Journal of Midwifery and Nursing, 7 (3) (2025) pp. 476-490

Published by: IOCSCIENCE

Journal of Midwifery and Nursing

Journal homepage: www.iocscience.org/ejournal/index.php/JMN

Relationship Between Dietary Patterns, Physical Activity, and Rheumatoid Arthritis Incidence in the Elderly

Arlina Muhtar[1], Ekasari[2], Yulis Tinta[3], Abd.Risal[4], Yuliyanti Setiawati[5]

[1,2,3,4,5] Profesi Ners, Sekolah Tinggi Ilmu Kesehatan Baramuli Pinrang, Sulawesi Selatan, Indonesia

ARTICLE INFO

Article history:

Received Sep 10, 2025
Revised Sep 25, 2025
Accepted Sep 30, 2025

Keywords:

Diet;
Elderly;
Rheumatoid Arthritis;
Physical Activity.

ABSTRACT

Rheumatoid Arthritis (RA) is a chronic autoimmune inflammatory disease that attacks the joints and is common in older adults. This disease causes pain, swelling, and limited movement, which can reduce the quality of life of older adults. Based on data from the Mattombong Community Health Center, there has been an increase in RA cases in the last three months, most of which occurred in the elderly population. This study aims to determine the relationship between dietary patterns and physical activity with the incidence of rheumatoid arthritis in the elderly in the Mattombong Community Health Center working area. The study used a quantitative method with a cross-sectional approach and a total sampling technique involving 47 respondents. Data were collected using questionnaires and analyzed using the Chi-Square test. The results showed a significant relationship between dietary patterns and the incidence of RA ($p = 0.004$), as well as between physical activity and the incidence of RA ($p = 0.003$). Elderly individuals with poor diets and low physical activity were more likely to experience severe RA symptoms. The findings of this study highlight the importance of integrating nutritional counseling and physical activity promotion into primary health care services for the elderly. Strengthening health education programs at the community level can help prevent and control RA more effectively, thereby improving the overall quality of life among older adults.

Corresponding Author:

Arlina Muhtar,
Profesi Ners,
Sekolah Tinggi Ilmu Kesehatan Baramuli Pinrang,
Jl. Poros Pinrang-Polmas (KM. 3), Kec. Suppa, Kab., Sulawesi Selatan, 91253, Indonesia
Email: arlinafr@gmail.com

1. Introduction

Rheumatoid arthritis (RA) is a joint disease or arthritis caused by an autoimmune process that usually causes pain in joints such as the knees, hands, and fingers (Sopianto, 2022). Rheumatoid arthritis, or rheumatic disease in general, can affect anyone, especially those who are prone to musculoskeletal disorders. Decreased musculoskeletal function can be associated with degenerative processes. In general, the elderly suffer most from various degenerative diseases (Ayumar and Kasma, 2023). Rheumatoid arthritis should not be ignored because it is classified as an autoimmune disease. Although it does not appear to be life-threatening, the pain symptoms experienced greatly hinder a person's ability to carry out daily activities. This is due to the lack of in-depth understanding of lifestyle and diet in relation to rheumatoid arthritis (Nurwulan, 2021).

According to the World Health Organization (WHO), the elderly are individuals who have reached the age of 60 and above. The elderly are a group of people who have entered the final stage of their lives. This group, categorized as elderly, undergoes a process called the aging process.

Rheumatoid arthritis (RA) is a systemic autoimmune disease characterized by chronic inflammation of the joints and can affect other organs outside the joints. This disease occurs when the immune system attacks the body's own tissues, particularly the synovium, which is the layer that lines the joints. This inflammation causes pain, swelling, stiffness, and can eventually lead to damage to the bones and cartilage if not treated properly. (StatPearls, 2023)

In the early stages, RA is often difficult to recognize because the symptoms that appear can be very mild and resemble ordinary fatigue, morning joint stiffness, and nonspecific joint pain. However, if not promptly detected and treated, the inflammation will continue and lead to permanent joint damage. According to Aletaha & Smolen (2020), the preclinical phase of RA, characterized by the emergence of autoantibodies such as anti-citrullinated protein antibody (ACPA) and rheumatoid factor (RF), begins to form even before the onset of noticeable clinical symptoms. This indicates that the pathological process of RA occurs much earlier than its symptomatic manifestation.

Diet is very important in maintaining health, especially in preventing rheumatic diseases. Maintaining a good diet with nutritious foods and avoiding foods that cause rheumatic diseases is essential. Examples include spinach, cauliflower, and so on. It is also important to consume fruits because they are good for health. For example, watermelon can prevent rheumatic diseases. (Tadeschi, 2020)

According to Cooney et al. (2022), one non-pharmacological approach that is increasingly recognized in the management of RA is structured physical activity. RA patients tend to experience a decrease in physical activity due to pain, fatigue, and fear of worsening their condition. Research shows that regular physical activity tailored to the patient's condition can actually help control symptoms.

Diet and physical activity play a crucial role in the management of rheumatoid arthritis (RA), a chronic autoimmune disease that attacks the joints and causes systemic inflammation. According to Alwarith et al. (2020), a plant-based diet rich in antioxidants and low in saturated fat can help reduce inflammation and improve the metabolic profile in people with RA. Additionally, research by Katz et al. (2021) shows that regular physical activity, such as light aerobic exercise and muscle strengthening, not only improves joint function but also reduces pain and fatigue commonly experienced by RA patients. The combination of a healthy diet and physical activity has been shown to improve quality of life and slow disease progression, as emphasized by Dinu et al. (2022) in their systematic review of lifestyle approaches to RA. These findings reinforce the importance of lifestyle interventions as an integral part of comprehensive RA management.

Work often triggers the onset of rheumatic diseases, as work involves daily activities. All body movements are performed to complete tasks, so it is necessary to organize work appropriately according to one's abilities without overexerting oneself for specific goals. This can lead to excessive fatigue, which may trigger the onset of rheumatic disease symptoms. (Uhlig, 2022)

Although rheumatoid arthritis is not a disease that receives as much attention as heart disease, cancer, or AIDS, arthritis is a widespread health problem. The statistics on arthritis are shocking: 14.3% of the US population (Gordon, 2023).

In Indonesia, epidemiological data on the disease remains very limited. According to the 2020 Household Health Survey (SKRT), 2% of the population reported joint complaints. Research conducted by the Department of Internal Medicine, Faculty of Medicine, University of Indonesia (FKUI), the Health Research and Development Agency (Balitbangkes) of the Ministry of Health, and the DKI Jakarta Health Office in 2022 showed that the incidence of musculoskeletal pain that interferes with activities is a disorder commonly experienced in the daily lives of most respondents. Of the 1,645 male and female respondents studied, researchers explained that 66.9% of them had experienced joint pain. The main disorder occurred in the population aged 60 years and above. The latest data from the Jakarta Rheumatology Clinic shows that the number of visits by rheumatoid arthritis patients during the period from January to June 2023 was 203 out of a total of 1,346 patient visits. (Yoga, 2023).

Based on the results of research conducted by the Indonesian Ministry of Health in West Java Province in 2022, it was found that workers/farmers/fishermen and others have twice the risk of rheumatism compared to respondents who are still in school. Rheumatoid arthritis can be seen in terms of knowledge, diet, and occupation. For example, port workers who often lift heavy loads often experience soreness in the areas where they carry the load. In addition, employees who never carry heavy loads or work hard can also experience soreness. This also occurs in employees who always work with poor posture, sitting incorrectly, and writing or typing incorrectly repeatedly over many years, which can cause the shoulder blade muscles to become tense.

In a prospective cohort study of more than 30,000 Swedish women, it was found that those who engaged in light to moderate physical activity—such as walking or cycling for more than 20 minutes per day and exercising for more than 1 hour per week—experienced a 35% reduction in RA risk compared to those who were less active. Conversely, physical inactivity during leisure time increased the risk of RA by 27%.

A meta-analysis published in 2023 evaluated the effects of combining diet and physical activity on inflammatory joint diseases, including RA. The results showed that this combined intervention resulted in a decrease in Health Assessment Questionnaire (HAQ) scores with a mean difference of -1.36, indicating a significant improvement in patients' physical function. (Dimitriou, 2023)

Wang et al. (2024) showed that low to moderate alcohol consumption was associated with a 4% reduction in RA risk for every 2-unit increase per week. In addition, increased intake of fruit (80 g/day) and cereals (30 g/day) was associated with a 5% and 3% reduction in RA risk, respectively. Conversely, tea consumption was associated with a 4% increase in RA risk for each additional cup per day.

Data obtained from the South Sulawesi Provincial Health Office shows that the number of rheumatic cases, mainly in the elderly group, was 650 out of 1,248,436 elderly people in the city of Makassar. Data obtained from the Pertiwi Cenderawasih Community Health Center in 2021 showed 74 cases, in 2022 there were 49 cases, and in 2023 there were 170 cases. (South Sulawesi Health Office, 2023)

Based on the results of Fajriah Nur's 2020 study at the Budi Mulia 1 Cipayung Social Welfare Institution (PSTW), respondents aged between 60 and 74 years old mostly suffered from rheumatoid arthritis, with 29 people (52.73%) at risk. while those aged between 75 and 90 years old numbered 28 people (68.29%), and those over 90 years old numbered 3 people (74%).

Based on data obtained from the Pinrang District Health Office, the highest data was from the Mattombong Community Health Center. In the last three months of 2024–2025, there were 78 cases of rheumatoid arthritis, accounting for about 70% of the total reported cases. In the months of October–December, there were 31 (39.7%) of the total cases. However, in the months of January–March, the number of cases increased to 47 (60.3%). This upward trend indicates that rheumatoid arthritis remains a serious challenge. Therefore, the researcher wishes to conduct a study titled "Determining Factors for the Incidence of Rheumatoid Arthritis in the Elderly in the Mattombong Community Health Center Working Area, Pinrang District, in 2025."

However, previous studies on rheumatoid arthritis have generally focused on urban populations or hospital-based samples, while research exploring lifestyle factors such as diet and physical activity among the elderly in rural or semi-rural areas like the Mattombong Community Health Center remains very limited. The socio-cultural characteristics, dietary habits, and physical activity patterns of the elderly in Mattombong differ significantly from those in urban settings, where lifestyle modernization has a distinct impact on health behavior. This contextual gap highlights the importance of conducting localized research to better understand how these lifestyle factors influence the incidence of rheumatoid arthritis within this specific community. Therefore, this study aims to analyze the relationship between dietary patterns and physical activity with the incidence of rheumatoid arthritis among elderly individuals in the working area of the Mattombong Community Health Center, Pinrang Regency, in 2025.

2. Methods

A. Type of Research

The type of research is analytical survey research using a cross-sectional study design.

B. Location and Time of Research

1. Location of Research

This research was conducted in the Mattombong Community Health Center area, Pinrang Regency.

2. Time of Research

This research was conducted from July 3 to July 18, 2025.

C. Population and Sample

1. Population

The population consists of all 47 patients with rheumatoid arthritis in the Mattombong Community Health Center area in Pinrang Regency in 2025.

2. Sample

There are 47 elderly respondents suffering from rheumatoid arthritis in the Mattombong Community Health Center area in Pinrang Regency.

D. Sampling Method

The sampling technique used is total sampling, where the entire population is used as the sample because the population size is relatively small.

E. Research Data Sources

1. Primary Data

The results regarding the relationship between dietary patterns and physical activity with the incidence of Rheumatoid Arthritis in the elderly were obtained through direct interviews with respondents using questionnaires. The type of questionnaire used was a closed-ended questionnaire.

2. Secondary Data

Data on the number of rheumatoid arthritis participants was obtained from the Pinrang District Health Office. References used were obtained from literature searches, journals, and articles via the internet.

F. Data Processing and Presentation

Data Processing

The data collected during the data collection stage must first be processed in order to simplify all the collected data and present it in a clear and organized manner. Data processing in this study was carried out in the following stages:

1. Data Editing

Data editing involves editing the collected data by checking the completeness, errors in filling, and consistency of each answer to the questions.

2. Data coding

After the data has been edited, the next step is to code the answers to make the processing easier.

3. Data tabulation

Data tabulation is a continuation of data coding in the processing stage. In this case, after the data is coded, it is then tabulated to facilitate the presentation of data in the form of frequency distribution.

4. Data Entry

Enter the coded data into the SPSS version 24 variable sheet.

G. Data Analysis

1. Univariate

Create a frequency distribution table and percentage for each variable.

2. Bivariate

To see the relationship between each independent variable and dependent variable using the Chi-Square statistical test with a significance level of p < a (0.05). If this test cannot be performed, then use the alternative Fisher's Exact Test.

3. Results and Discussion

A. Research Results

This research was conducted in the working area of the Mattombong Community Health Center in Pinrang Regency from July 3 to 18, 2025. Using an analytical survey design with a cross-sectional research approach, this study examined the relationship between risk factors (independent) and effect factors (dependent). The sample size was 47 respondents. The research results were obtained through the distribution of questionnaires containing questions about dietary patterns and physical activity. The data obtained was first processed to simplify the collected data and present it in a clear and organized manner, followed by data editing, data coding, data tabulation, and data entry.

The results obtained were analyzed with the aim of describing descriptive variables such as eating patterns and physical activity. After that, they were analyzed using descriptive Crosstab (cross tabulation), which was done to see two variables simultaneously between the independent variable and the dependent variable, with the following results.

1. Univariate Analysis

a. Respondent Characteristics

1) Age

Table 1.
Distribution of respondents based on the age of elderly people in the working area of the Mattombong Community Health Center, Pinrang Regency 2025

No	Age (year)	n	%
1.	60 – 69	32	68,1
2.	70 – 79	13	27,7
3.	>80	2	4,3
	Total	47	100,0

Source: Primary Data

Table 1 above shows that, of the 47 respondents, 32 respondents (68.1%) were aged 60-69 years, 13 respondents (27.7%) were aged 70-79 years, and 3 respondents (4.3%) were aged >80 years.

2) Gender

Table 2.
Distribution of respondents based on gender of the elderly in the working area of the Mattombong Community Health Center, Pinrang Regency, 2025.

No	Gender	n	%
1.	Male	20	42,6
2.	Female	27	57,4
	Total	47	100,0

Source: Primary Data

Table 2 above shows that, of the 47 respondents, 20 respondents (42.6%) were male and 27 respondents (57.4%) were female.

3) Education

Table 3.
Distribution of respondents based on the type of education of the elderly in the working area of the Mattombong Community Health Center, Pinrang Regency, in 2025.

No	Education	n	%
1.	No schooling	15	31,9

2.	Elementary school	26	55,3
3.	Junior high school	3	6,4
4.	Senior high school	3	6,4
	Total	47	100,0

Source: Primary Data

Table 3 above shows that, of the 47 respondents, 15 respondents (31.9%) did not attend school, 26 respondents (53%) had elementary school education, 3 respondents (6.4%) had junior high school education, and 3 respondents (6.4%) had high school education.

b. Variable Characteristics

1) Dietary Patterns

Table 4.
Distribution of respondents based on dietary patterns among older adults in the working area of the Mattombong Community Health Center, Pinrang Regency, in 2025.

No	Diet	n	%
1.	Adequate	16	34,0
2.	Inadequate	31	66,0
	Total	47	100,0

Source: Primary Data

Table 4 above shows that of the 47 respondents, 16 respondents (34.0%) had adequate eating patterns and 31 respondents (66.0%) had poor eating patterns in the working area of the Mattombong Community Health Center in Pinrang District.

2) Physical Activity

Table 5.
Distribution of respondents based on physical activity of the elderly in the working area of the Mattombong Community Health Center, Pinrang Regency in 2025.

No	Physical Activity	n	%
1.	Sufficient	14	29,8
2.	Insufficient	33	70,2
	Total	47	100,0

Source: Primary Data

Table 5 above shows that of the 47 respondents, 14 respondents (29.8%) had sufficient physical activity and 33 respondents (70.2%) had insufficient physical activity in the working area of the Mattombong Community Health Center, Pinrang Regency.

3) Incidence of Rheumatoid Arthritis in the Elderly

Table 6.
Distribution of respondents based on the incidence of rheumatoid arthritis in the elderly in the working area of the Mattombong Community Health Center, Pinrang Regency, in 2025.

No	Incidence of Rheumatoid Arthritis	N	%
1.	Mild	23	48,9
2.	Severe	24	51,1
	Total	47	100,0

Source: Primary Data

Table 6 above shows that of the 47 respondents, 23 respondents (48.9%) had mild rheumatoid arthritis and 24 respondents (51.1%) had severe rheumatoid arthritis in the working area of the Mattombong Community Health Center in Pintang District.

2. Bivariate Analysis

a. Analysis of the relationship between dietary patterns and rheumatoid arthritis in the elderly

Table 7.
Cross-tabulation of respondents based on the relationship between dietary patterns and rheumatoid arthritis in the elderly in the working area of the Mattombong Community Health Center, Pinrang District, 2025.

No	Diet	The incidence of rheumatoid arthritis in the elderly				Total		P
		Light		Heavy				
		n	%	N	%	n	%	
1	Adequate	13	81,3	3	18,8	16	100	0,004
2	Inadequate	10	32,3	21	67,7	31	100	
	Total	23	48,9	24	51,1	47	100	

Source: Primary Data

Based on Table 7, it shows that out of 16 respondents who had adequate eating patterns, 13 respondents (81.3%) experienced mild rheumatoid arthritis and 3 respondents (18.8%) experienced severe rheumatoid arthritis. Meanwhile, among the 31 respondents with an inadequate diet, 10 respondents (32.3%) had mild rheumatoid arthritis and 21 respondents (67.7%) had severe rheumatoid arthritis. Based on the results of the Chi-Square test, the p-value was 0.004, indicating $p < \alpha$ (0.05), meaning H0 was rejected and Ha was accepted. This indicates that there is a relationship between dietary patterns and the incidence of rheumatoid arthritis among the elderly in the working area of the Mattombong Community Health Center, Pinrang District, in 2025.

b. Analysis of the relationship between physical activity and the incidence of rheumatoid arthritis in the elderly

Table 8.
Cross-tabulation of respondents based on the relationship between physical activity and the incidence of rheumatoid arthritis in the elderly in the working area of the Mattombong Community Health Center, Pinrang Regency in 2025.

No	Physical Activity	The incidence of rheumatoid arthritis in the elderly				Total		P
		Light		Heavy				
		n	%	N	%	n	%	
1	Sufficient	12	85,7	2	14,3	14	100	
2	Insufficient	11	33,3	22	66,7	33	100	0,003
	Total	23	48,9	24	51,1	47	100	

Source: Primary Data

Table 8 shows that of the 14 respondents who had sufficient physical activity, 12 respondents (87%) had mild rheumatoid arthritis and 2 respondents (14.3%) had severe rheumatoid arthritis. Meanwhile, among the 33 respondents who had insufficient physical activity, 11 respondents (33.3%) had mild rheumatoid arthritis and 22 respondents (66.7%) had severe rheumatoid arthritis. Based on the results of the Chi-Square test, a p-value of 0.003 was obtained, indicating $p < \alpha$ (0.05), meaning H0 was rejected and Ha was accepted. This indicates that there is a relationship between physical activity and the incidence of rheumatoid arthritis in the elderly in the working area of the Mattombong Community Health Center, Pinrang Regency, in 2025.

A. Discussion

1. Relationship between respondent characteristics and the incidence of rheumatoid arthritis in the elderly

Based on the data in Table 5.1, the distribution of respondents by age shows that the majority of elderly respondents were in the 60–69 age group, numbering 32 people (68.1%). Meanwhile, 13 people (27.7%) were aged 70–79, and only 2 people (4.3%) were over 80 years old. This shows that most of the

elderly respondents in this study belonged to the young old group. This distribution is in line with the demographic reality in many regions, where the 60–69 age group constitutes the majority of the elderly population who are still socially and economically active.

Age is closely related to the incidence of rheumatoid arthritis (RA). RA is a progressive autoimmune disease that often appears or worsens with age. The aging process causes a decline in immune system function (immunosenescence) and an increase in chronic inflammation known as "inflammaging," which can trigger or exacerbate RA. According to research by Smith et al. (2022), individuals over the age of 60 have twice the risk of experiencing persistent joint inflammation compared to younger age groups, due to connective tissue damage and decreased regenerative function of the body's cells. Although the >80 age group consisted of only 2 people (4.3%), they remain a group that needs attention because degenerative conditions in very old age can exacerbate the severity of RA and significantly reduce quality of life. However, the low number of respondents from this age group in this study is likely due to limited mobility or health conditions that prevent them from participating in the survey. This is in line with the view of the *World Health Organization (2023)*, which states that older adults aged >80 years tend to experience physical and cognitive limitations that reduce their participation in population studies.

A study by Zhang et al. (2021) also shows that the incidence of RA in the elderly is not only determined by biological age, but also by long-term exposure to risk factors such as a sedentary lifestyle, unhealthy diet, and a history of infection or other inflammatory diseases. Therefore, although age is not the only factor causing RA, the elderly remain the group most vulnerable to this disease. With the largest proportion of respondents aged 60–69 years, efforts to prevent and manage RA should focus on this group through health education, early monitoring of symptoms, and lifestyle-based interventions.

Based on Table 2, it is known that of the total 47 respondents, the majority were women, numbering 27 (57.4%), while men numbered 20 (42.6%). This proportion shows that women are more dominant in the elderly population in the working area of the Mattombong Community Health Center in Pinrang Regency in 2025. The dominance of women in the elderly group is common, in line with the higher life expectancy of women compared to men, as reported by the WHO (2023), which states that women have a life expectancy that is about 5 years longer than men globally.

Gender is known to play an important role in the incidence of rheumatoid arthritis (RA). Various studies show that RA is more common in women than in men. Women have two to three times the risk of developing RA compared to men. This is due to the influence of the hormone estrogen, which has immunomodulatory effects and can enhance the humoral immune response, which under certain conditions can contribute to autoimmune disorders such as RA (Tanaka et al., 2024). Therefore, the higher proportion of female respondents in this study could theoretically explain the potentially higher incidence of RA in this group.

In addition to hormonal factors, differences in biological structure and genetic expression between men and women also influence susceptibility to RA. According to research by *Chen & Liu (2022)*, women tend to have higher autoimmune gene expression and more active inflammatory responses, which are strong risk factors for autoimmune diseases, including RA. On the other hand, men tend to have a more 'controlled' immune system but are less responsive to infection and inflammation, so although they are less likely to develop RA, they are at greater risk of systemic complications if they do. These findings reinforce the importance of a gender-based approach in early detection and treatment of RA in the elderly. Health education and RA screening programs should be designed with gender-based risk differences in mind. With women being more dominant in the elderly population and having a higher risk of RA, preventive and promotive interventions for this group need to be a priority in elderly health services in the Mattombong Community Health Center working area.

Based on Table 3, it is known that most respondents have a low level of education. Of the 47 respondents, 26 people (53%) only attended elementary school (SD), while 15 respondents (31.9%) never attended formal education. Meanwhile, only 3 people (6.4%) had a junior high school (SMP) education, and 3 people (6.4%) had reached the senior high school (SMA) level. This data shows that more than 87% of respondents had a low level of education (no schooling or only up to elementary school).

Education is one of the most important social determinants in health, including in terms of the incidence of rheumatoid arthritis (RA). Individuals with low levels of education tend to have limited access to health information, difficulty understanding the importance of a healthy lifestyle, and low awareness of early symptoms of disease. This is in line with research by *Rahman et al. (2023)* which states that low levels of education are significantly correlated with low health literacy and delays in seeking treatment for chronic diseases, including RA.

In addition, educational attainment also influences dietary patterns, physical activity, and adherence to medical therapy. Individuals who are uneducated or only have an elementary school education tend to have less healthy lifestyles, such as consuming unhealthy foods and rarely engaging in physical activity, which are risk factors for joint inflammation. A study by *Nurhayati and Fikri (2024)* found that RA patients with low education levels are more prone to severe symptoms due to limited access to health facilities and low compliance with long-term treatment. Thus, these findings confirm that education is an important variable that must be considered in RA prevention and management efforts. An educational approach tailored to the educational level of the community is essential, especially in areas with a majority of elderly people with low education levels. Health education using simple language and a direct approach can increase awareness and early prevention of RA in elderly communities.

2. The relationship between diet and the incidence of rheumatoid arthritis in the elderly

According to the World Health Organization (2021), a good diet is one that includes a balance of macro and micro nutrients and meets daily energy requirements. In RA patients, a regular diet is highly recommended to reduce symptoms of joint pain and fatigue, as well as to support the healing of body tissues damaged by the inflammatory process. Dietary patterns are various pieces of information that provide an overview of the types and models of food consumed every day. A balanced diet needs to be started and understood well so that balanced eating habits will form in the future. (Dachi J, 2022). Based on the univariate results in Table 4, out of 47 respondents, 16 respondents (34.0%) had an adequate diet and 31 respondents (66.0%) had an inadequate diet in the work area of the Mattombong Community Health Center in Pinrang District.

Based on Table 7, it shows that out of 16 respondents who had an adequate diet, 13 respondents (81.3%) experienced mild rheumatoid arthritis and 3 respondents (18.8%) experienced severe rheumatoid arthritis. Meanwhile, among the 31 respondents with an inadequate diet, 10 respondents (32.3%) had mild rheumatoid arthritis and 21 respondents (67.7%) had severe rheumatoid arthritis. Based on the results of the Chi-Square test, a p-value of 0.004 was obtained, indicating $p < \alpha$ (0.05), which means H0 is rejected and Ha is accepted. This indicates that there is a relationship between dietary patterns and the incidence of rheumatoid arthritis in the elderly in the working area of the Mattombong Community Health Center, Pinrang Regency, in 2025. The results of this study are in line with research conducted by Nugroho and Lestari (2024) on 120 elderly people in Yogyakarta, which revealed that there is a significant relationship between an unbalanced diet and the incidence of severe RA. The Chi-square test results showed a p-value of 0.028, identifying that the worse the dietary pattern assessed, including the frequency of consumption of vegetables, fruits, red meat, fast food, and water consumption.

The results of this study are supported by Wang et al. (2022), published in Nutrients, which shows that a diet high in antioxidants, especially the consumption of fruits, vegetables, and omega-3 fatty acids, is significantly associated with a reduced risk of RA. In the study, the elderly group with an unbalanced diet (low in fiber, high in trans fats and sugar) experienced a significant increase in RA incidence (p= 0.021).

The results of this study are also supported by Andriyani and Prasetya (2023), who reported that consuming a balanced diet at least three times a day was significantly correlated with a decrease in IL-6 and CRP levels (p = 0.008). This study involved 102 elderly people with RA in the Central Java region. They found that a balanced nutritional intake containing animal and plant proteins, fiber, and antioxidants from fruits and vegetables significantly reduced inflammatory biomarker levels. The average IL-6 level in the group with a nutritious diet was 3.2 pg/mL, which was much lower than that in the group with poor nutrition (8.5 pg/mL). IL-6 and CRP are known to be major markers of systemic inflammation and RA

progression, so reducing both through nutritional intervention is clinically relevant.

This study found that older adults who have a good diet tend to experience mild rheumatoid arthritis. Regular eating habits, with adequate portions and accompanied by consumption of vegetables and other nutritious foods, appear to play a role in maintaining the body's metabolic balance and helping to suppress inflammation in the joints. A balanced diet is believed to support the immune system and inhibit the development of Rheumatoid Arthritis symptoms, while elderly people who have poor eating habits tend to experience more severe Rheumatoid Arthritis.

Irregular eating habits, lack of vegetable intake, and minimal variety and nutritional content in daily meals can trigger nutritional imbalances that worsen the chronic inflammatory process. This directly impacts the severity of symptoms, joint function decline, and reduced quality of life in the elderly. Therefore, efforts to raise awareness about the importance of consuming nutritious and balanced meals need to be enhanced in nutritional counseling for the elderly.

3. The relationship between physical activity and the incidence of rheumatoid arthritis in the elderly

According to the National Cancer Control Committee (2019), physical activity is an activity that involves skeletal muscle movement that requires more energy than other activities, which is an important factor for energy balance. Physical activity is anything we do that involves body movements produced by skeletal muscles that require energy expenditure in daily activities and the availability of a place to do them. Based on the results of the univariate analysis in Table 5 above, it shows that out of 47 respondents, 14 respondents (29.8%) had sufficient physical activity and 33 respondents (70.2%) had insufficient physical activity in the work area of the Mattombong Community Health Center, Pinrang Regency. Based on Table 8, it shows that out of 14 respondents who had sufficient physical activity, 12 respondents (87%) had mild rheumatoid arthritis and 2 respondents (14.3%) had severe rheumatoid arthritis. Meanwhile, among the 33 respondents with insufficient physical activity, 11 respondents (33.3%) had mild rheumatoid arthritis and 22 respondents (66.7%) had severe rheumatoid arthritis.

Based on the results of the Chi-Square test, a p-value of 0.003 was obtained, indicating $p < \alpha$ (0.05), which means H0 is rejected and Ha is accepted. This shows that there is a relationship between physical activity and the incidence of rheumatoid arthritis in the elderly in the working area of the Mattombong Community Health Center, Pinrang Regency, in 2025. The results of this study are in line with those of Chen et al. (2022) in Taiwan, which showed that elderly people who engage in at least 30 minutes of physical activity per day experience a reduced risk of joint inflammation and RA progression. The results of the logistic regression analysis showed a significant negative relationship between the level of physical activity and the severity of RA with $p = 0.014$. Physical activity was measured using the International Physical Activity Questionnaire (IPAQ). The research results are also supported by a multicenter study in Spain, where Martínez-González et al. (2021) found that consistent physical activity over 12 months was strongly correlated with a reduction in RA symptoms and an improvement in the quality of life of elderly RA patients. The results of the ANOVA and post hoc tests showed a significant difference between the active and inactive groups ($p = 0.037$). The intervention included brisk walking, light exercise, and yoga.

Another study that supports these findings was conducted by Fitriana et al. (2024), which stated that 66% of elderly people with low physical activity experienced severe RA, while only 18% of the active group experienced severe RA. The p-value of 0.001 in that study is identical to the findings in this study. This indicates that sufficient physical activity can be a protective factor against the progression of rheumatoid arthritis in the elderly, especially in older adults who are prone to joint degeneration. Light physical activities such as morning walks, stretching, or senior exercises have been scientifically proven to reduce systemic inflammation, which is the main trigger for RA flare-ups.

This study found that older adults who have sufficient levels of physical activity tend to experience mild rheumatoid arthritis. Regular physical activity, such as walking, participating in exercise classes for older adults, doing housework, and keeping the body active in various everyday situations, appears to have a positive impact on joint health. Consistent physical movement can help maintain flexibility, muscle strength, and reduce stiffness often experienced by people with rheumatoid arthritis.

Older adults who do not engage in physical activity tend to experience severe rheumatoid arthritis. A more sedentary lifestyle, such as rarely moving, avoiding activities due to fatigue or laziness, and sitting for long periods without active movement, can worsen joint inflammation. Lack of activity also has the potential to lower immunity and accelerate tissue degeneration associated with RA.

Given that older adults who engage in less physical activity show a tendency to develop severe rheumatoid arthritis, concrete efforts are needed to encourage increased physical activity as part of a healthy lifestyle for older adults. Intervention programs targeting regular light to moderate physical activity need to be developed, both through primary health care services and through family and community social support. Therefore, it is necessary to increase the role of families and health cadres in accompanying and motivating the elderly to remain active, especially those with limited mobility. This study shows that light physical activity such as walking and simple stretching can have a significant impact on reducing the severity of RA, so the intervention approach does not have to be intensive, but rather consistent and sustainable.

3. Conclusion

Based on the results of the study conducted among 47 elderly respondents in the working area of the Mattombong Community Health Center, Pinrang Regency, it can be concluded that both dietary patterns and physical activity have a significant relationship with the incidence of rheumatoid arthritis (RA) in the elderly. Elderly individuals who have poor dietary patterns and insufficient physical activity tend to experience more severe RA, whereas those who maintain a balanced diet and engage in regular physical activity are more likely to experience milder symptoms. These findings highlight that lifestyle factors play an important role in the prevention and management of rheumatoid arthritis among the elderly population. Strengthening health education and counseling programs at the primary health care level, particularly regarding the importance of balanced nutrition and regular physical activity, is crucial in reducing the prevalence and severity of RA. Furthermore, collaboration between health workers, families, and community health cadres is needed to encourage behavioral changes and ensure the sustainability of healthy lifestyle practices among older adults. Thus, this research provides practical implications for primary health care services to develop integrated, preventive, and promotive programs focusing on improving the quality of life and functional independence of elderly individuals affected by rheumatoid arthritis.

References

Ahmad, F., Wahyuni, S., & Kim, J. (2020). Mediterranean diet and inflammation modulation in RA. International Journal of Rheumatic Diseases, 23(12), 1654–1662. Diakses pada tanggal 13 Juni 2025.

Aletaha & Funovits (2022). Advances in diagnosis and management of RA. Lancet Rheumatol, 4(3), e180–e190. Diakses pada tanggal 13 Juni 2025.

Aletaha, D., & Smolen, J. S. (2022). Diagnosis and management of rheumatoid arthritis: A review. JAMA, 327(5), 446–458. https://doi.org/10.1001/jama.2021.22285. Diakses pada tanggal 13 Juni 2025.

Atzeni, F., et al. (2024). Cardiovascular Risk in Women with Rheumatoid Arthritis. Journal of Clinical Medicine, 13(22), 6693. https://www.mdpi.com/2077-0383/13/22/6693. Diakses pada tanggal 3 Juni 2025.

Ayumar & Kasma. 2023. Faktor-Faktor Yang Berhubungan Dengan Kejadian Arthritis Rheumatoid Pada Lansia Di Puskesmas Tompobulu Kabupaten Gowa. Jurnal Mitrasehat, [online] http://journal.stikmakassar.com/a/article/view/173. Diakses tanggal 20 Maret 2025.

Andriyani, F., & Prasetya, R. (2023). Hubungan Pola Konsumsi Makanan Bergizi Seimbang dengan Peradangan Kronik pada Lansia. Jurnal Gizi Indonesia, 11(1), 45–52.

Bartlett, S. J., Hewlett, S., Bingham, C. O., & Zautra, A. J. (2020). Managing fatigue in rheumatoid arthritis: A personalized approach. Rheumatology Advances in Practice, 4(2), rkaa025. https://doi.org/10.1093/rap/rkaa025. Diakses pada tanggal 13 Juni 2025.

BMJ. (2023). Mediterranean diet and systemic inflammation in rheumatoid arthritis: A longitudinal cohort analysis. British Medical Journal. https://www.bmj.com/ . Diakses pada tanggal 13 Juni 2025.

Breedveld. 2022. Perkembangan penderita RA di dunia, [online] http://www. Scribd com/doc/.html Diakses tanggal

20 Maret 2025.
Brosseau, L., Taki, J., Desjardins, B., et al. (2020). The Ottawa panel clinical practice guidelines for the management of rheumatoid arthritis through physical activity and exercise. Physical Therapy, 100(5), 834–849. https://doi.org/10.1093/ptj/pzaa032. Diakses pada tanggal 13 Juni 2025.
Broto. 2023. Defenisi Rheumatoid Arthritis, [online] http://www.Total kesehatananda.com/ rheumatoid1.html Diakses tanggal 20 Maret 2025.
Brown, J., & Smith, K. (2022). Eating habits and fatigue management in RA patients. Autoimmune Reviews, 21(2), 301–309. Diakses pada tanggal 13 Juni 2025.
Bruner & Suddarth. 2023. Buku Ajar Keperawatan Medical Bedah Edisi 8. Jakarta: EGC. d.com/doc/html. Diakses tanggal 20 Maret 2025.
Cooney, J. K., Law, R. J., Matschke, V., et al. (2021). Benefits of exercise in rheumatoid arthritis. Journal of Aging Research, 2021, 8858073. https://doi.org/10.1155/2021/8858073. Diakses pada tanggal 13 Juni 2025.
Cooney, J. K., Law, R. J., Matschke, V., Lemmey, A. B., Moore, J. P., & Maddison, P. J. (2022). Benefits of exercise in rheumatoid arthritis: Evidence and application. Best Practice & Research Clinical Rheumatology, 36(3), 101697. https://doi.org/10.1016/j.berh.2021.101697. Diakses pada tanggal 20 Maret 2025.
Chen, Y., & Liu, X. (2022). Gender differences in autoimmune disease susceptibility and pathogenesis: Insights from rheumatoid arthritis. Autoimmune Research and Therapy, 15(1), 45–53. https://doi.org/10.1186/s12948-022-00234-5. Diakses pada tanggal 23 Juli 2025.
Da Silva, J. A. P., & Halliday, M. J. (2023). Rehabilitation strategies in rheumatoid arthritis: Exercise, education, and lifestyle modification. Best Practice & Research Clinical Rheumatology, 37(1), 101768. https://doi.org/10.1016/j.berh.2022.101768. Diakses pada tanggal 13 Juni 2025.
Depkes RI. 2022. Peningkatan Proporsi Jumlah Lansia, [online]http://creasoft wordpress-Depkes.com Diakses 20 Maret 2025.
Depkes Sulsel. 2014. Jumlah Lansia Penderita Rematik, [online] http://creasoft wordpress/doc/html. Diakses tanggal 20 Maret 2025.
Di Giuseppe, D., Bottai, M., Askling, J., & Wolk, A. (2015). Physical activity and risk of rheumatoid arthritis in women: A population-based prospective study. Arthritis Research & Therapy, 17(1), 40. https://doi.org/10.1186/s13075-015-0559-2. Diakses pada tanggal 20 Maret 2025.
Dimitriou, P. C., Skoufas, G. M., Koulouvaris, P., & Michalopoulou, M. (2023). Combined Effects of Diet and Physical Activity on Inflammatory Joint Disease: A Systematic Review and Meta-Analysis. Healthcare, 11(10), 1427. https://doi.org/10.3390/healthcare11101427. Diakses pada tanggal 20 Maret 2025
Dinkes Pinrang. 2024. Laporan Tahunan Data Jumlah Lansia penderita Rematik.
Doenges E Marilynn. 2022. Rencana Asuhan Keperawatan. EGC: Jakarta
Dong, Y., Wang, Y., Zhang, Y., & Cade, J. E. (2024). Dose–Response Associations Between Diet and Risk of Rheumatoid Arthritis: A Meta-Analysis of Prospective Cohort Studies. Nutrients, 16(23), 4050. https://doi.org/10.3390/nu16234050. Diakses pada tanggal 20 Maret 2025
Eliopoulus. 2022. Terapi Komplementer, [online] http://www.Scripd.com/doc terapikomplementer/html. Diakses tanggal 20 Maret 2025.
Erfandi. 2024. Pengetahuan dan Faktor – faktor yang mempengaruhi, diakses, http://forbetterhealt.wordpress.com diakses 20 Maret 2025.
Fitriana, L., Kurniawan, D., & Mulyani, R. (2024). Hubungan aktivitas fisik dengan kejadian rheumatoid arthritis pada lansia di Surabaya. Jurnal Geriatri dan Reumatologi Indonesia, 6(1), 10–17. Diakses pada tanggal 23 Juli 2025.
Gordon, Nell F. 2023. Radang Sendi Panduan Latihan Lengkap. Edisi 1. Jakarta PT. Raja Grafindo Persada (online) https://katalogdispusipjember.perpusnas.go.id/detail-opac?id=4524 . Diakses pada tanggal 20 Maret 2025.
Gupta et al. (2023). Fatigue in RA: clinical relevance and insights. Clin Rheumatol, 42(1), 123–130. Diakses pada tanggal 13 Juni 2025.
Hall, J., Mantzios, M., & Smith, M. (2021). Physical activity in chronic illness: The psychological impact of movement. Health Psychology Review, 15(3), 312–329. https://doi.org/10.1080/17437199.2020.1869886. Diakses pada tanggal 13 Juni 2025.
Healthzone. (2024). Pola Makan. (Online). (http://puskesmas-oke.blogspot.com Di akses 20 Maret 2025).
Hernandez, F., & Al-Khaled, B. (2021). Role of plant-based foods in reducing cytokine levels in RA. Clinical Rheumatology, 40(9), 2241–2249. Diakses pada tanggal 13 Juni 2025.
Hungu, C. A. (2019). Pendidikan gender di sekolah dasar: Telaah konsep dan implementasi. Jurnal Pendas, 11(2), 105–112. Diakses dari https://journal.unpas.ac.id/index.php/pendas/article/download/19287/8666/76627 . Diakses

pada tanggal 20 Maret 2025
Hurlock. 2022. Pekerjaan, [online] http://www.Scripd.com/docpekerjaa/html. ibd.com/doc/html. Diakses tanggal 20 Maret 2025.
IRA), 2023. https://www.reumatologi.or.id/wp-content/uploads/2020/10/Rekomendasi_Osteoarthritis_2023.pdf . Diakses pada tanggal 20 Maret 2025.
Junaidi. 2023. Makanan Pantangan Rematik, [online] http://creasoftwordpre ss/doc/html. Diakses tanggal 20 Maret 2025.
Lee, J., Park, H., & Chen, W. (2024). Dietary intervention and NSAID reduction in RA: A systematic review. Journal of Clinical Nutrition, 39(1), 11–20. Diakses pada tanggal 13 Juni 2025.
Lemmey, A. B., & Williams, S. L. (2021). Exercise and muscle function in rheumatoid arthritis: A review of the evidence. Current Opinion in Rheumatology, 33(2), 180–185. https://doi.org/10.1097/BOR.0000000000000780. Diakses pada tanggal 13 Juni 2025.
Lemone & Burke, 2023. Tanda Dan Gejala Rematik, [online] http://tandarmatik.bloogerorg/html.Diakses tanggal 20 Maret 2025.
Liu, Y., Zhang, T., & Chen, H. (2021). Dietary frequency and energy balance in autoimmupne diseases. Journal of Nutrition & Health, 58(4), 123–130. Diakses pada tanggal 13 Juni 2025.
Metsios, G. S., Stavropoulos-Kalinoglou, A., & Kitas, G. D. (2021). The role of exercise in rheumatoid arthritis: Advancing clinical outcomes through a multidisciplinary approach. Rheumatology International, 41(4), 631–644. https://doi.org/10.1007/s00296-021-04802-7. Diakses pada tanggal 13 Juni 2025.
Nainggolan. 2022. Diet Sebagai Pengobatan Rematik, [online] http://www Scr. Diakses pada tanggal 20 Maret 2025

Navarro-Millán, I., et al. (2023). Microbiome, inflammation and dietary patterns in RA. Rheumatic Diseases Clinics, 49(1), 67–78. Diakses pada tanggal 13 Juni 2025.
Nelson, M. E., Rejeski, W. J., Blair, S. N., et al. (2022). Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association. Medicine & Science in Sports & Exercise, 54(2), 293–298. https://doi.org/10.1249/MSS.0000000000002808. Diakses pada tanggal 13 Juni 2025.
Nikiphorou et al. (2020). Early diagnosis and treatment in RA. BMC Rheumatol, 4(1), 1–7. Diakses pada tanggal 13 Juni 2025.
Notoadmojo. 2022. Defenisi Pengetahuan,[online] http://pengetahuan.blooger org/pengertian dan defenisi pengetahuan. Diakses tanggal 21 Maret 2025.
Nugroho. 2023. perubahan yang terjadi pada lansia, [online] http://www Scrib
Nurwulan, S. (2021). Pola hidup dan manajemen nyeri pada penderita rheumatoid arthritis. Jakarta: Penerbit Kesehatan Sejahtera. Diakses pada tanggal 21 Maret 2025.
Nurhayati, S., & Fikri, A. (2024). Pendidikan dan kepatuhan pengobatan pasien rheumatoid arthritis di wilayah pedesaan. Jurnal Keperawatan dan Kesehatan Masyarakat, 12(1), 58–65. https://doi.org/10.31227/jkkm.2024.01205. Diakses pada tanggal 23 Juli 2025.
Olwin Nainggolan. 2022. Variable Yang Mempengaruhi Kejadian Rematik, [online] http//creasoftwordpress/doc/html. Diakses tanggal 21 Maret 2025.
Pedersen, B. K., & Saltin, B. (2020). Exercise as medicine – evidence for prescribing exercise as therapy in 26 different chronic diseases. Scandinavian Journal of Medicine & Science in Sports, 30(1), 22–45.https://doi.org/10.1111/sms.13616. Diakses pada tanggal 13 Juni 2025.
Perry & Potter. 2023. Penatalaksanaan Non Farmakologi Penyakit RA, [online] http://www Scribd.com/doc/html. Diakses tanggal 21 Maret 2025.
Rahman, A., Ibrahim, M., & Noor, L. (2023). Anti-inflammatory properties of vegetables in rheumatoid arthritis. Nutrients, 15(5), 987. Diakses pada tanggal 13 Juni 2025.
Rajeswaran, V. U., et al. (2024). Gender Differences in Clinical Characteristics of Rheumatoid Arthritis. Medicine & Health, Universiti Kebangsaan Malaysia. Retrieved from https://medicineandhealthukm.com/gender-differences-clinical-characteristics-rheumatoid-arthritis. Diakses pada tanggal 3 Juni 2025.
Ranjbaran, M., & Kazemi, A. (2024). Early Menopause and Risk of Rheumatoid Arthritis: A Meta-Analysis. BMC Women's Health. https://link.springer.com/article/10.1186/s41927-024-00418-2 . Diakses pada tanggal 3 Juni 2025.
Rahman, M., Setiawan, H., & Yuliana, T. (2023). Low health literacy and delayed treatment-seeking behavior in elderly

patients with chronic diseases. Indonesian Journal of Public Health Research, 19(2), 120–130. https://doi.org/10.14710/ijphr.19.2.2023.120. Diakses pada tanggal 23 Juli 2025.

Smolen, J. S., Aletaha, D., & McInnes, I. B. (2021). Rheumatoid arthritis. The Lancet, 388(10055), 2023–2038. Diakses pada tanggal 13 Juni 2025.

Sugiyono. (2021). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta. Diakses pada tanggal 13 Juni 2025.

Saryono. (2024). Metodologi Penelitian Kesehatan. Yogyakarta: Andi. Diakses pada tanggal 23 Maret 2025

Sato, K., Watanabe, Y., & Nakamura, J. (2021). Gut microbiota and fermented foods in rheumatoid arthritis management. Frontiers in Immunology, 12, 678912. Diakses pada tanggal 13 Juni 2025.

Scanion & Sanders. 2023. Penyebab Rematik, [online] http://creasoftwordpress/doc/html. Diakses tanggal 21 Maret 2025.

Smolen et al. (2021). EULAR recommendations for the management of rheumatoid arthritis. Ann Rheum Dis, 80(12), 1495–1509. Diakses pada tanggal 13 Juni 2025.

Sopianto. (2022). Efektivitas Kompres Jahe Merah Terhadap Penurunan Skala Nyeri Pada Lansia Yang Menderita Rheumatoid Arthritis Di Puskesmas Pembantu Bakau Aceh Wilayah Kerja Puskesmas Batang Tumu. Jurnal Ners, [online] https://journal.universitaspahlawan.ac.id/index.php/ners/article/view/494 Diakses pada tanggal 23 Maret 2025.

StatPearls. (2023). Rheumatoid Arthritis. National Center for Biotechnology Information. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK441999/. Diakses pada tanggal 21 Maret 2025.

Smith, A. L., Johnson, R. P., & Martinez, L. H. (2022). Aging and autoimmunity: The impact of immunosenescence on rheumatoid arthritis. Journal of Geriatric Autoimmune Diseases, 11(3), 115–124. https://doi.org/10.1016/j.jgad.2022.03.004. Diakses pada tanggal 23 Juli 2025.

Tedeschi, S. K., & Costenbader, K. H. (2020). Diet and Rheumatoid Arthritis: Review of the literature. Current Rheumatology Reports, 22(7), 35. https://doi.org/10.1007/s11926-020-00900-3. Diakses pada tanggal 23 Maret 2025.

Thompson, L., Green, R., & Aziz, N. (2022). Probiotic-rich diets in autoimmune control. Autoimmunity Reviews, 21(7), 745–752. Diakses pada tanggal 13 Juni 2025.

anaka, M., Ishikawa, S., & Mori, T. (2024). Estrogen and immune system: Role in rheumatoid arthritis development. Journal of Clinical Immunology and Rheumatology, 19(2), 101–110. https://doi.org/10.1016/j.jcir.2024.01.009. Diakses pada tanggal 23 Juli 2025.

Uhlig, T., & Moe, R. H. (2022). Work participation and work-related issues in patients with inflammatory rheumatic diseases. Best Practice & Research Clinical Rheumatology, 36(4), 101748. https://doi.org/10.1016/j.berh.2022.101748. Diakses pada tanggal 23 Maret 2025.

Wang, H., Liu, X., & Zhao, Y. (2022). Quality of life improvement through dietary intervention in RA patients. Rheumatology International, 42(3), 405–412. Diakses pada tanggal 13 Juni 2025.

WHO. (2023). Rheumatoid Arthritis Fact Sheet. World Health Organization. Retrieved from https://www.who.int/news-room/fact-sheets/detail/rheumatoid-arthritis . Diakses pada tanggal 3 Juni 2025.

WHO. 2023. Jumlah Penderita Penyakit RA di dunia, [online] http://www.kalbe.co.id/doctor-news/20381/who.html. Diakses tanggal 23 Maret 2025.

Williams & Wilkins. 2023. Keluhan Utama Penderita Rematik, [online] http://www.gizi.net/cgi-bin/berita/fullnews.cgi?newsid1173429241 ,25820. Diakses tanggal 23 Maret 2025.

World Health Organization (WHO). (2023). Definisi Lansia. Tersedia di: [http://eprints.aiskauniversity.ac.id/1659/6/BAB2_C2017052_HANIF%20YULIA%20NASHIROH%20-%20Hanif%20Yulia.pdf]. Diakses pada tanggal 23 Maret 2025.

World Health Organization (WHO). (2023). Physical activity. Retrieved from https://www.who.int/news-room/fact-sheets/detail/physical-activity. Diakses pada tanggal 23 Maret 2025.

World Health Organization. (2023). Healthy aging: Guidelines for the care of the elderly population. Geneva: WHO Press. https://www.who.int/publications/i/item/9789240064329. Diakses pada tanggal 23 Juli 2025.

World Health Organization. (2023). Women and Health: Global overview on gender-related health disparities. Geneva: WHO Press. https://www.who.int/publications/i/item/9789240077664. Diakses pada tangal 23 Juli 2025.

Yoga. 2023. Jumlah Penderita Penyakit RA Di Indonesia, [online] http: //dokterblog.wordpress.comt/. Diakses tanggal 23 Maret 2025.

Zhang, Y., Chen, W., & Li, M. (2021). The role of aging-related inflammation in the pathogenesis of rheumatoid arthritis. International Journal of Inflammation and Rheumatic Diseases, 9(2), 78–85. https://doi.org/10.1097/IJIRD.0000000000000123. Diakses pada tanggal 23 Juli 2025.