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Proceeding Paper

THE EFFECT OF GIVING FRUIT JUICE WITH A COMBINATION OF PROBIOTICS OF SOURSOP FRUIT JUICE ON URIC ACID LEVELS IN HYPERURYCEMIA PATIENTS IN THE WORKING AREA OF PUSKESMAS PASAR IKAN IN BENGKULU CITY

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Abstract

Uric acid is an acid in the form of crystals which is the end result of purine metabolism. Uric acid is normally found in the body, but high uric acid levels (Hyperuricemia) can cause uric acid crystals to accumulate in the joints and become disease. This study aims to determine the effect of giving fruit juice and soursop fruit juice probiotics to sufferers of hyperuresemia with 6-7 mg/dl who were divided into 4 treatment groups, namely groups P0, P1, P2, P3. The doses given are P0 education leaflet, P1 200 ml fruit juice, P2 200ml probiotic soursop fruit juice and education leaflet, P3 200 ml fruit juice and probiotic soursop fruit juice and education leaflet. The intervention was carried out for 7 days, measuring uric acid using Easy Touch. Checking uric acid was carried out before the intervention and after the intervention was given. The normality test was carried out using Shapiro-Wilk. Statistical analysis used the ANOVA test and continued with the Duncan test. The results of the study showed that the average before intervention was given P0 10.00 ± 0.923, P1 10.971 ± 0.989, P2 10.686 ± 1.149, P3 8.800 ± 1.833. And the average uric acid after the intervention was P0 9.271 ± 0.946, P1 9.000 ± 0.476, P2 8.914 ± 0.581, P3 7.086 ± 0.521. P-value = 0.019 and uric acid as low as P-value = 0.000. It can be concluded that there is an effect of giving fruit juice and soursop fruit juice probiotics on uric acid levels in hyperuricemia sufferers in the working area of Puskesmas Pasar Ikan in Bengkulu City.

Keywords: Fruit Juice, Gout, Probiotics soursop fruit juice, Hiperurisemia.

INTRODUCTION

Non-communicable diseases (NCDs) are one of the causes of death throughout the world, in 2016 around 71% of deaths were caused by this disease. Non-communicable diseases kill more than 36 million people every year. About 80% of these deaths occur in low and middle income countries. 73%

of deaths are currently caused by non-communicable diseases, of which 35% are caused by cardiovascular disease, 12% are caused by cancer, 6% are caused by chronic respiratory diseases, 6% are caused by diabetes and 15% are caused by other non-communicable diseases (Kemenkes, 2019).
Uric acid is an acid in the form of crystals which is the end result of purine metabolism. Uric acid is normally found in the body, but high uric acid levels (Hyperuricemia) can cause deposits of uric acid crystals in the joints and become disease (La Ode, 2012). Uric acid circulating in the human body is produced by the body itself (endogenous uric acid) and comes from food (exogenous uric acid). About 80-85% of uric acid is produced by the body, while the rest comes from food (Gondo et al. 2022). One of the degenerative diseases, gout, increases with age. Purine is a nucleic acid in the cell nucleus, which is the final stage of the body's metabolism which produces uric acid. Increased uric acid levels can cause problems such as rheumatic pain in the joints and very painful for sufferers (Lusiana et al. 2019). Consuming foods high in purine can increase uric acid levels. Foods high in purine, one of which is found in seafood, tuna, shrimp, crab and other fish, are one of the many types of seafood that contain high purine, offal, nuts and vegetables high in purine (Mirwana Amiruddin et.al, 2019).

According to the Word Health Organization (WHO), the prevalence of gout in the world is 34.2%. The prevalence of gout in America is 26.3% of the total population. In America, 26.3% of the total population, the increase in the incidence of gout does not only occur in developed countries, however, the increase also occurs in developing countries, one of which is Indonesia, whereas in Indonesia it occurs in people under 34 years of age by 32% and over 34 years of age. 34 years old, Indonesia is the largest country in the world whose population suffers from gout. The world health agency's survey shows details that 35% of Indonesia suffers from gout (Hamidi Nizar Syarif et.al, 2021).

Based on the results of Basic Health Research (Riskesdas) 2018, the prevalence of gout based on the diagnosis of health workers in Indonesia is 11.9% and based on diagnosis or symptoms 24.7% when viewed from age characteristics, the highest prevalence is at age ≥ 75 (54.8%). There are also more female sufferers (8.46%) compared to men (6.13%).1 Riskesdas 2018 shows that 5.35% of the population in North Sumatra suffer from joint disease and 6.02% of the population in Karo Regency suffer from joint disease based on a doctor's diagnosis. . In Indonesia, sufferers of joint disease due to high gout occur in several provinces such as Aceh as much as 13.26%, Bengkulu Province is in the 10th largest prevalence of gout, namely 12.11% of the population, Bali at 10.46% and Papua. as much as 10.43%, Banten Region as much as 6.15%, Tangerang Regency as much as 6.52%, Tangerang City as much as 6.03%. (Kemenkes RI, 2019)

The prevalence of those experiencing or suffering from gout based on age is, aged 15-24 years with a diagnosis of 1.2%, aged 25-34 years with a diagnosis of 3.1% and aged 35-44 years with a diagnosis of

6.3%. 45-54 years old based on diagnosis, namely 11.1%, aged 55-64 years based on diagnosis, namely 15.5%, aged 65-74 years based on diagnosis, namely 18.6% and aged 75 years or more, namely 18.9%. Uric acid examination is used to confirm the diagnosis and monitor gout treatment, prevent uric acid nephropathy during chemotherapy treatment, assess hereditary disorders of purine metabolism, detect kidney dysfunction, and assist in the diagnosis of kidney stones (Kemenkes RI, 2018)

Based on the results of Basic Health Research (Riskesdas) 2018, the prevalence of joint disease in Bengkulu Province is 9.85%. Apart from that, the uric acid result was 6.0 and high uric acid, namely 15. Apart from that, there were several respondents who had a family history of gout, had other diseases, rarely exercised and consumed coffee.

The buildup of crystals in the joints can cause pain and swelling in various parts of the body, causing joint deformity. In addition, uric acid nephrolithiasis, namely the formation of hard, stone-like masses in the kidneys that cause pain, bleeding and obstruction of the urinary tract, can occur due to high uric acid levels. If uric acid stones continue to accumulate in the kidneys, it will cause chronic kidney disease. Apart from that, urate crystals cause urolithiasis in the urinary tract (Oktavianti & Anzani, 2021).

Gout treatment can be done in 2 ways, namely pharmacological and non-pharmacological. One of the gout medications is allopurinol, this works by stopping the formation of uric acid from its precursors, namely xanthine and hypoxanthine. Metabolism of allopurinol into oxypurinol or allozanthin, functions as an inhibitor of the function of the enzyme xanthine oxidase. In the process of purine catabolism, allozanthin reduces uric acid production without interfering with purine biosynthesis (Marlinda & Putri, 2019). Meanwhile, non-pharmacological therapy includes patient education, diet management and joint rest. One method of treating gout requires patient instructions because the disease is caused by an unhealthy lifestyle, such as lack of exercise, obesity, lack of control over foods that are high in purines (Algifari et.al, 2020). Natural ingredients (herbs) with the development of functional foods and are popular with the public because they are practical and easy to obtain. One of the functional foods for gout that has been used is soursop fruit, pineapple and bay leaves.

Soursop has a lot of vitamin C, which helps increase the body's endurance and functions as an antioxidant that can stop the production of the enzyme xanthine oxidanse. The body can stop the formation of uric acid with soursop fruit. Soursop fruit contains the alkaloid compound isquinoline, which functions as an analgesic, so soursop fruit can also relieve gout pain. Soursop fruit also functions as an anti-inflammatory. This combination of inflammation and analgesic can help treat gout (Sani & Afni, 2019).

Pineapples contain flavonoids, which function as antioxidants that can inhibit the xanthin oxidase enzyme. Which can prevent purine metabolism to produce uric acid. Pineapples also contain the enzyme bromelain which effectively works as an anti-inflammatory and analgesic for gout sufferers (Zuriati & Suriya, 2020). Pineapples contain bromelain, which helps speed up healing of pain and swelling in the joints, helps stop proteins that cause uric acid levels to increase, and can prevent inflammation caused by gout (Mukhlisah & Irfan, 2023).

There are many types of herbal gout treatment. One type of herbal medicine for gout is one type of bay leaf that can be used to reduce uric acid levels. Essential oils, tannins, polyphenols, alkaloids and flavonoids are the chemical contents found in this plant. The leaves, bark, roots and fruit of this plant can be used as medicine, with side effects as a diuretic and analgesic (Ibrahim, H, & Widodo, 2020).

MATERIALS AND METHODS

This research uses a type of experimental research with a Randomized Group Design (RAK) research design with a combination of 4 treatments, namely P0 (for the control group given education using leaflet media). P1 (Probiotics 100g (soursop fruit 100g) and education using leaflets) P2 Fruit juice (Soursop 100g, Pineapple 45g, boiled bay leaves 50ml) and education using leaflets) and P3 (Soursop 100g, Pineapple 45g, boiled leaves greetings 50ml + probiotics (soursop juice) and education using leaflet media). The intervention was repeated once a day for 7 days. This research is an intervention on the effect of giving fruit juice with a combination of probiotic soursop juice on uric acid levels in hyperuresemia sufferers in the working area of Puskesmas Pasar Ikan in Bengkulu City.

The independent variable in this study was the provision of fruit juice and probiotic soursop juice while the dependent variable was uric acid.

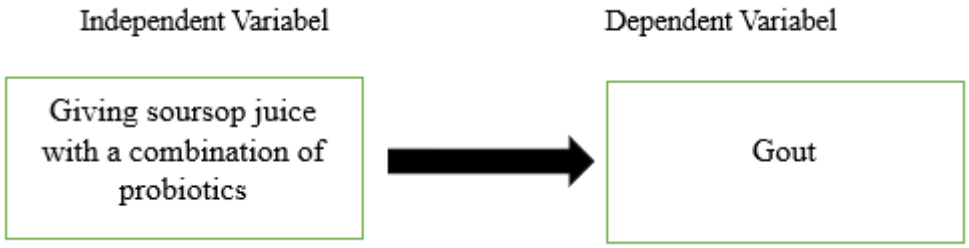

Figure 1: Conceptual framework

Independent variables: Fruit juice and soursop fruit juice probiotics

Dependent variables: gout sufferers in the working area of Puskesmas Pasar Ikan in Bengkulu City.

The samples in this study were people whose uric acid levels were around 6.0 mg/dl in the working area of Puskesmas Pasar Ikan in Bengkulu City. The technique used in sampling is a proportional sampling

technique, meaning that samples are taken based on the specified inclusion and exclusion criteria. The inclusion criteria are: respondents with uric acid 6.0 mg/dl, respondents aged 30-59 years, does not experience speech and hearing problems, respondents did not take gout medication, willing to be a respondent and sign informed consent. Whereas exclusion criteria are: experiencing complications such as kidney and heart problems and has allergies to soursop, pineapple, and bay leaves.

This research employs a randomized block design (RBD) pattern, with the main factor being the differences in the treatment groups, consisting of P0, P1, P2, and P3. P0 is the control group provided with education using leaflet media, P1 is the group given probiotics (soursop fruit) and education through leaflets, P2 is the group given fruit juice (100g soursop, 45g pineapple, 50ml boiled bay leaf) and education using leaflets, and P3 is the group given 100g soursop, 45g pineapple, 50ml boiled bay leaf + probiotics (soursop juice) and education using leaflet media. The intervention is administered once daily for seven days.

The operational definition of uric acid includes the medical condition of respondents' uric acid before and after being given the juice, measured using the Easy Touch device. The population in this study is all gout sufferers in the working area of Puskesmas Pasar Ikan in Bengkulu City in 2024, with samples selected using purposive sampling techniques based on inclusion and exclusion criteria. The inclusion criteria include respondents with uric acid 6.0 mg/dl, aged 30-59 years, not experiencing speech and hearing disorders, not consuming gout medication, and willing to participate as respondents and sign the informed consent. The exclusion criteria include respondents experiencing complications such as kidney and heart disorders, and having allergies to soursop, pineapple, and bay leaf.

The sample size is calculated using the Federer formula, with a total of 28 respondents divided into four treatment groups. Primary data is directly obtained from the sample's identity and uric acid measurements, while secondary data is obtained from Puskesmas Pasar Ikan in Bengkulu City. Data collection is done through interviews to determine the sample's identity and food intake patterns, and uric acid examinations before and after giving the fruit juice. The research flow includes submitting research requests, initial screening, sample selection, explaining the purpose and benefits of the research, obtaining respondent consent, initial uric acid examination, observing respondents' intake, administering the juice treatment, and analyzing the data from the examinations.

The research procedure involves filling out sample identity forms, consent forms to participate in the research, and making juice and soursop probiotic with the necessary tools and materials. Data processing includes data checking, coding, tabulation, and cleaning of invalid data. Data analysis consists of univariate analysis presenting respondent characteristics and bivariate analysis to determine the differences in uric acid after the treatment. The statistical analysis used is ANOVA and Duncan tests

if the data is normally distributed, and Kruskal-Wallis and Mann-Whitney tests if the data is not normally distributed, with a p-value < 0.005 indicating the effect of fruit juice administration on uric acid. Research ethics are maintained by informing respondents of the research's purpose and benefits and obtaining consent through informed consent before conducting interviews and interventions.

RESULTS AND DISCUSSION

Results

Pre-Elderly Characteristics

Based on research that has been carried out, it shows the following results:

Table 1: Respondents Characteristic

Characteristics	n	%
Age		
30-45	6	21,4
46-59	22	78,6
Total	28	100
Gender		
Man	19	67,9
Woman	9	32,1
Total	28	100

Based on table 1, it shows characteristics based on age and gender. There were 6 respondents aged 30-45 years with a percentage of 21.4% and 22 people aged 46-59 years with a percentage of 78.6%. Respondent characteristics based on gender were 6 people with a percentage of 21.4% and 22 male respondents with a percentage of 78.6.

Description of uric acid before and after being given fruit juice and soursop fruit juice probiotics. Based on the research that has been conducted, it shows the following results

Table 2: Description of Uric Acid before and after being given fruit juice and a combination of soursop fruit juice probiotics

Variable		Group P0	Group P1	Group P2	Group P3
		Mean± SD	Mean± SD	Mean± SD	Mean± SD
Gout	Pre	10,00±0,923	10,971±0,989	10,686±1,149	8,800±1,833
	Post	9,271±0,946	9,000±0,476	8,914±0,581	7,086±0,521

Table 2 shows the average uric acid before the intervention, namely in the P0 group 10.00 ± 0.923, P1 10.971 ± 0.989, P2 10.686 ± 1.149, P3 8.800 ± 1.833. And the average uric acid after the intervention was P0 9.271 ± 0.946, P1 9.000 ± 0.476, P2 8.914 ± 0.581, P3 7.086 ± 0.521.

Bivariate analysis to determine the effect of giving fruit juice with a combination of soursop fruit juice probiotics on uric acid levels in hyperuricemia sufferers in the working area of Puskesmas Pasar Ikan in Bengkulu City. Based on data analysis using the Shapiro-Wilk normality test because the number of respondents was <50 people. Based on the test of normality output in the attachment, a significance value of P-value >0.05 was obtained, so it can be concluded that the entire data meets the assumption of normality.

So, the bivariate analysis used the oneway ANOVA test to get the results of the analysis of the effect of fruit juice and soursop fruit juice probiotics which can be seen in table 3, then continued with the Duncan test to compare treatment groups with good uric acid reduction which can be seen in the table.

Table 3: Difference in respondents' uric acid before and after giving fruit juice and a combination of soursop fruit juice probiotics

	Variabel	N	Mean	Min	Max	SD	P-Value
Pre	Gout before	28	10,114	7,8	12,9	1,474	0,019
Post	Gout after	28	8,568	6,2	10,9	1,078	0,000

Based on the results of the One Way ANOVA test, it shows that the combination of giving fruit juice and soursop fruit juice probiotics on gout for 7 days had a significant effect on reducing uric acid in Puskesmas Pasar Ikan in this study. This can be seen in Table 3 in the Sig (P-value) column, that there is a difference in the respondents' uric acid before and after with a pre-P-value (Sig) of 0.019 and post 0.000, which indicates that there is an influence after being given the intervention.

Table 4: Duncan's results

Post Gout			
Group	N	1	2
P3	7	7,086	
P2	7		8.914
P1	7		9.000
P0	7		9.271
Sig		1.000	0,348

Based on the Duncan's multiple range test, it is shown that all four treatments (P0, P1, P2, and P3) have a significant effect on reducing uric acid levels in gout patients in the working area of Puskesmas

Pasar Ikan. Table 4 indicates that uric acid levels in P3 are ranked first with an average of 7.086 mg/dl, followed by P1 with 9.000 mg/dl, P2 with 8.914 mg/dl, and lastly P0 with 9.271 mg/dl, demonstrating that P0, P1, and P2 are not as effective as P3.

Discussion

Characteristics

Based on the research conducted, many respondents are aged between 46 and 59 years, comprising 78.6% of the total sample studied, with 22 out of 28 respondents falling within this age range. Additionally, the gender distribution shows a dominance of males at 67.9%, while females account for 32.1% of the total sample. These findings reflect significant demographic profiles within the studied population, with most elderly male respondents. This aligns with research indicating that most respondents aged 46-59 years dominate their samples. Similar demographic trends have been observed in other studies (Newmyer et.al, 2022). Furthermore, other research also indicates a higher proportion of males in the studied population compared to females (Román & Gracia, 2022). This supports findings from research showing that males dominate the sample respondents.

The predominance of males in this study may be attributed to higher participation rates in health surveys and demographic studies within the 46-59 age range. Differences in healthcare-seeking behaviors between males and females also influence respondent participation. Social and cultural factors play a role in determining the male dominance observed in this study, reflecting the complexity of demographic and health dynamics within the studied population (Yoon et.al, 2021).

Overview of Uric Acid Levels Before and After Giving Soursop Juice and Probiotics

The research results indicate a reduction in average uric acid levels after the intervention, suggesting the potential effectiveness of soursop juice and probiotic combinations in lowering uric acid levels. This change could indicate that the intervention may benefit uric acid management in the research subjects. These results align with research showing that fruit juice consumption can reduce average uric acid levels in older adult populations, consistent with findings observing uric acid reduction after fruit juice intervention (Desmawati et.al, 2019). Other studies also support the use of probiotics in fruit juice form to reduce uric acid levels, consistent with findings that soursop probiotic combinations can lower average uric acid levels in previous research (Zeng et al., 2022).

The reduction in average uric acid levels after the intervention with soursop juice and probiotic combinations suggests potential effectiveness in reducing the condition. This is due to the antioxidant content in the fruit juice, which helps reduce oxidative stress and inflammation contributing to uric acid production. Additionally, probiotics in soursop juice can influence gut microbiota balance, which

plays a role in purine metabolism and uric acid elimination. The combination of nutrients from both interventions may also play a significant role in regulating purine metabolism. These findings indicate that this intervention strategy has the potential for uric acid management, although further research is needed to validate these findings and understand the mechanisms in more depth (Helget & Mikuls, 2022).

The research results indicate that the combination of soursop juice and probiotics significantly reduces uric acid levels in Puskesmas Pasar Ikan over seven days. These results align with research supporting the findings that fruit juice and probiotics significantly reduce uric acid levels in community settings, consistent with the results at Puskesmas Pasar Ikan (Fang et al., 2022). Other research investigating various dietary interventions, including fruit juice and soursop probiotics, also shows potential in reducing uric acid levels in urban populations, consistent with the study results (Zhang et al., 2023).

This effectiveness is attributed to the combination of nutrients in fruit juice, such as antioxidants and vitamin C, which can reduce inflammation and oxidative stress contributing to uric acid production. Probiotics in soursop juice also have the potential to influence gut microbiota balance, an essential factor in purine metabolism and uric acid excretion. The setting at the health center may also support careful observation of individual responses to the intervention, creating an ideal environment to monitor and measure the intervention's impact on uric acid management. However, to confirm these results more thoroughly, further research with stricter controls and long-term studies are necessary to validate the long-term effectiveness of this combination in uric acid management (Žuntar et.al, 2020).

Duncan's multiple range test shows that all four treatments (P0, P1, P2, and P3) significantly reduce uric acid levels in gout patients at the health center. These results align with research supporting the finding that all treatments significantly reduce uric acid levels in gout patients at the health center. This study compares various interventions, showing that all treatments significantly affect uric acid reduction (Gill, Dalbeth, ’Ofanoa, & Goodyear-Smith, 2020). Other research reviews the effects of dietary modifications and nutritional interventions on uric acid levels, similar to the results that P0, P1, P2, and P3 treatments successfully reduce uric acid levels in the health center area (Vedder et al., 2019).

These results are due to the significant variation in uric acid levels among the treatment groups, confirming that each treatment has a different impact on reducing uric acid levels. Key factors influencing these results include variations in intervention compositions involving different combinations of diet, nutrition, or supplementation. Robust statistical analysis with Duncan's test provides confidence that the observed differences are not due to chance but the effects of the given treatments. The context of the studied population also plays an important role, with the demographic

and clinical characteristics of gout patients at the health center affecting responses to the given interventions. These findings support the importance of individualized approaches in uric acid management to achieve optimal results according to patients' needs and characteristics (Klongthalay & Suriyaprom, 2020).

CONCLUSION

The distribution of characteristics of gout patients in the working area of Puskesmas Pasar Ikan in Bengkulu City in 2024 shows that there are more male patients compared to female patients, with the age range mostly between 46-59 years. The average uric acid levels before the intervention were as follows: the P0 group had an average of 10.00±0.923, the P1 group had 10.971±0.989, the P2 group had 10.686±1.149, and the P3 group had 8.800±1.833. The average uric acid levels after the intervention were: the P0 group had 9.271±0.946, the P1 group had 9.000±0.476, the P2 group had 8.914±0.581, and the P3 group had 7.086±0.521. From these results, it can be concluded that the administration of fruit juice and soursop probiotic significantly affects uric acid levels in the working area of Puskesmas Pasar Ikan of Bengkulu City in 2024.

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