Jurnal Pendidikan Kesehatan Rekreasi
Vol. 11, No. 1, Hal. 28-36, January 2025
DOI : https://doi.org/10.59672/jpkr.v11i1.4329

P-ISSN 2337-9561
E-ISSN 2580-1430

Table Tennis Player Agility : Hexagon Drill on Sand or Ladder Drill

Amin Brilian Wicaksono Gussanto [1)*]
[1)] STKIP Modern Ngawi
E-mail : aminbrilianwg@stkipmodernngawi.ac.id [1)]

ABSTRACT

Agility is one of the crucial physical abilities for a table tennis athlete. In a match, the ability to move quickly and responsively often determines success. In addition to endurance and strength, agility plays a vital role as one of the primary attributes that differentiate regular athletes from elite ones. This study focuses on analyzing the impact of two training methods, namely the hexagon drill in a sandpit and the ladder drill, on improving the agility of table tennis players. The subjects of the study included students participating in the extracurricular table tennis activities at MIN 1 Kota Madiun. This approach was designed to evaluate the effectiveness of each method in enhancing agility, which is a key aspect of table tennis performance. A quasi-experimental method with a One Group Pretest-Posttest Design was employed in this research, involving agility measurements before and after the treatments were applied. The results of the study indicated that while both training methods positively impacted the players' agility, the ladder drill produced a more significant improvement compared to the hexagon drill in the sandpit. These findings provide valuable insights into the effectiveness of training methods in enhancing the agility of table tennis athletes.

Keywords : agility; drill training; table tennis

ABSTRAK

Kelincahan merupakan salah satu kemampuan fisik yang krusial bagi seorang atlet tenis meja. Dalam pertandingan, kemampuan untuk bergerak cepat dan responsif sering menjadi penentu keberhasilan. Selain daya tahan dan kekuatan, kelincahan berperan penting sebagai salah satu atribut utama yang membedakan atlet biasa dengan atlet unggulan. Penelitian ini difokuskan untuk menganalisis pengaruh dari dua metode latihan, yaitu hexagon drill di bak pasir dan ladder drill, terhadap peningkatan agility pemain tenis meja. Subjek penelitian melibatkan siswa dan siswi yang tergabung dalam kegiatan ekstrakurikuler tenis meja di MIN 1 Kota Madiun. Pendekatan ini dirancang untuk mengevaluasi efektivitas masing-masing metode dalam meningkatkan kelincahan, yang merupakan salah satu aspek penting dalam performa permainan tenis meja. Metode eksperimen semu dengan desain *One Group Pretest-Posttest Design* digunakan dalam penelitian ini, yang melibatkan pengukuran agility sebelum dan setelah perlakuan diberikan. Hasil penelitian menunjukkan bahwa meskipun kedua metode latihan memberikan dampak positif terhadap *agility* pemain, latihan *ladder drill* menghasilkan peningkatan yang lebih signifikan dibandingkan *hexagon drill* di bak pasir. Temuan ini memberikan gambaran penting mengenai efektivitas metode latihan dalam meningkatkan kelincahan atlet tenis meja.

Kata kunci : kelincahan; pelatihan *drill*; tenis meja

Correspondence : Amin Brilian Wicaksono Gussanto, STKIP Modern Ngawi
E-mail : aminbrilianwg@stkipmodernngawi.ac.id

INTRODUCTION

Sports activities carried out effectively and efficiently play a crucial role in fostering an active and healthy lifestyle within the community. One of the popular sports frequently practiced by people is table tennis. According to Aljaafreh (2024); Wang (2024) table tennis is one of the sports favored by communities across various parts of the world.

As a part of competitive sports, the primary goal of table tennis is to achieve the highest possible accomplishments. Achievements in sports not only serve as a means of individual development but also contribute to elevating the nation's reputation on the international stage (Ciomag & Pop, 2024). In this context, table tennis has made a significant contribution to introducing Indonesia to the global arena.

The development of interest and talent in table tennis requires support in the form of training clubs. These clubs must be equipped with adequate facilities and supporting infrastructure, such as courts with specialized carpets, appropriate sports equipment, a conducive training environment, and experienced coaches (Dane et al., 2023). Proper facilities enable the community to channel their interest and talent, allowing table tennis to become a field with the potential to achieve outstanding accomplishments. According to Ren (2024) table tennis falls into the category of competitive sports that demand explosive movements, quick reflexes, sudden direction changes, and optimal hand-eye coordination (Iorga et al., 2023).

In addition to being a source of national pride, table tennis also encourages the community to actively join training clubs to develop individual skills into professional athletes. According to research by Santoso (2024); Putra & Kusuma (2024); Simanjuntak et al. (2024), an athlete requires excellent physical condition, including strength, endurance, flexibility, agility, and coordination, all of which are essential to support technical and tactical performance on the court.

Initial observations during the table tennis championship at Semarak MBS Prof Hamka, Kota Madiun, in 2024 revealed that players from the Table Tennis Association possess competitive technical, tactical, and mental match capabilities. However, a prominent weakness was identified in the aspect of agility (Ilham et al., 2023; Zhang et al., 2023; Sun & Khishe, 2024). Several players struggled with executing quick and efficient foot movements, which affected the accuracy of their shots. This issue is often attributed to suboptimal body positioning when hitting the ball. This aligns with the views of Saleh & Saleh (2023); Hsu et al. (2024), who stated that agility is a crucial factor influencing performance in table tennis matches.

As a solution, hexagon drill training on a sandpit was implemented to improve the agility of table tennis extracurricular students at MIN 1 Kota Madiun. This training was designed to address agility issues through a scientific approach. According to Ma et al. (2024), table tennis learning requires the gradual integration of footwork techniques, from simple to complex, with a focus on directed movement combinations. Good footwork helps players achieve optimal positioning for accurate shots, where its

effectiveness depends on agility as a key element (Athak et al., 2022; Munivrana et al., 2022; Sunaryo et al., 2022).

In addition to the hexagon drill, coaches also implemented ladder drill training as part of the training program. According to Goodson et al. (2022), ladder drills have a positive impact on speed, agility, and lower limb muscle strength. This method has proven effective in improving foot movement and enhancing student performance, particularly in the aspects of agility and muscle strength (Jami & Irandoust, 2022).

This study aims to analyze the differences in the effects between hexagon drill training on a sandpit and ladder drill training on improving students' agility. The results of the study are expected to contribute to the development of a competitive younger generation in table tennis.

RESEARCH METHOD

This study employed a quasi-experimental method, where the sample was randomly assigned to ensure an objective distribution into groups. This approach is often used to establish treatment and control groups, even when researchers do not have full discretion in sample management.

In the context of this study, treatment was given to five (5) male and female students participating in the table tennis extracurricular program at MIN 1 Kota Madiun. The research design applied was the One Group Pretest-Posttest Design, which involved initial measurements (*pretest*) before the treatment and final measurements (*posttest*) after the treatment was completed. The accuracy of the research results was ensured through a comparative analysis of pretest and posttest data, as explained by (Célleri-Gomezcoello et al., 2024).

The initial activity in this experiment was conducted using a single-sample design with systematic stages. In the first stage, a pretest was administered to the male and female students participating in the table tennis extracurricular program at MIN 1 Kota Madiun who had not yet received any treatment. This test measured the time taken to perform a shuttle run as an indicator of agility. After the initial data were collected, treatment was provided: one group underwent hexagon drill training on a sandpit, while the other group practiced ladder drills over a specified period. Upon completion of the treatments, both groups underwent post-treatment measurements to evaluate the effectiveness of each training method in improving agility. This process was designed to provide objective and measurable data for analyzing the impact of the two training methods.

Subsequently, a posttest was conducted to measure the agility levels of the male and female students participating in the table tennis extracurricular program at MIN 1 Kota Madiun. Following the implementation of the treatments as experimental variables, the posttest data were analyzed to determine whether there was an improvement in the students' agility after undergoing hexagon drill training on a sandpit or ladder drill training, or if no significant changes were observed.

RESULTS AND DISCUSSION

The initial test was conducted prior to administering the treatments, which consisted of Hexagon Drill training on a sandpit and Ladder Drill training, with a

training frequency of 4 weeks encompassing 16 sessions. The training activities were scheduled 4 times a week, on Mondays, Wednesdays, Fridays, and Sundays. Data collection was carried out at the end of each training session involving the male and female table tennis extracurricular students at MIN 1 Kota Madiun, who served as the research subjects. The analysis results indicated that Hexagon Drill training on a sandpit significantly improved agility, as evidenced by shorter test times from the initial test to the final test. Similarly, Ladder Drill training demonstrated comparable improvements, with test times decreasing after the treatment was administered. This confirms that both training methods are effective in enhancing students' agility.

Table 1
Calculation of Activity Results

No.	Variable	Total	Average	Standard Deviation
1	Hexagon Drill Pretest	83,17	17,43	0,41
2	Hexagon Drill Posttest	88,55	18,51	0,57
3	Ladder Drill Pretest	77,57	16,31	0,34
4	Ladder Drill Posttest	75,38	15,88	0,29

Source : Data processed by the researcher using SPSS Version 25.00, 2024

Based on the data obtained, the pretest and posttest results of the two training methods, namely the Hexagon Drill and Ladder Drill, revealed differences in their effectiveness. For the Hexagon Drill training, the average pretest score of the table tennis extracurricular students at MIN 1 Kota Madiun was 83,17 with a standard deviation of 0,41. After the training program, the average posttest score increased to 88,55 with a standard deviation of 0,57. The average increase of 5,38 indicates that this training method was effective in improving participants' performance. However, the increase in the standard deviation from 0,41 to 0,57 suggests greater variability in the results, possibly reflecting individual differences in response to this training.

Conversely, in the Ladder Drill training, the average pretest score was 77,57 with a standard deviation of 0,34, while the posttest score decreased to 75.38 with a standard deviation of 0,29. The average decrease of 2,19 indicates that this method was less effective in improving participants' performance. However, the reduction in the standard deviation from 0,34 to 0,29 suggests more consistent results among participants after the training, reflecting a more uniform level of achievement.

Overall, the Hexagon Drill proved to be more effective in improving the average performance of table tennis extracurricular students at MIN 1 Kota Madiun, despite producing greater variability in results. This aligns with the findings of (Ilham et al., 2024; Yulianto et al., 2024). On the other hand, the Ladder Drill showed a decline in the participants' average performance but yielded more uniform results (Urfi et al.,

2023; Romadhoni & Yudhistira, 2024). Further statistical analyses, such as a t-test, are needed to evaluate the significance of the changes between pretest and posttest results.

Table 2
Results of Normality and Homogeneity Testing

No.	Variable	Normality	Asympt. Sig. P-Value
1	Hexagon Drill Pretest	0,628	1,002
2	Hexagon Drill Posttest	0,639	1,002
3	Ladder Drill Pretest	0,547	1,002
4	Ladder Drill Posttest	0,786	0,996

Source : Data processed by the researcher using SPSS Version 25.00, 2024

Based on the data obtained, an analysis was conducted on the normality test results for the pretest and posttest of two training methods: Hexagon Drill and Ladder Drill. The results indicated that the Asymptotic Significance (Asymp. Sig.) and $P_{\text{-value}}$ for all variables were greater than 0,05, indicating that the data followed a normal distribution. For the Hexagon Drill method, the Asymp. Sig. value for the pretest was 0,628 with a $P_{\text{-value}}$ of 1,002, while for the posttest, the Asymp. Sig. value reached 0,639 with a $P_{\text{-value}}$ of 1,002. Therefore, the pretest and posttest data for this method were normally distributed.

For the Ladder Drill method, the Asymp. Sig. value for the pretest was 0,547 with a $P_{\text{-value}}$ of 1,002, while for the posttest, the Asymp. Sig. value was 0,786 with a $P_{\text{-value}}$ of 0,996. Since the $P_{\text{-value}}$ is greater than 0,05, the pretest and posttest data for the Ladder Drill method also meet the assumption of a normal distribution.

In conclusion, all variables, both pretest and posttest for the Hexagon Drill and Ladder Drill methods, are normally distributed (Marom et al., 2023; Pratama et al., 2023; Ilmi & Hudain, 2024). This provides a strong foundation for using parametric statistical analysis, such as the paired $t_{\text{-test}}$, to evaluate the differences between the pretest and posttest results of table tennis extracurricular students at MIN 1 Kota Madiun.

Table 3
Results of Difference Testing

Variable		Mean	Standard Deviation	t	Sig. 2-Tailed
Pair-1	Pretest dan Posttest Hexagon Drill	2,07600	0,27255	9,164	0,002
Pair-2	Pretest dan Posttest Ladder Drill	1,43800	0,07979	4,034	0,001

Source : Data processed by the researcher using SPSS Version 25.00, 2024

Based on the results of the paired t_{-test} for the pretest and posttest of two training methods, Hexagon Drill and Ladder Drill, a significant difference was found between the two training sessions. For the Hexagon Drill, the average difference between the pretest and posttest was 2,076 with a standard deviation of 0,27255. The t_{-value} was 9,164, and the p_{-value} (Sig. 2-Tailed) was 0,002, which is less than 0.05, indicating that the average improvement between the pretest and posttest was statistically significant. These results suggest that the Hexagon Drill has a strong impact on improving the performance of table tennis extracurricular students at MIN 1 Kota Madiun.

Meanwhile, for the Ladder Drill, the average difference between the pretest and posttest was 1,438 with a standard deviation of 0,07979. The t_{-value} was 4,034, and the p_{-value} (Sig. 2-Tailed) was 0,001, which is also less than 0,05, indicating that the average improvement in the Ladder Drill was statistically significant. However, the smaller average difference compared to the Hexagon Drill suggests that this method is less effective in enhancing participants' performance. On the other hand, the smaller standard deviation in the Ladder Drill indicates that the results were more consistent among participants compared to the Hexagon Drill.

Overall, both training methods, Hexagon Drill and Ladder Drill, demonstrated significant performance improvements after the training (Shahril, 2024). However, the Hexagon Drill resulted in greater performance gains, while the Ladder Drill produced more consistent outcomes (Pambudi & Sulendro, 2021; Saputra & Ahmad, 2021). Therefore, the Hexagon Drill can be considered generally more effective in enhancing the performance of table tennis extracurricular students at MIN 1 Kota Madiun.

CONCLUSION AND SUGGESTIONS

The research findings indicate that the Hexagon Drill training method is more effective in improving the agility of table tennis extracurricular students at MIN 1 Kota Madiun. This is evidenced by the participants' performance improvement following the training, despite greater variation in individual results. Conversely, the Ladder Drill training yielded more consistent results but did not lead to significant overall performance improvement. Based on these findings, the Hexagon Drill is considered superior for achieving substantial agility development, while the Ladder Drill is more suitable for maintaining stability and consistency in participants' performance.

Based on these findings, table tennis extracurricular coaches at MIN 1 Kota Madiun are advised to prioritize the use of Hexagon Drill training in their agility development programs, particularly for students requiring significant performance improvements. Nonetheless, the Ladder Drill remains relevant as a complementary training method, especially for students who need stability and consistency. Additionally, adjusting the intensity and training patterns to suit individual participants' needs is recommended to optimize their potential development. Further research is needed to explore other training methods that can positively impact skill and performance enhancement in table tennis.

REFERENCES

Aljaafreh, O. J. (2024). Measuring the Level of Knowledge of the International Law of Table Tennis Among Physical Education Teachers in Al-Karak. *Sport i Turystyka*, *7*(1), 93-110. https://doi.org/10.16926/sit.2024.01.06

Athak, R. A., Soegiyanto, S., & Irawan, F. A. (2022). The Effect of Drive Training Method and Leg Length on Rally Ability in Rukun Tennis Club Players. Journal of Physical Education and Sports, 11(1), 61-67. https://doi.org/10.15294/jpes.v11i1.56010

Célleri-Gomezcoello, A., Avila, C., Alessio, S., Hanson, C. M., Ochoa, A., Mora, M., ... & Encalada, D. (2024). Impact of the Alforja Educativa'on Ecuadorian schoolchildren's knowledge of bacteria, antibiotics, and antibiotic resistance, a pretest-posttest study. BMC Public Health, 24(1), 844. https://doi.org/10.1186/s12889-024-18340-0

Ciomag, R. V., & Pop, C. (2024). Cultural and Sporting Characteristics of Countries Participating in Sports Competitions. *Marathon*, *16*(1), 19-26. https://doi.org/10.24818/mrt.24.16.01.02

Dane, K., Foley, G., Hendricks, S., & Wilson, F. (2023). "It's always the bare minimum"-A qualitative study of players' experiences of tackle coaching in women's rugby union. Journal of science and medicine in sport, 26(2), 149-155. https://doi.org/10.1016/j.jsams.2023.01.002

Goodson, C., McLeod, A. R., Kearns, Z., & Paquette, M. R. (2022). External loading of common training drills: ranking drills to design progressive return-to-run programs. Physical Therapy in Sport, 58, 167-172. https://doi.org/10.1016/j.ptsp.2022.10.012

Hsu, Y. H., Yu, C. C., & Cheng, H. Y. (2024). Enhancing Badminton Game Analysis: An Approach to Shot Refinement via a Fusion of Shuttlecock Tracking and Hit Detection from Monocular Camera. Sensors, 24(13), 4372. https://doi.org/10.3390/s24134372

Ilham, A., Amri, M. F. L., Isnanto, J., & Kadir, S. S. (2023). Evaluation of Physical Exercise Program of Table Tennis Club in Bengkulu City. Jurnal Ekonomi Teknologi dan Bisnis (JETBIS), 2(7), 500-510. https://doi.org/10.57185/jetbis.v2i7.66

Ilham, I., Putra, R. A., Agus, A., Bafirman, B., Arsil, A., Bahtra, R., ... & Sibomana, A. (2024). The effect of combination of cone drill (zigzag) with core stability, combination of ladder drill (snake jump) with core stability, and speed on agility of futsal players: A factorial experimental design. Retos: nuevas tendencias en educación física, deporte y recreación, (58), 1-11. https://doi.org/10.47197/retos.v58.105462

Ilmi, A. T. N., & Hudain, M. A. (2024). Analysis of Smash Accuracy in The Game of Badminton Viewed From Arm Muscle Strength And Body Height In PB Athletes Karsa Mandiri Makassar. Indonesian Journal of

Physical Activity, 4(2), 131-142. https://doi.org/10.59734/ijpa.v4i2.66

Iorga, A., Jianu, A., Gheorghiu, M., Crețu, B. D., & Eremia, I. A. (2023). Motor Coordination and Its Importance in Practicing Performance Movement. Sustainability, 15(7), 5812. https://doi.org/10.3390/su15075812

Jami, S., & Irandoust, K. (2022). Improving agility performance among athletes by Jami Agility Table (JAT). International Journal of Sport Studies for Health, 5(1), 1-5. https://doi.org/10.61838/kman.intjssh.5.1.1

Ma, T., Du, W., & Zhang, Q. (2024). The Effect of Virtual Reality Technology in Table Tennis Teaching: A Multi-Center Controlled Study. Sensors, 24(21), 7041. https://doi.org/10.3390/s24217041

Marom, M. F., Darmawan, A., & Fitriady, G. (2023). The effect of SAQ training to increase the agility of badminton atheletes aged 12-13 years. Bravo's: Jurnal Program Studi Pendidikan Jasmani Dan Kesehatan, 11(4), 366-372. https://doi.org/10.32682/bravos.v11i4.3256

Munivrana, G., Jelaska, I., & Tomljanović, M. (2022). Design and Validation of a New Tennis-Specific Reactive Agility Test—A Pilot Study. International journal of environmental research and public health, 19(16), 10039. https://doi.org/10.3390/ijerph191610039

Pambudi, R. D. A., & Sulendro, S. (2021). Pengaruh Latihan Drill Servis Terhadap Ketepatan Servis Samping Olahraga Sepak Takraw PSTI Panggul Trenggalek. SPRINTER: Jurnal Ilmu Olahraga, 2(2), 172-179. https://doi.org/10.46838/spr.v2i2.122

Pratama, R. S., Santosa, T., Lengkana, A. S., Imron, F., Mahardika, W., & Hidayah, T. (2023). The impact of hexagon drill on the agility of junior men's tennis players. Jurnal Keolahragaan, 11(1), 33-40. https://doi.org/10.21831/jk.v11i1.52532

Putra, A., & Kusuma, I. D. M. A. W. (2024). Profil Kondisi Fisik Tim Pelindo FC TAHUN 2022-2023. Jurnal Prestasi Olahraga, 7(6), 580-588. https://doi.org/10.1234/jpo.v7i6

Ren, W. (2024). A novel approach for automatic detection and identification of inappropriate postures and movements of table tennis players. Soft Computing, 28(3), 2245-2269. https://doi.org/10.1007/s00500-023-09587-7

Romadhoni, S., & Yudhistira, D. (2024). Implementing Complex Training Method: Its Effects on Endurance, Speed, Power, and Agility of Adolescent Basketball Players. Physical Education Theory and Methodology, 24(3), 426-432. https://doi.org/10.17309/tmfv.2024.3.11

Saleh, M. S., & Saleh, M. S. (2023). Analysis of Superior Extremity Strength on the Groundstroke Attack Skills of Tennis Athletes. Kinestetik: Jurnal Ilmiah Pendidikan Jasmani, 7(4), 1001-1008. https://doi.org/10.33369/jk.v7i4.29212

Santoso, L. S. I. (2024). Analisis Tes Fisik Puslatda Rowing Jawa Timur 100-IV. Jurnal Prestasi Olahraga, 7(4), 386-391. https://doi.org/10.1234/jpo.v7i4.62493

Saputra, Y. D., & Ahmad, N. (2021). Pengaruh Model Pelatihan Hexagon Drill Terhadap Kelincahan Pada Pemain Jombang Basketball Club (JBC). PENJAGA: Pendidikan Jasmani dan Olahraga, 1(2), 49-54. https://doi.org/10.55933/pjga.v1i2.143

Shahril, M. I., Suyoto, A. A., Sumardi, T., Round, C. R., & Safaun, W. D. Y. (2024). Content validity and reliability of agility test in wheelchair tennis. Retos, 55, 665-671. https://doi.org/10.47197/retos.v55.101929

Simanjuntak, G., Syamsuar, S., Khairuddin, K., & Arnando, M. (2024). Kondisi Fisik Pemain Bulutangkis Club New Binatama Padang. Jurnal JPDO, 7(3), 92-99. https://doi.org/10.24036/JPDO.7.3.2024.62

Sun, C., & Khishe, M. (2024). Enhancing precision in table tennis officiating through an optimized autonomous sensor node system. Engineering Computations, 41(8/9), 2134-2168. https://doi.org/10.1108/EC-05-2024-0415

Sunaryo, F. Y. A. B., Sugiyanto, S., Liskustyawati, H., & Riyadi, S. (2022). The Effect of Agility Drill Training on Agility Dribbling Techniques of Young Female Football Players. JUMORA: Jurnal Moderasi Olahraga, 2(2), 174-187. https://doi.org/10.53863/mor.v2i2.512

Urfi, F., Jalil, R., & Pribadi, I. (2023). The Effect of Forehand Practice on The Wall Media. ACTIVE: Journal of Physical Education, Sport, Health and Recreation, 12(2), 118-123. https://doi.org/10.15294/active.v12i2.67863

Wang, Y. (2024). Exploring Best Practices of University Table Tennis Teams in China: Basis for Improving Table Tennis Sports Training. *Journal of Education and Educational Research*, *7*(3), 174-178. https://doi.org/10.54097/n7729j10

Yulianto, W. D., Sukamti, E. R., Alim, A., Rismayanthi, C., Pradipta, G. D., Maliki, O., & Yudhistira, D. (2024). High-Intensity Interval Training Specific Programming: Effects on Wheelchair Tennis Players' Reactive Agility. International Journal of Kinesiology and Sports Science, 12(1), 31-37. https://doi.org/10.7575/aiac.ijkss.v.12n.1p.31

Zhang, S., Chen, G., Wu, Q., & Li, X. (2023). The Interplay Between Table Tennis Skill Development and Sports Performance: A Comprehensive Review. Pacific International Journal, 6(3), 150-156. https://doi.org/10.55014/pij.v6i3.433