

## Education effects on the medication adherence level in type 2 dm patients

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### ABSTRACT

Education is the primary basis for the perfect treatment and prevention of Diabetes Mellitus. Minimum knowledge about Diabetes Mellitus will lead to complications more quickly, burdening the family and society. This research design is experimental research with a Quasi-Experimental Design in the form of a "Two Group Pretest-posttest." The sample in this study was 50 people using the entire population. This research was conducted at the Kedaung Kaliangke Public Health Center, West Jakarta. Preliminary data collection was started in November 2022-December 2022, and the research was conducted from January 2023. The data analysis technique used the paired t-test. This research can be concluded that there was an effect of education on the adherence level in taking medication in patients with type 2 DM at the Kedaung Kaliangke Health Center Jakarta in the instrument group and the control group.

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## INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycemia associated with abnormalities in carbohydrate, fat, and protein metabolism caused by decreased insulin secretion or insulin sensitivity, or both. This causes chronic complications of microvascular, macrovascular, and neuropathy. Based on WHO (2019) data, as many as 347 million people in the world suffer from diabetes and Indonesia is a country included in the 10 countries with the highest number of diabetics in the world. Basic Health Research Adikusuma *et al.*, (2017) shows that the prevalence of diabetics in South Kalimantan Province in 2018 was 1.4%. (Zaharuddin & Ulum, 2019).

WHO predicts the number of people with type 2 DM will increase in the coming year, particularly Indonesia that will increase from 8.4 million in 2000 to 21.3 million in 2030. Without adequate action to overcome this situation, the researcher estimate that 643 million people will suffer from diabetes in 2030 11.3% of the population. If this trend continues, the number will

increase up to 783 million 12.2% by 2045. Webber, (2018) The IDF organization estimates that at least 463 million people aged 20-79 years in the world suffer from DM in 2019, equivalent to a prevalence rate of 9.3% of the total population of the same age. The prevalence of DM is estimated to increase with increasing population age to 19.9% or 11.2 million people aged 65-79 years (Kemenkes, 2020).

Basic Health Research (*Riskesdas*) was conducted by collecting data on DM sufferers in people aged  $\geq 15$  years in 2018. The DM criteria refer to the consensus of the Indonesian Endocrinology Association (*PERKENI*) which adopted the American Diabetes Association (ADA) criteria. According to these criteria, DM is enforced when fasting blood glucose levels  $\geq 126$ mg/dl and blood glucose during  $\geq 200$ mg/dl. Based on the results of the 2018 basic health research (*Riskesdas*), the prevalence in Jakarta increased from 2.5% to 3.4% with a total of 10.5 million people or around 250 thousand residents who suffered from diabetes (Kemenkes, 2020).

Type 2 diabetes mellitus is a metabolic disorder with symptoms of chronic hyperglycemia due to insulin resistance or deficiency of insulin secretion. Uncontrolled glucose levels can lead to multiple organ dysfunction and failure. The success of treatment is influenced by the quality of health services and patient compliance. Low adherence and lack of patient understanding about the use of oral anti-diabetic drugs which is a major problem in the treatment of type 2 diabetes mellitus Denny. A, (2020). In this case, pharmacist intervention is needed to increase understanding of drug use instructions and patient adherence for successful therapy.

Some of the symptoms that are often experienced by diabetics are polyuria, polydipsia, and polyphagia. It is important for people with diabetes mellitus (DM) to consult periodically to the doctor. Besides, it is highly recommended to be obedient and disciplined in undergoing the drug therapy given. Generally, DM sufferers adhere to treatment with doctors as long as they still suffer from subjective symptoms and interfere with their daily routine, once they are free from these various complaints, their adherence to treatment decreases (Antyka Bellah Esti Kawa, 2022).

Non-compliance DM treatment still becomes a big problem that is quite important in management. The lower level of type 2 DM patients adherence than type 1 DM can be caused by therapeutic regimens that are generally more complex and polypharmacy, as well as drug side effects that occur during treatment Compliance with medication. Taking medication in DM sufferers has a very important role in controlling blood levels of sugar in blood. It is assumed that HBM can explain non-compliance type 2 DM patients in carrying out medical therapy recommended by health workers as a way of managing DM. There are 4 components of the HBM concept that can explain the non-adherence of type 2 DM patients in medication therapy, namely perceived barriers for medication therapy, perceived benefits, perceived vulnerability as DM disease (perceived susceptibility), and perceived severity as the severity of DM (perceived severity) (Hidayah & Sopiandi, 2019).

The high number of recurrent hospitalizations requires special attention, especially in the field of health education through appropriate and programmed education. Hospitals have an important role in providing information and empowering the community, so that the community can play an active role in supporting behavior change, maintaining, and improving optimal health status as stipulated in Minister of Health Regulation No. 44 of 2018 concerning health promotion. One way is by providing education. Health education and support for diabetes self-management is essential to prevent acute complications and reduce long-term complications (Of & Care diabetes, 2018).

Education is the main basis for the perfect treatment and prevention of Diabetes Mellitus. Minimum knowledge about Diabetes Mellitus will lead to complications more quickly. This will be a burden on the family and society as well. Knowledge of nutrition is a very important factor in determining a person's attitude and behavior towards food. In addition, knowledge of nutrition is an important role to be able in making people to have a healthy, prosperous, and quality life (Bidulang *et al.*, 2021).

One step that is quite strategic to increase knowledge and generate motivation towards improving the condition of family health status is to empower families or communities. Forms of family empowerment activities, among others, are carried out through education on the level of medication adherence which aims to increase the ability of families to prevent and deal with problems in patients on their own. Obedience and health education is a form of intensive counseling through daily face-to-face meetings. Education is carried out using booklets for patients and families. Hyperglycemia is a medical condition in the form of an increase in blood glucose levels beyond normal which is a characteristic of several diseases, especially diabetes mellitus besides various other conditions (Soelistijo, 2019).

Mursidah Dewi (2022) stated that the use of an experimental method of pre-test post-test design with one group design involved 47 type II DM sufferers in the working area of the Kandis Health Center in 2021 which was selected by random sampling, through inclusion criteria, such as type II DM sufferers without DM injuries, long suffering from type II DM <2 years. This respondent was being educated through leaflet media accompanied by his family. The researcher argues that to make the education carried out on the respondents to be successful, the family must play an active role in participating in the education given. The education was carried out for 45 minutes with different topics.

Before the education was preceded by an initial meeting and a final meeting, follow-up process was carried out on each topic in the education group with educational material provided starting from basic concepts to management. Respondents will find it easier to understand the explanation given by the researcher because the material presented is not all material about diabetes mellitus but the more specific discussion. The education provided is not just using counseling methods either directly or indirectly but has developed by encouraging participation and cooperation of patients and families. Family support is part of the patient who is closest and inseparable, and increases the patient's confidence to manage their disease better.

Then, continued with research by Siwi Padmasari (2021) who said that the number of inclusion samples in this study were 60 patients out of a total of 65 patients who were evenly divided into the control and intervention groups. Sampling used total sampling and determined the pretest-posttest group of subjects. The implementation of pharmacist education through HPC was carried out at the Public Health Center and at the patient's home for 2 months with twice visits with a 3 minutes duration. HPC education was carried out for one month with twice in-person visits, in weeks 1 and 4 plus communication through virtual media and mobile phones which were carried out at least two times in one week. Pharmacists carried out direct visits to patient during a pandemic by implementing health protocols using personal protective equipment and keeping a safe distance. The entire implementation of HPC used guidelines for home pharmacy services.

In September, Dyah Restuning (2018) showed that diabetes education is education about knowledge and skills for diabetes patients that aims to change behavior to increase clients' understanding of their disease. Dietary compliance is a big problem that occurs in people with type 2 DM nowadays. The principle of managing the diet was based on the nutritional status of diabetic patients and modifying the diet by taking into account lifestyle and eating habits. The number of samples was 82 respondents (41 for the intervention group and 41 for the control group). In this study, the respondents were able to communicate verbally and understand Indonesian, diagnosed with type 2 DM for at least 3 years. Respondent exclusion criteria in this study were patients aged less than 30 years and experiencing decreased consciousness and were carried out offline from September 2018 to October 2018.

Saibi *et al.*, (2020) analyzed 7 respondents (type 2 DM sufferers) in the working area of the Mulyorejo Health Center in Surabaya. It showed that there were 5 respondents (71%) who did not comply with medication or treatment according to medical recommendations. Respondents stated that there was an effect of shaking, heart palpitations, and weakness in the knee bones after consuming OAD. Respondents preferred to avoid the side effects of using drugs by not taking

them without reporting them to their doctors. One respondent stated that he was lazy to drink OAD. Type 2 diabetes mellitus cannot be cured, but sufferers can control their health condition by maintaining stable blood sugar levels. One of the main efforts in controlling blood sugar levels is to comply with the rules of taking medication. (Yulianti & Anggraini, 2020)

In September, research by (Luh & Dian, 2021) analyzed 26 respondents in the Sahaba Denpasar Bali Pharmacy area using the MMAS-8 questionnaire (Morisky Medication Compliance Scale). It was analyzed using a paired t-test. The percentage of patient compliance before being given drug information with poster media was 92.85% low adherence, and 7.15% moderate adherence. Patient compliance after being given drug information using poster media was 21.42% low adherence, 71.42% moderate adherence, and 7.15% high adherence. Provision of drug information using posters has an effect on increasing adherence to taking medication in patients with type 2 diabetes mellitus.

44 respondents at Gunung Maria General Hospital for providing structured health education to the patients and families with booklet media. Respondents were dominated by women (34 people, 77.3%). The research results showed that there was a significant increase in the level of knowledge before and after the intervention, with a  $p < 0.05$ . Provision of structured health education to DM2 patients used booklets so that patients could understand the disease, especially to control of the patient's blood sugar levels (Sepang *et al.*, 2020).

With the occurrence of non-adherence in patients with diabetes mellitus, it will result in blood sugar levels both decreasing or increasing beyond normal limits so that it will cause complications or mortality. DM disease will have an impact on the quality of human resources and increase health costs which is quite large, so all parties, both the community and the government, should participate in efforts to overcome DM, especially in prevention efforts. The role of the patient and family in the management of DM is also very important because DM is a chronic disease that will last a lifetime (Soelistijo, 2019). Based on a preliminary study conducted by researchers at the Kedaung Kaliangke Health Center, as many as 15 respondents indicated that people with Type 2 DM indicated to the ages of the respondents ranged from 31 years - 79 years. Of the 15 respondents in the preliminary study, 2 respondents had high compliance, 2 respondents had moderate compliance, and 11 respondents had low compliance. The average respondent who has low adherence was caused by not having time to take medication because they were busy, afraid of the side effects of using drugs, and are lazy because they take long-term medication. Since DM is a disease that requires independent treatment, DM patients must have the knowledge, skills and attitudes to be able to adapt the daily management of DM.

## RESEARCH METHOD

The design of this research is experimental research through a Quasi-Experimental Design with the form of "Two Group Pretest-posttest" (Sugiyono, 2017). This study aims to provide an analysis of the object under study, namely medication adherence in patients with Type 2 Diabetes Mellitus. Population were from the area of generalization which consists of: objects/subjects that have certain qualities and characteristics determined by the researcher to be analyzed and then conclusions to be drawn. Population (universe) is the totality of all objects or individuals who have certain characteristics, clear, and complete to be analyzed (research material). The population is all certain aspects of the characteristics, phenomena or concepts as the center of attention in a field of study. The population in this study was Type 2 DM patients in December 2022 as many as 50 people. The sample in this study was 50 people using the entire population. This research was conducted at the Kedaung Kaliangke Public Health Center, West Jakarta. Preliminary data collection was started from November 2022 - December 2022 and the research was conducted from January 2023. The data analysis technique used the paired t-test.

## RESULTS AND DISCUSSIONS

Kedaung Public Health Center, located in Cemgkareng District, is one of the Health Centers under the auspices of the West Jakarta City Health Office, Jakarta. The Kedaung Health Center was designated as an Inpatient Health Center with PONE capabilities and was given additional resources to provide PONE-capable inpatient services based on service needs.

The description of Gender in the working area of the *UPTD Puskesmas* Kedaung can be described in the following table:

**Table 1.** Gender

Variable	Frequency	Percentage
Gender :		
Man	11	22
Woman	39	78
Total	50	100

Based on the table above, it is known that the number of women in this study was dominant, as many as 39 samples (78%) and men as many as 11 samples (22%). The description of education in this study in the working area of the *UPTD Puskesmas* Kedaung can be described in the following table:

**Table 2.** Education

Variable	Frequency	Percentage
Educational Background:		
Not in School	10	20
Elementary School	17	34
Junior High School	9	18
Senior/Vocational High School	14	28
Total	50	100

Based on the table above, in the level of education, it is known that the dominant education level is Elementary School with 17 samples (34%), then Senior/Vocational High School with 14 samples (28%), not in school with 10 samples (20%), and Junior High School with 9 samples (18%).

The description of age in the working area of the *UPTD Puskesmas* Kedaung can be described in the following table:

**Table 3.** Age

Variable	Frequency	Percentage
Age:		
44 - 49 years	12	24
50 - 57 years	8	16
58 - 62 years	8	16
63 - 71 years	16	32
71 - 84 years	6	12
Total	50	100

Based on the above table, it is known that the most dominant age is 63 - 71 years old with 16 samples (32%) and the least age is 71 - 84 years old with 6 samples (12%).

**Table 4.** Normality Test

Variable	Intervention		Control		P
	M	SD	M	SD	
Pre-Test	6,25	1,89	3,84	1,67	0,001
Post-Test	7,86	1,00	4,04	1,86	0,221

*M = Mean*

*SD = Standard Deviation p = Value*

Based on the results of the normality test using Shapiro-Wilk, it is found that the  $p$  value of the intervention group was  $0.001 < 0.05$  and the control group is  $0.221 < 0.05$ . So, it can be concluded if the data is normally distributed, the hypothesis test can be continued with the Paired T Test and the Independent T Test.

**Table 5.** Paired T-Test

Group	Pre-Test		Post-Test		t	p
	M	SD	M	SD		
<b>Intervensi</b>	6,25	1,89	7,06	1,678	-2,061	,050
<b>Control</b>	3,84	1,00	4,04	1,862	-2,449	,022

Based on the results of the Paired T Test in the intervention group, the mean Pre Test value is 6.25 with an SD of 1,96, the Post Test, the mean value is 7.06, SD is 1, and the  $p$  value is 0.050 which mean that there is no increase before and after given education. Meanwhile, the mean pre-test value for the control group is 3.84 and the SD is ,408. Whereas in the control group the post test mean was 4.04, SD was ,408 and  $p$  value was  $0.022 \geq 0.05$ , which means that there was an increase in medication adherence in the control group.

**Table 6.** Independent T-Test

Variabel	Group				t	p
	Intervensi		Control			
	M	SD	M	SD		
<i>Pre-test</i>	6,25	1,89	7,06	1,00	4,753	,000
<i>Post-test</i>	3,84	1,67	4,04	1,86	7,143	

Based on the table above, the  $p$  value of the pre-test and post-test intervention group was  $0.00 < 0.05$ , while for the control group the pre-test  $p$  value was  $0.00 < 0.05$  while for the post-test was 0.02. There was an increase in medication adherence in the control group. The results of data processing that was carried out in the intervention group and the control group were found that there is an effect of education on the adherence level to taking medication in patients with type 2 DM at the Kedaung Kaliangke Health Center, West Jakarta. Then, when viewed from the statistical value, it is known that the significance value is  $< 0.05$ .

The results showed that the average scores of the intervention and control groups before giving education are 6.05 and 3.84. So, based on these data according to the researcher, the level of patient adherence to taking medication is still low. So, it really needs education about the importance of taking medication for type 2 DM patients. After being given education to patients in this study, it was seen that there is an average increase in the intervention group to 6, 86 which was

previously of 6.05. in addition, in the control group becomes 4.04 which was previously 3.84. This is in accordance with the research which states that education is important in increasing patient adherence to taking medication (Pertwi & Mujahid, 2022).

According to the authors, education has a relationship with medication adherence. Formal education is very important for someone because it provides basic knowledge, theory and logic, as well as general knowledge. A person's intellectual power can be influenced by their level of education in making decisions, including whether to take medication or not. Diabetes patient therapy is a therapy that requires patience, so sufferers must have more complex intellectual abilities to understand the drug therapy given and comply with medication to achieve blood sugar control (Jasmine *et al.*, 2020).

Then, when viewed from patient education, it was found that there were 17 samples (34%) with elementary school education and 10 samples (20%) did not attend school. From these data, it can be seen that there are still many respondents who have a low educational background. According to the researcher, a person's ability and knowledge in implementing healthy living behaviors can be influenced by their level of education. Respondents with higher education levels will have more knowledge than those with lower education level. According to (Sugiharto, 2003) in research who stated that a person's educational level can affect a person's ability and knowledge in implementing healthy living behaviors, especially in preventing hypertension. The higher a person's education level, the greater his ability to maintain a healthy lifestyle (Mokolomban *et al.*, 2018).

According to gender related to different roles and life behavior in society between men and women, women usually pay more attention to their own health than men. So, women are more obedient in taking medication. Then, when viewed from gender, it was found that there were 39 women (78%) and 11 men in the sample (22%). Gender is associated with different life roles and individual reactions in society between men and women. In terms of health maintenance, women usually pay more attention to their health than men. Then, the results of the study by (Puspita, 2016), women respondents tend to be more obedient in taking medication in DM 2 patients (Ningrum, 2018).

Then, when viewed from the age of the respondents, it was known that there were 16 samples (32%) with ages 61-71 years, then in 16 samples (32%) at ages 50-62 years, and ages 71-84 years there were 6 samples (12%). From these data, it is known that most of the respondents in this study were elderly, they were > 60 years old. Age > 45 years did not have work-related activities that are high enough which causes patients in the age group > 45 years to be obedient in taking the drugs that have been given (Ratnasari & Andrie, 2022).

According to the authors, families can have an impact on the treatment programs they can receive. Adherence to medical programs is assisted by social support in the form of emotional support from family members. Compliance is a term used to describe agreement or cooperation, doing what a health worker suggests or following advice to take a certain attitude regarding health habits or health-related issues. In administering drugs to patients, directions and instructions are required so that patients could understand clearly what they have to do later at home so that they are more obedient in taking their medicine (Hannan, 2018).

The longer the duration of the disease, the greater the frequency of treatment and the more complex the drug regimen, the lower the level of adherence to treatment. Diabetic patients are often accompanied by co-morbidities, which will indirectly affect the amount of drugs consumed, and making treatment more complex. When compared with more complex drug regimens, patients with chronic disease are more compliant with once-daily drug regimens. In general, the more complicated a patient's medication regimen, the less likely the patient is to take their medication on time (Jasmine *et al.*, 2020). Patients who are taking medication will undoubtedly become bored. There are several causes, including patients not taking medication due to travel reasons, discomfort with side effects, discomfort sine they have to take medication every day, and a feeling

that things have improved or gotten worse. By providing education to the patients, this will affect adherence to taking medication in type 2 diabetes patients. Besides to providing education, support from family, friends, and the health center are also needed in providing education to patients, especially at the Kedaung Public Health Center. The results of this study are in line with research by (Mokolomban et al., 2018) which states that there is an influence by providing education on patient medication adherence. Then, based on the results of the study, it was also found that there was an influence by providing education on patient medication adherence (Viviandhari & Wulandari, 2017) and (Mulyani, 2019).

## CONCLUSION

There is an effect of education on the adherence level to taking medication in patients with type 2 DM at the Kedaung Kaliangke Public Health Center Jakarta both in the instrument and the control groups.

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