



Original Article

Effect of Video Education about Hypoglycemia on Knowledge of Diabetes Mellitus Patients and Their Families

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ARTICLE INFO

Article history

Received: 2021-04-01

Received in revised: 2021-04-25

Accepted: 2021-05-09

Manuscript ID: JMCS-2103-1171

Checked for Plagiarism: Yes

Language Editor:

Dr. Behrouz Jamalvandi

Editor who approved publication:

Dr. Zeinab Arzehgar

DOI:10.26655/JMCHMSCI.2021.3.7

KEYWORDS

Diabetes mellitus

Video education

Purposive sampling technique

Quantitative study

ABSTRACT

This study aimed to determine the effect of video education about hypoglycemia on knowledge of diabetes mellitus patients and their families. This type of research is a quantitative study with a pre-experiment method. This study focused on two groups, namely, type 2 diabetes mellitus patients by 162 people, and the families of diabetes mellitus patients by 162 people. In the group of diabetes mellitus patients, the sample used 30 respondents who were divided into two groups, namely 15 respondents in the experimental group and 15 respondents in the control group. In the population of family diabetes mellitus patients, the sample applied 30 respondents, who were divided into 15 respondents for the experimental group and 15 respondents for the control group. Non-probability sampling with a purposive sampling technique was utilized. Data analysis using the paired t-test showed a p-value of $0.001 < 0.05$. So, it can be concluded that health education on knowledge of hypoglycemia in type 2 diabetes mellitus patients was effective in the working area of Puskesmas Nguter Sukoharjo. For the results of the paired t-test, we found $p = < 0.001$ in the experimental group, which showed that there was an effect of hypoglycemia health education with videos on knowledge of type 2 diabetes families. Diabetes mellitus patients need to always adopt a healthy lifestyle so as to create a good health status and avoid complications of diabetes mellitus patients.

GRAPHICAL ABSTRACT

The Effect of Video Education About Hypoglycemia on Knowledge of Diabetes Mellitus Patients and Their Families



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Introduction

Diabetes mellitus is a health problem prevalent across the world that continues to increase every year. It is a chronic disease characterized by high blood glucose levels due to the pancreas not producing enough insulin or when the body cannot effectively use it [1–4].

Based on data from the International Diabetes Federation (IDF) in 2017, the prevalence of diabetes globally reached 424.9 million people and is estimated to increase to 628.6 million in 2045. Indonesia is the sixth country with the most diabetes mellitus sufferers in the world by 10.3 million people and are expected to continue to grow to 16.7 million people in 2045 [5–8]. According to data from the Public Health Office of Sukoharjo, Sukoharjo has a prevalence of diabetes mellitus type 2, which has changed in recent years. Type 2 diabetes mellitus or non-dependent diabetes mellitus rose from 4,610 cases in 2017 to 6,527 cases in 2018 [9]. In Indonesia, 2/3 of people do not know that they have diabetes and refer to health services late or already with complications. An acute complication resulting from an imbalance in blood glucose levels is hypoglycemia [10]. Non-insulin-dependent or adult-onset diabetes used to be called type 2 diabetes. But since over past 20 years, it has become more prevalent in children and teenagers, mainly because more young people are overweight or obese. About 90% of people with diabetes have type 2. Type 2 is also milder than type 1 diabetes. But, especially in the small blood vessels in your kidneys, nerves, and eyes, it can still cause significant health complications. Type 2 also increases the heart attack and stroke risk.

Hypoglycemia is a condition in which blood glucose levels are below normal limits, less than 70 mg/dl [11,12]. In the event of hypoglycemia, the body defence mechanism that functions to activate when several neuroendocrine systems are disrupted, causing the body's failure to maintain normal blood glucose levels, either by external or internal causes [13].

Hypoglycemia is common in people with type 2 diabetes mellitus, especially those who use insulin, but there are still many other treatments. The number of patients with mild/moderate hypoglycemia is known with a prevalence rate of 50% and 23 events per person-year, and for severe hypoglycemia with a prevalence rate of 21% and one incident per person-year. For treatments including sulfonylureas, the mild/moderate prevalence was 30%, and the incidence was 2 events per person-year, and the prevalence for severe was 5%, and the incidence was 0.01 events per person-year. A similar prevalence of 5% was found for treatment regimens that did not include sulfonylureas [14]. There is the failure to recognize the initial symptoms of hypoglycemia as a dominant risk factor which can worsen the patient's condition. The patient's awareness and knowledge of every symptom of hypoglycemia must be known from an early age as a first step to take treatment action and avoid risks that can even lead to death [15].

According to Dr. Moewardi hospital Surakarta, the level of knowledge about hypoglycemia before being given health education was 56.6%, while the level of knowledge about hypoglycemia after being given health education was 93.8%. There are significant differences before and after being given health education about hypoglycemia, so it can be concluded that there is an effect of health education on efforts to prevent hypoglycemia in people with diabetes mellitus [16], both in the treatment and control of this disease [17].

In the process of controlling diabetes, it is not only necessary to know the sufferer, but the family also needs to know and understand what diabetes is. Therefore, the role and support of the family is needed. Family support is an attitude, action and family acceptance of people who are sick [18]. There are four dimensions of family support, namely: The emotional dimension, the reward dimension, the instrumental dimension, and the participation dimension. Each of these dimensions is very important for the family

because it has something to do with the accuracy and the existence of support for someone [19–21]. Family support also acts as a strength for the individual.

Material and methods

This type of research is a quantitative study with a pre-experiment method. This study was divided into 2 groups, namely the population of type 2 diabetes mellitus patients as many as 162 people, and the families of diabetes mellitus patients as many as 162 people. In the population of diabetes mellitus patients, the sample was 30 respondents who were divided into two groups, namely 15 respondents in the experimental group and 15 respondents in the control group for. In the population of family diabetes mellitus patients, the sample was 30 respondents, who were divided into 15 respondents for the experimental group and 15 respondents in the control group for. Non-probability sampling with a purposive sampling technique was used. The data used in this study were primary data and to collect the data, a questionnaire was used, adopted and modified from previous research. The validity and reliability of the questionnaire has been already reported. This study has been approved by the Medical Faculty Ethics Committee, University Muhammadiyah Surakarta, and has a certificate. Data analysis included normality test, homogeneity test, paired-samples test, and independent t-test.

Result and Dissection

Characteristics of the respondents

Based on Table 1, diabetes mellitus respondents were mostly aged 56-65 years, namely 15 respondents (50%). Based on gender, the majority were women, namely 21 respondents (70%). As for the education level, most were not in school, namely 11 respondents (36.7%) and primary school as many as 11 respondents (36.7%). The highest number of illness duration

was 6-10 years, namely 17 respondents (56.7%). Further, as many as 13 respondents (43.4%) were unemployed. Regarding hypoglycemia symptoms, as many as 20 respondents (66.6%) had experienced hypoglycemia.

Based on Table 1, as for the family characteristics of diabetes mellitus patients, they were mostly aged 36-50 years, namely 13 respondents (43.3%). In terms of gender, most of the participants were women, namely 18 respondents (60%). Considering educational level, ten respondents (33.3%) had primary education, and the same percent were of high school level. Still, 33.3% had health education of diabetes, the most have never received health education about diabetes, namely 23 respondents (76.7%)

The Level of Knowledge of Respondents

Based on Table 2, the knowledge level of patients with diabetes mellitus in the treatment group at the most pre-test was low, namely ten respondents (67%), while the knowledge level during the most post-test was moderate by eight respondents (53%). In the control group, the pre-test knowledge level was mostly low, namely as many as 7 respondents (47%). During the post-test, the level of knowledge was moderate, with as many as seven respondents (47%).

Based on Table 2, the category of the knowledge level of the family of patients with diabetes mellitus in the treatment group at the most pre-test was moderate, seven respondents (46.6%), while the knowledge level during the most post-test was good, namely 11 respondents (73%). In the control group, the knowledge level during the pre-test was mostly moderate, namely as many as nine respondents (60%), while the level of knowledge during the post-test was low, as many as nine respondents (60%).

Table 1: Characteristics of Respondents

	No.	Characteristics	n	%	
Characteristic Diabetes Mellitus Patients	1.	Age			
		a. 40-55 years	6	20	
		b. 56-65 years	15	50	
	2.	Gender	a. Male	9	30
			b. Women	21	70
	3.	Level of education	a. No School	11	36.7
			b. Primary School	11	36.7
c. Junior High school			5	1.6	
d. High School			3	10	
a. Undergraduate			0	0	
4.	Duration of illness	a. 0 – 5 tahun	10	33.3	
		b. 6 – 10 tahun	17	56.7	
		c. > 10 tahun	3	10	
5.	Profession	a. Civil Servants	0	0	
		b. Labor	2	6.6	
		c. Farmer	8	26.7	
		d. Entrepreneur	6	20	
		e. Retired	1	3.3	
		f. No work	13	43.4	
6.	Symptoms of Hypoglycemia for patient		20	66.6	
		a. Ever	10	33.4	
Characteristic Family of Diabetes Mellitus	1.	Age			
		a. 20-35 years	6	20	
		b. 36-50 years	13	43.3	
		c. 51-65 years	6	20	
	2.	Gender	d. 66-80 years	5	16.7
			a. Male	12	40
	3.	Level of education	c. Women	18	60
			a. Primary School	10	33.3
			b. Junior High	9	30
			c. High school	10	33.3
	4.	Health education of diabetic	d. Undergraduate	1	33.3
			a. Ever	7	23.3
			b. Never	23	76.7

Table 2: The Level of Knowledge of Respondents

	Category	Pre-test		Post-test	
		F	%	f	%
The level of knowledge category of diabetes mellitus sufferer in the treatment group and the control group	Treatment Group				
	a. Good	2	13	4	27
	b. Moderate	3	20	8	53
	c. Low	10	67	3	20
	Control Group				
	a. Good	2	13	3	20
b. Moderate	6	40	7	47	
c. Low	7	47	5	53	
The level of knowledge category of diabetes mellitus family in the treatment group and the control group	Treatment Group				
	a. Good	4	26.7	11	73
	b. Moderate	7	46.6	4	27
	c. Low	4	26.7	0	0
	Control Group				
	a. Good	1	6.6	0	0
	b. Moderate	9	60	6	40
c. Low	5	33.4	9	60	

Bivariate Analysis

Homogeneity Test

Based on Table 3, it is known that the level of knowledge pre-test and post-test has a significance value (p -value) > 0.05 , so it can be concluded that the data variance in the pre-test and post-test treatment group and control group

is the same (homogeneous). Based on Table 3, it is known that the pre-test knowledge of the experimental group and the control group has a significance value (p -value) > 0.05 , so it can be concluded that the data in the post-test experimental group and the control group are the same (homogeneous).

Table 3: Homogeneity Test of Pre-Test and Post-Test

	Homogeneity Test	p -value	Conclusion
Homogeneity test of pre-test and post-test of diabetic patients	Pre-test group knowledge treatment and control groups	0.540	H0 be accepted
	Post-test group knowledge treatment and control groups	0.760	H0 be accepted
Homogeneity test of pre-test and post-test family of diabetes mellitus patients	Pre-test experimental group knowledge and control group	0.609	H0 is accepted
	Post-test knowledge experimental group and control group	0.539	H0 is accepted

Paired Samples Test

Based on the data in Table 4, the paired t-test (Paired Samples Test) on the effect of health education on diabetes mellitus patients for the level of knowledge in the treatment group indicates that there is a significant difference between pre-test and post-test. The significance value shows $0.001 < 0.05$ so H0 is rejected. It can be concluded that health counselling

interventions affect the level of respondent's knowledge about complications of diabetes mellitus, namely hypoglycemia. Meanwhile, the control group showed a significance value between the pre-test and post-test, namely $0.784 > 0.05$, which means that H0 is accepted. So, it can be concluded that there is no increase in knowledge of the control group respondents who were not given health education interventions.

Based on the data in Table 4, the results of the paired t-test (Paired Samples Test) the effect of health education on the family of diabetes mellitus patients for the level of knowledge in the treatment group shows that there is a significant difference between pre-test and post-test. The significance value shows $0.001 < 0.05$ so H_0 is rejected. It can be concluded that health counselling interventions affect the level of

respondent's knowledge about complications of diabetes mellitus, namely hypoglycemia. Whereas in the control group, the significance value between pre-test and post-test was obtained, namely $0.574 > 0.05$, which means that H_0 is accepted. So, it can be concluded that there is no increase in knowledge of the control group respondents who were not given health education interventions.

Table 4: Paired samples test on the effect of health education

	Group		Mean	Difference(sb)	IK95%	P value
Paired samples test on the effect of health education on diabetes mellitus patients	Treatment	Pre-test	7.27	-2.467	1.607 - 3.326	0.001
		Post-test	9.73			
	Control	Pre-test	7.87	-133 0	0.889 - 1.156	0.784
		Post-test	8.0			
Paired samples test on the effect of health education on diabetes mellitus family	Treatment	Pre-Test	10.53	2.83	1.54-4.21	0.001
		Post-test	13.41			
	Control	Pre-test	9.24	0.29	1.38-0.80	0.574

Independent T-Test

Based on Table 5, the independent t-test calculation results in patients with diabetes mellitus during the post-test showed that the level of knowledge between the treatment group and the control group showed a significance (p-value) of $0.039 < 0.05$, so H_0 was rejected. It means that there is a difference in the average level of knowledge between the treatment group and the control group in type 2 diabetes mellitus patients after receiving health education.

Based on Table 5, the results of the independent t-test calculation in the families of diabetes mellitus patients during the post-test show that the level of knowledge between the treatment group and the control group shows a significance (p-value) of $0.001 < 0.05$. so H_0 is rejected. It means that there is a difference in the average level of knowledge between the treatment group and the control group in the family of diabetes mellitus patients after receiving health education.

Table 5: Independent T-Test

	Group	Average (sb)	P-value	The difference in mean (CI 95%)
Independent t-test of health education in diabetes mellitus patients	Treatment	9.73 (2.3)	0.039	1.733(0.091-3.375)
	Control	8.00 (2.1)		
Independent t-test for health education in diabetes mellitus family	Treatment	13.41 (1.27)	<0.001	4.47 (3.50-5.45)
	Control	8.94 (1.52)		

Respondent Characteristics

Characteristics of Respondents in Diabetes Mellitus Patients

The majority of respondents in the treatment and control groups were women. This study is in accordance with the research by Rosyid et al. [22], which states that the prevalence of diabetes mellitus is higher in women because women have a greater chance of increasing body mass index

than men. This is caused by hormonal conditions such as pre-menstruation syndrome and post-menopausal conditions so that the distribution of body fat easily accumulates [23].

The majority of respondents in the treatment group and the control group are mostly 55-65 years old. According to the ADA [12], the age group with a high risk of developing diabetes is 40 years and over. This is caused by obesity

conditions, smoking habits, bad diet, and lack of exercise.

The majority of the respondents in the treatment group were not in school and primary school, while the most of the participants in the control group were in primary school. The level of education affects the thinking ability of individuals, where the higher the level of individual education, the easier it is to receive new information and be able to analyse new problems [24]. Highly educated patients usually have higher knowledge about diabetes so that they can more easily understand educational programs and have the ability to communicate well. Education is an important factor in understanding health management, overcoming the symptoms that arise, adherence to controlling blood sugar, taking appropriate treatment, and preventing further complications.

The majority of patients in the treatment group and the control group were housewives. This study is in accordance with a previous study [25], which states that most of the daily work carried out by respondents who suffer from diabetes is by housewives. According to a study [26], a physical activity carried out by a person can help control blood glucose levels where physical activity can affect the increase in insulin, so that blood glucose levels decrease.

The majority of respondents suffered from type 2 diabetes mellitus for 2-5 years, both in the treatment and control groups. The results of this study are in accordance with a previous study [27], with the largest distribution of 5-10 years as many as 43 respondents (53.1 %). The long history of suffering from diabetes mellitus is caused by heredity, the patient's inability to carry out good diabetes care, and a poor diet [28]. The results of this study are different from another study in the literature [29] in which the duration of the majority of diabetes suffering from diabetes mellitus was between 1-5 years. The length of time a person has diabetes can provide an overview of the course of the disease and also the person's severity. Diabetes mellitus disease can also be caused by several factors such as

lifestyle, heredity, and also because of the environment.

Most of the respondents in the treatment group and the control group had experienced symptoms of hypoglycemia. This study is in accordance with the research in which the majority of people with diabetes mellitus have experienced symptoms of hypoglycaemia [30]. Further, patients who suffer from diabetes mellitus, especially patients who are over 60 years of age, have the possibility of insulin resistance, which will eventually show signs and symptoms of hypoglycaemia [31]. The longer the suffers from diabetes mellitus, the more able they are to recognize the signs and symptoms of hypoglycemia.

Characteristics of Diabetes Mellitus family

The majority of respondents were between 35-50 years old. At that age, a person's mindset is at the maturity stage so that they are still able to absorb and absorb information well and will increase their knowledge [32]. The majority of respondents were female. This can be caused by the time when health education is provided, where the majority of women in the area were housewives so they had a lot of time to attend health education. In addition, in Java, the role of women in the family is to give attention and care to family members [33]. Based on a previous study [28], women in the family have a very important role, namely as mothers who usually have patience and patience in caring for family members who are sick.

The majority of respondents had primary school and high school level. The low level of education can prevent a person from digesting information related to knowledge. The level of education greatly influences the respondent's knowledge regarding diabetes mellitus disease, both the complications that occur in hypoglycemia and their discussion [34-36].

Based on the above results for health education regarding diabetes mellitus, most respondents have never received health education because there are rarely meetings in that area, so that health education is rarely given to families. Some

families have received health education, and they get health education through a village midwife or doctor [37].

The level of knowledge before and after being given health education

The level of knowledge for Diabetes Mellitus patients

The frequency distribution of the respondent's level of knowledge before being given health education in the treatment group shows that most respondents have a low level of knowledge. One of the efforts to increase respondents' knowledge is providing health education, especially regarding diabetes mellitus, namely hypoglycemia. Health education is a form of independent nurse action to help patients overcome their health problems through learning methods where nurses act as teaching nurses [38].

The frequency distribution of the respondent's level of knowledge after being given health education in the treatment group shows that the respondent's knowledge has increased. That is, the majority of respondents have a moderate level of knowledge. The increase in respondent's knowledge in this regard can be influenced by several factors, especially the ability of each respondent to understand a problem. Each respondent has different abilities depending on physical and cognitive factors, level of development, physical health, and intellectual learning processes [39].

Level of knowledge for Diabetes Mellitus family

Distribution of respondents' level of knowledge about the hypoglycemic disease before being given health education shows that most of them have sufficient knowledge, because several factors affect knowledge, including age, occupation, environment, experience, information, education; however, the source of information obtained must be correct. For example, the source of information comes from the village midwife or other health services.

Incorrect information will cause new problems, such as no need to recheck sugar if the sugar level has started to be normal.

The distribution of respondents' level of knowledge about the hypoglycemic disease after being given health education is mostly good. The increase in the level of knowledge occurs because of the health education that has been given regarding one of the complications of diabetes mellitus, namely hypoglycemia, and this is highly expected by researchers so that respondents can know about hypoglycemia, causes, symptoms, treatment, prevention and the role of the family in dealing with sufferers. Regarding family knowledge level before and after being given health education about hypoglycemia in the post-test group compared to the pre-test group (before health education), there is a significantly higher level after being given health education.

The effect of health education on knowledge of Diabetes Mellitus patient

The paired t-test (Paired Samples Test) for the level of knowledge in the treatment group showed a significant difference between the pre-test and post-test. The significance value shows $0.001 < 0.05$ so that H_0 is rejected. It can be concluded that health education interventions have an influence on the level of respondents' knowledge regarding complications of diabetes mellitus, namely hypoglycemia. Whereas in the control group, the significance value between pre-test and post-test was obtained, namely $0.784 > 0.05$, which means that H_0 is accepted. So, it can be concluded that there is no increase in knowledge of the control group respondents who were not given health education interventions.

This study is in accordance with the a study in the literature [38], which states that health education affects efforts to prevent hypoglycemia in diabetes mellitus sufferers in Dr. Moewardi hospital at Surakarta. Health education is a learning activity designed in accordance with the situation and condition of the patient, carried out in a relatively short time so that respondents concentrate more on understanding the material

[40]. Knowledge and prevention efforts need to be made to prevent complications of diabetes mellitus so changing lifestyle, determining the right diet, doing exercise, quitting smoking, and alcohol consumption, is needed.

The effect of health education on the knowledge of diabetes mellitus family

This study concluded that there was a difference in knowledge about hypoglycemia between before and after health education was given. Support from other family members greatly affects diabetics in changing healthier behaviour than people with diabetes who do not get family support [41]. Health education aims to increase the knowledge of family members from diabetes mellitus sufferers about the general understanding of diabetes to one of the complications that occur, namely hypoglycemia, including understanding, symptoms, causes, and prevention, which is supported by another study [42], explaining that health education aims to increase public knowledge and attitudes.

The difference on knowledge level after health education was carried out in diabetes mellitus patients

The results of the independent t-test on the post-test for the level of knowledge between the treatment group and the control group showed a significance (p-value) of $0.039 < 0.05$, so H_0 was rejected. This means a difference in the average level of knowledge between the treatment group and the control group in people with type 2 diabetes mellitus after receiving health education. Health education is proven to be effective in changing knowledge and behaviour by providing a positive influence in preventing and overcoming hypoglycemia in type 2 diabetes mellitus patients [43]. Providing health education about hypoglycemia knowledge through the lecture and question and answer method quipped with audio-visual media can help increase concentration, prevent boredom, and facilitate respondents' understanding [43]. The provision of health education nursing the audio-visual

method involves all sensory learning tools so that it can control the respondent's hearing and vision. The more senses involved in receiving, the more the knowledge gained will impact awareness in an effort to minimize diabetes mellitus and increase awareness of health.

Based on previous studies [44,45], there is a significant relationship between knowledge and the patient's ability to cope with hypoglycemia. Good knowledge will have an impact on the patient's ability to determine the treatment action he will take. This proves that the provision of health education about hypoglycemia enhances the level of patient knowledge, where patients who previously do not know about hypoglycemia become more aware and add information to patients themselves about hypoglycemia. Health education is very important to be given to type 2 diabetes mellitus patients in order to enable them to be as independent as possible in self-care.

Differences on knowledge levels after health education is carried out in diabetes mellitus family

The results of the independent t-test showed that there was no difference in knowledge between the control group pre-test and post-test. There was a decrease in the average for these results, for the average pre-test results were higher than the post-test. This can occur due to several factors, such as not receiving health education or health education given after the post-test. The level of knowledge among respondents was also lacking because some of the respondents were old, so they only answered according to their knowledge. Unlike the case with the experimental group, they received an education Health given a post-test questionnaire, and there was a change in knowledge improvement. Previous researchers have explained that health education has not been optimal, so families also need support from other family members [41]. With the existence of health education, it is hoped that the family of people with diabetes mellitus will also know about the diseases suffered by their members, both about the general understanding of diabetes and one of the complications that occur, namely

hypoglycemia, which includes understanding, symptoms, causes and prevention. This is in accordance with to a previous study [42], which explains the objectives of health education, including the attainment of public knowledge and attitudes, increasing community behaviour, and improving public health. Researchers in conducting health education to respondents have used video media and leaflets. This can make it easier for respondents who experience visual impairment in the eyes; without seeing it can also only be through the voice explanation of the video. The benefits of video media itself are also very important considering that 50% of people learn or get information from what they see and what they listen to [46,47].

The results of the paired t-test showed that there was no difference in knowledge between the control group pre-test and post-test. This can be due to several factors, such as not receiving health education or health education given after the post-test. The level of knowledge among respondents was low because some respondents were elderly, so they only answered according to their knowledge. Whereas in the experimental group they received health education first so that during the post-test there was an increase in knowledge. In the control group, there was also a change in the level of knowledge, from the initial level of knowledge to the majority being sufficient to the majority being less. This is because respondents were no longer cooperative in filling out the questionnaire. They thought that such a thing was not important. However, after the post-test, i.e. receiving health education, they realized that the answers they gave were not in accordance with what was conveyed. Through the available media, the respondents became interested in the material that was presented.

Conclusion

There was a difference in the level of knowledge of diabetes mellitus patients before and after video education. There was a difference in the level of family knowledge of diabetes mellitus patients before and after video education. There was an effect of Hypoglycemia video education on

knowledge of diabetes mellitus patient and families.

Acknowledgment

Thanks go to the head of nursing school, the dean of Faculty of Health Sciences, Universitas Muhammadiyah Surakarta, and Head of the Community Health Center, Nguter Sukoharjo.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions

All authors contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all the aspects of this work.

Conflict of Interest

We have no conflicts of interest to disclose.

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HOW TO CITE THIS ARTICLE

Okti Sri Purwanti, Puji Nurani, Alia Ulfa Wulandari. Effect of Video Education about Hypoglycemia on Knowledge of Diabetes Mellitus Patients and Their Families, *J. Med. Chem. Sci.*, 2021, 4(3) 267-278

DOI:10.26655/JMCHMSCI.2021.3.7

URL: http://www.jmchemsci.com/article_130415.html