

FAKTOR RISIKO “GOUTY ARTHRITIS” DI KOTA MASOHI KABUPATEN MALUKU TENGAH TAHUN 2010

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Abstrak

Angka kejadian arthritis gout di kota Masohi Kabupaten Maluku Tengah sebanyak 54 orang berdasarkan data rumah sakit umum kota Masohi. Tujuan penelitian untuk mengetahui faktor risiko kejadian arthritis gout di kota Masohi Kabupaten Maluku Tengah. Merupakan penelitian observasional analitik dengan rancangan *case control study* terhadap 196 responden yang terdiri dari 98 kasus dan 98 kontrol. Analisis bivariat dengan uji *odds ratio* (OR) dan multivariat dengan uji *regresi logistik berganda*. Variabel yang merupakan faktor risiko arthritis gout adalah hipertensi (OR = 2.20 CI 95%; 1.24-3.90), obesitas sentral (OR = 3.04 CI 95%; 1.66-5.55), konsumsi alkohol (OR = 2.28 CI 95%; 1.29-4.05), konsumsi makanan yang mengandung zat purin (OR = 5.14 CI 95%; 2.80-9.44), riwayat gout dalam keluarga (OR = 3.10 CI 95%; 1.73-5.55), minum *softdrink* (OR = 1.33), namun memberikan pengaruh yang lemah (CI 95%; 0.72-2.45). Analisis multivariat, variabel konsumsi makanan yang mengandung zat purin memiliki pengaruh paling besar ($p = 0,000$). Konsumsi makanan yang mengandung zat purin adalah faktor yang paling berpengaruh terhadap kejadian arthritis gout di Kota Masohi Kabupaten Maluku Tengah. Perlu pengaturan pola makan bagi penderita.

Abstract

Risk Factors in the Incidence of Gouty Arthritis in Masohi Town, Central Maluku Regency in 2010. The gouty arthritis incidence rate in Masohi Town of Central Maluku Regency is 54 people based on the data from the general hospital in Masohi. The aim of study was to find out the risk factor in the incidence of gouty arthritis in Masohi Town of Central Maluku Regency. The study was analytic observation using a control case study. The number of respondents was 196 people consisting of 98 cases and 98 controls. The data were analyzed by using odds ratio (OR) and multiple logistic regression. The results of the study indicate that the risk factors in the incidence of gouty arthritis are hypertension (OR = 2.20 CI 95%; 1.24-3.90), central obesity (OR = 3.04 CI 95%; 1.66-5.55), alcoholic consumption (OR = 2.28 CI 95%; 1.29-4.05), purine food consumption (OR = 5.14 CI 95% 2.80-9.44), gout history in family (OR = 3.10 CI 95%; 1.73-5.55), and soft drink consumption (OR = 1.33 CI 95%; 0.72-2.45). The multivariate analysis indicates that the most dominant factor affecting the incidence of gouty arthritis is purine food consumption ($p = 0.000$). Since the consumption of purine food is the most dominant factor affecting the incidence of gouty arthritis, diet pattern is necessary for the patients.

Keywords: central obesity, gouty arthritis, history of gouty arthritis, purine content food

Introduction

The gouty arthritis is a kind of a rheumatic illness related to the kinetic disorder of uric acid, which is hyperuricemia.¹⁻³ Hyperuricemia is a condition where there is an increase of the blood uric acid level above the normal level, and biochemically there will be hypersaturation, which is the uric acid solubility injected passing the acceptable threshold. The ideal hyperuricemia

threshold is two deviation standards of the laboratory result in a normal population, but pragmatically the uric acid standard which can be used is >7 mg/dl for men and >6 mg/dl for women. Hyperuricemia can happen due to the increase of the uric acid metabolism (overproduction), the decrease of the urine uric acid excretion (underexcretion), or the combination of both.⁴

The prevalence of gout and hyperuricemia in the society really varies and is estimated between 2.3% and 17.6%, while the incidence of gout is 0.16-1.36%. In USA in 1999, the incidence was 41 per 1,000, and the annual prevalence rate of gout and hyperuricemia increased especially to the elderly; in UK the gout prevalence was 1.4% or 14 per 1000 in 1999. The ratio of men compared to women was 36:1.⁵ In China in 2006 according Nan *et al.*,⁶ there were hyperuricemia prevalence with the percentage of 25.3% and gout prevalence with the percentage of 0.36% in the adults with the age of 20-74 years old.

The high number of the incidence of the gouty arthritis in the society in Indonesia is still not certain because the data have not been found, considering that Indonesia consists of various ethnics, so it is very possible if Indonesia has more varied number of incidence. In a hyperuricemia study in a hospital it is found a higher prevalence number between 17% and 28% because of the influence of the diseases suffered by and the medicine taken by the patients. The percentage of sufferers of the gouty arthritis in the population in Central Java is 24.3% for men and 11.7% for women. The field research done towards the population of Denpasar, Bali, discovers the prevalence of the gouty arthritis with the percentage of 18.2%.³

In the Central Maluku Regency in 2009, it was found that the number of the gout sufferers reached 132 people. Meanwhile, for Masohi Town the number of the gout sufferers was 54 people based on the data from the Regional General Hospital of Masohi Town; based on the said data, it is really important to discover the risk factor of the incidence of the gouty arthritis in the society particularly in Masohi Town, Central Maluku Regency. Thus, with the information on the risk factor of the gouty arthritis, the efforts to control the disease can be carried out appropriately and quickly.

Methods

The research was conducted in Masohi Town, Central Maluku Regency, consisting of 5 sub-districts (Sub-Districts of Namasina, Namaelo, Ampera, Lesane, and Letwaru), with the control case study; the sampling was done with the non-probabilistic method, which is purposive sampling, with the sample criteria: the age of the sufferers is >30 years old, the sufferers have been diagnosed to suffer from the gouty arthritis (in the status book of the sufferers), they have complete laboratory check-up data (urine acid check-up), and they have the domicile in Masohi Town, Central Maluku Regency, and the interview is done by using a questionnaire. In this research, there are 196 samples with the comparison 1:1 fulfilling the inclusive criteria, with *age matching*. The data were analyzed with the analysis of *univariate*, *bivariate*, *stratification*, and *multivariate* with the double

regression logistic test, $\alpha=0.05$ and 95% of *Confidence Interval*.

Results and Discussion

The variables researched in this study are hypertension, central obesity, softdrink beverage, alcoholic beverage, purine content food consumption, and the history of gout in the family.

Based on the result of the univariate test, it is discovered that the average age of the gouty arthritis sufferers is above 40 years old with the most number in the group of 50-59 years old.

Out of 98 of the gouty arthritis sufferers, the number of male sufferers is 59 people (60.2%), and the number of female sufferers is 39 people (39.8%). Bivariate analysis between independent variables and dependent variables (Table 1).

Based on the bivariate analysis, it is discovered that what becomes the risk factors of the incidence of the gouty arthritis respectively is hypertension (OR=2.02; CI 95% 1.24-3.90; $p<0.01$), central obesity (OR=3.04; CI 95% 1.66-5.55; $p<0.00$), alcoholic beverage (OR= 2.28; CI 95% 1.29-4.05; $p<0.00$), purine consumption (OR=5.14; CI 95% 2.80-9.44; $p<0.00$), history of gout (OR=3.10; CI 95% 1.73-5.55; $p<0.00$), while for softdrink beverage the value of $p = 0.43$ means insignificant.

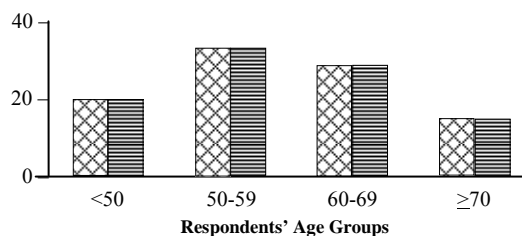


Figure 1. Distribution According to Age Groups, Case (☒), Control (▨)

Table 1. Bivariate Analysis between Independent Variables and Dependent Variables

Independent Variable	OR	CI 95%		p
		LL	UL	
Hypertension	2.02	1.24	3.90	0.01
Central Obesity	3.04	1.66	5.55	0.00
Softdrink Beverage	1.33	0.72	2.45	0.43
Alcoholic beverage	2.28	1.29	4.05	0.00
Purine Consumption	5.14	2.80	9.44	0.00
History of Gout	3.10	1.73	5.55	0.00

OR: Odds Ratio, LL: Lower Limit, UL: Upper Limit, p: Significance

With the interpretation of the value of odds ratio (OR) = 1.33, the softdrink beverage is one risk factor of the incidence with the confidence interval (CI) of 95%, which is 0.72–2.45. Therefore, the values of LL and UL cover value 1, so the variable of softdrink beverage is considered having insignificant influence.

The stratification analysis was conducted to see the influence of central obesity and the family history with the distratification gouty arthritis incidence according to hypertension.

Based on the stratification test, p value is obtained tested with *Chi Square Mantel-Haenzsel* <0.05, OR crude = OR M-H (OR crude = 3.041 equal to OR M-H = 3.080); therefore, it can be explained that the hypertension variable is not the trigger which increases the relation between central obesity and the gouty arthritis incidence. Meanwhile, the p value of history of gout obtained tested with *Chi Square Mantel-Haenzsel* is <0.05, OR crude = OR M-H (OR crude = 3.103 not equal with OR M-H = 2.789), with the difference of 10%; thus, it can be explained that the hypertension variable is the trigger which increases the relation between history of gout and the gouty arthritis incidence.

Multivariat Analysis. The multivariat analysis conducted aims to view and discover which variable is the most influential among the independent variables with the gouty arthritis incidence.

In the multivariat analysis with the *logistic regression*, out of 5 variables having the value of *p* <0.25, three variables having significant overall results are obtained in Table 3.

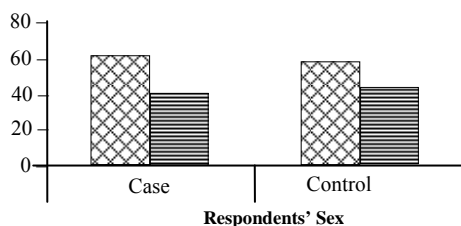


Figure 2. Distribution of the Gouty Arthritis According to Sex

Table 2. The Stratification Analysis Result Towards the Big Risk of the Distratification Gouty Arthritis Incidence According To Hypertension

Free Variable	OR		cOR	OR M-H	p
	1	2			
Central Obesity	3.14	3.00	3.04	3.08	0.00
History of Gout	2.44	3.25	3.10	2.79	0.00

OR: Odds Ratio, cOR: crude Odds Ratio, OR M-H: Odds Ratio Mantel-Haenzsel, p: Significance

It means the individuals not having hypertension but suffering from central obesity and not consuming alcoholic beverage but having the habit of consuming (often) purine content food, and having history of gout in the family have the probability around 95% to suffer from the gouty arthritis. If all variables in the regression function are multiplied by zero, the the lowest probability to suffer from the gouty arthritis is around 0.11%.

The study results show that the gouty arthritis sufferers exist mostly in the age group above 40 years old, and this is possible because there is a metabolism deviation process which is generally related to the age factor; the age above 40 years old or the elderly have the big risk to suffer from uric acid. The research proves that age has a big influence towards the gouty arthritis incidence, and those having the age between 40 and 50 years old are vulnerable to suffer from gout.

Based on sex characteristics, it is discovered that men suffer from the gouty arthritis more, and this is possible because several research results prove that the ratio between men and women suffering from the gouty arthritis shows more number in men since men do not have estrogen hormon which can help release uric acid through urine.

Relation between hypertension and the gouty arthritis incidence. The hypertension assessment in this research was conducted through the measurement of systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg, by using a tension tool which is then divided into 2 categories, hypertension (high risk) and not hypertension (low risk).

The hypertension in this research proven statistically is the risk factor towards the gouty arthritis incidence. Hypertension can be caused by the excessive natrium intake, especially in a form of chloride natrium, and the

Table 3. The Analysis Results of Double Logistic Regression

Free Variable	B	p	OR	OR	
				LL	UL
Hypertension	0.551	0.107	1.734	0.88	3.38
Central Obesity	1.001	0.005	2.272	1.35	5.48
Alcoholic beverage	0.605	0.079	1.832	0.93	3.60
Purine Consumption	1.438	0.000	4.214	2.15	8.24
History of Gout	1.047	0.002	2.850	1.45	5.60
Konstanta	-6.794	0.000	0.001		

OR: Odds Ratio, LL: Lower Limit, UL: Upper Limit, p: Significance

hypertension influence towards the gouty arthritis incidence can happen due to the decrease of renal blood flow caused by hypertension so that the blood flow to the glomerulus becomes less. A further effect which happens is the increase of uric acid reabsorption in the body so that it experiences hyperuricemia (the uric acid increase in the blood exceeding the normal threshold).⁷ Besides that, hypertension becomes one of the risk factors of gout because it is assumed that the antihypertension medicine consumed by a patient can influence fat metabolism, and this results in disorders in uric acid excretion causing the lack of uric acid release through urine.⁴ Gout is one of the illnesses which can follow and emerge together with the hypertension illness. There is a uric crystal sediment in the kidney which forms a kidney stone that can decrease the kidney function and worsen other disorders caused by hypertension. Around 50% of the hypertension cases untreated will experience hyperuricemia.⁸

The relation between hypertension and the gouty arthritis is supported by several epidemiological studies, among others the study conducted by Cohen *et al.*,⁹ 2008, giving evidence that hypertension becomes the risk factor towards the gouty arthritis incidence (with the value of OR = 2.080 CI95% 1.040-0.130, $p=0.001$), and the research conducted by Buraerah,¹⁰ showing that hypertension is the risk factor towards the gouty arthritis incidence with the value in the brackets (OR = 2.30 CI 95% 1.13-469 $p=0.020$).

Relation between central obesity and the gouty arthritis incidence. The central obesity assessment in this research was conducted through the measurement based on the waist size. The waist size for women is ≥ 80 cm and for men is ≥ 90 cm, by using a ribbon meter, and then the size is divided into 2 categories, central obesity (high risk) and not central obesity (low risk).

The central obesity in this research proven statistically is the risk factor towards the gouty arthritis incidence. In obesity, especially central obesity, there is an increase of coenzym A for the long chain fat acid. This coenzym is very much related to the insulin resistance syndrome. There is insulin resistance which will cause the high coenzym A so that this causes the work of adenine nucleotide translocator (ANT) to be hampered due to the increase of extracell adenine. The increase of the extracell adenine will cause the increase of serum uric acid concentration through the forming of uric acid from the adenine.¹¹

The relation between central obesity and the gouty arthritis is supported by several epidemiological studies, among others the study conducted by Lyu,¹ discovering that central obesity becomes the risk factor of the gouty arthritis in men in Taiwan, and the research conducted by Wisesa *et al.*,¹¹ discovering that central obesity is

related to the hyperuricemia incidence with the value in the brackets (OR = 5.44; CI 95% 1.584-18.714, $p=0.007$), in the native Balinese ethnic.

Relation between softdrink beverage and the gouty arthritis incidence. The assessment of softdrink drinking habit in this research was conducted through the measurement based on the average sample score; if the score obtained from the observation result is \geq the average sample score, and if the score obtained from the observation result is $<$ the average sample score, by using the table of food frequency, it is then divided into 2 categories, a high risk and a low risk.

From the statistical test, the value $p = 0.43$ is obtained, and it means it is not significant. With the interpretation of the value of Odds Ratio (OR) = 1.33, the softdrink beverage is the risk factor of the gouty arthritis incidence, with the confidence interval (CI) of 95%, which is 0.72–2.45. Therefore, the value of LL and UL covers the value of 1, so the habit of drinking softdrink statistically provides a weak influence towards the gouty arthritis incidence.

The research conducted by Choi *et al.*,² analyzes the relation between sugar intake from carbonated drinks and food rich with fructose, and discovers that there is an increase of gout risks in proportion to the increase of carbonated drink consumption; compared with the men who consume less than one portion of the carbonated drink in a month, those who consume between 5 and 6 portions of the carbonated drinks in a week have a risk level 29% higher to suffer from gout. Those who consume two portions or more of the carbonated drinks in a day significantly have a risk level 85% higher to suffer from gout.

The relation between the habit of drinking softdrink and the gouty arthritis is different from several epidemiological studies, among others the study conducted by Gao *et al.*,¹² discovering that those who are in the fourth quartile with the high sweet sugar consumption level have a high blood uric acid level with $p=0.001$.

Relation between alcoholic beverage and the gouty arthritis incidence. The assessment of alcohol drinking habit in this research was conducted through the measurement based on the average sample score; if the score obtained from the observation result is \geq the average sample score, and if the score obtained from the observation result is $<$ the average sample score, by using the table of food frequency, it is then divided into 2 categories, a high risk and a low risk.

The alcoholic beverage in this research proven statistically is the risk factor towards the gouty arthritis incidence. The alcohol consumption is very much

related to the gout incidence. The content of ethanol and purine in the alcoholic beverage can explain the relation between hyperuricemia and uric acid. For example, beer is reported to have a high guanosine content from yeast and barley fermentation. A mechanism which is possible for alcoholic intake association with gout includes the excessive production of lactate acid and fat acid, influencing the pH value of the body liquid and changing the kidney excretion towards uric acid. Besides that, the nucleotide overproduction happens after the ethanol injection, and one study in Japan shows that this effect occurs through one ATP metabolism disorder.¹

The relation between the habit of consuming alcohol and the gouty arthritis is supported by several epidemiological studies, among others the study conducted by Sharpe *et al.*,¹³ showing that those who are heavy drinkers have the risk to suffer from the gouty arthritis with the value of RR = 6, and the study conducted by Zhang *et al.*,¹⁴ showing that consuming alcohol can trigger the incidence of gout repeatedly less than 24 hours.

Relation between the purine content food consumption and the gouty arthritis incidence. The assessment of the habit of eating purine content food in this research was conducted through the measurement based on the average sample score; if the score obtained from the observation result is \geq the average sample score, and if the score obtained from the observation result is $<$ the average sample score, by using the table of food frequency, it is then divided into 2 categories, a high risk and a low risk.

The purine consumption in this research proven statistically is the risk factor towards the gouty arthritis incidence. Purine is a molecule in the cells in a form of nucleotide. In the food ingredients, purine exists in nucleic acid, such as nucleoprotein. The digestion enzym releases this nucleic acid from nucleoprotein. Furthermore, the nucleic acid is broken again into mononucleotide. The mononucleotide is hydrolized to become nucleocide which can directly be absorbed by the body and some will be broken further into purine and pyrimidine. Purine is then oxidized to become uric acid.⁷

The relation between the habit of eating purine content food and the gouty arthritis is supported by several epidemiological studies, among others the study conducted by Choi *et al.*,³ showing that consuming food rich with purine in seafood provides a very big influence for increasing uric acid in the blood.

Relation between history of gout and the gouty arthritis incidence. The assessment of history of gout in the family in this research was conducted based on

the confession of the respondents on whether there is a family member, such as a grandfather, a grandmother, a father, or a mother who suffers from the gouty arthritis, and then it is divided into into 2 categories, a high risk and a low risk.

The history of gout in this research proven statistically is the risk factor towards the gouty arthritis incidence. In the case of primary gout, besides the absence of the enzym of hypoxanthine guanine phosphoribosyl transperase (HGPRT) which causes the increase of purine syntesis, there is also a genetic factor influence that can cause disorders in glycogen deviation or digestion enzym deficiency. This makes the body produces the compounds of lactate or triglycerides more competing with uric acid to be thrown away by the kidney.¹⁵

McArdle *et al.*,¹⁶ mention that the influence gene GLUT9 towards the uric acid incidence of Gene GLUP9 gives a significant contribution for the uric acid incidence (95% confidence interval: 0.31-0.63, $p=0.004$).

Conclusions

Hypertension, central obesity, alcoholic beverage, purine content food consumption, family history, and softdrink beverage are the risk factors of the gouty arthritis incidence, but softdrink beverage statistically gives a weak influence towards the gouty arthritis incidence, and the variable of purine content food consumption is the most influential towards the gouty arthritis incidence. It is necessary to introduce to the society the prevention of the gouty arthritis.

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