

# RELATIONSHIP OF MENDOAN CONSUMPTION TO HbA1c PROFILE OF PATIENTS AGED 40-75 YEARS

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## ABSTRACT

The influence of globalization has caused modern era people to consume more fast food in the form of fried foods such as mendoan to save time and increase efficiency in working in the midst of increasingly rapid world development, but consumption of foods with high saturated oil content has a correlation with the incidence of metabolic syndrome so this study aims to examine the relationship between the frequency of mendoan consumption with the HbA1c profile in people of age 40-75 years. The design of this study was cross-sectional. Data collection was conducted through interviews at the Endocrine and Metabolic Poly. Data collected in the form of identity, *type of food consumed* from *interviews nutritional intake* of respondents measured using *Food Frequency Questionnaire (FFQ)*, and HbA1c levels. There were 186 respondents with an age range of 40-75 years. The majority of respondents consumed mendoan at least 1x in 1 month, which is as many as 180 people (96.8%), the remaining 6 people (3.2%) consume mendoan <1x / month. The results of the Statistical Test showed that most respondents who consumed mendoan >1x / month had a 3.93x greater risk of having higher HbA1C levels (PR 3.93). The *chi-square* test showed that there was a significant relationship between mendoan *consumption* and the HbA1c profile (p value 0.031).



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## 1. Introduction

*Mendoan* is an archipelago food derived from Javanese language *Banyumasan* that is *Mendo* which has the meaning of half-baked. This food is known as the typical food of the former Banyumas residency. *Mendoan* Served by frying in oil at high temperature [1]. *Mendoan* processing using large amounts of flour and oil is thought to have a correlation with the incidence of metabolic syndrome [2]. Diabetes is one of the metabolic syndrome diseases that requires HbA1c monitoring to monitor glucose for the last three months [3].

The prevalence of diabetics is known to increase every year even according to the World Health Organization, Diabetes Mellitus is ranked sixth cause of mortality in the world. Most deaths of diabetic patients occur at the age of 45-54 years, which is more common in urban residents than residents living in rural areas [4]. In Indonesia, the prevalence of diabetes has a significant increase where diabetics in 2013 were 6.9% then in 2018 there was an increase of up to 8.5%, this increase occurred due to lifestyle and food intake, even if left untreated the incidence of diabetes will increase drastically to 21.3 million people in 2030 (Ministry of Health RI, 2018) [5], [6].

Monitoring of Diabetes Mellitus patients is carried out through HbA1c, which is the result of glucose glycosylation in the patient's erythrocytes. Consumption of foods processed through frying has a correlation with an increase in HbA1c in Diabetes Mellitus patients. The association with Diabetes Mellitus has a strong correlation in respondents who consume fried foods [RR: 1.81 (95% CI: 1.58, 2.08) with a frequency of  $\geq 4$  times/week [7].

This shows that the more frequent the frequency of consumption of foods processed through frying, the worse the patient's HbA1c profile. Research data on the relationship between food and the frying process in the form of *mendoan* and HbA1c in people aged 40-75 years is still small. Therefore, this encourages research on the public on the relationship between *mendoan* consumption and HbA1c profile in people aged 40-75 years.

## 2. Research Methods

This study used analytical research methods with a *cross sectional* design. The study was conducted on patients at KMRT Wongsonegoro Hospital Semarang in August 2023. The independent variable in this study is *mendoan* consumption, while the dependent variable is HbA1C levels. The data used in this study were obtained through *food frequency questioner* (FFQ) and obtained from patient medical record data. This research has received *ethical clearance* from KMRT Wongsonegoro Hospital Semarang. Patient consent was also requested in the study through *informed consent*.

The inclusion criteria in this study are: patients who have medical record data (HbA1C levels, weight, height) at KMRT Wongsonegoro Hospital and are willing to become research subjects by filling out an *informed consent* sheet. The exclusion criteria in this study were patients with incomplete medical record data. The subjects in this study amounted to 186 people and were obtained by *simple random sampling* technique. The data obtained were then analyzed using spss with statistical tests *Chi-square* and *Fisher exact*.

## 3. Result

The subjects in this study amounted to 186 people, of whom 130 (69.9%) were female and 56 people (30.1%) were male. The average age of subjects in this study was  $54.86 \pm 10.63$ . The average subjects in this study had a body mass index of  $25.85 \pm 3.13$ . A total of 172 (92.5) subjects in this study had diabetes mellitus and the remaining 14 people (7.5%) did not have diabetes mellitus. The average value of GDS and GDP in the study subjects was  $221.58 \pm 103.68$  and  $178.38 \pm 83.55$ , respectively. The characteristics of the subject can be seen in table 1.

**Table 1.** Characteristics of the Research Subject

Variable	Sum (n (%))	Mean $\pm$ SD
<b>Gender</b>		
Woman	130 (69,9)	

Man	56 (30,1)	
<b>Age</b>		54,86 ± 10,63
<b>Weight</b>		64,97 ± 8,13
<b>Height</b>		158,61 ± 7,23
<b>IMT</b>		25,85 ± 3,13
<b>Diabetes</b>		
Already	172 (92,5)	
Do not	14 (7,5)	
<b>Regularity of Drug Consumption</b>		
Orderly	128 (68,8)	
Irregular	44 (23,7)	
No Drinking	14 (7,5)	
<b>GDS</b>		221,58 ± 103,68
<b>GDP</b>		178,38 ± 83,55

The majority of subjects in this study consumed mendoan at least 1x in 1 month, which was as many as 180 people (96.8%), the remaining 6 people (3.2%) consumed mendoan <1x / month. A total of 115 study subjects (61.8%) had HbA1C levels of >6.8 and 71 subjects (38.2%) had HbA1C levels of <6.7. Statistical tests in this study showed that there was a relationship between diabetes mellitus and HbA1C levels (p value <0.001, PR 9.42), in addition, there was also a relationship between mendoan consumption and HbA1C levels (p value 0.031). Patients who took mendoan >1x/month had a 3.93x greater risk of having higher HbA1C levels (PR 3.93). (Table 2)

**Table 2.** Distribution of Research Subjects and the Relationship between Diabetes Mellitus and Mendoan Consumption with HbA1c levels

Variable	Up to HbA1C			p value	PR
	Frequency (n,%)	Fair - Poor (n,%)	Good - Normal (n,%)		
<b>Diabetes Mellitus</b>					
Already	172 (92,5)	114 (61,3)	58 (31,2)	0,000*	9,42
Do not	14 (7,5)	1 (0,5)	13 (7)		
<b>Mendoan Consumption</b>				0,031**	3,93
≥1x/month	180 (96,8)	114 (61,3)	66 (35,5)		
<1x/month	6 (3,2)	1 (0,5)	5 (2,7)		

\*Chi-square

\*\*Fisher Exact

#### 4. Discussion

The prevalence of diabetes in Indonesia always increases every year, even according to the *International Diabetes Federation* 8 diabetes cases in Indonesia have increased from 2011 which amounted to 7.3 million to 19.5 million in 2021. Nutritional intake factors such as consumption of fried foods in high frequency can cause accumulation of body fat thereby triggering inflammatory factors resulting in increased oxidative stress that interfere with insulin secretion by pancreatic  $\beta$  cells, glucose transport in muscles and adipose tissue then cause insulin resistance [9], This is evident from the study of [10], which revealed a high percentage of body fat in line with an increase in HbA1c values in the non-diabetic group, where each 5% increase in body fat was associated with an increase in HbA1c of 0.04% to 0.11%.

The association of diabetes incidence with fried food consumption is also proven through the study of [7], which showed that subjects who consumed fried foods as much as 1-3 times per month had a risk of 1.15 (CI 95%) times diagnosed with type 2 diabetes mellitus, this is in accordance with research conducted by

researchers who found in this study, that patients who consume mendoan >1x / month have a 3.93x greater risk of having higher HbA1C levels (PR 3.93), the difference in risk values obtained is due to differences in the method of researchers who use cross-sectional studies with [7] research using meta-analysis and differences in the variables of this study which focused on one of the fried foods in the form of mendoan. There is also a meta-analysis study conducted by [11] that is in line with the researchers, showing that there is an increased risk of diabetes by 12% (relative risk (RR): 1.12; 95% confidence interval (CI) in patients who consume fast food.

The study had some limitations. One of the limitations in question is *recall bias*. This is because respondents filled out questionnaires based on memories of the last three months which resulted in researchers not being able to monitor respondents' consumption directly so that respondents could report data that was not fully in accordance with the experience experienced. The next difference in this study is in the form of food outside the mendoan that is not recorded so that confounding bias can occur in this study. This is because many factors out of control can affect a person's HbA1C level. These confounding factors result in reported results not necessarily reflecting actual HbA1c levels.

## 5. Conclusion

Based on the results of this study, it can be concluded that the majority of respondents who consume mendoan >1x / month have a 3.93x greater risk of having higher HbA1C levels. The results of statistical tests also show that there is a significant relationship between Mendoan consumption and a person's HbA1c level. Further research needs to be done by paying attention to confounding factors that can affect the results. In addition, it is recommended that researchers further collect food data other than mendoan processed by frying, so that the data obtained is more accurate. We recommend that future studies can pay attention to a more even distribution of respondents' ages, so that it can represent a picture of the occurrence of the relationship between Mendoan Consumption and a more real HbA1c profile.

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