OPEN ACCESS
Jurnal Medicare Vol. 5 No. 4, October (2026) https://doi.org/10.62354/jurnalmedicare.v5i4.590
Check for updates
Research Article

THE EFFECT OF DEEP FRICTION MASSAGE WITH PEPPERMINT OIL ON NECK MUSCLE PAIN AMONG WEAVERS IN JEMBRANA REGENCY

Received: August 18th 2026	Revised: October 7th 2026	Accepted: October 28th 2026	Published: October 31st 2026

Made Putri Tirta Yanti[1#], Gede Arya Bagus Arisudhana[2], Komang Srititin Agustina[3]

Abstract:

Background: Neck muscle pain is a prevalent musculoskeletal disorder experienced by traditional weavers due to prolonged static and non-ergonomic working postures.

Objective: This study aimed to determine the effect of deep friction massage using peppermint oil on neck muscle pain among weavers in Jembrana Regency. Methods: This study employed a quantitative, quasi-experimental design with a non-equivalent control group approach. The sample comprised 34 respondents selected via simple random sampling, divided equally into an intervention group (17 respondents) and a control group (17 respondents). Pain levels were measured using the Numeric Rating Scale (NRS) and analyzed using the Wilcoxon Signed-Rank Test at a significance level of $\alpha = 0.05$.

Results: The Wilcoxon Signed-Rank Test for the intervention group yielded a Z-value of -4.025 with a p-value of <0.001, indicating a statistically significant reduction in neck muscle pain following the intervention.

Conclusion: Deep friction massage combined with peppermint oil is significantly effective in reducing neck muscle pain among weavers.

Keywords: Deep friction massage; neck muscle pain; peppermint oil; weavers

Publisher Note:
CV Rena Cipta Mandiri stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Copyright ©2026 by the author(s).
License Rena Cipta Mandiri, Malang, Indonesia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution-ShareAlike (CCBY-SA)license (https://creativecommons.org/licenses/by-sa/4.0/).

1. INTRODUCTION

Neck muscle pain is a widespread musculoskeletal disorder associated with physical discomfort, psychological stress, and restricted mobility that can hinder daily functioning (Putri et al., 2019). According to the World Health Organization (WHO, 2022), approximately 1.7 billion people globally suffer from musculoskeletal conditions, with neck pain standing as the fourth leading cause of global disability (Global Burden of Disease [GBD], 2021). In Southeast Asia, neck pain incidence reaches 2,400 per 100,000 population, totaling approximately 17.2 million cases, with global projections expected to rise to 269 million cases by 2050 (GBD, 2021).

In Indonesia, the national prevalence of musculoskeletal disorders among productive age groups (≥15 years) is 7.3%, with the highest provincial prevalence recorded in Aceh (13.26%), Bengkulu (12.11%), and Bali (10.46%) (Riskesdas, 2018). Within Bali Province, Jembrana Regency ranks fourth highest at 13.63% (Riskesdas Bali, 2018). Prolonged static work activities and non-ergonomic postures are primary contributing factors (Lede et al., 2025). Weavers typically work

OPEN ACCESS
Jurnal Medicare Vol. 5 No. 4, October (2026) https://doi.org/10.62354/jurnalmedicare.v5i4.590
Check for updates
Research Article

in prolonged forward-flexed head postures with repetitive upper-limb movements, leading to upper trapezius and levator scapulae muscle fatigue, spasms, and pain (Jihan & Vahira, 2025).

Preliminary interviews with 45 weavers revealed moderate neck pain intensity resulting from working over four hours daily with sustained head flexion. Conventional relief is generally limited to brief resting and hydration. Non-pharmacological interventions such as deep friction massage and essential oils offer safe complementary relief. Deep friction massage relieves muscle tension, breaks down soft-tissue adhesions, and enhances local blood circulation (Nanda et al., 2019; Aziza et al., 2025). Simultaneously, peppermint oil (Mentha piperita) contains menthol and menthone, which stimulate TRPM8 cold receptors, providing analgesic, anti-inflammatory, and counter-irritant effects (Purwaeni et al., 2025; Zhao et al., 2022).

Although massage therapy and peppermint oil have each been explored as approaches to pain management, their combined application for occupational neck muscle pain warrants further investigation. Therefore, this study aimed to evaluate the effect of deep friction massage using peppermint oil on neck muscle pain among weavers in Jembrana Regency.

2. MATERIAL AND METHODS

2.1 Research Design

This study employed a quantitative, quasi-experimental design with a non-equivalent control group approach, comparing an intervention group receiving deep friction massage with peppermint oil against a non-treatment control group.

2.2 Research Population and Sample

The target population comprised 64 weavers at the Jembrana Souvenir Center and Putri Mas Collection, Batu Agung Village. The sample size was calculated using paired t-test sample size formulas, resulting in 34 respondents selected via simple random sampling and divided equally into two groups (17 respondents in the intervention group and 17 in the control group). Inclusion criteria: active weavers, cooperative, willing to participate, and experiencing neck muscle pain.

2.3 Research Setting and Time

The study was conducted in March 2026 in Jembrana Regency, Bali, Indonesia.

2.4 Research Procedures

Pretests were conducted after participants had completed more than four hours of work to assess their baseline neck muscle pain intensity. The intervention group received deep friction massage using peppermint oil once daily for 20 minutes over two consecutive days, while the control group received no treatment. Posttests were administered on the second day to evaluate changes in pain intensity following the intervention.

2.5 Research Instruments

The Numeric Rating Scale (NRS) was used as the research instrument to measure the intensity of neck muscle pain among participants before and after the intervention. Participants rated their perceived pain intensity using a numerical scale, allowing changes in pain levels following the intervention to be assessed.

2.6 Data Analysis

Univariate analysis described respondent characteristics. Normality testing via Shapiro-Wilk indicated non-normal data distribution ($p < 0.05$); hence, bivariate analysis utilized the non-parametric Wilcoxon Signed-Rank Test at a significance level of $\alpha = 0.05$ (Razali & Wah, 2011; Sugiyono, 2025).

OPEN ACCESS
Jurnal Medicare Vol. 5 No. 4, October (2026) https://doi.org/10.62354/jurnalmedicare.v5i4.590
Check for updates
Research Article

2.7 Ethical Considerations

This study was conducted in accordance with ethical standards for human research, ensuring informed consent and confidentiality. Approval was granted by the Health Research Ethics Committee of Universitas Triatma Mulya under protocol number NO. 021/EA/UNTRIM-KEPK/III/2026.

3. RESULTS AND DISCUSSION

3.1. Result

Table 1. Presents the frequency distribution of respondent characteristics

Characteristic	Category	Frequency (n)	Percentage (%)
Age	36–45 years	8	23.5%
	46–55 years	15	44.1%
	56–60 years	11	32.4%
Gender	Female	34	100.0%
	Male	0	0.0%
Work Duration	< 4 hours	0	0.0%
	> 4 hours	34	100.0%

As shown in Table 1, all 34 respondents were female (100.0%) and worked >4 hours per day (100.0%). The majority were aged 46–55 years (44.1%).

Table 2. Summarizes the Wilcoxon Signed-Rank Test results for both control and intervention groups

Group	Mean Rank	Sum of Ranks	Z-value	p-value	Conclusion
Control Group	1.50	3.00	-1.414	0.157	Not Significant
Intervention Group	9.00	153.00	-4.025	<0.001	Significant Difference

Table 2 indicates that the control group showed no significant difference between pretest and posttest pain scores ($Z = -1.414$, $p = 0.157$). Conversely, the intervention group demonstrated a statistically significant reduction in neck muscle pain following deep friction massage with peppermint oil ($Z = -4.025$, $p < 0.001$).

3.2 Discussion

3.2.1 Respondent Characteristics and Ergonomic Risk Factors

The predominance of middle-aged and older female weavers (46–55 years) working over four hours daily in static neck-flexion postures underscores high cumulative musculoskeletal strain. Physiological aging reduces muscle mass and tissue elasticity, rendering older workers more vulnerable to occupational fatigue (Putro et al., 2022; Kojongian et al., 2025). Furthermore, biological and hormonal differences result in lower relative muscle strength in women, predisposing upper trapezius muscles to rapid fatigue under repetitive workloads (Dewi et al., 2020; Laeto et al., 2020).

3.2.2 Effectiveness of Deep Friction Massage with Peppermint Oil

The significant pain reduction observed in the intervention group ($p < 0.001$) confirms the therapeutic efficacy of combining deep friction massage with peppermint oil.

OPEN ACCESS
Jurnal Medicare Vol. 5 No. 4, October (2026) https://doi.org/10.62354/jurnalmedicare.v5i4.590
Check for updates
Research Article

Deep friction massage breaks down soft-tissue adhesions, reduces muscle tone, and enhances local microcirculation, facilitating the clearance of accumulated metabolic waste such as lactic acid (Aziza et al., 2025; Nanda et al., 2019). Mechanically, tactile stimulation activates large A-beta nerve fibers, closing the spinal 'pain gate' via Gate Control Theory (Pratama, 2021). Concurrently, menthol in peppermint oil activates TRPM8 receptors to produce a cooling counter-irritant effect, while diffusing soothing aromas that stimulate endorphin release and psychological relaxation (Zhao et al., 2022; Nurhayati & Fatimah, 2024).

3.2.3 Implications and Limitations

Practically, occupational health programs in weaving centers should incorporate structured ergonomic training and complementary pain management protocols. However, this study is limited by its relatively small sample size in a single region and subjective pain assessment via NRS. Future studies should include larger cohorts and objective physiological measures.

4. CONCLUSION

Before the intervention, neck pain intensity among weavers in both groups was predominantly classified as moderate. Following the intervention, all respondents in the intervention group experienced a reduction in pain intensity from moderate to mild. Statistical analysis demonstrated a significant reduction in neck muscle pain following deep friction massage combined with peppermint oil ($Z = -4.025$, $p < 0.001$), indicating that the intervention was associated with improved pain levels among weavers in Jembrana Regency.

ACKNOWLEDGEMENTS

The authors express sincere gratitude to Universitas Triatma Mulya, the management of Jembrana Souvenir Center and Putri Mas Collection, and all participating weavers for their invaluable support.

AUTHOR CONTRIBUTIONS STATEMENT

All authors contributed to the conception and design of the study, data collection, data analysis, interpretation of the results, and manuscript preparation. All authors reviewed, revised, and approved the final version of the manuscript and agreed to be accountable for the integrity and accuracy of the work.

AUTHOR INFORMATION

Corresponding Author
Komang Srititin Agustina
Universitas Triatma Mulya, Indonesia
Email: 2214201031@triatmamulya.ac.id

Authors
Gede Arya Bagus Arisudhana
Universitas Triatma Mulya, Indonesia
https://orcid.org/0000-0001-5278-7608

Made Putri Tirta Yanti
Universitas Triatma Mulya, Indonesia

REFERENCES

Agustina, E. N., Meirita, D. N., & Fajria, S. H. (2019). The effect of peppermint aromatherapy on changes in pain levels among post-cesarean section patients at Leuwiliang Regional General Hospital, Bogor Regency. *Jurnal Ilmiah Wijaya, 11*(2), 17–25. https://jurnalwijaya.com/index.php/jurnal/article/download/pv11n2p17/50/166

Aprilia, B. (2024). The relationship between smartphone usage duration and the incidence of neck pain among first-year students of the Public Health Department at Universitas Negeri Gorontalo. *Jurnal Ilmu Kesehatan, 13*(3), 25–31.

Aziza, K., Rahmanto, S., & Lubis, Z. I. (2025). The effect of deep friction massage on reducing neck pain among tailors in Batu City. *Jurnal Berita Kesehatan, 18*(1), 85–92. https://doi.org/10.58294/jbk.v18i1.235

Dewi, K. I. M., Widiastuti, I. A. E., & Wedayani, A. A. N. (2020). The relationship between body mass index and muscle strength among students of the Faculty of Medicine, Universitas Mataram. *Jurnal Kedokteran Unram, 9*(1), 66–67. https://doi.org/10.29303/jk.v9i1.4310

Faana, J., Amalina, S., & Simanjuntak, J. (2025). The effect of TENS and friction massage on pain reduction in carpal tunnel syndrome patients at Sehat Bersama Physiotherapy Clinic, Medan. *World Health Digital Journal, 2*(1), 35–40. https://doi.org/10.31004/wolgitj.v2i1.51

Global Burden of Disease Study 2021. (2024). Global, regional, and national burden of neck pain, 1990–2020, and projections to 2050: A systematic analysis of the Global Burden of Disease Study 2021. *The Lancet Rheumatology*. https://doi.org/10.1016/S2665-9913(23)00321-1

Jihan, F., & Vahira, D. (2025). Personal factors associated with neck pain complaints among lurik weaving workers: An occupational health surveillance. *Jurnal Kesehatan Masyarakat, 9*(2), 5892–5901.

Jufri, & Indriani. (2023). The relationship between working hours and length of employment and the risk of neck pain complaints among computer operator workers at PT Sucofindo Makassar in 2022. *Jurnal Mitrasehat, 12*(2), 241–247. https://doi.org/10.51171/jms.v12i2.337

Kojongian, M. T., Lomboan, E. B., & Palilingan, R. A. (2025). The relationship between age and length of employment and musculoskeletal disorder (MSD) complaints among stilt-house construction workers in Woloan 2 Village, West Tomohon District, Tomohon City. *Jurnal Kolaboratif Sains, 8*(12), 8876–8886. https://doi.org/10.56338/jks.v8i12.9740

Laeto, A. B., Santoso, B., Zulissetiana, E. F., Putri, S. S. F., & Ferizon, A. F. (2024). The relationship between sitting duration and the incidence of neck pain among medical students at Universitas Sriwijaya during online learning. *ASSYIFA: Jurnal Ilmu Kesehatan, 2*(2), 244–249. https://doi.org/10.62085/ajk.v2i2.68

Lede, C. P., Ruliati, L. P., Purimahua, S. L., & Ratu, J. M. (2025). Factors associated with musculoskeletal disorder (MSD) complaints among ikat weaving artisans in Raporendu Village, Nangapanda District, Ende Regency. *PREPOTIF: Jurnal Kesehatan Masyarakat, 9*(2), 6208–6217. https://journal.universitaspahlawan.ac.id/index.php/prepotif/article/download/47891/30495

Manalu, N., Simatupang, K. W., Simanjuntak, K. A., Sitopu, J. W., & Sitorus, H. J. (2025). The importance of rest in the physical and mental recovery of athletes. *Pendas: Jurnal Ilmiah Pendidikan Dasar, 10*(4). https://doi.org/10.23969/jp.v10i04.36233

Nanda, H. Y., Ardhi, I., Junaidi, S., Rizki, B., Anis, Z., & Anugrah, W. (2019). *A quick guide to mastering fitness massage* (D. P. Pamungkas, Ed.). CV Kasih Inovasi Teknologi.

Nurhayati, & Fatimah. (2024). The effectiveness of inhaled peppermint aromatherapy in reducing pain intensity during the first stage of labor among primiparous women. *Ilmu Keperawatan dan Kebidanan (JIK2), 14*(2), 112–119.

Pratama, A. D. (2021). The effectiveness of friction massage in reducing pain in patients with upper trapezius myofascial trigger point syndrome. *Jurnal Ilmiah Fisioterapi, 4*(1), 18–24. https://doi.org/10.36341/jif.v4i01.1732

Purwaeni, D. A., Aliansy, D., Jaojah, S., Aulia, R. N., Meilasari, R. N., Yulianti Pertiwi, D., & Carla, N. C. (2025). Formulation and evaluation of Harmoni Dada: An innovative breast care oil preparation for breastfeeding mothers containing mint (*Mentha piperita*) essential oil. *Generics: Journal of Research in Pharmacy, 5*(1), 99–109. https://doi.org/10.14710/genres.v5i1.25570

Putri, Z. M., Murni, D., Maisa, E. A., Khairina, I., & Muthmainnah. (2019). The impact of work-related musculoskeletal disorders among nurses at RSI Siti Rahmah Padang in 2019. *Prosiding Seminar Kesehatan Perintis, 2*(1), 133–137. https://repository.itskesicme.ac.id/id/eprint/4395/21/Proceeding.pdf

Putro, W. G., Fadillah, H., Hasan, H. M., & Ilmi, A. F. (2022). The relationship between age, length of employment, and working posture and musculoskeletal disorder complaints among welders in Cipondoh District in 2021. *MAP: Midwifery and Public Health Journal, 2*(1), 45–52. http://openjournal.wdh.ac.id/index.php/MAP/article/download/404/315

Razali, N. M., & Wah, Y. B. (2011). Power comparisons of Shapiro–Wilk, Kolmogorov–Smirnov, Lilliefors, and Anderson–Darling tests. *Journal of Statistical Modeling and Analytics, 2*(1), 21–33.

Rika, S. S., Ruliati, L. P., & Tira, D. S. (2022). Ergonomic analysis of musculoskeletal disorder complaints among ikat weaving workers in Ternate Village, Alor Regency. *Media Kesehatan Masyarakat, 4*(1), 131–139. https://doi.org/10.35508/mkm.v4i1.2885

Suarjana, I. W. G., Moleong, M., Palilingan, R. A., Rumerung, G. E., & Akbar, H. (2023). Providing short breaks can reduce subjective fatigue among coconut farmers. *Malahayati Health Student Journal, 3*(1), 45–52. https://ejurnalmalahayati.ac.id/index.php/MAHESA/article/view/9184

Sugiyono. (2025). *Quantitative, qualitative, and research and development methods* (Sutopo, Ed.; 2nd ed., 7th printing). Alfabeta. ISBN 978-602-289-533-6. https://lib.unj.ac.id/slims2/index.php?id=45101&keywords=&p=show_detail

Widyawati, S. F. A., Indriati, I., & Safitri, R. (2023). The effect of friction techniques on dysmenorrhea pain intensity among adolescent girls aged 13–15 years in Regek Hamlet, Rejoso District, Pasuruan Regency. *Journal of Nursing Care & Biomolecular, 8*(2), 73–79.

World Health Organization. (2022). *Musculoskeletal health*. https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions

Zhao, H., Ren, S., Yang, H., Tang, S., Guo, C., Liu, M., Tao, Q., Ming, T., & Xu, H. (2022). Peppermint essential oil: Its phytochemistry, biological activity, pharmacological effects, and applications. *Biomedicine & Pharmacotherapy, 154*, Article 113559. https://doi.org/10.1016/j.biopha.2022.113559