

# The Relationship between Age, Education, and Knowledge on Compliance with Implementing Nutritional Therapy Management in Type II Diabetes Mellitus and the Implications for Blood Sugar Levels in Outpatients at the Kebayoran Baru Community Health Center, South Jakarta

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## ABSTRACT

Diabetes patients need to have minimal information provided after the diagnosis is made through a nutritionist during nutritional counseling. This knowledge is influenced by levels of education, information, culture, experience, and socio-economic factors. If the knowledge of diabetes mellitus sufferers is good, then attitudes towards the diabetes mellitus diet should be able to support patient compliance with the diabetes mellitus diet. This research used a survey technique with a cross-sectional method which was conducted on 24 PROLANIS DM patients at the Kebayoran Baru Community Health Center, South Jakarta. The result was that 91.7% of respondents were elderly women (87.5%). The educational level of the participants mostly came from elementary-middle school (6.7%) and had been diagnosed with DM for 1-5 years. Even so, 83.3% of PROLANIS participants had insufficient nutritional knowledge related to DM. 58.3% have controlled Fasting Blood Sugar, and 95.8% have uncontrolled Fasting Blood Sugar. There was no relationship between gender, education level, duration of illness, and dietary compliance with fasting blood sugar ( $p$ -value > 0.05). 95.8% complied with taking metformin, there was 1 respondent with uncontrolled fasting blood sugar and non-compliance with taking medication. Compliance with taking anti-diabetic medication affects the patient's blood sugar levels, therefore compliance with taking anti-diabetic medication can be a patient's choice in controlling their blood sugar. In future research, it is hoped that the number of samples can be increased and varied so that the data is more representative, or measure HbA1C as a compliance factor. diet and lifestyle for Diabetes Mellitus sufferers.

**Keywords** : Education, Knowledge of Diet Compliance, Medication Compliance, Type II Diabetes Mellitus, Fasting Blood Sugar

## I. INTRODUCTION

According to the World Health Organization (WHO), Indonesia ranks 6th in the world as the country with the highest number of diabetes mellitus sufferers after India, China, the Soviet Union, Japan, and Brazil. The World Health Organization predicts an increase in the number of people with diabetes in Indonesia, namely to 12 million by 2030 [1]. Based on Riskesdas (2013), the diagnosis or symptoms of diabetes increased from 1.1% in 2007 to 2.1% in 2013[2].

According to WHO, there are 2 primary types of diabetes mellitus (DM), namely type I DM and type II DM. According to Price and Wilson (2005), in type I DM, patients depend on insulin because the pancreatic beta cells have been damaged so they cannot produce insulin [3]. Type II DM is characterized by abnormalities in insulin secretion and insulin action. In the management of type II DM, blood sugar can be regulated without insulin, but the emphasis is on diet, weight control, and exercise. Diabetes mellitus can be serious and cause dangerous chronic conditions if it is not treated.

Diabetes mellitus complications are divided into two categories, namely acute metabolic complications and chronic metabolic complications. The most frequent acute metabolic complication is diabetic coma hypoglycemia [3]. Chronic metabolic complications can affect the entire body. These complications will not arise if diabetes mellitus treatment is carried out in an orderly and regular manner [4]. These two complications can be prevented or inhibited if blood sugar levels can always be controlled properly [5]. Controlling blood sugar levels for diabetes mellitus is very important to determine appropriate medical treatment, reduce the risk of serious complications, and help sufferers adjust or regulate their diet, physical activity, and insulin level needs to improve daily blood sugar levels.

According to Ilyas (2014), there are three main ways to manage diabetes mellitus, namely diet,

medication, and exercise [6]. Of the three keys to success, treatment with food planning is still the main treatment, but if diet together with physical exercise or physical activity fails, then additional oral medication or insulin is needed [7]. Compliance with nutritional therapy treatment plays an important role in stabilizing blood sugar levels in diabetes mellitus patients [8]. The prevalence of compliance with nutritional therapy management for type II diabetes mellitus sufferers in several regions in Indonesia is still low. Based on research by Suci Lestari (2012) at Fatmawati General Hospital, 56% (56 people) of type 2 diabetes mellitus outpatients did not comply with the diet [9]. Meanwhile, research by Phitri and Widiyaningsih (2012) at RSUD AM. East Kalimantan Parikesit as many as 42.6% (31 people) of type 2 diabetes mellitus patients adhere to the diet [10]. Meanwhile, in Febriana's (2014) research at Sukoharjo Regional Hospital, 31.2% (30 people) of type 2 diabetes mellitus patients adhered to the diet [11].

Diabetic patients need to have minimal information provided after the diagnosis is made, including basic knowledge about diabetes, self-monitoring, causes of high blood glucose levels, oral hypoglycemic drugs, meal planning, physical activity, and management of pain [12]. Sufficient information about diabetes can only be obtained from nutritionists through the role of nutritionists in nutritional counseling because nutritionists have knowledge of nutrition and health as well as knowledge of physiology, psychology, social, and communication [13]. Factors that influence knowledge according to Notoatmodjo (2003) include level of education, information, culture, experience, and socio-economics [14]. According to Notoatmodjo (2005) the higher the level of education, the greater the knowledge and the easier it is to develop knowledge and technology which has an impact on improving a person's welfare [15]. If the knowledge of diabetes mellitus sufferers is good, then attitudes towards the diabetes mellitus diet should be able to support compliance with the diabetes mellitus diet itself.

This research will discuss the relationship between adherence to implementing nutritional therapy management in outpatients with diabetes mellitus and blood sugar levels at the Kebayoran Baru Community Health Center, South Jakarta. Apart from that, factors that influence blood sugar levels will also be analyzed, including education and knowledge levels. The Kebayoran Baru Health Center, South Jakarta, was chosen because the health center has PROLANIS DM (Diabetes Mellitus Chronic Disease Management Program) which has around 60 members, namely type II diabetes mellitus patients. Apart from that, similar research has never been carried out at the Kebayoran Baru Community Health Center, South Jakarta.

## II. METHODS AND MATERIAL

This research uses survey techniques with a cross-sectional method, where the dependent and independent variables are observed at the same time. Sampling used a purposive sampling method and the

resulting sample was 24 people aged over 18 years, who had been diagnosed with type II DM for at least 1 month, had received nutritional counseling from a community health center nutritionist, consumed DM medication in the form of oral anti-diabetic drugs or insulin injections, had been examined Fasting Blood Sugar and are willing to be research respondents.

The research was carried out by collecting primary data such as characteristics (age, gender, education level, and length of time diagnosed with type II DM), and consumption of oral and injectable anti-diabetic drugs through interviews with questionnaires. data regarding nutritional knowledge about type II DM was collected through questionnaires. Dietary compliance data was taken using the 1x24-hour Food Recall interview method. Fasting Blood Sugar and 2 2-hour post-prandial Blood Sugar (GD2PP) levels were obtained from direct examination by health workers. The collected data was analyzed univariately using a frequency distribution table, and bivariate analysis was carried out using the non-parametric Mann-Whitney and Chi-Square tests.

## III. RESULTS AND DISCUSSION

Table. 1 Frequency distribution of Respondent Characteristics (n=24)

Variable	n	%
Age		
Middle Adult	2	8.3
Elderly	24	91.7
Gender		
Man	3	12.5
Woman	21	87.5
Last education		
Low (no school)	1	4.2
Medium (Elementary-Middle School)	16	66.7
High (high school)	7	29.2

Variable	n	%
Long time of illness		
≥ 1-5 years	16	66.7
>5 years	8	33.3
Nutrition Knowledge		
Less (<70%)	20	83.3
Good (>70%)	4	16.7
Fasting Blood Sugar		
Controlled	10	41.7
Not controlled	14	58.3
Post Predinal 2 Hour Fasting Blood Sugar		
Controlled		
Not controlled	1	4.2
	23	95.8

Based on the table above, the majority of respondents were elderly (91.7%) and dominated by women (87.5%). The level of education possessed by respondents was dominated by medium level education (66.75%), 66.7% of respondents had been diagnosed with Type II DM during  $\geq$  1-5 years. However, even though they have been diagnosed with Type II DM for more than 1 year, 83.3% of respondents' nutritional knowledge regarding Type II DM is still relatively lacking. As many as 58.3% had uncontrolled Fasting Blood Sugar (GDP) levels and 95.8% had uncontrolled 2 Hour Post-Prandial Blood Sugar (GD2PP) levels.

The risk of diabetes increases with age, especially over 40 years of age, because the aging process causes a reduction in cell capacity to produce insulin. The age factor affects the decline in all body systems, including the endocrine system [35]. Increasing age causes a condition of insulin resistance which results in unstable blood sugar levels, resulting in many cases of DM, one of which is due to increasing age which is a degenerative factor that causes a decrease in body function.

In the gender category, the proportion of respondents was dominated by women (87.5%). When menopause occurs, the insulin response decreases due to low estrogen and progesterone hormones. Another influencing factor is women's body weight, which is often not ideal, so this can reduce insulin response sensitivity. This is what makes women more likely to suffer from diabetes than men [36].

In the education level category, the proportion of respondents had a medium education level with a range of elementary to middle school education (66.7%). People with a high level of education will usually have a lot of health knowledge. The level of education also influences a person's physical activity because it is related to the work they do [35].

In the long-term illness category, the proportion of respondents who had suffered from diabetes was in the range of 1-5 years (66.7%). The length of time a person suffers from diabetes mellitus is caused by diabetes mellitus being a chronic disease with a long recovery period. The length of time a person suffers from diabetes mellitus depends on how the person can control their blood sugar levels because diabetes mellitus cannot be cured, however, it can only be controlled by carrying out lifelong treatment [36].

Furthermore, the highest proportion of respondents were those who had poor nutritional knowledge (83.3%). The knowledge you already have can be used to shape behavior. The formation of behavior using knowledge refers to cognitive learning theory.

Cognition plays a role in the formation of behavior, namely to provide understanding, produce emotions, form attitudes, and provide motivation for the consequences of behavior [37].

Table 2. Frequency Distribution of Diet Compliance and Compliance with Respondents' Oral Antidiabetic Drug Consumption

No.	Variable	N	%
1.	Energy Intake Compliance		
	Non-Compliant (<80% or >100%)	24	100
2.	Protein Intake Compliance		
	Compliant (80-100%)	3	12.5
	Non-Compliant (<80% or >100%)	21	87.5
3.	Fat Intake Compliance		
	Non-Compliant (<80% or >100%)	24	100
4.	Compliance with Carbohydrate Intake		
	Compliant (80-100%)	1	4.2
	Non-Compliant (<80% or >100%)	23	95.8
5.	Compliance with Oral Antidiabetic Drug Consumption		
	Obedient		
	Not obey	23	95.8%
		1	4.2%

Based on the data above, the majority of respondents (>80%) did not comply with the diet given in terms of providing energy, protein, fat, and carbohydrates. Dietary compliance is individual behavior that is in line with health recommendations, such as following dietary recommendations, complying with aspects recommended by health professionals, and adhering to the intervention plan provided [21]. In this study, insufficient or excessive intake of energy, protein, fat, and carbohydrates could be one of the causes of diet non-compliance. Factors that cause non-compliance with the diet of diabetes mellitus sufferers are because respondents do not know about foods that should not be consumed during a diet, do not know about diet prevention efforts because they rarely follow counseling either

from electronic media or mass media about food diets when blood glucose levels increase. Family support also influences diabetes mellitus diet compliance, the higher the family support, the more compliant the respondent is in following the diet. Respondents did not carry out or implement advice from health workers so diabetes mellitus diet non-compliance still occurred. The average patient compliance with long-term therapy for chronic diseases only reaches 50% in developed countries, and in developing countries, it tends to be lower [22].

Based on Table 2 on compliance with oral antidiabetic medication consumption, 95.8% of respondents adhered to taking antidiabetic medication. Female respondents have busy activities so they often forget to take their medicine and are late in paying for their medicine. Male patients tend to be more

concerned about the disease they suffer from, which makes them exercise more diligently, adjust their diet patterns, and take medication more regularly.

Table 3. Distribution of Median, Minimum, and Maximum Fasting Blood Sugar Based on Respondent Characteristics

Respondent Characteristics	Fasting Blood Sugar				p-value
	Controlled		Not controlled		
	Median	Min-Max	Median	Min-Max	
Age	62.50	52-73	57.0	34-71	0.267
Long Suffering	2	2-3	2	2-3	0.242
Nutrition Knowledge	60.0	33.30-73.30	63.30	54.40-73.30	0.194
Energy Intake Compliance (kcal)	1252.85	242.4-1800	1097.5	549-1800	0.557
Protein Intake Compliance (gr)	29.90	4.1-73.2	34.35	16.6-83.9	0.396
Fat Intake Compliance (gr)	34.45	6.1-52.7	36.06	13.2-63.8	0.412
Compliance with Carbohydrate Intake (gr)	142.55	42.6-218.9	122.38	55-176.9	0.178

Based on Table 3 the length of illness, no influence was found between the duration of the illness and Fasting Blood Sugar levels, but it was seen that among respondents who had been diagnosed with DM for more than 5 years, as many as 6 people experienced uncontrolled Fasting Blood Sugar. This could be due to worsening cognitive function in the subject. Cognitive function can be influenced by age, hypoglycemia, insulin resistance, smoking, diet, exercise, stress levels, depression, genetics, atherosclerosis, and comorbidities [23].

Based on compliance with energy, protein, fat, and carbohydrate intake which has a p-value > 0.05, which means there is no significant difference in Fasting Blood Sugar (GDP) levels. The energy intake in this study in the control group averaged around 1500 kcal, and according to the 2019 AKG, the energy

intake for the elderly was around 1800 kcal. So, energy intake meets >80% of the elderly's energy needs [24]. Consumption of energy-dense foods (high in fat and sugar) and low in fiber is associated with blood glucose levels. Energy consumption is related to blood glucose levels. High energy foods are associated with obesity and insulin resistance which can lead to increased blood glucose levels [25]. Excessive consumption of high-energy foods stimulates insulin resistance by increasing blood glucose levels and free fatty acids in the blood [26]. Consuming foods high in energy also causes an increase in body fat, resulting in obesity.

In this study, protein consumption in the controlled group of elderly people was by the principles of the DM diet. Proteins that respondents often consume include eggs, fish, tofu, tempeh,



skinless chicken, and lean meat. According to the Indonesian Endocrinology Association (PERKENI), good sources of protein are fish, shrimp, squid, lean meat, skinless chicken, low-fat dairy products, nuts, tofu, and tempeh. Food sources of protein with a high content of saturated fatty acids (SAFA), better known as saturated fat, such as beef, pork, goat meat, and processed animal products should be reduced for consumption [27].

The results of this study show low consumption of fat, especially saturated fat, which can result in high blood sugar levels. Respondents who had high blood glucose levels had a pattern of consuming saturated fat in the frequent to very frequent category. Saturated fat consumption patterns are related to BMI which causes insulin resistance or hyperglycemia. Continuous consumption of excessive food results in excess fat storage. High intake of saturated fat risks obesity and results in high blood sugar levels. Meanwhile, respondents' high-fat consumption was caused by several factors, such as fatty foods increasing appetite because of the savory taste, and frequent consumption of fried foods [28].

According to the Indonesian Endocrinology Association (PERKENI), the recommended carbohydrate intake is 45-65% of total energy intake, limiting total carbohydrates to <130 g/day is not recommended. Food should contain carbohydrates, especially those high in fiber [29]. In this study, carbohydrate intake for the majority of respondents was low and the increase in blood sugar levels was not indicated by an increase in daily carbohydrate consumption. This research is in line with the results of Putra & Mahmudiono's research which showed that there was no relationship between the amount of carbohydrate intake and the fasting blood sugar levels of respondents with Type 2 Diabetes Mellitus. Based on the results of interviews, several elderly people in the control group consumed more complex carbohydrates such as potatoes and cassava, as well as consumption of vegetables as much as 2p in one meal. This is to the principles of the DM diet, the recommendation is to consume 2p or 200 g of vegetables in one meal [30].

Table 4. Frequency Distribution of Fasting Blood Sugar Based on Compliance with Medication Consumption

Compliance with Medication Consumption	Fasting Blood Sugar						p-value
	Controlled		Not controlled		Amount		
	n	%	n	%	n	%	
Obedient	10	43.5	13	56.5	23	100	
Not obey	0	0	1	100	1	100	

Based on Table 4, there is 1 respondent with uncontrolled fasting blood sugar and non-compliance with taking medication. Compliance with taking anti-diabetic medication affects the patient's blood sugar levels, therefore compliance with taking anti-diabetic medication can be the patient's choice in controlling their blood sugar [31]. In this study, compliance with anti-diabetic medication consumption in metformin and glimepiride can control blood sugar in diabetic

patients. mellitus. Metformin is the main anti-diabetic drug of choice for patients who are obese, and have dyslipidemia and insulin resistance, which functions to reduce insulin resistance and reduce liver glucose production. Glimepiride is a sulfonylurea class of drugs that functions to increase insulin secretion by pancreatic beta cells [32]. Compliance with taking medication is important for diabetes mellitus sufferers to achieve treatment targets and prevent

complications effectively. Good and correct medical therapy will be very beneficial for diabetes patients, especially for patients who are required to take medication for a long time and life [33]. Disobedient behavior can increase the risk and worsen the disease suffered. According to WHO data, the low level of medication adherence in diabetes patients is influenced by several factors, namely characteristics of treatment and disease (duration of disease, complexity of therapy, and provision of care), intrapersonal factors (gender, age, stress, self-confidence, depression, and alcohol use), interpersonal factors (the patient's relationship with health workers and social support), and environmental factors[34].

#### IV. CONCLUSION

Of the 24 respondents, 91.7% were elderly, dominated by women (87.5%). The education level of the participants mostly came from elementary-middle school, namely 6.7%, and had been diagnosed with DM for 1-5 years. Even though they have suffered from DM for years, 83.3% of Prolanis participants still lack nutritional knowledge regarding DM

Of the 24 respondents, 14 of them had uncontrolled Fasting Blood Sugar (58.3%). 23 respondents had uncontrolled 2 Hour Post-Prandial Blood Sugar (95.8%). None of the participants adhered to their diet, as evidenced by the inappropriate percentage of energy requirements. However, 95.8% adhered to taking medication, and most of the medication consumed was metformin.

There is no relationship between gender and fasting blood sugar ( $p$ -value  $1,000 > 0.005$ ). There is no relationship between education level and fasting blood sugar, and there is no relationship between duration of illness and fasting blood sugar ( $p$ -Value  $1,000 > 0.05$ ). Energy, protein, fat, and carbohydrate intake have a  $p$ -value  $> 0.05$ , which means there is no significant difference in fasting blood sugar (GDP) levels.

In future research, it is hoped that the number of samples can be increased and the age range of respondents more varied to see more representative data or measure HbA1C as a factor in diet and lifestyle compliance for DM sufferers. The Food Frequency Questionnaire (FFQ) can be added to future research, to see dietary compliance in DM sufferers over a longer period.

#### V. REFERENCES

- [1] American Diabetes Association 2010. "Position Statement: Standards of Medical Care in Diabetes". Diabetes Care.
- [2] Kemenkes RI 2013. Riset Kesehatan Dasar (Riskesmas) 2013. Jakarta : Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI.
- [3] Price and Wilson (2005). Konsep Klinis Proses-Proses Penyakit Edisi 6 Vol 2. Jakarta : EGC.
- [4] Tjokropawiro, Askandar 2006. Hidup Sehat dan Bahagia Bersama Diabetes. Jakarta: PT. Gramedia Pustaka Utama
- [5] Waspadji S. Buku Ajar Penyakit Dalam: Komplikasi Kronik Diabetes, Mekanisme Terjadinya, Diagnosis dan Strategi Pengelolaan Jilid III. Jakarta: FK UI; 2009
- [6] Ilyas, Ernita 2014. Olahraga Bagi Diabetesi, dalam Penatalaksanaan Diabetes Mellitus Terpadu. Jakarta : Balai Penerbit FKUI.
- [7] Soegondo, S 2014. Prinsip Pengobatan Diabetes Mellitus, Insulin dan Obat Hipoglikemik oral, dalam Penatalaksanaan Diabetes Mellitus Terpadu. Jakarta : Balai Penerbit FKUI.
- [8] Sukardji, K 2014. Penatalaksanaan Gizi Pada Diabetes Mellitus, dalam Penatalaksanaan Diabetes Mellitus Terpadu. Jakarta : Balai Penerbit FKUI.
- [9] Suci Lestari, Tri 2012. Hubungan Psikososial dan Penyuluhan Gizi Dengan Kepatuhan Diet Pasien Diabetes Mellitus Tipe 2 Rawat Jalan RSUP Fatmawati Tahun 2012. Skripsi : Universitas Indonesia. Diakses dari <http://lib.ui.ac.id/> pada 27 Januari 2016 pukul 23.30.
- [10] Phitri dan Widiyaningsih 2012. "Hubungan Antara Pengetahuan dan Sikap Penderita Diabetes Mellitus Dengan Kepatuhan Diet Diabetes Mellitus Di RSUD AM. Parikesit Kalimantan Timur". Keperawatan Medical Bedah, Vol. 1, No. 1, pp 58 – 74. Diakses pada



- 17 Januari 2016 pukul 16.05 dari <https://perpustakaanhb.files.wordpress.com>.
- [11] Febriana, Reni 2014. Hubungan Kepatuhan Diet Dengan Kadar Gula Darah Sewaktu Pada Pasien Diabetes Mellitus Tipe 2 Rawat Inap RSUD Sukoharjo. Skripsi : Universitas Muhammadiyah Surakarta. Diakses pada dari <http://eprints.ums.ac.id/> pada 27 Januari 2016 pukul 23.45.
- [12] Basuki, Endang 2014. Penyuluhan Diabetes Mellitus, dalam Penatalaksanaan Diabetes Mellitus Terpadu. Jakarta : Balai Penerbit FKUI.
- [13] Persagi 2013. Konseling Gizi : Proses Komunikasi, Tatalaksana, serta Aplikasi Konseling Gizi pada Berbagai Diet. Jakarta : Penebar Plus.
- [14] Notoatmodjo, S 2003. Ilmu Kesehatan Masyarakat Prinsip Prinsip Dasar. Jakarta : PT Rineka Cipta
- [15] Notoatmodjo, S 2005. Promosi Kesehatan Teori dan Aplikasi. Penerbit : Rineka Cipta.
- [16] American Diabetes Association 2004. Diagnosis and Classification of Diabetes Mellitus. Diabetes Care.
- [17] Tandra, Hans 2008. Panduan Lengkap Mengenal dan Mengatasi Diabetes dengan Cepat dan Mudah. Jakarta: PT. Gramedia Pustaka Utama.
- [18] PERKENI 1998. Konsensus Pengelolaan Diabetes Mellitus. Jakarta.
- [19] Kementerian Kesehatan RI 2013. Pedoman Pelayanan Gizi Rumah Sakit. Jakarta:Kementerian Kesehatan RI.
- [20] Tjokroprawiro, Askandar 2002. DM : Klasifikasi, Diagnosis dan Terapi. Jakarta: PT. Gramedia Pustaka Utama
- [21] Kusumastuty, I., Handayani, D., Affandy, Y. I. K. D., Attamimi, N., Innayah, A. M., & Puspitasari, D. A. (2021). Kepatuhan Diet Berbasis Beras Coklat terhadap Glukosa Darah dan Lemak Tubuh Pasien Diabetes Mellitus. Indonesian Journal of Human Nutrition, 8(2), 182–194. <https://doi.org/10.21776/ub.ijhn.2021.008.02.9>
- [22] Haryono, S., Suryati, E. S., & Maryam, R. S. (2018). Pendidikan Kesehatan Tentang Diet Terhadap Kepatuhan Pasien Diabetes Mellitus. Jurnal Riset Kesehatan, 7(2), 91. <https://doi.org/10.31983/jrk.v7i2.3308>
- [23] Meloh, M. L., Pandelaki, K., & Sugeng, C. (2015). Hubungan Kadar Gula Darah Tidak Terkontrol Dan Lama Menderita Diabetes Mellitus Denganfungsi Kognitif Pada Subyek Diabetes Melitus Tipe 2. E-CliniC, 3(1). <https://doi.org/10.35790/ecl.3.1.2015.6837>
- [24] MENKES, R. (2019). PERATURAN MENTERI KESEHATAN REPUBLIK INDONESIA NOMOR 28 TAHUN 2019 TENTANG ANGKA KECUKUPAN GIZI YANG DIANJURKAN UNTUK MASYARAKAT INDONESIA. 3(1), 18–23.
- [25] Wirawanni, Y., & I.R, F. (2014). Hubungan Konsumsi Karbohidrat, Konsumsi Total Energi, Konsumsi Serat, Beban Glikemik Dan Latihan Jasmani Dengan Kadar Glukosa Darah Pada Pasien Diabetes Mellitus Tipe 2. Diponegoro Journal of Nutrition and Health, 2(3), 1–27.
- [26] Isganaitis, E., & Lustig, R. H. (2005). Fast food, central nervous system insulin resistance, and obesity. Arteriosclerosis, Thrombosis, and Vascular Biology, 25(12), 2451–2462. <https://doi.org/10.1161/01.ATV.0000186208.06964.91>
- [27] PERKENI. 2021. Konsensus Pengelolaan dan Pencegahan Diabetes Mellitus Tipe 2 di Indonesia. Jakarta.
- [28] Saraswati, N. K. L., Dhyana Putri, I. G. A. S., & Jirna, I. N. (2022). Gambaran Kadar Glukosa Darah Puasa Pada Penenun Kain Tenun Gringsing Di Desa Tenganan Pegringsingan Karangasem. Jurnal Skala Husada : The Journal of Health, 17(2), 40–46. <https://doi.org/10.33992/jsh:tjoh.v17i2.2062>
- [29] Utami, D. (2021). Hubungan Asupan Karbohidrat Sederhana, Serat Dan Kepatuhan Minum Obat Hipoglikemik Oral (Oho) Dengan Kadar Glukosa Darah Pada Penderita Diabetes Melitus Di Puskesmas Sukamerindu Kota Bengkulu Tahun. In Journal of Chemical Information and Modeling (Vol. 53, Issue 9).
- [30] Putra, F. D., & Mahmudiono, T. (2012). Hubungan Tingkat Konsumsi Karbohidrat, Lemak, Dan Dietary Fiber Dengan Kadar Gula Darah Pada Penderita Diabetes Mellitus Tipe 2. Media Gizi Indonesia, 2(9), 1528–1538.
- [31] Toharin, S. N. R., Cahyati, W. H., Zainafree, I. Hubungan Modifikasi Gaya Hidup dan Kepatuhan Konsumsi Obat Antidiabetik Dengan Kadar Gula Darah Pada Penderita Diabetes Melitus Tipe 2 Di RS QIM. Unnes J. Public Heal. 4, 153– 161 (2015).
- [32] Ndraha, S. Diabetes Mellitus Tipe 2 Dan Tatalaksana Terkini. Medicinus 27, 9–16 (2014).

- [33] Hannan, M. Analisis Faktor yang Mempengaruhi Kepatuhan Minum Obat pada Pasien Diabetes Melitus di Puskesmas Bluto Sumenep. *J. Kesehat. Wiraraja Med.* 47–55 (2013).
- [34] WHO. Adherence To Long-Term Therapies : Evidence For Action. World Health Organization <http://www.who.int/chp/knowledge/publications/ache> (2003).
- [35] Arania R, Triwahyuni T, Esfandiari F, Nugraha FR. Hubungan Antara Usia, Jenis Kelamin, Dan Tingkat Pendidikan Dengan Kejadian Diabetes Mellitus Di Klinik Mardi Waluyo Lampung Tengah. *J Med Malahayati.* 2021;5(3):146–53.
- [36] Irjayanti K, Zaenal S. Faktor-Faktor Yang Mempengaruhi Terjadinya Peningkatan Diabetes Melitus Tipe 2. *J Ilm Mhs Penelit Keperawatan [Internet].* 2022;1(6):805–13. Available from: <https://123dok.com/document/yj7xmxdk-faktor-faktor-mempengaruhi-terjadinya-peningkatan-diabetes-melitus-tipe.html>
- [37] Isnaini N, Ratnasari R. Faktor risiko mempengaruhi kejadian Diabetes mellitus tipe dua. *J Kebidanan dan Keperawatan Aisyiyah.* 2018;14(1):59–68.

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