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The effectiveness of alternate leg bounding training on kicking skills in taekwondo athletes

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Abstract

Taekwondo emphasizes kicking techniques, including elgol dollyo chagi, a spinning head kick requiring flexibility, strength, speed, coordination, and precision for optimal effectiveness. This study aims to evaluate the effectiveness of alternate leg bounding training on the elgol dollyo chagi performance of taekwondo athletes. It employs experimental research with a one-group pretest-posttest design. The participants consisted of 30 taekwondo athletes selected through total sampling, meaning the entire population was used as the sample. The research instrument involves an elgol dollyo chagi performance test conducted over a duration of 30 seconds. Data analysis uses descriptive tests, and the analysis prerequisite tests with data normality and data homogeneity, and continued with hypothesis testing using the t-test with the spss program version 23. The results of the t-test value obtained were 15.455, with a pretest mean of 23.83 and a posttest mean value of 36.20. Based on these results, the p-value is greater than 0.05 and has an increase of 12.37%. The results of the study showed a significant increase in the speed of execution of the elgol dollyo chagi kick after following the alternate leg bounding training program. In addition, this research is also useful in terms of athlete physical development, including strength, agility, coordination, and injury prevention.

Keywords: Training, alternate leg bounding, dollyo chagi, taekwondo.

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Authors contribution: a – Preparing concepts; b – Formulating methods; c – Conducting research; d – Processing results; e – Interpretation and conclusions; f - Editing the final version.

INTRODUCTION

Taekwondo is a branch of martial arts that emphasizes the use of kicks as the main technique in attacking and defending (Putri et al., 2024; Jaswir et al., 2022). In taekwondo competitions, the ability to master various kicking techniques with high speed, power, and accuracy is a key factor in achieving victory (Dandi et al., 2023). One of the kicking

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techniques that is often used is elgol dollyo chagi, training kicking skills does not only depend on mastering the technique, but also on physical development that supports kicking performance. One method of physical training that is believed to be effective is jumping exercises with alternating feet (Basri et al., 2021). This exercise prioritizes the development of leg muscle power, agility, and dynamic endurance, all of which are the main components in performing kicks quickly and powerfully (Naila & Akhmad, 2021).

Taekwondo has a number of basic techniques that are the foundation for learning and developing athlete skills, one of which is elgol dollyo chagi (Maliza et al., 2023). In taekwondo, elgol dollyo chagi is one of the most effective attack techniques in taekwondo, so that from the results of the research conducted and the form of training provided, it can improve the quality of kicks (Zulman et al., 2021; Sukma & Komaini, 2021). By utilizing strong body rotation movements, this kick has the potential to provide a strong and fast kick to the opponent, so that based on the results used in this study, it has a great contribution, especially the success of athletes in performing good and correct dollyo chagi kicks. (Reginald et al., 2021; Har, 2020). In taekwondo matches, success is often determined by the athlete's ability to use various techniques effectively (Liu & He, 2022). Research by Pamungkas, (2021) this study shows that dollyo chagi is often used as an opening technique to maintain distance and create opportunities for kicks or follow-up attacks. Research by Febriani et al. (2023) found that an emphasis on understanding biomechanics and repeated practice can increase success.

The dollyo chagi elgol kick provides important tactical variations, allowing athletes to adjust their attack strategy during the match depending on the situation and the opponent they are facing (Endrawan et al., 2023). Dollyo chagi is a kick aimed at a high area, such as the opponent's head or neck, which can increase points for the opponent which will have an impact on victory (Shadiqin & Irianto, 2020; Amalia et al., 2023). To perform a good kick, a high and maximum level of body

flexibility is required, especially in the hips and legs (Suwarningsih et al., 2024). Through consistent training and practice, athletes can improve their abilities, which are also beneficial for other techniques in taekwondo (Hariadi et al., 2023). To improve the dollyo chagi kick, continuous and effective training is needed, one of which is through alternate leg bounding training.

Alternate leg bounding exercises help improve coordination between legs and body balance, which are fundamental aspects in maintaining stability when performing circular kicks, and can improve hip joint mobility and flexibility of the hamstring muscles and muscles around the pelvis, which are needed to produce a wider kick range, which is needed to produce kicks with optimal range and height (Zulkarnain et al., 2021). The repetitive movements in this exercise help train leg muscle endurance so that athletes can perform dollyo chagi consistently during the match without losing strength or accuracy (Narbito, 2023).

Alternate leg bounding is a plyometric exercise that involves jumping movements by alternating from one leg to the other (Dann et al., 2023). This exercise aims to improve leg strength, balance, coordination, and jumping ability. It involves the use of leg muscles with high intensity, thus helping to improve overall leg strength (Narbito, 2023). The jumping movement in this exercise requires good balance and coordination, which is useful in improving motor skills (Granacher & Behm, 2023). The excess leg strength, balance, and coordination obtained from this exercise can strengthen the dollyo chagi kick (Ojeda-Aravena et al., 2021). Increased flexibility will help athletes achieve the height and rotation needed in the kick (Cortez et al., 2017). Alternate leg bounding exercise was chosen in this study as a training method to improve elgol dollyo chagi ability in taekwondo athletes because of its relationship with the physical components needed in elgol dollyo chagi. The elgol dollyo chagi technique requires the main physical components in the form of leg muscle strength, especially thigh and calf muscles, muscle explosive power, and body coordination and balance.

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This study is the first to provide alternate leg bounding training to improve elgol dollyo chagi kicks, some have linked the training to other types of sports. Alternate leg bounding training to improve kicks requires explosive power to produce fast and powerful high kicks. Alternate leg bounding, as a plyometric exercise, increases the explosive power of the quadriceps, gluteus, hamstring, and calf muscles, all of which play an important role in kick execution and require body balance, especially on the supporting leg, so that the kick can be done with precision.

Implementing the dollyo chagi kick in athletes, several problems arise that can affect the athlete's ability to master the technique properly, namely having difficulty coordinating the movements of the feet, hands, and body simultaneously when executing the dollyo chagi kick (Rusli et al., 2023). Lack of flexibility, especially in the hips and thighs, can be a barrier to achieving the rotation needed for the dollyo chagi kick (Al Habsyi et al., 2024). This can reduce the height and power of the kick and increase the risk of injury (Góra et al., 2024). Lack of leg strength, especially in the thigh and calf muscles, can hinder the athlete's ability to generate sufficient power in the kick. This can reduce the effectiveness of the kick in hitting the target or scoring points in the match (Corcoran et al., 2024). Errors in technique, such as incorrect body position, lack of rotation, or incorrect foot placement, can reduce the effectiveness of the kick and increase the risk of injury. Directed practice and good trainer supervision are needed to ensure proper technique (Boyanmış et al., 2024).

Some athletes experience fear or hesitation in executing kicks, especially when facing a tough opponent or in a pressure situation. This can interfere with concentration and reduce the effectiveness of the kick. Lack of targeted training and experience in executing kicks can be an obstacle to mastering the technique well. Consistent and repeated training is needed to improve technique and increase athlete confidence.

This study aims to test the effectiveness of alternate leg bounding training in improving the ability of the elgol dollyo chagi technique in taekwondo athletes. Alternate leg bounding training, which is included in

the plyometric training category, is expected to increase leg muscle strength, explosive power, kicking speed, and agility, all of which are very important in performing the dollyo chagi kick more effectively. The dollyo chagi technique requires high explosive power and body control, and through alternate leg bounding training, athletes can develop physical qualities that support the technique, such as explosive power and speed.

The time required to provide sample treatment for 18 meetings, for 6 weeks, and one week consists of 3 training sessions. The implementation of the training begins with low intensity (2-3 sets x 10-12 repetitions per session) to avoid injury and is increased gradually. These exercises are selected and arranged to support the mastery of dollyo chagi movements in match situations by looking at their duration so that the purpose of the study was achieved, namely to determine the effectiveness of alternative leg bounding training in improving the ability of elgol dollyo chagi techniques in taekwondo athletes.

METHOD

This study is included in experimental research using one group pre and posttest design. The subject of the study with pretest is the ability of elgol dollyo chagi (O1). Treatment was given with alternate leg bounding exercise (X) after that given posttest (O2) (Kusumawati, 2015). The research location was carried out at the Halu Oleo University Kendari sports center building, which was carried out in a programmed manner with a pretest, then exercise, and posttest. This test was followed by taekwondo athletes with a population of 30 athletes, and the sample also consisted of 30 people because drawing samples using the total sampling technique, meaning the number of populations used as research samples.

The data collection technique in this study used the Elgol Dollyo Chagi test, namely before the implementation, a maximum warm-up was given, then a warm-up was given in pairs, namely by kicking the target alternately in a horse stance position. After that, at the start signal, the sample was given the opportunity to kick using the right and left feet for 30

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seconds alternately. For points, the frequency of good and correct kicks was taken for 30 seconds (Setiawan, 2021).

The treatment was carried out using the alternate leg bounding training method by warming up first, during the training a comfortable position with one leg in front, carried out with reflex steps on the side of the body, then the sample began to push off the back leg, for the knee movement that was raised almost to the chest position, try to jump as high and as far as possible when landing. Arm swings play a very important role in rhythm, with the legs being stretched out. The movement is repeated when landing. The training was carried out for 18 meetings, with a moderate intensity of 70%, heavy 80%, and light 60%. The frequency was carried out 3 times a week.

In this study, when conducting the test, the first thing that was done was to check the presence of the sample, provide directions and, most importantly, carry out warm-ups, rest periods and relaxation before carrying out the test or exercises that were adjusted to a continuous program, and during the implementation process, provide medical personnel.

The subjects were given an alternative leg bounding training program with structured intensity and duration, namely, each training session involved 2-4 sets with 8-12 repetitions per set, depending on the athlete's initial ability level. Flexibility training (dynamic and static stretching) before and after the session. Balance and coordination training to support body stability when kicking. The duration was given 6 weeks, consisting of 18 meetings, in one week consisting of 3 training meetings according to the optimal duration standard of plyometric training to obtain significant results on strength and performance. For a frequency of 2-3 sessions per week, with a minimum rest period between sessions of 48 hours for recovery and around 60 minutes, including warm-up, core training, and cool-down. For taekwondo samples or athletes, focusing on the category of adolescents or young adults who actively train (minimum 1 year of experience), athletes who have basic dollyo chagi techniques, and

have no history of serious leg or knee injuries. The sample was selected based on certain criteria relevant to the research objectives. A total of 30 subjects will carry out the pretest, training, and posttest. Entering research data, namely from the implementation of the pretest and posttest, is then presented in the form of tables, graphs, or diagrams to facilitate interpretation and displays the average, standard deviation, and results of statistical analysis to support conclusions.

Data analysis using descriptive tests by finding the mean, median, mode, standard deviation, minimum value, and maximum value and then using the analysis prerequisite test with data normality, data homogeneity, and continued testing using the t-test with the SPSS version 23 program.

RESULT

Descriptive analysis of pretest and posttest variables on the elgol dollyo chagi ability variable in taekwondo athletes can be seen in table 1.

Table 1. Descriptive analysis of the ability of elgol dollyo chagi in athletes

Data Variables	Mean	Median	Mode	Std. Deviation	Minimum	Maximum	P-value
Pretest Analysis	27.83	27.50	30	4.332	21	37	0.000
Posttest Analysis	36.20	35.50	40	4.205	30	43	0.000

Based on table 1 explains that the descriptive analysis obtained data on the ability of Elgol Dollyo Chagi for the implementation of the pretest, the mean was 2.83, the median was 27.50, the mode value was 30, the standard deviation was 4.332, the minimum value was 21, and the maximum value was 37. While the implementation of the posttest obtained a mean of 36.20, the median was 35.50, and the mode value was 40. The standard deviation was 4.205, the minimum value was 30, and the maximum value was 43.

From pretest to posttest, there was a significant increase in the average value of Elgol Dollyo Chagi ability. The average pretest value was 2.83, while the average posttest value was 36.20. This shows that after following the training program, the athlete's ability to perform the Elgol Dollyo Chagi technique increased significantly. Based on the results of the analysis, it can be concluded that the training method applied is effective in improving technical ability in Elgol Dollyo Chagi, and this training

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program can be recommended for further implementation with variations in training intensity to improve more optimal results. To see how much the athletes obtained from each of the research results can be seen in table 2.

Table 2. Research data in frequency distribution on pretest and posttest variables

Pretest			Posttest		
Class Interval	Frequency	Percentage	Class Interval	Frequency	Percentage
21 - 23	6	20%	30 - 32	6	20%
24 - 26	6	20%	33 - 35	9	30%
27 - 29	5	17%	36 - 38	4	13%
30 - 32	9	30%	39 - 41	7	23%
33 - 35	3	10%	42 - 44	3	10%
36 - 38	1	3%	45 - 47	1	3%
Total	30	100%	Total	30	100%

Based on the results of the study on the frequency distribution for the highest value, namely with a frequency of 9 athletes who were able to get a score of 30-32, with a percentage of 30%, this group is the largest in the frequency distribution, indicating that the majority of athletes have quite good abilities in the elgol dollyo chagi technique. The frequency of 6 athletes is divided into 2 groups, namely with a score of 21-23 and 24-26 with a percentage of 20%, athletes in this group are in the low ability category, and their technical performance is still far below the main group and requires a special training program to improve performance. For a frequency of 5 athletes getting a score of 27-29, with a percentage of 17%, athletes in this group are in the moderate ability category, approaching the majority score but not yet optimal. For a frequency of 3 athletes getting a score of 33-35, with a percentage of 10%, athletes in this group are in the good ability category, although the number is small, they show positive results in elgol dollyo chagi ability. Meanwhile, for the frequency of 1 athlete getting a score of 36-38, with a percentage of 3%, this group is the smallest in the distribution. The frequency distribution shows that the training program has a positive effect on the majority of athletes, with better results in the middle group. However, there needs to be a strategic effort to increase the number of athletes who reach the good to very good

category, so that the overall results can be more optimal. The overall results of the frequency distribution can be seen in Figure 1.

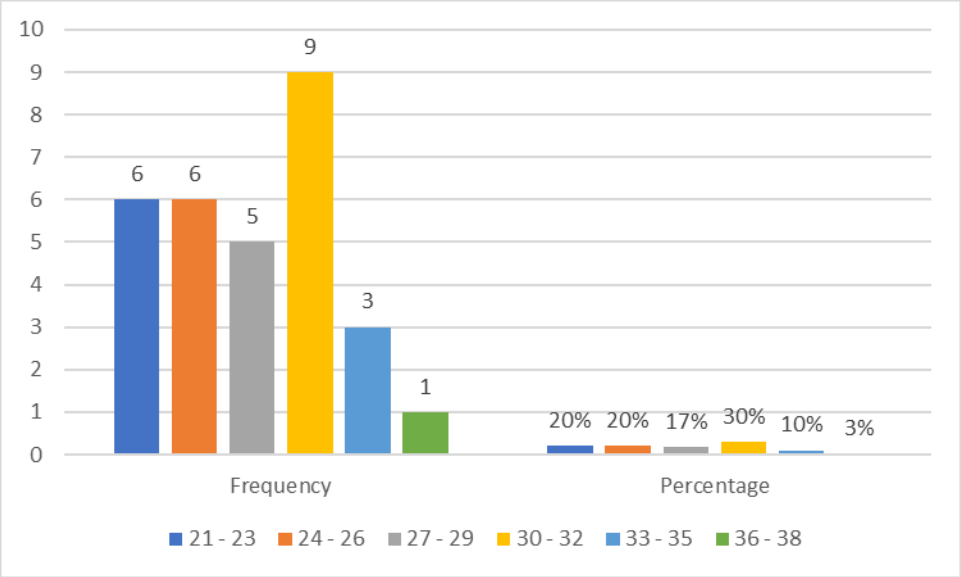

Figure 1. Research data graph in frequency distribution on pretest variables

Description:

Description: Blue is 21-29, with a frequency of 6 people and a percentage of 20%. Orange is 24-26, with a frequency of 6 people and a percentage of 20%. Gray is 27-29, with a frequency of 5 and a percentage of 17%. Yellow is 30-32, with a frequency of 9 and a percentage of 30%. Tosca blue is 33-35 with a frequency of 3 and a percentage of 10%. Green is 36-38 with a frequency of 1 and a percentage of 3%

Based on the results of the posttest research on the frequency distribution for the highest value, the distribution for the highest value is with a frequency of 9 athletes who are able to get a score of 33-35, with a percentage of 30%, this group has the largest number of athletes, indicating that the majority of athletes are at a good level of ability, athletes in this group dominate the distribution, reflecting the success of the training program that helps improve performance at this level. The frequency of 7 athletes getting a score of 39-41 with a percentage of 23%, this group is in the very good ability category, with a fairly large number of athletes. For the frequency of 6 athletes getting a score of 30-32, with a percentage of 20%, this group is in the sufficient ability category, which is close to the average but requires further improvement. For the frequency of 4 athletes getting a score of 36-38 with a percentage of 13%, this group

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is in the good to very good ability category, indicating athletes who have passed the average but are still below the peak group. For the frequency of 3 athletes getting a score of 42-44 with a percentage of 10%, these athletes are in a unique group and require further evaluation. While for the frequency of 1 athlete getting a score of 45-47, with a percentage of 3%, athletes in this group are in the extraordinary ability category, showing very high technical performance. The training program implemented has provided significant results, as evidenced by the larger distribution in the middle to upper categories. However, adjustments are needed to encourage more athletes into the very good and extraordinary ability categories. The overall results of the frequency distribution can be seen in Figure 2.

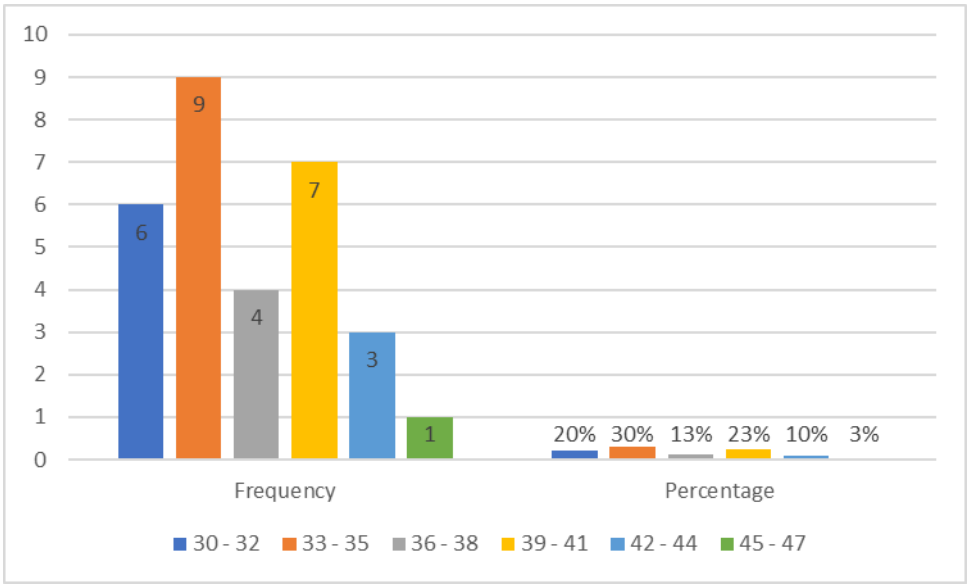

Figure 2. Graph of research data in frequency distribution on posttest variables

Description:

Blue is 30-32, with a frequency of 6 people and a percentage of 20%. Orange is 33-35, with a frequency of 9 people and a percentage of 230%. Gray is 36-38, with a frequency of 5 and a percentage of 13%. Yellow is 39-41, with a frequency of 7 and a percentage of 23%. Tosca blue is 42-44 with a frequency of 3 and a percentage of 10%. Green is 45-47 with a frequency of 1 and a percentage of 3%.

The prerequisite analysis uses a data normality test using Kolmogorov Smirnov to determine whether or not the data in the pretest and posttest variables is normal, as shown in Table 4.

Table 4. Pretest and posttest with data normality test

Variable	Statistic	Significance
Pretest Normality	0.125	0.200
Posttest Normality	0.150	0.082

The results in Table 4 state that the pretest and posttest normality test values are generally normally distributed because the significance value for the pretest is 0.200 and for the posttest is 0.082, which is greater than 0.05. Furthermore, using the homogeneity test can be seen in table 5.

Table 5. Pretest and posttest with data homogeneity test

Variabel	F	Significance
Homogeneity of pretest and posttest	57.169	0.000

The results in Table 5 state that the homogeneity test values of the pretest and posttest are generally distributed homogeneously because the significance value of 0.000 is smaller than 0.05. See the results of the t-test analysis in Table 6.

Table 6. Analysis of t-test results

Variable	t	p-value
T-test results from the pretest and posttest	15.455	0.000

The results in table 6 state that the t-test value obtained is 15.455 with a p-value of 0.000 smaller than 0.05. Based on the results obtained, it can be concluded that there is a significant increase in the Elgol Dollyo Chagi kick through alternative leg bounding training.

DISCUSSION

Elgol dollyo chagi performance is greatly improved by alternate leg bounding training, as demonstrated by this study, which also improves leg strength, explosive power, and kicking technique. The average pretest score was 23.83, and the posttest score was 36.20. By focusing on important muscles, including the quadriceps, hamstrings, calves, and gluteus, this exercise improves body coordination and explosive strength. By enhancing proprioception, balance, and momentum control, the exercise makes it possible to kick higher targets more quickly, accurately,

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and with greater strength. It also improves match efficacy and lowers the danger of injury. Athletes and coaches can use this approach to maximize training and effectively boost performance.

Elgol dollyo chagi's ability was assessed based on speed, strength, and kicking technique. Measurements were taken before and after the training period (Apriliani et al., 2024). The treatment group showed a significant increase in leg muscle strength compared to the control group. Alternate leg bounding training also resulted in a significant increase in kicking speed. The treatment group recorded an average increase in kicking speed of 12% after the training period.

Significant increases in strength and speed in the treatment group indicate that alternating leg bounding exercises have a positive contribution to kicking ability. So that the results of the study can improve the kicking ability of elgol dollyo chagi through alternate leg bounding exercises. According to Dann et al. (2023), the results of the exercise showed a significant effect that through the exercises carried out, explosive power can be increased, which is important for kicking effectively. This exercise also improves technique and coordination. Improved technique can be associated with the ability to alternate leg bounding to improve neuromuscular and motor control, which is important for the smooth and efficient execution of kicking techniques.

The results of this study are supported by research conducted by Solissa, (2014), involving taekwondo dollyo chagi kicks can improve good motor skills, as well as maximum results in each exercise. Rochman et al. (2020) said that for dolly change abilities carried out with audiovisual methods, there is a significant influence because this method provides direct feedback so that participants who follow can understand optimally. This was done by Furqon & Priyono, (2023), who studied taekwondo dollyo chagi kicks by involving ankle weight training also increased maximum ability in kicks. Based on some of the descriptions above, dollyo chagi kicks in taekwondo are very flexible in various types of training, and each can be improved with various training methods.

The implications of the research results regarding the effectiveness of training can help improve kicking techniques, including coordination and stability. This shows that explosive strength-based training can contribute to the improvement of kicking techniques (Pamungkas, 2021). Athletes can train this technique specifically to improve effectiveness in matches. Emphasis on strength and speed in training can improve technical performance (Zulkarnain et al., 2021). Athletes and coaches need to understand the importance of developing explosive strength for more effective kicking techniques. The results of this study can be the basis for further research on various aspects of training, including optimal training duration, training variations, and their impact on athlete technique and performance more broadly. These findings contribute to scientific knowledge about specific training in sports. It helps in understanding how explosive strength-based training affects athlete technique and performance, which can be applied in other sports contexts.

Athletes can integrate exercises into their training routine to focus on improving strength and kicking technique. This allows athletes to identify strengths and weaknesses in the elgol dollyo chagi technique and work specifically on improvements. By improving kicking technique and increasing muscle strength, athletes can reduce the risk of injury. Exercises that improve balance and muscle strength contribute to the prevention of injuries that often occur due to improper technique or lack of strength. This study is supported by Narbito (2023), who stated that alternate leg bounding exercises have been shown to improve the dependent variable. In this study, there are similarities, namely with one of the same methods, while for the dependent variable, it is different.

This study can provide guidelines on how to incorporate alternate leg bounding training into taekwondo training routines to improve kicking technique abilities, especially elgol dollyo chagi. Directs coaches and athletes to focus on training methods that are proven to be effective, saving time and effort in achieving performance targets. The limitation of this study is that it was conducted over a short period and did not capture

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long-term changes that occur due to training. Plyometric training, such as alternate leg bounding, may require a longer period to produce significant changes in kicking technique. The short duration may make the results of the study not fully reflect the long-term effects of this training. These findings provide a scientific basis for how plyometric training, especially alternate leg bounding, can improve the ability of certain kicking techniques such as the elgol dollyo chagi. Future research can develop more focused training methods and optimize the results. For example, variations in bounding techniques, frequencies, and different durations can be compared to find the most effective training protocol.

CONCLUSION

Leg bounding has been shown to be effective in improving elgol dollyo chagi performance in athletes. This can be seen from the increase in leg muscle strength, balance, kicking speed and accuracy. This exercise contributes significantly to the development of essential physical aspects in taekwondo, such as power and coordination of leg movements. This exercise is particularly effective for Taekwondo athletes because it targets the muscles and movements that are essential for optimal elgol dollyo chagi performance. Based on these findings, it is recommended that alternate leg bounding be included as a routine part of a taekwondo athlete's training program to optimize kicking performance. Research gaps in the effectiveness of alternate leg bounding training on elgol dollyo chagi performance include a lack of focus on biomechanical analysis, long-term data, psychological effects, and training safety. Research that addresses these gaps will provide more complete insights and contribute to the development of more effective, evidence-based training methods for taekwondo athletes.

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