



Analysis of Activity Daily Living in Elderly With Joint Pain: Rheumatic Exercise and Functional Independence

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Article Info

History Articles

Received:
January 2026
Accepted:
January 2026
Published:
June 2026

Keywords:

Activity Daily Living,
Elderly, Joint Pain,
Rheumatic Exercise

Abstract

The increasing prevalence of joint pain among the elderly often leads to decreased functional independence and limitations in Activities of Daily Living (ADL). Rheumatic exercise is considered a low-impact physical activity that may help maintain joint mobility and functional capacity in the elderly. This study aimed to analyze Activities of Daily Living among elderly individuals with joint pain and to examine the effect of rheumatic exercise on functional independence at Panti Werdha Rindang Asih II Bongsari, Semarang. A quantitative quasi-experimental design with a one-group pretest-posttest approach was employed. The study involved 18 elderly participants selected through purposive sampling. The intervention was conducted over four weeks, with rheumatic exercise sessions held three times per week for approximately 30 minutes. Functional independence was measured using the Barthel Index of Activities of Daily Living. Data were analyzed using the Wilcoxon Signed Rank Test. The results showed a significant improvement in ADL scores after the intervention, with the mean score increasing from 71.11 before the intervention to 79.72 after the intervention ($p = 0.001$). These findings indicate that rheumatic exercise significantly improves functional independence in elderly individuals with joint pain. Rheumatic exercise can therefore be recommended as a safe and effective non-pharmacological intervention to support mobility, independence, and quality of life among the elderly, particularly in institutional care settings.

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INTRODUCTION

The global population structure is undergoing a significant demographic shift marked by a rapid increase in the proportion of older adults, including in Indonesia. Data from the Indonesian Central Statistics Agency (Badan Pusat Statistik, 2023) indicate that older adults currently represent approximately 12% of the total population, with projections reaching nearly 20% by 2045. At the global level, the World Health Organization (2025) reported that the population aged 60 years and above reached one billion in 2020 and is expected to increase to 1.4 billion by 2030. This trend presents substantial challenges for public health systems, particularly in relation to maintaining mobility, independence, and overall quality of life among older adults.

Advancing age is accompanied by progressive physiological, psychological, and social changes that may reduce functional capacity and autonomy (Ika Nur Rohmah & Bariyah, 2012; Pany & Boy, 2019). One of the most common health complaints in later life is joint pain, which is frequently associated with degenerative conditions such as osteoarthritis and rheumatoid arthritis. Chronic joint pain contributes to limitations in movement, reduced participation in physical activities, and a decline in functional independence, ultimately affecting daily living and social engagement (Sima et al., 2022). From a clinical perspective, joint pain in older adults results from structural alterations including cartilage degeneration, synovial inflammation, and decreased elasticity of periarticular tissues. These changes often lead to joint stiffness, muscle weakness, and restricted range of motion, which interfere with the ability to perform Activities of Daily Living (ADL) such as bathing, dressing, walking, and eating (Zhang et al., 2005). Persistent pain may also trigger stress-related physiological responses, increasing cardiovascular strain and psychological distress, thereby exacerbating

functional decline (M Hartwig, 2006). Lahaye et al. (2019) and Huang & Lu (2024) Epidemiological studies have shown that arthritis remains one of the most prevalent chronic conditions among older adults worldwide, with an estimated prevalence of approximately 40.9%. Functional independence is a key indicator of health status and quality of life in the elderly population. It reflects an individual's ability to perform basic daily activities without assistance and is commonly assessed using standardized instruments such as the Barthel Index and Katz Index, both of which demonstrate strong validity and reliability (Ribeiro et al., 2018; Wade et al., 1987). Increased joint pain is closely associated with decreased functional independence, leading to greater reliance on caregivers and institutional support. Preliminary observations conducted at Panti Werdha Rindang Asih II Bongsari, Semarang, revealed varying levels of functional limitation among elderly residents. Of the 27 residents, several individuals were unable to perform daily activities independently due to mobility or sensory impairments, while 18 residents met the criteria to participate in structured physical activity programs. Initial assessments using a goniometer and the Barthel Index indicated reduced joint mobility and moderate dependence in daily activities, highlighting the need for targeted interventions to improve functional capacity in this setting. Physical exercise is widely recognized as an effective non-pharmacological strategy for preserving joint function, reducing pain, and enhancing physical performance in older adults. Rheumatic exercise, in particular, is a low-impact intervention designed to promote joint mobility through controlled and repetitive movements such as flexion, extension, and rotation. Previous studies have shown that regular participation in rheumatic exercise programs can improve range of motion, muscle strength, balance, and functional independence while

minimizing the risk of injury (Mas'adah, 2017); Hati & Rahmadana Lubis, 2022).

Empirical evidence supports the positive effects of rheumatic exercise on functional outcomes in elderly populations. For example, Susilowati et al. (2017) reported a substantial increase in independence among elderly participants following a structured rheumatic exercise program in a nursing home setting. Despite these findings, further research is needed to specifically analyze changes in Activities of Daily Living as a primary outcome of rheumatic exercise interventions, particularly among elderly individuals experiencing joint pain in institutional care environments.

Therefore, this study aims to analyze Activities of Daily Living among elderly individuals with joint pain and to examine the role of rheumatic exercise in supporting functional independence at Panti Werdha Rindang Asih II Bongsari, Semarang. The findings are expected to contribute to evidence-based recommendations for physical activity interventions that promote independence and improve quality of life among the elderly.

METHODS

This study employed a quasi-experimental quantitative approach with a one-group pretest–posttest design. The purpose was to determine the effectiveness of rheumatic exercise in improving functional independence among elderly individuals with joint pain at Panti Werdha Rindang Asih II Bongsari, Semarang. This design allows direct measurement of changes in independence and pain level within the same group (Sugiyono, 2019). The research was conducted over four weeks, with exercise sessions held three times per week, each lasting approximately 30 minutes. The population consisted of 27 elderly residents, and based on inclusion criteria, 18 participants were eligible and voluntarily participated in the study. The sampling technique used was purposive sampling,

focusing on elderly individuals experiencing joint pain and able to perform mild physical activity.

The research was conducted over four weeks, with exercise sessions held three times per week, each lasting approximately 30 minutes. The population consisted of 27 elderly residents, and based on inclusion criteria, 18 participants were eligible and voluntarily participated in the study. The sampling technique used was purposive sampling, focusing on elderly individuals experiencing joint pain and able to perform mild physical activity. Data were collected through observation and measurement using standardized instruments: (1) the Barthel Index to assess functional independence, (2) the Numeric Rating Scale (NRS) to measure joint pain intensity, and (3) a goniometer to evaluate joint range of motion (ROM). The intervention procedure included three stages: (1) Preparation – obtaining permission, coordinating with nursing home management, and screening participants, (2) Implementation – conducting rheumatic exercise sessions consisting of warm-up (5 minutes), core movements (20 minutes) focusing on flexion–extension and rotational movements of the joints, and cool-down (5 minutes). Each session was supervised to ensure safety and consistency. (3) Evaluation – performing pretest and posttest measurements using the Barthel Index and NRS to evaluate changes in functional independence and pain levels.

The collected data were analyzed using SPSS version 29. Normality tests were conducted before statistical analysis. If data were normally distributed, a paired t-test was used; otherwise, the Wilcoxon signed-rank test was applied to compare pretest and posttest results. The significance level was set at $p < 0.05$. All participants provided informed consent before the study began. Ethical considerations such as confidentiality, voluntary participation, and participant safety were maintained throughout the research process.

RESULTS AND DISCUSSION

The findings of this study demonstrate that rheumatic exercise has a significant effect on Activity Daily Living (ADL) among elderly individuals with joint pain. Prior to the intervention, pretest results measured using the Barthel Index indicated that most participants experienced moderate dependence, particularly in mobility-related activities such as transferring, walking, and bathing. These limitations are commonly associated with joint pain, reduced range of motion, and muscle weakness in the elderly. Following the four-week rheumatic exercise intervention, a noticeable improvement in functional independence was observed.

Table 1. Pre-test Results of Activity Daily Living (ADL) Before Rheumatic Exercise

Variable	Mean $\pm$ SD	Min	Max
ADL Score	71.11 $\pm$ 18.44	20	90

Table 1 presents the results of the pre-test measurement of functional independence among elderly participants before the rheumatic exercise intervention. The mean ADL score obtained was 71.11 with a standard deviation of 18.44, and a score range between 20 and 90. These data indicate that most elderly participants had moderate levels of independence before the intervention.

Table 2. Post-test Results of Activity Daily Living (ADL) After Rheumatic Exercise

Variable	Mean $\pm$ SD	Min	Max
ADL Score	79.72 $\pm$ 17.77	25	95

The posttest results showed an increase in the mean ADL score from 71.11 to 79.72, indicating enhanced ability to perform daily activities independently.

Statistical analysis confirmed that this improvement was significant ($p = 0.001$), suggesting that regular rheumatic exercise contributes meaningfully to functional recovery and independence among elderly individuals with joint pain.

Analysis of Activity Daily Living (ADL) performance indicated that the most notable improvements occurred in aspects related to mobility and joint movement, such as walking ability, transfers, and personal hygiene activities. These aspects are highly dependent on joint flexibility, muscle strength, and balance, which are directly trained through rheumatic exercise performed in a regular and controlled manner. In addition, the reduction in variability of ADL scores after the intervention suggests a more uniform level of functional independence among participants, indicating that the benefits of rheumatic exercise were consistently experienced by the elderly (Ribeiro et al., 2018; Wade et al., 1987). The observed improvement in ADL can be explained by the physiological mechanisms underlying rheumatic exercise. The intervention emphasizes low-impact movements such as flexion, extension, and rotational joint exercises, which promote synovial fluid circulation, maintain cartilage nutrition, and reduce joint stiffness. In addition, repeated muscle activation surrounding the joints enhances muscular strength and endurance, thereby supporting more efficient movement patterns during daily activities (Mas'adah, 2017).

These findings are consistent with previous studies reporting positive effects of rheumatic exercise and other low-impact physical activity programs on functional outcomes in elderly populations. Susilowati et al. (2017) reported a substantial increase in independence among elderly participants after participating in a structured rheumatic exercise program, while Mas'adah (2017) highlighted improvements in joint flexibility and functional activity following similar interventions. Moreover, Rausch Osthoff et

al. (2018) emphasized that regular, structured physical activity plays a crucial role in maintaining musculoskeletal function and reducing disability in elderly populations with arthritis. The findings of this study are further supported by the results of Irawan et al. (2024), who examined the effectiveness of exercise on muscle strength and movement speed in the sport of pétanque. Their study demonstrated that regular physical training can enhance muscle contraction capacity and movement coordination speed, thereby improving movement efficiency and joint stability. These principles are relevant to rheumatic exercise in the elderly, where low-intensity and structured movements facilitate neuromuscular adaptation, strengthen muscles, and improve body coordination in performing daily activities.

The findings of this study is a significant difference in Activities of Daily Living (ADL) scores before and after the implementation of the rheumatic exercise intervention. Based on the results of the Wilcoxon Signed Rank Test, a significance value of $p = 0.001$ was obtained, which is lower than the error threshold (α) of 0.05.

CONCLUSION

This study found that rheumatic exercise effectively improves the functional independence of elderly individuals with joint pain. The results showed a significant increase in the mean Barthel Index score from 71.11 before the intervention to 79.72 after four weeks of rheumatic exercise ($p = 0.001$). The findings of this study are emphasize the importance of structured physical exercise in maintaining musculoskeletal health and functional independence in older adults. Future studies are advised to include post-test measurements of NRS and ROM to obtain more comprehensive results.

ACKNOWLEDGEMENT

The author would like to thank to the management and staff of Panti Werdha Rindang Asih II Bongsari, Semarang.

REFERENCES

- Aiyegbusi, A. I., Kolawole, F. O., Oke, I. K., & Fawole, H. O. (2024). Immediate effects of exercise snacking on physical fatigue, mood, and pain in elderly adults with knee osteoarthritis. *Bulletin of Faculty of Physical Therapy*, 29(1), 92. <https://doi.org/10.1186/s43161-024-00254-y>
- Cai, H., Bullock, G. S., Sanchez-Santos, M. T., Peirce, N., Arden, N. K., & Filbay, S. R. (2019). Joint pain and osteoarthritis in former recreational and elite cricketers. *BMC Musculoskeletal Disorders*, 20(1). <https://doi.org/10.1186/s12891-019-2956-7>
- Chauhan, S., Kumar, S., Bharti, R., & Patel, R. (2022). Prevalence and determinants of activity of daily living and instrumental activity of daily living among elderly in India. *BMC Geriatrics*, 22(1). <https://doi.org/10.1186/s12877-021-02659-z>
- Depkes RI. (2003). Pedoman Pelayanan Gizi Rumah Sakit. *Direktorat Jendral Bina Kesehatan Masyarakat, Jakarta*.
- Edemekong, P. F., Bomgaars, D., Sukumaran, S., & Levy, S. B. (2019). *Activities of Daily Living*. https://digitalcollections.dordt.edu/faculty_work
- Hati, Y., & Rahmadana Lubis, C. (2022). Pelaksanaan Senam Rematik Pada Lansia Dalam Menurunkan Nyeri Sendi Dengan Penderita Osteoarthritis. *Jurnal Pengabdian*

- Masyarakat, 2(2).
<https://ojs.unhaj.ac.id/index.php/jukeshu>
m/index
- Holm, I., Pripp, A. H., & Risberg, M. A. (2020). The active with osteoarthritis (Aktiva) physiotherapy implementation model: A patient education, supervised exercise and selfmanagement program for patients with mild to moderate osteoarthritis of the knee or hip joint. a national register study with a two-year follow-up. *Journal of Clinical Medicine*, 9(10), 1–14.
<https://doi.org/10.3390/jcm9103112>
- Huang, Y., & Lu, Z. (2024). A cross-sectional study of physical activity and chronic diseases among middle-aged and elderly in China. *Scientific Reports*, 14(1).
<https://doi.org/10.1038/s41598-024-78360-z>
- Ika Nur Rohmah, A., & Bariyah, K. (2012). Quality of Life Elderly. *Juli, 2012*, 120–132.
- Irawan, F. A., Ramadhan, A. T., Junaidi, S., Hadi, H., Romadhoni, S., & Muhibbi, M. (2024). Effectiveness of muscle force and speed of movement carreau shot at distances of 6 and 7-meter petanque sport. *Jurnal Keolahragaan*, 12(1), 95–102.
<https://doi.org/10.21831/jk.v12i1.66405>
- Irawan, F. A., Sukmawati, F., Awaliyyah, U. A., Permana, D. F. W., Anam, K., Jati, S. K., Khampoosa, P., & Sriramatr, S. (2025). Analysis of running speed in the students with history of ankle injuries: running performance. *Retos: Nuevas Tendencias En Educación Física, Deporte y Recreación*, 107–115.
- Lahaye, C., Tatar, Z., Dubost, J. J., Tournadre, A., & Soubrier, M. (2019). Management of inflammatory rheumatic conditions in the elderly. In *Rheumatology (United Kingdom)* (Vol. 58, Issue 5, pp. 748–764). Oxford University Press.
<https://doi.org/10.1093/rheumatology/key165>
- M Hartwig, M. L. (2006). Nyeri, dalam Patofisiologi Konsep Klinis Proses-Proses Penyakit. *Terjemahan: Huriawati Hartanto et al, Edisi*.
- Mas'adah. (2017). Model senam rematik sebagai upaya peningkatan aktifitas fungsional lansia di pstw puspakarma mataram. In *Adi Husada Nursing Journal* (Vol. 3, Issue 1).
- Matthews, P. (2010). Religion and the secularization of spirituality: A catholic perspective on spirituality in the care of the elderly. *Journal of Religion, Spirituality and Aging*, 22(4), 283–290.
<https://doi.org/10.1080/15528030.2010.483944>
- Minropa, A., Fridalni, N., Reni, I., Hayati, M., Jumaris, I., Zikra, H., III Keperawatan, P. D., & MERCUBAKTIJAYA Padang, Stik. (2022). *Upaya peningkatan kesehatan lansia dengan rematik di kelurahan ampang melalui pelaksanaan senam rematik* (Vol. 2, Issue 1).
- Motamed-Jahromi, M., & Kaveh, M. H. (2021). Effective Interventions on Improving Elderly's Independence in Activity of Daily Living: A Systematic Review and Logic Model. In *Frontiers in Public Health* (Vol. 8). Frontiers Media S.A.
<https://doi.org/10.3389/fpubh.2020.516151>
- Nasution, F., Rambe, I. M., Ramadani, S. V., Tanjung, N. A., Anjani, N., & Fanani, W. A. (1972). Batasan Usia Dewasa Akhir (Lansia) dan Keadaan Penduduk Lansia di

- Indonesia. In *Edu Society: Jurnal Pendidikan, Ilmu Sosial, dan Pengabdian Kepada Masyarakat* (Vol. 4).
- Notoatmodjo, S. (2014). *Metode Penelitian Ilmu Kesehatan*.
- Pany, M., & Boy, E. (2019). Literature Review Prevalensi Nyeri Pada Lansia. In *Magna Medica* (Vol. 6, Issue 2).
- Pfizer. (2008). *Physical Activity and Health: A Report of the Surgeon General*.
- Rausch Osthoff, A. K., Niedermann, K., Braun, J., Adams, J., Brodin, N., Dagfinrud, H., Duruoz, T., Esbensen, B. A., Günther, K. P., Hurkmans, E., Juhl, C. B., Kennedy, N., Kiltz, U., Knittle, K., Nurmohamed, M., Pais, S., Severijns, G., Swinnen, T. W., Pitsillidou, I. A., ... Vliet Vlieland, T. P. M. (2018). 2018 EULAR recommendations for physical activity in people with inflammatory arthritis and osteoarthritis. In *Annals of the Rheumatic Diseases* (Vol. 77, Issue 9, pp. 1251–1260). BMJ Publishing Group.
<https://doi.org/10.1136/annrheumdis-2018-213585>
- Ribeiro, D. K. de M. N., Lenardt, M. H., Lourenço, T. M., Betiolli, S. E., Seima, M. D., & Guimarães, C. A. (2018). The use of the functional independence measure in elderly. In *Revista gaucha de enfermagem* (Vol. 38, Issue 4, p. e66496). NLM (Medline).
<https://doi.org/10.1590/1983-1447.2017.04.66496>
- Salmas Marsiami, A., Fitria Sari, I., Fahrudiana, F., & Dwi, W. W. (2023). Manfaat senam rematik pada lansia yang mengalami rheumatoid arthritis. In *Indonesian Journal of Health Development* (Vol. 5, Issue 1).
- SC Smeltzer. (2011). Bare BG Buku Ajar Keperawatan Medikal Bedah Edisi 8. *Agung Waluyo (Penterjemah)*.
- Seraji-Bzorgzad, N., Paulson, H., & Heidebrink, J. (2019). Neurologic examination in the elderly. In *Handbook of Clinical Neurology* (Vol. 167, pp. 73–88). Elsevier B.V.
<https://doi.org/10.1016/B978-0-12-804766-8.00005-4>
- Sima, L., Chen, Y. S., & Liu, B. (2022). *Randomized Controlled Trial Radiofrequency Denervation on Lumbar Facet Joint Pain in the Elderly: A Randomized Controlled Prospective Trial*. www.painphysicianjournal.com
- Sitinjak, V. M., Hastuti, M. F., & Nurfianti, A. (2016). *Pengaruh Senam Rematik terhadap Perubahan Skala Nyeri pada Lanjut Usia dengan Osteoarthritis Lutut*.
- Srisuharny, M., Diyah, M., Mahtuti A A Prodi, Y., Keperawatan, S., Maharani, S., Kemenkes, P., & Kesehatan, A. (2020). Perbedaan Tingkat Activity of Daily Living (ADL) antara Lansia Aktif dengan Lansia Tidak Aktif Melakukan Kunjungan ke Posyandu Lansia. In *PROFESIONAL HEALTH JOURNAL* (Vol. 1, Issue 2).
<https://www.ojsstikesbanyuwangi.com>
- Sumarsih, G., Kp, S., & Biomed, M. (2023). *Hubungan dukungan keluarga dengan fungsi kognitif pada lansia*.
- Suri, M., Yanti, R. D., Putri, V. S., S1, P., Keperawatan, I., & Kesehatan, I. (2024). Upaya Peningkatan Kesehatan Lansia Sehat Mandiri dan Produktif di Kelurahan Legok. *Seminar Kesehatan Nasional*, 3.
<https://prosiding.ubr.ac.id/>

- Suryani, N., Jailani, Ms., Suriani, N., Raden Mattaher Jambi, R., & Sulthan Thaha Saifuddin Jambi, U. (2023). *Konsep Populasi dan Sampling Serta Pemilihan Partisipan Ditinjau Dari Penelitian Ilmiah Pendidikan*. <http://ejournal.yayasanpendidikandzurriyatulquran.id/index.php/ihsan>
- Suryanto, D. (2005). Etika Penelitian. *Berkala Arkeologi*, 25(1), 17–22. <https://doi.org/10.30883/jba.v25i1.906>
- Susilowati, T., Suratih, K., Tinggi, S., Kesehatan ', I., & Surakarta, A. (2017). Senam rematik tingkatkan kemandirian lansia dalam melakukan activity daily living di panti wreda dharma bakti surakarta. In *Senam Rematik Tingkatkan* (Vol. 28, Issue 1).
- World Health Organization. (2025, October 1). Ageing and health. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
- Zeng, H., Liu, Y., Zhang, C., Zhang, X., Shen, M., & Zhang, Z. (2024). The mediating effect of expectations regarding aging between psychological resilience and quality of life in rural elderly. *Archives of Public Health*, 82(1). <https://doi.org/10.1186/s13690-024-01470-7>
- Zhang, W., Li, S., & Feldman, M. W. (2005). Gender differences in activity of daily living of the elderly in rural China: Evidence from chaohu. In *Journal of Women and Aging* (Vol. 17, Issue 3, pp. 73–89). https://doi.org/10.1300/J074v17n03_06