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EFFECTIVENESS OF MASSAGE GUN AND FOAM ROLLER METHODS ON FATIGUE RECOVERY IN FOOTBALL ATHLETES

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Abstract
An athlete's performance in a match can be influenced by various factors, including physical condition and fatigue. Studies indicate that fatigue leads to decreased physical and technical performance in soccer players. This study aimed to compare the efficacy of using a massage gun versus a foam roller for fatigue recovery in football athletes. Employing an experimental pretest-posttest design, the study assessed the impact of massage guns (MG) and foam rollers (FR) on 8 football athletes. The research utilized a lactic acid level test with Accutrend Lactate. Results revealed a t value of 0.982 with a significance level (2-tailed) of 0.364, indicating no significant difference between the two recovery methods in reducing fatigue levels among football athletes. Furthermore, the paired sample test showed a significance level (2-tailed) of 0.004 for the foam roller group and 0.006 for the massage gun group, both below 0.05. Consequently, the study concludes that foam rollers are more effective than massage guns in alleviating fatigue in football athletes.

Keywords: *Massage Gun, Foam Roller, Lactic Acid, Fatigue, Football*

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INTRODUCTION

Football is a very popular sport in Indonesia. Enthusiasm for the development of football in Indonesia is very rapid, not only among professional athletes but also among people who really like this game (Muhammad Sidik et al., 2021). The sport of football in Indonesia has a main organization, namely the Indonesian Football Association (PSSI), which aims to improve the quality of football through organizing tournaments or championships between clubs and football schools. This aims to find player talents through the football school program. in Indonesia (Leonardo et al., 2022) To achieve achievement in the sport

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of football is not easy, it requires a long training process (Utamayasa, 2020). Increasing physical and technical abilities through training together over a long period of time and gradually increasing loads will cause fatigue (Parwata, 2015). An athlete's performance in a match can be influenced by various factors, including physical condition and fatigue.

A condition known as reduced or reduced physical performance is called fatigue. Those who do physical activity often experience physical fatigue, especially athletes and sportsmen (Cahyanti, 2024). A decrease in the body's ability to maintain physical performance is a sign of fatigue (Patra et al., 2023) An athlete needs excellent physical condition to avoid fatigue when carrying out sports activities (Candra et al., 2016). According to (Gabriel Calderon Pellegrino et al., 2015). Several studies show that the physical and technical performance of football players decreases due to fatigue. The best recovery is a combination of jogging and massage and the recovery stages are interexercise recovery, postexercise recovery and long-term recovery. Fatigue will interfere with an athlete's physical activity so it must be overcome and restored, including by doing massage (Ardiyanto & Sumartiningsih, 2023).

With the development and increase in sports performance and the existence of various types of massage, special massage knowledge has emerged for athletes which is called sports massage (Se et al., 2012) Currently, more and more people are realizing that sports massage is very necessary to maintain body health, even though it uses simple techniques as a natural response to the body (Nuraini, 2016) In Indonesia, sports massage is increasingly popular and growing rapidly among athletes when major sporting events such as the Olympics, SEA Games and PON are held. Apart from that, massage is also increasingly popular with athletes to restore their body condition after competing (Kresnapati & Setiawan, 2021). The demand for sports massage services among competitive athletes appears to have increased in recent years (Jönhagen et al., 2004).

Sports massage is a treatment that uses hands or special equipment to massage, etc., certain parts of the body to improve blood circulation or restore

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fatigue (Ripai & Graha, 2019). Sports massage is the processing of body tissue with the hands, which aims to influence focus, nerves, muscles and blood circulation (Hendra Hasibuan & H. Jutalo, 2020). Sports massage is common in elite sports and popular across age groups and beginner levels. The benefits obtained from sports massage are increasing recovery and preventing injury (Davis et al., 2020). Physiologically proven that sports massage can have an effect on reducing heart rate, increasing blood pressure, blood circulation, reducing muscle tension, increasing joint mobility and reducing pain. pain (Ilmi, 2018). Many studies have shown the positive effects of massage on pain recovery, fatigue, as well as anxiety and stress management (Rodrigues et al., 2020)

The use of massage guns has become increasingly popular in recent years. A massage gun is a handheld mechanical device that resembles a gun, is powered by electricity or batteries, and uses applicators in various shapes such as small balls, flat tips, bullet tips and fork tips (Ferreira et al., 2023). Vibration therapy (VT) can be a Alternative methods to improve fatigue recovery.

In recent years, foam rolling has become a common practice in all types of sports and is highly valued in the field of strength and conditioning to increase the efficiency of training or competition preparation and to accelerate post-workout recovery (Wiewelhove et al., 2019). Individuals of all levels of sport and injury use foam rolling (Ebster, 2015). Foam rolling is believed to increase joint range of motion without neuromuscular degradation as well as correct muscle imbalances, reduce muscle pain and joint stress thereby improving skeletal function and optimal neuromuscular efficiency. Due to its potential underlying physiological mechanisms, it is believed that FR can improve acute athletic performance as well as recovery from intense physical activity (Ngle et al., 2015).

Research (Leabeater et al., 2024) suggests that recovery with a handheld percussion massage gun (massage gun) is a relatively new technique and has not been widely studied. This device stimulates soft tissue with vibrations in an effort to increase range of motion and reduce pain. There is a lack of empirical research regarding the possible impact of these devices on recovery of performance and

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perception after exercise. Later in the study (Hendricks et al., 2020), it was recommended that future research on the effects of foam rollers should include a control group or sham group, and consider the foam roller experience of athletes. Based on the research results and recommendations explained above, researchers are interested and motivated to research the comparative effectiveness of applying the massage gun and foam roller methods to the recovery of fatigue in football athletes.

METHOD

This study used an experimental pretest-posttest design method to determine the comparison of massage guns (MG), foam rollers (FR) in 8 football athletes. 4 players were given MG treatment after training was finished, 4 players were given FR treatment after training was finished. Blood lactate measurements using Accutrend Lactate are carried out before, after training ends, and after the recovery process is complete (Rahimi et al., 2020). To increase fatigue, all players are required to warm up for 6 minutes (static and dynamic movements) (Kuswahyudi et al., 2020). Next, do a 30 second Squat Jump and RAST (Running anaerobic sprint test). After completion, all players are immediately given treatment according to the group that has been determined.

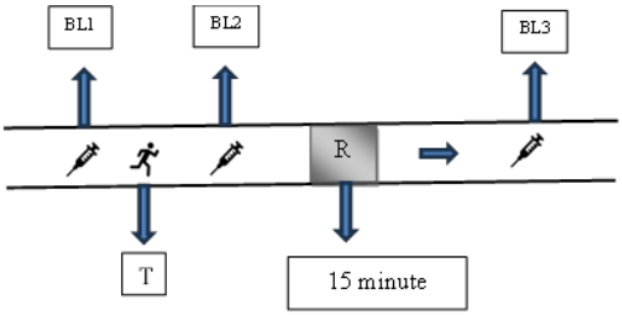

Figure 1. Research procedures

Information :
BL1 : Blood Lactate 1, BL2 : Blood Lactate 2, BL3 : Blood Lactate 3, R : Recovery, T : Test

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In the recovery process for the MG group, players were given sports massage treatment using massage gun technology on the lower body. According to (Bachtiar et al., 2022) in the sport of football, fatigue and muscle pain often occur in the lower extremity muscles. The massage treatment is carried out rhythmically for between 10-15 minutes (Ardiyanto & Sumartiningsih, 2023). The first 5 minutes are given a massage gun to the quadriceps, the next 5 minutes to the hamstring, and the last 5 minutes to the gastrocnemius. The recovery process for the FR group, Kettler Roller Foam (14 x 33 cm) was used to carry out the recovery treatment for the FR group, consisting of 3 forms of treatment, for the quadriceps, hamstring and gastrocnemius. FR treatment time is 15 minutes, for each part of the treatment form 5 minutes and 15 seconds rest time (Pelana et al., 2021)

Values are presented as mean ± SD. The normal distribution of the samples was checked using the Shapiro-wilk test. To calculate the differences and comparisons between the massage gun and foam roller groups using the independent samples test and paired samples test. Statistical analysis was carried out using SPSS V.26

RESULT AND DISCUSSION

Table 1. Independent Samples Test Results

	Levene's Test for Equality of Variances		t-test for Equality of Means	
Equal variances assumed	f	sig	t	sig(2-tailed)
	0.761	0.417	0.982	0.364

Based on the table of independent sample test results, it shows that the F value calculated by Levene's test is 0.761 and has a probability of significance (0.417 > 0.05). Thus, the analysis of different tests (t-test) must use the equal variance assumption. The t value for equal variance assumed is 0.982 with sig. (2-tailed) (0.364 > 0.05). So it can be concluded that there is no significant difference between the foam roller and massage gun groups in reducing the level of fatigue in football athletes.

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Table 2. Paired Samples Test Results

	M	SD	Sig. (2-tailed)
Pretest - posttest FR	7.900	1.930	0.004*
Pretest - posttest MG	6.375	1.776	0.006

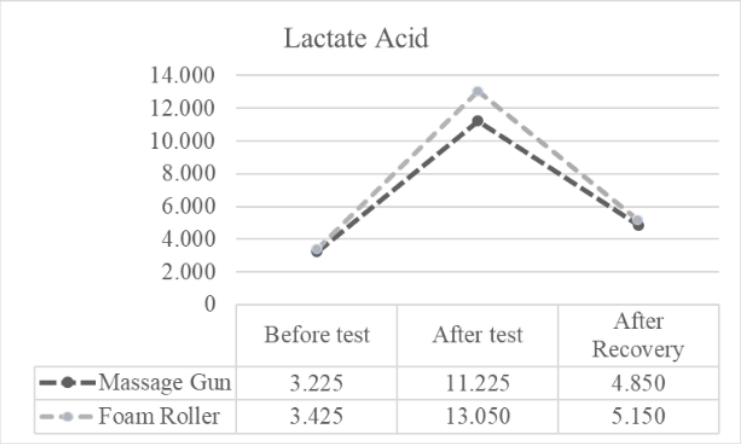

Figure 2. Results of Lactic Acid Levels

Based on the paired sample test output in the foam roller group, it shows a sig. (2-tailed) was 0.004 < 0.05, and the massage gun group obtained a sig value. (2-tailed) of 0.006 < 0.05. So it can be concluded that the recovery foam roller type is more effective than the massage gun in reducing the level of fatigue in football athletes.

Discussion

The aim of this study was to compare the application of the foam roller and massage gun recovery methods to football athletes. The hypothesis of this research determines that the foam roller and massage gun methods have the same effect and there is no significant difference in fatigue recovery according to the results of the independent test with a t value on equal variance assumed of 0.982 with sig. (2-tailed) (0.364 > 0.05). Referring to the hypothesis, this research concludes that the advantage of the recovery foam roller and massage gun is that it can reduce the concentration of lactic acid in the blood and provide good rest results. Based on the

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paired sample test output in the foam roller group, it shows a sig. (2-tailed) was 0.004 < 0.05, and the massage gun group obtained a sig value. (2-tailed) of 0.006 < 0.05. So it can be concluded that the recovery foam roller is more effective than a massage gun in reducing fatigue levels in football athletes, and is supported by research (Hendricks et al., 2020), that the foam roller is a useful strategy for increasing recovery after sports or training. It goes on to suggest that Foam rolling has been extensively investigated, showing benefits in performance and recovery. However (Zorko et al., 2017), concluded that foam rollers do not appear to have a better effect than passive rest in short-term recovery.

Fatigue in athletes occurs for various reasons, such as increased muscle lactic acid levels (Haryono et al., 2021). Anaerobic exercise causes an increase in lactic acid levels in the blood. If a lot of lactic acid collects in the muscles, the muscles become less effective and cause fatigue (Utamayasa, 2020). Lactic acid is actually a waste product of the anaerobic energy system. When the body cannot get the oxygen it needs, it is forced to continue activity or exercise, which leads to the formation of lactic acid. The buildup of lactic acid in the muscles is what causes the muscles to feel tired. Lactic acid is a waste/product of the anaerobic energy system. If the oxygen supply needed by the body is insufficient, the body is forced to continue doing activities/exercise and in the end lactic acid is formed, this is the buildup of lactate. acid in the muscles will have a tired effect on the muscles (Wismanadi et al., 2024).

Increasing physical and technical abilities through training together over a long period of time and gradually increasing loads will cause fatigue (Parwata, 2015). Therefore, fatigue will interfere with an athlete's physical activity so it must be overcome and restored by recovering using a massage gun or foam roller. Other factors that can influence fatigue recovery include the nutritional intake of each athlete. It was also explained in other studies that athletes' blood pressure, sugar levels and pulse rates are influenced by the food and drinks they consume. Even delaying fatigue can be influenced by intake (Rubiono & Setiawan, 2020).

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CONCLUSION

The recovery foam roller and massage gun methods can reduce the concentration of lactic acid in the blood and reduce fatigue levels well. Based on the analysis, it can be concluded that compared to the recovery massage gun method, the foam loller method is more effective in reducing lactic acid levels in the blood and recovering from fatigue in soccer athletes. This comparison can be seen from the output of the paired sample test for the foam roller group which shows a sig value. (2-tailed) was 0.004 < 0.05, and the massage gun group obtained a sig value. (2-tailed) of 0.006 < 0.05.

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