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The effectiveness of massage therapy on pain and range of motion (ROM) in knee injury patients at the health and sports center (HSC) clinic, yogyakarta state university

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Abstract

Knee injury is the most common complaint among lower extremity injuries at the Health and Sports Centre (HSC) therapy clinic of Yogyakarta State University. It is typically caused by physical contact or overuse syndrome. Knee injuries suffered by patients result in pain and lead to impaired Range of Motion (ROM) of the knee joint.

This research is a pre-experimental research utilizing the Pretest-Posttest Design research methodology. The research population consisted of knee injury patients at the Health and Sports Centre (HSC) Therapy Clinic, Yogyakarta State University. The sampling technique employed was purposive sampling using the Slovin formula (20% critical value), resulting in a sample of 25 individuals. The data collected included: (1) Measurement of knee joint pain using the Numeric Rating Scale. (2) The knee joint Range of Motion (ROM) was assessed using an ordinal ROM scale ranging from 0 to 3. The data analysis method employed quantitative descriptive analysis and hypothesis testing through the Wilcoxon Signed Rank Test with a significance level of 5%.

The outcomes revealed that: (1) Massage therapy can significantly decrease the knee joint pain scale ($\alpha = 0.00$) with an effectiveness of 38%. (2) Massage therapy can enhance the Range of Motion (ROM) scale in knee joint injuries ($\alpha = 0.003$) with an effectiveness of 15%.

Keywords: Massage therapy, knee pain, knee ROM

Introduction

The growing engagement of individuals in a wide range of physical activities, including work for livelihood, and exercising for health enhancement, physical fitness improvement, and achieving goals, is a significant aspect of human life as active beings. One of the inherent risks associated with engaging in physical activities and exercise is the potential for injury. This risk arises from the physical contact that occurs during various types of physical activities or exercise, either between individuals or with objects such as the equipment used for exercise, such as balls or hockey sticks.

Nevertheless, injuries do not solely result from physical contact. Forces exerted on muscle structures during activity can also lead to non-body contact injuries. These injuries typically manifest in areas such as muscles, tendons, ligaments, joints, and bones. Furthermore, indirect injuries tend to occur at both the commencement and conclusion of training or competitive events. This occurs due to inadequate or absent warm-up, inadequate flexibility, or fatigue. In addition to physical contact and indirect injuries, another factor contributing to injuries is excessive loading or repetitive loading. This type of injury is also attributed to training errors, biomechanical irregularities, sports equipment (such as shoes), or subpar field conditions ^[1] (Rahmaniar, 2018: 2).

The typical acute indicators of sports-related injuries manifest as the body's inflammatory response, characterized by tumour (swelling), calor (heat), rubor (redness), dolor (pain), and functio laesa (impaired function) ^[2] (Arovah, 2010: 3).

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Furthermore, the condition leads to alterations in motion control, muscle weakness, and a reduction in Range of Motion (ROM) ^[3] (Aminoto & Mukarommah, 2015: 30). One common injury complaint among individuals engaged in extensive physical activity and exercise is knee injury. This is primarily due to the fact that the knee joint is subjected to both intrinsic and extrinsic forces, rendering it highly susceptible to injury. Additionally, the knee serves as the central point of the leg lever and bears the brunt of significant forces transferred from the ground via the ankle and from the body through the hip ^[3] (Ferguson & Collins, 2010: 202). The knee joint is not only the joint bearing the highest load in the body but also serves as a crucial component for walking, rendering it susceptible to injury ^[4] (Sjarwani *et al*, 2016: 180).

The outcomes from the 2018 Basic Health Research (Risikesdas) indicated that lower extremity injuries had the highest prevalence, accounting for 67.9%, followed by upper extremity injuries at 32.7%, head injuries at 11.9%, back injuries at 6.5%, chest injuries at 2.6%, and abdominal injuries at 2.2% ^[5] (Risikesdas, 2018: 115).

Alongside the advancement of science, the methods for managing injuries have also progressed. Starting from the ICE technique to RICE, where both modalities only focus on overcoming injuries in the acute phase with the Rest method (rest from strenuous activity), Ice (applying ice compresses), Compress (emphasis on the injury site) and Elevation (elevating the injured body part) then developed into PRICE, POLICE and the latest is PEACE LOVE which is broader in scope, namely to deal with sub-acute and chronic phases of injury with additional modalities Protect (Protecting the injured body part), Load (post-injury loading to strengthen muscles and minimise re-injury), Education (education to patients about the benefits of undergoing various therapeutic modalities for injury healing), Optimism (motivation to raise the spirit of recovering from injury), Vascularisation (providing exercises to increase blood flow to the site of injury to support the healing process) and Exercise (providing exercises to restore joint flexibility and strengthen muscles) ^[6] Dubois & Esculier (2019: 1-2). There are various modalities that can be used to treat injuries including massage therapy, herbal therapy, water therapy, thermotherapy, coldtherapy, exercise therapy, oxygen therapy, respiratory therapy and others ^[7] (Graha, 2009: 2).

Massage therapy is considered one of the therapeutic modalities that is believed to be effective in pain reduction. It achieves this through the application of pressure, which stimulates large nerve fibers, subsequently inhibiting the transmission of harmful signals to the brain that are responsible for causing pain ^[8] (Adams *et al*, 2010: 5). Conversely, pressure applied in massage therapy also offers the advantage of decreasing muscle tension. This reduction in muscle tension, in turn, can enhance joint flexibility and Range of Motion (ROM) ^[9] (Monteiro *et al*, 2018: 105).

The advancement of medical science in the realm of sports is highly beneficial in addressing various aspects related to sports injuries, including the utilization of alternative medicine as a curative and rehabilitative approach. The Health and Sports Centre (HSC) therapy clinic is an injury therapy and rehabilitation clinic that concentrates on healing musculoskeletal injury complaints and pain management. With a team of excellent therapists under the direct supervision of a physical therapist, data from January to July 2020 reveals a substantial number of patients who underwent

therapy for various musculoskeletal injury complaints. Out of a total of 3,902 patients who received therapy, knee injuries were the most prevalent among lower extremity injury complaints, accounting for 19.06%, followed by pelvic injuries at 11.73%, ankle injuries at 11.27%, toe injuries at 0.05%, and metatarsal injuries (soles of the feet) at 0.03%. Patients who suffer from knee injury complaints typically report pain during movement and reduced Range of Motion (ROM) in the knee joint.

The massage therapy administered at the HSC therapy clinic employs techniques such as effleurage, friction, tapotement, and motion repositioning manipulation, involving movements of the knee joint in two directions: flexion and extension. From the outset of January 2020 until the present, no research has been conducted regarding the effectiveness of massage therapy employed at the Health and Sports Centre (HSC) Therapy Clinic, Yogyakarta State University. Considering the background outlined above, it becomes imperative to carry out an analysis concerning the success rate of massage therapy administered at the Health and Sports Center (HSC) Therapy Clinic, Yogyakarta State University. From the start of January 2020 until the present, there has been no research conducted regarding the effectiveness of massage therapy administered at the Health and Sports Center (HSC) Therapy Clinic, Yogyakarta State University. Given the background described above, it is essential to undertake an analysis concerning the success rate of massage therapy implemented at the Yogyakarta State University Health and Sports Center (HSC) Therapy Clinic.

Results and Discussion

This research aims to evaluate the effectiveness of massage therapy in alleviating the pain scale and enhancing Range of Motion (ROM) among patients with knee injury complaints at the Health and Sports Center. The research presents two types of data, which are:

1. Demographic data including: age, occupation, height and weight and body mass index.
2. Knee injury data which includes: duration of injury, cause of injury, pain location, pain scale and ROM scale.

Both research outcomes are presented in the form of a descriptive table as depicted below:

A. Descriptive Demographic Data of Knee Injuries

Table 1: Age Category Data of Knee Injury Subjects

Subject Category	Total
15-35 Years	9 Subject
36-55 Years	8 Subject
56-80 Years	8 Subject

Based on the data in Table 1, it is evident that a significant number of knee injury cases in this research occurred among individuals aged 15-35 years. This trend can be attributed to the fact that the majority of subjects within this age group engage in sports activities, which may lead to missteps, collisions, and sprains. Following this group are subjects aged 36-55 years, comprising 8 individuals, with the majority of them involved in strenuous work activities that exert stress on the knee joint. The third age category, 56-80 years, features subjects predominantly experiencing falls during physical activities.

Table 2: Occupational Categories of Subjects

Jobs	Total (%)
University Students	4 Subject (16%)
Self-employed	5 Subject (20%)
Civil Servants	3 Subject (12%)
Employed	5 Subject (20%)
Lecturers	1 Subject (4%)
Housewives	1 Subject (4%)
Students	1 Subject (4%)
Teachers	1 Subject (4%)

Based on the data in Table 2, the majority of subjects are employed as self-employed individuals and employees, followed by university students, civil servants, lecturers, housewives, students, and teachers. Descriptive data for height and weight are presented as follows: The height range of the subjects in this research ranged from 150 to 185 cm, with an average of 165.8 cm and a standard deviation of 8. On the other hand, the weight range of the subjects in this research varied from 48 to 100 kg, with an average weight of 71.8 kg and a standard deviation of 11.6.

Table 3: Body Mass Index (BMI)

BMI Category	Number of Subjects (%)
Normal	13 Subjects (52%)
Fat	7 Subjects (28%)
Medium Fat	4 Subjects (16%)
Very Fat	1 Subject (4%)

Based on the data in Table 3, it is evident that the majority of subjects fall into the normal Body Mass Index (BMI) category. The second most prevalent category is mild obesity, followed by moderate overweight, and lastly, severe obesity. This data underscores the significance of BMI in relation to the subjects' knee injuries. In addition to external factors stemming from trauma, internal factors such as BMI also play a role in influencing knee injuries among the subjects.

B. Descriptive Knee Injury Data

Table 4: Duration of Knee Injury

Duration	Category	Number of Subjects
< 2 Weeks	Acute	8 Subjects (32%)
2-4 Weeks	Sub Acute	7 Subjects (28%)
>4 Weeks	Chronic	10 Subjects (40%)

Based on table 3, it can be seen that the subjects are divided into three categories, namely: The classification of injuries was as follows: < 2 weeks (acute injury), 2-4 weeks (sub-acute injury), and > 4 weeks (chronic injury). The majority of subjects exhibited chronic knee injuries, primarily due to a history of previous injuries and recurrent incidents. Sub-acute injuries ranked second, while acute injuries were the least common, typically resulting from recent incidents among the subjects.

Table 4: Causes of Knee Injuries

Causes	Number (%)
Wrong Focus	15 Subjects (44%)
Overuse	11 Subjects (40%)
Impact	3 Subjects (12%)
Fall	1 Subject (4%)

Based on the data presented in Table 4, it is evident that the majority of knee injuries among the subjects result from support-related errors. This is primarily due to the subjects engaging in physically demanding activities, such as sports and heavy labor, which can lead to knee dislocation. Overuse ranks is the second most common cause, as subjects frequently engage in repetitive movements that place strain on the knee joint, such as participating in running sports or repeatedly lifting weights at work. Collisions during sports activities rank third, and falls during physical activities rank fourth. Subjects experienced collisions or missteps leading to posterior injuries, which rank fourth.

Table 5: Knee Injury Pain Location

Pain Location	Number (%)
Anterior	10 Subjects (40%)
Posterior	3 Subjects (12%)
Medial	7 Subjects (28%)
Lateral	5 Subjects (20%)

Based on the data above, it can be concluded that the majority of subjects experience complaints of knee pain in the anterior part because the majority do a lot of sports activities such as running and heavy physical activities such as working that do a lot of bending movements so that the anterior knee experiences a lot of stress. The medial part ranks second because the subject experienced sprains and incorrect support during sports activities and due to falls. The lateral part ranks third because the subject experienced collisions and misplaced support and the posterior part ranks fourth because the subject experienced misplaced support.

C. Descriptive Data of Knee Injury Pain Scale

Table 5: Total Percentage of Pretest and Posttest Pain Scale of Knee Injury

Category	Pre-test		Post-test	
	Pain	Total (%)	Pain	Total (%)
Scale 0	-	-	4	16 (%)
Scale 1-3	4	16%	10	40 (%)
Scale 4-6	15	60%	10	40 (%)
Scale 7-9	5	20%	1	4 (%)
Scale 10	1	4%	-	-

According to the data in the table above, it is evident that the majority of pre-test subjects fell into the category of moderate pain scale. This is primarily due to the fact that most subjects had a history of prior injuries and experienced recurrent injuries. The lowest number of pre-test subjects experienced the highest level of pain, which can be attributed to acute injuries. In the post-test data, subjects exhibited a reduction in the pain scale. Some subjects reported no pain, and there was an increase in the percentage of subjects in the mild pain scale category. Conversely, there was a decrease in the percentage of subjects in the moderate and severe pain scale categories, with the absence of subjects in the highest pain scale category. Based on this discussion, it can be concluded that massage therapy is effective in reducing the pain scale of knee joint injuries.

D. Descriptive Data of Knee Joint ROM Scale

Table 7: Pretest and Posttest ROM Scale Categories of Knee injury

Category ROM Scale	Pre-test		Post-test	
	ROM	Number (%)	ROM	Number (%)
Scale 0	-	-	-	-
Scale 1	3	12%	-	-
Scale 2	8	32%	5	20%
Scale 3	12	56%	20	80%

According to the data in the table above, it is evident that the majority of pre-test knee joint Range of Motion (ROM) falls under the category of number 3. This indicates that most subjects did not have knee joint ROM impairments, which is likely because the majority had chronic injuries. The second most prevalent category for pre-test knee joint ROM is number 2. In the third position, the percentage of pre-test knee joint Range of Motion (ROM) falls under category number 1, and there are no subjects in category number 0. In the post-test data for knee joint ROM, there has been an improvement. There are no subjects experiencing ROM category 1, a reduction in the number of subjects in category number 2, and an increase in subjects in category number 3. Based on this discussion, it can be concluded that massage therapy is effective in increasing the Range of Motion (ROM) for knee joint injuries.

Table 8: Results of Pretest-Posttest Descriptive Analysis of Knee Joint ROM

ROM	N	Mean (%) ± SD	ROM Changes	Effectiveness	P
Pre-test	25	2,44±0,71	0,36	15%	0,003
The post-test	25	2,8±0,41			

Based on the data presented above, the pre-test Range of Motion (ROM) levels experienced by subjects in the massage therapy treatment, with a sample size of 25 individuals, had an average value of 2.44 and a standard deviation of 0.71. In contrast, the post-test ROM levels experienced by subjects, also with a total sample size of 25 individuals, had an average value of 2.8 and a standard deviation of 0.41. The change in ROM score amounted to 0.36. According to the effectiveness test, the percentage value of the effectiveness in improving knee joint Range of Motion (ROM) in this research is 15%, with a probability value of 0.003, indicating that massage therapy treatment significantly enhances the ROM scale of knee joint injuries.

Wilcoxon test

Table 9: Wilcoxon Test Results Pain Scale Data

Variables	Pretest	Posttest	p	Description
Pain	5,48	3,4	0,00	Significant

The results of the Wilcoxon test in Table 9 demonstrate that massage therapy treatment has an impact on reducing the pain scale, as indicated by ($p < 0.05$), which signifies a significance value less than 0.05.

Table 10: Wilcoxon Test Results of Knee Injury ROM Data

Variables	Pretest	Posttest	p	Description
ROM	2,44	2,8	0,003	Significant

The results of the Wilcoxon test in Table 10 reveal that massage therapy treatment influences the knee joint Range of Motion (ROM) scale, as indicated by ($p < 0.05$), signifying a significance value less than 0.05.

Conclusions

Based on the analyzed and discussed research outcomes, the following conclusions can be drawn: 1) There is a significant impact of massage therapy in reducing the pain scale among patients with knee injury complaints at the HSC UNY therapy clinic. 2) There is a significant impact of massage therapy in increasing Range of Motion among patients with knee injury complaints at the HSC UNY therapy clinic.

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