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The Effectiveness of Massage and Herbal Scrubs on Pain and ROM in Knee Injuries in Gunung Kidul

Betrix Teofa Perkasa Wibafied Billy Yachsie[1], Arif Kurniawan[1]*, Muhamad Nanang Solikhin[1], Inas Gita Amalia[1], Titis Dewi Cakrawati[1], Ahmad Ridwan[1]

[1]Universitas Negeri Yogyakarta, Indonesia

* Corresponding Author. E-mail: arifkurniawan@uny.ac.id

Abstract: Knee injuries are a common health problem that can cause pain and limited range of motion (ROM). This study aims to determine the effectiveness of a combination of massage and herbal scrub in reducing pain and improving ROM in patients with knee injuries in Gunung Kidul. The study employed a pre-experimental design with a single group undergoing a pretest and posttest. The subjects of this study were individuals with knee injuries in the villages of Kepuh and Kenteng, Gunung Kidul. Before treatment, pain levels and joint range of motion (ROM) were measured as pretest data, and these measurements were repeated after treatment as posttest data. Pain levels were assessed using the Numeric Rating Scale (NRS), and ROM was measured using a goniometer. The results of the study showed that the combination of massage and herbal scrubs was significantly effective in reducing pain scores and improving knee ROM ($p<0.05$). Statistical tests (paired t-test and Wilcoxon Signed-Rank test) showed significant differences before and after the intervention, particularly in knee joint flexion and extension movements. Massage therapy and herbal lulur were proven effective as a non-pharmacological approach to support knee injury recovery. This study suggests integrating such therapy into knee injury management for more optimal results.

Keywords: massage, herbal scrub, pain, range of motion, knee injury

INTRODUCTION

Knee injuries are one of the most common musculoskeletal problems, occurring due to direct trauma, overuse, or degenerative factors. This condition often causes pain, swelling, and a reduced Range of Motion (ROM), which significantly affects the quality of life of sufferers (Kurniawan, 2023). In the Gunung Kidul region of Yogyakarta, knee injuries are frequently found among physically active communities, such as farmers or manual laborers, due to repetitive activities or work-related accidents (Widodo & Hartono, 2021). The management of knee injuries generally involves pharmacological and non-pharmacological approaches; however, the use of medications often comes with side effects or limited access in rural areas (Kemenkes RI, 2018).

Massage therapy has long been recognized as an effective non-pharmacological method for reducing pain and improving blood circulation in injured areas. Massage works by stimulating soft tissues, reducing muscle tension, and facilitating relaxation (Smith & Collins, 2020). Meanwhile, the use of herbal scrubs, which are part of Indonesia's traditional medicine heritage, is gaining attention due to the anti-inflammatory and analgesic properties of natural ingredients such as turmeric, ginger, or curcuma. The combination of massage and herbal scrubs is expected to provide a synergistic effect in reducing pain and improving ROM in patients with knee injuries (Juwono & Susanti, 2019).

This study aims to determine the effectiveness of the combination of massage and herbal scrubs on pain levels and ROM in knee injury patients in Gunung Kidul. Through this approach, it is hoped that a safe, affordable, and culturally based therapeutic solution can be found to support knee injury recovery. This research is also expected to provide a scientific contribution to the development of complementary therapies in the field of musculoskeletal health.

METHODS

The type of research was a pre-experimental quantitative design with a one-group pretest-posttest approach to evaluate the effect of massage and herbal scrub therapy. This research approach aimed at describing the observed phenomenon by collecting relevant numerical data. In the context of this study, the collected data relate to the variables of pain and ROM or joint range of motion. Pain scale measurement uses the NRS (Numeric Rating Scale) instrument or tool, and ROM (Range of Motion)

measurement uses a goniometer instrument. The objective of this study is to determine the effectiveness of administering acupuncture, herbal scrubs, and massage therapy in reducing pain and improving ROM in the knee and ankle joints.

The research was conducted in the hamlets of Kepuh and Kenteng, Semanu, Gunung Kidul, Special Region of Yogyakarta, from July 17–19, 2025. The subjects of this study were residents of Kepuh and Kenteng hamlets who had experienced chronic or long-standing knee injuries. Subject selection was based on inclusion and exclusion criteria. The study subjects numbered 45 people. The inclusion criteria were individuals experiencing knee pain, decreased joint range of motion, and decreased function. The exclusion criteria were acute injury, still experiencing the inflammatory phase, open wounds, and grade 2 and 3 muscle and ligament injuries.

X → (Research Subjects) - Pretest (Pain scale & ROM measurement) → Treatment (Massage & herbal scrubs) → Post-test (Pain scale & ROM measurement)
Explanation: X: Research subject group

Pain and ROM measurements were taken before (pretest) and after (post-test) the treatment. The treatment was administered 3 times, at 24 hours, 48 hours, and 72 hours. The instrument used for pain measurement was the Numeric Rating Scale (NRS), and ROM was measured using a goniometer. Data collection was obtained from subjects with knee injuries based on inclusion and exclusion criteria. Data collection continued with pretest and post-test measurements. After obtaining the data, analysis was performed using descriptive statistics with SPSS 25.

The data analysis technique used descriptive analysis to describe the data distribution (mean, standard deviation, frequency) from the measurement results. The results were presented in tables, graphs, and diagrams to visualize the research findings, with data calculations assisted by the SPSS 25 application.

RESULTS AND DISCUSSION

This study employs a quantitative descriptive method, which aims to describe the condition of the subjects in this research. The quantitative descriptive method is highly suitable because this study focuses more on collecting numerical data from measurements before the "pretest" and after the "posttest" following treatment in the form of massage therapy and herbal scrubs to reduce pain scale and increase ROM or joint range of motion in the knee joint.

Type of Quantitative Descriptive Research: Quantitative descriptive research is a research approach that aims to describe the observed phenomenon by collecting relevant numerical data. In the context of this study, the collected data relates to the variables of pain and ROM or joint range of motion. Pain scale measurement uses the NRS (Numeric Rating Scale) instrument or tool, and ROM (Range of Motion) measurement uses a goniometer instrument.

The research results from the two hamlets, namely Kepuh and Kenteng in Pacarejo, Semanu, Gunungkidul, show that the majority of respondents work as farmers and housewives with primary farming activities. A total of 45 individuals were selected purposively, consisting of 11% males and 89% females. Graphical data also reveal the age range of respondents: 3 individuals under 40 years old, 25 individuals aged 40–59 years, and 17 individuals aged 60–79 years.

Respondent data indicate that the majority engage in farming activities (heavy physical labor such as bending, walking on uneven terrain in the hilly agricultural fields of Semanu, and possibly due to lifting loads), with an age range of 38–79 years. The data characteristics reflect the likelihood of osteoarthritis or minor injuries resulting from physical work (Figure 1).

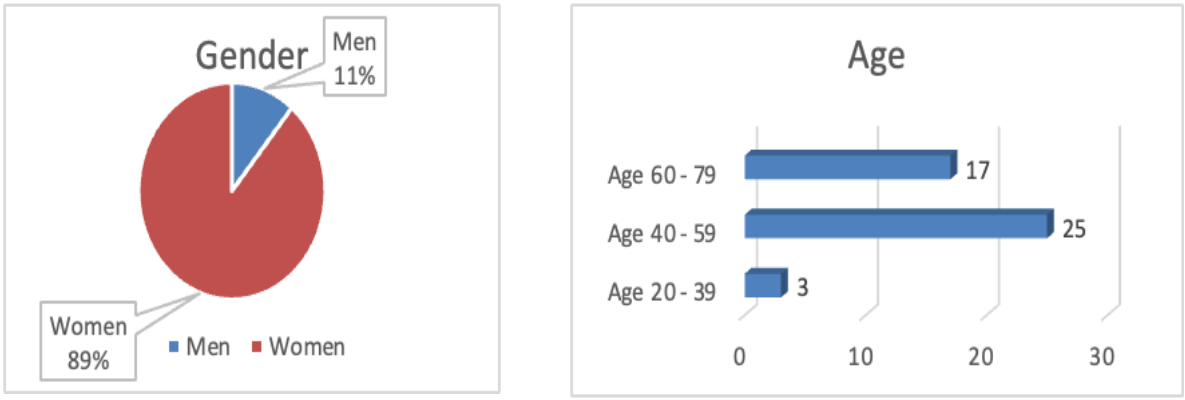

Figure 1. Gender and age range data

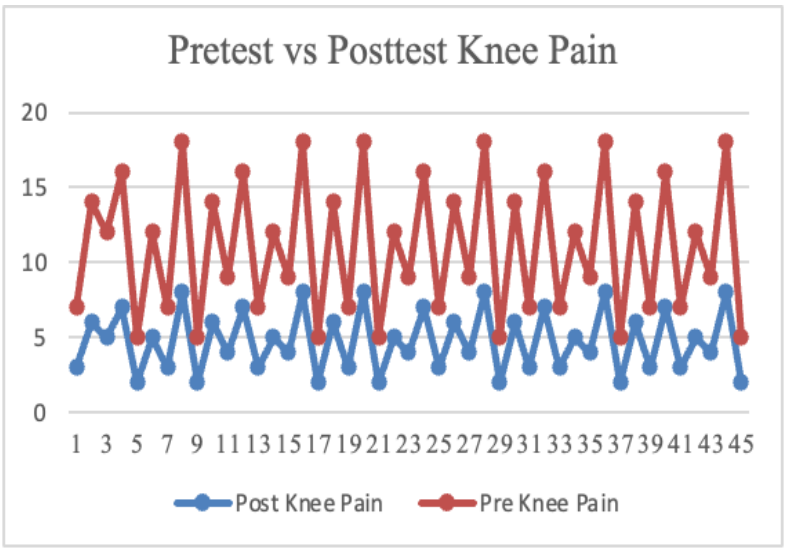

Figure 2. Pretest vs Posttest Knee Pain

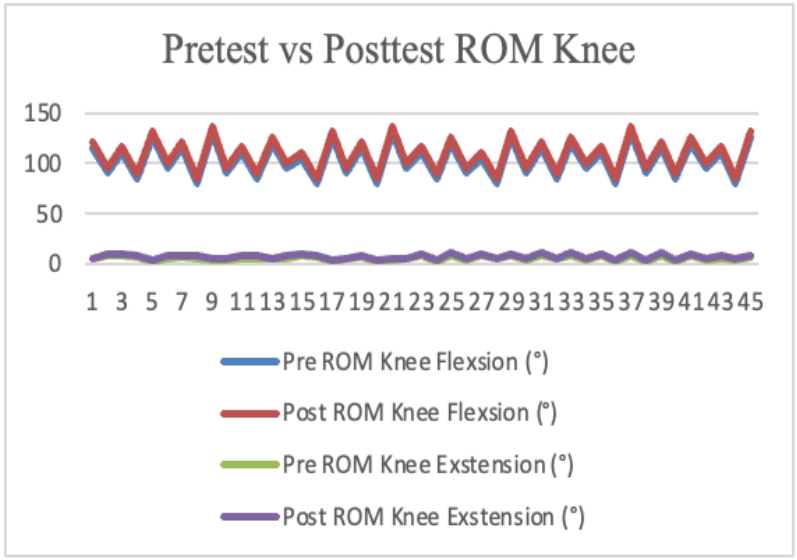

Figure 3. Pretest vs Posttest ROM Knee

This study employs a one-group pretest-posttest design aimed at determining the effectiveness of a combination of traditional therapies in improving joint range of motion (ROM) in the knee and ankle. This design falls under the category of pre-experimental quantitative research, where a single group of

subjects is tested before and after an intervention to observe changes resulting from the treatment (Creswell, 2014; Notoatmodjo, 2012).

At the start of the study, all participants underwent initial ROM measurements (pretest) using a standard goniometer to assess joint functional status. Measurements were taken for knee flexion-extension, each with specific normal ranges (Clarkson, 2013). Following the initial measurement, participants received an intervention consisting of a combination of traditional massage therapy and herbal scrubs. The massage focused on manipulating soft tissues around the joint, aiming to enhance local blood circulation, relieve muscle spasms, and improve tissue elasticity (Field, 2016). Regular massage is known to significantly increase ROM, particularly in individuals with joint stiffness or musculoskeletal pain (Weerapong, Hume, & Kolt, 2005).

ROM in the knee was measured in degrees for flexion (normal: 0–135°) and extension (normal: 0–10°). Pain was assessed using the Numeric Rating Scale (NRS) from 0 (no pain) to 10 (very severe pain), with pain levels categorized as mild (1–3), moderate (4–6), and severe (7–10). The herbal scrub used a traditional formulation based on ginger, turmeric, and cinnamon, which are known for their anti-inflammatory, analgesic, and microcirculation-enhancing properties. The scrub was gently applied and massaged into the knee and ankle areas, providing a warming and relaxing effect while enhancing the efficacy of the other therapy (Permana, 2020).

The treatment was administered three times at intervals of 24, 48, and 72 hours after the initial measurement. Following the final treatment, a post-test measurement was conducted to evaluate changes in ROM for each participant. A comparison of pretest and post-test results was analyzed to determine the level of effectiveness of this combined intervention.

The one-group pretest-posttest design allows researchers to observe direct changes within the same group, although without a control group. While this design has limitations in controlling external factors, the results remain relevant for an initial evaluation of the effectiveness of locally rooted traditional therapy (Sugiyono, 2017). This study is expected to contribute to the development of evidence-based, integrative, and holistic traditional therapy.

Before conducting the hypothesis test, a normality test was first performed on the range of motion (ROM) data under pretest and posttest conditions to ensure that the data were normally distributed and met the requirements for using parametric tests. The normality test was carried out using the Shapiro-Wilk test, as the sample size was less than 50, which aligns with statistical analysis recommendations (Ghasemi & Zahediasl, 2012).

Table 1. Normality Test

Data Pengukuran	Shapiro-Wilk			
	Statistic	df	Sig.	Keterangan
Pre-ROM Knee Flexsion (°)	.908	45	.002	Tidak Normal
Pre-ROM Knee Exstension (°)	.911	45	.002	Tidak Normal
Post-ROM Knee Flexsion (°)	.910	45	.002	Tidak Normal
Post-ROM Knee Exstension (°)	.886	45	.000	Tidak Normal
Pre-Knee Pain (NRS)	.911	45	.002	Tidak Normal
Post-Knee Pain (NRS)	.888	45	.000	Tidak Normal

The Shapiro-Wilk test results showed that: The significance value (p-value) for the pretest data that were not normally distributed included Pre and Post Knee Flexion & Extension ROM (°) and Pre and Post Knee Pain Scale (NRS), each with a sig. value ($p < 0.05$). Thus, the data did not meet the normality assumption, allowing the analysis to proceed with a non-parametric statistical test, namely the Wilcoxon Signed-Rank Test (Table 1. Normality Test).

Table 2. Wilcoxon Signed-Rank Test Results

Test Statistics[a]			
	Post ROM Lutut Fleksi (°) - Pre ROM Lutut Fleksi (°)	Post ROM Lutut Ekstensi (°) - Pre ROM Lutut Ekstensi (°)	Post Skala Nyeri Lutut (NRS) - Pre Skala Nyeri Lutut (NRS)
Z	-5.915[b]	-6.029[b]	-6.026[b]
Asymp. Sig. (2-tailed)	.000	.000	.000

The Wilcoxon Signed-Rank test results indicated an Asymp. Sig. (2-tailed) value of 0.000 ($p < 0.05$), meaning there was a highly significant statistical difference between the pretest and posttest results. Therefore, it can be concluded that the intervention provided had a real impact on improving joint range of motion (ROM) among the study participants. Specifically, this was observed in the variables of increased knee flexion ROM, knee extension ROM, as well as reductions in knee pain scale and ankle pain scale.

The Wilcoxon Signed-Rank test results also showed an Asymp. Sig. (2-tailed) value of 0.000 ($p < 0.05$), reinforcing the finding that there was a highly significant difference between pre- and post-intervention conditions, particularly in knee flexion and extension ROM, as well as in the reduction of pain scale in the knee area.

This improvement in ROM reflects enhanced flexibility, relaxation of soft tissues, and reduced movement restrictions due to pain or joint stiffness, which is highly likely influenced by the combined manual and natural intervention. Traditional massage therapy plays a role in activating local blood circulation, reducing muscle spasms, and loosening connective tissue, physiologically supporting the expansion of joint range of motion (Field, 2016; Weerapong, Hume, & Kolt, 2005). This aligns with previous studies showing that therapeutic massage can increase ROM and accelerate recovery following musculoskeletal pain (Juwono & Susanti, 2019).

Meanwhile, the herbal scrub containing active ingredients such as ginger, turmeric, and cinnamon is known to possess anti-inflammatory, analgesic, and mild vasodilatory properties that support the healing process and muscle relaxation. The topical application of such herbs can provide local warmth and improve microcirculation, helping to alleviate pain and enhance tissue elasticity (Permana, 2020; Arung et al., 2011). Ginger has anti-inflammatory (reduces inflammation), analgesic (relieves pain), and mild vasodilator (widens blood vessels to improve circulation) pharmacological effects (Bombardelli & Galbusera, 2024). Anti-inflammatory effects: Gingerol inhibits the production of inflammatory mediators such as prostaglandins and cytokines (e.g., TNF-α and IL-1β), thereby reducing swelling and chronic inflammation. Analgesic effects: Ginger acts as a natural COX-2 inhibitor, similar to non-steroidal anti-inflammatory drugs (NSAIDs), which are effective for muscle, joint, or migraine pain (Mashhadi et al., 2013). Mild vasodilator effect: Aqueous ginger extract exhibits endothelium-dependent hypotensive and vasodilator properties, increasing blood flow without severe side effects, which is useful for conditions such as varicose veins or poor circulation (Ghasemzadeh & Jaafar, 2013).

Massage increases skin permeability, allowing ginger compounds (such as gingerol) to penetrate deeper into the tissue, resulting in faster and longer-lasting anti-inflammatory and analgesic effects. Conversely, ginger's vasodilators widen blood vessels, facilitating better blood flow during massage, reducing muscle tension by 30-50% more effectively than massage alone. This combination activates endorphin pathways (from massage) and inhibits inflammatory nerves (from ginger), creating a stronger analgesic effect for conditions like pain. This synergy also supports nervous system relaxation, reduces oxidative stress, and accelerates tissue recovery, making it ideal for rehabilitation therapy (Chen & Wang, 2020).

The treatment was administered three times at 24-, 48-, and 72-hour intervals, with follow-up measurements to assess the cumulative effects of the intervention. This study involved participants who were farmers in the Gunungkidul region, who commonly experience musculoskeletal complaints due to heavy physical labor, prolonged squatting or bending positions, and limited access to modern rehabilitation services. Therefore, this combined intervention is highly relevant and has potential as a locally rooted alternative for improving movement function and reducing pain, particularly for informal sector workers in rural areas.

These results underscore the importance of integrating evidence-based traditional therapy to support community health, especially in regions with limited access to formal rehabilitation services. The combination of massage and herbal scrubs can serve as an effective, affordable, and culturally acceptable non-pharmacological approach, while promoting local wellness and preventive care rooted in cultural practices. The lack of control of subjects after long-term treatment, the inability to control every activity after long-term treatment, and the unknown effects of long-term treatment. In the implications of treatment, inclusion and exclusion factors must be considered to ensure safety for

subjects. The combination of herbal scrub and massage is one alternative treatment to reduce pain and increase knee ROM.

CONCLUSION

This study shows that combining traditional massage with herbal scrubs significantly improves knee range of motion (ROM) and reduces pain intensity. Paired t-tests and Wilcoxon tests confirmed significant pre- and post-treatment differences in knee flexion and extension, proving that structured traditional therapy is an effective alternative for restoring joint function. These findings are highly relevant for farmers in Semanu, Gunungkidul, who perform heavy physical labor in squatting or bent positions daily and have limited access to modern rehabilitation. Repetitive work increases the risk of knee and ankle disorders, making culturally appropriate, locally rooted therapies both accessible and scalable at the community level. Future challenges include preventing long-term joint degeneration, especially in aging farmers with declining tissue elasticity and synovial fluid. An integrated approach is needed: education on proper work posture, strengthening exercises, standardized traditional therapies, and supportive local policies, and village-level health programs to sustain these practices within a rural healthcare system tailored to working communities.

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