

# Effectiveness Education Based on Self-Efficacy for Strengthening Behavior of Foot Care in Diabetes Mellitus Patients in Indonesia

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## Abstract

A high incidence of foot injuries due to diabetes mellitus (DM) has been widely reported. This condition has several causes, including DM sufferers' tendency to overlook foot care management, despite knowing its impacts. Ignorance by individuals is a critical factor attributed to this condition. Therefore, there is a need for self-efficacy (SE) to increase and strengthen behavior. The aim of the study is to analyze the significance of education based on self-efficacy in strengthening foot care behavior among DM patients. The study used a one group pre-post test design, number population is 112 respondents. A sample size of 51 respondents was selected using purposive sampling. The instrument used was Nottingham Assessment of Functional Footcare (NAFF). The research uses self-efficacy and foot care behavior as independent and dependent variables, respectively. Data were analyzed using Wilcoxon signed test ( $\alpha = 0.05$ ). The results of this study before education based on self-efficacy, respondents were categorized as follows, good behavior 6 (11.7%), moderate behavior 38 (74.5%), and bad behavior 6 (11.8%). After a 2-week education based on self-efficacy, 47 (92%), 3 (6%) and 1 (2%) respondent had good, moderate and bad behavior, respectively. According to Wilcoxon test results, giving self-efficacy to DM sufferers improves foot care behavior, with  $p = 0.001$  (1.98 2.98, SD = .509-.390, positive rank = 43, mean rank = 22, ties = 8). Conclusion the study is an education based on self-efficacy forms build a strong and good perceptive to support and strengthen the DM sufferers' behavior and prevent diabetic foot injuries.

## Keywords

Behavior, Diabetes Mellitus, Education, Foot Care, Self-Efficacy

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## Introduction

Diabetic Foot Ulcer (DFU) is one of the most common complications of DM which is the main cause of many hospitalizations one of the causes is incorrect and inconsistent foot care behavior that can result in amputation of the lower extremities (Messenger et al., 2018). Foot care behavior is neglected, especially by adults and the elderly, strengthening self-efficacy will believe that foot care is one of the best methods to increase awareness of diabetics so that they are able to consistently perform foot care behavior (Biçer & Eng, 2016). One of the determining factors in realizing behavior is self-efficacy, which is a person's confidence in his ability to carry out a behavior that needs to be done to achieve goals, tasks, and challenges (Nursalam et al., 2020). Self-efficacy describes the interaction between behavioral, personal, and environmental factors that influence diabetes mellitus sufferers in carrying out health behaviors. People with high self-efficacy believe that being able to do difficult tasks well as something that must be mastered is not something that should be avoided (Nursalam et al., 2020).

There are 463 million people with diabetes worldwide in 2019, which is dominated by 463 million people with diabetes at the age of 20-79 years and it is predicted that in 2045 there will be an increase of 51% or 700 million people according to the International Diabetes Federation (IDF, 2019). Indonesia is a country that ranks 7th in the top 10 with 10 million people with diabetes mellitus until 2019, with the first place being China with > 100 million people. East Java Province as much as 2.6% or 113,045 people with diabetes, predominantly aged  $\geq 15$  years. The city of Surabaya shows a decline in potential from 2013 as much as 4.9% and in 2018 as much as 4.5%. Based on data obtained from Pucang Sewu Health Center Surabaya, the number of Type 2 Diabetes Mellitus patients at Pucang Sewu Health Center Surabaya in 2018 was 362 patients. Based on the data obtained, it shows that the incidence of Type 2 Diabetes Mellitus occurs mostly in men and women at the age of 56 to 70 years. Meanwhile, the data that the researchers got from Pucang Sewu Health Center Surabaya in January 2020 showed the results of 177 people with diabetes mellitus.

The most common complication experienced by DM sufferers is the occurrence of diabetic foot injuries, this incident starts from the presence of high glucose in the blood, which damages the peripheral blood vessels of the legs (Chun et al., 2019). One of the efforts to prevent foot injuries is to do foot prevention and care independently and routinely (Nuh et al., 2019). Foot care behavior has become something that must be done as a form of prevention, although there are various ways to prevent ulcers in diabetes sufferers. These methods include cleaning the feet every day, drying them after they get wet between the feet, applying moisturizer, cutting nails straight into the normal shape of the feet, wearing footwear (Chin et al., 2014). The activities of prevention and foot care that must be carried out every day by DM patients, of course often cause boredom and boredom, especially for patients who are still productive and still working, of course we need various supporting efforts to strengthen both psychological conditions, support systems and other support, so that this behavior can be carried out smoothly without any obstacles. It has been widely reported that the increase in the incidence of adult foot injuries is due to patients' reluctance to perform routine foot care behaviors (Chun et al., 2019). Different cultural patterns and knowledge in each region in Indonesia, causing the behavior of DM patients in each region to be different, the influence of cultural and family factors often makes patients experience a decrease or increase in self-efficacy, thus causing the incidence of foot ulcers due to diabetes in Indonesia to increase (Appil et al., 2020).

One of the efforts to strengthen foot care behavior is to provide self-efficacy (Huda et al., 2019). Health workers as educators and can make counseling efforts can use self-efficacy based concepts developed as a health intervention program for people with diabetes (Sharoni et al., 2017). Strengthening the self-efficacy of DM sufferers can improve and change better foot care behavior so that it can prevent complications that will occur (McEwen et al., 2016). Several studies outside show that self-efficacy can improve foot care behavior and is proven to reduce the number of foot injuries by up to 85% (Sharoni et al., 2018). Therefore, further studies are needed on how self-efficacy can improve foot care behavior in Indonesia. Self-efficacy is an individual's belief in his or her ability to exercise control over various self-functions and events in their environment. The individual's ability to move the motivation, cognitive resources and actions needed to meet the demands faced. Efficacy refers to the belief that an individual is able to estimate his ability to carry out tasks to achieve the expected results. Efficacy always develops continuously in a person

in line with the ability and the number of experiences or events they experience (Bandura et al., 2011) in realizing, accepting and being accountable for one's potential, appropriate skills in achieving a behavior in achieving certain goals. The high self-efficacy of a person is influenced by motivation, emotions and experiences that they have experienced or experienced by others (Nemcová & Hlinková, 2014). The purpose of this study was to find the influence of education base on self-efficacy on the foot care behavior of DM sufferers in preventing foot injuries. This research is very useful for DM patients and the community in improving health status, improving socio-economy, empowering DM patients.

## Materials And Methods

The research design used one group pre-post test design, assessment of foot care behavior was carried out before and after being given foot care education based on self-efficacy. then given foot care education based on self-efficacy conducted for 2 weeks through brochures and videos, re-observation was carried out after 2 weeks to assess the respondent's behavior. This research was conducted in the city of Surabaya in June-July 2020 with a total population of 112 respondents. The sampling technique using purposive sampling. The number of samples is 51 respondents. The inclusion criteria in this study were patients with DM, aged 17-60 years, long suffering from diabetes for 1 year. The provision of strengthening self-efficacy was carried out for 2 weeks with brochure and video media sent to all respondents. Behavioral observations were carried out using the Nottingham Assessment of Functional Footcare (NAFF) instrument (Senussi et al., 2011; Wendling & Beadle, 2015) and modification of foot care confidence (García-Inzunza et al., 2015) in an effort to get a comprehensive response about foot care behavior and self-efficacy which has been translated into Indonesian.

## Statistical Analysis

Tested the validity and reliability of the instrument using 21 respondents, who explained that the reliability results in the questionnaire were 0.820, declared reliability if  $> 0.60$ . As for the validity results of the questionnaire which has 26 questions, it shows that 12 questions are declared valid because the results of  $r_{count} > r_{table}$  (0.433) while 12 questions are declared invalid because  $r_{count} < r_{table}$  (0.433). This questionnaire is used after obtaining permission online, the content of the questionnaire assesses foot care behavior which consists of 12 questions, consisting of 2 main indicators, namely foot care and foot wound prevention. The use of self-efficacy on respondents refers to the concept put forward by Bandura (Fan et al., 2014). The sample is asked to fill in to fill in data on demographics, fill out the biodata and consent form that has been provided. The questionnaire sheets that have been collected are examined again for the completeness of their contents after which the analysis of the uni variate is carried out on each variable studied. The statistical test was analyzed using SPSS VERSION 23 carried out by using the Wilcoxon sign rank test with a significance level ( $\alpha$ ) = 0.05. accepted if  $p < 0.05$ , which means that giving self-efficacy to DM patients is able to strengthen foot care behavior. A statement of medical research ethics issued by the Health Research Ethics Commission (KEPK) of STIKes Hang Tuah Surabaya in accordance with Number: PE / 8 / V / 2020 / KEPK / SHT.

## Results

### Participants Demographics

Based on 51 respondents, it is known that the average age of the respondents as a whole is 27.5 years (SD = .931), 20 people (39.2%) and 31 women (60.8%) (SD = .493), education level of senior high school respondents 35 people (68.6%), (SD = .613). Meanwhile, from the experience of caring for feet, 26 people (51%) had done foot care (SD = .504). Respondents' occupation is the average private employee 24 people (47.1%), (SD = .756). The average length of suffering from diabetes was 2 years with SD = .834.

**Table 1:**  
Participants' Demographics

Variable	n	%
Ages		
17-25 years	26	51
26-30 years	9	17.6
31-45 years	15	29.4
>46 years	1	2
Sex		
Man	20	39.2
Women	31	60.8
Educations		
Primary school	1	2
Junior high school	5	9.8
Senior high school	35	68.6
University	10	19.6
Experience foot care		
Never	25	49
Ever	26	51
Profession		
Does not work	7	13.7
Private employees	24	47.1
Entrepreneur	18	35.3
Government employees	2	3.9
Long suffering DM		
1 years	16	31.4
2 years	16	31.4
>3 years	19	37.3

The Wilcoxon test results show the value that the average behavior before and after shows the number 1.98-2.98 with a standard deviation of  $Sd = .509-.350$  with the Wilcoxon test result value showing  $p$  value = 0.001 so that it means that there is a significant difference before and after being given education foot care. Foot care education based on Self-efficacy for respondents with diabetes mellitus can improve and strengthen foot care behavior in diabetes mellitus patients (Table 2).

**Table 2.**  
Analyses of self-efficacy on foot care behavior

Variable	Behavior after being given education			Total
	Bad	Moderate	Good	
Behavior before being given education	Bad	1	2	4
	Moderate	0	1	37
	Good	0	0	6
	Total	1	3	47
Wilcoxon test $p=0.001$ (Mean=1.98-2.98) (SD=.509-,350)				
Positive rank=43, ties =8, mean rank =22				

## Discussion

Diabetes mellitus foot care is considered easy and can be done by sufferers, even though it is

considered easy to do, but there are still many DM sufferers who cannot carry out or apply appropriate foot care to sufferers. The results showed that before being given education based on self-efficacy to the respondents, 51 respondents showed that 7 people had bad behavior in foot care, 38 respondents had moderate behavior and 6 people had good behavior in caring for their feet. Respondents with bad behavior said that they did not feel worried about the condition of their feet and rarely used footwear properly, and had never given lotion to the foot area. Meanwhile, the respondents' moderate behavior is due to the fact that they often take several precautions and perform foot care, but not routinely. This can be seen from the results of the questionnaire that respondents rarely checked the shoes they used, did not dry their feet after washing, rarely used a moisturizer, except for cracked feet and often walked barefoot around the house. Meanwhile, respondents who are good at doing foot care are because respondents often take precautions and care for their feet, namely always wearing footwear, checking shoes, wearing socks regularly, washing their feet, drying and using moisturizers on their feet. The results of Chin et al. (2014) research on 295 respondents that regular application of lotion is considered a strong prediction that a person with neuropathic DM will be able to prevent foot injuries (Chin et al., 2014).

Theory of Planned Behavior (the theory of planned behavior) put forward by Ajzen and Fishbein (1975) which provides evidence that a behavior is influenced by several factors. Theory of planned behavior is a development of Theory of Reasoned Action (theory of reasoned action) which is used to estimate a person's behavior (Ajzen, 2015). A person's behavior is determined by how strong the belief and the perception of the consequences of a behavior is. The results of this study state that after the implementation of education bases on self-efficacy which is carried out by conducting education for 2 weeks, about foot care on the basis of self-efficacy, a significant difference can be found where the results show that 47 respondents found good behavior, 3 people moderate behavior and bad behavior of 1 person. Foot care activities that are often carried out by respondents are drying their feet and then applying moisturizer to the feet, except between the feet, most of the respondents carry out grooming behavior after knowing and believing in the impact that DM can cause and the complications that can occur to them. New habits that are carried out are starting to get in the habit of washing their feet regularly, drying their feet, routinely doing independent foot examinations, and using footwear both inside and outside the home.

After education foot care based on efficacy is carried out, the respondent has an understanding of foot care is correctly, this can be seen from the routine foot care activities carried out by the respondent, the respondent takes and gives attention to the condition of their feet, they also have a strong desire to do foot care independently with strong belief that it can prevent foot injuries. It can be said that foot care is routinely carried out on DM sufferers. Respondents were given 1 week to practice foot care, then the researcher made direct observations on how the respondents performed their foot care. The result can be seen from a significant difference that the behavior of foot care that is carried out changes in attention, care, routine and becomes a new habit in doing foot care. Even though it is still found that there are 1 (2%) people who are still unable to do foot care, which is due to the busyness they face and various other obstacles that are conveyed. While there are still 3 (6%) respondents who are in the moderate category, where some foot care activities are still rarely done, for example there is the use of footwear while at home and the use of moisturizers and the use of socks that are rarely done, whereas 47 (92%) respondents performed foot care in the good category, where everything was done routinely and it became a new habit to do foot care with full confidence that it was done to prevent the occurrence of diabetic foot wounds.

The Wilcoxon test results showed that the  $p$ -value = 0.001, with a mean = 1.98-2.98 and a positive rank of 43 and ties = 8 people and a  $Z$  value = -6.308, here it can be seen that some respondents experienced changes in behavior and most of them had changed their behavior towards better after intervention. This means that the use of self-efficacy is able to increase and strengthen the behavior of DM patients in doing foot care as a behavior that must become a new habit for them. According to Donsu (2019) behavior is divided into three domains, namely the cognitive domain as measured by Knowledge, the affective domain is measured by attitude, and the psychomotor domain is measured by psychomotor practice. Health behavior is the behavior of a person or subject is influenced by factors both from within and from outside, health behavior can also be called the stimulation of a stimulus to someone related to the disease they experience (Jugert et al., 2016).

Patients are increasingly aware of the importance of doing foot care for diabetes mellitus sufferers

so that the lower the risk of diabetic foot wounds, diabetes mellitus sufferers are more concerned with the activities to be carried out such as caring for the footwear to be used so that the patient's feet do not experience blisters will cause diabetic foot wounds, care about foot care so that the feet in people with diabetes mellitus are kept clean and the leg tissue in patients is still good, actions or behaviors taken in these families can reduce the risk of diabetic foot injuries. Researchers provide education to respondents via brochure and video and will be sent by researchers via e-mail address to each respondent because at the time of the study there was an outbreak of COVID-19 so researchers could not make direct contact with respondents. Researchers give time to respondents after receiving education for 5-13 days, so that respondents have a very good response to receiving the education that researchers provide, after reaching the time limit set by the researcher, the researcher will give the second questionnaire so that the researcher can see whether families with diabetes mellitus give changes or not to the behavior of the diabetes mellitus family, after the respondent answered the second questionnaire given by the researcher, there was a change in family behavior from having bad family behavior to good, even there were only a few respondents who had moderate behavior.

The results of D'Souza et al. (2016) stated that almost 15.71% of the respondents had a history of foot ulcers, and 41.43% had numbness / tingling and pain / heaviness in the feet. The majority of adults with type 2 DM wash their feet every day (87.86%), while 32.86% have family members trimming their toenails. About 53.57% of the participants walked barefoot, and 24.29% of them used callus drugs. Nearly 33.57% of the participants wore special shoes and shoes, and 25% wore socks. Many participants were physically active (73.57%) and 37.86% had foot care education (D'Souza et al., 2017). Stated that the incidence of foot injuries was reported from a study involving more than 800,000 participants worldwide from 67 studies in the last three decades (Wang et al., 2017).

Education foot care based on efficacy can increase an individual's confidence and knowledge of his or her ability to exercise control over various self-functions and events in their environment (Tiyas et al., 2019). The individual's ability to move the motivation, cognitive resources and actions needed to meet the demands faced. Efficacy refers to the belief that an individual is able to estimate his ability to carry out tasks to achieve the expected results. Efficacy always develops continuously in a person in line with the ability and the number of experiences or events he experiences (Caprara et al., 2004). A person's ability to realize, accept and take responsibility for one's potential, appropriate skills in achieving behavior in achieving certain goals. The high level of self-efficacy in a person is influenced by motivation, emotions and experiences that have been experienced by them or that have been experienced by others. Self-efficacy is also defined as a belief about how capable an individual is to perform a behavior in a certain situation (Anselmo et al., 2010). Self-efficacy can be a determining factor for the implementation of an expected behavior. A person who has high self-efficacy tends to display high behavior. The results of research in Malaysia on the effects of self-efficacy in the self-care behavior program, say that increasing self-efficacy in individuals can increase the behavior and interest of patients in taking care of themselves and programmed health education can improve foot care behavior in DM sufferers (Sharoni et al., 2018).

## Conclusion

The provision of efficacy-based foot care education is able to increase the confidence, trust and knowledge of diabetes patients, so that it can improve and strengthen foot care behavior properly. Therefore, the use of self-efficacy-based foot care education for DM sufferers is a special approach to increase and strengthen the intention, belief and ability of individuals in carrying out diabetic foot care behavior, forms build a strong and good perceptive to support and strengthen the DM sufferers' behavior and prevent diabetic foot injuries.

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