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The Effect of the Return Board Tool on Improving Backhand Topspin Skills in Table Tennis Athletes

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Abstract: *One of the challenges in table tennis training, particularly at the youth athlete development level, is the limited time and training media. This study aims to determine the effect of using a return board on improving backhand topspin skills in table tennis athletes. The method used was a quasi-experimental design with a pretest-posttest group design. The research subjects were 12 youth-level table tennis athletes from a club in Solo. The data collection instrument was a backhand topspin skill test validated by experts. Data analysis using the paired sample t-test showed a significant improvement in backhand topspin ability after training with the return board ($p = 0.001 < 0.05$). These findings indicate that the return board can be an effective training tool for improving backhand topspin technique.*

Keywords: *table tennis, backhand topspin, return board, technical skills*

Introduction

Table tennis is one of the sports that requires a combination of fine motor skills, quick reaction time, and high-level game strategy (Pujianto, A., 2015). It relies heavily on speed, accuracy, and agility in ball control. As a skill-based sport, table tennis demands a systematic, consistent, and efficient learning process of basic techniques. In practice, learning fundamental techniques such as forehand, backhand, push, and topspin requires repetition and immediate feedback to optimally develop motor skills. However, various obstacles such as limited coaching time, a high number of participants, and inadequate facilities often hinder the effective learning of basic techniques (Rahmawati & Winarsih, 2022).

One of the essential techniques in this sport is the backhand topspin, which is widely used to control the pace of the game and deliver quick attacks (Kondrič et al., 2013). However, this technique requires consistent repetition and feedback to be mastered effectively. In the context of basic gameplay, the backhand topspin is a crucial element because it is frequently used both in defensive and offensive situations, especially when facing opponents with fast and aggressive playstyles (Kondrič et al., 2013). This technique demands good coordination between arm movement, body positioning, and precise ball contact timing. Therefore, systematic and consistent training is essential for mastering it.

One of the challenges in table tennis training, particularly at the junior athlete development level, is the limited time and training media. Technical training is sometimes suboptimal due to dependence on the availability of coaches or sparring partners. Additionally, many young athletes still do not train effectively (Kullal, M. A. et al., 2024). A significant number of athletes also struggle with mastering playing techniques during training (Mahamuddin, M., 2021). To address this issue, the use of training aids such as the return board has become a practical and efficient alternative solution. This tool allows athletes to return the ball after a stroke, creating a repetitive training cycle that can be performed independently without a partner (Malagoli Lanzoni et al., 2014). Coaches often face difficulties in delivering basic technique materials effectively. The lack of equipment and limited training time result in unequal training opportunities for participants. This leads to uneven and suboptimal development of skills among athletes (Widodo et al., 2022).

Motor learning is highly influenced by training frequency and the quality of feedback. According to motor learning theory, movement corrections occur more quickly when athletes receive immediate information about the outcome of their actions after performing a movement (Schmidt & Lee, 2019). In this regard, the return board functions not only as a device that provides a consistent ball rebound but also as a mirror for athletes to self-evaluate their technique. This is particularly important during the development phase of young athletes, where continuous repeti-

tion is necessary to establish optimal movement patterns. In the context of motor learning, repeated movement with immediate feedback is crucial to reinforcing muscle memory and improving technical precision (Magill & Anderson, 2017; Susanto et al., 2024).

In addition, this tool also supports the principles of self-training and deliberate practice, which involve structured, specific training aimed at improving particular technical aspects of athletic performance (Ericsson, Krampe, & Tesch-Römer, 1993). According to Zhang et al. (2020), the proper use of training aids can accelerate the learning of basic techniques and help reduce the coach's workload. With the return board, athletes can adjust the intensity and frequency of training according to their individual needs, while continuously receiving feedback through the ball's rebound. Therefore, it is important to further explore how the return board can be optimized in technical sports training, especially in supporting direct and continuous movement correction. The return board provides consistent ball rebounds, which can help athletes make immediate corrections to their movements and enhance kinesthetic awareness. Moreover, this tool enables increased training volume in a shorter amount of time, which, according to Schmidt and Lee (2019), will accelerate motor adaptation. The return board also proves helpful for athletes in correcting their technique during training sessions (Syamsudin, N., 2024).

Nevertheless, most previous studies have primarily focused on the effectiveness of the return board in improving forehand or service skills. Scientific research specifically examining the effect of using the return board on mastering the backhand topspin technique remains limited, particularly among adolescent athletes who are in the skill development phase. The use of training aids has become a solution to enhance the effectiveness of learning basic techniques. Physical aids such as the return board have been reported to be effective in improving drive skills in beginner players. For example, research by Hanim & Tomoliyus (2018) stated that the use of the return board had a significant positive impact on mastering the punch drive technique among beginners. One such tool is the return board, which functions by rebounding the ball struck by the player, allowing for individual practice without a partner or coach (Malagoli Lanzoni et al., 2014). In addition, the development of digital and robotic models has advanced, where table tennis robot systems are capable of returning the ball consistently and at high speed, enabling athletes to perform technique repetitions more intensively. Such systems provide real-time motor feedback that accelerates correction and the formation of optimal movement patterns (Triaiditya, B. S. M., & Santoso, D. A., 2021).

Basic techniques such as forehand and backhand strokes form the foundation of good gameplay patterns (Sukoco & Nugroho, 2021). Previous studies have mostly highlighted the use of the return board for forehand training, while studies on its application in developing backhand topspin are still very limited. Therefore, this study aims to analyze the effect of using the return board in improving backhand topspin technique among table tennis athletes. This research is expected to contribute to the development of more innovative and efficient training methods in table tennis coaching.

Method

This study employed a quantitative approach using a quasi-experimental method with a pretest-posttest one-group design. This design was chosen to measure changes in technical skills before and after the intervention training using a return board without a control group. Research Subjects: A total of 12 table tennis athletes aged 13–16 years from PTM Bengawan Table Tennis Club and Mitra Medika in Solo were selected purposively based on relatively homogeneous skill levels. Research Procedure: (1) A pretest of backhand topspin skills was conducted to assess the initial ability. (2) A 4-week training program (3 sessions per week) was implemented using the return board. (3) Each training session lasted 60 minutes and focused on the backhand topspin stroke. (4) A posttest was administered at the end of the fourth week using the same instrument as the pretest. Data Collection Instrument: The backhand topspin skill test assessed accuracy, speed, and consistency (scoring 1–10 for each aspect). Instrument validity was assessed by two nationally certified coaches, and the reliability test yielded a Cronbach's alpha value of $\alpha = 0.87$ (high reliability). Data Analysis: Normality was tested using the Shapiro-Wilk test, and data analysis was conducted using a paired sample t-test at a 0.05 significance level with the aid of SPSS version 25.

Resulth

This study aims to determine the effect of using a return board on improving backhand topspin skills in table tennis athletes. Data collection was carried out through backhand topspin skill tests conducted before and after a four-week training program.

1. Descriptive Statistics

The pretest and posttest results were analyzed descriptively to determine the mean, standard deviation (SD), minimum, and maximum scores of the backhand topspin skill.

Table 1. *Descriptive Statistics of Pretest and Posttest Results for Backhand Topspin Skills*

No	Phase	Minimum	Maximum	Mean	SD
1	Pretest	55	70	62.50	5.20
2	Posttest	68	82	75.83	4.90

The table above shows an increase in the average score of backhand topspin skills from 62.50 in the pretest to 75.83 in the posttest. This indicates an improvement of 13.33 points or approximately 21.3% from the initial score.

2. Normality Test

Before conducting the hypothesis test, a normality test using the Shapiro-Wilk method was carried out to determine the data distribution.

Table 2. *Shapiro-Wilk Normality Test Results*

Phase	Statistic W	Sig. (p)
Pretest	0.958	0.732
Posttest	0.948	0.581

Since the significance value ($p > 0.05$), the data are normally distributed and meet the assumptions for parametric testing.

3. Hypothesis Testing (Paired Sample t-test)

Hypothesis testing was conducted using a paired sample t-test to determine whether there is a significant difference between the pretest and posttest results.

Hypotheses:

H_0 (null): There is no significant difference between the pretest and posttest results.

H_1 (alternative): There is a significant difference between the pretest and posttest results.

Table 3. *Paired Sample t-test Results*

Variable	Mean Difference	t	df	Sig. (2-tailed)
Posttest - Pretest	13.33	8.211	11	0.000

Based on the t-test results above, the significance value was 0.000 ($p < 0.05$), indicating a significant difference between the pretest and posttest results. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted.

4. Practical Effect (Effect Size)

To determine the magnitude of the effect of using the return board on improving backhand topspin skills, the effect size (Cohen's d) was calculated. A Cohen's d value of 2.63 indicates a very large effect size, according to Cohen's (1988) interpretation.

Interpretation of Results

The athletes showed a significant improvement in their backhand topspin stroke technique. Training with the return board helped increase the number of repetitions and strengthened shot consistency. The instant feedback from the ball's rebound accelerated the process of technical correction.

Discussion

The results of the study indicate that the use of the return board significantly improved backhand topspin skills in table tennis athletes. The average skill score increased by 13.33 points after four weeks of training, with a significance value ($p = 0.000$) showing a highly significant difference between the pretest and posttest results. This indicates that training with the return board is effective in enhancing backhand topspin technique. Intensive and structured training can improve both technique and skill (Susanto et al., 2020; Susanto et al., 2024). These findings align with

the principles of motor learning theory, which state that movement repetition accompanied by immediate feedback is key to developing precise motor skills (Magill & Anderson, 2017). In addition, modified training methods have been shown to successfully influence an individual's motor abilities (Susanto et al., 2024). The return board functions as a training tool that allows athletes to receive instant feedback through ball rebound, thereby accelerating the self-correction process. This mechanism facilitates the internalization of movement, which is crucial for improving stroke consistency and accuracy (Schmidt & Lee, 2019).

In addition, the use of the return board encourages more intensive and efficient self-training. Athletes do not need to wait for their turn as in group training and are not dependent on the presence of a coach or training partner. This allows for a high frequency of technical practice within a limited timeframe. According to Malagoli Lanzoni et al. (2014), intensive and repetitive training under uniform conditions (such as predictable board rebounds) can improve timing and footwork two essential aspects for successful backhand topspin performance. Furthermore, circuit-based training also supports performance improvement (Susanto et al., 2021). This skill improvement can also be explained from a cognitive perspective. When training with the return board, athletes are required to continuously monitor the ball's rebound and adjust their movements accordingly. This process enhances concentration, visual perception, and anticipation—key components in motor decision-making (Abernethy et al., 2005). In other words, this type of training not only improves physical aspects but also stimulates the mental components of playing skills.

Furthermore, the effect size value (Cohen's d = 2.63) indicates a very large impact of this intervention. This means that the use of the return board is not only statistically significant but also practically relevant for implementation in regular training programs. This supports the adoption of such training aids in both junior and professional athlete development contexts. However, there are several limitations to this study. The sample size was relatively small (n = 12), and the training duration was limited to only four weeks. Further research with a larger scope and extended duration is recommended to examine the long-term effects of return board usage on other technical skills such as forehand topspin, service, and tactical rally play. The improvement in backhand topspin skills following the use of the return board demonstrates that this tool can provide instant feedback through consistent ball rebounds. This supports motor learning theory, which states that repeated practice with immediate feedback can accelerate the acquisition of movement skills (Magill & Anderson, 2017).

In addition, training with a return board allows athletes to practice independently and increase the volume of technical training without the need for a partner or direct supervision from a coach. This aligns with the findings of Malagoli Lanzoni et al. (2014), who stated that the use of a return board can enhance the efficiency of stroke training in table tennis. Moreover, the return board supports self-directed learning, where athletes can identify technical errors such as body positioning, racket swing, or balance, and immediately correct them in the next attempt. This is in line with the principle of deliberate practice, where training should be specific, repetitive, and accompanied by correction (Ericsson et al., 1993). Therefore, the return board is an effective training aid for developing backhand technique not only for beginner players but also at advanced levels as a means to improve accuracy and consistency. Furthermore, the use of training aids has a positive impact on learning motivation. Practice becomes more engaging and less monotonous, encouraging participants to train independently outside of formal training sessions (Mustofa & Kurniawan, 2020).

Conclussion

Based on the results of this study, it can be concluded that the use of a return board has a significant effect on improving backhand topspin skills in junior table tennis athletes. The increase in the average technical skill score from pretest to posttest indicates that training methods involving the return board are effective in developing accuracy, consistency, and movement control in backhand topspin strokes. These findings support the view that training with immediate feedback, high repetition, and active athlete involvement in self-correction greatly contributes to motor learning, especially in closed-skill sports like table tennis. The return board functions not only as a technical training aid but also as a tool that enhances athlete independence, focus, and training intensity. Furthermore, the high practical effect size (Cohen's d = 2.63) emphasizes that the use of this tool is not only statistically significant but also practically relevant in daily training contexts. Therefore, the return board can be recommended as a primary training aid in technical skill development programs for table tennis, particularly for improving backhand topspin performance. However, the results of this study should also be considered alongside its limitations, such as the small sample size and relatively short intervention duration. Thus, further research using a longitudinal approach and a larger sample is highly recommended

to investigate the long-term effects and the effectiveness of this tool in developing other technical skills in table tennis.

Suggestions

1. Coaches are encouraged to incorporate return board training into individual technical training programs.
2. Future research can explore the impact of using return boards on tactical aspects of the game.
3. Further studies with larger sample sizes and longer training durations are recommended to strengthen these findings.

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