Original Research Article

DETERMINANT ANALYSIS OF BLOOD SUGAR LEVEL VALUES IN DIABETES MELLITUS PATIENTS AT THE JOHAN PAHLAWAN MEDICAL FACILITY OF WEST ACEH

ABSTRACT:

Aims: A rise in blood sugar levels within the body is the cause of diabetes mellitus, a degenerative disease. Modifiable risk factors for diabetes mellitus include being overweight, not exercising, central obesity, Dyslipidemia, eating a diet rich Lacking in fiberand high in sugar,and non-modifiable risk faktors including genetics.

Study Designs: Cross Sectional Desain

Place and Durationof studi: West Aceh Regency's Johan Pahlawan District is home to the Johan Pahlawan Health Center. The study was conducted between August and December of 2024.

Methodology: Sample:This study had 87 people,Of them, 63 were women and 24 were men. Ages range from 36 to 83. Every diabetic patient receiving care at the Johan PahlawanWest Aceh Medical Center.

Results: The analysis's findings demonstrated that, at the Johan Pahlawan West Aceh Health Center, there was a correlation among body mass index and diabetes mellitus (P Value = 0.049), and there is a connectionamong diet and blood sugar levels value (P Value = 0.009), knowledge (P Value = 0.003), family history (P Value= 0.044), and physical activities (P Value= 0.006).

Conclusion: According to the research, blood sugar levels value in diabetes mellitus sufferer at the Johan PahlawanMedicalCenter in West Aceh are correlated with their diet, body mass index, knowledge, family history, and physical activity.

Keywords: *Blood Sugar Level, Diet, Knowledge, Body Mass Index, Family History, Physical Activity*

1. INTRODUCTION

Diabetes is a degenerative illness that arises when blood the amounts of sugar are abnormal brought on insulin secretion or the way insulin works, even a combination of the two (Rahman) *et al.,* 2023). Diabetes Mellitus can worsen quality of life and even lead to death (Anggreini&Lahagu, 2021). Diabetes can also affect various organs and systems of the body over a period of time, called complications (Rif"at *et al.,* 2023). The cause of Diabetes Militusis not exclusively the result of one factor nonetheless, the outcome of a combinationof various risk factors. Risk factors for DM are differentiated into modifiable risk factors such as overweight, smoking, obese, dyslipidemia, dietary habit(high sugar and low in fiber), and smoke(Anri A 2022). Irreversible risk factors such as genetics (Lestari *et al*., 2021). Research shows that these Numerous things may influence the risk of developing Diabetes Militus, such as unhealthy diet, low level of nutritional knowledge and family history. In addition, knowing the body mass index also plays a significant part in the early detection of diabetes risk and the management of its causative factors.

According to *International Diabetes Federation* (IDF),Every year, The quantity of diabetes mellitus cases rises globally. In 2021, the number of DM sufferers worldwide reached 537 (IDF 2021). In 2022, people with DM he World Health Organization (WHO) claims thatin (Maharani *et al.,* 2024) are around 422 million people in the world. Indonesia is the 5th ranked country with 19.5 million DM sufferers in 2021 (IDF 2021). Meanwhile, in 2022 the number of DM sufferers in Indonesia increased to 41.8 million (IDF 2022). And in 2023, according to the Indonesian Health Survey (SKI), there are 877,531 people with DM in Indonesia (SKI 2023). According to the Aceh Provincial Health Profile, there were 184,527 DM sufferers

in 2021 (Profile 2021), while in 2022 DM patients in Aceh reached 189,464 sufferers (Profile 2022). And in 2023, according to the Indonesian Health Survey, the number of DM sufferers in Aceh will be 17,271 (SKI 2023).

Based on EPROFILKES,In 2021, there were 5.87 DM patients in West Aceh. In 2022, there are 4,310 people with DM in West Aceh and in 2023 there are 4,325 people with DM in West Aceh (EPROFILKES). The Johan Pahlawan Health Center has the most number of patients with diabetes mellitus in West Aceh, according to the West Aceh Health Office. There were 2,703 DM patients at the Johan Pahlawan Health Center in 2021, and 5,709 DM patients there in 2022. The Johan Pahlawan Health Center will have 5,251 DM patients in 2023. Additionally, 639 (67%), DM patients will be treated at the Hero Champion Health Center between January and August of 2024.

From these problems, his research focuses on examining determinants of Blood Sugar Level Values in Diabetic Mellitus sufferer such as diet, knowledge, family history, body mass index and physical activity. This approach is expected to provide new insights into comprehensive prevention efforts as well as more optimal diabetes risk predictor management strategies at the individual and population levels.

2. Material And Methods

2.1 Material

The instruments employed in this investigation are digital scales to measure weight, to measure height using microtoise (ZEA), then to measure blood sugar levels using a glucometer (Easytouch).

2.2 Method

This investigation employs a quantitative technique using a cross-sectional design and an analytical survey research type.All patients with diabetes mellitus at the Johan PahlawanMedicalCenter in West Aceh comprise the study's populace. There were 639 individuals with diabetes at the Johan PahlawanMedicalCenter between January and August of 2024.The non-probability sampling method combined with the accidental sampling method is used for sampling in this study. Diet, knowledge, family history, body mass index, and physical activity were the five independent variables in this study. The Johan Pahlawan Health Center's Determinant of Blood Sugar Levels value in Diabetes Suffrerer is the study's dependent variable. From August to December 2024, This research was conducted in theJohan PahlawanMedicalCenter in the West Aceh Regency. A questionnaire will be the research tool utilized in this investigation. Univariate, bivariate, and multivariate testing were employed in this investigation.

3. Result And Discussion

3.1 Result

3.1.1 Responsive Features

Table 1Respondent characteristics for individuals with diabetes mellitus at the Johan Pahlawan West Aceh Health Center by age, gender, education, and occupation

Variable	Frequency	Percentage %
Age		
36-45	5	5,7
46-55	25	28,7
56-65	36	41,4
>65	21	24,1
Gender		
Woman	63	72,4
Man	24	27,6
Work		
Farmer	4	4,6
Merchant	4	4,6
PNS	5	5,7
Pensioner	12	13,8
IRT	43	49,4
Other	8	9,2
Not working	11	12,6
Education		
SD	26	29,9
SMP	20	23,0
SMA	28	32,2
Diploma	9	10,3
S1	4	4,6
Total	**87.0**	**100.0**

It is clear from the above table that there are 87 respondents in this study.Most of those surveyed of the age group is 56-65 years, up to 36 individuals (41.4%). while the lowest patients aged 36-45 years were 5 people (5.7%). Most of the distribution of respondent gender characteristics were women 63 people (72.4%). Most of the distribution of respondent occupation characteristics were housewives 43 people (49.4%), while the jobs with the lowest frequency distribution were traders and farmers only 4 people (4.6%). Most of the distribution of respondents' last education characteristics were high school 28 people (32.2%), while the lowest were respondents with a bachelor's degree education of 4 people (4.6%).

3.1.2 Variable Characteristics

A. Up to Gula Darah

Table 2 below displays the findings of the frequency and percentage computation based on blood sugar level values:

Table 2 Distribution of Blood Sugar Level Value Frequency Characteristics among Respondents Considering Diabetes Mellitus at theJohan PahlawanMedicalCenter in West Aceh

KGD Value	Frequency	Presented %
Tall	69	79,3
Lowly	18	20,7
Total	**87**	**100.0**

According to Table 2, 69 respondents, or 79.3%, had blood sugar levels that were too high.

B. Body Mass Index

Table 3 below displays the findings of the frequency and percentage computations based on body mass index:

Table 3 Frequency distribution of body mass index among Johan Pahlawan Medical Center patients with diabetes mellitus in West Aceh

Body Mass Index	Frequency	Presented %
Usual	69	79,3
Fat	18	20,7
Total	**87**	**100.0**

The highest responders have a normal BMI of 69 individuals (79.3), according to table 3.

C. Diet

Table 4 below displays the findings of the frequency and percentage computation depending on diet:

Table 4 Distribution of dietary frequency among Johan Pahlawan Health Center patients in West Aceh with diabetes mellitus

Diet	Frequency	Presented %
Good	37	42,5
Deficient	50	57,5
Total	**87**	**100.0**

Table 4 shows that 50 individuals, or 57.5% of the total responses, have poor diets.

D. Knowledge

Table 5 below displays the findings of the frequency and percentage computation based on knowledge:

Table 5 Distribution of Diabetes Mellitus Patients' Knowledge Frequencies at the Johan Pahlawan MedicalCenter in West Aceh

Knowledge	Frequency	Presented %
Good	34	39,1
Deficient	53	60,9
Total	**87**	**100.0**

Table 5 indicates that 53 individuals, or 60.9% of the total responses, have inadequate knowledge.

E. Family History

Table 6 below displays the findings of the frequency and percentage computation based on family history

Table 6 Distribution of Family History Frequencies in Johan Pahlawan West Aceh Health Center Patients with Diabetes Mellitus

Genetics	Frequency	Presented %
Have	45	51,7
Don't have	42	48,3
Total	**87**	**100.0**

Table 6 illustrates that the largest percentage of patients 45 individuals, or 51.7%had a family history of diabetes mellitus.

F. Physical Activity

Table 7 below displays the findings of the frequency and percentage computation based on family history

Table 7 The Johan Pahlawan Health Center in West Aceh's Diabetes Mellitus Patients' Distribution of Physical Activity Frequency

Physical activity	Frequency	Presented %
Good	24	27,6
Not good	63	72,4
Total	**87**	**100.0**

Table 7 show that the mostly of patients 63 individuals, or 72.4% have low levels of physical activity.

3.1.3 Bivariate Test

The Association In relation to the Body Mass Indexand Blood Sugar Levels value in Diabetic Mellitus Sufferer at the Johan Pahlawan Medical Center in West Aceh

1. **Table 8 Correlationamong Body Mass Index and KGD Value in Diabetes Mellitus Sufferer at Johan PahlawanMedical Center, West Aceh**

Body mass index	KGD Value				Total		*P value*
	Tall		Low				
	N	%	N	%	n	%	
Normal	58	84,1	11	15,9	69	100	0,049
Fat	11	61,1	7	38,9	18	100	

The table above also shows that the outcomes of the data processing using Chi Square relation body mass index and KGDvalue in diabetes Sufferer in the Johan Pahlawan Health Center, West Aceh, obtained a P value = 0.049 (p <0.005), this states that Ha is be accepted and H0 is rejected,It indicates that blood sugar levels and body mass index are related in diabetes mellitus Sufferer at the Johan Pahlawan Medical Center in West Aceh.

2. **The correlation Between Diet andSugar In The Blood in Diabetic Sufferer at the Johan PahlawanMedical Center in West Aceh**

Table 9 Diet and KGD Value in Diabetes Mellitus Sufferer at Johan PahlawanMedicalCenter in West Aceh

Diet	KGD Value				Total		*P value*
	Tall		Low				
	N	%	N	%	n	%	0,009
Good	24	64,9	13	35,1	37	100	
Not good	45	90,0	5	10,0	50	100	

The table above also shows that the outcomes of the data processing using Chi Square between diet and Blood Sugar Levels value in Diabetes sufferers at the Johan PahlawanMedical Center, West Aceh obtained a P value = 0.009 (p <0.005), this states that Ha is be accepted and H0 is rejected, This indicates that blood sugar levels and diet are related with diabetes mellitus sufferer at the Johan PahlawanMedicalCenter in West Aceh.

3. **The Correlation Between Knowledge and Blood Sugar Level Value in Diabetic Mellitus Sufferer at the Johan PahlawanMedicalCenter in West Aceh**

Table 10 Knowledge and KGD Value Relationship in Diabetes Mellitus Sufferer at Johan PahlawanMedicalCenter in West Aceh

Knowledge	KGD Value				Total		*P value*
	Tall		Low				
	N	%	N	%	n	%	0,003
Good	21	61,8	13	38,2	34	100	
Not good	48	90,6	5	9,4	53	100	

The table above also shows that the outcomes of data processing using Chi Square between knowledge and Blood Sugar Levels value in Diabetes Mellitus sufferers at the Johan PahlawanMedicalCenter, West

Aceh, obtained a P value = 0.003 (p <0.005), this states that Ha is be accepted and H0 is rejected,It indicates that among diabetes mellitus sufferer at the Johan Pahlawan Medical Center in West Aceh, there is a correlation between blood sugar levels and knowledge.

4. The Correlation Between Family History and Blood Sugar Level in Diabetic Mellitus Sufferer at the Johan PahlawanMedicalCenter in West Aceh

Table 11 Family History and KGD Value in Patients with Diabetes Mellitus at Johan Pahlawan West Aceh Health Center

Family history	KGD Value				Total		*P value*
	Tall		Low				
	N	%	N	%	n	%	0,044
Ada	40	88,9	5	11,1	45	100	
No	29	69,0	13	31,0	42	100	

table above also shows that outcomesof data processing using Chi Square between Family History and Blood Sugar Levels in Diabetes Mellitus sufferer at the Johan PahlawanMedical Center, West Aceh, obtained a P value = 0.044 (p <0.005), this states that Ha is be accepted and H0 is rejected,It indicates that blood sugar levels and family history are related diabetes mellitus sufferer at the Johan Pahlawan Medical Center in West Aceh.

5. The Correlation Between Physical Activity andBlood Sugar Levels Value in Diabetic Mellitus Sufferer at the Johan PahlawanMedicalCenter in West Aceh

Table 12Association relation KGD Value and Physical Activity in Patients with Diabetes Mellitus at Johan PahlawanMedicalCenter in West Aceh

Physical activity	KGD Value				Total		*P value*
	Tall		Low				
	N	%	n	%	n	%	0,006
Good	14	58,3	10	41,7	24	100	
Not good	55	87,3	8	12,7	63	100	

The table above also shows that outcomes of data processing using Chi Square relation physical activity and Blood Sugar Levelsvalue Diabetes Mellitus sufferein the Johan PahlawanMedical Center, West Aceh obtained a P value = 0.006 (p <0.005), this states that Ha is be accepted and H0 is rejected , it indicates that Blood Sugar Levels and physical activity are related Diabetes Mellitus sufferer in the Johan Pahlawan Health Center, West Aceh.

3.1.4 Uji Multivariat

The table below shows the factors that, according to statistical findings, have the most effects on elevated blood sugar levels

Table 13The Johan Pahlawan Health Center in West Aceh's Diabetes Mellitus Patients' High Blood Sugar Levels Are the Most Important Factor

Variable	P value	OR	OR 95% CI	
			LOWER	UPPER
Body Mass Index	0.025	2.727	1.135	6.555
Diet	0.012	0.137	0.029	0.648
Knowledge	0.006	0.084	0.014	0.500
Family History	0.050	4.473	0.998	20.044
Physical activity	0.011	0.132	0.028	0.624

Family history is the most significant factor influencing blood sugar levels value in people with diabetes mellitus, according to the outcomes of the logistic regression test on each independent variable that influences the dependent variable. This means that individuals High blood sugar levels are four times more common in people with a family history of diabetes mellitus than in people without the condition.

3.2 Discussion

3.2.1 Body Mass Index

The findings of the studies that occurred conducted There is a Association between blood sugar levels value and body mass index with diabetes mellitussufferer in the Johan PahlawanMedical Center in West Aceh, according to the outcomes of the Chi Square statistical test, which yielded a value of P value = 0.049, which is greater than α = 0.05 (P value = 0.049 < α = 0.05). High levels of GDs are not usually associated with obesity. On the other hand, blood sugar levels can be impacted by the corticosteroid hormones and adrenaline that the adrenal glands release. While adrenaline might raise blood sugar requirements, corticosteroids typically lower blood sugar levels. Body mass index is frequently used by people to assess their risk of developing metabolic diseases (Sherwood, 2009). But the Body The results of this study are in line with the research (Sari 2024) Based on the outcome of *the Chi Square test,* the value of P = 0.005 ≤ 0.05,There is a correlation between blood sugar levels and body mass index in sufferer with type II diabetes mellitus at the Telaga Dewa Health Center in Bengkulu City, indicating that Ho is rejected and Ha is accepted. This study also supports studies (Harahap, 2020) that found a significant correlation amongBody mass index and blood sugar levels in individuals with diabetes mellitus in Sisumut village, Kotapinang district.

3.2.2 Diet

Correlation between blood sugar levels value and diet with diabetes mellitus sufferer, according to the findings of a study done at the Johan Pahlawan West Aceh Health Center with 87 respondents. The outcome of the Chi Square test statistical test revealed that of p (0.009) < α (0.05). A diet is a collection of data that gives a general idea of the kinds of foods and quantities of food that people eat on a daily basis, as well as what is particular to a particular group (Sulistyoningsih, 2011: Yanti 2016). Diet is one of the behaviors or habits that can impact your health. This is because a person's and society's consumption of certain foods and beverages has an effect. As a result, the body maintains a normal or healthy weight, is immune to infectious diseases, and avoids chronic illnesses and early mortality (Adriana, 2016). The results of this investigation align with those of a 2016 study by Dwi Rahma Fefbri Yanti at the Bengkulu City Fish Market Health Center, which found a correlation between diet and the incidence of diabetes mellitus with a P value of 0.000 (p < 0.05). The statistical test results showed a significant correlation among diet and the incidence of Diabetes Mellitus at the South Tapanuli Regency Hospital, with a value of P = 0.000 (P value <0.05), indicating that Ho was rejected in accordance with Ritongga's (2019) research.

3.2.3 Knowledge

In light of the findings of research conducted at the Johan Pahlawan West Aceh Health Center from 87 Respondents, the Chi Square test statistical results revealed that the value of p (0.003) < α (0.005), indicating a correlation between the KGD value and knowledge in patients with diabetes mellitus. Understanding diabetes mellitus can aid in diabetes management, enabling more and more individuals with the disease to become aware of their condition, learn how to modify their behavior, and control their diabetes to extend their lives and improve their quality of life (Teslatu 2023). Knowledge is the product of a person's curiosity and through a sensory process that uses their five senses, primarily the ears and eyes, towards a particular item. Knowledge plays a major role in shaping open and open conduct (Donsu, 2017). With aassociation coefficient of -0.281, the findings of this study are consistent with Azra's research from 2024 at Mitra Siaga Hospital in Tegal Regency, which demonstrated that the lower the blood sugar level and the direction of the negative relationship with low relationship closeness, the higher the level of knowledge. The findings of this study also support those of a study by Fadhli et al. (2022) that found a substantial correlation between blood sugar levels and knowledge.

3.2.4 Family History

Correlation link blood sugar levels and family history value with diabetes mellitus sufferer, according to the findings of a study done at the Johan PahlawanMedicalCenter in West Aceh with 87 respondents.

The outcome of the Chi Square test statistical test revealed that the value of p (0.044) < α (0.005). Genetic risk factors for diabetes mellitus indicate a connection between the disease and inherited variables. In "genetic" words, genes are elements that influence whether a person's offspring will inherit particular traits from them. However, a person's elevated risk does not guarantee that they will get diabetes mellitus. Genetic factors are only seeds. As an illustration, these seedlings will (Sutanto, 2015). The findings of this investigation are consistent with those of Siregar's (2022) study, which found a correlation between genetics and the incidence of diabetes mellitus in the elderly population of AekGodang Village in 2022, with a P value = 0.023 (P < 0.05). The results of this study showed a correlation between genetic history and DM patients in Lalang Village with a P value of 0.029 (p < 0.05), which is consistent with the research done by Sibagariang et al., (2024).

3.2.5 Physical Activity

Correlationbetween physical activity and the KGD value with diabetes mellitus Sufferer, according to the findings of a study done at the Johan Pahlawan West Aceh Medical Center with 87 respondents. The outcomes of the Chi Square analyze statistical test revealed that the value of p (0.006) < α (0.005). One of the key tenets of clinical treatment for people with type 2 diabetes (T2DM) is physical activity. In addition to improving glucose balance and other metabolic risk factors, physical activity enhances quality of life. There is proof that rigorously regulated physical activity can raise blood cholesterol and blood sugar levels (Serbis et al., 2021). P value = 0.013 (P < 0.05), it indicates that H0 is rejected and Ha is be accepted, indicates that there is a relationship among blood sugar levels and physical activity in patients with type II diabetes mellitus at Padangsidimpuan City Hospital. This study is consistent with research done by Oktapia (2019) at Padangsidimpuan Hospital. According to Ananda's (2024) research, there is a correlation between glucose levels and physical activity in patients with diabetes mellitus at the Dempet Health Center; the P-value, also known as the Sig (2-tailed), is 0.04 or less than 0.005.

3.2.6 Multivariate Discussion

Five factors significantly impacted blood sugar levels value in individuals with diabetes, according to the study's findings utilizing the logistic regression test. These factors include physical activity, family history, knowledge, nutrition, and body mass index. Among the five variables, family history is the variable that most affects blood sugar levels value with diabetes mellitus sufferer with an OR value of 4,473 which means that individual with diabetes mellitus who have a family history will be at 4 times greater risk of high blood sugar levels compared to people with diabetes mellitus who do not have a family history.

4. Conclusion

Blood sugar levels and diet are related with diabetes mellitus sufferer at Johan Pahlawan MedicalCenter in West Aceh, with a P value of 0.009 <0.05. Blood sugar levels and knowledge are related in diabetes mellitus sufferer at Johan PahlawanMedicalCenter in West Aceh, with a P value of 0.003 <0.05. Blood sugar levels and family history are related with diabetes mellitus sufferer at Johan PahlawanMedical Center in West Aceh (P value = 0.044 <0.05). Blood sugar levels and physical activity are related in patients with diabetes mellitus at Johan PahlawanMedicalCenter in West Aceh, with a P value of 0.006 <0.05 correlation exists between blood sugar and body mass index.

CONSENT (WHERE EVER APPLICABLE)

I agree that this journal is in Pulish in the journal that you manage according to the journal I choose

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

This Research Has Passed the Code of Ethics from the University Research Institute and the Dean of the Faculty of Health Sciences

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