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Comparison of Sport Massage And Ice Bath on Lower Extremity Muscle Recovery Post-Training In Futsal Extracurricular Students of SMA Muhammadiyah 5 Jakarta

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Abstract
In futsal sports, the lower extremities are predominantly used, so that after training or competing, muscle fatigue is often complained of, especially in the lower extremities. Recovery is an important aspect that must be done after training because it accelerates the loss of fatigue and reduces the risk of injury during training or competition. This study aims to compare sports massage and ice bath on lower extremity muscle recovery after training in futsal extracurricular at students at SMA Muhammadiyah 5 DKI Jakarta. The method in this study used a quasi-experimental approach with a two-group pretest and posttest design. The population in this study were students who participated in futsal extracurricular training at SMA Muhammadiyah 5. The sample in this study was determined using the total sampling technique, and the sample used was 26 students, then divided into 2 treatment groups. The data collected in this study were the level of fatigue using an instrument in the form of a questionnaire with a scale of 1-5, and the Delayed Onset Muscle Soreness (DOMS) pain scale using the Numeric Rating Scale (NRS) instrument with a scale of 0-10. The data analysis technique used the Wilcoxon Test for paired groups and the Mann Whitney test for unpaired groups. Based on the results of data analysis, the sports massage treatment group and the ice bath treatment group each had an effect on lower extremity muscle recovery, which was indicated by a decrease in fatigue levels between before and after treatment ($p < 0.05$). The results of the comparison test showed no significant difference between the results of the decrease in fatigue levels in the sports massage group and the ice bath group ($p > 0.05$). However, in terms of percentage, the decrease in fatigue levels after exercise, the sports massage group had a higher percentage decrease, which was 80.65%, compared to the ice bath group of 74.26%. Another result of this study, namely based on the results of the comparison test between the DOMS pain scale 24 hours after exercise in the sports massage and ice bath groups, there was no significant difference in results ($p > 0.05$). Thus, sports massage and ice bath recovery can be used as post-exercise recovery strategies and can help prevent pain due to DOMS and shorten muscle recovery time.

Keywords:*Sports Massage, Ice Bath, Recovery*

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INTRODUCTION

Futsal extracurricular is a futsal sports activity that is carried out outside of class hours and is a counseling service to help develop students according to their needs, potential, talents and interests (Pinem & Situmeang, 2021). In futsal, players are required to have prime physical condition. This is because physical condition plays an important role in supporting

performance in sports, and will affect the results of the match. Generally, prime physical condition is obtained by doing exercises. Exercise is to provide physical emphasis regularly, systematically, and continuously in such a way that it can improve the ability to do work and improve physical fitness or physical ability (Suharjana, 2013). Exercise is an effort that is done consciously, continuously and systematically aimed at improving the functional ability of the body (Giriwijoyo, 2012). Exercise is a systematic process that is carried out in the long term, repeatedly, progressively, and aims to improve physical ability (Nopriansyah, 2015). However, the effects of exercise in addition to improving physical condition, also cause muscle fatigue.

Ice bath is a therapy in which the body is immersed in cold water at a temperature of 10°C for 10 minutes with the aim of recovering after a tough match and reducing muscle pain. The benefits of cold water immersion therapy can cause decreased metabolism, local vasoconstriction, decreased muscle spasms, decreased inflammatory effects, decreased pain, and decreased nerve conduction velocity. During cold immersion, vasoconstriction occurs in the area being immersed. This vasoconstriction can reduce cells to carry out local metabolism, thus helping to stop the rate of metabolic waste in the form of lactic acid from accumulating too much. Immersion in cold temperatures also causes muscle temperature to return to normal quickly and reduces muscle spasms.

Both recovery methods above each have positive benefits in reducing post-training and post-match fatigue. Although both methods are often applied in recovery practices, which discuss direct comparisons between *sports massage* and *ice bath* especially for extracurricular futsal students is still very limited. Based on the results of observations at school conducted by players after futsal training are: 1) after training or competing players experience fatigue and *DOMS (Delayed Onset Muscle Soreness)* in the lower extremity muscles 2). The Muhammadiyah 5 High School futsal extracurricular team has never done *recovery* by method *sport massage* And *ice bath*, and research has never been conducted at Muhammadiyah 5 High School regarding recovery post-exercise. With clear research evidence, it is expected that schools will implement effective recovery so that they can improve performance and prevent injuries to the lower extremity muscles in extracurricular futsal students at SMA Muhammadiyah 5. Thus, the purpose of this study will compare two recovery methods, sport massage and ice bath, to determine the most effective method.

METHOD

The research method used by the author to uncover the problems in the research is the experimental research method. According to (S. Sugiyono & Darnoto, 2017) the experimental

research method can be interpreted as a research method used to find the effect of certain treatments on others in controlled conditions.

The type of experimental method used in this study is Pre-Experimental Design. And the form of research design uses Two Groups "Pretest and Posttest Design". Namely the provision of Pretest before treatment and Posttest after treatment. The experimental method in this study is considered the most appropriate choice, this method is used because of the nature of experimental research, namely trying something to find out the cause and effect of a treatment.

This study uses total sampling, namely all students who participated in the extracurricular futsal training of SMA Muhammadiyah 5 with a total of 26 students, According to Sugiyono in (Mudian, 2018) total sampling is a sample determination technique as if all members of the population are used as samples. This sample is used if the population is relatively small, namely no more than 30 people, total sampling is also called a census, where all members of the population are used as samples.

RESULTS AND DISCUSSION

The sample in this study were students who participated in extracurricular futsal training at SMA Muhammadiyah 5. The sample determination in this study used total sampling with a sample size of 26 students.

Tabel 1. Sample Measurement Data After Exercise, After Treatment, After 24 hours of exercise, DOMS, Age, Weight, and Height of Sport Massage Respondents

NO	Name	***SPORT MASSAGE***						
		after practice	**after treatment**	**after 24 hours of training**	***DOMS***	**Age**	**Weight (kg)**	**Height (cm)**
1.	AH	4	2	2	0	18	89	167
2.	AE	4	2	1	2	17	57	176
3.	MIC	4	3	2	0	16	52	167
4.	FA	5	2	1	0	17	70	173
5.	A A	4	3	2	2	17	60	174
6.	MH	5	4	2	3	16	60	172
7.	FA	5	3	1	1	16	60	165
8.	SF	4	3	1	0	17	96	174
9.	M N	5	2	1	0	17	52	169
10.	KA	4	2	1	0	15	52	162
11.	AM	4	1	1	1	16	72	160
12.	AK	4	2	2	3	15	53	165
13	FR	4	2	1	0	17	67	171

The following is a description of the data for the sports massage and ice bath groups presented

NO	Name	ICE BATH						
		after practice	after treatment	*after 24 hours of training*	*DOMS*	Age	Weight (kg)	Height (cm)
14.	MRH	5	4	3	0	15	45	165
15.	KI	5	3	2	0	16	64	174
16.	NNA	5	3	1	0	15	50	173
17.	HAN	5	2	1	0	16	67	160
18.	MIR	5	3	1	0	17	70	165
19.	HAZ	4	2	1	0	16	59	179
20.	MR	5	3	2	2	17	58	163
21.	MNR	4	3	1	2	17	56	175
22.	DDR	5	3	1	0	17	56	165
23.	BB	5	2	1	0	17	65	166
24.	MRA	5	1	1	1	15	50	150
25.	FA	4	3	2	1	16	52	166
26.	RA	4	3	1	1	17	58	173

in the table below.

Table 3. Sport Massage and Ice Bath Group Data

Group	Age		Weight		Height	
	Mean	Sd	Mean	Sd	Mean	Sd
Sports Massage	16.46	0.877	64.62	14.151	168.85	4.981
Ice Bath	16.23	0.832	57.69	7,364	167.23	7,617

Based on the table above, it can be seen that the average age value in the sport massage group is 16.46 and the average age value in the ice bath group is 16.23, then the standard deviation of age in the sport massage group is 0.877 and the standard deviation of age in the ice bath group is 0.832. Furthermore, the average weight value in the sport massage group is 64.62 and the average weight value in the ice bath group is 57.69 so it can be concluded that the sport massage group has a higher average weight value compared to the ice bath group.

Table 4. Group Fatigue Level Data Description *Sport Massage and Ice Bath*

Statistics	Sports Massage Group		Ice Bath Group	
	Pretest	*Posttest*	*Pretest*	*Posttest*
Mean	4.31	2.38	4.69	2.69
Median	4.0	2.0	5.0	3.0
Mode	4.0	2.0	5.0	3.0
Std. Deviation	0.48	0.77	0.48	0.75
Minimum	4.0	1.0	4.0	1.0
Maximum	5.0	4.0	5.0	4.0

Based on the table above, it can be seen that in the sport massage group, the average pretest fatigue level was 4.31 and the posttest was 2.38. While in the ice bath group, the average pretest fatigue level was 4.69 and the posttest was 2.69. So it can be concluded that the sport massage group has a smaller average posttest value compared to the ice bath group.

Table 5. Results of the Normality Test for Fatigue Levels and Scales *DOMS 24 Hours after Workout*

Group	*P*	Information
Pretest Fatigue Level of Sport Massage Group	.000	Abnormal
Posttest Fatigue Level of Sport Massage Group	.035	Abnormal
Pretest Ice Bath Group Fatigue Level	.000	Abnormal
Posttest Ice Bath Group Fatigue Level	.011	Abnormal
DOMS Scale Sports Massage Group	.003	Abnormal
Ice Bath Group DOMS Scale	.001	Abnormal

Based on the table above, the calculation of the normality test using the help of SPSS 25.0 for windows above obtained the significance value on the six overall data has a value of $p < 0.05$, meaning that the overall data is said to be not normally distributed. Furthermore, for the hypothesis test using a non-parametric test

Table 6. Wilcoxon Test Results

Group	*Pretest*	*Posttest*	P	Information
Sports Massage	4.31	2.38	0.001	Significant
Ice Bath	4.69	2.69	0.001	Significant

Based on the table above, the calculation with the Wilcoxon Test using SPSS 25.0 for windows obtained a significance value in the sports massage group of 0.001 or $p < 0.05$, which means that there is a significant difference between the average pretest and posttest values of post-exercise fatigue levels or it can be concluded that sports massage treatment can significantly reduce post-exercise fatigue levels. Thus, the hypothesis is accepted, that there isThe effect of sports massage and ice bath on reducing post-exercise fatigue in extracurricular futsal students at SMA Muhammadiyah 5.

Table 7. Test Results *Mann Whitney*

Group	*Pretest*	*Posttest*	*P-Value*	Information
Sports Massage	4.31	2.38	0.892	There is no significant difference
Ice Bath	4.69	2.69		

Based on the table, it is known that the p-value of 0.892 is greater than 0.05 (p> 0.05), so it can be interpreted that there is no significant difference in the effect between the recovery sports massage and ice bath methods on reducing post-exercise fatigue levels.

Table 8. Effectiveness Test Results

Group	*Pretest*	*Posttest*	Decreased Fatigue Levels	Effectiveness
Sports Massage	4.31	2.38	1.92	80.65%
Ice Bath	4.69	2.69	2.0	74.29%

So it can be concluded that Recovery Sport Massage is more effective in reducing post-exercise fatigue levels in extracurricular futsal students at SMA Muhammadiyah 5 Jakarta.

Discussion

Post-exercise recovery is very important. Aspects of recovery play a major role in influencing energy turnover, muscle recovery, and improving physical condition. In addition, recovery can prevent muscle cramps and injuries as well as increased lactic acid (Aspar, 2022). Thus, the recovery method must be chosen appropriately. In accordance with the times, many recovery methods are currently used in sports development.

There are many types of recovery, namely active recovery such as walking, swimming, gardening, mobility training, or yoga. This is usually done the day after a high-intensity session. This activity has a number of benefits, including helping muscle recovery. Furthermore, there is passive recovery, namely steam baths, massage or sports massage, ice baths. From the various types of recovery, according to research (Subhan & Graha, 2019) on Sport Massage and according to research (Kurniawan & Sifaq, 2018) on ice baths, it can be concluded that the most effective use is sports massage and ice baths. However, a comparison between sports massage and ice baths has never been done at SMA Muhammadiyah 5.

Sports massage has benefits for improving blood flow, reducing muscle tension, and promoting relaxation so it can help recovery time between workouts. Because *sports massage*

is *massage* sports that treat the physical, physiological and psychological aspects of students. It can be used before or after sports activities. If used before sports activities it will be very helpful in lengthening and loosening the body's soft tissues for therapeutic purposes and improving blood circulation.

Based on the results of the study, it is known that there is an effect of sports massage on reducing post-exercise fatigue in extracurricular futsal students at SMA Muhammadiyah 5. This is because sports massage can affect the reduction of lactic acid levels, can smooth blood flow so that it accelerates the process of returning metabolic waste from exercise. There is an effect of ice bath on reducing fatigue, this is because exercise causes damage to muscle micro fibers, so that blood flow increases. Meanwhile, the effects produced by ice baths can cause vasoconstriction in blood vessels so that they affect fatigue and reduce muscle pain.

The implementation of the research had obstacles both technically and non-technically. These obstacles became limitations of the research that could not be controlled by the researcher. The limitations of this research include: 1) The researcher could not control or pay attention in detail to the activities of the treated samples. 2) The researcher could only observe the effects of each level of fatigue and DOMS level per group that had different levels. 3) The degree of pain measured was only carried out for a maximum of 24 hours after exercise and did not measure the long term or continuously so that the long-term effects were unknown. 4) Treatment was not carried out simultaneously due to the lack of the number of masseurs needed by the researcher.

CONCLUSION

Based on the results of the study, it can be concluded that, sport massage and ice bath each have an effect on reducing post-exercise fatigue levels and are able to prevent DOMS. When compared, the two methods related to the results are not significant, either in reducing fatigue levels or preventing DOMS. Thus, it can be concluded that, recovery sport massage and ice bath can be used as a post-exercise recovery strategy and can help prevent DOMS and shorten muscle recovery time. .

REFERENCE

Alinia-Najjar, R., Bagheri-Nesami, M., Shorofi, SA, & ... (2020). The effect of foot reflexology massage on burn-specific pain anxiety and sleep quality and quantity of patients hospitalized in the burn intensive care unit (ICU). Burns. https://www.sciencedirect.com/science/article/pii/S0305417920303466

Ambarawati, NED, Jawi, IM, Muliarta, I., & (2021). The Effect Of Sport Massage Toward

The Decrease Of Fatigue. Sports and Fitness https://pdfs.semanticscholar.org/6229/58a2d05268b690486cdb80d0bbe48956544a.pdf

Chavan, S. K., & Wabale, R. N. (2016). Reviewing morphology of Quadriceps femoris muscle. Journal of Morphological Sciences. https://doi.org/10.4322/jms.053513

Chiarotto, A., Maxwell, LJ, Ostelo, R.W., Boers, M., & ... (nd). TheJournal of Pain.

Chin, J.J., Kim, A.J., Takahashi, L., & ... (2015). Do sexually oriented massage parlors cluster in specific neighborhoods? A spatial analysis of indoor sex work in Los Angeles and Orange Counties, California. Public Health…. https://doi.org/10.1177/003335491513000516

Giriwijoyo, Santosa. (2012). Sports Health Science. Bandung: PT Remaja Rosdakarya

Kurniawan, MTA, & Sifaq, A. (2018). Comparison of Cold Water Immersion Hydrotherapy (Cryotherapy) Methods with Sport Massage on Reducing Lactic Acid Levels Post Circuit Training. Journal of Sports Achievement.https://ejournal.unesa.ac.id/index.php/jurnal-prestasi-olahraga/article/view/26275

Nopriansyah. 2015. "The Effect of Sport Massage on Reducing Feelings of Fatigue After Training at UKM Pencak Silat UNY". Jurnal Olahraga Prestasi. Vol 11, No 2, July 2015

Pinem, JUJ, & Situmeang, R. (2021). The relationship between leg power and leg length on the agility of Panca Budi Medan futsal players in 2020. *JournalScientificSTOCK OF Bina Guna* http://jurnal.stokbinaguna.ac.id/index.php/JSBG/article/view/252

Ramadani, I., Hartini, S., Aisyah, A., & (2021). Supply chain risk assessment at poultry slaughterhouses using house of risk method to define mitigation action.

Samsudin, S. (2019). Basic Knee Science of Fitness Massage. Jakarta: FIK UNJ.

Subhan, A., & Graha, S. (2019). Effectiveness of Sports Injury Therapy Massage on Heel Pain and Tibial Muscle Pain in Futsal Athletes of SMA Negeri 1 Ciamis. Medikora, XVIII (2), 56–63.

Sugiyono, S. (2016). Development Of Psychological Instruments For Sensory Assessment. Proceedings of Fashion Culinary Engineering Education. https://journal.uny.ac.id/index.php/ptbb/article/view/30556

Sugiyono, S., & Darnoto, S. (2017). The Effect of Dengue Fever (DF) Prevention Training on the Level of Knowledge and Attitude of Students at Sdn Wirogunan I Kartasura Regency. *JournalHealth*. https://journals.ums.ac.id/index.php/JK/article/view/4594

Sugiyono, S., Hardyanto, W., & (2019). Developing Academic Supervision Model Assisted by The Information System Management on Geography Teachers of Senior High School in Pekalongan Regency. *Educational*https://journal.unnes.ac.id/sju/eduman/article/view/29194

Triansyah, A., & Haetami, M. (2020). The effectiveness of stretching, passive activity and VO2 Max in preventing delayed onset muscle soreness. Journal of Sports. https://journal.uny.ac.id/index.php/jolahraga/article/view/29487

Widhiyanti, KAT (2017). Effleurage massage technique on the lower extremities as passive recovery in increasing agility. Journal of Recreational Health Education. https://ojs.mahadewa.ac.id/index.php/jpkr/article/view/210

Yaghoubi, A., Golfeshan, E., Azarfarin, R., & (2017). Effects of acupressure on sleep quality after coronary artery bypass surgery. *Iranian Heart* http://journal.iha.org.ir/article_83126.html

Zuhri, Aa (nd). Effectiveness of Soaking in Water at Temperatures of 15 C, 25 C, and 40 C on Level Fatigue On Athlete Football University Negeri Eprints.Uny.Ac.Id. https://eprints.uny.ac.id/78703/1/fulltext_arin%20atman%20zuhri_19603141021.pd f