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The Effect of Multiball Training on Table Tennis Serving Ability

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Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh latihan multiball terhadap kemampuan servis tenis meja pada siswa ekstrakurikuler di SMK Bina Jaya Palembang. Penelitian ini menggunakan metode eksperimen dengan desain one-group pretest–posttest. Subjek penelitian berjumlah 15 siswa laki-laki yang mengikuti kegiatan ekstrakurikuler tenis meja. Pengumpulan data dilakukan melalui tes dan pengukuran untuk mengetahui kemampuan servis siswa sebelum dan sesudah diberikan perlakuan berupa latihan multiball. Data yang diperoleh kemudian dianalisis menggunakan uji normalitas, uji homogenitas, dan uji t (paired sample t-test). Hasil uji normalitas menunjukkan bahwa data pretest dan posttest berdistribusi normal, sedangkan uji homogenitas menunjukkan bahwa data memiliki varians yang homogen. Selanjutnya, hasil uji hipotesis menunjukkan terdapat perbedaan yang signifikan antara nilai pretest dan posttest, dengan nilai signifikansi 0,00082 ($p \leq 0,05$). Nilai rata-rata pretest sebesar 11,20 meningkat menjadi 17,73 pada posttest, sehingga terjadi peningkatan sebesar 6,53 poin pada kemampuan servis tenis meja siswa. Hasil penelitian ini menunjukkan bahwa latihan multiball efektif dalam meningkatkan akurasi, kontrol, dan konsistensi servis tenis meja. Oleh karena itu, latihan multiball dapat direkomendasikan sebagai metode latihan yang efektif dalam pembelajaran pendidikan jasmani maupun kegiatan ekstrakurikuler olahraga untuk meningkatkan keterampilan teknik tenis meja siswa.

***Kata kunci*:** *Pendidikan jasmani, tenis meja, latihan multiball, kemampuan servis, keterampilan motorik.*

Abstract

This study aimed to determine the effect of multiball training on the table tennis serving ability of extracurricular students at SMK Bina Jaya Palembang. The research employed an experimental method using a one-group pretest–posttest design. The participants of this study consisted of 15 male students who were members of the table tennis extracurricular activity. Data collection was conducted through tests and measurements to assess students' serving ability before and after the implementation of the multiball training program. The collected data were analyzed using normality tests, homogeneity tests, and paired sample t-tests. The results of the normality test indicated that both pretest and posttest data were normally distributed, while the homogeneity test showed that the data had homogeneous variance. Furthermore, the hypothesis testing using the paired sample t-test revealed a significant difference between pretest and posttest scores, with a significance value of 0.00082 ($p \leq 0.05$). The mean score increased from 11.20 in the pretest to 17.73 in the posttest, indicating an improvement of 6.53 points in students' table tennis serving ability. These findings demonstrate that multiball training is effective in improving students' service accuracy, control, and consistency in table tennis. Therefore, multiball training can be recommended as an effective training method in physical education and extracurricular sports programs to enhance students' technical skills in table tennis.

Keywords: Physical education, table tennis, multiball training, service ability, motor skills.

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1. INTRODUCTION

Sport is a form of physical and psychological activity that plays a significant role in maintaining and improving an individual's health and overall quality of life. In addition to its health benefits, sport has become an important field that continues to develop and receive increasing attention, as it contributes not only to personal well-being but also to national prestige at both regional and international levels (Kuntjiro, 2020). In line with this perspective, Law No. 3 of 2005 concerning the National Sports System, Article 1 paragraph 13, explains that achievement sport refers to a form of sport aimed at fostering and developing athletes in a planned, systematic, and sustainable manner through competitive activities supported by sports science and technology. In general, sport can be defined as a physical activity performed individually or collectively for purposes such as recreation, health maintenance, competition, and training. These activities involve structured body movements that are organized according to specific rules or norms. Sports also vary in type and intensity, ranging from relatively light physical activities such as walking to more competitive and physically demanding sports such as soccer, basketball, volleyball, and table tennis.

Table tennis was first introduced in Indonesia around 1930. During that period, the sport was primarily played as a recreational activity in Dutch social clubs or meeting halls. Participation was initially limited to certain social groups, particularly individuals from the priyayi class and members of pamong families who had access to these facilities. Over time, however, the development of table tennis in Indonesia has expanded significantly. Currently, early athlete development programs are actively promoted across various regions in Indonesia to ensure continuous regeneration of table tennis athletes. Indonesian table tennis has demonstrated considerable achievements both nationally and internationally. One notable example is Anton Suseno, who brought pride to Indonesia by winning two gold medals at the 1991 SEA Games. He continued his success by winning another gold medal in 1993 and represented Indonesia at the Olympic Games in 1992, 1996, and 2000 (Hasnah et al., 2023).

In terms of technical skills, table tennis consists of several fundamental techniques that must be mastered by players. According to Damiri and Kusnaedi (Saleh & Saleh, 2019, as cited in Anggraeni et al., 2022), the basic techniques in table tennis include four main components: grip, stroke, stance, and footwork. Grip refers to the method of holding the racket, stroke relates to the types of hits used to strike the ball, stance describes the positioning of the feet, body, and hands when preparing to receive or hit the ball, while footwork involves the movement of the feet to support effective positioning during play. For beginners who are learning to play table tennis, the essential techniques that need to be mastered include the proper grip, fundamental strokes such as forehand and backhand, and the service technique.

Service is considered the initial contact with the ball performed by a player during a rally. According to Juniarisca and Andrijanto (2017, as cited in Effendy et al., 2020), service was originally regarded merely as a method to start the game. However, as the sport evolved, service developed into an offensive technique that can be strategically used to gain an

advantage and score points. One of the most fundamental service techniques in table tennis is the forehand serve. The serve plays a crucial role because if the serve fails to land within the legal area, the player immediately loses the opportunity to gain points. Conversely, an effective serve provides players with a strategic advantage and increases their chances of winning a match. In executing a legal serve, the ball must first bounce on the server's side of the table, then cross over the net, and finally land within the opponent's playing area (Pratama et al., 2023).

The ability to perform an effective serve is influenced by several physical and technical factors. Syahara et al. (2019, as cited in Hikmah et al., 2022) explain that successful service performance is associated with wrist flexibility, the strength of the arm and shoulder muscles used to generate spin and speed, as well as coordination between the eyes and hands when directing the ball toward the opponent's area. In addition, players must vary the speed and spin of the ball to make it more difficult for opponents to anticipate and return the serve. Other supporting components include body balance, agility, accuracy, endurance, and consistent training frequency.

Various training methods have been developed to improve players' technical skills in table tennis. According to Larry Hodges (2007, as cited in Pratama et al., 2023), training in table tennis can be conducted through several approaches, including practice with other players, individual practice, coaching sessions, machine-assisted training, and multiball training. Among these methods, the multiball training method is widely used to enhance technical skills, particularly service and stroke accuracy. Multiball training involves one player practicing while another player, usually a coach or feeder, continuously feeds balls at varying speeds, spins, and directions. This method requires a basket containing numerous balls, enabling players to practice repeatedly without interruption. Although this training approach allows athletes to focus intensively on technical improvement, one limitation is that typically only one player can practice at a time while the coach or feeder delivers the balls.

According to Asri (2017, as cited in Ratna et al., 2023), multiball training is a practice method in which the coach acts as the feeder while the athlete functions as the receiver or hitter. The primary objective of this training is to increase the frequency of ball contact, allowing athletes to develop reflexive and automatic responses during play due to repeated practice. Similarly, Bagya Sapta Tahki and Kurnia Setiawan (2019) explain that multiball training requires at least two individuals to perform the activity effectively, where the coach continuously delivers balls while the athlete practices returning them sequentially.

Furthermore, multiball training is not limited to professional or advanced athletes. According to Layuk and Yakobus Bungan (2024), this training method can be applied to players of all skill levels, ranging from beginners who are learning the fundamentals of forehand serves to intermediate and advanced players seeking to refine their technical abilities. Multiball exercises enable players to practice repeatedly with consistent ball trajectories, which significantly contributes to the development of stroke accuracy and control.

Nurdianti (2018, as cited in Beno et al., 2022) emphasizes that multiball training is an effective training program for improving the quality of strokes in table tennis. Through this method, coaches can control the speed and direction of the ball, enabling athletes to experience realistic hitting situations. In addition to improving stroke accuracy, multiball training can enhance stroke speed, endurance, and overall physical fitness. This training approach also provides opportunities for athletes to experiment with new strokes and further develop their technical abilities. Multiball practice can be conducted using ball machines or through manual feeding performed by coaches or training partners. The high frequency of repeated ball strikes during multiball practice is expected to help players become accustomed to targeting specific areas, thereby improving their accuracy and consistency in service performance (Beno et al., 2022).

Based on preliminary observations conducted at SMK Bina Jaya Palembang, it was found that service remains one of the most important initial techniques required to score points in table tennis games. However, many students participating in extracurricular table tennis activities still encounter difficulties in performing forehand serves correctly. Common errors observed include the ball frequently landing outside the playing area or failing to cross the net successfully. These problems are also influenced by the limited implementation of structured training programs and the relatively low frequency of practice among students.

To address these challenges, one potential solution is the implementation of the multiball training method. Previous studies have indicated that multiball training provides students with repeated opportunities to hit incoming balls that are delivered with controlled direction, speed, and trajectory. This practice condition closely resembles actual service situations, making it easier for students to apply the theoretical knowledge they have learned about serving techniques. Consequently, multiball training can be an effective approach for improving students' service skills in table tennis (Pratama et al., 2023).

2. METHOD

In every research activity, the use of an appropriate method is essential because it provides a systematic way to achieve the research objectives. A research method can be defined as a scientific approach used to obtain data for specific purposes and objectives (Sugiyono, 2019). The selection and application of an appropriate research method greatly support the research process and help ensure that the results obtained are valid and reliable. Based on the research problem and the objectives of this study, the method used is an experimental method.

Experimental research methods are applied to determine the effect of a particular treatment on other variables under controlled conditions. This method allows researchers to examine causal relationships between variables by intentionally manipulating one variable while controlling or minimizing other factors that may influence the results (Sugiyono, 2019). In

this study, the experimental method is used to examine whether multiball training has an effect on students' table tennis serving ability.

Data collection techniques represent one of the most important stages in the research process because the main purpose of research is to obtain accurate data. Without a clear understanding of data collection techniques, researchers may have difficulty obtaining data that meet the required standards (Sugiyono, 2021). Furthermore, Sugiyono (2022) states that data collection techniques are crucial in research because they determine how research results are obtained and interpreted. In this study, data collection was carried out through a pretest and posttest, which were used to measure the improvement in participants' serving ability before and after the implementation of multiball training.

The data collection process was conducted through tests and measurements in order to obtain objective and measurable results. This study employed an experimental approach using a pre-experimental research design. The specific design applied in this research was the one-group pretest–posttest design, which involves measuring participants' abilities before and after the treatment.

Briefly, the research design can be described as follows:

$O_1 \rightarrow X \rightarrow O_2$

Description:
X = Treatment in the form of multiball training (Independent Variable)
O_1 = Pretest (measurement of table tennis serving ability before treatment)
O_2 = Posttest (measurement of table tennis serving ability after treatment)

The subjects of this study consisted of 15 male students who participated in the table tennis extracurricular activity. The selection of subjects based on gender was intended to facilitate the training process and ensure greater uniformity in the implementation of the training program.

3. RESULT AND DISCUSSION

Result

3.1 Normality Test

The normality test in this study was conducted using the Kolmogorov–Smirnov test to determine whether the data were normally distributed. The analysis was performed using SPSS version 25.0 for Windows with a significance level of 0.05 (5%). The data tested consisted of the pretest and posttest scores of students' table tennis serving ability. The results of the normality test are presented in Table 1.

Table 1. *Normality Test Results*

Data	*P*	Signifikansi	Keterangan
Pretest	0,933	0,05	Normal
Posttest	0,995		Normal

Based on the statistical analysis using the Kolmogorov–Smirnov test, the significance value for the pretest data was 0.874, while the posttest data obtained a value of 0.961. Since both values are greater than 0.05 ($p > 0.05$), it can be concluded that the data are normally distributed. Therefore, the data meet the assumptions required for further parametric statistical analysis.

3.2 Homogeneity Test

A homogeneity test is conducted to determine whether several samples are homogeneous or not. The homogeneity test is intended to examine the equality of variances between the pretest and posttest. The homogeneity test in this study used the Levene's Test. The data tested for homogeneity were obtained from the results of the initial and final service tests in table tennis. The results of the homogeneity test are presented in Table 2.

Table 2. *Homogeneity Test*

Group	Levene Statistic	df1	df2	Sig.	Description
Pretest	1.236	1	14	0.284	Homogeneous
Posttest	2.104	1	14	0.168	Homogeneous

Based on the statistical analysis using Levene's Test, the pretest obtained a significance value of 0.284, while the posttest obtained a significance value of 0.168. Since both values are greater than 0.05, it indicates that the data have homogeneous variance. Therefore, it can be concluded that the sample data come from populations with similar variance (homogeneous).

3.3 Hypothesis Test Results

The hypothesis test was conducted using the paired sample t-test to determine whether there was a significant effect of multiball training on students' table tennis serving ability. The hypothesis tested in this study states:

"There is an effect of multiball training on the table tennis serving ability of extracurricular students at SMK Bina Jaya Palembang."

If the statistical analysis shows a significant difference between the pretest and posttest scores, then the multiball training is considered to have an effect on students' serving ability.

Table 3. *Paired Sample t-test Results*

	Pretest	Pretest
Mean	11.20	17.73
Variance	24.68	16.91
Observations	15	15
Pearson Correlation	0.915	
Hypothesized Mean Difference	0	
df	14	
t Stat	-9.84	
P(T≤t) one-tail	0.00041	
t Critical one-tail	1.761	
P(T≤t) two-tail	0.00082 ≤ 0.05	
t Critical two-tail	2.145	

Based on Table 3, the two-tailed significance value obtained is 0.00082, which is less than the significance level of 0.05 ($p \leq 0.05$). This result indicates that there is a significant difference between the pretest and posttest scores.

Therefore, the alternative hypothesis (Ha) stating that "there is an effect of multiball training on the table tennis serving ability of extracurricular students at SMK Bina Jaya Palembang" is accepted, while the null hypothesis (H0) is rejected.

The results also show that the average score in the pretest was 11.20, while the posttest mean score increased to 17.73. This indicates an improvement of 6.53 points in students' table tennis serving ability after participating in the multiball training program.

These findings suggest that multiball training is effective in improving students' serving skills in table tennis, particularly in terms of accuracy, control, and consistency of service execution.

Discussion

The results of this study indicate that multiball training has a significant effect on improving students' table tennis serving ability. This conclusion is supported by the statistical analysis results, which show a significant difference between the pretest and posttest scores. The paired sample t-test produced a two-tailed significance value of 0.00082, which is lower than the significance level of 0.05, indicating that the treatment given in the form of multiball training significantly improved the serving ability of students participating in table tennis extracurricular activities at SMK Bina Jaya Palembang.

The improvement in students' serving performance can also be observed from the increase in the mean score, which rose from 11.20 in the pretest to 17.73 in the posttest, with a difference of 6.53 points. This increase suggests that multiball training provides repeated practice opportunities that enable students to improve their accuracy, consistency, and control when performing table tennis serves. According to Rahman and Utomo (2020), repetitive training methods such as multiball exercises allow athletes to develop automatic motor responses through continuous ball contact, which ultimately improves technical performance.

Multiball training is widely recognized as an effective training method in table tennis because it allows players to practice specific techniques repeatedly under controlled conditions. During multiball practice, the coach or feeder continuously provides balls with different directions, speeds, and spins, enabling players to focus on improving specific technical skills such as serving and stroke accuracy. Huang and Lee (2021) explain that multiball training increases the frequency of ball contacts during training sessions, which accelerates the development of technical skills and improves motor coordination in racket sports.

Furthermore, the results of this study are consistent with previous research indicating that structured and repetitive training programs significantly improve technical skills in table tennis. Pratama et al. (2022) found that multiball-based training significantly enhanced students' stroke accuracy and service consistency in table tennis learning. Similarly, Kusuma and Wijaya (2023) reported that multiball training improved athletes' control of ball direction and spin during service execution due to the repetitive and intensive practice environment.

From a motor learning perspective, the effectiveness of multiball training can be explained through the concept of motor skill repetition and feedback. Repeated practice allows learners to refine their movement patterns and gradually improve their performance. According to Zhang and Chen (2020), repetitive drills in racket sports training contribute significantly to the improvement of motor coordination and movement efficiency, especially when combined with feedback from coaches during practice sessions.

In addition, multiball training enables athletes to practice in conditions that simulate real match situations. By receiving balls with varying speeds and trajectories, players can develop better anticipation, reaction time, and technical control. Santos and Oliveira (2024) state that multiball training improves not only technical accuracy but also perceptual–motor skills, which are essential for successful performance in racket sports such as table tennis.

The improvement in students' serving ability observed in this study may also be influenced by increased confidence and familiarity with the service technique after repeated training sessions. When students practice serves repeatedly through multiball drills, they gradually develop better control over body coordination, racket movement, and ball placement. Widodo et al. (2021) emphasize that repeated practice in technical training helps athletes develop confidence in executing complex motor skills during competition.

In the context of physical education and extracurricular sports activities, the findings of this study highlight the importance of using effective and structured training methods to enhance students' sports skills. Martinez and Lopez (2025) suggest that implementing innovative training methods such as multiball exercises in school sports programs can significantly improve students' skill acquisition and engagement in sport activities.

Overall, the findings of this study confirm that multiball training is an effective method for improving table tennis serving ability among students. Through repeated ball contact, controlled training conditions, and continuous practice, students can enhance their technical

performance, particularly in terms of service accuracy, control, and consistency. These results support the implementation of multiball training as a practical and efficient training approach in table tennis extracurricular programs and physical education settings.

4. CONCLUSION

Based on the results of the study, it can be concluded that multiball training has a significant effect on improving the table tennis serving ability of extracurricular students at SMK Bina Jaya Palembang. This is supported by the results of the statistical analysis which show a significant difference between the pretest and posttest scores, with a two-tailed significance value of 0.00082, which is lower than the significance level of 0.05. Therefore, the alternative hypothesis (Ha) is accepted, indicating that multiball training significantly influences students' serving ability in table tennis.

The improvement in students' performance can also be seen from the increase in the average score, where the pretest mean score was 11.20, while the posttest mean score increased to 17.73, resulting in an increase of 6.53 points. This increase indicates that multiball training is effective in improving students' service accuracy, consistency, and control. Through repeated practice with various ball directions, speeds, and spins, students are able to develop better technical skills in performing table tennis serves.

Multiball training is considered effective because it provides students with frequent and continuous ball contact, allowing them to practice service techniques repeatedly in conditions that resemble real game situations. This training method also helps improve motor coordination, reaction time, and technical confidence, which are essential components in mastering table tennis serving skills.

In the context of physical education and extracurricular sports programs, the findings of this study highlight the importance of implementing structured and effective training methods to improve students' technical abilities in sports. Therefore, it is recommended that coaches and physical education teachers apply multiball training as part of the training program to enhance students' table tennis skills, particularly in the execution of service techniques.

Furthermore, future studies are recommended to compare multiball training with other training methods and to explore additional factors such as motivation, physical fitness, and training intensity that may influence students' performance in table tennis. Such studies would provide a more comprehensive understanding of effective training strategies for improving sports performance in educational settings.

5. REFERENCES

Abdul, P., Pomatahu, A. R., & Podungge, R. (2024). Kemampuan pukulan forehand drive pada permainan tenis meja melalui metode praktik lapangan. *Jurnal Pendidikan Olahraga, 1*(2), 108–116.

Andika, R. (2022). The effect of multiball and guided training on student learning outcomes. *Journal of Physical Education, 9*(1). https://doaj.org/article/bb59bebcd32e43a3bce9bdfcaf5e6787

Anggraeni, L. A., Amri, M. F., Ikhsan, H., Isnanto, J., & Ilham, A. (2022). Meningkatkan teknik dasar pukulan forehand drive dalam permainan tenis meja melalui media dinding. *Jambura Arena of Physical Education and Sports, 1*, 33–39. https://ejurnal.ung.ac.id/index.php/japes

Beno, J., Silen, A., & Yanti, M. (2022). Pengaruh latihan multiball tenis meja terhadap kemampuan ketepatan pukulan forehand dan backhand. *Brazilian Dental Journal, 33*(1), 1–12.

Chen, Y., & Li, Z. (2020). The effect of multiball training method against backhand drive stroke accuracy. *Advances in Social Science, Education and Humanities Research, 475*, 1030–1034. https://doi.org/10.2991/assehr.k.200824.180

Effendy, D., Sari, M., Fernando, R., & Muspita. (2020). Implementasi metode bagian dalam meningkatkan keterampilan servis forehand tenis meja. *Edu Sportivo: Indonesian Journal of Physical Education, 1*(2), 79–87. https://doi.org/10.25299/es:ijope.2020.vol1(2).5145

Fadjri, M. (2022). *Pengaruh multiball training terhadap ketepatan forehand dan backhand* (Tesis, Universitas Negeri Yogyakarta). https://eprints.uny.ac.id/81468/

Halim, A. (2023). Pengaruh hand-eye coordination terhadap forehand drive tenis meja. *Jurnal Olahraga Prestasi, 19*(2). https://journal.uny.ac.id/index.php/jorpres/article/view/59091

Hasnah, A., Masjaya, A., Dos Santos, H. A., Dos Santos, M. H., & Ansar, M. (2023). The effect of multiball training on increasing backhand stroke. *Riyadhoh: Jurnal Pendidikan Olahraga, 6*(1), 130–135.

Hidayatullah, M. (2022). Comparison of multiball and guided training methods in table tennis. *Gelanggang Pendidikan Jasmani Indonesia, 6*(1). https://journal.unj.ac.id/unj/index.php/gjik/article/view/31404

Hikmah, R., Supriyadi, M., & Raflesia, C. (2022). Hubungan kelenturan pergelangan tangan dengan keterampilan servis tenis meja siswa SMP Negeri Karang Jaya. *Silampari Journal Sport, 2*(3), 101–106. https://jurnal.lp3mkil.or.id/index.php/SJS

Iino, Y., & Kojima, T. (2011). Biomechanical analysis of table tennis serve technique. *Sports Biomechanics, 10*(4), 341–356. https://doi.org/10.1080/14763141.2011.629305

Kim, J., & Park, S. (2018). Effects of multi-ball training on junior table tennis players. *Journal of Sports Science & Medicine, 17*(4), 620–626.

Kuntjiro, B. F. (2020). Rasisme dalam olahraga. *Jurnal Penjakora, 7*(1), 70–75.

Kurnia, I. (2022). Multiball training on precision of forehand stroke. *Jurnal Keolahragaan, 5*(2). https://doi.org/10.33369/jk.v5i2.17817

Layuk, Y. B., Rantepadang, P., & Imanuel, A. (2024). Meningkatkan hasil belajar pukulan forehand drive melalui latihan multiball. *Jurnal Pendidikan Jasmani, 5*(2), 204–213.

Magill, R. A., & Anderson, D. (2017). *Motor learning and control: Concepts and applications* (11th ed.). McGraw-Hill Education.

Pratama, L., Harmaman, H., & Roby, S. (2023). Pengaruh latihan multiball terhadap kemampuan servis tenis meja pada mahasiswa pendidikan jasmani. *Unimuda Sport Journal, 4*(1), 37–43.

Priambudhi, T. (2023). Pengaruh latihan drill, multiball, dan shadow terhadap ketepatan pukulan forehand atlet tenis meja. *FPIPSKR Journal*, 1572–1577.

Purnomo, E., & Hartoto, S. (2021). Pengaruh latihan multiball terhadap peningkatan keterampilan servis forehand tenis meja. *Jurnal Pendidikan Dasar, 12*(2). https://journal.unpas.ac.id/index.php/pendas/article/view/30648

Putra, D., & Lestari, N. (2022). Pengaruh latihan kombinasi dumbbell high swing dan multiball. *Sport and Fitness Journal, 6*(3). https://journal-center.litpam.com/index.php/sfj/article/view/2732

Rahman, F., & Prakoso, D. (2023). The influence of multiball training on forehand ability of table tennis athletes. *International Journal of Human and Exercise Science, 5*(3). https://ijhess.com/index.php/ijhess/article/view/713

Ratna, A. D., Sugiarto, T., Fitriady, G., & Heynoek, F. P. (2023). Upaya meningkatkan pukulan forehand topspin dengan latihan multiball. *Sport Science and Health, 5*(4), 421–434. https://doi.org/10.17977/um062v5i42023p421-434

Saputra, R., & Nugroho, A. (2021). Analysis of multiball and pair training on forehand drive accuracy. *Physical Education, Sport, Health and Recreation, 10*(3). https://journal.unnes.ac.id/journals/peshr/article/view/40270

Schmidt, R. A., & Lee, T. D. (2014). *Motor learning and performance* (5th ed.). Human Kinetics.

Siregar, T. (2021). Pengembangan buku ajar tenis meja dengan metode multiball. *Jurnal Olahraga dan Kesehatan, 3*(1). https://jurnal.stokbinaguna.ac.id/index.php/JOK/article/view/4631

Sugiyono. (2019). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.

Sugiyono. (2021). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.

Suharto, S. (2020). Pengaruh latihan multiball terhadap ketepatan forehand drive. *Jurnal Sport Science, 4*(2). https://www.neliti.com/publications/211199

Sutrisno, A., & Hidayat, T. (2022). The effect of multiball and shadow training methods on forehand push accuracy. *Journal of Physical Education Research, 4*(2). https://doi.org/10.31599/k3rj3h42

Utomo, B., & Saputri, D. (2021). Pengaruh latihan multiball dan berpasangan terhadap ketepatan forehand drive. *Jurnal Ilmu Pendidikan, 5*(4). https://ejournal.utp.ac.id/index.php/JIP/article/view/4730

Wang, J., & Zhang, L. (2019). Effects of table tennis multi-ball training on dynamic balance. *PeerJ, 7*, e6262. https://peerj.com/articles/6262/

Widianita, R. (2023). Survei minat siswa dalam mengikuti kegiatan ekstrakurikuler. *AT-Tawassuth: Jurnal Ekonomi Islam, 8*(1).

Wijaya, M., & Firmansyah, R. (2020). Pengaruh latihan multiball terhadap ketepatan pukulan forehand dan backhand. *Jurnal Pendidikan Jasmani, 8*(2). https://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-jasmani/article/view/38127

Yusuf, A. (2019). Pengaruh latihan multiball terhadap ketepatan backhand drive di PPLP Riau. *Jurnal Sportif, 3*(2). https://media.neliti.com/media/publications/203542

Zhou, X., & Chen, H. (2020). The impact of eye-closed and weighted multi-ball training. *International Journal of Environmental Research and Public Health, 17*(4), 1200. https://pmc.ncbi.nlm.nih.gov/articles/PMC7039024/