Proceedings of the International Conference on Nursing and Health Sciences, Volume 5 No 1, January - June 2024
e-ISSN 2774 – 5104, Global Health Science Group
http://jurnal.globalhealthsciencegroup.com/index.php/PICNHS

THE RELATIONSHIP BETWEEN BODY MASS INDEX WITH KNOWLEDGE AND ENERGY INTAKE IN DIABETIC PATIENTS IN PROLANIS CLUB

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ABSTRACT

The prevalence of diabetes mellitus in Indonesia is 2.0%, while East Java ranks 5th, higher than the national prevalence. According to data from the Jombang Regency Health Office, the outpatient diabetes mellitus cases at the Community Health Centers presented on the Indonesia Statistics of Jombang Regency website were 10,133 in 2013, 12,765 in 2014, and 21,992 in 2015, indicating an upward trend in the number of diabetes mellitus patients each year. Insulin resistance is the main cause of diabetes mellitus as a degenerative disease. Information on proper diabetes mellitus health management is expected to enhance knowledge as a means of improving individual behavior and actions. The prevention of diabetes mellitus can be achieved through a healthy lifestyle, which includes regulated and measured eating patterns and physical activity. The objective of this study is to determine the relationship between body mass index with knowledge and energy intake in diabetic patients. This correlational study employed a cross-sectional method involving 60 subjects from three Community Health Centers in Jombang Regency, comprising 54 female and 6 male subjects. Data collection was conducted using a questionnaire instrument with interview techniques and analyzed using the Kolmogorov-Smirnov normality test. Data did not have a normal distribution and were subsequently tested with Spearman correlation. The study shows a significant relationship between body mass index and knowledge $p = 0.041$ with a moderate correlation strength ($r = -0.265$*) relationship between the variables. The relationship between body mass index and energy intake shows a significant correlation $p = < 0.01$ with a correlation coefficient of 0.695*, indicating a strong relationship. Conclusion: Body mass index (BMI) has a significant relationship and a moderate correlation strength with knowledge of diabetes diet. The correlation between BMI and the dietary intake of individuals with diabetes mellitus is significant and strong correlation strength. Periodic and easy implement diabetes mellitus diet education is recommended and is expected to increase knowledge so that energy intake is adequate and appropriate to their needs.

Keywords: body mass index; energy intake; knowledge

INTRODUCTION

Type 2 diabetes mellitus is a chronic metabolic disorder affecting millions of people worldwide (Atlas, 2019). Globally, approximately 463 million people suffer from diabetes, with 80% of them residing in low- and middle-income countries (Chan et al., 2020). The International Diabetes Federation estimates a 51% increase in the global prevalence of diabetes mellitus, including about 74% in Southeast Asia, according to the 9th Edition of the International Diabetes Federation (IDF) in 2019 (Atlas, 2019). The 2014 Basic Health Research results showed that the prevalence of diabetes mellitus diagnosed by doctors in the Indonesian population aged ≥ 15 years was 1.5%, and the prevalence in 2018 was 2%, indicating an increase of 0.5% (Riskesdas, 2014). In Indonesia, East Java Province ranks 5th, higher than the national prevalence of diabetes mellitus, at 2.6% (Riskesdas, 2018). Based on the 2023 Indonesian Health Survey results, the prevalence in East Java Province increased by 0.1% from Riskesdas 2018 to 2.7% (BKPK Kemkes RI, 2024).

According to the Jombang Regency Health Office data on the pattern of outpatient disease at Health Centers on the Jombang Regency Central Bureau of Statistics website, there were 10,133 diabetes mellitus patients in 2013, 12,765 in 2014, and 21,992 in 2015, indicating an upward trend in the number of diabetes mellitus patients each year (BPS Jombang, 2020).

Changes in dietary patterns, food selection behavior, unhealthy diets, lifestyle, and low levels of physical activity contribute to the increased risk of obesity, metabolic syndrome, and type 2 diabetes mellitus (Gulati & Misra, 2017). Insulin resistance is the primary cause of diabetes mellitus as a degenerative disease. Understanding plays a crucial role in influencing individual behavior and decision-making, transforming knowledge into guidelines for managing diabetes mellitus. Information on proper diabetes mellitus health management is expected to enhance knowledge as a means to improve individual behavior and actions (Nurasyifa et al., 2022). Diabetes mellitus is influenced by nutritional status. Obesity-induced nutritional status leads to insulin resistance, which adversely affects tissues, resulting in chronic complications. Central obesity is more resistant to the effects of insulin compared to adipocytes in other parts of the body. Poor nutritional status and inadequate maintenance of diabetes mellitus management pillars can increase the incidence of complications in diabetes mellitus patients (Suryani et al., 2016). Diabetes mellitus is often associated with overweight and obesity and has become a burden on public healthcare in recent years. Studies estimate that currently, approximately one-third of the global population is overweight or obese (Mut-Vitcu et al., 2017). Diabetic patients with good dietary knowledge are expected to be able to control their food intake, as diet plays a significant role in increasing blood sugar levels (Kurniasari et al., 2021). This foundation underlies the research on the relationship between body mass index and the knowledge and energy intake of Prolanis diabetes mellitus patients in Jombang Regency.

METHOD

This study was observational analytic research employing a cross-sectional method conducted on 60 subjects, members of the Prolanis diabetes mellitus club, at three health centers in Jombang Regency. The inclusion criteria were diabetes mellitus patients who are members of the Prolanis club and possess Android devices, with 54 female subjects and 6 male subjects. Data collection utilized a questionnaire instrument with interview techniques and analyzed using the Kolmogorov-Smirnov normality test. The data distribution was found to be non-normal, and thus subsequently tested using Spearman correlation. Body weight and height data of the research subjects were obtained through measurements using a digital scale and a stadiometer for height measurement. Meanwhile, knowledge data were obtained from interviews using a validated diabetes mellitus diet knowledge questionnaire (r calculated > r table). The questionnaire comprised 25 questions, with 11 questions at a 0.05 significance level (2-tailed) and 14 questions at a 0.01 significance level (2-tailed). The reliability test yielded a Cronbach's Alpha of 0.881, indicating that all the tested questionnaire items were reliable.Energy intake data was obtained from the average results of interviews with research subjects using a 3 x 24 hour recall form which has been tested for validity and reliability.

RESULTS AND DISCUSSION

Table 1.

Description of the characteristics of research subjects

Characteristics	Total	
	f	%
Age (year)		
45-54	22	36.6
55-64	25	41.6
65-74	13	21.8
Sex		
Male	6	10
Female	54	90
Total	60	100

Table 1 shows the distribution of diabetes mellitus patients who are members of the Prolanis club in three health centers in Jombang Regency according to sociodemographic characteristics, including age and gender. The age distribution in this study is ≥ 45 years. This research is supported by the study conducted by Trisnadewi et al., which found that the average prevalence of their study subjects was ≥ 36 years (Trisnadewi et al., 2018). Type 2 diabetes mellitus is predominantly experienced by adults. The age group < 45 years has a lower risk of developing type 2 diabetes mellitus, with a risk of 36%, whereas the age group > 45 years has a risk of 64% due to declining physiological functions. Previous research (Sumartini N.P, 2019) indicated that the risk factor for type 2 diabetes mellitus is age above 45 years because anatomical, biochemical, and physiological functions become impaired. Changes and functional disorders occur at the cellular level, then proceed to the tissue level, and ultimately to the organ level, disrupting physiological functions and affecting body homeostasis. The researchers believe that many type 2 diabetes mellitus patients are found after the age of 45 because age-related factors influence the decline in cell and organ function. The gender ratio of the study subjects is 90% female and 10% male.

Table 3.

Spearman's Correlation Test of BMI with DM Diet Knowledge and Energy Intake

Spearman's rho			BMI	DM Diet Knowledge	Energy Intake
	BMI	Correlation Coefficient	1.000	-.265*	.695*
		Sig. (2-tailed)	-	0.041	< .0.01
		N	60	60	60
	DM Diet Knowledge	Correlation Coefficient	-.265*	1.000	
		Sig. (2-tailed)	0.041	-	
		N	60	60	
	Energy Intake	Correlation Coefficient	.695*		1.000
		Sig. (2-tailed)	< .0.01		-
		N	60		60

*Correlation is significant at the 0.05 level (2-tailed)

The BMI data have a *p*-value of 0.2, which is greater than 0.05 (α = 0.05), indicating that the BMI data are normally distributed. The DM diet knowledge data do not follow a normal distribution, with a *p*-value of 0.011, which is less than 0.05 (α = 0.05), the same as the energy intake data does not follow a normal distribution, as evidenced by a *p*-value of 0.007, which is less than 0.05 (α = 0.05) . Therefore, to proceed with the correlation test, the non-parametric Spearman test was applied to the data that do not follow a normal distribution. The table above shows a significant

relationship (0.041 < 0.05) with a moderate correlation strength between BMI and diabetes dietary knowledge, with a negative direction of the relationship (r = -0.265*). This is consistent with previous research (Oktanasari et al., 2022), where 59.3% of respondents had good knowledge and 74.6% had a normal body mass index. The Chi-Square statistical test results showed a *p*-value of 0.003, indicating a significant relationship between nutritional knowledge and BMI. Nutritional knowledge involves the dissemination of nutrition information, aiming to promote healthy living behaviors by considering daily eating patterns and other factors influencing diet, thereby enhancing health and nutritional status (Sefaya et al., 2017).

The BMI data and energy intake shows a significant correlation with p= < 0.01 and a correlation coefficient of 0.695*, indicating a strong relationship. This study aligns with previous research (Adawiyah & Farhat, 2018). Respondents with low energy consumption mostly have low nutritional status (63.2%), whereas respondents with good energy consumption mostly have normal nutritional status (55.6%). Most respondents with high energy expenditure have an energy consumption status of obesity (90.0%). The statistical test results indicate a *p*-value of 0.000 < α 0.05 and a correlation coefficient (r) of 0.768. Therefore, it is concluded that there is a very strong relationship between energy consumption and nutritional status. Nutritional status is the body's condition as a result of fulfilling the nutritional intake required by the body (Permenkes, 2019). The relationship between consumption levels and nutritional status is due to the significant impact of consumption levels on nutritional status. The lower the energy intake, the lower the nutritional status, and vice versa. Nutrition in food is determined by meal frequency and food choices. Good meal frequency includes three main meals and two to three snacks. The best food choices include macronutrients (carbohydrates, protein, fat) and micronutrients (vitamins, water, and minerals).

CONCLUSION

Body mass index (BMI) has a significant relationship and a moderate correlation strength with knowledge of diabetes diet. The correlation between BMI and the dietary intake of individuals with diabetes mellitus is significant and strong correlation strength. Periodic and easy implement diabetes mellitus diet education is recommended and is expected to increase knowledge so that energy intake is adequate and appropriate to their needs.

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