



# CRITICAL MEDICAL AND SURGICAL NURSING JOURNAL

Vol. 13, no. 1, February 2024

Journal Homepage: <https://e-journal.unair.ac.id/CMSNJ>



This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License

## The Effect of Health Education Using Uric Acid Diary Book (URICAB) on Dietary Compliance and Uric Acid Levels in Gout Arthritis Patients

Putri Maulinda Afandi<sup>1</sup>, Andri Setiya Wahyudi<sup>1</sup>, Lingga Curnia Dewi<sup>1</sup>

<sup>1</sup> Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia

### ARTICLE HISTORY

Received: November 10, 2023

Accepted: February 20, 2024

Published: February 26, 2024

### KEYWORDS

Health education, URICAB, uric acid levels, gout arthritis, non-communicable disease

### CORRESPONDING AUTHOR

Putri Maulinda Afandi

[putri.maulinda.afandi-](mailto:putri.maulinda.afandi-2019@fkip.unair.ac.id)

[2019@fkip.unair.ac.id](mailto:2019@fkip.unair.ac.id)

Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia

### ABSTRACT

**Introduction:** Gout arthritis is a non-communicable disease that continues to increase. The prevalence of gout in Indonesia is 7.30% because the adherence to an unbalanced diet. Therefore, innovation is needed to overcome the problems in gout arthritis patients. The Uric Acid Diary Book (URICAB) is a modification of the booklet media in supporting health education. URICAB contains information related to uric acid, diet lists, and diet diary tables. This study aims to analyze the effect of health education on URICAB media on dietary compliance and uric acid levels in gout arthritis patients.

**Methods:** This study used the Quasy Experiment method pretest-posttest control group design with a population of 147 people and sample of 72 people. The independent variable is health education media URICAB, while the dependent variable is dietary adherence and uric acid levels in gout arthritis sufferers. The research instrument used blood samples and dietary compliance questionnaires. The data analysis used the Wilcoxon Signed Ranks Test, Mann Whitney U Test, Paired Sample T Test, and Independent Sample T Test.

**Results:** The results of the Mann-Whitney U Test obtained a value of  $p = 0.046$  indicate that there are increasing dietary adherence. The results of the Independent Sample T Test obtained a value of  $p = 0.025$  indicate that health education in URICAB media affected the reducing uric acid levels.

**Conclusion:** URICAB media health education had significant effect to improve dietary adherence to the recommended diet and limiting high-purin diets and adherence to drinking as recommended by health workers and reduce uric acid levels.

### Cite this as:

Afandi, P.M, Wahyudi, A.S, Dewi, L.C. (2024). The Effect of Health Education Using Uric Acid Diary Book (URICAB) on Dietary Compliance and Uric Acid Levels in Gout Arthritis Patients. *Crit. Méd. Surgical. Nurs. J*, 13(1),7-13.

## 1. INTRODUCTION

Non-communicable diseases (NCDs), especially degenerative diseases, are a health problem in Indonesia that requires strong attention because this problem continues to increase (Aupia, 2021). One of the most common degenerative diseases is gout. Gout or gouty arthritis is a type of inflammation of the joints caused by a buildup of uric acid crystals resulting in unbearable pain, swelling and a feeling of heat in the joint (Kemenkes, 2022). This is generally caused by adherence to an unbalanced diet (food content high in purine). Lack of knowledge about diet, attitudes and beliefs of sufferers are

factors that cause non-compliance with diet, thereby increasing the incidence of gout and causing various complications (Wetik dan Lumintang, 2022).

Ignorance of gout sufferers can occur because when they are in health services they are only given oral diet therapy so the information obtained is less effective (Algifari et al., 2020). Errors by health workers in providing complete information, using medical terms and giving lots of instructions that sufferers must remember are also causes of sufferers' non-compliance with the diet. Therefore, an innovative diet therapy is needed to overcome the problems of gouty arthritis patients. This therapy can be carried out by providing information on

health education methods to sufferers (Aupia, 2021). Providing health education must be accompanied by supporting media to make it easier for sufferers to understand the information (Nelia Sari, 2020). The media designed can contain information related to gout and the disease and serve as a reminder for sufferers to adhere to the recommended diet (Gambir et al., 2021). Research on health education, diary media was proven to significantly increase diet compliance compared to just verbal diet explanations. Based on this problem, a diary media health education is needed to increase diet compliance and reduce uric acid levels in gouty arthritis sufferers.

WHO estimates that non-communicable diseases (NCDs) cause at least 40 million deaths every year in the world. This number is equivalent to 70% of deaths from all causes at the global level (Kemenkes, 2021). The prevalence of gout arthritis worldwide based on WHO data in 2018 has increased by 1,370 (34.3%) (Irdiansyah, et al 2022). Based on 2018 Riskesdas data, the prevalence of joint disease referred to as pain due to high uric acid or acute or chronic hyperuricemia in Indonesia is 7.30% with East Java Province being in second highest at 6.72% and the number The highest district/city sample was in Surabaya City with 5,586 (7.67%) sufferers. If we look at age characteristics, the highest prevalence in Surabaya occurs in the age range 15 - 54 years with a sample of 57,575. There are also more women sufferers (7.67%) compared to men (5.72%) (Riskesdas Jatim, 2018). The incidence of gout arthritis in the working area of the Keputih Health Center, Surabaya, based on data from doctors in charge of non-communicable diseases, found that there were 295 gout sufferers in both the gout arthritis and hyperuricemia phases and in the working area of the Mulyorejo Community Health Center, Surabaya, there were 71 people in 2022. Preliminary study which was carried out by researchers using the interview method in September 2022

Showed that 6 gout arthritis sufferers said that they did not pay attention to the type of daily food they consumed and did not routinely carry out uric acid checks. Then, from the results of uric acid examination by researchers on 40 people in the working area of the Keputih Health Center, Surabaya, 22 people (55%) were found and in the Mulyorejo Public Health Center working area, 10 people out of 35 sufferers (28.5%) had uric acid levels. above normal. From the results of interviews with doctors in charge of PTM regarding the efforts that have been made by the Keputih Health Center and Mulyorejo Health Center to treat gout arthritis, namely through pharmacological therapy, namely by administering drugs and non-pharmacological therapy with diet education when controlling gout. Meanwhile, the provision of health education has not been carried out by the Community Health Center for a long time, the last time it was carried out in 2020 (before the COVID-19 pandemic). The health

education provided by the Community Health Center only uses leaflets containing information related to gout and has never been carried out using diet diaries.

Increased uric acid levels in gouty arthritis sufferers are caused by congenital disorders of purine metabolism, inherited disorders or genes, low adherence to a uric acid diet, and consumption of foods with high purine levels (such as: meat, offal, crab, shellfish, peanuts, spinach, beans). Increased uric acid levels in the blood (hyperuricemia) are also caused by increased production (overproduction), decreased excretion (underexcretion) of uric acid through the kidneys, or a combination of both (Srimawati, et al 2022). The impact that occurs if excessive uric acid levels in the body can cause kidney stones or gout in the joints. Even though gout is not life-threatening, if this disease starts to attack, the sufferer will experience very painful pain, swelling, and even disability in the joints of the hands and feet. Most people who suffer from gout usually also have other diseases such as kidney disease, diabetes or hypertension.

Gout diet compliance behavior can be explained based on the Health Promotion Model (HPM) theory by Nolla J Pender (Nursalam, 2020) that the health behavior that is formed is influenced by several factors, namely previous behavior such as the habit of consuming a high purine diet and an unbalanced diet. Then, personal factors include age, gender and menopausal status. It was explained that attacks of gout arthritis occur in men starting from puberty until the age of 40-69 years, while in women attacks of gout arthritis occur at an older age than men, usually occurring at the time of menopause. Other factors that can influence diet compliance behavior in gouty arthritis sufferers are cognition and affect which include perceived benefits of action, perceived barriers to action, self-efficacy, attitudes related to activities, interpersonal influences such as family support, peers, and social support. (Nursalam, 2020). The results of Saputra's research (2018) in Kacangan Giripurwo Purwosari Gunungkidul showed that there was a significant relationship between family support and adherence to the gout diet. All of the factors above can influence the formation of health improvement behavior through a commitment formed, namely health education (Maryati et al., 2021).

Health education is a form of independent nursing action to help clients, both individuals, groups and communities, overcome their health problems through learning activities in which nurses act as nurse educators in accordance with the duties of a nurse (Faridasari, 2020). Health education can be provided using several media such as print media (posters, leaflets, booklets, flyers), electronic media (television, radio, video, slides), and board media. Several studies have proven that booklet media is effective in implementing health education (Dewi, 2022). Uric Acid Diary Book (URICAB) is a modification of booklet media which is an innovation

in supporting health education. URICAB is packaged in the form of a diary book or daily notebook by combining information from the rheumatology pocket book by the Indonesian Rheumatology Association (2020) and the pocket book for gout control cadres in the community by the UGM Faculty of Medicine, Public Health and Nursing (2020) and is equipped with a monitoring table. The diet of gout sufferers must be recorded every day.

URICAB contains information related to gout, a list of healthy diets for gout sufferers, and a daily diet monitoring table is included to evaluate dietary compliance. Through the information contained in URICAB, it can increase the knowledge of gout arthritis sufferers, especially regarding the gout diet. Increasing knowledge in sufferers will increase the compliance of gout arthritis sufferers with the diet they consume so that sufferers' uric acid levels will decrease and reduce the risk of complications due to gout arthritis. Based on the explanation explained above, the researcher wants to analyze the effect of health education in the Uric Acid Diary Book (URICAB) media on diet compliance and uric acid levels in Gouty Arthritis sufferers.

## 2. METHODS

### Study Design

This type of research is quantitative research using a quasi-experimental research design with a Pre-Posttest Control Group Design.

### Population, Samples, and Sampling

This research involved two groups, namely treatment and control. Population of this study were 147. The number of respondents in this study was 72 respondents consisting of 36 respondents in the treatment group and 36 respondents in the control group. The independent variable in this study was URICAB media health education, while the dependent variable was diet compliance and uric acid levels in gout arthritis sufferers.

### Instruments

The questionnaire in this study was adapted from research conducted by Aupia (2021) "The Effect of Health Education on The Knowledge and Adherence of Diet for Gout Arthritis Patients".

### Procedure

The research was carried out with prior approval with informed consent, then data collection using a research instrument in the form of a questionnaire. This research has passed the ethical test of the Health Research Ethics Committee, Faculty of Dentistry, Airlangga University, Surabaya with Ethical Clearance Number 188/HRECC.FODM/II/2023.

### Data Analysis

The results of the Independent Sample T Test obtained a value of  $p = 0.025$  indicate that health education in URICAB media affected the reducing uric acid levels.

## 3. RESULTS

Table 1. Distribution of respondents based on age, gender, occupation, gout history, and family history

Characteristics	Intervention		Control	
Age	f	%	f	%
15-24 years old	3	8,3	4	11,1
25-34 years old	1	2,8	2	5,6
35-44 years old	13	36,1	8	22,2
45-54 years old	19	52,8	22	61,1
Sex	f	%	f	%
Male	29	80,6	33	91,7
Female	7	19,4	3	8,3
Occupation	f	%	f	%
Unemployed	17	47,2	24	66,7
Farmer	0	0,0	0	0,0
Merchant	10	27,8	4	11,1
Self-employed	1	2,8	3	8,3
Other	8	22,2	5	13,9
Gout History	f	%	f	%
<5 tahun	27	75,0	29	80,6
5-10 tahun	6	16,7	5	13,9
>10 tahun	3	8,3	2	5,6
Family History	f	%	f	%
Yes	19	52,8	20	55,6
No	17	47,2	16	44,4

Table 2. Distribution of the relationship between motivation and self-care management in leukemia patients

Gender	Diet Compliance	Intervention Group			
		Pretest		Posttest	
		f	%	f	%
Female	Compliance	13	36,1	23	63,9
	Uncompliance	16	44,4	6	16,7
Male	Compliance	1	2,8	2	5,6
	Uncompliance	6	16,7	5	13,9
Total		36	100%	36	100%
Average		5,47		7,86	
Wilcoxon Signed RanksTest		p=0,000001			
Control Group					
Gender	Diet Compliance	Pretest		Posttest	
		f	%	f	%
Female	Compliance	12	33,3	12	33,3
	Uncompliance	21	58,3	21	58,3
Male	Compliance	1	2,8	1	2,8
	Uncompliance	2	5,6%	2	5,6%
Total		36	100%	36	100%
Average		5,06		7,17	
Wilcoxon Signed RanksTest		p=0,000003			
Mann Whitney U Test Pre-test		p=0,487			
Mann Whitney U Test Post-test		p=0,046			

The characteristics of the research subjects in both the treatment and control groups were almost the same. Of the total subjects, namely 72, most were aged 45-54 years (52.8) in the treatment group and in the control group there were 22 people (61.1%).

Table 3. Uric Acid Levels in Treatment Group and Control Group in Gouty Arthritis Sufferers, 2023

Gender	Diet Compl iance	Intervention Group			
		Pretest		Posttest	
		f	%	f	%
Female	Compliance	13	36,1	23	63,9
	Uncompliance	16	44,4	6	16,7
Male	Compliance	1	2,8	2	5,6
	Uncompliance	6	16,7	5	13,9
Total		36	100%	36	100%
Average		5,47		7,86	
Paired Sample T Test		p=0,001			

Gender	Diet Compl iance	Control Group			
		Pretest		Posttest	
		f	%	f	%
Female	Compliance	12	33,3	12	33,3
	Uncompliance	21	58,3	21	58,3
Male	Compliance	1	2,8	1	2,8
	Uncompliance	2	5,6%	2	5,6%
Total		36	100%	36	100%
Average		5,06		7,17	
Paired Sample T Test		p=0,045			
Independent Sample T Test Pre-test		p=0,431			
Independent Sample T Test Post-test		p=0,025			

Almost all genders were female with 29 people in the treatment group (80.6%) and 33 people in the control group (91.7%). Nearly half of the treatment group did not work, 17 people (47.2%) and most of the control group did not work, 24 people (66.7%). Most had a history of gout for <5 years in the treatment group 27 people (75.0%) and in the control group 29 people (80.6%). Most had a family history of gout in the treatment group, namely 19 people (52.8%) and 20 people in the control group (55.6%). Pretest dietary compliance in the treatment group, a small number of gouty arthritis sufferers complied, namely 13 female respondents (36.1%) and 1 male respondent (2.8%). Pretest dietary compliance in the control group was 12 female respondents (33.3%) and 1 male respondent (2.8%). Posttest diet compliance, most of the treatment group adhered to 23 female respondents (63.9%) and 2 male respondents (5.6%) and experienced an increase from the pretest results. Dietary compliance in the control group did not increase and had the same results, namely only a small portion in the adherent category were 12 female respondents (33.3%) and 1 male respondent (2.8%) after being given intervention using leaflets from the Community Health Center (posttest). The results of the Wilcoxon Signed Ranks Test in the treatment group and control group showed a significant difference ( $p < 0.05$ ) in the treatment group, namely  $p = 0.000001$  and the control group with a value of  $p = 0.000003$ . The pretest results using the Mann Whitney U Test showed a significance value of 0.487 ( $p > 0.05$ ) indicating there was no difference in dietary compliance between the treatment group and the control group. Based on these results, the

treatment posttest can be compared with the control posttest where the test results show a difference with a significance value of 0.046 ( $p < 0.05$ ) so it can be concluded that URICAB media health education has an effect on increasing dietary compliance in gout arthritis sufferers.

Pretest uric acid levels in the treatment group had a small percentage of normal uric acid levels, 10 female respondents (27.8%) and 3 male respondents (8.3%). The pretest results of the control group's uric acid levels were mostly normal, 12 female respondents (33.3%) and there were no male respondents with normal uric acid levels. Posttest uric acid levels in the treatment group, the majority of gouty arthritis sufferers had normal uric acid levels, 21 female respondents (58.3%) and 4 male respondents (11.1%) and experienced an increase from the pretest results, while the uric acid levels in the treatment group The majority of controls were normal, 13 female respondents (36.1%) and 1 male respondent (2.8%) and only experienced a slight increase. The results of the Normality test showed that the data distribution was normal ( $p \geq 0.05$ ), so the Paired Sample T Test and Independent Sample T Test were carried out to determine the effect of the intervention provided. The results of the Paired Sample T Test showed that there was a significant difference ( $p < 0.05$ ) with a value of  $p = 0.001$  in the treatment group before and after being given the URICAB media health education intervention, while the control group showed a significant difference ( $p < 0.05$ ) with a significance value of  $p = 0.045$ . The results of the Independent Sample T Test pretest showed a significance value of 0.431 ( $p > 0.05$ ) indicating there was no difference in uric acid levels between the treatment group and the control group. Based on these results, an Independent Sample T Test can be carried out to assess the influence of the intervention by comparing the treatment posttest with the control posttest where the test results obtained a significance value of 0.025, thus showing a difference ( $p < 0.05$ ) and it can be concluded that URICAB media health education has an effect on reducing uric acid levels in gouty arthritis sufferers.

#### 4. DISCUSSION

The demographic characteristics of the research sample show that the majority of respondents are female. This is in line with research conducted by (Adhanty et al., 2021) that there is a significant relationship between gender and obedience, where female respondents are much more obedient than male respondents. However, this is not in line with the results of research conducted by Rohani (2018), that there is no significant relationship between gender and diet compliance. The insignificance between gender and dietary compliance can be caused because gender is not a factor that is directly related to compliance behavior as stated in the Health Promotion Model theory. Based on the data in

this study, respondents who had dietary compliance in the adherent category were mostly female and had an age range of 45-54 years.

The demographic characteristics of the research sample show that the majority of respondents were aged 45-54 years. In receiving health education, age is an influential element (Aupia, 2021). Aupia's research (2021) states that the younger a person is, the easier it is to absorb and accept the information conveyed. However, this is contrary to the results of this study, namely that the majority of respondents were in the 45-54 year category and they were able to receive health education information well. This is supported by previous research that one of the factors that makes someone over 40 years of age easily accept information from health education is motivational factors (Bjursell, 2019). Sufferers will be motivated to understand that the information conveyed through health education is important and really needed for their better health so as to form compliance in managing their health, in this case diet compliance.

Furthermore, in this study, almost half of the respondents did not work. In line with research by (Hestiana, 2017) that there is a relationship between employment status and compliance with diet management. Respondents who have low incomes are more disobedient in managing their diet compared to people who have high incomes. This is because people with low incomes are less likely to buy food that suits their diet than those with high incomes (Macgilchrist, 2010 in Hestiana, 2017). In contrast to previous research explaining that employment status is related to health behavior, namely compliance with the recommended diet, this relationship is influenced by the availability of time (Tambuwun et al., 2021). Someone who works tends not to have free time, but someone who doesn't work will have enough free time which can affect their compliance with the recommended diet. In this study, researchers assume that someone who works and has a source of income compared to someone who does not work tends to be more compliant with the recommended diet.

Results of statistical test analysis of the Wilcoxon Signed Ranks Test and Mann Whitney U Test on dietary compliance variables with 36 respondents in the treatment group and 36 control group respondents showed that there was an influence of URICAB media health education on diet compliance in gout arthritis sufferers. Before the treatment group was given health education by URICAB media, data was obtained that only a small percentage of sufferers complied and in the control group the same results were obtained, a small portion of sufferers adhered to their diet. This is supported by the answers given by respondents to the diet compliance questionnaire. Judging from the results of the pretest filling out the questionnaire in the treatment and control groups, it shows that almost all respondents answered question item number 1, namely not wanting to comply with eating rules as

recommended by health workers. This is supported by respondents' answers to question items number 3, 4, 5, 6, 7 and 8 regarding respondents' habits in consuming foods that should be limited and recommended for gouty arthritis sufferers. In question item number 9 related to recommendations from health workers regarding the habit of drinking water, only a small percentage of respondents have complied. In question items number 2 and 10 regarding the accuracy of eating schedules and the number of meals in a day, almost half of the respondents had followed the rules as recommended by doctors or health workers.

The demographic characteristics of the research sample show that the majority of respondents were aged 45-54 years. The results of this research are in line with research conducted by Lusiana et al. (2019), where most respondents were >45 years old. The older a person is, the greater the risk of suffering from gout, because aging means reduced kidney function and changes in metabolic processes. This results in increased uric acid levels. Medicines used as you get older can also increase your risk of developing gout. As age increases, at the age of 45-54 years various changes will occur including changes in metabolism which contribute to an increase in the occurrence of gout arthritis, thus indicating that uric acid levels will increase further.

Based on the results of this study, the majority of respondents who had uric acid levels above normal were female. These results are in line with research conducted by Ferdiani (2021), explaining that the majority of respondents who suffer from gouty arthritis are female. Especially women aged >40 years will enter menopause, causing estrogen levels in the blood to decrease. This estrogen hormone functions as a uricosuric agent, which is a chemical substance that functions to help excrete uric acid through the kidneys. The mechanism of uricosuric agents in uric acid excretion is to inhibit URAT1 (urate transporter-1) from the lumen to proximal tubular cells when regulating fluid-electrolyte balance (Darmawan et al., 2016). Based on research data, female respondents who had uric acid levels above normal were aged 45-54 years. The correlation with this research is that respondents aged 45-54 years in women are pre-menopausal, so they will experience a decrease in the hormone estrogen and this will have an impact on the difficulty of excreting uric acid through urine and resulting in an increase in uric acid levels in the blood.

The difference in uric acid levels in the pretest and posttest after providing health education in the results of statistical analysis shows the influence of URICAB media health education on uric acid levels in gout arthritis sufferers. This reduction can be achieved after receiving health education for 1x60 minutes and filling in a diet diary using URICAB media for 14 days. Health education is a planned and dynamic learning process. The aim of this learning process is to modify behavior through increasing

skills, knowledge, and changing attitudes related to improving lifestyle patterns in a healthier direction. Providing health education must be accompanied by supporting media to make it easier for sufferers to understand the information (Nurmala & KM, 2020). Supported by research conducted by Wetik & Lumintang (2022), explained that the uric acid levels of gouty arthritis sufferers decreased after health education was carried out. A decrease in uric acid levels can occur due to increased knowledge gained after being given health education so that there is an improvement in the sufferer's daily lifestyle, especially in terms of food and drink consumption.

The success of the intervention provided cannot be separated from the efforts of gouty arthritis sufferers who can control or evaluate themselves regarding the causes of increased uric acid such as the food and drink consumed and the activities carried out so that it can be a supporting factor in reducing uric acid levels because in this condition the researchers did not can control the overall factors that cause an increase in uric acid levels.

## 5. CONCLUSION

Uric Acid Diary Book (URICAB) media health education has a significant effect in increasing diet compliance and reducing uric acid levels. It is hoped that health workers and community health centers can improve and optimize health education programs regarding the importance of dietary compliance for gout arthritis sufferers. It is hoped that future researchers will be able to examine other factors that influence diet compliance and uric acid levels in gouty arthritis sufferers.

## REFERENCE

- Adhanty, S., Ayubi, D., & Anshari, D. (2021). Hubungan Health Locus of Control dengan Kepatuhan Diet pada Pasien Diabetes Mellitus Tipe 2 di RSUD Kota Depok Tahun 2020', *Perilaku dan Promosi Kesehatan: Indonesian Journal of Health Promotion and Behavior*. <https://doi.org/10.47034/ppk.v3i1.4150>.
- Algifari, M. R. N., Darma, S., & Reagan, M. (2020). Sebuah Pengetahuan Penyakit Gout Arthritis Pada Pasien Di Poliklinik Reumatologi RSUP Dr. Mohammad Hoesin Palembang. *Sriwijaya Journal of Medicine*, 3(1), 57–64. <https://doi.org/10.32539/sjm.v3i1.128>
- Aupia, A. (2021). The Effect of Health Education on The Knowledge and Adherence of Diet for Gout Arthritis Patients. *Media Keperawatan Indonesia*, 4(2), 120–126. <https://doi.org/10.26714/MKI.4.2.2021.120-126>
- Bjursell. (2019). *Inclusion In Education Later In Life: Why Older Adults Engage In Education Activities*. *Eur J Res Educ Learn Adults*. <https://doi.org/10.3384/rela.2000-7426.rela20192>.
- Darmawan, P. S., Kaligis, S. H. M., & Assa, Y. A. (2016). Gambaran kadar asam urat darah pada pekerja kantor. *EBiomedik*, 4(2). <https://doi.org/10.35790/ebm.v4i2.14615>
- Dewi, S. . (2022). *Pengaruh media booklet terhadap tingkat kepatuhan diet pasien diabetes melitus tipe-2 di Puskesmas Gamping II*. Politeknik Kesehatan Kementerian Kesehatan Yogyakarta.
- Faridasari, I. (2020). Pengaruh Pendidikan Kesehatan Terhadap Tingkat Pengetahuan Remaja Tentang Hiv/Aids. *Jurnal Kesehatan*, 10(2), 1359–1364. <https://doi.org/10.38165/jk.v10i2.17>
- Fitri Dwi Nur Ferdiani, Yuliana, N., & Estiningtyas. (2021). *Pengaruh Penyuluhan Kesehatan Diet Gout Arthritis terhadap Tingkat Pengetahuan Lansia di Desa Karangmojo*. <https://doi.org/10.54877/stethoscope.v2i1.832>
- Gambir, J., Jaladri, I., Sari, E. M., & Kurniasari, Y. (2021). A nutrition diary-book effectively increase knowledge and adherence of iron tablet consumption among adolescent female students. *Jurnal Gizi Dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics)*, 8(2), 87. [https://doi.org/10.21927/ijnd.2020.8\(2\).87-92](https://doi.org/10.21927/ijnd.2020.8(2).87-92)
- Hestiana, D. W. (2017). Faktor-faktor yang berhubungan dengan kepatuhan dalam pengelolaan diet pada pasien rawat jalan diabetes mellitus tipe 2 di Kota Semarang. *Journal of Health Education*, 2(2), 137–145. <https://doi.org/10.15294/jhe.v2i2.14448>
- Irdiansyah, I., Saranani, M., & Putri, L. (2022). Pengaruh Senam Ergonomik terhadap Penurunan Kadar Asam Urat pada Penderita Gouth Arthritis di Wilayah Kerja Puskesmas Bone Rombo Kabupaten Buton Utara. *Jurnal Ilmiah Karya Kesehatan*, 02(2).
- Jatim, R. (2018). *Laporan Provinsi Jawa Timur Riskesdas 2018*. Kementerian Kesehatan RI.
- Kemenkes. (2021). *Profil Kesehatan Indonesia 2021*. Pusdatin.Kemenkes.Go.Id.
- Kemenkes. (2022). *Penyakit Asam Urat*.
- Lusiana, N., Widayanti, L. P., Mustika, I., & Andiarna, F. (2019). Korelasi Usia dengan Indeks Massa Tubuh, Tekanan darah Sistol-Diastol, Kadar Glukosa, Kolesterol dan Asam Urat. *Journal of Health Science and Prevention*, 3(2), 101–108. <https://doi.org/10.29080/jhsp.v3i2.242>
- Maryati, M., Widyaningrum, I., & Sulistyowati, E. (2021). *Effects of Imperata cylindrica on Anti-hyperlipidemia: A*.
- Nelia Sari. (2020). Pengaruh Diabetes Self Management Education Melalui Media Buku Pintar Terhadap Komitmen Perawatan Diri Penderita Diabetes Melitus Tipe Ii Skripsi. In *Malaysian Palm Oil Council (MPOC)* (Vol. 21, Issue 1). <http://journal.um-surabaya.ac.id/index.php/JKM/article/view/2203%0Ahttp://mpoc.org.my/malaysian-palm->

oil-industry/

Nurmala, I., & KM, S. (2020). *Promosi kesehatan*. Airlangga University Press.

Nursalam. (2020). *Metodologi Penelitian Ilmu Keperawatan :Pendekatan Praktis Edisi 5*. Salemba Medika.

Rohani. (2018). *Analisis Faktor Yang Berhubungan Dengan Kepatuhan Diet Penderita Diabetes Melitus'*, *Jurnal Proteksi Kesehatan*.

Srimawati, S., Fauzia, N., & Risna, R. (2022). Engaruh Pendidikan Kesehatan Terhadap Pengetahuan dalam Diet Rendah Purin pada Lansia dengan Arthritis Gout di Wilayah Kerja Puskesmas Kembang Tanjong Kabupaten Pidie. *Jurnal Sains Riset*, 12(2).  
<https://doi.org/10.47647/jsr.v10i12>

Tambuwun, A. A., Kandou, G. D., & Nelwan, J. . (2021). Hubungan Karakteristik Individu Dengan Kepatuhan Berobat Pada Penderita Hipertensi Di Puskesmas Wori Kabupaten Minahasa Utara. *KESMAS*.

Wetik, S. ., & Lumintang, C. . (2022). The Effectiveness of Health Education about Gout Arthritis Diet Compliance and Uric Acid Levels in Gout Arthritis Patients. *Jurnal Kesehatan Stikes Ngesti Waluyo*, 11(1), 1–5.  
<https://doi.org/10.46815/JK.V11I1.70>