



## The influence of health education on the prevention of diabetic ulcers in type 2 diabetes mellitus patients

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### Abstract

**Background:** Diabetes mellitus is a relative or absolute decrease in insulin production that can cause direct or long-term metabolic disorders. The complications are microangiopathies and macroangiopathies. Diabetic ulcer is one of the side effects. Numerous studies have shown that health education can stop diabetic ulcers from progressing.

**Methods:** This research is a quasi-experimental study with two group pretest-posttest with control design. Respondents were type 2 diabetes mellitus at the Gatak Health Center. The number of respondents consisted of 78 respondents who were divided into 2 groups. In this study there were 78 respondents with type 2 diabetes mellitus who participated, and divided into two groups, namely the intervention group (n = 39) who were given health education about diabetic ulcer prevention and the control group (n = 39) who were not given health education about diabetic ulcer prevention. Data from the results of this study were obtained from filling out questionnaires that had been tested for validity and reliability and analyzed using the Paired Sample t-test and Independent Sample t-test. Data were processed using SPSS. Results: The test results showed that there was a significant difference between the intervention group and the control group in preventing diabetic ulcers with a P=0.000.

**Conclusion:** Data from the results of this study were obtained from filling out questionnaires that had been tested for validity and reliability and analyzed using the Paired Sample t-test and Independent Sample t-test. Data were processed using SPSS. Results: The test results showed that there was a significant difference between the intervention group and the control group in the prevention of diabetic ulcers with a value of P = 0.000. Conclusion: Data from the results of this study were obtained from filling out questionnaires that had been tested for validity and reliability and analyzed using the Paired Sample t-test and Independent Sample t-test. Data were processed using SPSS.

**Results:** The test results showed that there was a significant difference between the intervention group and the control group in preventing diabetic ulcers with a P=0.000.

**Conclusion:** Providing health education to people with type 2 diabetes mellitus in the prevention of diabetic ulcers that there is a significant influence in preventing the occurrence of diabetic ulcers.

**Keywords:** Diabetes mellitus; Diabetic Ulcer Prevention; Health Education

### 1. Introduction

Fat and protein caused by relative or absolute deficiency of insulin hormone, diabetes mellitus (DM) is a group of symptoms that develops in a person and, if not controlled, can lead to microangiopathies and macroangiopathies, acute metabolic complications, and long-term vascular complications.[1]. The general public is affected by a number of non-

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communicable diseases, including diabetes mellitus (DM)[2]. Diabetes is one of the four non-communicable diseases that are closely monitored by international authorities and is a significant public health problem that requires attention. Currently, the number of people with Diabetes Mellitus is increasing and continues to increase[3]. As the population ages, the prevalence of diabetes is predicted to increase to 19.9%, or 111.2 million people between the ages of 65 and 79. It is estimated that the population will continue to increase, reaching 578 million in 2030 and 700 million in 2045[4]. Diabetes mellitus (DM) in Indonesia is always increasing every year. The incidence of diabetes mellitus increased by 1.6% in 2018 compared to 2013[5]. Almost all provinces in Indonesia experienced an increase in prevalence between 2013 and 2018, and Central Java is one of the provinces with the largest increase, namely 0.9%. The estimated number of DM patients in Central Java Province in 2021 is 618,546 people, and 91.5 percent of these patients have received standard health services, leaving 8.5 percent of patients without these services, according to the P2PTM Section of the Central Java Provincial Health Office and Profile District/City Health 2021.

According to information from the Sukoharjo Health Office, there were 17,349 DM cases in Sukoharjo Regency. Out of a total population of 1008 people, 842 people will suffer from diabetes mellitus in 2021, according to statistical data at the Gatak Health Center. Increased complications in DM patients can have a significant impact on increasing the prevalence of this disease. The development of ulcer or wound problems is one of the main consequences. DM sufferers often experience sores on their feet. which, given that the patient has diabetes mellitus, could result in amputation and death if precautions are not taken. The main risk factors for developing diabetes in today's society include being over 40 years of age, a family history of the disease, and being overweight. Modernization and even cocasolanization are major contributors to the development of diabetes[6]. In addition, always monitor the patient's blood sugar levels and pay attention to the causative factors that can cause minor trauma to the feet that are not visible, such as callus formation due to wearing inappropriate footwear.[6]. Peripheral arterial disease and peripheral neuropathy in diabetics can cause ulcers in all layers of the skin, necrosis, or gangrene on the bottom of the feet[7]. In addition, the most common wound in diabetics is foot ulcers, which are caused by hyperglycemia, which slows down the healing process. Wound healing is a dynamic and complex process involving the regeneration of tissue layers and cellular structures[8]

The lack of prevention of diabetic ulcers results in a lack of knowledge about diabetic ulcers. In line with research[9]. When it comes to self-care for the prevention of diabetic ulcers, knowledge is very important, so it is very important to understand how few people are aware of the topic because of the limited information they receive from health professionals, as evidenced by the low to average level of knowledge in this research and practice. inadequate or insufficient self-care. Knowledge comes through sensing, be it through the sense of hearing, the sense of sight, or other senses[10]. Patients' knowledge of diabetes mellitus can be said to be the result of their awareness of their condition, understanding of their condition, and knowledge of how to prevent, treat, and manage its complications.[11]. Patients are educated about their health as part of efforts to improve patient adherence to their therapy[12]. According to the results of Arvida's research (2021), one of the factors behind the high incidence of diabetic ulcers is patient ignorance, and 34% of DM patients are classified as having poor knowledge about diabetic ulcers[10]. This is due to the lack of available information about diabetic ulcers. Provision of health education is a form of independent nursing activities carried out by nurses in accordance with their nursing responsibilities to help clients, both individuals, groups and communities, in solving their health problems through learning activities.[13].

Based on the results of a preliminary study conducted by researchers on 10 people with Type 2 Diabetes Mellitus, it was found that 4 out of 10 patients knew well about diabetic ulcer prevention, 3 of them did not know well about diabetic ulcer prevention, and 3 of them knew diabetic ulcers when they were already suffering from it. Prevention of diabetic ulcers can be carried out by people with type 2 diabetes mellitus based on the information obtained about the prevention of diabetic ulcers. If an ulcer has occurred, it is possible to experience an infection which makes the wound even wider because high blood sugar levels make it difficult to manage. Therefore, the importance of early prevention to prevent diabetic ulcers from occurring.

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## 2. Material and methods

This type of research is quantitative. The research design used was quasi-experimental with two groups pretest-posttest with control design. The population in this study were all Type 2 Diabetes Mellitus patients at the Gatak Health Center. According to calculations using the slovin formula, the population taken was 112 people and after calculating the results, 78 people were obtained and 10% had been added to anticipate dropout. The sample in this study were type 2 diabetes mellitus at the Gatak Health Center, totaling 78 people. And divided into 2 groups, namely 39 control groups and 39 experimental groups. Sampling technique with total random sampling. The samples given were in the form of pre-test and post-test questionnaires in both groups. Only in the intervention group that after being given a pre-test will be given health education. Time of administration Intervention in the form of health education to prevent diabetic ulcers as much as 1 x 60 minutes in 1 day and the study was conducted for 1 day. In the control group, after completing the pre-test,

general health education was carried out. For the time as much as 1x60 minutes and done in 1 day. Administrative steps such as obtaining a certificate of ethical eligibility and research authorization from the Health Research Ethics Commission (KEPK) Dr. Moewardi Surakarta with number 1.437/XI/HREC/2022. The technical process includes a request for approval from the Sukoharjo District Health Office and the Director of the Gatak Health Center, as well as outlining the aims and objectives of the research to the director of the Elderly Poly.

The aims and objectives of the previous research were explained to the participants, who were then asked to participate as a sample and sign an informed consent form after the researchers selected prospective respondents who met the research requirements. Results Data from respondents were reviewed again after data collection. then Paired Sample t-test and Independent Sample t-test were used for data analysis.

### 3. Results

#### 3.1. Characteristics of Respondents

**Table 1** Distribution of frequency characteristics of respondents by age group, gender, education, and occupation

Characteristics	Ex. Control		Ex. Experiment		P-Valuea	
	N	(%)	N	(%)		
Age:					0.204a	
35 – 45 years	6	15.4	10	25.6		
46 - 55 years	18	46.2	12	33.3		
56 – 60 years	15	38.5	17	41.1		
Gender:			1.74360.44236		1.94870.22346	0.003 <sup>a</sup>
Man	10	25.6	2	5.1		
Woman	29	74.4	37	94.9		
Education:			2.4103		2.3333	0.696 <sup>a</sup>
Elementary school	12	30.8	14	35.9		
Junior high school	7	17.9	8	20.5		
Senior high school	12	30.8	7	17.9		
University	8	20.5	10	25.6		
Profession:			2.2564		1.8205	0.030 <sup>a</sup>
Housewife	16	41.2	24	61.5		
Entrepreneur	4	10.3	4	10.3		
Private employee	12	30.8	5	12.8		
Government employees	7	17.7	6	15.4		
Amount	39	100	39	100		

aPaired Sample t-test

Based on table 1 it shows that the age of the respondents in the control group was more in the age range between 46-55 years (46.2%) with an average and in the experimental group aged between 56-60 years (41.1%) with an average age of . statistical test results on age characteristics (p=0.204). The sex in each group was dominated by the female sex, namely as many as 29 people (74.4%) in the control group and as many as 37 people (94.9%) in the experimental group with the average sex in the control group 1.74360.44236 and in experimental group 1.94870.22346. statistical test results on sex characteristics (p=0.003). The education of respondents from the control group had the same value, namely 12 elementary and high school students (30.8%) with an average education of 2.4103, and from the experimental group there were 14 elementary school students (35.9%) with an average education of 2.3333. statistical test results on educational characteristics (p=0.696). Most of the employment status was as housewives in the control

group, namely 16 people (41.2%) with an average of 2.2564 and in the experimental group, there were 24 people (61.5%) with an average of 1.8205. statistical test results on job characteristics ( $p=0.030$ ).

### 3.2. Effect of health education on DM sufferers' knowledge in preventing diabetic ulcers in the experimental group and the control group

**Table 2** The Effect of Health Education on the Experimental Group and the Control Group

Variable	Pre-Test	Post-Test		P-Value <sup>a</sup>	P-Value between the two groups b
Intervention Group	9.03±3.199	14.72±1.317	5.692±3.286	0.000 <sup>a</sup>	0.000 <sup>b</sup>
Control Group	9.82±2.771	10.31±2.745	0.487±2.246	0.184 <sup>a</sup>	

<sup>a</sup>Paired Sample t-test; <sup>b</sup>t Independent sample test

Based on table 2, it shows that the variables in the intervention group increased with an average difference of  $5,692 \pm 3,286$  from the pre-test to the post-test. And in the control group the increase that occurred was so large with an average difference of  $0.487 \pm 2.246$  from the pre-test to the post-test. The statistical test results showed that the effect of health education had a significant effect on the intervention and control group variables ( $p=0.000$ ).

## 4. Discussion

Age is the most important aspect of a person. Age influences all aspects of exposure, risk and resistance to varying degrees. A person's age influences differences in how health problems, illnesses, and decision making are experienced. In this study, most of the respondents in the control group were aged between 46 - 55 years, while the respondents in the experimental group were mostly aged between 56 - 60 years. Age has an impact on a person's level of information acquisition and how advanced their brain growth is. Age-related wisdom increases with information received and activities undertaken to broaden experience[14]. Age can affect the development of glucose intolerance, which can lead to an increase in the prevalence of diabetes, especially in people over 40 years of age[15].

Knowledge is closely related to education where it is intended that someone with a higher education will have a broader knowledge base. In the results of the study, the control group was dominated by respondents with elementary and high school education, while the experimental group was dominated by elementary school students, but not a few also had tertiary education. According to Arvida Bar's research (2018), however, someone with low education is not necessarily less knowledgeable. A person's skills vary, depending on their physical and cognitive makeup, stage of development, physical health, and mental abilities[10]. In line with researchPutu et al., (2015)said this growth in understanding was the result of health education and health information[16], [17]

The results of the study of the two groups found that the highest proportion was in female respondents where there were differences in sex characteristics, namely women. According to research[18]there is a relationship between gender and type 2 diabetes mellitus in elderly women because women are more likely to gain weight and hormonal changes cause fat to accumulate in post-menopausal women.

Another benefit of health education is two-way communication, which allows people to ask medical professionals directly about issues they do not understand.[19]In the research conducted, there was an increase in the intervention group compared to the control group after being given health education. According to researchSaragih (2022)the results of his research say that after being given health education through video media, there is an increase in knowledge which can be interpreted as effective health promotion activities carried out using video media[20].

This is consistent with research showing that type 2 diabetes mellitus patients who receive education are better prepared to change their behavior[21]. The process of human transformation related to achieving individual group health goals is called health education[16].

Increased knowledge can be seen in the control group as a result of learning information from health professionals, the internet or social media. Conversely, after receiving information in the form of health education videos about diabetic ulcer prevention, the increase in knowledge of the intervention group could be measured. It is thought that the group will become more knowledgeable and stay out of trouble. In line with Care research (2022)that his research showed a substantial correlation between changes in respondents' desire to practice foot care and the health education they received[22]. Proper health knowledge can certainly influence healthy living behavior[19].

These explanations lead to the conclusion that health education has a significant role to play in preventing diabetic ulcers by empowering individuals to take preventive actions that are critical to their overall health. In addition, it is anticipated that nurses and other health professionals will be able to contribute to reducing complications by offering health education. Researchers offer recommendations for health services based on the research findings that have been described previously and the limitations of the research. The first health service for people with diabetes mellitus is intended to help prevent the most common consequences, such as diabetic ulcers, by educating people with type 2 diabetes.

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## 5. Conclusion

Providing health education to people with type 2 diabetes mellitus in the prevention of diabetic ulcers that there is a significant influence in preventing the occurrence of diabetic ulcers.

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## Compliance with ethical standards

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### *Disclosure of conflict of interest*

The author has no conflict of interest in this research

### *Statement of ethical approval*

The ethical clearance was obtained from the Commission of Health Research Ethics at RSUD Dr. Moewardi/FK UNS Surakarta (Number: 1.437/XI/HREC/2022).

### *Statement of informed consent*

Prospective participants were invited and oriented towards the purpose of this study, namely to find out health education on the prevention of diabetic ulcers in patients with type 2 diabetes mellitus. Informed consent was obtained before the lesson and participants were allowed to withdraw at any time.

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