International Journal of Movement Education and Social Science
Peer Reviewed and Indexed Journal
IJMESS Vol. 13 Issue 1 (March 2024)
ISSN: 2278-0793 (Print) & 2321-2279 (Online)
Impact Factor 5.62
www.ijmess.org

RELATIONSHIP BETWEEN SELECTED SKILL-RELATED PHYSICAL FITNESS COMPONENTS AND PROFICIENCY OF VOLLEYBALL SKILLS

Dr. Gajanana Prabhu B., Associate Professor
Mr. Ganesh H. V., M.P.Ed. Student
Department of P. G. Studies in Physical Education
Kuvempu University, Jnanasahyadri; Shankaraghatta

ABSTRACT

Volleyball is a spectacular game liked by players, coaches, spectators, organizers and promoters. The game provides wholesome satisfaction to all those involved in the game. It can be played by everybody at all levels for varied purposes. Volleyball is a team sport which requires intermittent bouts of high intensity exercise, followed by periods of low intensity activity like walking or standing. The performance of volleyball players is influenced by many factors such as physical, physiological and psychological variables, technique, tactics, physique, body size, body composition and application of biomechanical principles. Playing volleyball requires strength, power, agility, flexibility, balance, speed and cardiovascular endurance along with performance related factors likes body composition, physiological and mechanical aspects as well as skills in order to be played effectively. The subjects for the present study were fifty inter-collegiate level male volleyball players (N=50) selected from eight colleges of Kuvempu University jurisdiction. The players were studying during the academic year 2022-23 in various affiliated colleges of Shivamogga and Chikmagaluru District. Their age ranged between 20 to 27 years. All players were healthy and free from any injury during data collection. All positions were included in the present study. Standardized tests for assessment of skill related physical fitness and volleyball playing ability were selected for testing the hypotheses framed for the present study. Significant moderate positive correlation was found between serving ability and power. There is significant moderate negative correlation between serving ability and reaction time of inter-collegiate level volleyball players. There is significant low positive correlation between volleying ability and power. There is significant moderate positive correlation between volleying ability and standing height of inter-collegiate level volleyball players.

Keywords: Volleyball, Physical Fitness, Skills, Inter-Collegiate, Serving Ability and Volleying.

Introduction

Volleyball is a spectacular game liked by players, coaches, spectators, organizers and promoters. The game provides wholesome satisfaction to all those involved in the game. It can be played by everybody at all levels for varied purposes. Volleyball is an intermittent sport that requires players to compete in frequent short bouts of high-intensity exercise, followed by periods of low-intensity activity (Kunstlinger, Ludwig & Stegemann, 1987; Viitasalo, et. al., 1987). The high-intensity bouts of exercise, coupled with the total duration of the match (lasting approximately 90 minutes), requires players to have well-developed aerobic and anaerobic alactic (ATPCP) energy systems (Hakkinen, 1993; Viitasalo, et. al.,

ISSN: 2278-0793 (Print) & 2321-2279 (Online)
Impact Factor 5.62
www.ijmess.org

1987). Considerable demands are also placed on the neuromuscular system during the various sprints, jumps (blocking and spiking), and high-intensity court movement that occurs repeatedly during competition (Hakkinen, 1993).

During a volleyball match players are involved in various performance movements such as; defensive and offensive jumps, blocks, spikes and sprints where power, strength, agility, and speed are required (Gabbett & Georgieff, 2006). Volleyball is a team sport which requires intermittent bouts of high intensity exercise, followed by periods of low intensity activity like walking or standing (Marques et al., 2006). These high-intensity bouts include both horizontal approach movements (spike jumps) and movements without an approach i.e. jump setting, jousts, blocking (Sheppard et al., 2008). The performance of volleyball players is influenced by many factors such as physical, physiological and psychological variables, technique, tactics, physique, body size, body composition and application of biomechanical principles (Pradhan, 2017). It has been well established that special physical characteristics indicates whether the player would be suitable for the competition at the highest level in a specific sport (Slater et al., 2005). No doubt the performance of player influenced by many factors but still physical fitness components of a specific game is the primary factor among those entire factors (Lidor & Ziv, 2010).

During the course of game, players are required to serve, pass, set, attack, block and dig the ball. Playing volleyball requires strength, power, agility, flexibility, balance, speed and cardiovascular endurance along with performance related factors likes body composition, physiological and mechanical aspects as well as skills in order to be played effectively (Pradhan, 2017).

Physical fitness is defined as a set of qualities that an individual has or develops relating to their ability to perform physical activity (Caspersen, Powell & Christenson, 1985). These measurable qualities commonly include the components of body composition, cardiorespiratory fitness, muscular strength, muscular endurance, flexibility, agility, balance, coordination, power, reaction time, and speed (Corbin, Pangrazi & Franks, 2000).

Physical fitness components have been shown to have a significant positive relationship with enhanced outcomes in physical activity, including sports participation (Malina, 2001). There is a substantial amount of published research delineating the various physical fitness components required to successfully compete across team-based ball sports (Farley, et. al., 2020). Additionally, there is a large quantity of work profiling the physical fitness qualities of different playing positions in various land-oriented, team-based ball sports, such as soccer (Lockie, et. al., 2018), rugby league, volleyball, Australian football, and team handball (Farley, et. al., 2020).

According to Natraj, & Kumar (2006) successful performances of skill components of motor abilities contribute independently and interdependently. The role of motor abilities for successful sports performance cannot be undermined. Strength, endurance, speed, flexibility, agility and coordinative abilities are the prerequisites for motor action in all sports. The improvement and maintenance of these components are very important in sports training (Gangey & Kerketta, 2006). No doubt the performance of player influenced by many factors but still motor fitness components is the primary factor among these entire factors (Lidior, R. & Ziv, G., 2010).

ISSN: 2278-0793 (Print) & 2321-2279 (Online)
Impact Factor 5.62
www.ijmess.org

Methodology

The purpose of the present investigation was to systematically investigate the extent of relationship between selected skill-related physical fitness components and the proficiency of volleyball skills among intercollegiate players. The subjects for the present study were fifty inter-collegiate level male volleyball players (N=50) selected from eight colleges of Kuvempu University jurisdiction. The players were studying during the academic year 2022-23 in various affiliated colleges of Shivamogga and Chikmagaluru District. Their age ranged between 20 to 27 years. All players were healthy and free from any injury during data collection. All positions were included in the present study. Standardized tests for assessment of skill related physical fitness and volleyball playing ability were selected for testing the hypotheses framed for the present study. The details of various tests used are given in table 1 as below.

TABLE 1.
DETAILS OF VARIABLES, TESTS AND UNIT OF MEASUREMENT OPTED FOR THE STUDY.

S. No.	Variables	Name of test	Unit of Measurement
1	Serving ability	Russel Lange Volleyball test	Points
2	Volleying ability	Russel Lange Volleyball test	Score
3	Speed	30 meters dash test	Seconds
4	Agility	Illinois agility test	Seconds
5	Power	Seated basketball throw for distance	Meters
6	Balance	Flemingo balance test	Seconds
7	Reaction time	Ruler drop test	Centimeters

Russell-Lange Volleyball Test: The objective of the test was to measure volleyball playing ability of college students. Volleyballs, stop watch, scoring material, wall and floor markings were required for this test. Following is the brief description of test items in this test battery.

Volley: Marked on wall at net height of 7.5feet from floor (line is 10 feet wide). A paralleling of same length is marked 3 feet from wall. On an audible signal the student, starts the test with an underhand movement to toss the ball against the wall from behind the restraining line. The ball is repeatedly volleyed for 30 seconds. The action may be restarted at any time from behind the restraining line. The number of legal volleys that hit on or above the wall line are counted if they are contacted from behind the restraining line. The top score for 3 trials is recorded.

Necessary markings are required as pre-requisite for this test item. From the serving area behind the end line, student completes two trials of 10 legal serves. Points accumulated in the best trial are recorded as the final score. Serves in which foot faults occur are given a zero and balls landing on a line are given the score of the higher value.

Speed (30 meter dash): The aim of this test was to determine acceleration and speed. Measuring tape or marked track, stop watch or timing gates, flat and clear surface of at least 50 meters were required for the present test. The test involved running a single maximum sprint over 30 meters, with the time recorded. A thorough warm up were given, including some practice starts and accelerations. The subject started from a stationary position, with one foot in front of the other. The front foot was on or behind the starting line. This starting position was held for 2 seconds prior to starting, and no rocking movements were allowed. The tester provide hints for maximizing speed (such as keeping low, driving hard with the arms and legs) and encouraged them to continue running hard through the finish line.

Agility (Illinois agility test): The purpose of the test was to test running agility using various

ISSN: 2278-0793 (Print) & 2321-2279 (Online)
Impact Factor 5.62
www.ijmess.org

turns and movements. Equipment required included flat non-slip surface, marking cones, stopwatch, measuring tape, Participants lied on their front (head to the start line) and hands by their shoulders. On the 'Go' command the stopwatch was started, and the athlete gets up as quickly as possible and runs forwards 10 meters to run around a cone, then back 10 meters, then ran up and back through a slalom course of four cones. Finally, the athlete ran another 10 meters up and back past the finishing cone, at which the timing is stopped. (see Illinois test video examples). Several trials were completed, with the best score recorded.

Balance (Flamingo balance test): The purpose of the study was to assess the ability to balance successfully on a single leg. Equipment required for this test were- stopwatch, metal beam 50cm long, 5cm high and 3cm wide (the beam is stabilized by two supports at each end, and should have a non-slip surface). The subject stood on the beam without shoes. Balance was retained by holding the instructor's hand. While balancing on the preferred leg, the free leg was flexed at the knee and the foot of this leg was held close to the buttocks. The watch started as the instructor lets them go. The stopwatch was stopped each time the person lost balance (either by falling off the beam or letting go of the foot being held). The subject started over again with timing until balance was completely lost. The number of falls in 60 seconds of balancing was counted. If there were more than 15 falls in the first 30 seconds, the test was terminated and a score of zero was given.

Reaction time (Ruler drop test): The purpose of the test was to measure reaction time, hand-eye quickness and attentiveness. The equipment required were 1 meter long ruler or Yardstick and a calculator. The person to be tested stood or sat near the edge of a table, resting their elbow on the table so that their wrist extends over the side. The assessor held the ruler vertically in the air between the thumb and index finger of the subject, but not touching. The zero mark on the ruler was aligned with the fingers of participants. The participant indicated their readiness. Then, without prior warning, the assessor released the ruler and lets it drop – the subject was expected to catch it as quickly as possible as soon as they it gets released from the assessor. The distance the ruler fell was recorded in centimeters (the level the participant grabed the ruler). This procedure was repeated several times (e.g. 10 times) and the average score was taken.

Power (seated basketball through): This test measured upper body (arms/shoulders/chest) strength and explosive power. Basketball, wall and tape measure were required for this test. The athlete sat on the floor with the back against a wall, and the legs fully extended in front of the body. The ball was held with the hands on the side and slightly behind the center and pulled back against the middle of the chest. The forearms were positioned parallel to the ground ("elbows up!). The athlete pushed the basketball vigorously as far forward as possible while maintaining the back against the wall. Throw favouring one arm or rotating about the spine was not allowed. The distance thrown was recorded. Three attempts were allowed.

Descriptive statistics Mean and Standard Deviation were used in the present study. In order to test the hypotheses of the study Pearson' product moment correlation coefficient was calculated at 0.05 levels of significance. Tables and Scattergrams were inserted wherever necessary to make inferences.

ISSN: 2278-0793 (Print) & 2321-2279 (Online)
Impact Factor 5.62
www.ijmess.org

Findings

The raw data on volleyball skill test and skill related physical fitness test of inter collegiate level volleyball players are provided in table 2 as below.

TABLE 2
MEAN AND STANDARD DEVIATION OF INTER COLLEGIATE LEVEL VOLLEYBALL PLAYERS ON VOLLEYBALL SKILL TEST AND SKILL RELATED PHYSICAL FITNESS

Variables	Mean	Std. Deviation
Serving ability	27.44	6.98
Volleying ability	30.12	5.55
Speed	4.54	.57
Agility	19.38	1.65
Power	5.94	1.04
Reaction time	9.65	2.94
Balance	18.23	10.07
Standing height	174.64	9.44
Body weight	64.92	9.29

The data presented in table 2 is normally distributed with acceptable homogeneity of sample. The raw data was further treated with Pearson's Product moment correlation to find the coefficient for establishing relationship. The confidence level selected was 0.05. The results of relationship between serving ability and selected skill related physical fitness is given in table 3.

TABLE 3.
SUMMARY OF CORRELATION BETWEEN SERVING ABILITY AND SELECTED SKILL RELATED PHYSICAL FITNESS OF INTER-COLLEGIATE LEVEL VOLLEYBALL PLAYERS

Variables	Serving Ability
Speed	-.232
	.104
	50
Agility	-.251
	.078
	50
Power	.443**
	.001
	50
Reaction Time	-.421**
	.002
	50
Balance	.224
	.119
	50
Standing Height	.229
	.110
	50
Body Weight	.180
	.211
	50

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

From table 3 it is clear that there is significant moderate positive correlation between serving ability and power. The correlation coefficient of 0.443 indicates a moderate positive correlation in the present context. The players with higher power tend to serve more accurately. Therefore in order to improve serving ability in volleyball it is imperative to improve power of players. The above results are graphically plotted in figure 1 as below.

ISSN: 2278-0793 (Print) & 2321-2279 (Online)
Impact Factor 5.62
www.ijmess.org

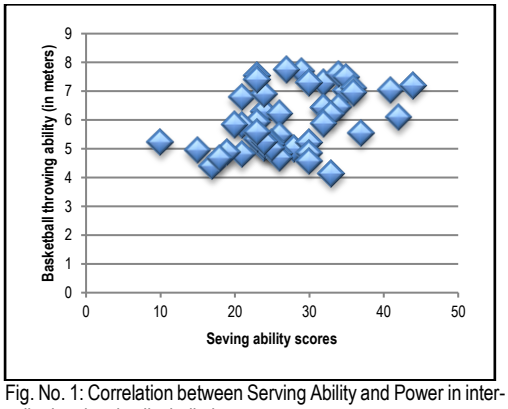

Fig. No. 1: Correlation between Serving Ability and Power in inter-collegiate level volleyball players

Further, from table 3 we infer that there is significant moderate negative correlation between serving ability and reaction time of inter-collegiate level volleyball players. The correlation coefficient of -0.421 indicates a moderate negative correlation in the present situation. Players with better reaction time are found to serve better. Immediate response to tossed ball is essential in service. The above results are graphically plotted n figure 4.2 as below.

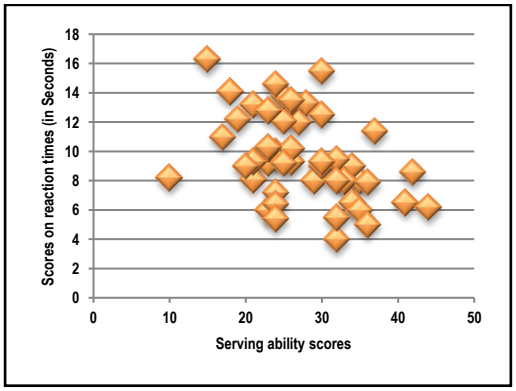

Figure 2 Graphical presentation of correlation between serving ability and reaction time in inter-collegiate level volleyball players

The results of relationship between volleying ability and selected skill related physical fitness is given in table 4 as below.

TABLE 4
SUMMARY OF CORRELATION BETWEEN VOLLEYING ABILITY AND SELECTED SKILL RELATED PHYSICAL FITNESS OF INTER-COLLEGIATE LEVEL VOLLEYBALL PLAYERS.

Variables		Volleying Ability
Speed	Pearson Correlation	-.032
	Sig. (2-tailed)	.826
	N	50
Agility	Pearson Correlation	-.135
	Sig. (2-tailed)	.351
	N	50
Power	Pearson Correlation	.281*
	Sig. (2-tailed)	.048
	N	50
Reaction Time	Pearson Correlation	-.029
	Sig. (2-tailed)	.841
	N	50
Balance	Pearson Correlation	-.031
	Sig. (2-tailed)	.830
	N	50
Standing Height	Pearson Correlation	.416**
	Sig. (2-tailed)	.003
	N	50
Body Weight	Pearson Correlation	.079
	Sig. (2-tailed)	.585
	N	50

From table 4 it is clear that there is significant low positive correlation between volleying ability and power. The correlation coefficient of 0.281 indicates a low positive correlation in the present context. The players with higher power can volley the ball better than their counterpart with lower power. Hence, prime focus should be laid on improving power in order to improve volleying ability of players in volleyball. The above results are graphically plotted in figure 3 as below.

ISSN: 2278-0793 (Print) & 2321-2279 (Online)
Impact Factor 5.62
www.ijmess.org

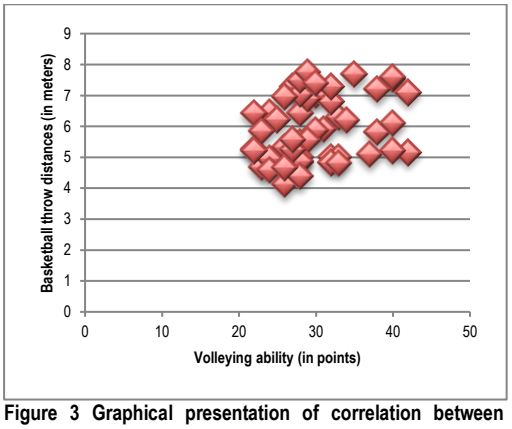

Figure 3 Graphical presentation of correlation between volleying ability and power in inter-collegiate level volleyball players.

Further, from table 4 we infer that there is significant moderate positive correlation between volleying ability and standing height of inter-collegiate level volleyball players. The correlation coefficient of 0.416 indicates a moderate positive correlation in the present context. Tall players are found to be volleying the ball better than shorter players in the present investigation. The above results are graphically plotted n figure 4 as below.

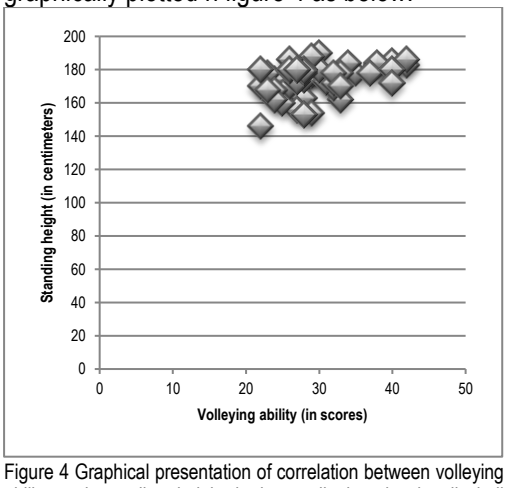

Figure 4 Graphical presentation of correlation between volleying ability and standing height in inter-collegiate level volleyball players.

Discussion

The results of the study indicates that there is significant moderate positive correlation was found between serving ability and power. There is significant moderate negative correlation between serving ability and reaction time of inter-collegiate level volleyball players. There is significant low positive correlation between volleying ability and power. There is significant moderate positive correlation between volleying ability and standing height of inter-collegiate level volleyball players.

It is understood that the shoulder explosiveness in beneficial for serving as well as volleying abilities as tested in the study. Reaction time plays an important role in determining playing ability for volleyball players. Hence, coaches and players should constantly strive for developing shoulder explosiveness in volleyball.

Conclusion

Significant moderate positive correlation was found between serving ability and power. There is significant moderate negative correlation between serving ability and reaction time of inter-collegiate level volleyball players. There is significant low positive correlation between volleying ability and power. There is significant moderate positive correlation between volleying ability and standing height of inter-collegiate level volleyball players.

References:

Agar-Newman, D. J., Goodale, T. L., & Klimstra, M. D. (2017). Anthropometric and physical qualities of international level female rugby sevens athletes based on playing position. The Journal of Strength & Conditioning Research, 31(5), 1346-1352.

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public health reports, 100(2), 126.

ISSN: 2278-0793 (Print) & 2321-2279 (Online)
Impact Factor 5.62
www.ijmess.org

Chia-Hung Chuang, Min-Hao Hung, Chi-Yao Chang, Yung-Yi Wang and Kuo-Chuan Lin. Effects of Agility Training on Skill-Related Physical Capabilities in Young Volleyball Players. Applied sciences volume 12 issue

Collins, D. R., and Hodges, P. B. (2001). A Comprehensive Guide to Sports Skills Tests and Measurement (2nd ed.). Lanham, MD: Scarecrow Press. Page 288-290.

Corbin, C. B., Pangrazi, R. P., & Franks, B. D. (2000). Definitions: Health, fitness, and physical activity. President's Council on Physical Fitness and Sports Research Digest.

Farley, J. B., Stein, J., Keogh, J. W., Woods, C. T., & Milne, N. (2020). The relationship between physical fitness qualities and sport-specific technical skills in female, team-based ball players: a systematic review. Sports medicine-open, 6, 1-20.

Gangey, O. & Kerketta, I. (2016). Relationship between selected motor fitness and playing ability of volleyball players. International Journal of Academic Research and Development. Volume 1; Issue 6; June 2016; Page No. 25-26.

Hakkinen, K. (1993). Changes in physical fitness profile in female volleyball players during the competitive season. The Journal of sports medicine and physical fitness, 33(3), 223-232.

Hasan Sozen (2016).The Effect of Volleyball Training on the Physical Fitness of High School Students. December 2012Procedia – Social and Behavioral Sciences 46:1455-1460DOI:10.1016/j.sbspro.2012.05.320

Kumar. S. G. & Kumar, V. (2020) Effect of Skill Related Training on Skill Performance among Volleyball Players . Journal of humanities and social sciences study. 2(5), 1–05.

Kunstlinger, U., Ludwig, H. G., & Stegemann, J. (1987). Metabolic changes during volleyball matches. International Journal of Sports Medicine, 8(05), 315-322.

Lidor, R., & Ziv, G. (2010). Physical and physiological attributes of female volleyball players-a review. The Journal of Strength & Conditioning Research, 24(7), 1963-1973.

Lockie, R. G., Moreno, M. R., Lazar, A., Orjalo, A. J., Giuliano, D. V., Risso, F. G., Davis, D.L., Crelling, J.B., Lockwood, J.R .& Jalilvand, F. (2018). The physical and athletic performance characteristics of Division I collegiate female soccer players by position. The Journal of Strength & Conditioning Research, 32(2), 334-343.

Malina, R. M. (2001). Physical activity and fitness: pathways from childhood to adulthood. American Journal of Human Biology: The Official Journal of the Human Biology Association, 13(2), 162-172.

Miguel Silva, Rui Marcelino, Daniel Lacerda (2016). Match Analysis in Volleyball: a systematic review. Montenegrin Journal of Sports Science and Medicine 5(1):35-46.

Nasuka, N., Setiowati, A., & Indrawati, F. (2020). Power, strength and endurance of volleyball athlete among different competition levels. Utopia y Praxis Latinoamericana, 25(10), 15-23.

Natraj, H. V., & Kumar, C. (2006). Selected motor ability variables and kabaddi performance. Journal of sports and sports sciences, 29(1), 6-11.

Pradhan, K. (2017). Physical Fitness and Performance Indicators of Indian Female Volleyball Players: the Need for individual Data. Bhatter College Journal of Multidisciplinary Studies, 7(1), 1-10.

Rao, G. L. (2022). A study of physical fitness between Volleyball Players and Football players of Dr.Y.S.R Horticulture University, Tadepalligudem, AP. Volume 10 (9); PP-a161-a167.

Sharma, Y., Mishra, M., & Utthasani, U. (2022). A Comparative Study of Selected Physical Fitness Components between Volleyball and Non-Volleyball Players. Journal of Positive School Psychology, 6(3), 9463-9468.

Ahmad, S. R., & Jain, R. (2020). A comparative study of development of physical fitness of volleyball players of rural and urban area from Anantnag district. Vol-7(5): PP: 283-288.s

Wang, S. (2022). An Empirical Analysis of the Influence of Volleyball Elective Course on Students' Physical Health Based on Digital Image. Computational Intelligence and Neuroscience, 2022(1), 9229912.

Gabbett, T., Georgieff, B., Anderson, S., Cotton, B., Savovic, D., & Nicholson, L. (2006). Changes in skill and physical fitness following training in talent-identified volleyball players. The Journal of Strength & Conditioning Research, 20(1), 29-35.

Viitasalo, J., H. Rusko, O. Pajala, P. Rahkila, M. Ahila, and H. Montonen. (1987) Endurance requirements in volleyball. Can. J. Appl. Sports. Sci. 12:194–201.

Chahal, V., Kadam, K. & Kadam, G. (2023). Relationship of Selected Physical Fitness Components with the Performance of Volleyball Player. Research pedagogy and technology in education and movement sciences. Vol. 12 No. 03 (2023): JUL-SEP.

Yuting Zhou, Cheng-Ta Chen, Neil G. Muggleton (2020).The effects of visual training on sports skill in volleyball players. Progress in Brain Research Volume 253 Pages 201-227.