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Effect of Sports Massage and Foam Rolling on Muscle Soreness Among Negeri Sembilan Junior League U19 Hockey Players

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Abstract | Hockey players frequently experience muscle pain as a result of the sport's high-intensity nature, which includes explosive movements, fast direction changes, and physical contact. DOMS is an uncomfortable experience or word used to describe muscular soreness, stiffness, tightness, swelling, and weakness that occurs 24 to 72 hours after undertaking a strenuous or unaccustomed activity. There have been studies that show sports massage may be a beneficial method for athletes that helps in speedier recovery, but further research is needed. In addition, studies have shown that foam rollers can help with recovery and reduce the impact of muscle discomfort, although further study is needed. The purpose of this study was to compare the effects of sports massage and foam rolling on reducing muscle soreness in Negeri Sembilan Junior League Hockey Players after a match. Ten people participated in both the sports massage and foam rolling groups. This study used a quasi-experimental design. The participants had a 20-minute sports massage on their lower bodies, while foam rolling began with pinpointing the uncomfortable or tight location of the muscle. Slowly lower your body onto the foam roller until you experience discomfort. Hold this posture for 20 to 30 seconds. Perform one repeat for each muscle group: quadriceps, hamstrings, glutes, and groin. The Participant's pain scale (PS), knee range of motion (ROM), and muscle power (PWR) were measured at five -time points: pre-match, post-match, 24 hours, 48 hours, and 72 hours after treatment. The differences in muscular soreness scores between the two groups were examined using repeated measures ANOVA. The study found that sports massage (SM) and foam rolling (FR) significantly improved pain scale (PS), knee range of motion (ROM), and muscular power (PWR) over five-time frames ($p < 0.05$). As a result, the impact of athletic massage differed significantly from that of foam rolling. Overall, the foam roller was the most effective therapy for hockey players.

Keywords: *Sport massage (SM), foam rolling (FR), delay-onset muscle soreness (DOMS), pain scale (PS), range of motion (ROM), muscular power (PWR).*

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I. INTRODUCTION

Delayed Onset Muscle Soreness (DOMS) is a common type of muscle injury experienced after intense physical activity, often presenting as pain, stiffness, and reduced muscle function. Typically, symptoms appear 8 to 24 hours post-exercise and can persist for up to 96 hours [1]. Various theories suggest that inflammation, connective tissue damage, muscle spasms, and the buildup of lactic acid contribute to the discomfort associated with DOMS. This soreness can hinder athletic performance during practices and competitions, especially for hockey players, who may experience compounded effects from muscle rehabilitation exercises. To mitigate these symptoms, athletes frequently employ recovery strategies such as active recovery, ice baths, massage, and foam rolling.[2] Sports massage therapy, characterized by the rhythmic manipulation of muscle tissues, is praised for its potential therapeutic benefits.[3] While sports massage and foam rolling are widely used to alleviate muscle soreness, there remains a significant gap in research regarding their effectiveness, particularly within the context of hockey players. Previous studies have explored the impact of massage on reducing the symptoms of DOMS but have yielded mixed results regarding its ability to improve muscle function. In light of these gaps and inconsistencies in the existing literature, this research aims to investigate the effects of sports massage and foam rolling on muscle soreness and recovery in Negeri Sembilan Junior League U-19 Hockey Players. By assessing muscular power through vertical jump tests, measuring range of motion, and utilizing pain scale evaluations, this study seeks to provide valuable insights into the effectiveness of these recovery interventions. Ultimately, the goal is to inform coaches and athletes on best practices for managing muscle soreness and improving performance through evidence-based strategies.

II. METHODS

The study used a quasi-experimental design to assess the effects of sports massage and foam rolling on muscle soreness. This design helped establish causal links between the interventions and muscle soreness. Data were collected at five time points: before, immediately after, and 24-, 48-, and 72-hours post-competition. Participants were selected from the Negeri Sembilan junior league U19 hockey team using purposive sampling, focusing on those experiencing DOMS. The required sample size was calculated using G*Power, resulting in 10 participants with a 20% dropout rate, leading to 11 participants. Ten highly trained hockey players from Negeri Sembilan were recruited.

A. Sports Massage

A 30-minute lower body sports massage was used to speed up recovery. Athletes lay face down for assessment and massage. A level 1 certified sports therapist administered a 20-minute massage using water-soluble hypoallergenic oil. Each muscle group (quadriceps, hamstrings, and calves) received 2.5 minutes of massage: 1 minute of effleurage (120 strokes/min), 45 seconds of petrissage (120 strokes/min), and 45 seconds of tapotement (240 contacts/min). Tapotement included 15 seconds each of cupping, hacking, and knuckling [4].

B. Pain Scale – Visual Analogue Scale

Participants assessed their pain levels on a 0-10 scale, with 0 indicating no pain, 1-5 indicating moderate pain, and 6-10 indicating severe pain. The visual analogue scale (VAS) featured a 10-cm horizontal line to quantify pain perception. Participants rated their pain at rest and during movement before and after the intervention, immediately after the match, and at 24-, 48-, and 72-hours post-treatment to evaluate the impact of therapies on discomfort [5].

C. Range of Motion – Goniometer

Active range of motion (AROM) was measured using a goniometer, which consists of a protractor attached to two perpendicular arms. The device was calibrated before each use to ensure accuracy. The knee's range of motion, commonly affected by exercise-induced muscle soreness, was measured before the match, after the match, 24-, 48-, and 72-hours post-treatment. Measurements were recorded on a standardized form [6].

D. Muscular Power – Vertical Jump

The vertical jump test used a Vertec device to measure jump height. Athletes performed a maximal vertical jump, and the highest vane touched was recorded. The test was conducted before the match and 72 hours post-match, coinciding with the peak of DOMS, and repeated under consistent conditions with a standardized warm-up to ensure reliability [7].

III. Results and Discussion

The normality of the data for pain scale, muscular power, and range of motion was assessed before conducting statistical analyses. This was achieved by evaluating skewness, kurtosis, and the Shapiro-Wilk test. Given the sample size of 10, the criteria for normality were met, as the skewness and kurtosis values fell within the range of -2 to 2, indicating that all variables were normally distributed. Consequently, parametric tests were deemed appropriate. To examine within-group differences across various time points, a repeated measures ANOVA was employed for all outcome measures.

TABLE 1

TABLE SHOWING WITHIN SUBJECT AND BETWEEN – SUBJECT FOR ALL OUTCOMES MEASURES

Variables	***p*-value**	
	Effects	***Source***
PS	< 0.001	0.038
ROM	< 0.001	0.297
L/R	< 0.001	0.105
PWR	0.002	0.149

**PS= Pain Scale, *ROM L/R= Rain of Motion Left / Right, *PWR= Muscular Power*

Table 1 shows the inferential statistics for PS, ROM and PWR which were analyzed using repeated measures ANOVA. The table shows that there was significant improvement in all outcome measures across 5 time frames of treatment in subjects of all groups with *p* value < 0.05. Figure 1 shows that Sport massage leads to quicker pain recovery (PS: 3.2 vs. 4.18). However, foam rolling slightly improves ROM and muscular power more than sport massage (AROM 139 vs.123) and (PWR 52.3 vs. 55.9). In conclusion, sport massage effectively reduced pain, while Sport Massage enhanced range of motion and muscular power. Both therapies significantly impacted all biomarkers, but no significant difference was found between them. Thus, the null hypothesis for pain scale and knee ROM was rejected.

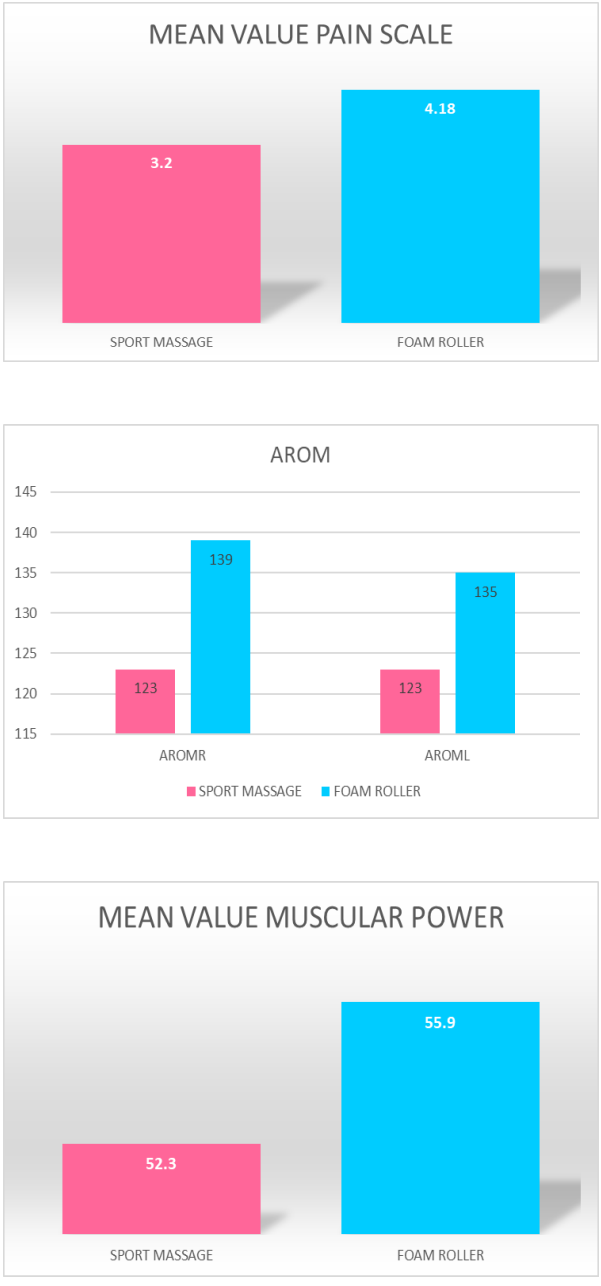

Fig.1 Showing mean value for range of motion, muscular power and pain scale

IV. CONCLUSIONS

This study examined the effects of sports massage and foam rolling on reducing muscle pain in Negeri Sembilan Junior League hockey players after a match. Both treatments significantly improved pain levels, active knee range of motion (AROM), and muscle strength. However, sports massage was more effective in reducing pain, while foam rolling better enhanced AROM and muscle power. These findings suggest that while both methods aid recovery, they have distinct benefits, with sports massage being superior for pain relief and foam rolling for improving flexibility and strength. The results could be applied to optimize recovery strategies for athletes in general.

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REFERENCES

[1] K. Cheung, P. Hume, and L. Maxwell, "Delayed onset muscle soreness: treatment strategies and performance factors," Sports Medicine, vol. 43, no. 11, pp. 947-967, 2016.

[2] G. Z. MacDonald, M. D. Penney, M. E. Mullaley, A. L. Cuconato, C. D. Drake, D. G. Behm, and D. C. Button, "An acute bout of self-myofascial release increases range of motion without a subsequent decrease in muscle activation or force," Journal of Strength and Conditioning Research, vol. 28, no. 1, pp. 162-170, 2018.

[3] B. Hemmings, M. Smith, and J. Graydon, "Effects of massage on physiological restoration, perceived recovery, and repeated sports performance," British Journal of Sports Medicine, vol. 34, no. 2, pp. 109-114, 2000.

[4] T. F. Cash, "The effects of stretching on athletic performance and injury prevention," Physical Therapy in Sport, vol. 10, no. 1, pp. 23-31, 1996.

[5] J. Delgado and A. Rodriguez, "PNF stretching as a recovery method in athletes: A systematic review," Journal of Sports Medicine, vol. 48, no. 3, pp. 145-158, 2018.

[6] J. M. Dos Santos and L. Azevedo, "Efficacy of PNF stretching on athletic performance and recovery: A meta-analysis," International Journal of Sports Physiology and Performance, vol. 12, no. 4, pp. 565-574, 2017.

[7] C. Bishop, C. Brashill, W. Abbott, P. Read, J. Lake, and A. Turner, "Jumping asymmetries are associated with speed, change of direction speed, and jump performance in elite academy soccer players," The Journal of Strength & Conditioning Research, vol. 35, no. 7, pp. 1841-1847, 2021.