Chapter II

REVIEW OF RELATED LITERATURE

The researcher has made every effort to obtain literature related to the problem for the game of volleyball. For this purpose, he made the maximum possible efforts by spending considerable time in the major libraries pertaining to the literature on Physical Education and Sports. The researcher had access to the libraries of Panjab University, Chandigarh, P.G.I., Chandigarh, NSNIS, Patiala, Government College of Physical Education, Patiala, and Lakshmibai National College of Physical Education, Gwalior. A brief review of the studies relevant to the problem has been presented in this chapter.

The literature pertaining to it has been abstracted in this chapter to provide the background material so as to evaluate the study well as to interpret its findings.

Horak\(^1\) evaluated the physical fitness of the 1972 Olympic men's team of Czechoslovakia to know the level

of fitness. The test battery consisted of age, weight, height, percentage fat, reach height, 3 kg medicine ball put by both hands first, with right then left hand, 350 gram ball throw with run-up and without run-up, broad jump, triple jump, touching the basketball board by jumping, sprint 60 mts, 1000 mts, run, step test and bicycle ergometer test. He found that these items were significantly related to their performance.

Spence et al.² developed a descriptive profile on 15 members of the United States Women National Volleyball team, who were highly skilled. The data were obtained from anthropometric, strength, physiological and motor performance domains consisting of jump and reach, triple hop, agility run, and 20 metre dash. Within group comparisons were made between the six women who were selected for the Pan American team and the nine who were not selected. The Pan American selected players were taller and heavier and demonstrated better motor ability than the non-selected

players. Strength measurement did not indicate consistent differences between the two sub-groups. The non-selected players had a greater VO₂ max than those selected. Between group comparisons on selected variables were made between the team players and other women volleyball players. The training team subjects were taller and heavier than the comparative groups. The training team group demonstrated a lower heart rate MAX (180 beats/min) than the other groups and their VO₂ max (43.2 ml/kg/min) was within the range of the comparative groups.

Murugesan³ established the relationship of height, agility and vertical jump to spiking in volleyball. The researcher conducted tests on 30 male students of L.N.C.P.E., Gwalior, and concluded that the vertical jump is the most reliable single variable in judging spiking ability of men volleyball players; combination of height and vertical jump proved to be the most reliable for assessing the spiking ability of male

volleyball players. The combination of three variables, i.e., height, agility and vertical jump, was found valid and reliable for predicting spiking ability of male volleyball players. The most valid combination in predicting spiking ability consisted of height, agility and vertical jump.

Adhikari\(^4\) opined in his research study, conducted on 30 college boys to find out the comparative relationship of power, agility and selected speed characteristics to block jump and three-stride jump in volleyball. A different set of tests like Sarjent jump, Nelson speed of movement test, Squat thrust, etc., were used to measure different components and their relationship to each other. The results showed that:

1. Power of an individual contributed much to performance of Block Jump and Three-stride jump and showed positive relationship with each other.

2. Agility, which was a required factor in performance in vertical jump, co-relates significantly with Block Jump and Three-stride Jump.

3. Speed, reaction time and speed of movement did not contribute much in performance of Block Jump and Three-stride Jump.

4. Power and agility played an equal role in the performance of Block Jump as well as Three-stride Jump because there was no significant difference between the 'r's of power and agility to the performance at Block Jump and Three-stride Jump.

Phipps\(^5\) inferred that the game of volleyball requires quickness, endurance and co-ordination and suggested that a player was to be evaluated through the skill tests, physical component, general ability tests and specific skill tests. In his study he first gave the general test of general ability test,

successive long jumps, vertical jumps, rolling tests, seven-second run, bend reach, basketball throw, Illinois agility run, shuttle run, push up and ball roll. The vertical jump, seven-second run and shuttle run, had the highest correlation to performance.

He concluded that the specific ability and sport skill were more specific than general, especially at Senior High School levels, such as blocking test, approach spiking, bump test, repeated volleys test for setting, switching and digging, and accuracy serve test. The approach spiking test, bump test and test for passing had the highest correlation to the criterion.

He further suggested that if general and specific abilities were combined for evaluation, it could be a better predictor of playing abilities.

Siridhar\(^6\) conducted a study on 30 college volleyball players to determine the relationship of agility

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flexibility and muscular endurance to playing ability. The tests conducted were Sarjent Jump, side step, trunk flexion, pull-up, sit-up, and one-minute lateral jump. The findings showed that motor fitness components of power, muscular endurance, circulo-respiratory endurance as well as flexibility contributed to the game of volleyball. The study showed significant relationship of power with performance. There was a positive relationship between flexibility and playing ability. The circulo-respiratory test showed a significant relationship to playing ability in volleyball because of repeated jumps in the game. Agility also had a significant relationship with playing ability in volleyball.

Rajan\(^7\) evaluated the effects of selected weight training exercises (half squats, supine bench press, sit up with weight, leg press, wrist curl), and specific exercises (medicine ball throw, jump and throw, lift ball, target throw, hurdle leap and other individual movements) on volleyball playing ability. There were

60 subjects in all who belonged to 10th and 11th classes and were divided in three groups. His results revealed that volleyball playing ability could be improved significantly by administering a programme of weight training and specific exercises in addition to regular practice of volleyball and also playing volleyball alone.

Weight training exercises and specific exercises given in addition to regular practice of volleyball were found superior to regular practice of volleyball alone for developing performance in Russel Lunge Volleyball Test.

Devi\(^8\) made a study on 36 college-level volleyball players to determine the relationship of depth perception, agility and speed of movement. Her findings reveal that depth perception, agility and speed of movement contribute to volleyball playing ability. The significant correlation of agility and speed of movement may be expected in the game of volleyball as

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it demands a quick acceleration rate along with performing movements in any direction. The results showed a significant relationship with speed of movement and agility.

Disch and Disch\textsuperscript{9} developed a Battery of Tests which significantly discriminated between the level of volleyball playing ability and distinguished as varsity or junior varsity players. Almost 70% of variability due to the group membership was found. The scholar conducted 8 tests and 93.5% of the players were classified systematically. The variables that contributed significantly to the predictions were the agility run, triple hop, percentage body fat, reach, weight, 20 mts dash, vertical jump and height. These would be used as a diagnostic tool to indicate the area in which the individual player needs to improve.

Farawani\textsuperscript{10} designed a test battery to examine the physical fitness level of the national team (Men).


The tests were (1) run test 90 mts, (2) total body reaction time (3) right-hand movement time, (4) left-hand movement time, (5) running vertical jump (6) diving movement time (7) leg extension strength and (8) arm extension strength test. The physical performance of the volleyball players as judged by these tests successfully correlated with playing ability.

Shondell\textsuperscript{11} established the relationship of selected motor performance and anthropometric traits with successful volleyball performance. Initially 23 tests and measurements were selected to assess the characteristics of successful collegiate volleyball players. A jury of four judges provided the criterion which was overall volleyball performance.

A two-phase cross validation procedure was used to determine if the test battery of six items (medicine ball toss, 30 yards dash, wall catch, zig-zag run, jump and reach and weight) could actually predict volleyball potential and to see if the test discriminated between

highly skilled and beginner players. The finding showed that the power appeared to be a most significant factor in successful volleyball performance. The test battery of 6 items correlated .732 with volleyball playing ability.

Disch et al.\textsuperscript{12} developed a test battery in 1974 to analyse the performance of volleyball players. This battery was developed with the help of U.S.A. women volleyball coaching staff and measurement specialized staff of Rice and Houston University. It assessed the playing ability of women volleyball players. The tests were selected from the various physical fitness components following the procedure of most reliable and valid information to volleyball playing capacity and also keeping in view that the tests could be administered in teaching and coaching situations and they were closely related to various phases of the game. The tests were age, weight, height, reach height, percentage fat, vertical jump, triple hop, 20-metre dash, agility run, basketball throw and

Queen's College step test to assess the maturity, structure, body size, leg power, coordination speed, controlled speed, arm power, coordination and an aerobic condition.

Kumar\textsuperscript{13} conducted a study regarding the inter-relationship among leg power tests spiking and blocking skills on 32 volleyball players at N.I.S., Patiala. The tests were vertical jump without approach and with approach, block jump, three consecutive long jumps with both legs and with left and right leg, standing broad jump, half squat, shuttle run (9-3-6-3-9), forward and back bending of body, 20 mts. sprint and 40 mts. sprint and 60 mts. run spiking and blocking. He concluded that spiking and blocking skills were not inter-correlated. Spiking had significant correlation with 40 mts sprint, reach jump with and without approach. The approach and without approach jump tests were highly correlated with each other. Sprint tests showed a significant correlation with jump tests. The test of flexibility was correlated with agility only.

Blocking was highly correlated with consecutive jumps, and it had a high correlation with the approach and without approach jump.

Narain\textsuperscript{14} conducted a study on different levels of 77 volleyball players and 25 control subjects. The subjects were assessed by 31 anthropometric measurements and 10 physical performance tests. The results stated that State players were better than the other groups. The control group with a persistent descending gradient in most of the variables like height and weight. The volleyball players showed poor muscular development. In ectomorphic component volleyball players were leaner and thinner than control and average value of the State players were more lean.

In performance test (block jump, approach jump and three successive jumps, 20 mts dash, 6-3-6-3-9 agility basketball throw, sit-ups, forward and backward bend, 2.4 km run), the State players were best followed by those of the University and District levels. The

\textsuperscript{14}Jai Narain, "Kinanthropometric Study of Indian Volleyball Players of Different Levels of Competition" (Unpublished Thesis Master's Course of Sports, N.I.S., Patiala, 1985).
control group has a descending gradient of performance; in overall performance State players were better than other groups.

Sandhu\textsuperscript{15} evaluated the kinanthropometric potential of junior volleyball players of 16 to 18 years of age. The results revealed that the wing volleyball players were significantly taller than the non-wing players. The 18 years of age players are heavier than those of 16 years. The non-wing volleyballers showed significant improvement in tests of explosive strength from 16 to 18 years. The wing players showed a higher level of performance than non-wing volleyballers and showed better performance in basketball throw. Both groups showed improvement in speed (20 mts dash) but wing players were better than the control group; they were more agile than non-wing (control) players. In sit-up both group showed improvement from those of 16 to 18 years of age. The magnitude of improvement was less in wing players than in non-wing players. The test of aerobic endurance in case of non-wing volleyball players showed significant improvement of 16 to 18 years of age.

Devi\textsuperscript{16} tested 24 volleyball players of Lakshmi-
bai National College of Physical Education, Gwalior, in order to study the relationship of selected strength and flexibility measures by using Koger's Formula, sit-ups, leg dynamometer, wrist flexion and extension by goniometer, trunk flexibility by sit and reach test, shoulder flexibility by Metric Scale, to volleyball playing ability. She concluded that arm, abdominal and leg strength were significantly related to playing ability in volleyball. Shoulder flexibility also contributed significantly to the playing ability. Grip strength did not, however, correlate significantly to playing ability, wrist flexibility and ankle flexibility, and it had an insignificant relationship to playing ability. Trunk flexion also showed an insignificant correlation to playing ability in volleyball.

Bhola\textsuperscript{17} conducted a study on 25 volleyball players to assess the relationship of absolute leg length, foot length, dynamic power, and ankle flexibility


to jumping ability in volleyball, using three stride rhythm. The tests included the 50-metre run, side step and Sarjent jump. He concluded that:

1. Foot length and dynamic power showed a significant relationship with jumping ability in volleyball using three stride rhythm.

2. Right and left ankle flexibility also showed a significant relationship to jumping ability.

3. Agility too was closely related to jumping ability.

4. The variables of absolute leg length, fore leg length and thigh leg length showed an insignificant relationship to jumping ability.

Dyba\textsuperscript{18} conducted a study on 11 subjects who were junior men’s provincial volleyball team members. They undertook a series of laboratory tests to determine selected motor performance and anthropometric and physiological characteristics. The motor performance tests were 20 metres sprint, 3 long jumps, Sarjent jump,

Block Jump, Running spike jump, push-ups, 90 mts run, shuttle run, rolls and sit-ups. The findings were:

1. The game of volleyball as played at this level is a moderately stressful aerobic sport; game heart rates average 144 beats per minute. Game blood lactic acid concentration averaged 32.5 mg%.

2. Significant differences in action component profiles were observed among the players. Blocking actions had the greatest frequency. Setters performed a significantly greater number of volleys.

3. Differences in time characteristics were not significant during the various games of a match. Rally durations averaged 7.0 seconds while the rest of durations averaged 13.3 seconds. Average game length was 18 minutes and 33 seconds.

4. The predominance of play ends with the first net encounters, the more stressful the rally.

Popovskii noted that there was a trend to select the tall boy in volleyball, giving the example

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of XXII Olympic Games in which the average height of a boy and a girl was 190.4 cm and 176.9 cm, respectively.

After analysing the different criteria of selecting for height (1) children's original height (2) Shamakova prediction criterion (3) Havlichek formula equation from the father and mother's height (4) and combination of biological and chronological age and their negative features, he expressed the view that improvement in reliability of the criteria used to predict high combination may be beneficial as suggested by Leningrad scientists' team. The boy should not be shorter than 145 cm, at the age of nine years and whose parents were taller than the average adult (father and mother) 179.5 cm, and 165.1 cm, tall respectively. Also during school there should be a check-up of biological ages. The final heights of the experimental groups were in the range 180 cm, to 194 cm. Children whose parents were between 164-173.9 cm, tall grew to 180-189 cm. Children of tall parents (174-183.9 cm,) grew to 190 cm, or taller. The boy having a high growth potential can be selected with a temporary advantage in height because of faster biological maturation.
Coutts\textsuperscript{20} tested eleven members of Canada's National women's volleyball team on vertical jump ability and Margaria's test of anaerobic power. It was concluded that the velocity or power per unit body weight exhibited by the subjects on two tests of leg power were not related to each other. The total power output on both tests was significantly correlated to each other and to body size as indicated by height and weight. The usual method of scoring vertical jump tests was thus an indicator of velocity or power per unit body weight, which was unrelated to the total power output during the jump or the velocity and power of Margaria power test.

Gill\textsuperscript{21} conducted a study on 30 students of Hari Singh's Sabha Higher Secondary School, Patiala, of ages between 13 to 16. The skill tests included serve test, smash test, repeated volley test and physical performance tests of push up, squat test, straddle test and vertical jump. The results indicated that both the


skill test and the motor fitness test had a significant relationship.

Gionet\textsuperscript{22} analyzed in his perspective approach to the physiological basis of volleyball by showing the relationship of serve and pass skills with different physical fitness components relating to specific body parts. He also mentioned the relationship of spike and block to their physical fitness components. He further explained that the game of volleyball required a high degree of shoulder strength, abdominal strength, muscular strength, muscular endurance, power of legs and arms, flexibility, reaction ability, agility and speed of movement. He further opined that "volleyball required high degree of aerobic capacity for energy production, which comes from the muscle in the form of ATP and CP, which fulfills the demand of sudden, quick, volleyball movements. Performance depends greatly on an effective training program of physical fitness components. The

training program must be in accordance with the energy sources based on understanding of importance of specificity principles of training (related to recruitment pattern)."

Gladden and Colacina\textsuperscript{23} explained the contribution of various characteristics of volleyball players in national tournaments. They studied 94 male and 86 female participants, measuring height, weight, skinfold, vertical jump and maximal anaerobic power. The male volleyball players had a low skinfold total (48.7) and women 71.2; males had high vertical jump 67.4 cm, and women 49.6 cm. The females scored very high in both total anaerobic power and anaerobic power per unit of body weight when compared with normal females. When compared with other athletes, the males were found to have high total anaerobic power but only an average anaerobic power per unit of body weight. Rank order correlations between final standings in the tournament had no significant relationship, but women had a significant relation with age, height, vertical jump and maximal height on jump. Partial rank order correlation showed that height and vertical jump were the

major factors which correlated with the final standing. The difference in the rank order correlations between the males and females might be explained by (1) a "critical height" above the volleyball net or (2) a higher skill level in the males.

Morrow et al.\textsuperscript{24} attempted to know the importance of various anthropometric, strength and speed variables which were obtained on 180 inter-collegiate women volleyball players who participated in a regional round-robin tournament. The purpose of the study was to determine the factors underlying the motor performance of the women and then determine if there was any relationship between the factors and team success. A factor analysis of the measured variables showed that these could be dimensioned as body size, speed/fat and strength. Multiple discriminant analysis showed that the teams were significantly different on the factor of strength and speed/fat. Team centroids were plotted in two dimensional discriminant space and this graphic representation showed that the stronger, faster and leaner teams were the most successful in tournament play. The results showed that the basic factors of speed/fat and strength were related to

team success. Multiple discriminant analysis helped to identify the two most important individual variables for team success. Upper body strength and fat weight were identified as most important in differentiating between players of the most and least successful teams.

Joseph\textsuperscript{25} conducted a study to determine the relationship of agility, shoulder flexibility, arm length and leg length to volleyball playing ability. For this purpose, he selected 30 volleyball players. He administered the test of Sargent jump, 40 meter shuttle run, shoulder flexibility, arm length and leg length and found that power was the most reliable variable followed by arm length and leg length in predicting volleyball playing ability. It was also concluded that agility and flexibility did not correlate significantly with volleyball playing ability.

Puhl\textsuperscript{26} examined the absolute and relative physical and physiological characteristics of elite men and women


volleyball players. Eight males and 14 females subjects were put under study, by measuring the body fat, \( \text{VO}_2 \text{ max} \), post-exercise blood lactic acid, vertical jump and peak isokinetic torque for knee flexion and extension, shoulder extension and planter flexion.

1) The results indicated that the men were taller, heavier, had a higher body density, lean body weight and lower body fat.

2) Men achieved greater absolute height for jump and reach.

3) Men had a greater \( \text{VO}_2 \text{ max} \) maximal exercise heart rates; post-exercise blood lactic acid values were similar between the groups.

4) Torque production decreased with velocity of movement and sex differences in absolute torque disappeared as velocity increased. The differences in muscle mass were apparently due to the sex differences.

Toyoda\(^{27}\) found through his study that volleyball players have different types of physical requirements.

according to the nature of the activity. He concluded that a volleyball player requires muscular strength and power and also muscular endurance, circulo-respiratory endurance, agility and speed of movement, flexibility of muscles and joints, and ability to control body movements like timing, rhythm, balance or coordination and relaxation and coordination of the whole body. These elements had a significant relationship with volleyball skills.

Bakker\textsuperscript{28} studied the relationship of certain factors with success in volleyball. The subjects were 28 members of women's extra murals volleyball teams at Illinois State University. Two experienced volleyball coaches established a criterion by rating each player on the basis of her playing ability. The following variables were measured: height, weight, leg extensor strength using a dynamometer, skinfold using the large caliper, jumping ability using the jump and reach test; reaction time and movement time were measured by an apparatus constructed by the investigator. Through 't' test and correlations it was found that jumping ability and reaction time was significantly related to success in volleyball.

Mohr and Haverstick\textsuperscript{29} evaluated 102 students for an 8-week volleyball course. They were given repeated volleys tests at 3 ft and 7 ft restraining lines. Their height was measured and they were given tests of agility, combining running and rolling and vertical jumping (Jump and Reach Test). Correlations were computed between volleys tests and other factors. From a study and a comparison of these correlations, a significant relationship was found to exist between jumping and volleying, between agility and volleying and between height and volleying.

Lamp\textsuperscript{30} analysed in his work the playing ability of 806 Junior High School students in relation to various physiological and strength factors. A statistical analysis of volleyball players showed them to be objective, reliable and valid measures of playing ability. Positive correlations were found between the volleyball playing ability of boys and girls and factors such as: age, height, weight and strength. There was no significant

\textsuperscript{29} D.R. Mohr and M.J. Haverstick, "Relationship between Height, Jumping Ability and Agility to Volleyball Skill," \textit{The Research Quarterly} 27 (March 1956):74-78.

\textsuperscript{30} Nancy A. Lamp, "Volleyball Skills of Junior High School Students as a Function of Physical Size and Maturity," \textit{The Research Quarterly} 25 (May 1954):189-199.
difference between boys and girls in their age and ability to perform skills in volleyball. Age and weight were more closely related for girls than boys in performance skills. Height was more important than other growth factors for boys in volleyball. For both, there was a positive relationship between strength and volleyball playing ability. A comparison of scores and pubescent status indicated that there was a decided relationship between these factors for this level. The more mature boys perform better than others. For girls, all pubescent groups showed an early increase in performance with age in all groups and a decline after the 14th year.

Smith\textsuperscript{31} formed three groups of subjects, 66 beginner players, 11 varsity players, three highly skilled and experienced players; vertical jump correlated .35 with the Brady Test, .55 with the judges evaluation for the beginners. The r between the vertical jumping ability of the varsity players and a potential playing ability ranking by their coaches was -.36. It was concluded that the vertical jump was not an accurate predictor of volleyball playing ability.

Toyoda et al. administered the physical fitness tests on Japanese (men's) volleyball team to know the physical abilities of the players. The tests included: muscular strength tests, push up, grip strength, back strength, basketball distance throwing, vertical jump, block jump, three successive broad jumps, sit ups (20 sec) bending of upper body (20 sec.).

The agility tests included, 20 mts. dash, 3 shuttle run of 9 metres distance, side step (1.2 m. main line for 20 sec.), rolling test (time required for 5 forward rolls, 5 backward rolls and standing up), total body reaction time.

The test of cardio-respiratory included, Harvard step test (for 5 min stepping on 50 cm block), maximum oxygen uptake, amount of oxygen debt.

The flexibility tests included forward bending of the body, backward bend, duration of hand stand. The tests of dexterity included those of horizontal bar, horse, mat work and trampoline.

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The results indicated that the volleyball players possess these abilities.

Buligin\textsuperscript{33} proposed a model of physical preparation for volleyball players for combination of various physical qualities and to check the improvement in the players. This model was prepared and worked out over a period of several years in volleyball improvement groups in Izmailski Pedagogical Institute where planning of the training and checking of progress is done with the use of eight indicates. The speed of movement was with shuttle run, muscle strength by throwing medicine ball, speed of arm movement by throwing a tennis ball against a wall rebounds, the strength of the extremities by executing the maximum number of repetitions (push and squat thrust) in 15 seconds. The model directs the combination of the various qualities of a volleyballer. The conclusions were:

1. The constructed model allows for effective planning for improvement in the physical qualities of a player by taking into consideration their individual characteristics.

2. The scores in the separate parameters of the model can be used as control norms for evaluation of physical preparation.

3. The proposed model makes it easier to evaluate the capabilities of the players for selection.

Netleton and Briggs experimented by using Zelenka test as a specific function test to measure the performance. Validation was provided for the use of the specific prediction tests for soccer players devised by Zelenka. Following a pilot study in which measurements were recorded from a group of soccer players on the Zelenka test, VO₂ max, Margaria-Kalamen power test, vertical jump, Hill soccer skill test and a coach's assessment of player performance, as a modified version of the Zelenka test, was constructed. The modified test was then shown to discriminate between different levels of competitive league players.

Garry studied the relationship of college football players, strength, speed, agility to the coach's ranking

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and divided the players in two groups. Correlations were computed between the coach's subjective evaluation with strength, speed and agility. It was concluded that arm strength and agility were not valid predictors of football ability. Total strength and total 'T' scores were moderate predictors of football playing ability, while the leg strength and speed were significant predictors.

Christian\textsuperscript{36} studied the contribution of selected variables to college football performance. Thirty members of the South-eastern State collegiate football teams were selected for this study. From the multiple correlation co-efficient it was found that the best predictor of the game percentage for backs was lateral movement. For the line, the best predictor of the game percentage score was bench step. When he combined the groups, the best predictor of the game percentage score was the vertical jump, and also the 12 minutes run.

Narain\textsuperscript{37} constructed and standardized specific physical fitness test for Badminton players. He used factor analysis technique on the data of 100 Inter College/


District Badminton Players of North India. As many as 7 factors of specific physical fitness were obtained, out of which, five were considered as meaningful to select test items from each factor. One test item having the highest loading was included in the test battery, from each factor. The test items thus derived were applied on 500 badminton players to develop the norms.

Ikeda conducted a relationship study of some selected measures with the Badminton playing ability. During the last weeks of an eight week Badminton unit, a series of tests including wrist flexibility, shuttle race and various measures of kinesthesia, such as arms-forward-spread, supination, pronation and grip. Pressure were administered to 72 women students. These test scores were compared to the result on the volley and clear badminton tests. There was no significant relationship between wrist flexibility, kinesthesia or agility and badminton playing ability.

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Tergerson conducted a study on the relationship of selected measures of wrist strength, vision and general motor ability to badminton playing ability. The French short serve and clear test and Miller wall volley test were given to 23 Sophomore college women. Motor ability was measured through the Scott test, Palmer and dorsi flexion strength with a tensiometer, temoral vision with a parameter and depth perception with the Howard-Dolman apparatus. Total badminton playing ability correlated, significantly, with general motor ability, depth perception and peripheral vision. The wall volley just correlated, significantly, with motor ability and depth perception. The highest and the lowest six players differed significantly in motor ability, depth perception and peripheral vision, but not in total wrist strength.

O'Connor studied speed and skill in relation to success achieved by college women engaged in badminton singles competition. Various badminton skills, specific movement times and success in singles competition were tested. Analysis by multiple correlation and regression


showed that speed and skill were essential to success, but success depended to a greater degree on skill than on speed of movement. The Miller Wall Volley Test was the best predictor of success in the singles competition and total body movement was the best time predictor.

The study proved that skill is more dominant than speed of movement in the success of badminton but speed of movement is also considered to be essential. Other things being equal, speed of movement will influence success.