



Original Article

## Improving Knowledge of Diabetes Mellitus Patients Using Booklet

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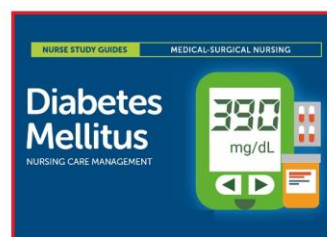
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### ABSTRACT

This research aimed to determine the increase in knowledge of Diabetes Mellitus patients through a booklet. This quantitative study followed a quasi-experimental design with two groups of pretest-posttest, at Kartasura Sukoharjo community health centre in April 2019. We used the purposive sampling technique with 40 samples divided into 20 samples in the experimental group and 20 samples in the control group. The patients aged 50-65 years, registered at the Chronic Disease Management Program (prolanis) Kartasura Community Health Centre, without comorbidities participated in the study. We used a questionnaire containing 20 questions that was modified by researchers. Its validity was 0.443, and its reliability was 0.945. Wilcoxon test was used to analyse the data. The results showed that the pre-test results of the experimental group showed a mean of 9.35, post-test of 12.95, and a P-value of 0.001. The pre-test results of the control group showed a mean of 11.00, post-test of 10.90, and P value of 0.414. There was also an in-depth study of the material by dividing it into small groups and giving booklets so that respondents could remember and do it at home. As for chronic disease patients, the more often they socialize, the less burden they feel.

### GRAPHICAL ABSTRACT

#### Improving Knowledge of Diabetes Mellitus Patients Using Booklet



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## Introduction

Diabetes mellitus (DM), generally referred to as diabetes, is a category of metabolic disorders characterized over an extended period of time by a high level of blood sugar. Frequent urination, increased thirst and increased appetite are also symptoms. Diabetes can cause several problems if left untreated. Diabetic ketoacidosis, hyperosmolar hyperglycaemic condition, or death can include acute complications. Cardiovascular disease, stroke, chronic kidney disease, foot ulcers, nerve damage, eye damage and cognitive disability are significant long-term complications. The World Health Organization (WHO) [1] states that as many as 422 million adults aged over 18 years old have diabetes. Meanwhile, according to the literature, 415 million adults suffer from diabetes worldwide, and by 2040 it is expected that there will be 642 million people suffering from diabetes [1, 2]. Based on a study [3], the prevalence of people with diabetes in Indonesia for the aged over 15 years is 5.7%. Indonesia is one of the ten countries with the highest number of diabetic patients as the highest non-communicable disease in Indonesia. The sixth-leading cause of death in this country is diabetes [4]. WHO reports that 1.5 million deaths were caused by diabetes in 2012, making it the 8th leading cause of death. However, another 2.2 million deaths annually are due to elevated blood glucose and increased risks of cardiovascular disease and other related complications (e.g., kidney failure), often leading to premature death, and are often reported on death certificates rather than diabetes as the underlying cause. The International Diabetes Federation (IDF) reported, for example, that diabetes resulted in 4.0 million deaths worldwide in 2017, using modelling to estimate the overall number of deaths that could be attributed directly or indirectly to diabetes [5,6].

Indonesia has experienced an increase in diabetes cases, according to a survey of diabetes sufferer cases in older adults in Indonesia, reaching 0.4%. Given the data, diabetes in older adults is more common in urban areas,

comprising 0.6% compared to rural areas with 0.2%. Women are at higher risk of developing diabetes because women are biologically more likely to increase their body mass index and monthly cycle syndrome (premenstrual syndrome), post-menopause which facilitates accumulated body fat distribution easily due to the hormonal process so it causes women at higher risk of suffering from diabetes [7].

According to the literature [8,9], age over 45 years is one of the risk factors for diabetes mellitus apart from family and obesity factors. The aging process can affect homeostasis, one of which is the change in the function of pancreatic beta cells as insulin producers, which will lead to disruption of hormone secretion and result in an increase in blood sugar levels. Besides age, education is an important factor that the patients must possess. A good education will lead to positive behaviour so they will be more open in receiving information. Health education can use tools or media, both audio and visual media. An example of visual media is a booklet.

Kartasura Community Health Centre had never previously conducted health education through booklets, but the lecturer and patients were asked to listen, whereas this study used booklet media. The booklet is a printed media that aims to disseminate information in the form of writing and images. Booklets have several advantages, such as it can be studied at any time since it is in the form of books and contains a lot of information. Booklets are very suitable as educational media for diabetes patients [10].

Kartasura Community Health Centre has a Prolanis (Chronic Disease Management program), which is actively held every month. There are 60 cases of diabetes sufferers who are also members of the program. Based on the preliminary study, patients expressed that health education was only done through lectures, and they immediately forgot when they went home because the media was not provided. Therefore, researchers provided health education to patients first and distributed booklets to take home and be read at

home. This research aimed to determine the increase in knowledge of diabetes patients through the booklet.

### Material and methods

This research is a quantitative study with a two-group pretest-posttest design approach using a quasi-experimental research design. This research was conducted at the Kartasura Sukoharjo Community Health Centre in April 2019. We used a purposive sampling technique with 40 samples divided into two groups, 20 experimental group respondents and 20 control group respondents. Inclusion of criteria included general criteria that must be present in the subject to participate in research. These criteria were patients aged 50-65, registered at prolanis Kartasura Community Health Centre, and suffered diabetes without complications and comorbidities. A questionnaire consisting of 20 questions of knowledge was used, which was modified by researchers. A score of 1 was given for the correct answer, and a score of 0 was given for the wrong answer. The categories were good knowledge with a score of 14-20, moderate knowledge with a score of 8-13, and poor knowledge with a score of 0- 7. The validity test was performed at the Baki Sukoharjo community health centre to 20 respondents with the results of  $r$  table 0.443 - declared valid- and the reliability test with the results of 0.945 (reliable). Before giving the booklet to respondents, it was tested by two health promotion experts, one from educational institutions and the other from nurses at the community health centre, to test the booklet content whether it was appropriate as a research medium. Prior to conducting the research, researchers, and nurses as well as prolanis health centre officers first made an apperception about the implementation of the research and were followed by a pre-test by researchers on April 3, 2019, performed by reading and filling out questionnaires, while the respondents only answered questions from the items being asked and gave health education about diabetes, including signs and symptoms,

clinical manifestations, complications, home care. The material was presented only once in 60 minutes. After that, they formed groups into three groups, then conducted questions and answers from the material delivered and booklet distribution. Nurses and Prolanis health workers accompanied each group. After one week, the intervention was carried out using a post-test on April 10, 2019, by distributing questionnaires to respondents. On April 12, the control group was given the same treatment as in the experimental group after the post-test.

### Result and Dissection

Based on the results of the analysis in Table 1, the majority of the experimental group is female with a total of 11 (55%), and the control group has the same number of women and men with a total of 10 (50%). As for the distribution of respondents according to the age, the experimental group has 9 (45%) of 60-65 years, while the majority of the control group is 56-59 years with 12 (60%). The educational level of the majority of experimental group respondents is junior high by 8 respondents (40%), and the control group between junior high education and senior high education has a dominant number of 7 (35%). Based on the results, the experimental and control groups have the majority of housewives with 9 (40%) and 5 (25%) respondents, respectively.

As shown in Table 2 above, considering the knowledge score of the experimental group respondents before treatment or pre-test, the majority of the level of knowledge was poor with 14 respondents (70%). After the treatment, the knowledge became ten respondents (50%). In the control group, the majority of the pre-test results were categorized as poor with nine respondents (45%), while the post-test remained poor with nine respondents (45%). The experimental and control groups showed the homogeneity test results of  $p > 0.05$ , which means that both groups' scores were homogeneous. Based on the normality test results in Table 2 above, the data are not normally distributed.

**Table 1:** Distribution of the homogeneity results of respondents according to sex, age, education, and occupation

Characteristic	Experimental Group		Control Group		P Value
	N (20)	%	(N=20)	%	
Sex					0.664
a. Male	9	45	10	50	
b. Female	11	55	10	50	
Age					0.341
a. 50-55 years	3	15	1	5	
b. 56-59 years	8	40	12	60	
c. 60-65 years	9	45	7	35	
Education					0.535
a. No education	2	10	0	0	
b. Elementary	6	30	6	30	
c. Junior High	8	40	7	35	
d. Senior High	4	20	7	35	
Occupation					0.494
a. Labourer	6	30	6	30	
b. Farmer	1	5	5	25	
c. Private worker	4	20	4	20	
d. Housewife	9	40	5	25	

**Table 2:** Frequency distribution and normality test of pre-test and post-test level of knowledge

Characteristics	Experimental Group		Normality Test	Control Group		Normality Test
	(N: 20)	%	P	(N: 20)	%	
<b>Pre-Knowledge</b>			0.006			0.006
<b>Poor</b>	14	70		9	45	
<b>Moderate</b>	3	15		6	30	
<b>Good</b>	3	15		5	25	
<b>Post Knowledge</b>			0.014			0.137
<b>Poor</b>	10	50		9	45	
<b>Moderate</b>	5	25		8	40	
<b>Good</b>	5	25		3	15	

**Table 3:** Results of the mean difference in pre-test and post test

Group	Analysis Results of Wilcoxon signed-rank test			P
	Information	N	Mean ± SD	
<b>Experimental</b>	Pre-Test	20	9.35 ± 3.746	0.001
	Post Test	20	12.95 ± 3.748	
<b>Control</b>	Pre-Test	20	11.00 ± 4.117	0.414
	Post Test	20	10.90 ± 4.128	

Based on the Wilcoxon signed-rank test (Table 3), in the experimental group, there was a significant increase in knowledge between the pre-test and

post-test after health education treatment through booklet ( $P < 0.05$ ).

**Table 4:** Results of the different testing on knowledge scores

Information	Group	Analysis Result of Mann - Whitney Test	
		Z	P-Value
Knowledge score difference	Experimental Control	-3.108	0.002

Based on the results of the Mann-Whitney test (Table 4), there was a major difference between

the health education booklet and the level of knowledge between experimental and control groups ( $P < 0.05$ ).

#### *Respondent Characteristics*

The research results show that most respondents are 60-65 years for the experimental group and 56-59 years old for the control group. Age is highly correlated with an increase in blood sugar, so that the older the person, the higher the prevalence of diabetes [11]. Identification and analysis of macro-vascular and microvascular complications in diabetes patients show that of the 30 respondents, the age of the respondents was 50-60 years old. The risk of diabetes increases according to the age group; the most at risk is the 55-64 age group with 14 times at risk compared with the 25-34 age group [12-15]. The aging after 30 results in anatomical, physiological, and biochemical changes. Changes from the cellular level continue at the tissue level and eventually at the organ level can affect homeostatic function. Body components that can experience are pancreatic beta cells, which produce the hormone insulin, target tissue cells that produce glucose, the nervous system, and other hormones.

The results of the research related to occupation show that the majority of diabetes patients are housewives. It is because differences in activities and daily lifestyle may affect the disease cases. It is reported that diabetes patients are mostly found in women [16]. Housewives usually neglect the physical activities they undertake. Like education, occupation describes an individual's socioeconomic status, which impacts how one gets access to health services in the context of promotional, preventive, and curative efforts. The diabetes cases are more often experienced by unemployment and it shows a relationship between occupation and diabetes cases, with a risk level of 1.544.

#### *Knowledge level before and after the intervention*

The frequency distribution of diabetes patients before health education was carried out, the

majority of respondents with poor knowledge were 14 respondents (70%). Factors influencing knowledge are age, experience, occupation, environment, socio-cultural, information, and education [17]. Improving knowledge can be achieved through health education or information from mass or print media. Individual's knowledge can be produced from the results of the surrounding environment, such as a community environment or health environment. The community health centre provides health-related information and facilities that can support the implementation of health education. By providing diabetes information, self-management strategies, and support, community health workers meet the needs of the study [18]. Diabetes self-management, as established by the ADA, is the process of providing the individual with diabetes knowledge and skills required for self-care, crisis management, and lifestyle changes. Diabetes health education is important for long-term success. To translate result from diabetes research studies into clinical and public health practice, the National Diabetes Education Program (NDEP) was established. Patients and providers work together in a long-term, ongoing process to accomplish this task. Although only limited studies are available, they support the idea that diabetes education can be cost-effective and enhance results. To fully implement the diabetes health education process, a team of educators is usually needed because the required range of expertise is broad and the amount of information that needs to be shared is large. Trust, mutual respect, and communication are essential for health education to be most effective [19].

After health education was completed, the post-test results show that the mean in respondents increased, with poor knowledge reaching only ten respondents (50%). Prior to the implementation of health education, there were respondents with a poor category of more than 50% and only a few respondents with a good category. During health education, researchers used the lecture method with a booklet. The

researchers delivered the lecture well so that the respondents could understand it. Based on the lecture method, there are advantages, such as it was easy to convey and could be understood as well as the existence of two-way communication, respondents understood more than what the researchers explained. The influence of an individual's level of knowledge is the information received and sources of information obtained from several sources, one of which is health education. The booklet will give the reader the impression by presenting attractive images so that the booklet is not merely a formal and rigid media. The advantages of booklet are: it can be stored for a relatively long period, can be studied independently, and can help other media. Besides, it also brings drawbacks, such as its readers are required to have the ability to read. Educational methods using coloured booklets and forming a group can improve patient self-management at home, as well as the booklet will explain questions about Diabetes and therapeutic targets [19].

Based on research conducted using statistical tests, a p-value < (0.05) was obtained. It means that  $H_0$  is accepted, so there was an influence between health education and knowledge of diabetes patients. The Wilcoxon signed-rank test results gave a Z score of -3.108 and a significant value of 0.002. Thus, there were differences in the pre-test and post-test of knowledge. All things considered; health education is effective in increasing knowledge of diabetes patients about the risk factors for complications of diabetes. Processes of behaviour change and a major success factor in chronic disease control are improved when patients are motivated and gain knowledge that empowers efficient self-management. More independent patients mean not only increased self-care, but also better relationships with the healthcare providers, decreased use of healthcare services, and better adherence to medication [20]. Knowledge is an outcome of understanding, and it occurs only after a person senses a certain object. Sensing occurs because of the five senses, which are sight,

hearing, smell, touch, and taste. The majority of human information is derived from the eyes and ears. Cognitive knowledge is an important part of shaping one's behaviour [21,22]. Patients with diabetes can improve disease management by performing therapeutic education to increase knowledge, resources, and skills in metabolic control and reduce the number of acute and chronic complications [23]. Knowledge deficits of diabetes care represent a major risk for unsafe practice delivery. Education for self-management of diabetes is an important component in improving the state of the patients and preventing the complications associated with diabetes. Every person who has diabetes is responsible for controlling this condition and therefore must understand the basic principles of pathophysiology and the disease's treatment to be more efficient. Clearly, the importance of preventive measures is high. Investing in relatively simple and inexpensive procedures leads to a significant positive effect on human health and reduces the cost of their treatment [25].

To maintain psychological well-being, the management of diabetic patients requires not only regular medical treatment but also health education. Currently, in China and around the world, the diabetes educational intervention is primarily a medical staff's prescriptions and lifestyle restrictions [26]. Psychoeducation intervention is an activity that is linked to counselling various diabetes mellitus and depression problems, starting from patient knowledge, information related to the diabetes diet, and depression management [27]. In recent years, to improve glucose control and encourage patients themselves to help manage their disease, educational interventions for patients with Diabetes have been implemented. In the previous studies, family and community based educational approaches were used. Most research conducted in urban China has found that educational interventions have beneficial effects by improving blood glucose and diabetes knowledge levels. The few studies based on rural China

patients have also shown an improvement in blood glucose levels and diabetes knowledge [28]. The lack of funding to support patients living in rural communities has contributed to the awareness of the key roles that family members can have in treating chronically ill patients. Consequently, self-management health programs have progressively included family members in the past decade. Numerous studies have shown health care strategies involving family members in individuals with a chronic condition such as T2DM can enhance self-efficacy, awareness about the condition, and self-care skills [29].

In the overall care of patients with DM2, individual health education is considered to be important, although there is some uncertainty regarding its metabolic control benefits. One of the different educational models developed by Green and Kreuter is the PRECEDE (Predisposing, Reinforcing, Enabling, Causes in Educational Diagnosis, and Evaluation), which focuses on factors influencing health-related behaviour, based on the relationship between the health professional and the patient, and is especially suitable to apply in chronic diseases. The efficiency of the PRECEDE model has been shown in numerous health environment research, such as improving care habits among asthmatic children and improving adherence to medication in patients with chronic disease [30].

### Conclusion

Based on the research results, it can be determined that the results of the pre-test, the majority of the knowledge level were in the poor category. Following the post-test, there was still a poor category but the level of knowledge of moderate and good increased. There was a significant effect of health education with a booklet on knowledge of diabetes mellitus patients. In conclusion, health education can help increasing respondents' knowledge in the management of diabetes mellitus. Health education is primary prevention that must be given to high-risk groups. Secondary prevention is given to the diabetes mellitus patient group. Meanwhile, tertiary prevention is given to

diabetes mellitus patients with chronic complications.

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### 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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