



Analysis of the Physical Condition of Male Sepak Takraw Athletes 2024 Central Java

Winda Anggraeni*, Anggit Wicaksono

Sports Coaching Education, Faculty Of Sport Sciences, Universitas Negeri Semarang, Indonesia

Article's Info

Article's History:

Submitted May 26, 2025
Revised Nov 28, 2025
Accepted Dec 9, 2025

Keywords:

Physical condition;
sepak takraw; PON;
central java athlete

DOI:

<https://doi.org/10.15294/jssf.v1i2.25733>

Abstract

Introduction: Physical condition is a fundamental factor that determines the performance and achievement of athletes, particularly in sports requiring complex movements such as sepak takraw. **Objectives:** This study aims to find out how the physical condition of PON Central Java men's sepak takraw athletes is and as a benchmark or minimum standard for sepak takraw athletes who want to become national athletes. **Method:** The type of research is Quantitative Research with a Descriptive Approach. The sample extraction technique uses a saturated sample technique, so that the research sample amounted to 10 athletes equal to the population. The population in this study is Central Java sepak takraw training athletes. The variables of the study are the physical condition of the athlete which consists of: 1) leg power 2) strength, 3) agility, 4) speed, and 5) aerobic endurance. The five physical components were measured using valid and reliable instruments. The data used is secondary data obtained from the head coach of the Central Java PON sepak takraw training team. The data analysis technique used in this study is a descriptive statistical technique using SPSS by calculating percentage, mean, minimum value, maximum value and standard deviation. **Result:** the study showed that there was 1 component of physical condition that was in the very good category, namely agility, 2 components of physical condition were in the good category, namely abdominal muscle strength and aerobic endurance, and 2 components of physical condition were in the poor category, namely leg muscle explosiveness and speed. **Conclusion:** The average professional score of the physical condition of PON athletes in Central Java 2025 is in the medium category

*Correspondence E-mail: anggrainiwinda131@students.unnes.ac.id

INTRODUCTION

Physical condition is the condition of an athlete's body which consists of components that cannot be separated from its maintenance and improvement. Physical condition is a requirement that must be possessed by an athlete in improving and developing optimal sports achievements, so that all physical conditions must be developed and improved according to the characteristics, characteristics, and needs of each sport (Pujianto 2015). According to (Harsono 2018) In his book, the physical condition of athletes has an important role in an athlete's training program. To increase the functional physical freshness of the body system, a well-planned and systematic physical fitness training program is needed in order to achieve even better athlete achievements. Physical exercise is an activity in which there are various forms, attitudes and directed movements, repeated with increasing loads which are useful to increase the efficiency of the ability (Sidik, dikdik zafar, Pasurnay, paulus l., & Afari 2019). Physical conditions consist of general and special physical conditions. General physical condition is an exercise that aims to develop the body's abilities and improve the basic abilities of a specific physical condition (Umar and Pratama 2020). While special physical condition is a very important thing aimed at building punch strength, strength, jump, speed, agility and endurance (Ahsan 2019). According to (Maizan 2020) The physical condition itself not only affects the improvement of technique, but affects the improvement of tactics. Tactics will not work if you have not mastered the technique and are supported by good physical condition. Physical condition is the main factor to show good athlete performance. There are interrelated components in improving the physical condition of an athlete. The components of physical condition are measured strength, endurance (muscle endurance, general endurance, muscle explosiveness), speed, flexibility, balance, coordination, agility, precision, and reaction (David Anderson, Helen Moggridge, Philip Warren 2014). Physical condition cannot be obtained in one exercise, but in a regular, structured, and systematic manner (Donnelly, Joseph E. 2016).

In sports, physical ability achievements have a very important role, an athlete must have good physical abilities because with good physical support can have the opportunity to excel even better. This is because without adequate physical ability, movement techniques will not be able to be done perfectly (Kamaruddin 2019). To get good achievements in a sport, cooperation is needed and seeing all aspects that support the realization of an achievement that has been aspired to (Maizan 2020). Achievement sports coaching is carried out at the non-formal level. Law of the Republic of Indonesia number 11 of 2022 concerning the national sports system in article 1 paragraph 12 which reads "Achievement Sports is a sport that fosters and develops sportspeople in a planned, systematic, integrated, tiered, and sustainable manner through competitions to achieve achievements with the support of sports science and technology."

Sepak takraw is a game that uses a ball made of rattan or fiber (takraw), played on a flat field measuring 13.40 m long and 6.10 m wide. In the middle of being limited by a net or net like a game of badminton (Sulaiman 2008). Sepak takraw has developed in Indonesia and is known by the public. This sport is very interesting because it contains acrobatics that can be played by all levels of society. Various basic techniques need to be mastered in the game of sepak takraw, including kicking (sepak sila, sepak kura, sepak cukil, mepak, and sepak badek), head games, understanding, crushing, and blocking (Adrian Sya'ban 2020). The numbers contested in sepak takraw are teams, doubles, double teams, teams, quadrants. To be able to become a sepak takraw athlete, you must have a good physical condition in order to overcome the fatigue that arises during competition.

Sepak Takraw in Central Java is a sport that has never been absent in donating mendali in various matches. Central Java men's sepak takraw PON athletes succeeded in donating mendali at the PON event which is held every four years. Judging from the last three PONs, namely in the West Java PON, the Central Java men's sepak takraw PON athletes succeeded in contributing gold medals in the men's doubles team number, Silver in the men's doubles team, and bronze medals in the men's team number, PON Papua managed to donate silver in the doubles and teams, and the Aceh – North Sumatra PON succeeded in donating gold in the team number and silver in the quadrant number.

Peraih Medali

Event	Emas	Perak	Perunggu
Ganda regu putra (detail)	Jawa Timur	Jawa Tengah	Gorontalo Sulawesi Selatan
Inter regu putra (detail)	Gorontalo	Sumatera Barat	Sulawesi Selatan Jawa Timur
Tim ganda putra (detail)	Jawa Tengah	Jawa Timur	Sumatera Barat Sulawesi Selatan
Tim regu putra (detail)	Gorontalo	Riau	Jawa Timur Jawa Tengah

Peraih Medali Putra

Event	Emas	Perak	Perunggu
Ganda	Gorontalo	Jawa Tengah	Kalimantan Timur Sulawesi Tenggara
Beregu	Gorontalo	Jawa Tengah	Kepulauan Riau Sumatera Barat
Kuadran	Sulawesi Selatan	Jawa Timur	Papua Riau
Ganda beregu	Jawa Timur	Sulawesi Selatan	DKI Jakarta Papua

From the empirical data above, it shows that Central Java PON sepak takraw athletes are very accomplished. To be able to achieve these results, of course, PON Central Java men's sepak takraw athletes must have good physical condition. Evaluation of physical condition in sepak takraw is not only important, but very crucial to support athletes' performance, safety, and long-term development. Research on physical factors include (Jufrianis, Akbar, and Tangkudung 2018) showed that the relationship between ankle coordination, flexibility and

balance had an effect on accuracy in the sepak takraw game of PPLP students. (Qurun 2015) which examines agility in sepak takraw athletes which is linked to somatotype. From the study, it can be concluded that physical factors can affect the performance of athletes, especially sepak takraw sports. Therefore, based on several studies that discuss the physical factors of sepak takraw athletes at the school level, this study will examine different subjects, namely in Central Java PON athletes and physical aspects that have not been tested in previous studies. Based on the explanation above, the researcher is interested in conducting research with the aim of finding out how the physical condition of PON Central Java men's sepak takraw athletes is and as a benchmark or minimum standard for sepak takraw athletes who want to become national athletes. With the hope that this research can provide insight benefits for coaches and athletes in determining optimal training strategies.

METHOD

The type of research is Quantitative Research with a Descriptive Approach. Because this study aims to find out how the physical condition of PON Central Java male sepak takraw athletes is and as a benchmark or minimum standard for sepak takraw athletes who want to become Central Java athletes.

(Arikunto 2017) states that "Population is the whole subject of research". The population in this study is 10 athletes from PON Central Java men's sepak takraw. The data collection method is test and measurement. The sample extraction technique uses the total sampling technique so that the research sample of 10 athletes is equal to the population.

The variables of the study are the physical condition of the athlete which consists of: 1) leg power 2) strength, 3) agility, 4) speed, and 5) aerobic endurance. The five physical components were measured using valid and reliable instruments. (Adolph 2016) Validity is a condition that describes the level at which the instrument in question is able to measure what is being measured, describing the level of validity of the instrument used. The data used is secondary data obtained from the head coach of the Central Java PON sepak takraw training team. The data instruments used in this study include:

Leg muscle power using the Vertical jump test. It has a reliability of 0.99 and a validity of 0.989 (Nugroho, M.B. Sutardji and Nugroho 2016).

The abdominal muscle strength test uses a sit up test. The validity of the sit up test was the content validity and reliability of the test of 0.91 (Bernanda 2023).

The agility test uses a 6 x 5 meter sutele run test. The validity is about 0.82 and the reliability is about 0.93 for men (Bernanda 2023).

The Speed Test uses a 20-meter running test. It has a validity value of 0.95 and a reliability of 0.92 (Fuzyiyono 2013).

Durability tests use MFT tests. Multistage Fitness Test (MFT) with a validity value of 0.77 (face validity) and reliability of 0.98 (Doewes, M., & Furqon 1999).

The data analysis technique used in this study is a descriptive statistical technique using SPSS by calculating percentage, mean, minimum value, maximum value and standard deviation.

RESULT AND DISCUSSION

Result

Based on the results of the analysis of data obtained from the field, namely: *Vertical Jump, Sit-Up, Shuttle Run, 50 Meter Sprint, and MFT (Multistage Fitness Test)* tests on Central Java PON sepak takraw athletes. The descriptive analysis in this study discusses the minimum, maximum, mean, and standard deviation values of the *results of the Vertical Jump, Sit-Up, Shuttle Run, 50 Meter Sprint, and MFT (Multistage Fitness Test)* test results in Central Java PON sepak takraw athletes. The results of the descriptive analysis are presented as follows:

Table 1. Descriptive Analysis Results

Test Item	N	Minimum	Maximum	Mean	Standard Deviation
Vertical Jump		52	74	60,50	7,169
Sit Up		40	80	62,70	12,957
Shuttle Run	10	8,57	10,86	9,5390	0,79145
Sprint		3,33	3,55	3,4080	0,0654
MFT		0	55,10	39,4400	21,0517

Furthermore, to interpret the data, frequency analysis was carried out on the 5 test items, namely: *Vertical Jump, Sit-Up, Shuttle Run, 50 Meter Sprint, and MFT (Multistage Fitness Test)* tests on Central Java PON sepak takraw athletes. The results of the frequency analysis are presented as follows:

Table 2. Vertical Jump Frequency Analysis Results

Test Item	N	Category	Frequency	Percentage
Vertical Jump	10	Very good	0	0%
		Good	0	0%
		Keep	2	20%
		Less	8	80%
		Less Than Once	0	0%

From the results of the vertical jump frequency analysis above, it shows that most of the leg muscle strength of PON Central Java sepak takraw athletes is in the poor category. This indicates a lack of leg muscle strengthening exercises, specifically in the quadriceps, hamstrings, gluteus, and calves muscles.

Table 3. Sit Up Frequency Analysis Results

Test Item	N	Category	Frequency	Percentage
Crunches	10	Very good	3	30%
		Good	5	50%
		Keep	1	10%
		Less	1	10%
		Less Than Once	0	0%

The success of abdominal muscle strengthening exercises can be seen from the results of the sit-up test. From the results of the analysis of the frequency of the sit-up test above, it shows that most of the abdominal muscle strength of the Central Java PON sepak takraw athletes is in the good category, but there are still 2 athletes who are in the medium category and do not show the need for coach evaluation of their athletes in order to be able to catch up.

Table 4. Shuttle Run Frequency Analysis Results

Test Item	N	Category	Frequency	Percentage
Shuttle Run	10	Very good	4	40%
		Good	0	0%
		Keep	3	30%
		Less	1	10%
		Less Than Once	2	20%

In the results of the analysis of the frequency of the shuttle run test, most of the agility levels of Central Java PON sepak takraw athletes are in the very good category. However, there are still athletes whose agility test results are in the category of less and less once. Showing the need to emphasize agility training in the athlete in order to be able to increase his agility, where agility is one of the important factors in sepak takraw.

Table 5. Results of the 50 Meter Sprint frequency analysis

Test Item	N	Category	Frequency	Percentage
Sprint	10	Very good	0	0%
		Good	0	0%
		Keep	4	40%
		Less	5	50%
		Less Than Once	1	10%

Judging from the results of the analysis of the frequency of speed tests above, it shows that most of the physical conditions of athletes' speed are in the poor category. This is a special concern for coaches in evaluating their training programs and athletes, where speed is one of the important factors in sepak takraw.

Table 5. MFT Frequency Analysis Results

Test Item	N	Category	Frequency	Percentage
MFT	10	Very good	0	0%
		Good	5	50%
		Keep	3	30%
		Less	0	00%
		Less Than Once	2	20%

Judging from the results of the analysis of the frequency of endurance tests above, most of the physical conditions of aerobic endurance of PON Central Java sepak takraw athletes are in the good category. However, there are still athletes who are in the medium category and less so. It is necessary to know the cause of this lag so that it becomes an evaluation for

coaches so that their athletes are able to catch up. Because good aerobic endurance will support athletes in maintaining their stamina during the match.

Discussion

Leg Muscle Explosiveness (Vertical Jump)

The results of the analysis of vertical jump test data showed that most of the physical conditions of the leg muscles of the PON men's sepak takraw athletes in Central Java were in the poor category with a frequency of 8 athletes with a percentage of 80%. This has an impact on the main abilities of athletes. The explosiveness of the leg muscles is one of the dominant physical conditions in the sport of sepak takraw. Good leg muscle explosiveness will support athletes in making movements in the game of sepak takraw. For example, research conducted by Setiawan, Sugihartono, and Nopiyanto (2022) It shows that the explosive power of the leg muscles has a contribution of 46.24% to the smash ability of sepak takraw athletes. This shows that the greater the explosive power of the leg muscles, the athlete can make stronger kicks as well, thus creating a point for his team.

In addition to making strong kicks, the explosiveness of the leg muscles is needed in making jumps to head the ball. For example, research conducted by Sapira, Sugihartono, and Idivine (2022) shows the contribution of leg muscle explosiveness of 15.3% to jump heading ability. Heading is one of the techniques in sepak takraw that aims to give a pass to teammates. This means that if sepak takraw athletes have less explosive power in the leg muscles, this will make it difficult for athletes to make movements to kick the ball and head the ball to create points, and it will be difficult to defend themselves from the opponent's target.

For this reason, this physical condition needs to be maintained and improved. The explosiveness of the leg muscles can be increased through a wide variety of exercises. Specific to the movements in the sepak takraw sport, the researcher recommends plyometric exercises and explosive strength training because these two exercises are important aspects of the sepak takraw player training program to increase the effectiveness of these techniques.

Abdominal Muscle Strength (Sit-Up)

The results of the analysis of sit-up test data showed that most of the physical conditions of the abdominal muscle strength of the PON Central Java men's sepak takraw athletes were in the good category. The abdominal muscles have an important role in maintaining the stability and flexibility of a sepak takraw athlete's movements. The strength of the abdominal muscles plays a crucial role in supporting various movements in sepak takraw. As part of the core muscle (Core), abdominal muscles function to maintain stability, balance, and body coordination when performing dynamic movements such as serves, smashes, and headers (Hermawan, Susanti, and Nahdliyyah 2023; Hsu et al. 2018). Research (Jufinda 2019) Indicates that the strength of the abdominal muscles contributes significantly to basic technique abilities such as the header of the takraw ball. In addition, good abdominal muscle strength helps in maintaining optimal posture, allowing players to perform movements

efficiently and reducing the risk of injury (Primary 2020). Exercises that focus on strengthening the abdominal muscles, such as crunches, hanging leg raises, and planks, can improve the overall performance of sepak takraw athletes (Syaifuddin and Hakim n.d.). Thus, the development of abdominal muscle strength is an important aspect of the training program for athletes to achieve optimal performance in the sport of sepak takraw.

Agility (Shuttle Run)

The results of the analysis of shuttle run test data showed that most of the physical conditions of the agility of PON Central Java male sepak takraw athletes were in the very good category. This is one of the success points of coaches in training Central Java PON athletes, where agility is one of the components of physical condition that is indispensable in sepak takraw. This is proven when the game takes place agile movements are needed when running which is a movement to change places quickly to chase takraw balls (Riskita, Bulqini, and Wijaya Kusuma 2019). The influence of agility in playing sepak takraw is very large, because on average in playing sepak takraw requires good agility, with an overview of the results of this agility test showing that the agility component is quite important in sepak takraw.

Speed (20 Meter Sprint)

The results of the analysis of the 20-meter sprint test data showed that most of the physical conditions of the speed of PON Central Java male sepak takraw athletes were in the poor category. This shows that attention to the running speed component is still too low. According to Syaifuddin and Aziz Hakim (2019) Although running speed only plays a small role in sepak takraw, this cannot be used as an excuse in training physical condition because in the match all elements are very useful. The importance of training the speed component is an evaluation of the trainer in making training programs. Exercise models to increase sprint speed specifically such as sprints on inclines, hill runs, and are also balanced by muscle-strengthening exercises such as weight training or plyometrics (Rumpf et al. 2016). With systematic and measurable training, it is hoped that the physical condition of athletes' speed can increase so as to support athletes in achieving even better achievements.

Aerobic Endurance (MFT)

The results of the analysis of MFT test data showed that most of the physical condition and aerobic endurance of PON Central Java male sepak takraw athletes were in the good category. This shows the success of the implementation of the training program that has been carried out by the athletes. Systematic and integrated training will help athletes improve their physical condition, and when there is an improvement in physical condition, athletes can play better as well (Purnomo 2019). Sepak takraw is one of the sports that has a close relationship with the physical condition of endurance. There has been no study that specifically discusses the duration of the sepak takraw game, but it is based on official regulations from the International Sepaktakraw Federation (ISTAF). Sepak takraw matches are played in a best-of-three set format, where each set is played until one of the teams reaches 15 points, with a

minimum difference of two points to win the set. If the score is 14-14, the game continues until one of the teams reaches a maximum score of 17 points. This shows that sepak takraw athletes need high aerobic endurance to be able to maintain their stamina until the end of the game. With a good level of aerobic endurance, it will make it easier for athletes to complete each match optimally (Mara and Çobaj 2025). One of the training methods to improve aerobic endurance is circuit training. Research (Aryatama 2022) showed that circuit training exercises significantly improved students' aerobic endurance with an increase in $VO_{2\text{max}}$ by 13.54%. Circuit training is a training method that consists of a series of movements in at least 6 posts, where the athlete must move from one post to the next without a break in rest so as to force the athlete to maximize his aerobic capacity (Jan 2019)

CONCLUSION

Based on the results of the research and discussion above, it shows that there is 1 component of physical condition that is in the very good category, namely agility, 2 components of physical condition are in the good category, namely abdominal muscle strength and aerobic endurance, and 2 components of physical condition are in the poor category, namely leg muscle explosiveness and speed. Thus, it can be concluded that the average profile value of the physical condition profile of PON athletes in Central Java 2024 as a whole is in the medium category. This needs to be used as a special attention for coaches and management to be used as material for evaluating even better training programs.

REFERENCES

Adolph, Ralph. 2016. "済無No Title No Title." 1-23.

Adrian Sha'ban, & Heru Syarli Lesmana. 2020. "Overview of Basic Technical Skills and Special Techniques for ATC (Ambacang Takraw Club) Women's Athletes in Sepak Takraw." *Patriot's Journal* 3(1):16-37.

Ahsan, I. 2019. "Review of Physical Condition at the Football Club of SMA N 1 Baso, Agam Regency." *Patriot Journal* 158-63.

Arikunto. 2017. *Research Procedure A Practical Approach*. Jakarta: Rineka Cipta.

Aryatama, that's good. 2022. "THE EFFECT OF CIRCUIT TRAINING ON THE PHYSICAL FITNESS (AEROBIC ENDURANCE) OF BSC METRO STUDENTS." *JOLMA* 2(1):40. doi:10.31851/jolma.v2i1.7626.

Bernanda, Eric. 2023. "Survey of Arm Muscle, Abdominal Muscle, Leg Muscles and Heart Lung Endurance of Male Athletes in Volleyball at the Avong Club, Bojonegoro Regency." *Universitas Nusantara Persatuan Teachers of the Republic of Indonesia*.

David Anderson, Helen Moggridge, Philip Warren, James Shucksmith. 2014. "The Impacts of 'Run-of-River' Hydropower on the Physical and Ecological Condition of Rivers." 29(2).

Doewes, M., & Furqon, M. 1999. "Physical Freshness Test with Multi-Stage Running." *ICECD*.

Donnelly, Joseph E., et al. 2016. "Physical Activity, Fitness, Cognitive Function, and Academic Achievement in Children A Systematic Review." *Medicine & Science in Sports & Exercise* 48(6):1197-1222.

Fuzyono, ASAP. 2013. "Profile of Physical Condition of Football Athletes of SMA Negeri 3 Cimahi." *University of Education Indonesia*.

Harsono. 2018. *Physical Fitness Training for Active Healthy Athletes*. Pe Print. Bandung: Remaja Rosdakarya.

Hermawan, Agung, Nur Susanti, and Ade Irma Nahdliyyah. 2023. "The Effectiveness of Core Stability on Improving Balance and Coordination in Jintot Competition Participants." *Journal of Physiotherapy and Rehabilitation* 7(2):206-11. doi:10.33660/jfrwhs.v7i2.294.

Hsu, Shih-Lin, Harumi Oda, Saya Shirahata, Mana Watanabe, and Makoto Sasaki. 2018. "Effects of Core Strength Training on Core Stability." *Journal of Physical Therapy Science* 30(8):1014-18. doi:10.1589/jpts.30.1014.

Jufinda, Anggil. 2019. "The Relationship between Abdominal Muscle Strength and Stroke Flexibility with Ball Heading Ability in Buana Putra FC Football Players in Sebukar Village, Kerinci Regency." *Sifa*

Smart Journal 57(2).

Jufrianis, Jufrianis, Akbar Akbar, and James Tangkudung. 2018. "The Effect of Eye-Foot Coordination, Flexibility of the Limbs, Body Balance and Self-Confidence To The Accuracy of the Football of Sepak Takraw." *Jipes - Journal of Indonesian Physical Education and Sport* 4(2):39–45. doi:10.21009/jipes.042.06.

Kamaruddin, I. 2019. "The Influence of Physical Ability on Smash Skills in the Game of Badminton. *SPORTIVE: Journal Of Physical Education, Sport and Recreation.*" *SPORTIVE: Journal Of Physical Education, Sport and Recreation* 2(2):114.

Maizan, A. 2020. "Profile of the Physical Condition of Padang Adios Club Football Athletes." *Journal of Sports Performance* 5(1):12–17.

MARA, Ferdinand, and Jorida ÇOBAJ. 2025. "Quantitative Analysis of Athletic Performance Enhancement: The Effects of Aerobic Training on VO₂ Max in Young Soccer's." *Edelweiss Applied Science and Technology* 9(2):1463–72. doi:10.55214/25768484.v9i2.4779.

Nugroho, M.B. Sutardji and Nugroho, P. 2016. "The Effect of Plyometric Depth Jump and Knee Tuck Jump Exercises on the Results of Hard Kicks of Football Athletes in the Juniar Ghezang Simo Team'." *Journal of Sport Sciences and Fitness* 3(2):47–51.

Pratama, Indra Gunawan. 2020. "The Effect of Circuit Exercises Using Core Stability Static Exercise on Abdominal Muscle Balance and Endurance." *Briliant: Journal of Research and Conceptual* 5(1):44. doi:10.28926/briliant.v5i1.417.

Praise Money, Agus. 2015. "Profile of Physical Condition and Basic Technical Skills of Early Childhood Table Tennis Athletes in Semarang City." *Journal of Physical Education Health and Sport* 2(1):38–42.

Purnomo, Ed. 2019. "The Effect of Training Programs on Improving the Physical Condition of Bolatangan Athletes of Porprov Kubu Raya." *JSES: Journal of Sport and Exercise Science* 2(1):29. doi:10.26740/jses.v2n1.p29-33.

Qurun, Deavy Khoirul. 2015. "The Relationship of Somatotype to Agility." *Thesis Papers* 1–32.

Rani, Sunita. 2019. "A Systematic Review Study of the Effects of Circuit Training on Physical Fitness Components." 4(1):2647–51.

Riskita, Amelia Vica, Arif Bulqini, and I. Dewa Made Aryananda Wijaya Kusuma. 2019. "THE RELATIONSHIP BETWEEN AGILITY AND BALANCE TO RECEIVE RESULTS IN WOMEN'S SEPAK TAKRAW ATHLETES OF THE EAST JAVA PUSLATDA." *JSES: Journal of Sport and Exercise Science* 2(2):44. doi:10.26740/jses.v2n2.p44–48.

Rumpf, Michael C., Robert G. Lockie, John B. Cronin, and Farzad Jalilvand. 2016. "Effect of Different Sprint Training Methods on Sprint Performance Over Various Distances." *Journal of Strength and Conditioning Research* 30(6):1767–85. doi:10.1519/JSC.00000000000001245.

Sapira, Dea, Tono Sugihartono, and Bogy Blessing Ilahi. 2022. "The Contribution of Leg Muscle Explosiveness to the Jump Heading Ability of Female Football Athletes at the Budas Muda Club of Bengkulu." *SPORT GYMNASTICS : Scientific Journal of Physical Education* 3(2):301–12. doi:10.33369/gymnastics.v3i2.21533.

Setiawan, Fahrul Rahmadi, Tono Sugihartono, and Yahya Eko Nopiyanto. 2022. "The Contribution of Leg Muscle Explosiveness to the Smash Ability of Sepak Takraw Athletes in Extracurricular Activities at SMP Negeri 12 Bengkulu City." *SPORT GYMNASTICS : Scientific Journal of Physical Education* 3(2):226–39. doi:10.33369/gymnastics.v3i2.22734.

Sidik, dikdik zafar, Pasurnay, paulus I., & Afari, L. 2019. *Physical Condition Training.* PT. Teenager Rosdakarya.

Sulaiman. 2008. "Sepak Takraw." *Semarang State University.*

Syaifuddin, Muhammad, and Abdul Aziz Hakim. 2019. "Profile of the Physical Condition of Men's Sepak Takraw Athletes of the 2018 Asian Games and Unesa SMEs." *Journal of Sports Health* 8(1):1.

Syaifuddin, Muhammad, and Abdul Aziz Hakim. n.d. "Physical Condition Profile of 2018 Asian Games Men's Sepak Takraw Athletes and UNESA UKM 155 PHYSICAL CONDITION PROFILE OF 2018 ASIAN GAMES MEN'S SEPAK TAKRAW ATHLETES AND UNESA SMES."

Umar, and Tomi Pratama. 2020. "A Review of the Level of Physical Condition of Football Athletes in Forma Fc Sijunjung." *Patriot Journal* 2:549–64.