



## Factors Affecting Eating Patterns on Blood Sugar Levels in Diabetes Mellitus Patients in UPT Puskesmas Narumonda

Betty Simanullang<sup>1</sup>, Zuraidah Nasution<sup>2</sup>, Endang Maryanti<sup>2</sup>

<sup>1</sup>Student of Master of Public Health Study Program, Helvetia Institute of Health Medan, Indonesia

<sup>2</sup>Lecturer at the Faculty of Public Health, Helvetia Institute of Health Medan, Indonesia

\*Corresponding Author: Betty Simanullang

Email: [fayola.gev@gmail.com](mailto:fayola.gev@gmail.com)



### Article Info

#### Article history:

Received 19 October 2021

Received in revised form 21 November 2021

Accepted 30 November 2021

#### Keywords:

Diabetes Mellitus

Diet

Number of calories

### Abstract

The purpose of this research was to identify and evaluate the major dietary components linked with blood sugar levels in diabetic patients at UPT Puskesmas Narumonda in Toba Regency. This sort of study employs a cross-sectional descriptive analytic survey. The population in this research was 118 individuals, whereas the sample size was 54. Univariate, bivariate, and multivariate analyses were used to analyze the data. The chi-square test results indicate that the sugar level of people with diabetes mellitus is related to the number of calories  $p = 0.000$ , the type of food  $p = 0.000$ , and the eating schedule  $p = 0.003$ , indicating that there is a relationship between obesity, the number of calories, the type of food, and the eating schedule and blood sugar levels in people with diabetes mellitus. The findings of multivariate analysis indicate that the most relevant variable in this research, with an OR value of 53, is the quantity of calories. The research concluded that the quantity of calories consumed is the most important factor influencing blood sugar levels in persons with diabetes mellitus at UPT Puskesmas Narumonda, Toba Regency. To help lower the occurrence of diabetes mellitus, it is intended that the Health Service, puskesmas, and health professionals would collaborate to give frequent counseling about diabetes mellitus and a healthy and balanced diet.

### Introduction

According to the WHO, the number of persons with type II diabetes mellitus is increasing, a trend that is being seen in a number of developing nations, including Indonesia. Indonesia's population will more than double from 8.4 million in 2000 to 21.3 million in 2030. The relationship between diet and blood sugar levels in diabetes mellitus (DM) is a type of non-communicable degenerative disease that is a significant public health problem in Indonesia, and the irregular eating patterns prevalent in modern society may contribute to an increase in the number of degenerative diseases, one of which is DM. Diabetics must pay close attention to their diet, which includes their schedule, the quantity of food ingested, and the kind of food consumed. Blood sugar levels spike dramatically after ingesting some meals, owing to the foods' proclivity for having an unregulated blood sugar content.

Diabetes mellitus is a chronic condition in which the pancreas produces insufficient insulin or the body is unable to use it effectively (Juliantini, 2021). Diabetes Mellitus (DM) is a non-communicable degenerative disease that poses a significant public health burden in Indonesia and around the globe (Bistara, 2018). Today's society's irregular eating habits may contribute to a rise in the prevalence of degenerative illnesses, one of which is diabetes mellitus (Suiraoaka, 2012). Diabetics must pay close attention to their diet, which includes their schedule, the

quantity of food ingested, and the kind of food consumed. Blood sugar levels spike dramatically after ingesting specific meals, owing to the food's propensity for containing uncontrolled blood sugar.

Diabetes often manifests itself without symptoms. However, there are several signs to be aware of as a potential sign of diabetes. Polyuria (frequent urine), polydipsia (frequent thirst), and polyphagia (eating a lot / being hungry more readily) are all common symptoms experienced by diabetics. Additionally, clouded vision, decreased coordination of bodily motions, tingling in the hands or feet, persistent itching (pruritus), and weight loss for no apparent cause are also reported.

The prevalence of diabetes mellitus as determined by blood tests follows the DM criteria established by the Indonesian Endocrinology Association (Perkeni), which accepted the American Diabetes Association's standards (ADA). There are two versions of this report: the most recent (Consensus Perkeni and ADA 2015) and the 2011 version (Alwi, 2015). DM is defined as fasting blood glucose (GDP) of 126 mg/dL; or blood glucose two hours after loading (GDPP) of 200 mg/dL; or blood glucose (GDS) of 200 mg/dL with symptoms of frequent hunger, frequent thirst, frequent urination and large amounts of urine, and weight loss. At Riskesdas 2018, blood sugar levels were measured in 15-year-olds on ART.

Diabetes Mellitus Prevalence by Regency/City in Population Age 15 Years in North Sumatra Province, Riskesdas 2018 in Toba Regency is 553. Diabetes mellitus is commonly recognized as a condition that is strongly tied to dietary consumption. Excessive consumption of carbohydrates/sugars, protein, fat, and energy may contribute to the start of DM. The more food consumed in excess, the more probable it is to produce diabetes (Kowalski et al., 2008). Carbohydrates, particularly sugars, will be digested and absorbed in the form of monosaccharides. Sugar absorption results in a rise in blood sugar levels and stimulates the production of the hormone insulin, which helps regulate blood sugar levels (Kowalski et al., 2008). Diabetes Mellitus is a degenerative illness that may be managed by the use of four management pillars. Diet is a critical component of the four pillars of diabetes care since patients do not adhere to a balanced food consumption. Increased blood sugar levels in diabetic individuals contribute to an imbalance in the quantity of insulin produced; consequently, diet is one of the preventative measures to ensure that blood sugar levels do not rise; with the appropriate diet, blood sugar levels may be controlled. Maintaining normal blood sugar levels involves proper management of the DM diet. Additionally, motivation and guidance from a dietary consultant are required. This may be accomplished via nutrition education and well-planned diets. In this example, the Narumonda Health Center is accomplished via frequent outreach activities aimed at motivating persons with diabetes mellitus to adhere to the suggested 3J diet (Amount, Schedule, and Type) in order to regulate blood sugar levels.

Indonesia is fourth in the world in terms of diabetes mellitus prevalence, after India, China, and the United States (WHO, 2000). The worldwide burden of diabetes mellitus was 135 million in 2000 and is anticipated to climb to 366 million by 2025. By 2025, Asia is expected to have the world's highest diabetic population. The largest prevalence of diabetes mellitus occurs in those over the age of 60, with the highest incidence occurring in the elderly (Khairani, 2007). According to the WHO, the number of persons with type II diabetes mellitus is increasing, a trend that is being seen in a number of developing nations, including Indonesia. Indonesia's population will more than double from 8.4 million in 2000 to 21.3 million in 2030.

In 2018, basic health study determined that the prevalence of diabetes mellitus (DM) based on blood tests matched the DM criteria established by the Indonesian Endocrinology Association (Perkeni), which used the American Diabetes Association's standards (MANALU, 2020). There are two versions of this report: the most recent (Consensus Perkeni and ADA 2015) and the 2011 edition. According to the 2015 criteria, diabetes mellitus is defined as fasting blood

glucose (GDP) of 126 mg/dL; or blood glucose two hours after loading (GDPP) of 200 mg/dL; or blood glucose (GDS) of 200 mg/dL with symptoms of frequent hunger, frequent thirst, frequent urination and large amounts of urine, and weight loss. At Riskesdas 2018, blood sugar levels were measured in 15-year-olds on ART. Diabetes Mellitus prevalence in population of all ages by regency/city in North Sumatra Province's Toba Regency is 2.58 percent based on doctor's diagnosis. Diabetes mellitus (DM) affects 6.9 percent of the population aged 15 years.

According to Riskesdas statistics, the prevalence of diabetes in Indonesia has increased from 5.7 percent in 2007 to 6.9 percent, or around 9.1 million, in 2013. According to 2015 data from the International Diabetes Federation, the expected number of diabetics in Indonesia is ten million. Diabetes has surpassed heart disease as the leading cause of mortality in Indonesia. According to statistics from the 2014 Sample Registration Survey, diabetes is the third leading cause of mortality in Indonesia, accounting for 6.7 percent of deaths, behind stroke (21.1 percent) and coronary heart disease (12.9%). North Sumatra Province is one of the provinces in Indonesia with the highest prevalence of diabetes mellitus sufferers, with a prevalence of 2.23 percent that is diagnosed based on symptoms. This places North Sumatra Province among the top ten provinces in Indonesia with the highest prevalence of diabetes mellitus.

The high incidence of diabetes mellitus in North Sumatra Province cannot be separated from the large number of patients who are unaware of the disease, have unhealthy lifestyles, consume bad diets/nutrition, and engage in insufficient physical activity. Diabetes mellitus was the illness with the highest prevalence (3.93 percent) in Toba Regency in 2018, and it continues to grow in prevalence. According to statistics gathered from the Toba District Health Office in 2018, diabetes mellitus was the most prevalent disease.

The number of people with diabetes in Indonesia is increasing continuously every year. This is closely related to a lifestyle and an unbalanced diet. Lifestyle is the main variable that causes various health problems, especially DM problems. Ninety-eight percent of the overall risk factors for type 2 diabetes are lifestyle. Lifestyle associated with an unbalanced diet and non-optimal physical activity patterns are the main contributors to the onset of DM.

During the initial survey, researchers found that the prevalence of diabetes mellitus aged 40 years at UPT Puskesmas Narumonda, Toba Regency was 2.5% higher than the prevalence of diabetes mellitus in other Puskesmas areas, namely UPT Puskesmas Sigumpar, which was 0.8%, which is a neighboring health center of UPT Puskesmas Narumonda, Toba Regency. Based on data from diabetes mellitus visits to health services, it was stated that there were 17.16% or around 118 diabetics or about 28.07% of the population in the UPT area of the Narumonda Health Center. It is known that the residents of the UPT Puskesmas Narumonda Toba Regency are generally Batak Toba ( $\pm 75\%$ ), Mandailing ( $\pm 10\%$ ), Javanese ( $\pm 10\%$ ) and Padang ( $\pm 5\%$ ) tribes. Eating habits must eat staples 3 times a day, rice, side dishes and vegetables are always available, but sometimes only consume rice and side dishes, there is also rice and vegetables only, instant noodles and rice, consume sweet foods and drinks, such as every morning, evening, and at night always consume foods such as fried gomak noodles/gravy, harsot noodles and consume sweet drinks such as tea and coffee, not to mention if you visit a neighbor's house you will definitely be treated to drinks such as tea, syrup and coffee. Snacks or snacks such as banana compote, porridge, getuk, klepon (malacca fruit) and so on. In making snack foods such as porridge or compote, only use brown sugar as a colorant and then add white sugar depending on preference without a certain dose to make it taste sweeter. Snacks are eaten in the afternoon, and if the evening is still there after dinner eaten again. Food Traditions and customs in the village such as daily meals, thanksgiving, parties and banquets for guests cannot be separated from food and drink which can be the cause of diabetes mellitus as mentioned above.

## Methods

This is an analytic survey using a cross sectional study design, with the purpose of determining the influence of obesity, calorie intake, food type, and eating pattern on the incidence of diabetes mellitus. The population in this research consisted of 118 patients with diabetes mellitus who lived in the UPT region of the Narumonda Health Center in Toba Regency. Using the slovin formula, the sample size was 54 people. A questionnaire is used to gather data. The data was analyzed using univariate, bivariate, and multivariate analysis. The purpose of univariate analysis is to determine the frequency distribution of all variables under consideration, including dependent and independent variables. Bivariate analysis is used to determine the relationship between the dependent and independent variables, whereas multivariate analysis is used to determine the effect of the independent variable on the dependent variable using the multiple logistic regression technique in order to determine the independent variable that has the greatest influence on the dependent variable.

## Result and Discussion

### Univariate Analysis

Based on table 1 about the distribution of respondents' characteristics, the number of calories, types of food, eating schedules and the incidence of Diabetes Mellitus shows that. respondents (55.0%). Then, from the results of the study, it was found that the majority of the respondents' ethnic groups were Batak, 42 respondents (77.8%), the majority of respondents had high school/vocational education as many as 39 respondents (72.2%) at UPT Puskesmas Narumonda, Toba Regency in 2021.

Based on the variable the majority of respondents are more energy adequacy as many as 42 respondents (77.8%) based on the number of calories the majority of respondents are more carbohydrate adequacy as many as 43 respondents (79.6%) based on the number of calories the majority of respondents are protein adequacy as many as 37 respondents (68.5%), based on the variable number of calories the majority of respondents are fat adequacy more than 40 respondents (74.1%), based on the variable type of food the majority of respondents' food types are not diverse as many as 38 respondents (70.4%), based on the variable eating schedule the majority of respondents' food schedule is irregular as much as 37 respondents (68.5%), and based on the variable incidence of diabetes mellitus the majority of respondents experienced the incidence of diabetes mellitus as many as 43 respondents (79.6%).

Table 1. Distribution of characteristics of respondents, number of calories, type of food, meal schedule and incidence of diabetes mellitus

Variable	N	Percentage
<b>Age Group</b>		
30-49 years	8	14.8
50-64 Years	28	51.8
65-80	16	29.6
>80 years	2	3.8
<b>Gender</b>		
Man- man	24	44.4
Woman	30	55.6
<b>Blood Sugar Levels</b>		
> 200 mg/dL	43	79.6
< 200 mg/dL	11	20.4
<b>Tribe</b>		
Javanese	5	9.3
Batak	42	77.8

Mandailing	4	7.4
Padang	3	5.6
<b>Education</b>		
Elementary/Junior School	10	18.5
High/Vocational School	39	72.5
College	5	9.3
<b>Energy adequacy</b>		
More	42	77.8
Good	12	22.2
<b>Adequacy of Carbohydrates</b>		
More	43	79.6
Good	11	20.4
<b>Protein adequacy</b>		
More	37	68.5
Good	11	31.5
<b>Fat adequacy</b>		
More	40	68.5
Good	14	31.5
<b>Type of food</b>		
Not diverse	38	70.4
Diverse	16	29.6
<b>Meal schedule</b>		
Irregular	37	68.5
Orderly	17	31.5
<b>Incidence of Diabetes Mellitus</b>		
Diabetes Mellitus	43	79.6
Not Diabetes Mellitus	11	20.4

### Bivariate Analysis

Based on table 2 about the relationship between the number of calories, type of food, schedule with the incidence of Diabetes Mellitus at UPT Puskesmas Narumonda, it shows that of the 42 respondents who have more energy adequacy, 38 respondents (90.5%) have diabetes mellitus and 4 respondents (9.5%) ) did not have diabetes mellitus. Of the 12 respondents who had sufficient energy, it was found that as many as 5 respondents (41.7%) experienced the incidence of diabetes mellitus and 7 respondents (58.3%) did not experience the incidence of diabetes mellitus. Of the 43 respondents who had sufficient carbohydrates, it was found that as many as 40 respondents (93.0%) had diabetes mellitus and 3 respondents (7.0%) did not have diabetes mellitus. Of the 11 respondents who had adequate carbohydrates, it was found that 3 respondents (27.3%) had diabetes mellitus and 8 respondents (72.7%) did not. Then, of the 40 respondents who had more fat adequacy, all (79.6%) had diabetes mellitus. Of the 14 respondents who had adequate protein, it was found that 3 respondents (21.4%) had diabetes mellitus and 11 respondents (78.6%) did not. Next, out of 38 respondents who had different types of food, all (79.6%) experienced diabetes mellitus. Of the 16 respondents who had various types of food, it was found that as many as 5 respondents (31.2%) experienced the incidence of diabetes mellitus and 11 respondents (68.8%) did not experience the incidence of diabetes mellitus. And of 37 respondents who have an irregular food schedule, all (100%) have

diabetes mellitus. Of the 17 respondents who had a regular meal schedule, it was found that 6 respondents (35.3%) had diabetes mellitus and 11 respondents (64.7%) did not.

Table 2. Relationship between calorie count, food type, meal schedule and incidence of diabetes mellitus at UPT Puskesmas Narumonda

Variable	Diabetes Mellitus				Sum		P-Value
	Diabetes		Not Diabetes		f	%	
	f	%	f	%			
<b>Energy Adequacy</b>							0,001
More	38	90.5	4	9.5	42	100	
Good	5	41.7	7	58.3	12	100	
<b>Adequacy Carbohydrates</b>							0,000
More	40	93.0	3	7.0	43	100	
Good	3	27.3	8	72.7	11	100	
<b>Kecukupan Protein</b>							0,000
More	37	79.6	0	0.0	37	100	
Good	6	35.3	11	64.7	17	100	
<b>Fatsufficiency</b>							0,000
More	40	79.6	0	0.0	40	100	
Good	3	21.4	11	20.4	14	100	
<b>Type of food</b>							0,000
Not diverse	38	79.6	0	0.0	38	100	
Diverse	5	31.2	11	68.8	16	100	
<b>Meal schedule</b>							0,003
Disorganized	37	76.6	0	0.0	37	100	
orderly	6	35.3	11	64.7	17	100	

### Multivariate Analysis

Table 3 shows the results of the survey. According to the data in the table above, of the three variables tested for multiple logistic regression in the first stage, it can be seen that all of the variables with a p-value greater than 0.05 have an impact on patient satisfaction; therefore, all of the variables have an impact on patient satisfaction.

According to the results of the multiple logistic regression test shown in Table 4, the significant value of the model as a whole was obtained at 0.000 0.05, indicating that the three variables used as models in this study had a statistically significant relationship with the incidence of Diabetes Mellitus at UPT Puskesmas Narumonda University Hospital. Consequently, it can be concluded that the Number of Calories is the factor with the greatest/dominant influence on the incidence of Diabetes Mellitus, as indicated by a variable with an OR value of 53,969, which means that respondents with Total Calories have a 54 times chance of developing Diabetes Mellitus at UPT Puskesmas Narumonda.

Table 3. Effect of calorie count, type of food and meal schedule with Diabetes Mellitus Patients at UPT Puskesmas Narumonda Toba Regency in 2021

### Logistic Regression Test

Variable	B	Itself.	Exp(B)
----------	---	---------	--------

Number of calories	17.798	0.000	53.969
Type of Food	18.863	0.000	15.407
Meal Schedule	17.618	0.000	1.002

### **Calorie Count(Carbohydrate Adequacy, Protein Adequacy, Fat Adequacy and Energy Adequacy) With Diabetic Mellitus**

The quantity of food ingested by a person in a day is represented by the number of calories consumed. The quantity of nutrients ingested is often used to determine the number of calories consumed. The nutrients that enter the body are composed of macronutrients, such as carbs, proteins, and fats, as well as micronutrients, such as vitamins and minerals. It is necessary to strike a balance between the quantity of calories consumed and the amount of energy spent. The food ingested must be matched with age-adjusted nutritional requirements, and the food pyramid is composed of 50-60 percent carbs, 25-30 percent fat, and 15-20 percent protein, respectively. A person who is overweight is one who consumes more calories than they exert. This is due to an insufficient intake of calories (adequacy of energy, protein, carbs, and fat).

On the basis of the study's findings, it can be concluded that the majority of respondents had more energy adequacy, with 42 respondents (77.8 percent) being more energy adequacy, and that the minority have excellent energy adequacy, with 12 respondents (22.2 percent ). Among those who responded, the majority (43 respondents, or 79.6 percent) reported more carbohydrate adequacy, whereas the minority (11 respondents, or 13.6 percent) reported greater carbohydrate adequacy (20.4 percent ). 37 respondents (68.5 percent) are more protein adequacy, with a minority of 17 respondents (68.5 percent) being good protein adequacy, and the majority of respondents are more protein adequacy (31.5 percent ). And the majority of respondents are more fat adequacy, with as many as 40 respondents (74.1 percent) and the minority of respondents are excellent fat adequacy, with as many as 14 respondents (14 percent) (25.9 percent ).

At UPT Puskesmas Narumonda in Toba Regency, according to the results of the Chi Square Test statistical test, the p-value was 0.000 0.05, indicating that there was a relationship between the quantity of calories consumed and those with diabetes mellitus.

Respondents who express an opinion on the importance of the number of calories have a 54-times chance of influencing Diabetes Mellitus Patients at UPT Puskesmas Narumonda, Toba Regency in 2021, according to the most recent results of the study, which had an OR value of 53,969 at the time of publication.

### **Types of Food with Diabetic Mellitus**

The kind of food refers to the sort of food that is typically provided. Food elements that, when consumed, digested, and absorbed, will result in at the very least a healthy and balanced menu structure are sought. Providing a variety of meals might help to alleviate boredom, which can lead to decreased appetite. Menu variants that are formed of a mix of food elements that have been calculated properly will result in meals that are both high in quality and quantity and are healthful.

There are various different kinds of diabetic meals that are both excellent and harmful to consume. It is critical to understand this in order to maintain normal and stable blood glucose levels. As a result, diabetics are recommended to exercise more caution while ingesting meals. It is critical for diabetes patients to follow a healthy eating plan. People with type 2 diabetes are at risk of developing health issues such as exhaustion, nerve damage, increased susceptibility to infections and traumas, and even loss of consciousness or coma if their blood sugar levels rise significantly.

According to the findings of the study, the majority of respondents' food preferences are not varied, with as many as 38 respondents (70.4 percent) stating this, while the minority are various, with as many as 16 respondents stating this (29.6 percent).

After doing a Chi square test, it was discovered that the p-value was equal to or greater than 0.000, which indicated that there was a link between food type and persons with diabetes at UPT Puskesmas Narumonda in Toba Regency, Indonesia.

This is consistent with the findings of Arika Ayu Susilawati's study (2019), which examined the impact of eating patterns including sweet foods, salty diets, and fatty diets on the likelihood of developing diabetes mellitus. Gender, age, and nutrition are the most significant risk factors for developing diabetes mellitus, according to the research.

### **Meal Schedule with Diabetic Mellitus**

Daily eating habits and eating schedules are not always as consistent as they should be. The daily meal schedule is divided into three major meals, which are breakfast, lunch, and supper. Breakfast is the first meal of the day. The daily meal pattern is organized into three parts: breakfast (before 09.00), lunch (12.00-13.00), and supper (after 19.00). (18.00-19.00). Snacks, on the other hand, are often served between breakfast and noon and between lunch and supper. Food is digested in the body in a natural way by the digestive organs, which run from the mouth to the small intestine. How long food remains in the stomach for digestion is determined by the nature and kind of food consumed. On average, the stomach is completely empty between 3 and 4 hours after eating. As a result, this eating pattern may be adjusted to accommodate an empty stomach.

The findings revealed that the bulk of respondents' eating patterns were irregular, with as many as 37 respondents (68.5 percent) having irregular schedules and a regular minority of 17 respondents having regular schedules (31.5 %).

A correlation between eating schedules and diabetics was discovered at UPT Puskesmas Narumonda Toba Samosir, as determined by the Chi square test, with a p-value of 0.000 0.005. This indicated that there was a link between eating patterns and diabetics.

This is in conformity with the findings of Nuri Hidayat's investigation (2021). In accordance with the findings of the research, it is known that, of the 72 respondents who are good at maintaining an eating schedule, there are respondents who suffer from acute complications of diabetes mellitus, which account for up to 25% of those who are good at maintaining an eating schedule, and respondents who suffer from complications of diabetes mellitus, which account for the remaining 75%. as many as 47 respondents said they were chronic (65.3 %)

### **Conclusion**

At UPT Puskesmas Narumonda, there is a relationship between the quantity of calories consumed, the kind of food consumed, and the frequency with which one consumes those calories.

### **References**

- AYUNI, O. Q. Asuhan Keperawatan Klien Diabetes Mellitus Pada Tn. M Dan NY. S Dengan Masalah Keperawatan Ketidakefektifan Perfusi Jaringan Perifer Di Ruang Melati RSUD dr. Haryoto Lumajang Tahun 2019.
- Bistara, D. N. (2018). Hubungan Pola Makan Dengan Gula Darah Pada Penderita Diabetes Mellitus. *Jurnal Kesehatan Vokasional (JKESVO)*, 3(1), 29-34.
- Hutabarat, A. S. (2019). *HbA1c (Hemoglobin Glikosilasi) pada Penderita Diabetes Melitus Tipe H di Rumah Sakit Umum Daerah Deli Serdang Lubuk Pakam* (Doctoral dissertation, Universitas Medan Area).



- Khairani, R. (2007). Prevalensi diabetes mellitus dan hubungannya dengan kualitas hidup lanjut usia di masyarakat. *Universa Medicina*, 26(1), 18-26.
- Kowalski, M., Rubin, D., Aldering, G., Agostinho, R. J., Amadon, A., Amanullah, R., ... & Supernova Cosmology Project. (2008). Improved cosmological constraints from new, old, and combined supernova data sets. *The Astrophysical Journal*, 686(2), 749.
- Manalu, S. H. (2020). Tingkat Kepuasan Pasien Rawat Jalan Terhadap Pelayanan Kefarmasian Di Apotek Puskesmas Bandar Baru Kecamatan Sibolangit. [ecampus.poltekkes-medan.ac.id](http://ecampus.poltekkes-medan.ac.id)
- Suiraoaka, I. P. (2012). Penyakit degeneratif. *Yogyakarta: Nuha Medika*, 45-51.