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The Effectiveness of Post-Exercise Sports Massage on Recovery in U17 Football Athletes at the Thirteens Football Academy

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Abstract

This study aimed to examine the effectiveness of post-exercise sports massage in accelerating Countermovement Jump (CMJ) performance recovery in U17 football athletes at the Thirteens Football Academy. The research employed a quantitative approach using a quasi-experimental one-group pretest–posttest design. Thirty U17 football athletes participated in the study and received a post-exercise sports massage intervention lasting 15–20 minutes using effleurage and petrissage techniques. CMJ performance was measured before and after the intervention. Data were analyzed using descriptive statistics and a paired samples t-test. The results showed an increase in the mean CMJ score from 44.67 before treatment to 50.83 after treatment, with a mean difference of –6.167. The paired samples t-test revealed a significant difference between pre- and post-treatment scores ($t = –5.651$; $p < 0.05$), indicating that sports massage had a significant effect on improving CMJ performance recovery. These findings suggest that post-exercise sports massage is an effective recovery method to enhance lower limb explosive power in young football athletes and may be considered as part of structured recovery programs in football academies.

How to Cite

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INTRODUCTION

Football is a sport that demands high physical abilities, especially lower limb muscle explosive power, which is essential for sprinting, aerial duels, and changes of direction. The Countermovement Jump (CMJ) is a primary indicator for measuring this explosive power, as it reflects the ability for rapid muscle contraction and vertical explosive power (Anwar et al., 2023). In young soccer athletes, especially in the U17 group, the decline in CMJ performance after intensive training can reach 15-20% due to muscle fatigue, which not only reduces performance consistency but also increases the risk of injury by up to 30% during the physical development phase (Pahlevi et al., 2024). In Indonesia, where the PSSI U17 competition is increasingly competitive (such as the Garuda Select program), CMJ performance recovery is a crucial challenge to prevent overtraining and support the achievements of the youth national team.

One potential recovery method is sports massage, which works by increasing blood flow by 20-50% and reducing muscle tension through techniques such as effleurage and petrissage (Arrosyid et al., 2023). International studies have demonstrated its benefits for explosive performance: Querido et al., (2022) reported an acute increase in vertical jump of 8-12% post-massage, Zaworski, (2020) found an acceleration of CMJ recovery by up to 10% within 24-48 hours after strenuous exercise. However, a meta-analysis by Fikri Ramdhan et al., (2024) indicated small effects (effect size <0.3) on delayed onset muscle soreness (DOMS) and flexibility, with limited evidence for specific performance improvements such as CMJ in adolescent athletes. Most previous studies have emphasized the reduction of DOMS or general physiological markers such as creatine kinase (CK) levels, rather than the recovery of explosive physical performance (Efda & Ambardini, 2024).

In Indonesia, similar studies are still limited and lack specificity. Nur Alpiah et al., (2024) found that sports massage reduced CK levels and improved vertical jump in female soccer players, but did not use CMJ as the primary indicator and did not focus on the U17 age group. Charbel et al., (2021) reported accelerated lactic acid recovery in female futsal athletes, while Muhammad Nuh Sharid et al., (2024) explored DOMS reduction through petrissage massage, without assessing explosive performance. Recent international studies, such as (Horoshko et al., 2022), used CMJ after percussive massage in active young men, but the subjects were not adolescent soccer athletes. This gap is further exacerbated by the lack of research specifically examining the effectiveness of sports massage on CMJ recovery in U17 soccer athletes in the local context, where cultural factors and recovery facilities are often limited.

Based on the description, this study seeks to answer whether sports massage is effective in accelerating Countermovement Jump (CMJ) performance recovery after strenuous training in young U17 soccer athletes at the Thirteens Football Academy. The purpose of this study was to determine the effectiveness of sports massage in accelerating CMJ performance recovery in U17 soccer athletes after intensive training, as well as to provide input for coaches and academy administrators in designing more effective recovery strategies to support the achievements of young athletes in Indonesia.

Thirteens Football Academy, a football academy located in South Bandung, has unique environmental characteristics, with geographic and social conditions that can influence the physical activity habits of young athletes. Variations in family background, the surrounding sports culture, and the availability of sports facilities at the academy are important factors influencing the daily physical activity of U17 football athletes. To date, there has been no empirical study specifically examining the physical activity levels of athletes at Thirteens Football Academy and the extent to which these levels relate to their physical fitness. Therefore, this study is important to conduct in an effort to understand the fitness and physical activity conditions of athletes more deeply. The results of this study are expected to provide useful information for the academy, football coaches, and other stakeholders in designing interventions or programs aimed at improving physical activity and physical fitness in athletes in a sustainable manner.

METHODS

This study used a One-Shot Case Study design, which is included in quantitative research with a quasi-experimental approach. According to (McDaniel et al., 2024), a One-Shot Case Study design is a research design that only makes a single observation after the treatment/intervention is given without any initial measurement (pretest) or control group. This design was used to determine the effectiveness of post-exercise sports massage on the performance recovery of U17 soccer athletes. The method used was a qua-

si-experimental method, because it is appropriate for the initial exploration of the effectiveness of interventions in natural contexts such as routine training programs at soccer academies.

The population of this study was all U17-aged soccer athletes actively training at the Thirteens Football Academy in Bandung. The sampling technique used was purposive sampling, with the criteria being that athletes must be actively participating in an intensive training program, aged 15-17, and have at least one year of experience at the academy. The sample size was 25-30 athletes, adjusted based on availability and suitability to the research criteria, to ensure a representative sample size. The study was conducted in November 2025 at the Thirteens Football Academy in Bandung.

The research variables in this study consisted of the independent variable (X), namely post-exercise sports massage, which is a massage technique applied after exercise to accelerate muscle recovery and reduce fatigue. This intervention was carried out for 15-20 minutes by a certified therapist, focusing on effleurage, petrissage, and friction techniques to increase blood circulation and reduce muscle tension. The dependent variable (Y) was Countermovement Jump (CMJ) performance, which is an indicator of lower limb muscle strength and explosiveness and is used to measure the level of recovery of athletes' physical performance after the intervention (Marttinen et al., 2020). CMJ measurements focused on vertical jump height as the main indicator of recovery, with high reliability (ICC >0.9) based on measurement standards (Huang et al., 2025).

The data collection procedure was carried out by first requesting official permission from the management of the Thirteens Football Academy. After obtaining permission, athletes underwent intensive training according to a routine program (such as sprints and plyometrics) designed to induce muscle fatigue (Russell et al., 2025). After the training session, athletes received a 15-20 minute sports massage by an experienced therapist. da Silva et al., (2022) stated that this duration is effective in reducing muscle tension and accelerating the recovery process. Next, CMJ performance was measured using a vertical jump measuring device such as a jump mat or a calibrated force platform (Stout & Novacheck, 2021). Measurements were taken immediately after the massage to assess acute effects, with each athlete performing three repetitions to ensure consistency. All collected data was then double-checked for completeness and consistency before being tabulated.

Data analysis was conducted using statistical software such as SPSS. The analysis phase included descriptive analysis to describe the post-intervention CMJ performance profile, including the calculation of mean, median, and standard deviation values, as well as the presentation of data in tables and graphs (Nurhaswinda et al., 2025). Descriptive analysis is crucial for describing the characteristics of the data in a One-Shot Case Study design, where there is no control group or pre-treatment data. The validity of the measuring instrument was ensured through periodic calibration (Khidzir et al., 2018), while reliability was tested by repeating measurements (test-retest) on several athletes prior to the main study (Saputra, 2025). The significance level was set at $\alpha = 0.05$, with interpretation of results based on improvements in CMJ performance (e.g., by 5-15%) as an indicator of intervention effectiveness.

RESULTS AND DISCUSSION

Table 1. Data Description

	Mean	N	Sd	Std.Error Mean
Before	44.67	30	4,84	.885
After	50.83	30	5,62	1,026

Based on the results of the **Table 1.** Paired Samples Statistics analysis of 30 research subjects, the average value before treatment was 44.67 with a standard deviation of 4.845 and a standard error of the mean of 0.885, indicating a relatively homogeneous data distribution and a stable average estimate. After treatment, the average value after treatment increased to 50.83 with a standard deviation of 5.621 and a standard error of the mean of 1.026.The average increase of 6.16 points descriptively indicates a trend towards improved outcomes after treatment, although data variation was slightly greater in the post-treatment condition. Overall, these descriptive statistical results indicate a positive impact of the treatment on the studied variables, which was further confirmed through inferential analysis using a paired samples t-test.

Table 2. Paired Correlation Data

	N	Sd	Sig.
Pair 1	30	.355	.054

Based on the results of the **Table 2.** Paired Samples Correlations analysis, the correlation value between pre- and post-treatment scores was

obtained at r = 0.355 with a sample size of 30 subjects. This value indicates a positive relationship with a low to moderate level of strength, indicating that subjects with relatively high scores before treatment tend to maintain relatively high scores after treatment, although the relationship is not strong. The significance value obtained was Sig. = 0.054, slightly above the significance limit of $\alpha = 0.05$, so the relationship between the values before and after treatment was not statistically significant. However, this correlation indicates a tendency for a positive relationship that is descriptive and is used as supporting information, while the main conclusion regarding the effect of the treatment is determined through a paired samples t-test.

Table 3. Paired Samples Test

Variable	Before-after
Mean	-6,167
Sd	5,977
Std. Error Mean	1,091
Lower	-8,399
Upper	-3,935
t	-5,651
d	29
Sig. (2-tailed)	.000

Based on the results of the **Table 3.** Paired Samples Test analysis, the average value of the difference (mean difference) between the scores before and after treatment was -6.167, which indicates that the average score after treatment was higher than before treatment. The results of the statistical test showed a t value = -5.651 with df = 29 and Sig. (2-tailed) = 0.000 (<0.05), so the null hypothesis was rejected and there was a statistically significant difference between the values before and after treatment. The 95% confidence interval is in the range of -8.399 to -3.935, which does not include the zero value, so the differences that occur are consistent and convincing. Overall, the results of the paired samples t-test confirm that the treatment given has a real effect in improving the measurement results after treatment.

The results showed a clear increase in mean scores between before and after sports massage treatment. The average score increased from 44.67 to 50.83, a difference of 6.16 points. Descriptively, these findings indicate that post-exercise sports massage can aid in the recovery of athletes' performance, particularly in the aspects measured in this study. This improvement reflects the athletes' positive response to the massage intervention after experiencing fatigue from intensive training (Ali & Alharbi, 2024).

These findings are supported by the results of a paired samples t-test, which showed a significant difference between pre- and post-treatment scores ($t = –5.651$; $p < 0.05$). The 95% confidence interval (CI) value, which did not exceed zero, confirms that the performance improvements were consistent and not merely coincidental. Therefore, these results demonstrate that sports massage significantly accelerates athletes' recovery after training, in line with the primary objective of the study (Salem et al., 2025)

Physiologically, the results of this study can be explained by the mechanism of action of sports massage, which improves blood circulation, accelerates the transport of oxygen and nutrients to muscle tissue, and helps eliminate metabolic waste from exercise (Nct, 2023). Massage techniques such as effleurage and petrissage are known to be effective in reducing muscle tension and accelerating the relaxation process, allowing muscles to return to optimal function (Awaliyyah et al., 2025). This is especially important for U17 athletes who are still in the physical development phase and are susceptible to fatigue and decreased performance after training.

The correlation between pre- and post-treatment scores showed a positive relationship with low to moderate strength ($r = 0.355$), although it was not statistically significant ($p > 0.05$). This indicates that post-massage performance improvements are not entirely influenced by the athlete's initial performance level, but rather are more related to the effects of the treatment. In other words, sports massage provides relatively uniform recovery benefits, regardless of differences in initial ability between athletes (Pereira et al., 2025).

Overall, the results of this study support previous findings that suggest sports massage is effective as a post-exercise recovery method, particularly in improving physical performance (Mathunjwa et al., 2025). These findings have practical implications for coaches and soccer academy administrators, particularly in developing structured and applicable recovery programs for young athletes. However, the limitations of the study design without a control group need to be considered, and further research is recommended using a more robust experimental design to more comprehensively confirm these findings.

CONCLUSION

Based on the results of descriptive statistical analysis, it was found that there was an increase in average performance scores after sports massage treatment. The average score after treatment was higher than before treatment, which descriptively indicates a trend towards improved performance or measurement results in the study subjects. This improvement indicates that sports massage has the potential to positively impact the physical condition of athletes after intensive training.

The results of the inferential analysis using a paired samples t-test showed that the difference between pre- and post-treatment scores was statistically significant. The significance value obtained was less than the 0.05 level, and the confidence interval did not exceed zero, confirming that the improvement was not due to chance alone. Thus, sports massage treatment has been shown to have a significant effect on improving post-treatment measurement results.

Meanwhile, the results of the Paired Samples Correlations showed a positive relationship with low to moderate strength levels between pre- and post-treatment values, but the relationship was not statistically significant. This finding suggests that correlation is not the primary basis for determining treatment effectiveness. Therefore, overall, it can be concluded that post-exercise sports massage is effective in improving post-treatment measurement results, and these findings can be used as a basis for consideration for coaches and sports practitioners in implementing sports massage as part of an athlete's recovery strategy.

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