



DOES SLED TRAINING WITH A LOAD OF 10 KILOGRAMS HAVE AN EFFECT ON THE SPEED OF COLLEGE STUDENT SOCCER PLAYERS?

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Abstract

Study purpose. Running speed is an ability soccer players need to build attack and defence. There needs to be more research in football that applies sleds using specific loads to improve the running ability of college student soccer players. This study aims to analyze the effect of sled training with a load of 10 kilograms on the running speed of college student soccer players.

Materials and methods. This study uses a quantitative approach with a quasi-experimental design research type, with the research design used being a one-group pretest-posttest design. The sample used in this research was 14 students taken from a population of 95 individuals using random sampling techniques. The study sample used had characteristics of age 18 ± 0.75 years, height 169.42 ± 5.84 cm, weight 58.5 ± 4.21 kg, and BMI 20.44 ± 2.00 . Treatment was carried out for six weeks with a frequency of three times a week. The 20-meter sprint speed test was used as an instrument for collecting speed data. The data analysis technique uses a paired samples t-test at a significance level (α) 0.05. The prerequisite test used is the Shapiro-Wilk test.

Results. The research showed increased players' running speed obtained from the pretest results of 4.48 ± 0.291 and the post-test results of 4.15 ± 0.266 from the 20-meter sprint test.

Conclusions. Based on the results of the paired sample t-test, it can be concluded that there is a significant increase in the running speed of college student soccer players using 10 kg sleds.

Keywords: sled training, speed, soccer.

Introduction

Fundamental movement patterns in soccer require rapid strength development and high power (Pinillos et al., 2014). One of the basic movements in soccer is speed; speed is an essential factor in the success of a soccer game (Modric et al., 2019). Not only that, but speed is also an aspect of the physical components crucial for players in the game of soccer (Beato et al., 2021; Faude et al., 2012). Apart from being a determining factor in dribbling the ball towards the opponent's goal, the speed at the competitive level of students is also an essential factor in defensive and attacking tactics, as well as transitions between the two phases of the game

(Welch et al., 2021). The speed possessed by a player can change the dynamics of a match, create goal opportunities, or even avoid attacks from opponents (Barnes et al., 2014; Brechue et al., 2010). Therefore, a deep understanding is needed regarding how to increase the speed of soccer players to improve the team's quality and the player's performance on the field.

One training method that needs to be explored to increase soccer players' speed is using a sled with a load weighing 10 kg. Sled training is a commonly used approach in developing athlete speed Petrakos et al. (2016), but there has not been much research that examines its effects on soccer players explicitly, especially at the youth level (Cahill et al., 2020; Rumpf et al., 2015). Sled training involves an athlete running while pulling a weighted sled to generate excess load during specific movement patterns in the running (Petrakos et al., 2016). Sled training is adequate for improving sprint

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performance using heavier loads (Kawamori et al., 2014; Zisi et al., 2022). However, according to research by Alcaraz et al. (2018) on the use of sleds, no optimal load must be used. However, the load must be adjusted to the desired purpose. Based on the opinion above, research must be conducted to determine effective loads, especially for student college soccer players. Therefore, this study aims to analyze the effect of sled training with a load of 10 kg on the speed of student soccer players.

Research on sledding training with a 10 kg load is important, considering that every soccer player requires high physical performance, such as speed, in various game situations (Aquino et al., 2017). Training using a sled with an additional 10 kg weight can be an interesting training method for increasing player speed, and a deeper understanding of its potential can provide valuable guidance for coaches and players in designing more efficient training programs (Cochrane & Monaghan, 2018; Williams et al., 2021).

One of the key challenges in gaining insights into enhancing the speed of college soccer players is the necessity for further investigation specifically focused on using sled training with a 10 kg load within the context of student-athletes. Speed plays a pivotal role in soccer, and comprehending the efficacy of sled training among youth-level players can offer invaluable insights for coaches and athletes. This study will serve as a vital contribution to addressing the knowledge gap, ultimately leading to the creation of more efficient training regimens to enhance the speed of college-level soccer players. In this way, team quality and player performance on the field can be improved.

It is hoped that the results of this research will provide new insight into the effectiveness of sled training with a load of 10 kg in increasing the speed of student college soccer players, as well as contribute to the development of more innovative and efficient training programs in improving the physical abilities of soccer players at the student level.

Materials and methods

Study participants

Fourteen male student college soccer players participated in the study. Samples were taken using random sampling techniques from 95 students as a population. The age of the participants in this study was 18 ± 0.75 years, with a height of 169.42 ± 5.84 cm, weight 58.5 ± 4.21 kg, and BMI 20.44 ± 2.00 .

Study organization

This study used an experimental method with a One-Group Pretest-Posttest Design. The sample used in this research was 14 students college soccer player taken from a population of 95 using random sampling techniques. Fourteen soccer players will do sledging training with a 10 kg load with a training frequency of 3 times a week for six weeks (Alcaraz et al., 2018; Chaalali et al., 2022; McMorro et al., 2019). The pretest and posttest were carried out one day before and after treatment. The test used is a 20-meter sprint. Before treatment, the samples were given static and dynamic heating for 15 minutes, then divided into two groups of seven people each. The sample ran using a 10 kg

sled for 20 meters. In weeks 1 and 2, the sample ran for six repetitions and two sets; in weeks 3 and 4, the sample ran for eight repetitions and three sets; in weeks 5 and 6, the sample ran for ten repetitions with two sets. The six-week interval is a 1:6 ratio where one time works and six-time rest. After treatment, the sample is cooled down. A stadiometer is used to measure the sample's height and weight. The 20-meter sprint test was used as a data collection instrument in this study. A stopwatch is used to measure sample times while running. The sample was given two opportunities to run, and the best time was used as research data.

Statistical analysis

The data analysis techniques used in this research include the normality test using Shapiro-Wilk and hypothesis testing using the paired sample t-test. Paired sample t-test was used to analyze the differences between the pretest and post-test. The significance level (Sig) used in decision-making is as follows: If the value (Sig) < 0.05 , then H_0 is rejected, and H_a is accepted. If the value (Sig) is > 0.05 , then H_0 is accepted, and H_a is rejected. Statistical analysis was carried out using IBM SPSS statistics 22.

Results

This research was conducted for six weeks, with 18 times attended by 14 student college soccer players. The results of descriptive statistical analysis of the pretest and post-test running speed of student college soccer players can be seen in the table below as follows.

Table 1. Descriptive Statistics for Pretest and Post-test Running Speed

Indicators	N	M	SD	Minimum	Maximum
Pre-test	14	4.48	0.291	3.89	4.99
Post-test	14	4.15	0.266	3.63	4.51

The data are presented by means $\pm$ SD.

Table 1 above shows the results of the pretest running speed of student college soccer players with a mean value of 4.48 ± 0.291 and post-test running speed results have a mean value of 4.15 ± 0.266 .

Table 2. Normality Test Results

Shapiro-Wilk			
Indicators	Statistic	Df	Sig.
Pre-test	0.979	14	0.967
Post-test	0.946	14	0.500

The data are presented by means $\pm$ SD and sig. Value: In the Shapiro-Wilk test, the data is normally if the sig. ≥ 0.05

From Table 2 above, it can be seen that all data has a p-value (Sig.) > 0.05 . Specifically, the results of the pretest data value for running speed were $0.967 > 0.05$, and the post-test data value for running speed was $0.500 > 0.05$. Thus, the entire data is normally distributed data with a level (Sig.) > 0.05 .

Table 3. Hypothesis Test Results

Paired Difference					Significance		
Mean	Std. Dev.	Std. Error Mean	95% Confidence Interval of the Difference		T	df	Sig. (2-tailed)
			Lower	Upper			
0.33	0.168	0.045	0.233	0.428	7.338	13	0.000

The data are presented by means $\pm$ SD; *statistically significant difference, mean scores at point comparisons from baseline: sig (2-tailed) value of ≤ 0.05 .

Based on the data in table 3. above, it shows that the players' running speed has a sig (2-tailed) value of $0.000 < 0.05$, indicating a significant difference. The hypothesis, "There is an effect of sled training with a load of 10 kg on the speed of student college soccer players" is accepted. Shows that sled training with a load of 10 kg significantly influences the running speed of student college soccer players. Based on the pretest data above, the average is 4.48, and the post-test data has an average of 4.15. The magnitude of the increase in the running speed of the student college soccer players can be seen from the difference in the average value, which is 0.33.

Discussion

Sled training with a load of 10 kg has a positive influence on increasing the 20-meter running speed of soccer players. Several factors influence this increase in running speed. The influencing factors include training load, training adaptation, suitability of sprint movements, and muscle activation (Iaia et al., 2009; Rodríguez-Rosell et al., 2017; Suarez-Arrones et al., 2018; Zabaloy et al., 2022). Soccer players' training load every week will have a physical impact that gradually increases (Buchheit & Mendez-Villanueva, 2013; Fitzpatrick et al., 2018). Players who do regular training will experience anatomical and physiological adaptations that impact their body to adjust the movements and muscle activity required when moving and increase aerobic and anaerobic power capabilities (Aguar et al., 2015; Cust et al., 2018). Therefore, it is essential to develop specific training methods to improve the physicality of soccer players, especially in the aspect of speed.

One interesting training method to develop to increase running speed is sled training or a running training method by pulling a held weight. A fixed load of 10 kg used in sled training is one of the critical aspects of this research. By using consistent loads for six weeks, players can experience significant improvements in their running speed. Using this load requires players to perform sprint movements with more force, thus providing sufficient stress on the muscles involved in the sprint movement, encouraging adaptation and increasing strength (Alcaraz et al., 2014; Zabaloy et al., 2022). It is important to note that consistent use of weights also helps track a player's progress regularly throughout the training period. According to (Alcaraz et al., 2018; Chaalali et al., 2022; McMorro et al., 2019), the ideal training load to perform is 2-3 times a week for six weeks.

Furthermore, another essential factor is the principle of movement specifications in sled training appropriate to sprint movements. Sled training movements have characteristics that correspond to sprint movements when players run in matches or training. That will optimize the muscles that contract during the exercise. Understanding how to sled

correctly, including body position, foot placement, and pushing technique, is necessary (Cross et al., 2016). In this way, players can maximize the benefits of sled training with a 10 kg load. Training appropriate to sprint movements will help players build coordination and correct movement habits, essential for achieving optimal running speed (Cross et al., 2017; Zabaloy et al., 2022).

During a six-week training period with a frequency of 3 times a week, anatomical and physiological adaptations in the player's body will occur (Lockie et al., 2012). The movement in sled training with a load of 10 kg requires the lower extremity muscles to work harder to overcome the resistance of the load so that the muscles involved in the movement will experience changes, such as increased strength and endurance. As a result, players can accelerate more quickly. In addition, physiological adaptations, such as increased aerobic and anaerobic capacity, can also occur, which is an essential factor in improving running performance (Kelly et al., 2021; MacInnis & Gibala, 2017; Vorup et al., 2016).

One interesting finding that can be considered in further research is that several samples experienced hamstring symptoms in the second week. That was possible because the quality of the hamstring muscles was not yet ready, and there were many multiples during training. However, further research needs to be done on the quality of the initial hamstring muscles before doing this exercise.

This study has limitations in the absence of a control group to see more clearly whether the absolute increase was caused by sled training. It is hoped that future research can add a control group to compare this exercise.

Conclusions

Based on the results of research and discussion of sled training with a load of 10 kg on increasing the running speed of student college soccer players, it can be concluded that the sled training method with a load of 10 kg, which was carried out for six weeks with a total of 18 meetings, there was a significant increase in the running speed of the players.

Conflict of interest

Authors do not receive endorsement from any organization for submitted work. The author has no relevant financial or non-financial interest to disclose.

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ЧИ ВПЛИВАЄ ТРЕНУВАННЯ ІЗ СИЛОВИМИ ТРЕНУВАЛЬНИМИ САНЯМИ З НАВАНТАЖЕННЯМ 10 КІЛОГРАМІВ НА ШВИДКІСТЬ ФУТБОЛІСТІВ-СТУДЕНТІВ КОЛЕДЖІВ?

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 6 с., 3 табл., 33 джерела.

Мета дослідження. Швидкість бігу — це здатність, яка потрібна футболістам для побудови нападу та захисту. Потрібні додаткові дослідження з футболу, у яких застосовують силові тренувальні сани з використанням певних навантажень для покращення бігових здібностей футболістів-студентів коледжів. Метою цього дослідження є аналіз впливу тренування із силовими тренувальними санями з навантаженням 10 кілограмів на швидкість бігу футболістів-студентів коледжів.

Матеріали та методи. У цьому дослідженні використовують кількісний підхід із квазіекспериментальним типом дослідження, при цьому використовують план дослідження з попереднім і підсумковим тестуванням на одній групі. Вибірка, яку використовували в цьому дослідженні, становила 14 студентів, відібраних із генеральної сукупності кількістю 95 осіб із використанням методів випадкової вибірки. Досліджувана вибірка мала такі характеристики: вік $18 \pm 0,75$ року, зріст $169,42 \pm 5,84$ см, вага $58,5 \pm 4,21$ кг, ІМТ $20,44 \pm 2,00$. Заняття проводили протягом шести тижнів із періодичністю тричі на тиждень. Тест на швидкість бігу на дистанцію 20 метрів використовували як інструмент для збору даних про швидкість. У методиці аналізу даних використовують t-критерій Стюдента для парних вибірок за рівня значущості (α) 0,05. Як обов'язковий попередній тест використовували критерій Шапіро-Вілка.

Результати. Результати дослідження показали збільшення швидкості бігу гравців, отримане за результатами попереднього тестування $4,48 \pm 0,291$ та за результатами підсумкового тестування $4,15 \pm 0,266$ в тесті на швидкість бігу на дистанцію 20 метрів.

Висновки. За результатами аналізу даних із використанням t-критерію Стюдента для парних вибірок можна дійти висновку про наявність статистично значущого збільшення швидкості бігу футболістів-студентів коледжів, які користуються силовими тренувальними санями з навантаженням 10 кг.

Ключові слова: тренування із силовими тренувальними санями, швидкість, футбол.

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