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SUMEJ
Sumatera Medical Journal

The Relationship of Consumption Purin-rich foods to the incident of Hyperuricemia in the Elderly at Hisosu Nursing Home In Binjai

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Abstract. Hyperuricemia is an increase in blood uric acid levels. In the elderly cell damage occurs due to the aging process which can result in organ weakness, physical damage and various diseases such as increased uric acid levels. The purpose of this study is to determine the relationship between purine intake and the incidence of hyperuricemia in the elderly at the HISOSU Binjai nursing home. This research was conducted with an observational analytic research design using a cross sectional study. Samples were selected using the total sampling method and adjusted for inclusion and exclusion criteria. Data taken by weighing and recording food (in 1 day) Then assess respondent uric acid levels. This is done 3 times in the HISOSU Binjai nursing home. There are 32 research samples. Samples that experienced hyperuricemia as much as 40.6%, most of them consuming moderate-category purine source protein. The results of the chi-square test Pearson chi-squared t-test was 16.453 and p value < 0.001 (<0.05), it can be concluded as consumption of purine source protein associated with the incidence of hyperuricemia. The higher the purine intake, the greater the chance of getting hyperuricemia.

Keyword: Purines Intake, Hyperuricemia, Gout Arthritis

Received date month year. | Revised date month year | Accepted date month year

1 Introduction

Along with the existence of health services getting better, it causes an increase in the population, especially in the elderly has increased every year. Based on population projection data, it is estimated that in 2017 there were 23.66 million elderly people in Indonesia (9.03%). It is predicted that the number of elderly population in 2020 (27.08 million), 2025 (33.69 million), 2030 (40.95 million) and 2035 (48.19 million) [1].

With increasing age, physiological function decreases due to degenerative processes (aging) so that many degenerative diseases that arise, one of it is arthritis such as gout arthritis which is a

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Journal Homepage: https://talenta.usu.ac.id/smj/

condition caused by uric acid levels higher than nomal levels (hyperuricemia), then monosodium crystal urate (MSU) forms. Based on a meeting held by the American Collage of Rheumatology, Gout is a chronic musculoskeletal disease that contributes to 1-2 % of the world's population and is included in one of the Global Burden of Desease (GBD), more hyperuricemia prevalence data is needed to make gout prevention strategies [3,2].

The prevalence of hyperuricemia and gout in Asia in the past decade is around 13% -25 % and 1% - 2 %. The prevalence of hyperuricemia and gout in Indonesia is still unknown with certainty due to the limited data available. However, the prevalence for joint disease in Indonesia is based on the diagnosis of health workers which is 11.9% and based on symptoms of 24.7% [4].

The last few decades the prevalence of hyperuricemia continues to increase rapidly in the world population, not only in developing countries but also countries with a lower middle economy. Factors of life habits such as obesity, high purine diets (such as: brain, liver, heart, kidney, organ meats, extracts of meat / broth, sardines) and alcohol are considered as independent predictors for the development of hyperuricemia. Research conducted by the Third National Health and Nutrition Examination Survey (NHANES-III), states that this will increase along with the increase of meat and seafood consumption as one of purin-rich foods [5].

Uric acid is the result of the rest of purine breakdown, where the main source of purines in the body comes from food and from the body's DNA metabolism. Purines derived from food are the result of the breakdown of food nucleoproteins carried out by the walls of the digestive tract. So that an increase in blood uric acid levels can be caused by consumption of purin-rich foods. Therefore, in the treatment of gout and hyperuricemia, lifestyle modification is needed, one of them is diet regulation, especially for diets with high purine levels [6,7].

Based on the description above, the authors are interested in conducting a study of the relationship of consumption of purin-rich foods to the incidence of hyperuricemia in the elderly at the HISOSU Nursing Home in Binjai.

2 Method

This is an analytical research with cross-sectional design to evaluate the relationshop between purine-rich food consumption to the incidence of hyperuricemia at HISOSU Binjai nursing home. It was carried out from july to October 2019 after receiving ethical clearance from the Ethics Commission of Medical Faculty, USU with letter number 56/TGL/KEPK FK USU-RSUP HAM/2019.

This research involved all the elderlies at HISOSU Binjai nursing home and had characteristics according to the inclusion criteria: Elderly ≥ 60 years (WHO criteria) and willing to participate in the study. Exclusion Criteria: Alcoholism (alcohol dependence), History of malignancy and

chronic kidney disease, kidney stones, Currently taking drugs (eg: diuretics, cyclosporin, low-dose aspirin, pyrazinamide, niacin, ethambutol), metabolic acidosis, obesity.

The gathering of data were excuted by measuring the amount of food consumed and should be recorded as precisely as possible. The amounts of each food can be measured with a kitchen weighing scale or using household measures (e.g., bowls, cups, and glasses). Alternatively, portion sizes can be estimated in reference to standard household measures, or using three-dimensional food models, or two-dimensional aids such as photographs. These methods provide excellent estimates for energy, nutrients, foods and food groups. Before blood samples were taken from veins, it is recommended to fast (not eat) about 4 hours before the uric acid test is done. Then, uric acid levels were measured with uric acid test strips. Measuring of food consumed and uric acid levels were done three times a month with a week of interval.

The obtained data were then analyzed utilizing Statistical Product Service Solution for Windows (SPSS). Tested with Chi-Square test to assess the association between two or more variables.

3 Result

This research was carried out on 32 of 48 elderly who fulfilled inclusion criteria at Hisosu Binjai Nursing Home in 2019. Characteristics of the sample in this study included age and gender. Age was classified into 3 groups : 60-70 years, 71-80 years and more than 80 year. Purine intake in this study was grouped into 3 categories : high purine (100-1000 mg purine / 100 gr of food), moderate purine (9-100 mg purine / 100 g of food) and low purine (<9 mg purine / 100 gr of food). The incidence of hyperuricemia in this study is grouped into 2 categories (hyperuricemia and not hyperuricemia).

Table 1 Age and Gender Frequency Distribution

No	Variable	Frequency	Percentage
1	**Age (years)**		
	60-70	23	71.9
	71-80	8	25.0
	>80	1	3.1
2	**Gender**		
	Woman	13	49.6
	Man	19	59.4
	Total	**32**	**100.0**

According to table 1 the most age of samples are between 60-70 years (71.9%) and most of samples are men (59.4%).

Table 2 Age and Gender Frequency Distribution

Category		Week-1		Week-2		Week-3	
		n	%	n	%	n	%
Purine							
1	High	8	25.0	9	28.1	9	28.1
2	Moderate	20	62.5	17	53.1	17	53.1
3	Low	4	12.5	6	18.8	6	18.8
Hyperuricemia							
1	Yes	13	40.6	13	40.6	13	40.6
2	No	19	59.4	19	59.4	19	59.4

According to table 2 shows on the 1st week, the most consumed foods are moderate purine category (62.5%), as well as 2nd and 3rd week, the most consumed foods is moderate purine category (53.1%). It was discovered that the incident of hyperuricemia between 1st week, 2nd week and 3rd week were 40.6%.

Table 3 Age and Gender Frequency Distribution

Comsumption Of Purin-rich foods	Hyperuricemia				Total		*P*- value
	Yes		No				
	N	%	n	%	N	%	
High	8	100.0	-	-	8	100.0	
Moderate	5	25.0	15	75.0	20	100.0	**0.001**
Low	-	-	4	100.0	4	100.0	
Total	**40.6**		**19**	**59.4**	**32**	**100.0**	

According to table 3 the incident of hyperuricemia cause by high level of purin intake is 100%, while moderate and low level are 75% and 25%. Chi-square test results shows p value < 0.001, which means the consumption of purine-rich food has a significant relationship to the incidence of hyperuricemia.

4 Discussion

The results of the cross tabulation analysis showed that the study sample consumed the most foods with moderate purine category (62.5%) and the most research samples that experienced hyperuricemia were 40.6%. Chi-square test results showed $p < 0.001$, smaller than 0.05, which means that the consumption of purine-rich foods had a significant relationship with the incidence of hyperuricemia.

Based on the analysis of scientific data in 2012 [8] proved that hyperuricemia and increased of uric acid are more developed in the elderly group, either endogenously (purine sitensis) or reduced uric acid excretion. Significant increase of uric acid occurs in women age 80-89 years (affected by estrogen) compared with age 20-29 years. While men tend to increase significantly at the age of 60- 69 years compared with age 20-29 years.

A research in 2019 [9] showed there is a significant relationship between nutritional status with uric acid levels ($p < 0.005$), a relationship between milk and it's processed consumption with uric acid levels ($p < 0,001$), while the results of the chi-square test showed no relationship between sex with uric acid levels $p = 0.204$ in the elderly at the Cipondoh Health Center, Tangerang.

The results of this study are in line with research in 2017 [10] the relationship between purine and sex intake and uric acid levels in the elderly in Posyandu at Pabelan Village, Kartasura District, Sukoharjo. The results showed that there was a correlation between purine intake and uric acid levels in the elderly, with $p < 0.005$.

The results of this study are also in line with the research in 2016 [11] the relationship of purine consumption with hyperuricemia in the Balinese in rural tourism areas shows that there is a significant relationship between high purine diet and hyperuricemia in the Balinese in the Ubud District. Consumption of foods containing high purine sources is one of the factors causing hyperuricemia. So far the Balinese eating habits are in fact often from high purine food such as pork lawar prepared from pork, chicken / duck betutu, chicken / pork pepes, pork satay, pork roll.

Purine intake can increase uric acid levels in the blood, this is evidenced by research conducted in 2009 to outpatients dr.kariadi hospital in Semarang that there is a relationship between intake of purines with uric acid levels in the blood, purines in food have different content and bioavailability, besides the change of purine into gout also depends on the cellularity and transcription activity and celluar metabolism of the food.

This is also consistent with the research in 2014 [13] consumption of high purine foods has to do with hyperuricemia. The results of this study are also in line with a research in 2017 [14] the relationship between intake of purines, vitamin C and nutritional status with uric acid levels in the elderly in Posyandu pajang yuswo, Pajang Village, Laweyan District, Surakarta shows that there is a relationship between purine intake, nutritional status with uric acid levels in veins.

According a research in 2016 [15] about nutritional intake factors that are associated with postmenopausal blood uric acid levels in women prove that excessive animal protein intake and lack of vitamin C and calcium intake are associated with increased uric acid levels in blood in postmenopausal woman. Kalim cross sectional study in 2011 [16] in Batu, Malang which shows that high animal protein intake has a significant effect on gout risk which is a complication of

hyperuricemia and a research in 2013 [17] shows that there is a correlation between purine intake and uric acid levels, which is the higher the consumption of purines the higher the uric acid levels.

5 Conclusion

From the results of the statistical analysis utilizing Chi-Square test, p value smaller than 0.001 was obtained ($p < 0.001$). Thus, it could be concluded that there is a significant relationship between consumption of purin-rich foods with the incidence of hyperuricemia in the elderly of HISOSU Binjai nursing home. Most of samples consumed moderate level of purine category (75%). Samples that experienced the incidence of hyperuricemia were 40.6%.

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