Analysis of Factors Affecting Uric Acid Levels (Case Study in Diploma III Nursing Students of Stikes Dirgahayu Samarinda in 2022)

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Abstract— *The research aimed to determine the factors influencing uric acid levels in Diploma III students of Nursing STIKES Dirgahayu Samarinda in 2022. This research analytically uses a Cross-Sectional Design to determine the Factors of Uric Acid Levels of Students. The research was carried out at Campus of STIKES Dirgahayu Samarinda from January to August 2022. The research sample was 42 Diploma III students for the 2019/2020 academic year. The research activities are as follows: (1) preparation, (2) implementation by collecting data, namely examining uric acid levels using Accu Cek and distributing questionnaires, (4) data analysis, and (5) reporting. The results showed that: (1) the number of respondents who had urate levels was classified as consisting of 9 male sex (21.40%) and only six female respondents (14.28%); (2) types of food that affect the incidence of high uric acid are seafood, organ meats and nuts; and (3) exercise activities can also cause high uric acid events.*

Keywords— Gout Incidence.

I. INTRODUCTION

Ordinary people know uric acid as gout arthritis caused by the accumulation of monosodium urate crystals in the body uric acid results from the final metabolism of foods containing purine substances. Purine substances are components of nucleic acids found in the nucleic of body cells. Increased uric acid levels in the body can cause pain in the joint area, which is very painful for the sufferer accumulating crystals in the communal area results in high uric acid levels in the blood. Consuming foods high in purines can increase uric acid levels in the blood. High-fat foods, such as fried foods, coconut, milk foods, margarine, butter, and fruits, such as durian and avocado, also increase uric acid levels (Krisnatuti, 2007).

In the 2012 Basic Health Research, it was found that the prevalence of hyperuricemia in Indonesia was found to be 11.9%; in East Java, it was 26.4% (Ministry of Health RI, 2013). Differences in uric acid levels according to age and gender. Before puberty in males and females, it is around 3.5 mg/dL. After puberty, uric acid levels in men increase gradually. They can reach 5.2 mg/dL, and in women, they usually remain low because they have the hormone estrogen, which can excrete uric acid in the body. Uric acid levels in women begin to show an increase in the postmenopausal period and can reach 4.7 mg/dL. It is said that normal uric acid levels in adult men are 3.4 – 7.0 mg/dL, and in adult women, 2.4 – 5.7 mg/dL, Uric acid circulating in the blood will not cause pain if the levels are within normal limits. Herliana, 2103).

According to data from the Central for Disease Control and Prevention (CDC), in the last decade, approximately 12.7 million (17%) children and adolescents were obese. In 2011-2012, as many as 20.25% of children aged between 12 to 19 years were obese, and this was the highest compared to other age groups. In a survey conducted by Riskesdas in 2010 and 2013 in Indonesia, the prevalence of adolescents aged 16-18 years who were obese increased from 1.4% to 7.3%. (Journal e-Biomedik (EBM), Volume 6, Number 1, January-June 2018).

The research aimed to determine the factors influencing uric acid levels in Diploma III Students of Nursing STIKES Dirgahayu Samarinda in 2022.

II. RESEARCH METHODS

2.1 Place and Time

The research was carried out at Campus of STIKES Dirgahayu Samarinda from January to August 2022. The research sample was 42 Diploma III students for the 2019/2020 academic year, consisting of 9 men and 33 women.

2.2 Materials and Tools

The material used is in the form of a questionnaire, and the tool used is ACCU Check.

2.3 Research Design

The research is analytical by using a Cross-Sectional Design and taking research samples using saturated samples (Nursalam, 2014), namely Diploma III Students at STIKES Dirgahayu Samarinda for the 2019/2020 academic year, with as many as 42 people as respondents.

2.4 Research Activities

The research activities are as follows: (1) preparation, (2) determination of respondents, (3) data collection through (a) examination of uric acid levels and (b) filling out questionnaires, (4) data analysis, and (5) reporting.

III. RESULTS AND DISCUSSION

3.1 Results of Measurement of Uric Acid Levels

The results of measuring uric acid levels from 42 respondents are presented in Table 1 below:

TABLE 1
RESULTS OF MEASUREMENT OF URIC ACID LEVELS

No	Gender	Uric Acid Level (mg/dL)	Status	Total	Percentage
1	Male	7,2 – 8,1	High	9	21,43
2	Female	6,7 – 8.4	High	6	14,29
3	Wanita	4,3 – 5,8	Normal	27	64,28
Jumlah				42	100,00

Source: Data Processed Results (2022)

The data in Table 1 above shows that all nine men have high uric acid levels, ranging from 7.2 – 8.1 mg/dL, and in women, out of 33 people, six people have uric acid levels. Classified ranged from 6.7-8.4 mg/dL, and 27 people had uric acid levels classified as usual, ranging from 4.3 to 5.8 mg/dL. WHO stated (2016) that normal uric acid levels in men range from 2.0 - 7.5 mg/dL, while in adult women, it is 2.0 - 6.5 mg/dL; in Men aged 40 years, average uric acid levels are 2.0 - 8.5 mg/dL and in women are 2.0 - 8.0 mg/dL; and in children aged 10-18 years, that is, for boys, the normal level of uric acid is 3.6 - 5.5 mg/dL, and for women, it is 3.6 - 4.0 mg/dL. Furthermore, Herliana (2013) stated that normal uric acid levels in adult men are 3.4 - 7.0 mg/dL, and in adult women, 2.4 - 5.7 mg/dL. Uric acid circulating in the blood will not cause disease if the levels are within normal limits.

3.2 Characteristics of Respondents

The results of completing the questionnaire by 42 respondents consisting of 9 men (21.40%) and 33 women (78.60%) are presented in Table 2.

TABLE 2
CHARACTERISTICS OF RESPONDENTS

No	Factors / Variable	Respondents' Answers			
		Yes		No	
	Symptoms of Gout	**n**	**%**	**n**	**%**
1	Pain	30	71,40	12	28,60
	Tingling	20	47,60	22	52,40
	Joint Stiffness	9	21,40	33	78,60
2	Soft drinks	11	26,20	31	73,80
3	**Types of food**				
	Seafood	24	57,10	18	42,90
	Offal	34	81,00	8	19,00
	Nuts	29	69,00	13	31,00
	Cassava leaves	12	28,60	30	71,40
	Kale	3	7,10	39	92,90
	Avocado fruits	15	35,70	27	64,30
4	Sports activity	28	66,70	14	33,30
5	Uric acid	15	35,70	27	64,30

Source: Data Processed Results (2022)

Based on the results of the data analysis presented in Table 2, it shows that:

1) out of 42 respondents who were classified as having high uric acid, there were 15 respondents (26.70%), and 27 respondents (64.30%) did not have gout.

2) the symptoms of gout experienced by respondents were: (a) 30 respondents (71.40%) felt pain, (b) 20 respondents (47.60%) felt tingling, and (c) felt stiff joints, as many as nine respondents (21.40%);

3) about food and beverages, it shows that: (a) respondents did not consume alcoholic beverages or soft drinks, namely 31 respondents (73.80%) and only 11 people (26.20%) consumed soft drinks; (b) 24 respondents (57.10%) consumed seafood and 18 respondents (42.90%) did not consume seafood, (c) 34 respondents (81.00%) consumed offal and did not consume offal eight respondents (19.00%), (d) consumed nuts as many as 29 respondents (69.00%) and did not consume nuts 13 respondents (31.00%), (e) consumed cassava leaves as many as 12 respondents (28.60%) and did not consume cassava leaves by 30 respondents (71.40%), (f) consumed kale by three respondents (7.10%) and did not consume kale by 39 respondents (92.90%), and (g) 15 respondents (35.70%) consumed avocado fruits and 27 respondents (64.30%) did not consume avocado fruits;

4) 28 respondents (66.70%) did sports activities, and 14 respondents (33.30%) did not do sport activity.

3.3 Variable Relationship with Uric Acid

The results of research regarding the relationship between factors of gender, type of food, and sports activities with gout are presented in Table 3 below:

TABLE 3
RESEARCH RESULTS REGARDING THE RELATIONSHIP BETWEEN ASPECTS OF GENDER, TYPE OF FOOD, SPORTS ACTIVITIES AND THE INCIDENCE OF GOUT

Nomor	Factors / Variable		Uric acid		n	%	P Value
			Yes	No			
1	Gender	Male	9	0	9	21,40	0,00
		Female	6	27	33	78,60	
	Total		15	27	42	100,0	
2	Soft drinks	Yes	11	0	11	26,20	0,00
		No	4	27	31	73,80	
	Total		15	27	42	100,0	
3	Seafood	Yes	15	9	24	57,00	0,00
		No	0	18	18	43,00	
	Total		15	27	42	100,00	
4	Offal	Yes	15	19	34	81,00	0,01
		No	0	8	8	19,00	
	Total		15	27	42	100,0	
5	Nuts	Yes	15	14	29	69,00	0,01
		No	0	13	13	31,00	
	Total		15	27	42	100,0	
6	Cassava leaves	Yes	12	0	12	29,00	0,00
		No	3	27	30	71,00	
	Total		15	27	42	100,0	
7	Kale	Yes	3	0	3	7,00	0,04
		No	12	27	39	93,00	
	Total		15	27	42	100,00	
8	Avocado Fruits	Yes	15	0	15	36,00	0,00
		No	0	27	27	64,00	
	Total		15	27	42	100,00	
9	Sports activity	Yes	15	13	28	67,00	0,00
		No	0	14	14	33,00	
	Total		15	27	42	100,00	

Source: Data Processed Results (2022)

Based on the data in Table 3 above, it can be stated that various relationships between factors that influence the incidence of gout are as follows:

3.3.1 Gender Relations and Gout Incidence

The number of respondents with male sex was nine respondents (21.40%), and all of them had high uric acid levels, while the female sex, there were 33 respondents, only six respondents had high uric acid levels (14.29%). The study results are in accordance with the results of the research reported by Firdayanti, Susanti & Setiawan (2019) that men tend to have higher uric acid levels than women before the age of 30.

The result of the bivariate test is a p-value of 0.00, indicating a relationship between gender and the incidence of gout. This is supported by the results of the research reported by Widyanto (2014), cited by Firdayanti, Susanti & Setiawan (2019), that the incidence of high uric acid in women tends to be found at the age of menopause because it is influenced by a decrease in the

hormone estrogen, whereas in men the risk is high. Experiencing high uric acid levels can occur at any age because hormones do not influence it.

3.3.2 The Relationship between Soft Drinks and Gout Incidence

The study results in Table 3 shows that 11 respondents (26.20%) who consumed soft drinks experienced high uric acid levels. The bivariate analysis results also showed that the p-value was 0.00, which means there is a relationship between the consumption of soft drinks and the incidence of gout. This is in accordance with the results of a study reported by Zhu, Pandya & Choi (2008), quoted by Thayibah, Ariyanto & Ramani (2018) that there is an increased risk of hyperuricemia directly proportional to the increase in consumption of carbonated drinks, compared to men who consume less than one serving carbonated beverages in a month, those who consume between 5-6 servings of carbonated drinks in a week have a 29% higher risk of developing hyperuricemia, those who consume two or more servings of carbonated beverages in a day, have a significantly higher risk of 85% of developing hyperuricemia.

3.3.3 Relationship between High Purine Foods and Gout Incidence

The study results in Table 3 show that 15 respondents who consumed seafood, offal and nuts had high uric acid levels. The bivariate analysis showed that the p-value was below 0.05, namely seafood and uric acid levels (p-value 0.00) and the relationship between organ meats and nuts and uric acid levels (p-value 0.01). This is supported by the results of Nursilmi's research (2014) in Listiani (2020) that purine acids contained in food will be converted into uric acid. Purines are one of the essential organic compounds that make up the nucleic acids or the nucleus of cells that are included in the amino acid group, the building blocks of protein. Consumption of foods high in purines triggers increased uric acid levels in serum and foods rich in purines, namely seafood, organ meats, and nuts. Furthermore, it was stated by Saraswati (2009), which was also supported by the research results of Amiruddin, Nuddin & Hengky (2019), that foods containing high purines (> 150 mg/100 g of food ingredients), namely liver, kidneys, and brain, heart, lungs, other offal, shrimp, mussels, clams, sardines, herring, meat/broth extract, duck, sardines, mackerel, mussels and clams could increase uric acid levels.

3.3.4 The relationship between the Types of Vegetables and Gout Incidence

The study results in Table 3 shows that 12 respondents who consumed cassava leaves experienced gout. The bivariate analysis showed a relationship between cassava leaf consumption and gout incidence with a p-value of 0.00. For the consumption of kale, the data indicates that only three respondents who consumed kale had high uric acid levels. Interestingly, 12 respondents did not consume kale but had high uric acid levels. This could be due to their habit of consuming foods high in purines other than kale. The results of the bivariate analysis showed a p-value of 0.04 which means that there is a relationship between the consumption of kale and the incidence of gout. As stated by Kaneko et al. (2012); Yenrina et al. (2014); and Fithri, Probosari & Nissa (2018) that tofu, tempeh (fermented soybean), mushrooms, green beans, tolo beans, spinach leaves, cassava leaves, kale leaves, leaves and seeds of melinjo (*Gnetum gnemun*), and broccoli beans, as well as all animal food ingredients, are good fresh and processed foods are foods that have a high purine content. Based on the results of the semi-quantitative FFQ conducted during the interview, most respondents with high uric acid levels also consumed foods high in purines. apart from offal (liver, gizzard, tripe and intestines), food ingredients such as leaves and seeds of *Gnetum gnemun*, cassava leaves, tofu, and tempeh also contain high purines affect high uric acid levels (Wahyuni & Novianti, 2020).

3.3.5 Relationship between Avocado Fruit and Gout Incidence

The study results in Table 3 show that as many as 15 respondents who consumed avocado fruits had high uric acid levels, whereas 27 respondents who did not consume avocado fruits had low uric acid levels. The bivariate analysis showed a significance test of p-value 0.00, namely that there was a relationship between avocado fruits consumption and uric acid levels in a person's blood. As stated by Fauzan (2016), high fat or oil consumption such as fried foods, coconut milk, margarine or butter, and fruits containing high fat, such as durian and avocado fruits, also affect uric acid expenditure.

3.3.6 Relationship between Sport Activity and Gout Incidence

The study results in Table 3 show that the 15 respondents who did sports had high uric acid levels. The results of the bivariate analysis showed that there was a relationship between exercise and uric acid levels (p-value 0.00), similar to the effects of previous studies at the Tanjungsari Pacitan Health Center, which showed that there was a relationship between exercise and the incidence of gout arthritis ($p<0.001$). This incident was explained by Aspiani (2014) that activities carried out by humans are related to uric acid levels in the blood. Physical activity such as sports or physical movement will reduce the excretion of

uric acid and increase the production of lactic acid in the body. The results of the research reported by Mayers (2003) and cited by Fauzan (2016) show that strenuous activity can exacerbate gout or uric acid disease, which is characterized by increased uric acid levels in the blood. Exercise or physical movement will cause an increase in lactic acid levels. An increase in lactic acid in the blood will cause a decrease in uric acid excretion by the kidneys. The increase in lactic acid levels cannot be measured with certainty because we cannot be sure when the body's muscles contract anaerobically. This is why activity does not significantly affect uric acid levels in the blood.

IV. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Based on the results of research and discussion, it can be concluded, namely as follows:

1) The number of respondents with urate levels is classified as consisting of 9 males sex (21.40%) and only six female respondents (14.28%).
2) Types of food that affect the incidence of high uric acid are seafood, organ meats and nuts.
3) Sport activities can also cause high uric acid events.

4.2 Suggestion

It is necessary to carry out further research that is carried out in more detail and depth by involving many respondents, especially on the factors that most influence the incidence of gout.

REFERENCES

[1] Amiruddin M., Nuddin A., Hengky H.K. 2019. Consumption Pattern as a Risk Factor for Gout in Parepare Bay Coastal Communities Consumption Pattern as a Risk Factor for Gout in Parepare Bay Coastal Communities Jurnal Ilmiah Manusia dan Kesehatan. 2 (2) http://jurnal.umpar.ac.id/index.php/makes

[2] Fauzan, A. 2016. Correlation between Body Mass Index (BMI), Purine Intake and Exercise with the Incidence of Gout Arthritis in the Elderly in the Working Area of the Tanjungsari Pacitan Health Center. Skripsi Program Studi Kesehatan Masyarakat Fakultas Ilmu Kesehatan Universitas Muhammadiyah, Surakarta.

[3] Firdayanti, Susanti, Setiawan, MA. 2019. Gender and Age Differences on Uric Acid Levels in Patients with Hyperuricemia. Medika Udayana Journal Vol. 8 (12)

[4] Fithri, A.A., Probosari, E., Nissa, C. 2018. Differences in Uric Acid Levels and Nutrient Intake in Vegetarian and Non-vegetarian Groups. Journal of Nutrition College Vol 7 (1) : 15-22.

[5] Hyperuricemia in Adolescents in the Working Area of the Arjasa Health Center, Situbondo Regency. E-jurnal Pustaka Kesehatan Vol 6 (1) Januari

[6] Kaneko, Kiyoko, Yasuo Aoyagi, Tomoko Fukuuchi, Katsunori Inazawa, dan Noriko Yamaoka. 2012. Total Purine and Purine Base Content of Common Foodstuffs for Facilitating Nutritional Therapy for Gout and Hyperuricemia. Biological and Pharmaceutical Bulletin 37(5):709–21

[7] Thayibah R., Ariyanto Y., Ramani, A. 2018. Hyperuricemia in Adolescents in the Working Area of the Arjasa Health Center, Situbondo Regency.

[8] Wahyuni, Y., Novianti, H.A.A., 2020. Correlation of Purine Intake, Vitamin C, Calcium, Magnesium and Consumption of Caffeine on Uric Acid Levels in Menopausal Women. Scientific Article Writing Training (SAWT) Batch II, Program Studi S1 Gizi, FIKES, Universitas Esa Unggul.
https://digilib.esaunggul.ac.id/hubungan-asupan-purin-vitamin-c-kalsium-magnesium-dan-konsumsikafein-terhadap-kadar-asam-urat-pada-wanita-menopause-16045.html

[9] Yenrina, Rina, Diah Krisnatuti, and Dini Rasjmida. 2014. Diet Sehat untuk Penderita Asam Urat. Penebar Swadaya, Jakarta.