



The Agility and Endurance SPV BBC Ungaran Volleyball Players

Amelia Dela Riska Pratiwi^{1A-E*}, Wiga Nurlatifa Romadhoni^{2B-D}

^{1,2}Universitas Negeri Semarang, Jawa Tengah, Indonesia

ameliadelariska@students.unnes.ac.id^{*}, wiganurlatifa@mail.unnes.ac.id²

ABSTRACT

This study aims to analyze the levels of agility and aerobic endurance ($VO_2\max$) of male volleyball athletes at SPV BBC Ungaran as a basis for evaluating their physical condition and designing a training program. This study employed a quantitative, descriptive approach using a survey method. The study subjects consisted of 14 active athletes participating in a regular training program. Data collection was conducted using the T-test agility test to measure agility and the beep test to measure aerobic endurance ($VO_2\max$). Data were analyzed using descriptive statistics, including mean, standard deviation, and percentage distribution. The results indicated that the athletes' agility levels were predominantly in the moderate category (72%), while their aerobic endurance ($VO_2\max$) also fell into the moderate category (79%). These findings suggest that the athletes' biomotor capacity is not yet optimal to meet the demands of fast-paced, high-intensity volleyball. These findings suggest that improving athletes' performance requires a more structured, sport science-based training program, particularly through the application of periodization and specific agility and aerobic endurance training. This study has limitations due to the relatively small sample size and the use of a descriptive design without intervention, so the results cannot yet be widely generalized. Therefore, future research is recommended to use an experimental design with a larger sample size to obtain more comprehensive and applicable results. Additional materials: This study is supported by 30 references, 3 tables (data categories and frequency distributions), and 2 figures/diagrams of measurement results illustrating the athletes' agility and endurance profiles.

ARTICLE HISTORY

Received: 2026/05/10

Accepted: 2026/05/15

Published: 2026/05/25

KEYWORDS

Agility;
Endurance;
Volleyball;
Physical Condition;
Athletes.

AUTHORS' CONTRIBUTION

- Conception and design of the study;
- Acquisition of data;
- Analysis and interpretation of data;
- Manuscript preparation;
- Obtaining funding

Cites this Article : Pratiwi, A.D.R.; Romadhoni, W.N. (2026). Profiles of Agility and Endurance SPV BBC Ungaran Volleyball Players. **Competitor: Jurnal Pendidikan Kepeleatihan Olahraga**. 18 (2), p.3458-3467

INTRODUCTION

Sports play a very important role in people's lives. In today's modern world, people cannot be separated from sports activities, whether as a means to improve performance or as a necessity for maintaining physical health and fitness (Teguh et al., 2024). Physical activity also plays a role in improving physical fitness, maintaining health, and supporting individual productivity in daily life. One type of sport that is very popular among the public today is volleyball, as it can be enjoyed by people of all backgrounds both men and women and contributes to increased physical activity and overall health (Novitasari et al., 2016).



Volleyball is also a dynamic and competitive sport that requires strong teamwork, so it affects not only the physical aspects but also the psychological and social aspects of the athletes. Volleyball is a sport that requires optimal physical conditioning to support the successful execution of game techniques and strategies. In volleyball, physical attributes such as strength, speed, agility, endurance, flexibility, and explosiveness play a crucial role in enhancing athletes' performance during matches (Kadafi & Irsyada, 2021). Good physical condition enables athletes to move quickly, accurately, and efficiently, and to respond to dynamic and rapidly changing game situations (Johann & Gabbett, 2017). This indicates that an athlete's performance is not solely determined by technical ability but is also significantly influenced by their level of physical readiness.

Among the various components of physical fitness, agility is one that plays a crucial role in supporting volleyball skills. Agility is the ability to change the direction of one's body movement quickly and precisely without losing balance. In volleyball, agility is essential for performing various movements such as changing positions, chasing the ball, and executing effective defense and offense. Agility training has been proven to improve athletes' movement abilities, particularly in making quick and precise changes of direction during a match (Aditia & Wijaya, 2026). In addition, agility also contributes to improving fundamental skills such as passing, blocking, and defensive movement in volleyball. As such, agility is one of the key indicators in assessing an athlete's physical readiness (Andika et al., 2026). In addition to agility, cardiovascular endurance is also a crucial component of physical fitness in volleyball. Cardiovascular endurance refers to the body's ability to sustain physical activity over an extended period without experiencing excessive fatigue. Athletes with good endurance levels will be able to maintain optimal physical activity even during high-intensity matches. Good aerobic endurance is closely related to the body's ability to utilize oxygen to its fullest potential (VO_2Max), which is often used as an indicator of an athlete's level of physical fitness (Andrea Ganjar Firjatulloh et al., 2025). Thus, endurance has a close relationship with the stability of an athlete's physical performance throughout a match.

Various studies have examined the importance of agility and endurance in volleyball; however, most of these studies still focus on the effects of training on improving physical abilities or the relationship between physical fitness components and specific technical skills. Several studies have shown that physical training methods such as plyometric and agility training have been proven to improve agility and physical performance in volleyball players (Yoda et al., 2023). In addition, this study also confirms that physical fitness components such as strength, speed, agility, and endurance are key factors influencing the performance of volleyball players during matches (Jariono et al., 2024). Research specifically analyzing athletes' agility and endurance within the context of a particular club or team remains relatively limited, particularly at the regional athlete development level, especially in Semarang Regency. Therefore, research is needed to provide a concrete picture of athletes' agility and endurance within volleyball clubs as a basis for developing more effective and targeted training programs, particularly for the SPV BBC Ungaran volleyball club.

Athlete development at SPV BBC Ungaran in Semarang Regency is fundamentally carried out through a systematic, structured, and progressive training approach that encompasses technical, tactical, mental, and physical conditioning aspects. In practice, this development not only focuses on improving playing skills but also emphasizes the importance of periodically evaluating athletes' physical condition as a basis for making decisions regarding the training program. Physical condition evaluations, particularly regarding agility and endurance, serve as key indicators for measuring an athlete's readiness for competition and for minimizing the risk of fatigue and injury (Bompa et al., 2019). However, studies that specifically examine the physical profiles of volleyball players at the regional club level remain limited, particularly those focusing on the analysis of agility and endurance as key components of performance (Gabbett, 2016). Yet, these two components play a crucial role in supporting athletes' performance during matches. The limitations of this study highlight the need for further research capable of providing a realistic picture of athletes' physical condition at the regional development level. Therefore, this study aims to analyze the agility and endurance of male volleyball athletes at SPV BBC Ungaran in Semarang Regency, identify the athletes' physical fitness levels based on measurement results, and provide an overview of the athletes' physical fitness profiles as a basis for developing more effective, targeted, and data-driven training programs. Additionally, this study aims to support the development of sports coaching science, particularly in the evaluation of volleyball athletes' physical condition at the regional development level, thereby enhancing athletes' performance quality in a sustainable manner (Sari & Sifaq, 2025).

METHODS

This study employs a quantitative approach using a descriptive research design. This approach was chosen because the study aims to describe the agility and endurance of volleyball athletes based on results and measurements obtained objectively in the field. The method used is a survey with data collection techniques through measurement tests. A quantitative descriptive approach is used to present data in numerical form without making generalizations, but rather to provide a picture of the actual condition of the objects under study (Febriani, 2022). The subjects of this study were 14 male volleyball players from SPV BBC Ungaran in Semarang Regency, who also constituted the study population. The research subjects were active athletes participating in the club's regular training program.

The data collection methods used in this study involved physical fitness tests, including the Beep Test to measure endurance and the T-test agility to measure agility. The use of tests and measurements in sports research is a common method for objectively obtaining quantitative data on athletes' physical condition (Ridwansyah et al., 2022). The research instruments used in this study included a course and beep test equipment to measure cardiovascular endurance, as well as a T-shaped course for conducting the T-test agility test. The T-test agility test is one of the most widely used instruments for measuring athletes' ability to change direction and their agility (Tirtawirya, 2011). The data analysis technique employs descriptive statistical methods, including the mean, standard deviation,

minimum, and maximum values, to identify the characteristics of the data. The use of descriptive statistics such as the mean and standard deviation in sports research aims to describe the general distribution and trends of the data (Ivan et al., 2025), Meanwhile, percentage analysis is used to determine the distribution of the research results across categories (Maulana et al., 2024). The research classification data is then analyzed using percentages based on the following formula:

$$P = \frac{f}{N} \times 100\%$$

The results of this study are presented in the form of a descriptive analysis that includes the frequency distribution and percentage of agility and endurance levels among SPV BBC Ungaran volleyball athletes based on test results and measurements.

Table 1.
Data Categories

No.	Conversion Formula	Category
1.	$X \geq (M + 1.SD)$	High
2.	$(M - 1.SD) < X < (M + 1.SD)$	Medium
3.	$X < (M - 1.SD)$	Low

RESULTS AND DISCUSSION

Result

The results of this study provide an overview of the agility and aerobic endurance (VO_2max) levels of male volleyball athletes at SPV BBC Ungaran based on data obtained through tests and measurements. The data were then analyzed descriptively and classified into several categories to facilitate the interpretation of the research results. The measurement results are presented in the form of tables and diagrams as follows:

Table 2.
Frequency Distribution Result Of Agility Tests

No.	Category	Interval	Frequency	Percentage
1.	Height	$X \geq 12,45$	2	14%
2.	Medium	$11,47 \leq X < 12,45$	10	72%
3.	Low	$X < 11,47$	2	14%
Total			14	100%

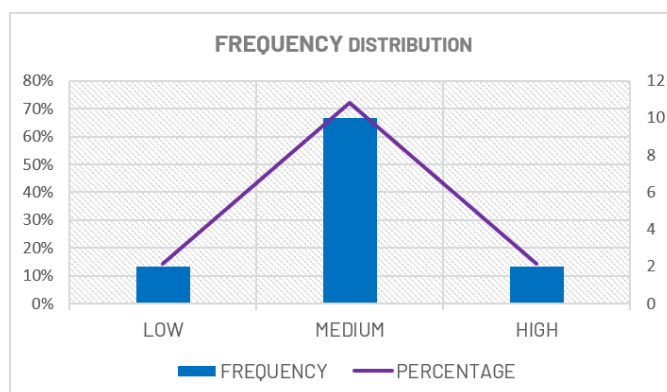


Figure 1.
Agility Test Results Diagram

Based on the frequency distribution of the agility test result presented in Table 2, it can be seen that there are 2 athletes in the high category, accounting for 14%. Furthermore, there are 10 athletes in the moderate category, accounting for 72%, making it the category with the highest number of athletes. Meanwhile, there are 2 athletes in the low category, accounting for 14%. Overall, these results indicate that the agility level of the SPV BBC Ungaran volleyball athletes falls into the moderate category, so further improvement efforts are still needed through more targeted training programs to achieve a more optimal condition (see Figure 1).

Table 3
 Frequency Distribution Result of the Endurance Test

No.	Category	Interval	Frequency	Percentage
1.	High	$X \geq 38,11$	2	14%
2.	Medium	$26,08 \leq X < 38,11$	11	79%
3.	Low	$X < 26,08$	1	7%
Total			14	100%

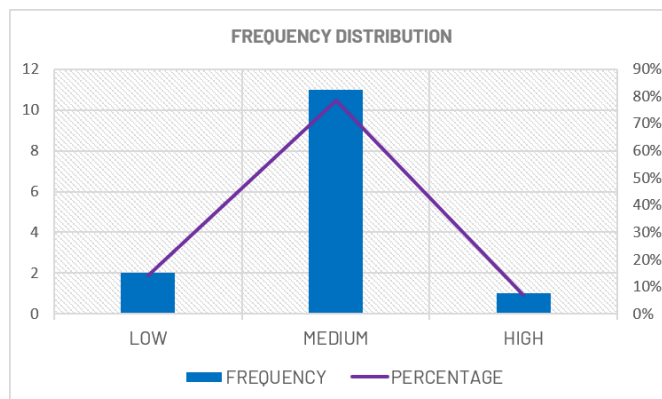


Figure 2.
 Endurance Test Results Diagram

Based on results of the endurance (VO₂max) frequency distribution presented in Table 3, it can be seen that in the high category, there were 2 athletes (14%), while in the moderate category, there were 11 athletes (79%), making it the category with the largest number. Meanwhile, in the low category, there was 1 athlete (7%). These results indicate that the majority of athletes have aerobic endurance levels in the moderate category, meaning that the athletes' (VO₂max) capacity is generally still at an intermediate level and needs to be improved through a more targeted training program (see Figure 2).

Discussion

Based on the research findings, it was determined that the levels of agility and aerobic endurance (VO₂max) among male volleyball athletes at SPV BBC Ungaran were predominantly in the moderate category, with 72% of the 10 athletes falling into the agility category and 79% of the 11 athletes falling into the VO₂max category. These findings indicate that the athletes' biomotor capacity is not yet optimal. In the context of volleyball, which involves fast and responsive movements, agility is a crucial component that determines the effectiveness of an athlete's performance. According to Harsono

(2015), agility is the ability to change the body's direction and position quickly and precisely without losing balance. This is consistent with research indicating that agility is the ability to change direction rapidly, a skill that is heavily influenced by an athlete's speed and coordination (Siska Ervi Andini, 2023). However, the predominant results in the moderate category cannot be explained solely in normative terms; rather, they must be analyzed contextually based on the specific conditions of each team. One of the main possibilities is that the training program design is not yet optimal. In many cases at the regional club level, training remains focused on technique and game-based training, while specific physical conditioning exercises—such as agility drills—have not yet been systematically incorporated into the program. Several studies indicate that specific exercises such as agility ladder drills, pro agility drills, and reactive drills have a significant impact on improving the agility of volleyball athletes (Aditia & Wijaya, 2026).

Furthermore, it is highly likely that the training program implemented was not based on the principles of periodization. Training periodization is crucial to ensure that improvements in physical ability occur gradually and in a targeted manner, progressing from the general preparation phase through the specific preparation phase to the competition phase. Without proper periodization, training tends to become stagnant and fails to yield significant improvements. This is often the case in non-elite clubs that have not yet fully implemented a sports science approach. The results of this study also indicate that this situation aligns with the theory of periodization proposed by Tudor O. Bompa. Bompa states that "periodization is a structured, long-term planning of training to optimize performance." This statement underscores that training cannot be conducted haphazardly but must be systematically designed over the long term to achieve peak performance at the right time. (Bompa et al., 2019a). Another factor to consider is the athlete's own characteristics, such as age, training experience, and playing position. Athletes with less training experience tend to have agility skills that have not yet developed to their full potential. This is supported by research indicating that agility is a complex skill influenced by various physical components and developed through a continuous training process (Chuang et al., 2022). In addition, in volleyball, each position has different physical demands.

Each position has its own specific characteristics and performance requirements, both in terms of technique and physical condition (Aditia & Wijaya, 2026). Liberos and setters, for example, require a higher level of agility because they are involved in defensive plays, receiving serves, and setting up attacks—all of which demand quick reactions and dynamic changes of direction. In contrast, middle blockers rely more heavily on height, jumping ability, and blocking skills, although they still require a certain degree of agility (Marpaung et al., 2025). In terms of aerobic endurance ($VO_2\max$), the study results show that the majority of athletes fall into the moderate category (79%). This indicates that the athletes' cardiorespiratory capacity is not yet optimal to meet the demands of the increasingly dynamic game of volleyball (Tuurmaida et al., 2024).

Physiologically, $VO_2\max$ is a key indicator of the body's ability to consume oxygen at maximum capacity during high-intensity activities, playing a crucial role in maintaining

performance during long rallies and multi-set matches. This is supported by research indicating that $VO_2\text{max}$ represents the upper limit of the body's ability to use oxygen to produce energy during high-intensity physical activity and serves as a primary indicator of cardiorespiratory fitness. (Jalanko et al., 2026). Therefore, in the context of volleyball—a sport that demands high-intensity repetitive activity— $VO_2\text{max}$ plays a crucial role in maintaining performance stability during long rallies and multi-set matches. This study indicates that while volleyball is dominated by anaerobic activity, the aerobic component remains essential for accelerating recovery between rallies and maintaining consistent performance (Helaprahara et al., 2019).

However, the predominance of the moderate category in $VO_2\text{max}$ cannot be interpreted merely as a general condition. One of the most likely factors is the low proportion of aerobic endurance training in the training program. In many regional-level clubs, training tends to focus more on technique, tactics, and strength, so the development of aerobic capacity has not yet become a top priority. This aligns with research findings showing that training programs for volleyball athletes often emphasize strength more, resulting in a less significant increase in $VO_2\text{max}$ compared to other physical components (Lleshi, 2021).

In addition, other studies have shown that exercise programs not specifically designed to improve aerobic capacity but rather those that emphasize other components such as strength or technique result in a relatively limited increase in $VO_2\text{max}$ due to a lack of appropriate physiological stimulation (Yunus & Raharjo, 2022). Compared to previous studies, the findings of this study show a similar trend, particularly regarding aerobic endurance ($VO_2\text{max}$) Research (Padmoyo & Astuti, 2024). This indicates that the majority of volleyball athletes fall into the moderate category for $VO_2\text{max}$ (55.5%), suggesting that the aerobic capacity of non-elite volleyball athletes generally has not yet reached an optimal level. This finding aligns with the results of this study, in which the majority of athletes also fall into the moderate category, thereby reinforcing a general pattern in the physical training of volleyball athletes. Thus, there is a significant difference when compared to experimental studies. Intervention studies show that with the application of appropriate training methods, such as interval training and agility-specific exercises, there is a significant increase in both athletes' $VO_2\text{max}$ and agility (Taufik, 2025). This indicates that the moderate-level performance observed in this study does not represent the athletes' physiological limits, but is rather due to suboptimal training program design and implementation. Crucially, this comparison confirms that the findings of this study align with those of previous research, while also highlighting significant room for improvement. In other words, the dominance of the moderate category in agility and $VO_2\text{max}$ reflects the limitations of the training approach rather than the athletes' physical potential itself. Therefore, optimizing training programs based on sport science particularly by increasing the proportion of aerobic training and agility-specific exercises is a key factor in improving athletes' overall performance.

CONCLUSION

This study indicates that the agility and aerobic endurance ($VO_2\max$) of the male volleyball athletes at SPV BBC Ungaran remain at an intermediate level, and thus do not yet fully meet the demands of a fast-paced, dynamic, and high-intensity game. These findings underscore the importance of optimizing physical conditioning through more systematic training planning, particularly by applying the principles of periodization and incorporating specific training exercises tailored to the athletes' biomechanical needs and playing positions. Practically, the results of this study imply that improving athletic performance depends not only on technical and tactical training but also requires a structured, sport science-based approach to maximize physiological adaptation. However, this study has several limitations. The relatively small sample size (14 athletes) and the study's scope being limited to a single club mean the results cannot yet be widely generalized. Additionally, the use of a descriptive design without intervention means this study can only describe the actual conditions without explaining causal relationships in depth. Furthermore, limitations in variable measurement and the lack of control over external factors such as training frequency, training patterns, nutrition, and athletes' fatigue levels have the potential to influence the study's results. Therefore, future research is recommended to use an experimental design with a larger sample size to yield more comprehensive and practical findings.

ACKNOWLEDGMENTS

The author would like to thank all parties who provided support for the conduct of this study. In particular, the author extends gratitude to the SPV BBC Ungaran Volleyball Club in Semarang Regency for granting permission and the opportunity to conduct this research. Thanks are also extended to the athletes who agreed to serve as research subjects and actively participated throughout the data collection process. In addition, the author would like to thank the supervising lecturer and all parties who provided guidance, input, and support, both directly and indirectly, in the preparation of this research, enabling it to be successfully completed.

REFERENCES

- Aditia, P., & Wijaya, F. (2026). Pengaruh Latihan Pro Agility dan 20-Yard Square Drill terhadap Peningkatan Kelincahan Atlet Bola Voli. 11(02), 1-11.
- Andrea Ganjar Firjatulloh, Dwi Priyono, Joan Siswoyo, & Herman Tarigan. (2025). Tingkat Kemampuan ($Vo_2\max$) Pada Siswa Ekstrakurikuler Bola Basket Se-Sma Negeri Kota Metro. JURNAL ILMIAH PENJAS (Penelitian, Pendidikan Dan Pengajaran), 11(1), 89-98. <https://doi.org/10.36728/jip.v11i1.3953>
- Bompa, Tudor, O., Buzzicheli, & Carlo. (2019a). Periodization-6th Edition: Theory and Methodology of Training.

- Bompa, Tudor, O., Buzzicheli, & Carlo. (2019b). Periodization: Theory and Methodology of Training.
<https://books.google.co.id/books?id=2f90DwAA0BAJ&printsec=copyright&hl=id#v=onepage&q&f=false>
- Chuang, C., Hung, M., Chang, C., Wang, Y., & Lin, K. (2022). applied sciences Effects of Agility Training on Skill-Related Physical Capabilities in Young Volleyball Players.
- Febriani, S. (2022). Analisis Deskriptif Standar Deviasi. 6, 910–913.
- Gabbett, T. J. (2016). The training-injury prevention paradox: should athletes be training smarter and harder? National Library of Medicine.
<https://doi.org/https://doi.org/10.1136/bjsports-2015-095788>
- Gymnastics, S., Ilmiah, J., & Jasmani, P. (2023). latihan koordinasi, kelincahan, passing atas. 4(1), 121–130. <https://doi.org/10.33369/gymnastics>
- Info, A. (2019). Jurnal Pendidikan Jasmani dan Olahraga. 4(2), 231–236.
- Ivan, M., Aziz, M., & Irawati, A. F. (2025). Hubungan Panjang Tungkai dan Daya Ledak Otot Tungkai terhadap Kemampuan Berubah Arah pada Atlet Bolabasket. 15(1), 52–59.
- Jalanko, P., Laitinen, E., Vlachopoulos, D., Gao, Y., Nurmi, T., Barker, A. R., Bond, B., Lee, E., & Haapala, E. A. (2026). Measuring V̇O₂max in adolescents : verification phase and impact of time averaging strategies.
- Jariono, G., Nurhidayat, N., Indarto, P., Sistiasih, V. S., Nugroho, H., & Maslikah, U. (2024). Physical Activity Training Methods to Improve the Physical Condition of Volleyball Players: A Systematic Review. Physical Education Theory and Methodology , 24(1), 118–129. <https://doi.org/10.17309/tmfv.2024.1.15>
- Jember, U. M., Jember, U. M., & Muhammadiyah, U. (2022). Universitas Muhammadiyah Jember 2 Universitas Muhammadiyah Jember 3 Universitas Muhammadiyah Jember.
- Johann, W., & Gabbett, T. J. (2017). How do training and competition workloads relate to injury? The workload-injury aetiology model. National Library of Medicine.
- Journal, I., Humanities, O., Tiurmaida, M., Candra, O., Riau, U. I., & Author, C. (2024). Review Of Vo₂max Volleyball Athletes Club Rekita Vc Dikoto Gasib Kabupaten Siak. 3(4), 2038–2045.
- Kadafi, A. P., & Irsyada, M. (2021). Analisis Kondisi Fisik Atlet Bola Voli Putra Blitar Mandiri Di Masa Pandemi Covid-19. Jurnal Prestasi Olahraga, 4(6), 128–133.
<https://ejournal.unesa.ac.id/index.php/jurnal-prestasi-olahraga/article/view/40815%0Ahttps://ejournal.unesa.ac.id>
- Lleshi, E. (2021). Performance of Female Volleyball Players in VO₂max. 9563(December), 118–121.
- Marpaung, D. R., Purba, D., Jekson, J., & Alamsyah, V. (2025). SPRINTER : Jurnal Ilmu Olahraga Analisis Komparatif Efektivitas dan Strategi Blocking pada Middle Blocker , Opposite Hitter , dan Outside Hitter dalam Bolavoli. 6(3), 777–782.
- Maulana, R. A., Friskawati, G. F., & Karisman, V. A. (2024). Gender dan kebugaran jasmani siswa : analisis perbedaan hasil Tes Kebugaran Siswa Indonesia (TKSI) fase D Gender and students ' physical fitness : An analysis of differences in the results of the Indonesian Student Fitness Test (TKSI) Phase D Abstrak. 4, 39–49.

- Novitasari, D. A., Rahfiludin, M. Z., & Suroto. (2016). (Tosser Dan Smasher) Atlet Bola Voli. *Jurnal Kesehatan Masyarakat*, 4(April).
- Padmoyo, R. H., & Astuti, R. K. (2024). *Journal of Physical Education , Health and Sport Aerobic Endurance (VO 2 Max) Male Volleyball Student Activity Unit Doktor Nugroho University Magetan*. 11(2), 120-125.
- Ridwansyah, M., Irianto, T., & Dirgantoro, W. (2022). Analisis Kebugaran Jasmani Dari Aspek Durasi Olahraga Pada Peserta Didik SMP Negeri 1 Tamban Kabupaten Barito Kuala. 3(2), 101-110.
- Sari, Y. N., & Sifaq, A. (2025). *JPO : Jurnal Prestasi Olahraga*. 852-860.
- Taufik, M. S. (2025). El entrenamiento de 5 minutos mejora el VO2máx y la agilidad ? Un estudio sobre el entrenamiento de juego situacional en el fútbol sala Does 5-minute training improve VO2max and agility ? A study of situational game training in futsal Authors How to cite in APA Keywords Resumen Palabras clave. 2025, 280-290.
- Teguh, T., Indika, P. M., Sari, A. P., & Kurniawan, R. (2024). Peran Berolahraga Dalam Menciptakan Kesehatan. *Jurnal Family Education*, 4(1), 130-135. <https://doi.org/10.24036/jfe.v4i1.151>
- Tirtawirya, D. (2011). Agility T Test Taekwondo. 7, 27-31.
- Yoda, I. K., Kusuma, K. C. A., Suwiwa, I. G., & Silva, H. Da. (2023). A combination of split jumps and short sprints to increase the volleyball athletes' leg muscle power and agility. *Jurnal Keolahragaan*, 11(2), 256-265. <https://doi.org/10.21831/jk.v11i2.65780>
- Yunus, M., & Raharjo, S. (2022). Kinestetik : *Jurnal Ilmiah Pendidikan Jasmani The Effect Of Circuit And Interval Training On Maximum Oxygen Volume (VO2 Max) in Professional*. 6(5), 128-133.