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The impact of education on the prevention of diabetes mellitus on the level of knowledge of families with diabetes mellitus

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Abstract

Background: Diabetes mellitus is a chronic disease that is indicated by the high levels of glucose in human's blood. Diabetes mellitus can occur due to a lack of education, especially families with a history of diabetes mellitus. As prospective future diabetics as well as supporters of those who already have the disease, families are crucial to the management of diabetes. One of the most crucial initiatives to identify the DM risk factors and lower the prevalence is education. Families can be given education in the form of health education by health workers to be able to implement healthy lifestyle practices, stay motivated to regularly test glycemic status, and be aware of diabetes complications.
Purpose: To know the impact of education on the prevention of diabetes mellitus on the level of knowledge of families with diabetes mellitus.
Method: Using a quasi-experiment research method, this study used a non-randomized pretest-posttest control group research design. The method employed for sampling is called purposive sampling.There were 40 participants in the sample, which was split into the intervention and control groups. Mann-Whitney and Wilcoxon tests are used in data analysis.
Results: P-value for the Mann-Whitney test is 0.000 (<0.05). This demonstrates that Ha is acceptable in order for diabetes mellitus prevention education to have an impact on the case group's knowledge levels both before and after the intervention.
Conclusion: There is a relationship between the level of information that families with diabetes mellitus possess and diabetes mellitus prevention education.

Keywords: Diabetes Mellitus; Education; Knowledge Level.

INTRODUCTION

The population of Indonesia faces a significant health issue with non-communicable diseases. The existence of an epidemiologically based pattern of infectious diseases that progress to non-communicable diseases (NCD) ultimately explains this. Diabetes mellitus is one of the common disorders linked to this. The prevalence of diabetes mellitus (DM) is rising annually. The primary symptom of diabetes mellitus, a diverse metabolic illness, is persistent hyperglycemia. It is brought on by either decreased insulin output, decreased insulin effect, or typically both (Soelistijo, Lindarto, Decroli, Permana, Sucipto, Kusnadi, Budiman, Ikhsan, Sasiarini, Sanusi, Nugroho, & Susanto, 2021).

According to predictions from the International Diabetes Federation, 537 million individuals worldwide are estimated to have diabetes. By 2030 and 2045, this figure is predicted to rise to 643 million and 783 million, respectively. In Indonesia, which is ranked fifth globally, 19.47 million people (10.6% of

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the world's population) have diabetes mellitus (DM), according to IDF data from 2021. As of 2022, the Central Java Public Health Office reports 647.093 cases of diabetes mellitus. The number of people with DM in Boyolali Regency is 18.531. Of the 719 residents of Boyolali, Gladagsari is the only one living with diabetes mellitus (International Diabetes Federation, 2021; Central Java Provincial Health Office, 2022).

The increasing occurrence of diabetes mellitus is attributed to multiple risk factors. One of the main risk factors that aggravates DM is unhealthy eating habits, where one gradually increases the consumption of carbohydrates and fats in the diet in a balanced manner. This means that people with diabetes need to follow a strict diet plan for consuming food and then adjust it daily based on their needs. In addition to unhealthy food, one of the factors that worsens the impact of DM is the low education level of the community (Patandean, Nur, Kadek, Swarjana, & Eppang, 2023). The incidence of DM may increase due to public awareness, particularly families with a history of DM (Nelma & Ratnalela, 2023).

Familial knowledge of DM is a gift that can sustain them for the rest of their life. Observing things like eyes, noses, lips, and ears leads to knowledge or comprehension (Haryani, Astuti, & Minardo, 2021). Lack of information can have a detrimental impact on a person's and a group's willingness to engage in health education as well as their capacity to uphold interpersonal and group dynamics.

Family has a crucial role in managing diabetes, whether as diabetes educators or as caregivers for patients. Proper self-care techniques and accurate diabetes education can improve diabetes management and reduce complications for those who have the disease. However, there are still a lot of family members who don't understand DM and should receive education so that it doesn't become more severe. Knowledge is important to make people aware of healthy behaviours and enable early detection of symptoms (Hulu, Pasaribu, Julianto, Sirait, Sitanggang, Wahab, Halim, Br Singarimbun, Sinaga, & Zega, 2023).

Providing education is one of the most important efforts to find out the DM risk factors to lower the disease's incidence. Low awareness of diabetes mellitus, its risk factors, and consequences in diabetes sufferers was revealed by a systematic review (Petersmann, Müller-Wieland, Müller, Landgraf, Nauck, Freckmann, Heinemann, & Schleicher, 2019). One of the roles of nurses is to provide education about complications in diabetes mellitus, how to prevent, and how to handle them (Purwanti, Istiningrum, & Wibowo, 2023). Education is an effective strategy for diabetes prevention and management. Diabetes prevention education can provide the necessary information to families of diabetes sufferers about healthy lifestyles, proper eating patterns, physical activity importance and can also monitor blood glucose levels, as well as signs and symptoms, to look out for (Erika, 2023).

Families can be given education in the form of health education by health workers to be able to implement healthy lifestyle practices, remain motivated to regularly test their glycemic status, and be aware of diabetes complications. As a result of receiving health education, diabetes patients' knowledge, attitudes, and behaviors must change in order to attain glycemic control and stop the onset of complications from their condition (Galuh & Prabawati, 2021).

Families may not know how to prevent or minimize these risk factors if they are unaware of the diabetes risk factors. Knowledge is key to stop the spread of diabetes mellitus. Knowledge-based behavior will be simpler to implement than ignorance-based behavior (Silalahi, 2019).

RESEARCH METHOD

This study implemented a non-randomized pre-post test control group research design using a quasi-experimental method, conducted at Gladagsari Health Centre and in May to June 2024 after obtaining ethical approval from KEP-FIK No. 234/KEPK-FIK/III/2024. Purposive sampling was applied as the sampling technique, and a total of 40 paricipants were collected, with 20 respo paricipants as the case group and 20 paricipants as the control group. The sample consisted of children whose parents had a history of diabetes.

This study used a questionnaire made by the researcher which consisted of 20 questions. In addition to use questionnaires, researchers also used leaflets and powerpoint made by researchers containing material about diabetes mellitus and how to prevent it.

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The validity test in this study was performed on families with diabetes mellitus at Gladagsari Health Centre as many as 20 people whose characteristics were the same as the research sample. The results of the instrument validity test in this study showed that the 20 question items, the results of r count> r table (0.444) where the highest; r table value was 0.738 and the lowest result was 0.468. Therefore, the 20 question items from the questionnaire were declared valid. The reliability test results show that the Cronbach alpha value for 20 question items is 0.846, which means that the instrument in this study is said to be reliable because the Cronbach alpha value is 0.846> 0.623. To assess the difference in mean scores between pre-tests and post-tests regarding knowledge levels in both intervention and control groups, the Wilcoxon test was used due to non-normal data distribution. Furthermore, to examine the impact of education between the intervention and control groups, the Mann-Whitney test was applied.

The level of knowledge is categorized as Poor if the value is <55; moderate if the value is 56-75; and Good if the value is 76-100. The researcher conducted an intervention for about 2 weeks to the treatment group by providing education using leaflets and PPT media about preventing diabetes mellitus.

RESEARCH RESULTS

Table 1. Characteristic of Participants (N=40)

Variable	Results	
	Intervention (n=20)	Control (n=20)
Age (Mean±SD)(Range)(Year)	(29.51±0,858)(20-35)	(28.65±0,826)(20-35)
Age (n/%)		
20 - 25 years old	7/35	7/35
26 – 30 years old	6/30	7/35
31 – 35 years old	7/35	6/30
Gender (n/%)		
Male	3/15	3/15
Female	17/85	17/85
Education Level (n/%)		
Elementary School	9/45	1/5
Junior High School	3/15	6/30
Senior High School	8/40	10/50
Bachelor	-	3/15
Pre-test Knowledge Level (n/%)		
Good	2/10	1/5
Moderate	7/35	15/75
Poor	11/55	4/20
Post-test Knowledge Level (n/%)		
Good	17/85	1/5
Moderate	3/15	15/75
Poor	0/0	4/20

According to Table 1, the intervention group's participants range in age from 20 to 35 years old, with an average age of 29.51 and a standard deviation of 0.858. In contrast, the control group, which has members ages ranging from 20 to 35, has an average of 28.65 and a standard deviation of 0.826. Most of the participants were between

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the ages of 20 and 25. The gender distribution revealed that, in both the intervention and control groups, 85% of participants were female. The majority of participants in the intervention group (45%) had only completed elementary school, while the majority of participants in the control group had completed junior high school.

The level of knowledge about preventing diabetes mellitus in the intervention group showed that the majority of pre-test results were in the poor category as many as 11 (55%), in the post-test there was a decrease in the results in the poor category as many as 0 (0%), in the pre-test in the moderate category as many as 7 (35%), in the post-test there was a decrease of 3 (15%), in the good category in the pre-test as many as 2 (10%), and in the post-test there was an increase of 17 (85%). While the distribution results in the control group showed that the majority of pre-test results were in the moderate category as many as 15 (75%). While in the post-test the same results were obtained or there was no change.

Table 2. Wilcoxon Test

Group	Mean	*p-value*
Intervention		
Pre-test	58.75	0,000
Post-test	85.25	
Control		
Pre-test	66.50	1.000
Post-test	66.50	

The results of the difference in the mean value of knowledge level based on the table above obtained the value before the intervention of Diabetes Mellitus Prevention Education which is 58.75. After getting the intervention, there was a change in value to 85.25 with P value = 0.000 (<0.05). Statistically, it shows a difference in the level of knowledge before and after the Diabetes Mellitus Prevention Education intervention in the case group. In the control group, the pretest value was obtained with a mean value of 66.50 and a post test value of 66.50 with a P value = 1.000 (<0.05). This indicates because the control group did not get the Diabetes Mellitus Prevention Education intervention, so that there was no statistically meaningful change in this group.

Table 3. Mann-Whitney Test

Group	Mean	*p-value*
Intervention	29.10	0.000
Control	11.90	

Based on the table above, the difference in knowledge level after the Diabetes Mellitus Prevention Education intervention in the intervention group with a mean value of 29.10 and in the control group with a mean value of 11.90 showed high increase of 18% in the intervention group with p-value of Asymp.Sig. (2-tailed)= 0.000 (<0.05). It is concluded that there is a statistically significant difference between the Diabetes Mellitus Prevention Education intervention group and the control group which was not given the intervention.

DISCUSSION

The results showed that the characteristics of respondents based on the age category were mostly 20-25 years old as many as 14 respondents. In accordance with research in Medan which stated that the age of respondents was still relatively young, namely 21-25 years, which was around 59.5% (Hulu et al., 2023). At that age, it is necessary to provide understanding related to the prevention of type 2 DM disease in order to avoid its risk factors in adolescence. Better and significant knowledge was

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found at a younger age (Zowgar, Siddiqui, & Alattas, 2018). Therefore, understanding early the risk factors of DM is very important for adolescents in order to take preventive measures.

Based on the results of the study on the gender category, it shows that the majority of respondents are female. Research in Pontianak also had a majority of female respondents (Nurhasanah, Petrika, & Sopiyandi, 2022). Another similar study conducted in Sukoharjo Regency showed that the majority of respondents were female, which was around 64.2% (61 people) (Dewi & Faozi, 2023).

Based on the results of research on the last education category, the majority of respondents were mostly at the high school level. This is in accordance with research in Pontianak, the majority of respondents are high school graduates (Nurhasanah, Petrika, & Sopiyandi, 2022). Senior High School (SMA) is one of the levels of education that is good and high enough for being the participants. The level of education affects a person's behavior when carrying out care and treatment for the disease she/he has suffered. Education is a factor that can influence patients in determining treatment options and understanding health information to prevent and avoid the spread of disease (Ismail & Yulian, 2019).

The frequency distribution of the case group's knowledge level before being given educational treatment with leaflet and powerpoint media showed that most of them were in the less category with 11 respondents (55%). One of the efforts that can be done to increase the level of knowledge is by providing education with leaflet and powerpoint media regarding the prevention of diabetes mellitus including the definition of diabetes, types of diabetes, diagnostic examination, signs and symptoms, risk factors, and prevention of diabetes.

Most respondents in this study had a fairly low level of knowledge, namely at the elementary level. Although the education is quite low, few respondents are not in the enough category. Education is one of the internal factors that influence knowledge where it is expected that higher level of education is directly proportional to a person's knowledge in obtaining, analysing and implementing the information obtained (Afaya, Bam, Azongo, & Afaya, 2020).

The distribution of respondent's knowledge after being given educational treatment using leaflets and powerpoint in the case group experienced a very significant increase. Some respondent's knowledge level increased as proven by the pre-test score in the good category of 2 respondents (10%), and in the post-test increased to 17 respondents (85%). One of the aspects that contributed to the respondent's increased knowledge was their comprehension of the information presented in the form of pamphlets and powerpoints. This is in line with research at the Prolanis Ngrampal Sragen Health Center which showed a change in the level of knowledge of respondents, namely diabetes sufferers, most of whom were in the low knowledge level category before being given health education, but then after being given treatment in the form of health education experienced, the level had increased. However, there were several respondents whose knowledge level had not increased due to advanced age factors. It is because of their physical changes that decrease the sensory function and physiological changes which cause the decrease of the ability to remember and solve problems (Purwanti et al., 2021).

Based on the results of the research in the case group with treatment in the form of leaflets and powerpoint on the prevention of diabetes mellitus, it showed an increase in the level of knowledge of respondents. Moreover, based on research in the control group, there was no increase in the level of knowledge regarding the prevention of diabetes mellitus. This is because respondents in the control group did not know and did not get information about the prevention of diabetes mellitus. This is in accordance with research at the Madani Palu General Hospital which showed a change in the level of knowledge of respondents, most of whom were in the low knowledge category, experienced an increase after being given health education treatment (Kunoli & Sudarman, 2024). However, there were several respondents who did not experience an increase due to advanced age factors which cause physical changes that can cause a decrease in sensory function and physiological changes. It will decrease the ability to remember and solve problems. Research in Purwakarta also showed that the results of the questionnaire given after health education showed an increase in student knowledge after being given education using leaflets (Dewi & Kurniasari, 2022).

Proper prevention and management as well as early screening for non-communicable diseases such as diabetes mellitus are needed to prevent the

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disease become wide-spreaded. Prevention management to reduce and prevent diabetes mellitus can be done through health education. Health education or health promotion can reduce the impact of risk factors. Health promotion can be done by counseling, one of which is by direct counseling to the community. Health promotion in the form of education can be given for both patients who already have diabetes or who do not. It is hoped that it can provide information for the prevention of DM and control and prevention of complications in DM patients (Zuriati, Zahlimar, & Suriya, 2021). The increase in knowledge level after education can be seen from the results of the pretest and posttest with an increase in knowledge in the good category from 10% to 85%. Aligned with research in Cileunyi Kulon Village which stated that there was an increase in community knowledge about Diabetes Mellitus after being given education (Vitniawati, Fuadah, Widyawati, Puspitasari, & Nugraha, 2024).

Based on the results of the study in the case group, it shows the effect of diabetes mellitus prevention education as evidenced by the results of the Mann-Whitney test with a p-value of 0.000. This proves that Diabetes Mellitus Prevention Education has an effect in increasing the level of knowledge of families with diabetes mellitus compared to families who do not get educational interventions. Aligned with previous research showing that education is the most direct way to acquire knowledge (Li, Wang, Huang, Li, & Qiu, 2022).

CONCLUSION

There is an effect of diabetes mellitus prevention education on the level of knowledge of families with diabetes mellitus in the intervention group.

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