

Correlation Between BMI (Body Mass Index), Abdominal Circumference and Purine Intake With Incidence of Arthritis Gout for Elderly at Simo's Health Center Area, Tulungagung District

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ABSTRACT

Arthritis gout is an arthritis that grows on people with high levels of uric acid in the blood. Factors affecting the arthritis gout include age, genetic factors, alcohol, lack of fluid, medications, obesity and nutrients. The purpose of this study was to know the correlation between BMI (Body Mass Index), abdominal circumference and purine intake with the incidence of arthritis gout in Simo health care area, Tulungagung District. The sampling technique used was the probability sampling technique with a randomized proportional type of sampling (proportional stratified random sampling). Samples on this study as much as 55 respondents who were in 5 villages in the working area of Simo Health Center. The instruments used in this research were digital scales, microtoise, measuring tape, 24 hour Food recall sheet and GCU blood meter. The Chi-square test results indicated that the IMT had a P value of 0.699 ($p > 0.05$), and the abdominal circumference had a P value of 0.470 ($p > 0.05$), indicating that there was no significant correlation. While the purine intake had P value of 0.011 ($P < 0.05$) which indicated that there was a significant correlation between purine intake with incidence of arthritis gout at Simo health care area, Tulungagung District.

Keywords: Arthritis gout, BMI, Abdominal circumference, Purine intake.

1. INTRODUCTION

Based on Riskesdas Results on 2013, most diseases in the elderly are Non-Communicable Diseases (NCD), with hypertension in the first order and diseases of arthritis (joints/rheumatism/gout) in the second order with the prevalence of 45% for aged 55-64 years, 51.9 % for aged 65- 74 years, and 54.8% for the age of > 75 years [1]. According to the Arthritis Foundation (2017) [2], arthritis gout is an arthritis that grows on people with high levels of uric acid in the blood. This acid can form crystals like needles in joints and cause pain, tenderness, redness, and warmth. Arthritis gout in Indonesia ranks second after osteoarthritis [3]. Research from Tjokroprawiro said that the prevalence of gout arthritis in USA is 13.6/100,000 people, while in Indonesia is 1.6-13.6/100,000 people. The prevalence increases with increasing age [4].

There are two factors that influence the arthritis gout, namely changeable factors and unchangeable

factors. Unchangeable factors include age and genetic factors [5]. Whereas changeable factors are alcohol, lack of fluids, drugs, obesity and nutrition [3]. Based on Riskesdas (2013), the highest province in Indonesia with the prevalence of arthritic (joint/rheumatism/gout) disease is East Nusa Tenggara (33.1%), West Java (32.1%), Bali (30.0%), South Sulawesi (27.7%), and East Java (26.9%). As for the age category, the higher the age of a person, the higher the prevalence of the arthritis [1]. Like at the age of 45-54 years as much as 37.2%, age 55-64 years as much as 45.0%, and age 65-74 years as much as 51.9% [1]. According to Dinas Kesehatan Kabupaten Tulungagung in the Report of Non-Communicable Diseases (NCD, 2018), arthritis ranks 3rd most after hypertension and obesity, with 6,388 for men and 7,513 for women. Whereas if sorted by age, the elderly category (aged 45-69 years) ranks 4th after hypertension, type I Diabetes Mellitus, and cataracts, with 7,480 cases of arthritis [6]. Based on data from Simo health care area, Tulungagung District in

2017, there were 330 people visiting because of arthritis gout. Whereas the number of visits in 2018 reached 337 total cases, with the number of cases in the last 3 months was 34 cases in October, 16 cases in November, and 20 cases in December [7].

2. METHOD

The study design used was correlational study with a cross sectional research design implemented. The sampling technique used was probability sampling technique with the type of proportional stratified random sampling. The inclusion criteria of this study were willing to be the subject of the study, elderly (aged 46-65 years) and participated in Posyandu Lansia. The exclusion criteria in this study were respondents who had mental disorders, were not willing to measure their uric acid levels, were not willing to be data for 3 times, and who were sportsmen.

Samples from this study were taken from 5 villages randomly from 10 villages, namely Ngulang (9 samples), Mangunsari (8 samples), Gendingan (11 samples), Ketanon (24 samples), and Winong (3 samples), with a total sample of 55 sample. The instrument used was a digital scale that had been reconfigured at UPT Meteorology Legal on Sunandar Priyo Sudarmo No. 22 Malang, microtoise, measuring tape, 24-hour Food Recall Sheet that has been standardized from the Kementerian Kesehatan Republik Indonesia 2018, and GCU blood meter that has been calibrated by using the dongle. Data collection was performed 3 times in 1 week randomly. Data collection on the first day included weight measurements, height measurements and calculation of purine intake (day 1). Data retrieval of the second day were the measurement of uric acid levels and calculation of purine intake (day 2), while on day 3, the data collection was the calculation of purine intake (day 3). Data analysis used univariate and bivariate and bivariate analysis using the Chi Square test.

3. RESULTS

The following is an overview of the characteristics of respondents who were the subjects of the study and the results of analysis between Body Mass Index (BMI), abdominal circumference, and purine intake with incidence of arthritis gout for elderly at Simo health care area, Tulungagung District.

Tabel 1. Characteristic descriptions of research respondents

Variable	n	%
Age		
Early Elderly (45-55 years)	17	31
Late Elderly (56-65 years)	38	69

Variable	n	%
Sex		
Male	8	14
Female	47	86
Uric Acid Levels		
Male < 7 mg/dl	6	11
Female < 6 mg/dl	29	53
Male > 7 mg/dl	2	3
Female > 6 mg/dl	18	33
BMI		
Thin Weight (< 17.0)	0	0
Skinny Lightweight (17.0-18.4)	1	2
Normal (18.5-25.5)	23	42
Mild Obesity (25.1-27)	8	14
Obesity Weight (> 27)	23	42
Abdominal Circumference		
Normal	8	15
Abnormal	47	85
Purine intake		
Low (< 600 mg / dl)	22	40
Normal (600-1000 mg / dl)	18	32
High (> 1000 mg / dl)	15	27

Based on table 1, it can be seen that the frequency distribution of respondents' age from 50 respondents found that 17 people (31%) had an early elderly category and 38 people (69%) had the late elderly category. Frequency distribution based on gender is 8 people (14%) male and 47 people (86%) female. The frequency distribution of respondents based on uric acid levels was 35 people (64%) had normal uric acid levels and 20 people (36%) had excess uric acid levels. Frequency distribution based on BMI is 1 person (2%) had a light weight BMI category, 23 people (42%) had a normal category, 8 people (14%) had a mild obesity category and 23 people (42%) had a category of severe obesity. Frequency distribution based on abdominal circumference was 8 people (15%) had normal abdominal circumference and 47 people (85%) had excessive abdominal circumference. Frequency distribution based on purine intake was 22 people (40%) had low purine intake, 18 people (32%) had normal purine intake and 15 people (27%) had high purine intake.

Table 2. Results of bivariate analysis between BMI, abdominal circumference and purine intake to arthritis gout in the elderly in Simo health care area Tulungagung district

Variabel	PR	p-value
V ₁ Body Mass Index (BMI)	1,11; 1,23; 0,69	0,699
V ₂ Abdominal Circumference	1,22	0,470
V ₃ Purine Intake	1,36; 4,61	0,011*

Sign (*) shows a significant correlation (p <0.05)

Based on table 2, it is found that the BMI variable has a p value of 0.699 (p > 0.05), which showed that there was no significant correlation between BMI and the incidence of arthritis gout at working area of Simo Health Care, Tulungagung District. The value of the Prevalence Ratio (PR) is 1.11; 1.23; and 0.69 (this PR value was not meaningful because there was no significant correlation between BMI and the incidence of arthritis gout). Based on the results of the Chi square statistical test, the p value = 0.470 (p > 0.05), which showed that there was no significant correlation between abdominal circumference and the incidence of arthritis gout at working area of Simo Health Care, Tulungagung District. The value of the Prevalence Ratio (PR) is 1.22 (this PR value was not meaningful because there was no significant correlation between abdominal circumference and the incidence of artery gout). Based on the results of the Chi square statistical test, p value = 0.011 (p < 0.05), which showed that there was a significant correlation between purine intake and the incidence of arthritis gout in the working area of Simo Health Care, Tulungagung District. In addition, the value of Prevalence Ratio (PR) of 1.36 showed that people who had high purine intake were at 1.36 times greater risk of arthritis gout compared to people who had normal purine intake. Whereas people who have high purine intake are at a higher risk of 4.61 times greater exposure to gout arthritis compared to people who have low purine intake.

4. DISCUSSION

Based on the bivariate test, results showed of the 3 variables studied and analyzed, there was 1 variable that was significantly associated with the incidence of arthritis gout in the working area of Simo Health Care, Tulungagung District. The discussion of variables related to BMI, abdominal circumference and purine intake with the occurrence of arthritis gout at work area of Simo Health Care Area, Tulungagung District can be explained as follows:

4.1 Relationship between BMI and Arthritis Gout

Based on the results of the Chi square statistical test, obtained p value of 0.699 (p > 0.05), which showed that there was no significant correlation between BMI and

the incidence of arthritis gout at working area of Simo Health Care, Tulungagung District. The value of Prevalence Ratio (PR) was 1.11; 1.23; and 0.69 this PR value was not meaningful because there was no significant correlation between BMI and the incidence of arthritis gout at Simo Health Care Area). This research is in line with the research by Sonya (2015) which showed that there was no correlation between BMI and arthritis gout for elderly men in Gido Sub-district, Nias Regency in 2015 (with p value = 0.105). According to Sonya (2015), in general, the elderly gain weight up to the age of 60 years and progressively decline after the age of 60 years. This Body Mass Index (BMI) is also influenced by diet, lifestyle and socio-demographic environmental factors [8].

This study's result found no relationship because there were many respondents who have normal BMI as much as 23 respondents (with an average value of 26.7), and the number of respondents who had normal uric acid levels, especially in women (29 respondents had normal uric acid levels of 47 female respondents). According to Misnadiarly (2007), uric acid levels of men and women when adolescents are generally low, but in men after puberty will be higher than women. Whereas women will tend to have low uric acid levels and only increase after menopause [9]. Whereas based on age, the average age of respondents is 57.4 years. According to Riskesdas (2013), the prevalence of arthritis will increase with age.

However, this is not in accordance with Fauzan's (2016) study, which stated that there was a correlation between BMI and the incidence of arthritis gout for elderly in Tanjungsari Pacitan Health Center work area (p < 0.001). In his study, BMI was one of the factors causing gout arthritis in respondents who had overweight nutritional status triggered the occurrence of gout arthritis which amounted to 11,387 times [10]. According to Choi et al (in Fauzan, 2016), in overweight people (BMI > 25 kg / m²), leptin levels in the body will increase, this is different from thin BMI that leptin levels will not increase. Leptin is a helical protein secreted by adipose tissue. Increased levels of leptin along with increasing levels of uric acid in the blood. This is because there is a disruption of the process of uric acid reabsorption in the kidneys.

4.2 Relationship between Abdominal Circumference and Arthritis Gout

Based on the results of Chi square statistical test, obtained p value of 0.470 (p > 0.05), which showed that there was no significant correlation between abdominal circumference and the incidence of arthritis gout at working area of Simo Health Care, Tulungagung District. The value of the Prevalence Ratio (PR) of 1.22 (this PR value was not meaningful because there was no significant relationship between abdominal circumference and the incidence of arthritis gout in the Simo Health Care Area). The results of this study are in line with the research of Thomastola et al. (2015) that

stated there was no relationship between central obesity and an increase in uric acid levels with a P value = $0.502 > 0.05$. In his research, respondents with central obesity were not always followed by an increase in blood uric acid levels. This understanding is in line with what experienced by researchers that the average person who has excessive abdominal circumference has normal uric acid levels. The average abdominal circumference in Thomastola's study, et al. (2015) had an average of 88.72 cm. This shows that blood uric acid levels are not only determined by one factor but by other factors including gender (17 women and 15 men), age (average age 59 years), kidney function, alcohol intake and purine content in food [11].

The absence of a relationship in this study was because many of the respondents who had abnormal circumference but are not balanced with an increase in uric acid levels in the blood as well. Many of the respondents who had excessive abdominal circumference were female respondents (47 respondents), according to Kristianita (2018) an increase in abdominal circumference in women in line with increasing age compared to men [12].

It is different from Anwar (2017) who said that there was a correlation between abdominal circumference and gout with the results of statistical tests p value of $0.004 (\leq 0.05)$ [13]. Abdominal circumference is also closely related to metabolic disorders and abdominal obesity. Abdominal obesity is more associated with increased uric acid levels. High levels of leptin in people who are obese can cause leptin resistance. If leptin resistance occurs, it will cause diuresis disorders in the form of urinary retention. It is this urinary retention that can cause urinary acid disruption in the urine.

4.3 Relationship Between Purin Intake and Arthritis Gout

Based on the results of the Chi square statistical test, the value of p value was 0.011 ($p < 0.05$), which showed that there was a significant relationship between purine intake and the incidence of arthritis gout in the working area of Simo Health Care, Tulungagung District. The value of Prevalence Ratio (PR) of 1.36 showed that people who had high purine intake were at 1.36 times greater risk of arthritis gout compared to people who had normal purine intake. Whereas people who have high purine intake are more at risk of 4.61 times greater exposure to arthritis gout compared to people who have low purine intake. The results of this study are in line with the research conducted by Nurhayati (2018) which showed that the value of p Value 0,000 meant there was a relationship diet with gout in Limran Village Pantoloan Boya Village, Tawaeli District. The more often a person eats a meal that contains high purine, the higher the level of uric acid in the blood which can result in gout [14].

This study aligns with Fauzan's (2016) which showed that there was significant correlation between purine intake and the incidence of gout arthritis (p value < 0.001 , OR = 43.9 and CI (95%) 17.1-113.14) in the

elderly in the working area of Pacitan Tanjungsari Health Center. Elderly who have high purine intake are more at risk of experiencing high uric acid levels or the occurrence of gout arthritis as much as 43.9 times compared to elderly who have normal purine intake. The incidence / risk of arthritis gout tends to occur in the elderly with high purine intake, which weighs 67 people (88.2%) [10]. Some foods high in purine sources such as liver, beef, beans and mutton are often consumed in the elderly in this study. This is because purines are organic base compounds that make up nucleic acids and are included in the amino acid group forming proteins [15].

According to Misnadiarly (2007), it was said that consuming foods that are high in purines such as innards, seafood, sardines, coconut milk, jengkol, avocados and spinach will increase the production of uric acid in the body [9]. Conversely, if you consume foods that are low in purines, it can reduce the risk of arthritis gout. This is in accordance with the results of a study conducted by Diantari (2012) with the research title of the effect of purine and liquid intake on uric acid levels in women aged 50-60 years in Gajah Mungkur Subdistrict, Semarang which showed that there was an association between purine intake and uric acid levels which was the higher the consumption of purine, the higher the level of uric acid [15].

5. CONCLUSION

Based on the analysis using the Chi square test showed that there was no correlation between BMI and the incidence of gout arthritis, there was no correlation between abdominal circumference and the incidence of gout arthritis and there was a relationship between purine intake and the incidence of gout arthritis in the Simo Health Care Area. It is recommended for Simo Health Care Area to make POSBINDU PTM in all working areas of Simo (Village) Health Care Area as a forum for screening arthritis gout by means of rapid tests. Cross- sector collaboration is also needed to optimize PTM programs, such as nutrition consultations, and additional physical activity.

REFERENCES

- [1] Riset Kesehatan Dasar. (2013). Riset Kesehatan Dasar. Available at: www.depkes.go.id/resources/download/general/Hasil%20Rikesdas%202013.pdf
- [2] Arthritis Fondation. (2017). Gout. Retrieved January 4, 2109, from <https://www.arthritis.org/about-arthritis/types/gout/what-is-gout.php>
- [3] Anies. (2006). Waspada Ancaman Penyakit Tidak Menular: Solusi Pencegahan Dari Aspek Perilaku Dan Lingkungan. Jakarta: PT Elex Media Komputindo
- [4] Oktaviani, P. (2017). Jumlah Penderita Asam Urat di Wilayah Indoneisa. Retrieved from

[http://gizi.depkes.go.id/forum/viewtopic.php?f=3
&t=3598](http://gizi.depkes.go.id/forum/viewtopic.php?f=3&t=3598)

- [5] Soeroso, dkk. (2011). *Asam Urat*. Jakarta: Penebar plus.
- [6] Dinas Kesehatan Kabupaten Tulungagung (2018). *Data Penyakit Tidak Menular di Tulungagung Tahun 2018*.
- [7] Data Sekunder Puskesmas Simo. (2018). Jumlah penderita Arthritis Gout tahun 2017-2018
- [8] Sonya. and Zaluchu, N. (2017). Korelasi Antara Indeks Massa Tubuh Dengan Kadar Asam Urat Pada Laki-Laki Lanjut Usia Di Kecamatan Gido Kabupaten Nias Pada Tahun 2015. *Nommensen Journal of Medicine*. Volume: 3. pp. 82–87.
- [9] Misnadiarly. (2007). *Rematik: Asam urat, Hipeurisemia, Arthitis Gout*. Jakarta: Pustaka Obor Populer.
- [10] Fauzan, A. (2016). Hubungan Indeks Massa Tubuh (Imt), Asupan Purin Dan Olahraga Dengan Kejadian Gout Arthritis Pada Lansia Di Wilayah Kerja Puskesmas Tanjungsari Pacitan. Universitas Muhammadiyah Surakarta. Retrieved from eprints.ums.ac.id/48304/18/NASKAH_PUBLIKASI_REV.pdf
- [11] Tomastola, Y. A., Djendra, I. M., & Tadjimo, Y. (2015). Asupan Gizi Makro Dan Obesitas Sentral Dengan Kadar Asam Urat Darah Pada Pasien Rawat Jalan Di Poli Endokrinrsup Prof Dr R.D Kandou. *Gizido*, 7(2), 381–396.
- [12] Gayatri, R. W. (2018). *Surveilans: Penyakit Tidak Menular*. (Q. Labibah, Ed.). Indonesia: Jurusan Kesehatan Masyarakat.
- [13] Anwar, H. M. (2018). Hubungan Antara Lingkar Pinggang Terhadap Tekanan Darah Dan Asam Urat Di Dusun Sarite'ne Desa Bili-Bili. *Journal Of Islamic Nursing*, 3(2001), 54–61.
- [14] Nurhayati. (2018). Hubungan Pola Makan Dengan Terjadinya Penyakit Gout (Asam Urat) Di Desa Limran Kelurahan Pantoloan Boya Kecamatan Taweli. *Kesmas*, 7(6).
- [15] Diantari, E. (2012). *Pengaruh Asupan Purin Dan Cairan Terhadap Kadar Asam Urat Pada Wanita Usia 50-60 Tahun Di Kecamatan Gajah Mungkur, Semarang*. Universitas Diponegoro. Retrieved from http://eprints.undip.ac.id/38586/1/494_ERVI_DIANTARI_G2C008023.pdf