudine Sherrill, “Validating the Beck Battery of Quad Rugby Skill Tests”, \textit{Adapted Physical Activity Quarterly}, Vol. 15, No. 2 (April 1998): 155.
includes five tests: maneuverability with the ball, pass for accuracy, picking, sprinting and pass for distance.