

# Gula darah puasa

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## HUBUNGAN TINGKAT PENGETAHUAN PENATALAKSANAAN *DIABETES MILLETUS*(DM) DENGAN KADAR GULA DARAH PUASA

### Abstrak

**Latar belakang:** Pengetahuan diabetes mellitus sangat berpengaruh pada gaya hidup pasien diabetes mellitus. Pengetahuan merupakan salah satu faktor penting yang dapat menentukan manajemen kesehatan bagi penderitanya. **Tujuan:** Tujuan dari penelitian ini adalah untuk mengetahui hubungan tingkat pengetahuan penatalaksanaan DM dengan kadar gula darah puasa (GDP). **Metode:** Penelitian ini menggunakan metode kuantitatif *cross sectional* dengan pendekatan korelasi. Responden penelitian ini berjumlah 68 orang dengan cara pengambilan sampel menggunakan *purposive sampling*. Pengukuran tingkat pengetahuan penatalaksanaan DM menggunakan kuesioner yang dikembangkan oleh peneliti terdiri dari 28 pertanyaan berdasarkan teori dari *American Diabetes Association*, dan pengukuran nilai GDP dengan menggunakan alat glukosa tes (*easytouch*<sup>®</sup>). Analisa data telah dilakukan dengan menggunakan analisis univariat dan bivariat dengan uji statistik *pearson correlation*. Penelitian ini dilakukan pada bulan Januari-Februari 2019 di Puskesmas Parakan Manggung, Jawa Tengah, Indonesia. **Hasil:** Berdasarkan tabel uji statistik menunjukkan koefisien korelasi yaitu -0,422 dengan *p value* <0.001 (*p*<0.05). **Kesimpulan:** Pengetahuan yang tinggi akan mengurangi resiko hiperglikemia, oleh karena itu perlu kontinuitas pendidikan informasi tentang pentingnya penatalaksanaan DM oleh tenaga kesehatan khususnya perawat dan kesadaran penderita diabetes agar hiperglikemia dapat ditekan.

**Kata Kunci:** tingkat pengetahuan, gula darah puasa, diabetes mellitus.

### Abstract

**Background:** Knowledge about diabetes mellitus affecting the lifestyle of patients who suffered diabetes mellitus. Knowledge one of the essential factor that determines health management for sufferers. **Purpose:** This study aimed to determine the relationship between level knowledge of diabetes mellitus (DM) management toward fasting blood glucose levels. **Method:** This study uses a quantitative cross-sectional method with a correlation approach. As many as 68 people participated in this study by using purposive sampling. Measurement of level knowledge of DM management uses a questionnaire and measure of value GDP using the glucose test tool (*easytouch*<sup>®</sup>). Data analysis has been done by using univariate analysis and bivariate analysis. The study was conducted in January – February 2019. **Results:** Based on the statistical test table showed a significant correlation between level knowledge of DM management toward fasting blood glucose level (coefficient correlation: -0.422), *p*<0.001 (*p*<0.05). **Conclusion:** The more experience the patient has, the less risk getting hyperglycemia. Hence need continuity of information about DM management not only by healthcare members (nurses) but also patients that the number of hyperglycemias could be diminished.

**Keywords:** level of knowledge, fasting blood glucose, diabetes mellitus.

### BACKGROUND

The epidemiological transition of diabetes mellitus is a phenomenon that is characterized by an increase in morbidity rates and mortality rates (Forouhi & Wareham, 2019). These changing phenomena cause inhibited insulin work so that it triggers degenerative diseases (Forouhi & Wareham, 2019). Diabetes mellitus is a persistent metabolic disease related to the loss of insulin released by the pancreas leading to a rise in blood glucose levels; it called hyperglycemia (Forouhi & Wareham, 2019; Koye, Magliano, Nelson, & Pavkov, 2018; Kwon, Hong, Park, & Jung, 2019). Diabetes is a persistent condition that is not a definite cause of death but is a severe illness if care is not sufficient (Forouhi & Wareham, 2019).

The incidence rate of diabetes tends to grow per year. International Diabetes Federation (IDF) estimated in 2030; diabetes mellitus alone would be rise on to sixth global ranking for chronic diseases (Forouhi & Wareham, 2019). Nowadays, people with diabetes reach 415 million people; WHO predicted that the amount would rise by 642 million in 2040 (WHO, 2018). Otherwise, diabetes in Indonesia predicted will reach the top nine in 2030 for non-communicable diseases after hypertension (KemenkesRI, 2018). Based

on data World Health Organization WHO, in 2014, the number of people with diabetes in Indonesia increased by 21.3 million people (WHO, 2018). Data on Indonesian Health Study, Ministry of Health (Riskesdas) in 2013, diabetes has the top ten cases in Temanggung District. Temanggung District Health Officer said that the prevalence of diabetes in 2014 was the second-highest after hypertension by 18.78% of the total 4736 cases.

Indonesia Health policy, the Government has implemented a health program through the Indonesian Health Insurance (BPJS). The procedure is to provide facilities for the public in examining their health (KemenkesRI, 2013). Indonesian Health Insurance held promotive and preventive efforts to prevent complications in chronic diseases such as diabetes. Chronic disease management program (*prolanis*) is a system with a proactive approach by providing health services to the community. The health service involves participants, health providers that all were trying to improve Indonesian people for their healthy (Ulfayani, Laksono, & Likke, 2017).

Indonesian people are less enthusiastic about utilizing health facilities that are programmed by the government; some people tend to neglect their health (Maharani, Herawati, & Anggraeni, 2014). People often underestimate diabetes; actually, diabetes can cause various complications and even lead to death for sufferers (Haris & Nugraheni, 2017). The increasing incident rate of diabetics in Indonesia is due to the lack of public awareness in conducting health checks (Al Slail, Afridi, Fadl, & Kheir, 2018; Haris & Nugraheni, 2017).

The American Association of Diabetes Educators (AADE) argues that testing and monitoring blood glucose levels are essential measures to avoid hyperglycemia. However, people continue to conduct a test until they have several symptoms, resulting in delayed diagnosis in the chronic period. Lack of control contributes to a rise in blood glucose levels in the body and can trigger multiple complications (Al Slail et al., 2018; Haris & Nugraheni, 2017). Test of blood glucose levels should be held separately (self-monitoring) to make it easier to do an early test (Al Slail et al., 2018). In particular, experience plays a significant role in the administration of DM in the conduct of effective handling (Al Slail et al., 2018; Albuquerque, Correia, & Ferreira, 2015; Haris & Nugraheni, 2017).

Low levels of DM management expertise possessed by people with diabetes can influence their ability and sensitivity to regulate blood glucose levels (Al Slail et al., 2018; Albuquerque et al., 2015). Learning, practice, age, and experience are some of the aspects that may influence a person's awareness. Knowledge of the diagnosis of diabetes may be given across five pillars to present details on diabetes (Haris & Nugraheni, 2017). Somebody requires a particular standard of experience and understanding. The degree of expertise can be affected by education, practice, and the environment (Albuquerque et al., 2015; Hermanns et al., 2019; Lawton & Rankin, 2010). In the second half of 2017, people with diabetes had exceeded 158 population in Parakan Health Services. Patients want a direct test, either by community staff in community services or clinics, and buy an anti-glycemic drug without an adequate prescription, as well as a shortage of knowledge from government authorities. It ensures that diabetes treatment will not perform to a limit in 2016 and 2017 (primary data, 2019).

## METODE

18 This research is a quantitative analysis that uses a cross-section method with a correlation approach. This research aims to establish the relationship between the level of diabetes management awareness and fasting blood glucose levels. This study conducted in January-February 2019. The location of this analysis was in the Parakan Puskesmas with inclusion criteria: people with diabetes at Parakan Primary Health Services, who could read and write, were able to become respondents and to pursue the study until the end. Respondents in this study were 68 individuals enrolled in a consecutive sampling test.

Knowledge of diabetes management was measured using a questionnaire with 28 question items—twenty-eight valid questions from 30 questions developed by researchers based on theories from the American Diabetes Association. Researchers used two stages of validity testing: namely C28 content validity index). CVI test conducted for two UMY Nursing lecturers who are experts on diabetes (Erna Rochmawati, S.Kp., MNsc., M.Med.Ed., Ph. D and Erfin Firmawati, S.Kep., Ns., MNS) earned 0.6 of Gregory value (high content validity). After that, the second stage (Pearson Product Moment Test) enrolled 30 respondents in

different areas (they have the same characteristics) to fulfill the questionnaire. Among the 30 respondents, 28 relevant queries with r count range= 0.362 - 0.651. The questionnaire uses closed questions where, if correct, the score is 1 (one), and the wrong response is 0 (null)—fasting blood glucose levels measured with a standardized glucose monitor (easy-touch®). The questionnaire reliability test uses Cronbach's alpha with a value of  $r = 0.619$  ( $r > 0.6$ ).

Univariate analysis is defining the occurrence of each component, including age, sex, profession, gender, background history of having been given education about diabetes, and period of diabetes. Bivariate analysis has established the association between variables. The correlation test uses the pearson product moment method since the data is a normal distribution. Faculty Ethics Committee of Universitas Muhammadiyah Yogyakarta, give an ethical approval with the number 003/EP-FKIK-UMY/I/2019.

## RESULT AND DISCUSSION

**Overview:** The Parakan Community Health Center requires a society in a safe and prosperous way. The aim is to promote the adoption of healthier behaviors, increase community engagement in health growth, enhance the quality of care, and increase human resources.

**Sample characteristic:** Respondents in this study were 68 people with diabetes live in Parakan Community Health Center. Characteristics of respondents analyzed based on gender, age, educational, occupational, background history of having been given education about diabetes.

Table 1. Respondent characteristics

No	Characteristic	Frequency (n)	Percentage (%)
1.	<b>Gender</b>		
	Male	27	39,7
	Female	41	60,3
2.	<b>Education</b>		
	Elementary	26	38,2
	Junior high school	27	39,7
	Senior high school	15	22,1
3.	<b>Occupational</b>		
	Civil servant	2	2,9
	Retirement	6	8,8
	Entrepreneur	18	26,5
	Housewife	12	17,6
	Farmer	24	35,3
	Unemployment	6	8,8
4.	<b>Diabetes education history</b>		
	Ever had before	55	80,9
	Never had before	13	19,1

Source: Primary data 2019

**Gender:** Table 1 reveals that the most significant percentage of respondents are female, up to 41 (60,3%). Sex is one of the risk factors for a person developing diabetes. The findings of this research are associated with the Djuned, which showed that people of menopause age (premenopause) are more vulnerable to diabetes as they have an elevated level of LDL relative to men (Djuned & Dieny, 2014). Physically, females have the potential to witness a rise in body mass index that raises the risk of obesity. In line with a study by Fahni & Nugraheni, the findings found that women with diabetes had double the chance relative to males (Haris & Nugraheni, 2017). Increased age induces hormone improvements in people. The hormone estrogen, which regulates the cycle of endothelial cell regeneration and influences cholesterol levels, has reduced, and there is evidence of decreased female exercise due to weight gain. (Cagnacci et al.,

2007) People that are obese have higher calorie requirements, such that pancreatic cells feel exhaustion and become unable to generate enough insulin to raise blood glucose rates and trigger diabetes.

**Education:** As many as 26 respondents (38.6%) had primary school education. According to Notoatmojo, the standard of education is one that can not be distinguished from the learning cycle, which consists of the stimulus (awareness) and intervention (behavior) (Notoatmodjo, 2007). Another definition of studying is an attempt to gain knowledge that is important for life. The degree of elementary school education of an individual is not a significant influence in the level of experience acquired, accompanied by a broad spectrum of information and practice that can allow a person to have a high level of knowledge. This study, in line with Ananda et al. study, claimed that elementary school levels should not typically have low levels of awareness (Ananda Asriany, Burhannudin, & Devi Usdiana, 2013). Someone has a high level of knowledge if they have adequate sources of information (Haris & Nugraheni, 2017). The level of education is directly proportional to the source of information, which is confirmed by the findings of the research, which shows that the level of knowledge increases significantly in the intervention group who given the knowledge about HbA1c at different levels of education (Hermanns et al., 2019).

**Occupational:** Most of the respondents were farmers (n=24, 35.3%). Someone who has an irregular working period is one of the contributing factors for patients with diabetes. Job makes those assume like they do not have the time to develop a regular monitoring schedule or visit a specialist to make up for a prescription (Al Slail et al., 2018). Busyness also makes people have the potential to forget the therapies that have been given by doctors, thereby reducing adherence to taking medication and exercise for blood glucose control programs (Lawton & Rankin, 2010).

**Table 2. Diabetes history**

Information	Mean	Std. Dev	Min (month)	Max (month)
History	40.88	34.968	1	192

Source: Primary data 2019

**Diabetes education history and diabetes history:** The majority of respondents have experienced diabetes education (n=55, 80.9%). The average duration of respondents with diabetes is 24 months, with a maximum period of 192 months and a minimum period of a month. The longer a person has diabetes, the risk of developing complications is also increasing, and the underlying condition may be impaired. A study argued that having diabetes for more than five years will affect poor glucose control (Fahra, Widayati, & Sutawardana, 2017). Also, anyone who has been suffering from chronic diseases for a long time, in case diabetes, does not regularly take medicine and check-ups. On the other hand, diabetes is a progressive condition that needs lifetime intervention.

**Table 3. Age characteristic**

Information	Mean	Std. Dev	Min (years)	Max (years)
Age	48.69	11.100	35	72

Source: Primary data 2019

Table 3 showed that respondents have 48.69 years old of an average of ages. Age is a predictor that can raise a person's risk of developing diabetes. When the age rises, the capacity of the organ function is decreasing, i.e., aging may cause declining insulin sensitivity and decrease metabolism activity, for example, glucose metabolism.

This study is in line with Widyasari, in which 8.6 percent of people with diabetes are older than 65 years of age. Most of them have type 2 diabetes (Widyasari, 2017). People will experience physiological changes after the age of 40 years. People over 45 have a growing risk of developing diabetes and glucose

intolerance due to factors of degeneration, especially the ability of  $\beta$  cells in the pancreas to produce insulin for metabolizing glucose (Forouhi & Wareham, 2019).

**Table 4. Distribution of respondents based on the level of knowledge on diabetes management**

Information	Mean	Std. Dev	Min	Max
Level of knowledge on diabetes management	20.37	3.494	12	26

Source: Primary data 2019

Focus on table 4: for 28 questions in total, the average knowledge of diabetes management in the respondents is 20.37, and the standard deviation is 3.494. The high knowledge level is a crucial point for people with diabetes mellitus to manage their health (Haris & Nugraheni, 2017). Awareness of diabetes management is one of the measures that will help individuals with diabetes maintain diabetes throughout their lifespan, and once they have a high level of diabetes awareness, then they can better understand how to manage diabetes (Al Slail et al., 2018; Albuquerque et al., 2015; Haris & Nugraheni, 2017; Hermanns et al., 2019). Health-related information may affect the incidence of health problems. Efforts to enhance the wellbeing of the population will be a standard for the quality of their safety. Improvement of the degree of understanding observed by the availability of information that impacts how an individual's conduct enhances the quality of life of a healthy person, how to preserve health, and how to handle illness. Also, a high level of knowledge can prevent a variety of factors from causing complications. In order to increase knowledge, it is possible to improve the quality of life that is productive and to maintain health awareness (Al Slail et al., 2018; Albuquerque et al., 2015; Hermanns et al., 2019).

**Table 5. Distribution of respondents based on fasting blood glucose level**

Information	Mean	Std. Dev	Min	Max
Fasting blood glucose level	139.72	67.529	67	402

Source: Primary data 2019

The results of fasting blood glucose in respondents at the Parakan Community Health Center had an average of 139.72, and the standard deviation was 67.529. The minimum value is 67 mg/dL, while the maximum amount is 402 mg/dL. The average blood glucose is almost ideal because the respondent has good knowledge and routine daily activities. In contrast, Al Slail's study shows that poor people with diabetes tend to be unfamiliar and reluctant to control blood glucose and are not in compliance with doctor's therapy (Al Slail et al., 2018). The average fasting blood glucose value is high because one respondent (newly suffering from diabetes) has an elevated fasting blood glucose value of 402 mg/dL so that it affects the average fasting blood glucose value. Other research shows that patients need a vigilant program and seriousness to control blood glucose daily, to take anti-glycemic drugs, and to exercise regularly to get the average value of normal blood glucose (Albuquerque et al., 2015).

**Table 6. SPSS Analytic**

Information	Mean	Std.dev	Min	Max	p value
Level of knowledge on diabetes management	20,37	3,494	12	26	0.001
Fasting blood glucose level	139,72	67,529	67	402	

Source: Primary data 2019

Table 6 shows that bivariate analytic uses Pearson correlational test. There are statistically correlate ( $\alpha=0.001$ )  $p<0.05$  between the level of knowledge on diabetes management with fasting blood glucose level in respondents with coefficient correlation is (-0.422). The negative path means that the higher the score on the level of diabetes management knowledge, the value of fasting blood glucose levels approaches the standard scale.

The result showed that the majority of respondents have the right level of knowledge, with 20.37 points on average. Awareness about diabetes influences the respondents' life quality. In line with Notoatmodjo, It argued that the behavioral change process is equal to the learning process. The strategy to achieve behavioral change in health behavior is to seek sources of information that can provide health knowledge. Good knowledge of diabetes can be a way to manage diabetes well throughout life. As a result, the better and more people with diabetes understand the disease, the more they know how to change their behavior to perform blood glucose and health checks routinely. Knowledge is one of the factors that can affect a person's level of compliance with treatment (Notoatmodjo, 2007).

Researchers assume some factors can influence the level of knowledge, including sources of information and experience. Data would have a significant impact on the level of expertise for people with diabetes. The results showed that the majority of diabetics in the Parakan Health Center had received 55 diabetes education (80.9%) through a program run by the health center, namely "prolanis". Where *prolanis* may be a source of information for diabetics related to diabetes and its treatment (Al Slail et al., 2018), with participation in these activities, people with diabetes will have a high level of knowledge about diabetes management (Ulfayani et al., 2017).

The second factor that influences the level of knowledge is experience, that can be gained through the work environment and culture (Tsalissavrina et al., 2018). According to Alfiani, Yulifah, and Sutriningsih state that the working environment may allow a person to gain experience and knowledge, both directly and indirectly. Apart from the working environment, environmental culture can also influence the experience of a person's behavior in maintaining his or her health (Alfiani, Yulifah, & Sutriningsih, 2017). *Prolanist* activities may also be an experience for them to receive social support from others so that they can encourage and motivate each other. According to the buffering hypothesis theory, social support can affect the physical and psychological condition of people with type 2 diabetes (Hermanns et al., 2019; Lawton & Rankin, 2010; Tsalissavrina et al., 2018). Good experience can influence people's level of knowledge for the better.

As a result, the level of knowledge is not just one sub-field, just like education, but other sub-fields influence knowledge factors, such as experience and information. Another opinion argues that higher education generally has a high level of knowledge, which has an impact on increasing awareness in efforts to minimize diabetes mellitus (Hermanns et al., 2019; Lawton & Rankin, 2010). However, a high level of knowledge does not determine whether a person will have diabetes or not. The thing that supports a high level of expertise is how to obtain information and experience in the management of health by maintaining a healthy lifestyle and routine controlling blood glucose (Haris & Nugraheni, 2017).

The results of the study, there is a relationship between the level of diabetes management knowledge with fasting blood glucose levels. This investigation is in line with research conducted by Ananda et al., stated that the higher the level of education, the closer it is to average fasting blood glucose values (Ananda Asriany et al., 2013). According to Slail et al., an adequate level of knowledge, people will seek health services to ensure their blood glucose levels are within normal limits. Besides, good experience can contribute to sharing or finding sources of information with health workers (Al Slail et al., 2018). A high level of knowledge in people with diabetes also makes them aware of the importance of control to a doctor or health service. These factors make the fasting blood glucose of respondents in this study within the normal range. According to Carlos, a high level of knowledge about blood glucose control also reduces stress levels in people with diabetes, which provides flexibility in finding sources of health care (Albuquerque et al., 2015).

## CONCLUSION

Based on the description of the discussion, the following conclusions can be drawn: the majority of respondents' characteristics are farmers, their average age is 48.69 years old with elementary school education, women, and some of them have history diabetes mellitus education before. They have a high level of knowledge of diabetes management which the score is 20.37 on average. Respondents have an average fasting blood glucose level of 139.72 mg. It is statistically significant between the level of knowledge of diabetes management toward fasting blood glucose levels among people with diabetes in the Parakan Health Center with  $\alpha=0.001$  ( $p<0.05$ ) and coefficient correlation value equal (-0.422).

## SUGGESTION

Based on the explanation above, the researcher suggested that respondents should be participating in *prolanis* activities as a way to comply with proper diabetes management. For Parakan health center increase the variety of diabetes education sources so that respondents better understand and comply with blood glucose levels using electronic media in the public area (waiting room).

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