



THE EFFECT OF MASSAGE AND INJURY *GRADE* ON IMPROVING *RANGE OF MOTION* IN PATIENTS WITH CHRONIC ANKLE INJURIES

Dellavazsi Ovazsia Nazshrullah Naffza^{1*}, Arif Setiawan²

¹Master of Sports Education, Universitas Negeri Semarang, Sekaran, Gunungpati, Semarang, Jawa Tengah 50229, Indonesia

²Sports Coaching Education, Universitas Negeri Semarang, Sekaran, Gunungpati, Semarang, Jawa Tengah 50229, Indonesia

*naffzanazs@students.unnes.ac.id

ABSTRACT

The high number of chronic ankle injury cases leads to limited range of motion and suboptimal treatment of ankle injuries. The purpose of this study was to determine the effects of circular massage and friction massage, as well as the effects of Grade I and Grade II injuries and the interaction between the two, on improving the range of motion in chronic ankle injuries. Using a 2x2 factorial design, the sample consisted of 24 patients with chronic ankle injuries selected through purposive sampling. The participants were assessed before and after receiving treatment. Data analysis was performed using a two-way ANOVA. The results showed that both circular massage and friction massage increased the average range of motion. There was a significant effect of injury grade on the improvement in plantarflexion range of motion ($p = 0.017$); the Grade II group experienced a greater improvement (3.67) compared to the Grade I group (2.58). However, there was no significant effect of massage type or an interaction effect between massage type and injury grade. In conclusion, circular massage and effriction are equally effective in restoring range of motion in chronic ankle injuries, regardless of injury grade.

Keywords: chronic ankle injuries; circular massage; friction massage; injury grade; range of motion

How to cite (in APA style)

Naffza, D. O. N., & Setiawan, A. (2026). The Effect of Massage and Injury Grade on Improving Range of Motion in Patients with Chronic Ankle Injuries. *Indonesian Journal of Global Health Research*, 8(5), 1433–1442. <https://doi.org/10.37287/ijghr.v8i5.2808>.

INTRODUCTION

Physical activity is a bodily movement that requires energy produced by skeletal muscles (Purbasari & Soesanto, 2022). Sports are a type of organized, sustained, and structured physical activity involving repetitive body movements according to specific guidelines with the aim of improving performance and physical fitness (Pertiwi et al., 2025). However, sports can also cause injuries that may interfere with daily physical activities; injuries affect physical and psychological abilities as well as daily routines, and can even result in permanent disability. According to Becker, J. in (Graha, 2019), injuries impact daily activities and cause physical impairment; they can result from improper movements or accidental impacts during sports activities. A sports injury is a condition in which the body experiences tissue damage and functional impairment due to physical impacts ranging from mild to severe. Sports injuries rank as the second most common type of accident after domestic accidents (3.7%) and workplace accidents (3.1%) (Nurrokhmah & Anggita, 2024). Musculoskeletal injuries which occur in the ankles, wrists, neck, shoulders, arms, and lower back are often caused by overuse, excessive strain, muscle weakness, lack of flexibility, and inadequate warm-up. One such injury is an *ankle* injury (Widodo et al., 2024).

Ankle injuries are among the most common musculoskeletal injuries worldwide; a study in the United States shows that more than 23,000 people both athletes and non-athletes require medical treatment for *ankle* injuries every day (Simatupang et al., 2025). *Ankle sprains* are

categorized into three grades: *Grade I* (minimal swelling and localized pain), *Grade II* (localized swelling and more widespread pain), and *Grade III* (significant swelling, pain, bruising, and requiring treatment by a healthcare professional) (Sudaryanto et al., 2022). Most people who experience an ankle sprain do not realize just how much pain they are in. Ankle sprains are indeed common, but according to research, only 50% of people seek treatment. Ankle instability which can lead to recurrent injuries and difficulty walking due to reduced joint proprioception and muscle weakness poses a risk if not effectively treated over time (Hasdianti & Rahman, 2022). Between 40% and 70% of people or athletes with *chronic ankle instability* (CAI) are at a higher risk of recurrence than those without a history of *ankle injuries* (Waritsu, 2022).

Ankle injuries inevitably cause pain during daily activities. According to *the Association for the Study of Pain*, pain is an unpleasant emotional and sensory experience resulting from tissue injury, thus reflecting the state of injury caused by damage (Nurhasanah et al., 2023). Not only can *ankle injuries* cause pain, but they can also lead to a limited *range of motion* in the *ankle joint*, which can result in discomfort and interfere with daily activities. This limitation in joint range of motion is caused by pain, swelling, stiffness, and nerve damage. Massage can be used as a therapeutic approach to help restore *range of motion*. Massage is a series of touch or rubbing techniques, accompanied by a comprehensive examination and assessment of the patient's complaints, aimed at reducing discomfort and restoring movement and function of *the musculoskeletal system* by normalizing muscle or tissue tone (Zerkle et al., 2022). Theoretically, massage refers to the manipulation of soft tissues in the body. As an alternative therapy, massage offers benefits for treating injuries, chronic conditions, fitness recovery, and improving athletic performance. According to another definition, *massage* refers to more specific manipulations of body tissues (Hanief et al., 2019). Massage is a common practice; through massage, the process of muscle recovery can occur more quickly. Additionally, relaxing the muscles helps restore them to their original condition (Setiawan et al., 2024). In massage, therapists use specific techniques to treat *ankle injuries*. Some massage techniques include *effleurage* (stroking), *petrissage* (kneading), *shaking*, *tapotement* (tapping), and *skin rolling* (Hidayat et al., 2025).

Many patients with *ankle injuries* which are joints that support the body at the Bantul Sports Injury & Fitness Therapy Center in Yogyakarta often experience limited *range of motion*; therefore, the researchers were interested in studying *Grade I* and *Grade II ankle injuries* by applying the *Circulo* massage and *effriction* massage programs to improve *the range of motion* in chronic *ankle injuries*. Many patients with ankle injuries, which involve joints that support the body, at the Bantul Sports Injury & Fitness Therapy Center in Yogyakarta experience limited range of motion. Therefore, this study focused on patients with *Grade I* and *Grade II chronic ankle injuries* and examined the application of *Circulo* massage and *effriction* massage to improve ankle range of motion. The purpose of this study was to determine the effects of *Circulo* massage and *effriction* massage, injury *Grade I* and *Grade II*, and the interaction between massage type and injury grade on improving range of motion in patients with chronic ankle injuries.

METHOD

This study is a quantitative study using a 2x2 factorial design. It involves four groups, and each subject is assigned to only one *treatment* group. Each subject received *treatment* only once to prevent the sample from becoming bored and to minimize the likelihood of subjects withdrawing from the study. This study will be conducted at the Sports Injury & Fitness Therapy Center in Bantul, Yogyakarta. The independent variables are massage and injury *grade*, while the dependent variable is *range of motion*. This study uses a sample of 24

participants selected via *purposive sampling*, in which participants are chosen based on specific criteria. The sample will be divided into 4 groups, each consisting of 6 participants. These groups are: *Circulo* massage, *Grade I*; *Circulo* massage, *Grade II*; *Effriction* massage, *Grade I*; and *Effriction* massage, *Grade II*. Participants were selected based on the following criteria: male, aged 20–40 years, patients at the Sports Injury & Fitness Therapy Center, chronic *ankle* injury, injury occurring more than 3 weeks prior to the study, limited *ankle* joint movement, *Grade I* and *Grade II* *ankle* injuries, and willingness to participate. The data collection instrument uses a goniometer to measure the range of motion of the *ankle* joint (*dorsiflexion*, *plantarflexion*, *inversion*, and *eversion*). *Treatment* is performed for 15 minutes using *circular* massage and *friction* massage, and the participants' range of motion was measured using a goniometer both before and after *treatment*. The areas *treated* included the *anterior region of the lower leg*, the *posterior region of the lower leg*, and the *foot region*. Data analysis involved tests of normality, homogeneity, and statistical tests. The *Shapiro-Wilk* test was used to assess normality; if the *p*-value was greater than 0.05 ($p > 0.05$), the data were considered normally distributed. The *Levene's* test was used to assess homogeneity; if the *p*-value was greater than 0.05 ($p > 0.05$), the data were considered homogeneous, and statistical analysis used a *two-way ANOVA*; if the *p*-value is less than 0.05 ($p < 0.05$), a significant effect is present. The *Mann-Whitney U* test was used to assess whether any data were non-normal.

RESULT

This study aimed to determine the effects of *circular* massage, *friction* massage, injury *grade I*, injury *grade II*, and the interaction between the two on the improvement of *range of motion* in chronic *ankle* injuries. All participants in this study were male, ranging in age from 20 to 38 years with a mean age of 27 years; the largest group consisted of 11 respondents aged 25–29 years. The participants' occupations included 10 private-sector employees, 4 college students, 5 entrepreneurs, and 1 each in the following categories: freelancer, private-sector worker, administrative staff, self-employed individual, and laborer. The causes of injury included running (3 respondents), playing soccer (5 respondents), sprains while mountain climbing (4 respondents), badminton (2 respondents), sprains (6 respondents), and accidents, silat, falls, and wearing new shoes—each with 1 respondent.

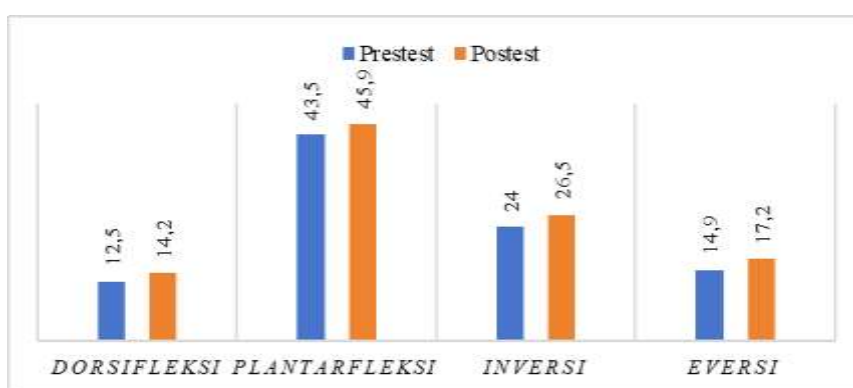


Figure 1. Average data for *Grade I* masase *circulo*

The figures above represent the average results of the *Grade I* Masase *Circulo* test, showing an increase of 1.7 in *dorsiflexion*, 2.4 in *plantarflexion*, 2.5 in *inversion*, and 2.3 in *eversion*.

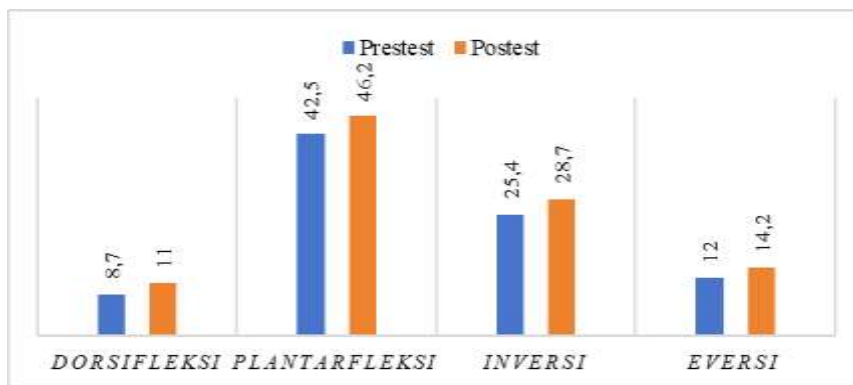


Figure 2. Average data for *Grade II masase circulo*

The above figures represent the average results of *Grade II Masase Circulo* treatment, showing an increase of 2.3 in *dorsiflexion*, 3.7 in *plantarflexion*, 3.3 in *inversion*, and 2.2 in *eversion*.

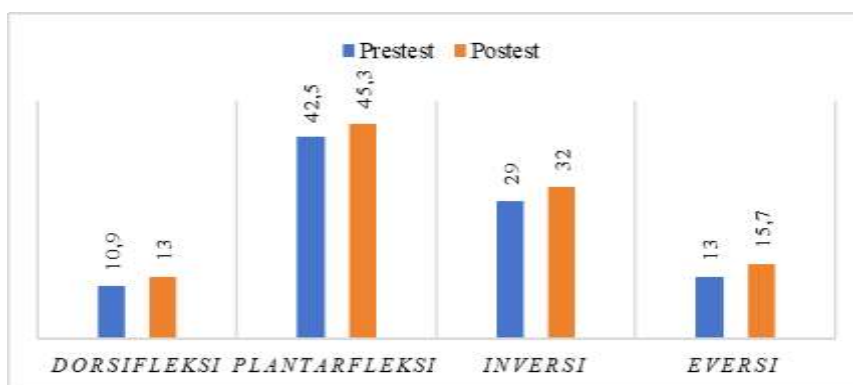


Figure 3. Average data for *Grade I effriction massage*

The figures above represent the average results of the *Grade II Circulo* massage: *dorsiflexion* increased by 2.1, *plantarflexion* by 2.8, *inversion* by 3, and *eversion* by 2.7.

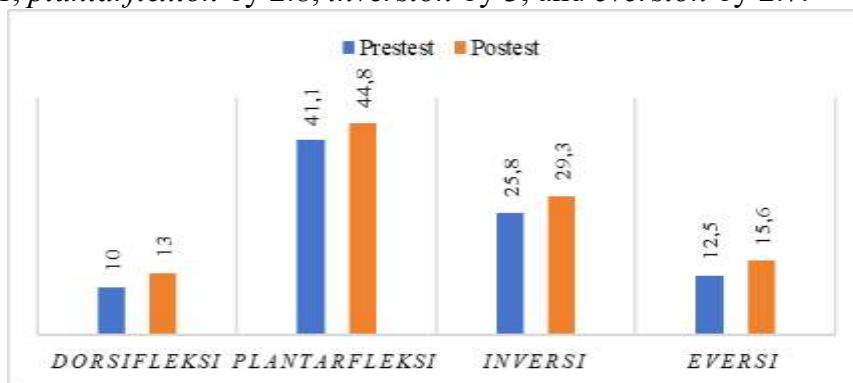


Figure 4. Average data for *Grade II friction mass*

The figures above represent the average results for *Grade II circular* massage: *dorsiflexion* increased by 3, *plantarflexion* by 3.7, *inversion* by 3.5, and *eversion* by 3.1.

Through the *Shapiro-Wilk* test, for the variables “*circular massage*,” “*effriction massage*,” *Grade I*, and *Grade II*, both normal and non-normal data were found. For *plantarflexion* and *eversion*, all variables were normally distributed and will be analyzed using a *two-way ANOVA*, whereas for *dorsiflexion* and *inversion*, some variables were non-normally distributed and will be analyzed using the *Mann-Whitney U* test.

Based on the results of the two-way ANOVA, the “Grade” variable for *the range of motion in plantarflexion* showed a significance value of 0.017 ($p < 0.05$). This indicates a significant effect of injury grade on the increase in *plantarflexion range of motion*; therefore, H0 is rejected and H1 is accepted. Meanwhile, the *massage* variable yielded a significance value of 0.555 ($p > 0.05$), indicating no significant effect of *massage* on the increase in *range of motion* in patients with ankle injuries; therefore, H0 is accepted and H1 is rejected. The results of the interaction test showed a significance value of 0.555. It can be concluded that there is no significant interaction effect between *massage* and injury grade on the improvement in *range of motion* for plantarflexion, as the significance value is greater than 0.05 ($p > 0.05$).

Based on the results of the two-way ANOVA, the “*massage*” variable for *the range of motion in eversion* showed a significance value of 0.264. This indicates that there is no significant effect of *massage* on the improvement in *the range of motion in eversion* because the significance value is greater than 0.05 ($p > 0.05$); therefore, H0 is accepted and H1 is rejected. Meanwhile, the results of the test on the injury grade variable for *the range of motion in eversion* showed a significance value of 0.777. This indicates that there is no significant effect of injury grade on the improvement in *the range of motion in eversion* because the significance value is greater than 0.05 ($p > 0.05$); therefore, H0 is accepted and H1 is rejected. The results of the interaction test showed a significance value of 0.572. It can be concluded that there is no significant interaction effect between *massage administration* and injury grade on the improvement in *range of motion* for the *eversion* movement, as the significance value is greater than 0.05 ($p > 0.05$).

Based on the results of the *Mann-Whitney* test for the *dorsiflexion massage* variable, a significance value of 0.135 was obtained. It can be concluded that there is no significant effect of *circular* and *effriction* massage on the improvement in *the range of motion for dorsiflexion* because the significance value is greater than 0.05 ($p > 0.05$). Based on the results of the *Mann-Whitney* test for the *dorsiflexion injury grade* variable, a significance value of 0.082 was obtained. It can be concluded that there is no significant effect between patients with Grade I and Grade II injuries on the improvement in *the range of motion for dorsiflexion*, as the significance value is greater than 0.05 ($p > 0.05$). The results of the interaction test for the *dorsiflexion* variable showed a significance value of 0.268 for Grade I patients receiving *circular* and *effriction* massage and a value of 0.271 for Grade II patients receiving *circular* and *effriction* massage. It can be concluded that there was no significant interaction effect between the two massage methods and injury grade on the improvement in *range of motion* for *dorsiflexion*, as the significance values were greater than 0.05 ($p > 0.05$).

Based on the results of the *Mann-Whitney* test for the *inversion* massage variable, the significance value was found to be (0.785). It can be concluded that there is no significant effect of *circular massage* and *effriction* on the improvement in *the range of motion for inversion*, as the significance value is greater than 0.05 ($p > 0.05$). Based on the results of the *Mann-Whitney* test for the *inversion injury grade* variable, the significance value was (0.238). It can be concluded that there is no significant effect between patients with Grade I and Grade II injuries on the improvement in *the range of motion for dorsiflexion*, as the significance value is greater than 0.05 ($p > 0.05$). The results of the interaction test for the *inversion* variable showed a significance value of (0.742) for Grade I patients receiving *circular* and *effriction* massage and a value of (0.863) for Grade II patients receiving *circular* and *effriction* massage. It can be concluded that there was no significant interaction effect between the two massage methods and injury grade on the improvement in *range of motion* for *inversion*, as the significance values were greater than 0.05 ($p > 0.05$).

DISCUSSION

The Effect of *Circular Massage* on Improving *Range of Motion* in Chronic Ankle Injuries

Treatment with the *circular massage* method resulted in an increase in the *mean* values of the *ankle range of motion* for *dorsiflexion*, *plantarflexion*, *inversion*, and *eversion*. However, the statistical test results showed a significance value greater than 0.05 ($p > 0.05$), indicating that the application of the *Circulo massage* method had no statistically significant effect on improving the *range of motion* in patients with ankle injuries. *Circulo* massage focuses on lymphatic circulation and blood circulation. The removal of metabolic waste helps alleviate fatigue, stiffness, and muscle tension in the nerves [15]. The combination of *friction*, *tapotement*, and *effleurage* techniques in *Circulo* massage works to improve local blood flow and trigger the release of endorphins to relieve tissue stiffness. This mechanical process effectively helps reduce muscle tension in the *cruris* and *pedis* regions, thereby functionally improving the patient's *range of motion*. These results are consistent with the findings in [16] and [17], which indicate that the manipulative stimulation of *Circulo* massage can contribute to improved circulation and the restoration of joint mobility. The functional improvement in *range of motion* occurs due to the *friction*, *tapotement*, and *effleurage* techniques used in *circulo* massage, which work to improve local blood flow and trigger the release of endorphins, resulting in a technical and functional increase in joint range of motion, even though the improvement did not reach statistical significance in comparative tests.

The Effect of *Friction Massage* on Improving *Range of Motion* in Chronic Ankle Injuries

Effriction massage increases the average *range of motion* in *dorsiflexion*, *plantarflexion*, *inversion*, and *eversion*. However, statistical test results show that the significance value is greater than 0.05 ($p > 0.05$), indicating that there is no statistically significant effect on the *range of motion* in patients with *ankle* injuries. *Effriction* is a massage technique that uses deeper and stronger pressure, combined with rubbing (*friction*) and stroking (*effleurage*) movements, which can improve blood circulation, raise body temperature, accelerate tissue recovery, relieve muscle fatigue, and accelerate lymphatic flow [18]. The study results indicate that *effriction* is more effective at increasing local blood flow and reducing muscle tension. These results support research showing that soft tissue massage manipulation contributes to an increased *range of motion* in *ankle* injuries. The average increase in *range of motion* achieved through *effriction* is greater than that of *circular* massage; this is due to the combination of *effleurage* and *friction*, which focuses on breaking down soft tissue adhesions and increasing local tissue temperature. This directed-pressure rubbing effectively breaks down tense muscle and tendon fibers in the *lower leg* and *foot* regions, thereby restoring elasticity to the connective tissue and expanding the range of motion of the *ankle* joint.

The Effect of Mild Injury Grade (I) on the Improvement of *Range of Motion* in Chronic Ankle Injuries

Grade I patients experienced an average increase in range of motion; however, statistical analysis indicated that injury grade significantly influenced plantarflexion ($p = 0.017$), while the results for other movements, namely dorsiflexion ($p = 0.082$), inversion ($p = 0.238$), and eversion ($p = 0.777$), showed no significant effect. This finding indicates that the response of ankle range of motion to intervention may differ according to the direction of movement and the severity of the initial injury. In Grade I injuries, the ligament injury is relatively mild, so the functional impairment may also be less pronounced than in injuries with greater ligament involvement. The clinical condition of an ankle sprain can include pain, swelling, limited ankle range of motion, and impaired function, with the degree of impairment varying among patients. Therefore, patients with Grade I injuries may have a relatively better initial range of motion and consequently a smaller potential for improvement following intervention. Martin et al., (2021) emphasized that ankle range of motion, particularly dorsiflexion, should be assessed in patients with ankle sprain because ROM impairment can influence the clinical course and functional recovery. In addition, Cheng & Jaafar, (2020)

reported that lateral ankle sprain was associated with changes in ankle range of motion, strength, and postural balance.

The relatively small improvement in some ROM directions in Grade I patients may also be related to the fact that their initial limitation was not severe. When the baseline ROM is already relatively close to the functional range, the magnitude of improvement following intervention may be smaller than in patients who initially have greater movement restriction. This is consistent with the findings of (Maetzler et al., 2020), who reported that manual fascial manipulation could improve ankle dorsiflexion following ankle trauma, while (Gogate et al., 2021) demonstrated that manual therapy combined with exercise could improve ankle mobility and function in patients with Grade I and II ankle sprains. Thus, the improvement observed after intervention may depend not only on the intervention itself but also on the severity of the initial impairment.

The Effect of Moderate Injury Grade (II) on the Improvement of Range of Motion in Chronic Ankle Injuries

The results of the two-way ANOVA test on plantarflexion showed a significant effect ($p = 0.017$), with the average increase in range of motion for Grade II patients (3.67) being higher than that for Grade I patients (2.58). However, the effects on dorsiflexion, inversion, and eversion were not statistically significant. These findings indicate that the response of ankle range of motion to the intervention may differ according to the severity of the injury and the direction of ankle movement. Grade II ankle injuries generally involve greater ligament damage and may be accompanied by greater pain, swelling, stiffness, and functional limitation than Grade I injuries. These conditions can contribute to greater restriction of ankle movement at baseline. Manual therapy may help improve ankle mobility by reducing movement restrictions and facilitating pain-free joint movement. Martin et al., (2021) recommended manual therapy, including soft tissue and joint mobilization, as part of ankle sprain management to reduce symptoms and improve pain-free ankle and foot mobility. The guideline also reported evidence that manual therapy can provide short-term improvements in ankle dorsiflexion range of motion in individuals with lateral ankle sprain.

The present finding is also supported by Gogate et al., (2021), who examined patients with acute and subacute Grade I and II inversion ankle sprains and found that mobilization with movement produced benefits in ankle mobility, pain, disability, and balance compared with the control intervention. In another randomized clinical trial involving Grade II lateral ankle sprain, Maitland mobilization and Mulligan mobilization with movement were both used to improve pain and ankle range of motion (Norouzi et al., 2021). These findings suggest that manual therapy can contribute to restoring ankle mobility when movement is restricted following an ankle sprain.

The greater mean improvement in plantarflexion among Grade II patients in the present study may be related to their greater initial functional limitation. When a patient has greater restriction of movement at baseline, there is a greater potential for measurable improvement following an intervention. However, this interpretation should be considered in relation to the characteristics of the participants and the specific movement assessed. The significant finding was observed only in plantarflexion, whereas dorsiflexion, inversion, and eversion did not show significant effects. Therefore, the results do not indicate that Grade II injury generally produces greater improvement in all ankle movements.

Manual therapy has also been shown to produce short-term improvements in ankle mobility among patients with ankle sprain and chronic ankle instability. A Norouzi et al., (2021) clinical practice guideline recommended manual therapy procedures, including soft-tissue mobilization, joint mobilization, and mobilization with movement, to improve pain-free ankle mobility and weight-bearing dorsiflexion. Therefore, the greater improvement in plantarflexion observed in Grade II

patients in this study may reflect the interaction between the greater initial movement limitation and the response of the affected tissues to the intervention.

The Interaction Effect Between Massage and Injury Grade on the Improvement of Range of Motion in Chronic Ankle Injuries

The results of the interaction test (*Massage * Grade*) for all movements showed significance values greater than 0.05 ($p > 0.05$): *plantarflexion* (0.555), *eversion* (0.572), *dorsiflexion* (*Grade I*: 0.268 and *Grade II*: 0.271), and *inversion* (*Grade I*: 0.742 and *Grade II*: 0.863). This means there was no significant interaction effect between *massage* type and *injury grade* on the improvement in *range of motion* in patients with *ankle* injuries. The total range of movement that a joint can perform, whether actively or passively, is called *the range of motion*, which can be influenced by various factors, namely the joint structures formed by the shape of the bones, the joint structures formed by the ligaments connecting the bones, the muscles crossing the joint, injuries such as the presence of new tissue and swelling, as well as age and gender. The effectiveness of both massage techniques is independent and does not depend on the severity of the injury (*Grade I* or *Grade II*). These results align with the principles of *medical massage* as outlined by Asman, (2022), where manual manipulation aims to normalize the tone of musculoskeletal tissues to restore movement, regardless of variations in the intervention groups administered. Both massage techniques focus on relaxing soft tissues and improving blood circulation, thereby promoting the recovery of *range of motion* in chronic *ankle* injuries. Although they share the same objective, *circular* massage focuses more on fitness benefits, while *friction* massage targets specific tense tissues and emphasizes deeper, more vigorous massage techniques.

CONCLUSION

The application of the *Circulo* Masase treatment resulted in an average increase in functional *range of motion* in all directions of *ankle* joint movement (*dorsiflexion*, *plantarflexion*, *inversion*, and *eversion*). However, statistically, there was no significant effect because the p-value was greater than 0.05 ($p > 0.05$). The p-values for *dorsiflexion* (0.135), *plantarflexion* (0.555), *inversion* (0.785), and *eversion* (0.264). The application of *effriction* massage was shown to increase the average *range of motion* in patients with chronic *ankle* injuries. Although the statistical test results indicated no statistically significant effect that is, the p-values were greater than 0.05 ($p > 0.05$). The significance values for *dorsiflexion* (0.135), *plantarflexion* (0.555), *inversion* (0.785), and *eversion* (0.264). The average increase in *range of motion* achieved with the *effriction* massage treatment was greater than that achieved with the *circular* massage. Patients with *Grade I* *ankle* injuries experienced an average increase in *range of motion* after receiving massage treatment. Because the initial level of limitation in *Grade I* injuries tends to be mild and close to the normal *range of motion*, the difference in the increase in *range of motion* obtained was not as great as that seen in patients with more severe tissue damage.

There was a significant effect of *injury grade* on the increase in *plantarflexion range of motion* ($0.017 < 0.05$), with patients with *Grade II* *ankle* injuries experiencing a higher average increase in *plantarflexion range of motion* (3.67) compared to those with *Grade I* *ankle* injuries (2.58). This indicates that the release of muscle tension and spasm following massage results in a more pronounced improvement in range of motion in cases of more complex tissue stiffness. There was no significant interaction effect, as the p-values were greater than 0.05 ($p > 0.05$), between the type of massage technique (*circular* massage and *friction* massage) and the severity of the injury (*Grade I* and *Grade II*) on the increase in

range of motion across all ankle movement directions (*dorsiflexion*, *plantarflexion*, *inversion*, and *eversion*). The p-values for *dorsiflexion* (0.268 for Grade I and 0.271 for Grade II), *plantarflexion* (0.555), *inversion* (0.742 for Grade I and 0.863 for Grade II), and *eversion* (0.572).

REFERENCES

- Asman, L. L. A. (2022). Pelatihan Circulo Massage dan Sport Massage dalam Upaya Peningkatan Pengetahuan dan Keterampilan Masyarakat Kecamatan Guguak Panjang Kota Bukittinggi. *ABDI: Jurnal Pengabdian Dan Pemberdayaan Masyarakat*, Vol 4 No 1 (2022): *Abdi: Jurnal Pengabdian dan Pemberdayaan Masyarakat*, 37–41. <http://abdi.ppj.unp.ac.id/index.php/abdi/article/view/161/75>
- Cheng, W. L., & Jaafar, Z. (2020). Effects of lateral ankle sprain on range of motion, strength and postural balance in competitive basketball players: a cross-sectional study. *The Journal of Sports Medicine and Physical Fitness*, 60(6), 895–902. <https://doi.org/10.23736/S0022-4707.20.10619-4>
- Gogate, N., Satpute, K., & Hall, T. (2021). The effectiveness of mobilization with movement on pain, balance and function following acute and sub acute inversion ankle sprain – A randomized, placebo controlled trial. *Physical Therapy in Sport*, 48, 91–100. <https://doi.org/https://doi.org/10.1016/j.ptsp.2020.12.016>
- Graha, A. S. (2019). MANFAAT ISTIRAHAT PADA PASCA CEDERA AKIBAT BEROLAHRAGA BEROLAHRAGA. *MEDIKORA*, XVIII(1), 49–55.
- Hanief, Y. N., P, A. M. I., Junaidi, S., Zamawi, M. A., Burstiando, R., & Warthadi, A. N. (2019). *CARA CEPAT KUASAI MASSAGE KEBUGARAN BERBASIS APLIKASI ANDROID*.
- Hasdianti, A. U., & Rahman, F. (2022). PROGRAM LATIHAN PENINGKATAN KEMAMPUAN FUNGSIONAL PADA SPRAIN ANKLE LATERAL GRADE I AKUT (A CASE REPORT). *Journal of Innovation Research and Knowledge*, 2(7), 2829–2838.
- Hidayat, W., Irawan, R. J., Sulistyarto, S., & Adi, T. (2025). The impact of effleurage massage on post-exercise physical recovery. *Sriwijaya Journal of Sport*, 5(1), 155–167. <https://doi.org/http://dx.doi.org/10.55379/sjs.v5i1.131>
- Maetzler, M., Ruescher, M., Punzenberger, F., Wang, W., & Abboud, R. J. (2020). The Foot Progressive rehabilitation of the sprained ankle: A novel treatment method. *The Foot*, 43(June 2019), 101645. <https://doi.org/10.1016/j.foot.2019.09.007>
- Martin, R. L., Davenport, T. E., Fraser, D. P. T. J. J., Sawdon-bea, J., Carcia, C. R., Carroll, L. A., Kivlan, D. P. T. B. R., Carreira, D., & Cpg, I. F. D. (2021). Ankle Stability and Movement Coordination Impairments: Lateral Ankle Ligament Sprains Revision 2021. *Journal of Orthopaedic & Sports Physical Therapy*, 51(4), CPG1–CPG80. <https://doi.org/10.2519/jospt.2021.0302>
- Norouzi, A., Delkhoush, C. T., Mirmohammadkhani, M., & Bagheri, R. (2021). A comparison of mobilization and mobilization with movement on pain and range of motion in people with lateral ankle sprain: A randomized clinical trial. *Journal of Bodywork and Movement Therapies*, 27, 654–660. <https://doi.org/https://doi.org/10.1016/j.jbmt.2021.05.006>
- Nurhasanah, A., Trismiyana, E., & Pribadi, T. (2023). Latihan rentang gerak sendi (ROM) untuk menurunkan nyeri sendi pada pasien dengan asam urat tinggi. *JOURNAL OF Qualitative Health Research & CaseStudies Reports*, 3(1), 8–14.
- Nurrokhmah, R. W., & Anggita, G. M. (2024). Analisis Tingkat Pengetahuan Penanganan Pertama Cedera Olahraga (Metode RICE) Pada Siswa SMA Negeri Kota Semarang. *Journal of SPORT*, 8(1), 265–278.
- Pertiwi, J. K., Ghufroni, A., & Wahyono, Y. (2025). Pengaruh Edukasi dan Intervensi Aktivitas Fisik Intensitas Sedang Terhadap Peningkatan Kebugaran Kardiorespirasi Mahasiswa Fisioterapi. *Jurnal Pengabdian Olahraga Di Masyarakat*, 6(3), 249–258.
- Purbasari, Y. A., & Soesanto, E. (2022). Hubungan antara aktivitas fisik dengan nyeri sendi lansia di posyandu melati kelurahan mugassari kota semarang. *Jurnal Keperawatan Suaka Insan*,

7(2), 200–205.

- Setiawan, A., Priyanto, & Aziz, Z. (2024). Effectiveness of Effriction Massage and Flexibility Training on Recovery of Pain Perception and Back Flexibility in Martial Arts Athletes. *Proceedings of International Conference on Physical Education, Health, and Sports*, 4, 577–584.
- Simatupang, N., Gaol, Y., Abelia, D., Rajagukguk, B., & Maduwu, S. (2025). Analisis Cedera Sprain Ankle pada Cabang Olahraga Wushu Terhadap Kinerja dan Kualitas Hidup Atlet Berdasarkan Kajian Literatur. *Journal of Education Religion Humanities and Multidiciplinary*, 3, 56–59. <https://doi.org/10.57235/jerumi.v3i1.6209>
- Sudaryanto, W. T., Nurochman, M. A., Raudyatzahra, F. G., & Thalib, D. A. (2022). EDUKASI DAN PENYULUHAN CEDERA ANKLE PADA KOMUNITAS “ BASKET SMAGA .” *Jurnal Pengabdian Masyarakat*, 2(22).
- Waritsu, C. (2022). Analisis tingkat persentase cedera ankle pada atlet profesional. *Jurnal Sport Science*, 12(2), 71–75. <https://doi.org/10.17977/um057v12i2p71-75>
- Widodo, A., Pristianto, A., Viyanti, A. N., Silaen, N. B., Musyafa, Z., & Surakarta, U. M. (2024). Penyuluhan Sprain Ankle pada Pelajar SMKN 6 Sukoharjo. *Karunia: Jurnal Hasil Pengabdian Masyarakat Indonesia*, 3(4). <https://doi.org/https://doi.org/10.58192/karunia.v3i4.2595>
- Zerkle, D., Sonk, A., Gawronski, R., Duffey, T., & Syn-, N. A. (2022). Poster Abstracts from the 2022 Massage Therapy Foundation International Massage Therapy Research Conference EFFECT OF MASSAGE ON BLOOD. *International Journal of Therapeutic Massage and Bodywork*, 15(2), 22–27. <https://doi.org/https://doi.org/10.3822/ijtm.v15i2.747> EFFECT