



EFFECTIVENESS OF INFORMATION–MOTIVATION–BEHAVIORAL (IMB) SKILLS MODEL ON DIABETES MELLITUS PATIENTS KNOWLEDGE

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ABSTRACT

Diabetes mellitus (DM) is characterized by increased blood glucose levels caused by insulin deficiency or insulin resistance. Knowledge of diabetes mellitus plays an important role in reducing diabetes-related complications and improving its prevention. Knowledge about diabetes influences decision-making related to physical activity, diet, medication use, and health monitoring, including diabetes assessment and foot care. Model Information-Motivation-Behavioral Skills (IMB) is effective in being implemented in providing health education to patients. The purpose of the research is to analyze the effectiveness of the information–motivation–behavioral (IMB) skills model on the knowledge of diabetes mellitus patients. The research design was quasi-experimental nonequivalent control group design. The sampling technique was purposive sampling. The number of samples was 66 respondents. The instruments used are DKQ-24 (Diabetes Knowledge Questionnaire). Data analysis used dependent t-test and independent t-test. The results of data analysis showed the influence of the IMB skills model on pre- and post-test knowledge in the intervention and control groups with a p value = 0.000 (<0.05). The results of statistical tests also showed that there was a difference in the influence of the intervention between the intervention and control groups with a p value = 0.000 (<0.005). This study proves that the IMB skills model is effective in improving the knowledge of diabetes mellitus patients.

Keywords: diabetes mellitus; IMB skills model; knowledge

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INTRODUCTION

Diabetes mellitus (DM) is a chronic disease that is increasingly prevalent throughout the world. This disease is characterized by increased blood glucose levels caused by insulin deficiency or insulin resistance. DM can cause various serious complications, such as heart disease, stroke, kidney damage, and blindness if not managed properly. (Ministry of Health, 2022). *World Health Organization* (2019) reported that diabetes mellitus directly causes 1.5 million deaths, and 48% of all deaths occur before the age of 70. The number of diabetes sufferers was recorded at 537 million people in 2021, and is expected to increase to 643 million people in 2030 and 783 million people in 2045. The adult population aged 20-79 years as many as 10.5% were reported to suffer from diabetes mellitus, with almost half of them unaware that they had the disease. (International Diabetes Federation, 2021).

Basic Health Research (2018) reported that the prevalence of diabetes mellitus (DM) nationally reached 8.5%, which means that around 20.4 million people in Indonesia were diagnosed with DM. The North Sumatra Profile noted that in 2022 there were 225,587 diabetes sufferers, and 68,182 of them, or around 30.22%, had received health services. The prevalence of diabetes mellitus sufferers diagnosed by doctors reached 1.4% in all age groups

in North Sumatra(Health Development Policy Agency, 2023). Diabetes mellitus can damage various organs of the body if insulin deficiency is not treated for a long time. Dangerous complications such as cardiovascular disease, nerve damage, kidney damage, and visual impairment that can lead to blindness are caused by diabetes mellitus. Serious complications can be delayed or prevented through proper care management.(International Diabetes Federation, 2021).

Knowledge about diabetes mellitus plays an important role in reducing diabetes-related complications and improving its prevention.(Ferreira, et al., 2024). Perception of the disease and knowledge about diabetes are important factors in self-care practices for people with diabetes. Knowledge about diabetes influences decision-making related to physical activity, diet, medication use, and health monitoring, including diabetes assessment and foot care. Knowledge about diabetes mellitus, self-management, and self-care practices are important factors that can significantly affect the quality of life of diabetes patients.(Kugbey, Oppong, & Adulai, 2017).

American Association of Diabetes Educators(AADE) uses the model *Information-Motivation-Behavioral Skills(IMB)* with an information component to assess the effectiveness of diabetes education, a motivational component to evaluate cognitive changes, and a behavioral skills component to assess self-efficacy in diabetes self-management. According to the IMB model, the performance of health promotion behavior is supported by good knowledge of the behavior, high motivation to carry out the behavior both in personal and social aspects, and having the right skills to carry out the behavior.(Park & Jeon, 2018).

Study Bakır, Çavuşoğlu, & Mengen (2021) about the influence of model *Information-Motivation-Behavioral Skills(IMB)* on metabolic control in adolescents with type 1 diabetes mellitus showed that model-based interventions *Information-Motivation-Behavioral Skills(IMB)* effectively improves glycemic control among adolescents with type 1 diabetes mellitus. Results of a self-administered intervention study *Information-Motivation-Behavioral(IMB)Skills* namely the level of knowledge, level of personal motivation, level of social motivation and behavioral skills of the intervention group improved.

Study Gao, Wang, Zhu, & Yu (2013) test about the model *Information-Motivation-Behavioral Skills(IMB)* in a sample of Chinese adults with type 2 diabetes. The results of the study indicate that diabetes mellitus education programs should include strategies that improve patients' knowledge, motivation, and behavioral skills to influence changes in self-care management behavior of diabetes mellitus patients. Previous research listed above has similarities to the research conducted, namely using the IMB model as a research intervention. The search for related journals was conducted through academic databases such as *Science Direct* and *PubMed* with keywords *diabetes self-management; diabetes education; blood sugar; Information-Motivation-Behavioral Skills; IMB* period (2021-2024).

There is a wealth of research supporting the effectiveness of the IMB model, but there is a paucity of literature regarding the specific implementation of this model in the context of self-care management and adherence for people with diabetes mellitus in Indonesia. Therefore, researchers want to know the effectiveness of the model *Information-Motivation-Behavioral(IMB)Skills* on the knowledge of diabetes mellitus patients. The purpose of this study was to analyze the effectiveness of the information-motivation-behavioral (IMB) skills model on the knowledge of diabetes mellitus patients.

METHOD

This type of research is quantitative research. The research design used is quasi-experimental nonequivalent control group design. The sampling technique is purposive sampling. The number of samples in the intervention group is 33 people and the control group is 33 people. The total research sample is 33 people. The instruments used are DKQ-24 (Diabetes Knowledge Questionnaire). The DKQ-24 questionnaire has been tested for validity with a value of 0.361 and has been tested for reliability with a value of 0.889. The research location is Helvetia Health Center, Medan. The implementation of the intervention in the intervention group before implementing education was carried out a pre-test. Then, education about DM was carried out using videos that were shared with respondents via WhatsApp media and respondents were motivated to watch videos 3 times a week for two weeks. The post-test was carried out after two weeks. Data analysis used *dependent t test* and *independent-t test*. This research was conducted after obtaining ethical clearance from the Health Ethics Committee of the Universitas Sumatera Utara with Number 1482/KEPK/USU/2024.

RESULT

Table 1.
Frequency Distribution and Presentation Based on Respondent Characteristics

Variables	Intervention (n=33)		Control (n=33)	
	f	%	f	%
Age				
26 – 35	11	33.3	5	15.1
36 – 45	2	6.1	10	33.3
46 - 55	20	60.6	13	39.4
Gender				
Man	10	30.3	15	45.5
Woman	23	69.7	18	54.5
Education				
Intermediate	21	63.6	24	72.7
Tall	12	36.4	9	27.3
Marital status				
Marry	29	87.9	26	78.8
Not Married	4	12.1	7	21.2
Work				
Doesn't work	10	30.3	12	36.4
Retired	0	0	2	6.1
Laborer	2	6.1	0	0
Trader	3	9.1	5	15.1
Self-employed	9	27.3	11	33.3
Farmer	2	6.1	3	9.1
civil servant	7	21.1	0	0
Long time suffering from DM				
Less than 1 year	19	57.6	10	30.3
More than 1 year	14	42.4	23	69.7
Leg Pain				
Yes	12	36.4	25	75.8
No	21	63.6	8	24.2
Hypertension				
Yes	27	81.8	29	87.9
No	6	18.2	4	12.1

Table 2.
Frequency distribution and presentation of respondents based on answers to the knowledge questionnaire about diabetes mellitus (DKQ24) in the intervention group (n=33)

No	Question	Pre-test						Post test					
		Correct		Wrong		Don't know		Correct		Wrong		Don't know	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Eating too much sugar and other sweet foods is a cause of diabetes mellitus.	18	54.5	15	45.5	0	0	25	75.8	8	24.2	0	0
2	The common cause of diabetes mellitus is a lack of sufficient insulin in the body.	15	45.5	10	30.3	8	24.2	18	54.5	15	45.5	0	0
3	Diabetes mellitus is caused by the pancreas not producing enough or no insulin.	13	39.3	20	60.7	2	6.0	21	63.6	12	36.4	0	0
4	The pancreas produces insulin	13	39.3	20	60.7	3	9.0	16	48.5	17	51.5	0	0
5	In untreated diabetes mellitus, the amount of sugar in the blood usually increases.	17	51.5	16	48.5	0	0	27	81.8	6	18.2	0	0
6	If I have diabetes mellitus, my children have a greater chance of having diabetes mellitus too.	15	45.5	18	54.5	0	0	18	54.5	15	45.5	0	0
7	Diabetes mellitus can be cured	15	45.5	18	54.5	0	0	9	27.3	24	72.7	0	0
8	A fasting blood sugar level of 210 is too high	19	57.6	14	42.4	0	0	25	75.8	8	24.2	0	0
9	The best way to check for diabetes mellitus is with a urine test.	24	72.7	9	27.3	0	0	33	100	0	0	0	0
10	Regular exercise will increase the need for insulin or other diabetes mellitus drugs.	15	45.5	18	54.5	0	0	8	24.2	25	75.8	0	0
11	There are two main types of diabetes mellitus: Type 1 (insulin dependent) and Type 2 (non-insulin dependent)	8	24.2	20	45.0	5	20.8	20	60.6	13	39.4	0	0
12	Insulin works because of eating too much	12	36.4	21	63.6	0	0	26	78.7	7	21.3	0	0
13	Medication is more important than diet and exercise for controlling diabetes mellitus	17	51.5	16	48.5	0	0	8	24.2	25	75.8	0	0
14	Diabetes often causes poor blood circulation	9	27.3	24	72.7	0	0	19	57.6	14	42.4	0	0
15	Wounds and abrasions in people with diabetes mellitus take a long time to heal.	13	39.4	20	57.6	0	0	27	81.8	6	10.2	0	0
16	People with diabetes mellitus must be very careful when cutting their toenails.	17	51.5	16	42.5	0	0	28	84.8	5	15.2	0	0
17	People with diabetes mellitus should clean wounds with iodine (betadine) and alcohol.	17	51.5	16	42.5	0	0	23	69.7	10	30.3	0	0
18	How to cook food is as important as the food eaten by people with diabetes mellitus.	9	27.3	24	72.7	0	0	18	54.5	15	45.5	0	0

19	Diabetes mellitus can damage the kidneys	16	48.5	17	51.5	0	0	30	90.9	3	9.1	0	0
20	Diabetes mellitus can cause numbness, a sign of high blood sugar levels.	14	42.4	19	57.6	0	0	20	60.6	13	39.4	0	0
21	Shaking and sweating are signs of high blood sugar levels.	13	39.3	20	60.7	0	0	25	75.8	9	24.2	0	0
22	Frequent urination and thirst are signs of low blood sugar levels.	10	31.3	23	69.7	0	0	8	24.2	25	75.8	0	0
23	Tight socks can be worn by people with diabetes mellitus	19	57.6	14	42.4	0	0	10	31.3	23	69.7	0	0
24	The diabetes mellitus diet mostly consists of special foods.	23	69.7	10	30.3	0	0	7	21.3	26	78.7	0	0

Table 3.
 Respondents' knowledge before and after the intervention in the intervention group and control group at the Helvetia Medan Health Center

Variables	Knowledge	n	Mean	Median	Standard Deviation	95% Confidence Interval	
						Lower	Upper
Intervention Group							
	Before	33	10.55	11	1,371	10.06	11.03
	After		21.18	21	1,802	20.52	21.84
Control Group							
	Before	33	11.42	11.46	1,480	10.90	11.95
	After		14.89	14.00	1,540	13.85	14.94

Table 4.
 The effect of the IMB skliss model on respondents' knowledge in the intervention group at the Helvetia Medan Health Center (n=33)

Variables	Mean	SD	Mean difference	SE	p-value
Knowledge					
Before	10.55	1,371	10,636	0.437	0.000
After	21.18	1,862			

DISCUSSION

The age of diabetes mellitus sufferers in the intervention group was mostly in the adult age range (46-55 years) and the control group was mostly in the adult age range (46-55 years). Age is one of the risk factors for diabetes. Type 2 diabetes mellitus in low or middle income countries is 80% in the age range of 40-59 years (Susilawati, 2021). Age has a close relationship with increased blood sugar levels, the older you are, the greater the risk of developing Type II diabetes mellitus. The gender of most diabetes mellitus sufferers is female, in the intervention group as much as 69.7% and in the control group as much as 54.5%. In line with the research of Chaudhary et al., (2019) which states that diabetes occurs more in women than men. Menopause or early menopause that occurs in women can cause a lack of estrogen hormone and is at risk of decreased sensitivity to insulin, thus contributing to an increased risk of developing type II DM (Ciarambino et al., 2022).

The most education diabetes mellitus sufferers are secondary education, in the intervention group 63.6% and the control group 72.7%. In line with research by Widyasari (2017) that there is a relationship between the last education and DM status, with a P value of 0.001. A

person with a higher level of education is more receptive to information and has better knowledge than a lower education which affects efforts to seek information about health (Rini & Hairitama, 2021). Knowledge is a very important main factor in the formation of an action, behavior based on knowledge will last longer than that not based on knowledge (Notoadmodjo, 2018).

The marital status of most diabetes mellitus sufferers is married, in the intervention group 87.9% and the control group 30.3%. This study is in line with research Yeni et al., (2024), marriage has a relationship with the quality of life of diabetes mellitus patients with the majority of married respondents (56.5%) having good quality, while the quality of life of respondents who are widowers/widows (100%) is predominantly bad. Family support has a positive impact on compliance with care management. DM sufferers who receive family support tend to find it easier to make behavioral changes towards healthier ones than sufferers who receive less support (Safaruddin & Permatasari, 2022). The majority of diabetes mellitus sufferers do not work, in the intervention group 30.3% and in the control group as much as 36.4%. Work with light physical activity will cause a lack of energy burning by the body so that excess energy in the body will be stored in the form of fat which causes obesity.

Duration suffering from DM, diabetes mellitus sufferers in the intervention group <1 year were 57.6% while in the control group 69.7%. Research Yeni et al., (2024) said the majority of respondents who suffered from DM for 5-10 years had a good quality of life (92.9%), while the quality of life of respondents who had suffered from DM for more than 10 years was poor (63.9%). The longer the person suffers from DM, the more complications of the disease are suffered, and affect the quality of life. The presence of DM complications is the strongest determining factor for the decline in quality of life for the next five years (Retnowati & Satyabakti, 2015).

Patients with diabetes mellitus in the intervention group did not experience leg pain as much as 63.6% while the control group experienced leg pain as much as 75.8%. Patients with diabetes mellitus who also suffered from hypertension in the intervention group were 81.8% and the control group 87.9%. Research conducted by Srikartika at Banjarbaru City Hospital showed that respondents diagnosed with diabetes mellitus mostly had comorbidities (Srikartika et al., 2016).

Respondents knowledge about diabetes mellitus before and after the intervention increased, with a mean value before the intervention of 10.55, a standard deviation of 1.371 and after the intervention a mean value of 21.18 and a standard deviation of 1.862. The P value obtained <0.005 so that there is an influence of the IMB skills model on the knowledge of respondents with diabetes mellitus in the intervention group. There is a difference in the mean knowledge of the pre-test and post-test after the intervention with a pre-test mean of 11.42, a standard deviation of 1.480 and a post-test mean value of 14.39 and a standard deviation of 1.540, P value <0.05, meaning that there is a significant difference in the mean knowledge of the pre-test and post-test in the control group after the intervention in patients with diabetes mellitus.

This research is in line with research Ilham et al., (2024) which states that the average knowledge before education was 6.30 with a standard deviation of 0.877 and after education increased to 7.47 with a standard deviation of 1.167. Rumiris's research (2017) showed that the average knowledge in diabetes mellitus patients before education was 4.26 after being given education through leaflet media there was an increase in the average value to 7.75. In

line with Isnani's research (2017) it is known that the average difference score of knowledge in DM patients before being given health education was 51.57 and the average value after being given health education was 69.33.

CONCLUSION

This study proves that the IMB skills model can improve knowledge in the intervention group. Data analysis comparing knowledge scores in the control and intervention groups showed significant differences. Therefore, this model can be used by health workers in providing health education to diabetes mellitus patients to improve their self-care and prevent complications of the disease.

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