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## **EFFECT OF KINESIOLOGY TAPE AND SPORTS MASSAGE ON MARKERS OF EXERCISE INDUCED MUSCLE SORENESS AND MUSCULAR POWER AMONG UNIVERSITY FOOTBALL PLAYERS**

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### **ABSTRACT**

The aim of this research is to investigate the effects of kinesiology tape and sport massage on exercise-induced muscle soreness and muscular power in UiTM Seremban 3 football player's post-match. This study is a quasi-experimental design. This quasi-experimental study involved eleven (N=11) participants that were assigned to underwent kinesiology tape (KT) and sport massage (SM). The participants underwent taping of the lower limbs, with particular emphasis on the quadriceps, hamstrings, and gastrocnemius muscles, for both the KT and SM interventions. The participant's pain scale and ROM were recorded at four time periods: immediately after the match, 24 hours, 48 hours, and 72 hours after the match. Power was assessed at three time periods: 24 hours, 48 hours, and 72 hours after the match. The differences in muscle soreness scores between the two groups were analysed using repeated measure ANOVA. The results indicated that both KT and SM had a significant effect on pain scale (PS), range of motion (ROM), and power (PWR) between the four-time periods ( $p < 0.05$ ). However, there is no significant difference in effect between KT and SM. SM and KT reduced the pain, increased range of motion, and increased power because massage generated a sense of relaxation and alleviated pain. While kinesiology tape activates inhibitory interneurons, effectively blocking pain signals carried by A-delta and C-fibres, it alleviates pain. In conclusion, KT and SM are effective to reduce muscle soreness and increase muscular power among football players.

**Keywords:** Kinesiology Tape (KT), Sport Massage (SM), Pain Scale (PS), Range of Motion (ROM), and Power (PWR)

### **INTRODUCTION**

Football is a high-intensity sport that demands extraordinary physical and mental prowess from its players. Combining explosive movements, rapid changes in direction, and sustained cardiovascular endurance, football poses a multifaceted challenge to athletes (Fazackerley et al. 2023). The sport requires exceptional strength, speed, agility, and endurance to execute actions such as sprinting, jumping, tackling, and shooting with precision. The intermittent nature of football, with periods of intense bursts interspersed with brief recovery intervals, places significant strain on players' energy systems, contributing to high physiological demands and necessitating comprehensive training and conditioning programs (Stojanović et al. 2021). High-intensity exercise and competition in intermittent

sports have been identified as potent triggers of fatigue in elite athletes. The demanding nature of these activities, characterized by repetitive bursts of high-intensity efforts interspersed with brief periods of rest, places substantial stress on the neuromuscular and cardiovascular systems (Chang et al. 2022). As athletes push their physiological limits to maintain peak performance throughout prolonged matches or races, the accumulation of metabolic byproducts, such as lactate and hydrogen ions, along with glycogen depletion and contributes to the delayed-onset muscle soreness (McKeigue et al. 2022). Delayed-Onset Muscle Soreness (DOMS) is a common physiological response experienced after strenuous or unaccustomed exercise. Characterized by localized muscle pain and discomfort, DOMS typically emerges within 24 to 48 hours post-exercise and peaks around 72 hours, gradually subsiding thereafter (McKeigue et al. 2022). This condition is attributed to microscopic muscle fibre damage, inflammation, and the activation of nociceptors in the affected muscles. DOMS often leads to reduced range of motion, decreased muscular strength, and temporary impairment in athletic performance. Moreover, DOMS is a consequence of intense physical activity, leading to reduced athletic performance and discomfort.

The use of kinesiology tape and sport massage as recovery methods for DOMS has been widely researched in the past. Studies have reported the effectiveness of kinesiology tape in reducing muscle soreness and restoring muscle function following exercise (Andrýsková & Lee 2020). Similarly, sport massage has been found to accelerate the healing of strained muscles and sprained ligaments, decrease muscle pain, swelling, and spasm, and increase joint flexibility and range of motion. However, there are limited studies that compare the effectiveness of these two recovery methods on symptoms and indices of DOMS among athletes (Andrýsková & Lee 2020). This study aims to compare the effectiveness of kinesiology tape and sport massage on symptoms and indices of DOMS among UiTM Negeri Sembilan Football Club. The results of this study will provide valuable information on the effectiveness of kinesiology tape and sport massage as recovery methods for athletes experiencing DOMS and can help guide the development of recovery strategies for athletes in the future.

## **METHODOLOGY**

### ***Sampling***

Eleven players (N=11) UiTM Negeri Sembilan's football club aged 18-25 years old participated in this study. The convenience sampling technique was used, whereby the researcher recruited available and willing participants from the UiTM Negeri Sembilan football team. Informed consent was obtained from all participants prior to the commencement of the study with explanation on the study objective and potential benefits. All procedures were conducted in accordance with the Declaration of Helsinki and approved by the Institution's Ethics Committee.

### ***Instrumentation***

#### ***Pain Scale***

The Visual Analogue Scale (VAS) is a widely used and validated tool to measure pain intensity and assess subjective perceptions of pain. It consists of a straight line, with the endpoints representing extreme pain intensity (e.g., "no pain" on the left end and "worst pain imaginable" on the right end). The individual is asked to point on the line corresponding to their pain level, with the distance from the left end indicating the pain intensity. VAS provides a continuous scale, allowing for precise measurement of pain perception and capturing subtle changes over time.

#### ***Range of Motion***

A goniometer is a widely used tool in clinical and research settings to measure knee range of motion (ROM). This device enables the quantification of joint movement angles, making it particularly valuable in assessing the flexibility and function of the knee joint. The goniometer typically consists of two arms, with one arm fixed to the body segment and the other adjustable to align with the anatomical axis of the knee joint. To measure knee ROM, the goniometer is placed over specific bony landmarks, such as the lateral epicondyle of the femur, the head of the fibula, and the lateral malleolus of the fibula. By aligning

the goniometer's axis with the corresponding joint axis, the angle of knee flexion or extension can be accurately measured during active or passive movements.

### *Muscular Power*

To measure muscular power in this study, the researchers used the vertical jump test. This test was a common method used to measure an individual's ability to generate force and power with their lower body muscle. The vertical jump test is typically performed by having the individual stand next to a wall or a measuring device reach up as high as possible. The difference in height between the individual's reach and the highest point of their jump is measured and recorded as their vertical jump height. The athlete repeated this process three times, and the average or best of the three jumps was calculated. This method allowed for more accurate and reliable measurements of the athlete's muscular power (Slomka et al. 2014).

### *Procedure*

Physical exertion during a 90-minute football match caused physiological changes in the body, which led to muscle soreness. These changes included depletion of muscle glycogen, resulting in decreased energy levels and muscle fatigue. To minimize the impact of these changes on the participants' physical health, the researcher planned to establish a consistent physical baseline before each intervention. This was achieved by ensuring that participants trained regularly according to their team's schedule, as provided by the coach. After the football match, the researcher evaluated the baseline muscle soreness experienced by the participants using a pain scale and knee range of motion. After evaluating the indicators of muscle soreness, the researcher implemented two methods of recovery: kinesiology tape and sports massage. Each intervention was carried out on different days, with one intervention per match. The participants underwent the other intervention after the next match. The kinesiology tape intervention was applied to the lower body parts, including the hamstring, calf, and quadriceps by the researcher and certified assistant. Participants were instructed not to remove the kinesiology tape for one day. The sports massage intervention involved three basic techniques of massage such as effleurage (Figure 2), cross-fibre (Figure 3) and kneading (Figure 4) which focused more on the lower body parts with the same muscle targets as the kinesiology tape method (Figure 1). After the intervention, the researcher assessed the pain scale, knee range of motion, and power for 24, 48, and 72 hours. The results of both interventions were compared to understand their effectiveness as recovery strategies for reducing muscle soreness and maintaining muscular power.



Figure 1: The "I strip" KT Application on Hamstrings, Gastrocnemius and Quadriceps



Figure 2: Effleurage Massage Technique



Figure 3: Cross-Fibre Massage Technique



Figure 4: Kneading Massage Technique

### **Statistical Analysis**

Descriptive analysis was used to contrast demographics features and the masticatory behavior of the participants. Differences between the mean scores of kinesiology tape and sport massage were assessed using repeated measure ANOVA. Analysis of data was conducted using SPSS software (version 27), with statistical significance was accepted at  $P < 0.05$

## **RESULTS**

Table 1: Effect of KT and SM on Pain Scale (PS), Active Range of Motion (AROM), Passive Range of Motion (PROM) and Power (PWR)

<b>Effect</b>	<b>Sig.</b>	<b>Eta Square</b>
PS	0.001	0.922
PROMR	0.001	0.620
PROML	0.018	0.422
AROMR	0.005	0.500
AROML	0.008	0.473
PWR	0.001	0.611

All the results presented that there was a significant effect of KT and SM for all the biomarkers which PS, ROM and PWR between the four-time period. This proposes that there was a change in all the biomarkers between the treatments across the four time periods.

Figure 5 shows each treatment has changes which was a decrement for four-time period. From the mean value, it showed that SM group has the lowest value for PS which was 4.523 while KT group has the value of 5.091 respectively. Figure 6 demonstrated each treatment has changes which was an increment of AROM for four -time period. From the mean value, it showed that SM group has slightly value for AROM which is 137.864 for AROMR and 139.727 for AROML compared to KT has the value of 131.295 for AROMR and 134.773 for AROML. Figure 7 presents the mean value of PROMR and PROML between SM and KT. It showed that SM group has slight value for PROM which is

141.705 for PROMR and 143.295 for PROML compared to KT has the value of 132.828 for PROMR and 134.773 for PROML. Figure 8 presents the mean value of PWR between SM and KT. From the mean value, it showed that SM group has the highest value for power which was 51.660 while KT group has the value of 51.499 respectively.

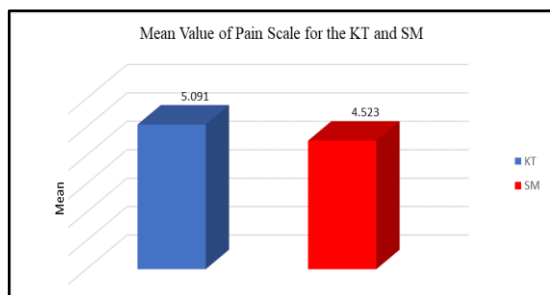


Figure 5: Mean Value of KT and SM on Pain Scale (PS)

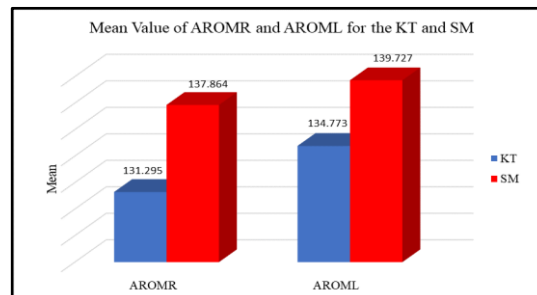


Figure 6: Mean Value of KT and SM on AROMR and AROML

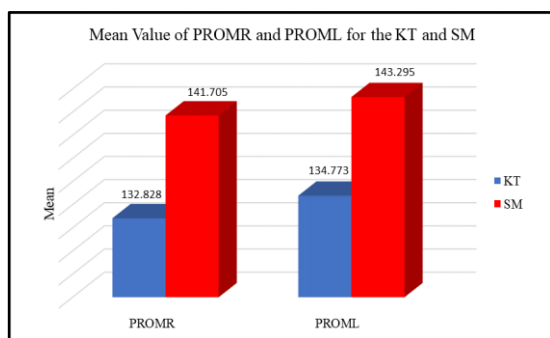


Figure 7: Mean Value of KT and SM on PROMR and PROML

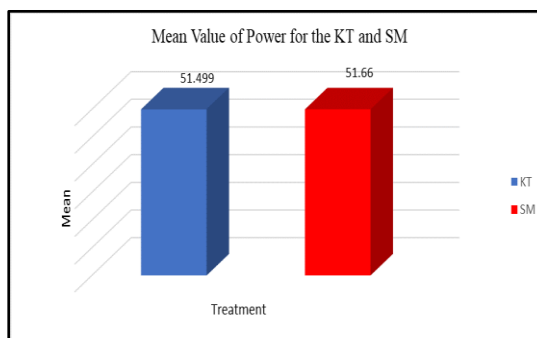


Figure 8: Mean Value of KT and SM on Power (PWR)

## DISCUSSION

Result of the current study showed there was reduction in pain scale after received the treatment across the four time periods. Boguszewski et al. (2014) found that massage treatments can help in pain relief, restore muscle efficiency and improve musculoskeletal system function. Through the reduction of muscle tension and enhancement of blood circulation, massage generates a sense of relaxation and alleviates pain.

In addition, the current result also proved that kinesiology tape reduced the pain level. Study from Lee & Lee (2018) found that kinesiology tape application improves proprioception by activating cutaneous mechanoreceptors, leading to reduced pain through the stimulation of A-beta fibres. As a result, the tactile stimulation offered by kinesiology tape on the injured hamstring muscle has been observed to alleviate pain.

Based on the present findings, it can be observed that both treatments possess a significant reduction in pain scale. Analysing the mean value further validates that among the two implemented treatments, SM exhibits greater reductions compared to KT. In other words, SM proved to be more effective in swiftly reducing the pain scale among football players than KT. According to Joseph et al. (2018) sport massage entails applying mechanical stimulation to soft tissues, which can result in enhanced tissue blood circulation due to the rubbing and mechanical pressure exerted on the soft tissues, thereby elevating arteriolar pressure.



In this current study, it showed that there was significant increment in both active and passive knee range of motion. Similar result with study from Weerapong et al. (2005) there was revealed that following a session of massage involving techniques such as effleurage, petrissage, and friction massage, there was a significant immediate improvement in all ROM tests.

This current finding also confirms that SM demonstrates a greater improvement compared to KT when it comes to increasing range of motion among football players. In simpler terms, SM proves to be more effective than KT in enhancing the range of motion among football players. According from the previous study by Leivadi et al. (1999). proved that massage therapy has the potential to stimulate deep pressure receptors, which can subsequently activate parasympathetic activity, as indicated by the decrease in cortisol levels. This state of increased relaxation may be more advantageous for enhancing range of motion.

## CONCLUSION

In conclusion, this study suggests that both KT and SM are suitable to be used as recovery method that players can apply to reduce muscle soreness and increased muscular power. The selection of an appropriate recovery treatment holds great significance for coaches, therapists, and players alike, as it empowers them to choose the most fitting method for athletes' training regime. This knowledge becomes a crucial asset for coaches aiming to enhance their athletes' training experience, ensuring optimal treatment implementation, preventing injuries, facilitating rehabilitation, and ultimately enabling athletes to achieve peak performance levels upon their return to training and competition.

## Conflict of Interest

For present paper, there are no conflict of interest occurs, whether financially or other by all authors.

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