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A Self-Efficacy Theory-Based Program to Reduce Diabetic Foot Ulcer Risk in Agricultural Areas

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ABSTRACT

Several studies indicate a significant increase in diabetes and its complications in agricultural regions. Jember is an agricultural area with a high prevalence of diabetes and a heightened risk of Diabetic Foot Ulcer (DFU). Reducing aggressive risk factors involves a self-efficacy theory based program. This intervention aimed to evaluate the program's effectiveness on foot care behaviors, self-efficacy in self-care foot management, and the risk of DFU occurrence. The study spanned over six months, consisting of three stages: program introduction, health education delivery, and program evaluation. It employed a Pre-Experimental Design with a Group Pretest-Posttest approach. Sample selection was done using simple random sampling, resulting in a sample of 28 research participants. The statistical test used was the Wilcoxon Test. The study's results showed significance values for all three variables < 0.001, signifying the influence of the intervention. The risk of diabetic foot ulcers had a negative rank, indicating a decrease in the risk of DFU after the intervention, with an average reduction value of 13.00. Foot Self-Care Behavior showed a positive rank of 14.50, signifying an improvement in Foot Self-Care Behavior following the intervention. Foot Care Confidence displayed a positive rank, indicating an increase in Foot Care Confidence after the intervention, with an average improvement of 14.50. Consequently, nurses can implement a self-efficacy-based foot care education program to reduce the risk of diabetic ulcers by enhancing self-care behaviors and self-efficacy in independent foot care.

Keyword: Diabetic Foot Ulcer, self-efficacy in foot care, self-care foot management, Diabetes Mellitus, health education

ABSTRAK

Sejumlah studi menunjukkan bahwa di wilayah agricultural terjadi peningkatan besar diabetes dan komplikasinya. Jember merupakan wilayah agricultural yang memiliki prevalensi diabetes dan risiko Diabetic Foot Ulcer (DFU) yang tinggi. Strategi untuk mengurangi faktor risiko yang agresif adalah program pendidikan perawatan kaki berbasis teori self-efficacy. Intervensi ini diberikan bertujuan untuk mengevaluasi efektivitas program pada perilaku perawatan kaki, efikasi diri perawatan kaki mandiri, dan risiko terjadinya DFU. Studi ini dilaksanakan selama 6 bulan yang terdiri dari 3 tahap yang meliputi tahap pengenalan program, pemberian pendidikan kesehatan, dan evaluasi program. Studi ini menggunakan Pre-Experimental Design dengan pendekatan One Group Pretest-Postest. Teknik pengambilan sampel menggunakan simple random sampling dan didapatkan sampel sebanyak 28 responden penelitian. Uji statistik yang digunakan yaitu Uji Wilcoxon Test. Hasil studi menunjukkan nilai hitung signifikansi pada ketiga variabel < 0,001 yang menandakan adanya pengaruh intervensi yang diberikan. risiko ulkus kaki diabetes memiliki rank negative yang menunjukkan penurunan risiko ulkus kaki diabetes setelah diberikannya intervensi dengan rata-rata nilai penurunannya sebesar 13,00. Foot Self Care Behavior memiliki rank positive sebesar 14,50 yang menunjukkan adanya peningkatan perilaku Foot Self Care Behavior setelah diberikan intervensi. Foot Care Confidence memiliki rank positive yang menandakan adanya peningkatan Foot Care Confidence setelah pemberian intervensi dengan rata-rata peningkatan sebesar 14,50. Dengan demikian, perawat dapat mengaplikasikan program pendidikan perawatan kaki berbasis teori self-efficacy guna menurunkan risiko kejadian ulkus diabetik melalui peningkatan perilaku dan efikasi diri dalam melakukan perawatan kaki mandiri..

Kata Kunci: *Diabetic foot ulcer, efikasi diri perawatan kaki, perawatan kaki mandiri, Diabetes Mellitus, edukasi kesehatan*

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Introduction:

Diabetes is predicted to increase in 2035, with an estimated 600 million people. (International Diabetes Federation, 2015). World Health Organization (2016) states that DM is one of the sixth highest causes of death in Indonesia, and East Java Province is ranked sixth for the prevalence of DM in Indonesia (Pusat Data dan Informasi Kesehatan Provinsi Jawa Timur, 2016). Jember Regency is one of the areas that has a relatively high prevalence of DM (Dinas Kesehatan Kab. Jember, 2017).

Several studies show that in agricultural areas, there has been a significant increase in diabetes and its complications (National Center For Farmworker Health, 2021; Velmurugan *et al.*, 2021). The prevalence of diabetes is almost twofold higher among agricultural communities (15.0%) compared to non-agricultural populations (8.7%) (Velmurugan *et al.*, 2021). Accordingly, Jember Regency is an agricultural area with around 51% of the area and its population working in agriculture, but on the other hand, it has a high prevalence of diabetes (Dinas Kesehatan Kab. Jember, 2017).

One of the complications of DM is Diabetic Foot Ulcer. It is estimated that 15% of patients with diabetes will suffer a DFU during their lifetime. DFU causes difficulty moving, experiencing limitations in activities, depending on other people (Kurdi, et al., 2020) and decreased performance (Velmurugan *et al.*, 2021). Treatment is complicated and expensive, and the recurrence rate is estimated at 40-65% in the first five years.(David G. Armstrong, Boulton and Bus, 2017; Jeffcoate *et al.*, 2018) As a psychological result, people with diabetes will experience increased stress. (Kurdi *et al.*, 2020; Rahmatia *et al.*, 2020). Furthermore, it will increase morbidity and mortality (Perkumpulan Endokrinologi Indonesia (Perkeni), 2021).

DFU is mainly preventable (Balducci, Stefano, Sacchetti, Massimo, Haxhi, Jonida, Orlando, Giorgio, D'Errico, Valeria, Fallucca, Sara, Menini, Stefano, Pugliese, 2014; Naqvi *et al.*, 2020). Among prevention strategies, health education can increase knowledge about foot problems foot care behavior, and reduce foot problems. (Ahmad Sharoni *et al.*, 2016; David G. Armstrong, Boulton and Bus, 2017) However, the evidence of the effectiveness of education alone without additional preventive measures in reducing DFU requires further research (Dorresteijn *et al.*, 2014). In addition, programs targeting people with diabetes at low risk of DFU to prevent the early development of complications have rarely been studied (Mcinnes *et al.*, 2011).

Bandura's self-efficacy theory is most often applied for preventing diabetic feet and is confirmed to be effective (Ahmad Sharoni *et al.*, 2016; Biçer and Enç, 2016; Sharoni *et al.*, 2017). Self-efficacy, defined as an individual's belief in their capability to execute specific actions required to manage prospective situations (Bandura, 1997), has a significant relationship with behavior and accuracy of actions in carrying out foot care independently. Specifically, the theory posits that individuals with higher self-efficacy for foot care are more likely to initiate and sustain these self-care behaviors. This is because strong self-efficacy beliefs influence cognitive processes, motivation, and affective states; individuals who believe they can succeed (e.g., correctly inspect their feet, choose appropriate footwear, perform proper hygiene) will set higher goals, exert more effort, persevere longer in the face of difficulties, and recover more quickly from setbacks compared to those with low self-efficacy (Bandura, 1997; Wang *et al.*, 2019). This theoretical link is supported by research demonstrating that higher foot care self-efficacy directly predicts better adherence to recommended foot care practices among diabetic patients (Pourkazemi *et al.*, 2020; Susanti and Pramana, 2020; Hamedan *et al.*, 2021; Tan *et al.*, 2022). Nurses providing nursing interventions, especially for outpatient patients, therefore play a crucial role in paying attention to and helping build patients' self-confidence (self-efficacy) in caring independently to prevent complications (Susanti and Pramana, 2020). With effective prevention through self-management, it is hoped that diabetic ulcers can be avoided, and initial treatment can be given promptly at the first symptoms (Monteiro-Soares *et al.*, 2020). Knowledge and attitudes about foot care are also positively correlated with foot care (Al-Sayyed

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and Al-Malkawi, 2023), and importantly, consistent performance of good foot care practices by people with diabetes significantly reduces their risk of developing diabetic foot ulcers (D G Armstrong, Boulton and Bus, 2017; Schaper *et al.*, 2023).

The foot care educational intervention program evaluated in this study is based on Bandura's self-efficacy theory and is known as 3STEPFUN. This multi-component program aims to enhance foot care self-efficacy and behaviors by utilizing key sources of efficacy information, such as performance accomplishment, vicarious experience, and verbal persuasion (Bandura, 1997). Specifically, 3STEPFUN typically involves several core elements delivered over a period, including: (1) multiphase educational sessions delivered in small groups covering essential foot care knowledge and problem-solving skills; (2) hands-on practical skills training (e.g., foot inspection, nail care); (3) provision of supportive written materials and often a basic foot care kit; and (4) structured telephone follow-up calls to reinforce learning, address barriers, and provide ongoing encouragement (Nguyen *et al.*, 2019). This program, designed to evaluate effectiveness on foot care behavior and pre-ulcerative foot problems in adults with low-risk diabetes, was originally developed and tested by Nguyen et al. (2019) in collaboration between Queensland University Technology Australia and Ho Chi Minh City University of Medicine and Pharmacy Vietnam (Kalsum *et al.*, 2020). The successful application of 3STEPFUN in Vietnam provided the basis for implementing this program in the agricultural area of Jember district, considering the geographical and developmental similarities as agricultural and developing regions, respectively.

This study aims to analyze the effectiveness of the Self-Efficacy Theory Based Program for independent foot care behavior, self-efficacy for independent foot care, and the risk of DFU in people with diabetes in agricultural areas.

Methods:

A pre-experimental, one-group pretest-posttest design guided this study. Participants were recruited from the Sumbersari Community Health Center, serving an agricultural region in Sumbersari District, Jember Regency. Eligibility was confined to adult patients diagnosed with Type 2 Diabetes Mellitus residing in the service area and registered at the center, regardless of agricultural occupation. Inclusion criteria required:

1. a minimum of two months of prior treatment registration at the center, ensuring diagnostic stability and established provider contact,
2. proficiency in spoken and written Indonesian,
3. telephone contact availability for follow-up, and
4. absence of current foot ulcers.

Individuals with cognitive impairment or severe comorbidities (e.g., stroke, dementia) were excluded. Simple random sampling was employed to select participants from the eligible patient registry identified during the initial recruitment phase.

The final sample size comprised 28 participants. This sample size determination was based on the number of eligible and consenting patients identified during the recruitment period. Its adequacy for this exploratory pre-experimental design was verified post-hoc using Cochran's formula adjusted for a finite population (N=122, eligible patients). With a 95% confidence level (Z=1.96), maximum variance assumed (p=0.5), and a 19% margin of error (e=0.19), the calculation yielded a base sample of 22 [$n = n_0 / (1 + (n_0 - 1) / N)$; $n_0 = (Z^2pq)/e^2$]. An additional 27% was incorporated to account for potential attrition or drop-out during the six-month follow-up, resulting in the final N of 28.

The intervention spanned six months, involving: Stage 1 (program introduction); Stage 2 (health education on foot care and a 60-minute practical skills session); and Stage 3 (door-to-door follow-up assessments at weeks 2, 10, and 20 post-intervention).

Assessment Form Guide to measure risk factors for DFU, the Diabetes Foot Self-care Behavior Scale (DFSBS) to measure self-care foot care, and Foot Care Confidence (FCCS) to

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measure self-efficacy for self-care foot care. The data obtained were subjected to a normality test using Shapiro Wilk, and a homogeneity test was carried out using Levene's Test. A statistical test was carried out using the Wilcoxon Test. This study has passed ethics at the Faculty of Dentistry, University of Jember, with ethics number 2060/UN25a./KEPK/DL/2023.

Results:

The results of this study are presented in two tables. The first table is the characteristics of the respondents, which contain age, gender, education, employment, and marriage. Table two is the result of the Wilcoxon Test for the three variables.

Table 1. Characteristics of respondent

Karakteristik	Frekuensi (%)	Median (Min-Max)
Age		59 (37-65)
Gender		
Male	7 (25,0%)	
Female	21 (75,0%)	
Level of Education		
elementary school	12 (42,9%)	
Junior High School	3 (10,7%)	
Senior High School	11 (39,3%)	
Collage	2 (7,1%)	
Occupation		
Unemployed	16 (57,1%)	
Farmer	1 (3,6%)	
Self-employed	6 (21,4%)	
Private employees	1 (3,6%)	
Housewife	2 (7,1%)	
etc	2 (7,1%)	
Marital Status		
Married	15 (53,6%)	
Widow	13 (46,4%)	

Source: primary research data, 2023

Table 1 shows that the respondent's age has a median value of 59 years, with a minimum value of 37 years and a maximum value of 65 years. 75% are female, 42.9% have elementary school/equivalent education, 57.1% do not work, and are married as much as 53.6%.

Table 2. Wilcoxon Test Results (n=28)

No.	Variabel		Ranks	Mean Rank	p
1.	Diabetic foot ulcer risk	*Pre test* – *Post test*	Negative	13,00	0,000
2.	*Foot Self Care Behavior*	*Pre test* – *Post test*	Positive	14,50	0,000
3.	*Foot Care Confidence*	*Pre test* – *Post test*	Positive	14,50	0,000

Source: primary research data, 2023

Table 2 shows the calculated significance value for the three variables is less than 0.05, namely 0.000, which indicates that there is an influence of the intervention given to the treatment group on the risk of diabetic foot ulcers, Foot Self Care Behavior, and Foot Care Confidence. In the first variable, the risk of diabetic foot ulcers has a negative rank, which indicates a decrease in the risk of diabetic foot ulcers after the intervention was given to the treatment group, with an average reduction of 13.00. In the second variable, Foot Self Care Behavior has a positive rank, which indicates an increase in Foot Self Care Behavior after the intervention was given to the treatment group, with an average increase of 14.50. The third variable, Foot Care Confidence, has a positive rank, which indicates an increase in Foot Care Confidence after the intervention was given to the treatment group, with an average increase of 14.50.

Discussion :

Characteristics of the respondents.

The sociodemographic profile of the participants, recruited from an agricultural area in Jember Regency, offers insights relevant to managing Type 2 Diabetes Mellitus (T2DM) within this specific context. This research shows that the respondent's age is a maximum of 65 years. Other research shows that the median age for diabetes is 56.5 years, with a minimum value of 23 years and a maximum of 87 years. Older age is a risk factor for type 2 DM (International Diabetes Federation, 2021). The age factor is closely related to the body's physiology, which is increasingly declining (Komariah and Rahayu, 2020). Increasing age impacts decreasing body function, affecting all systems in the body, one of

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which is the endocrine system, where insulin resistance occurs, resulting in instability of blood glucose levels (Isnaini and Ratnasari, 2018).

This research shows that diabetes is dominated by women, namely 21 people (75.0%). In line with other research, it was also explained that of the 126 total respondents with DM, the majority were female, 91 people (72.2%) (Arania, et al., 2021). Women are often unable to control unhealthy eating patterns, stress, and being overweight or obese (Florenza et al., 2021). n women, increasing age causes a decrease in the concentration of the hormone estrogen, which has an impact on increasing fat reserves, especially in the abdominal area, and increasing the release of free fatty acids, which is a condition that is closely related to insulin resistance (Isnaini and Ratnasari, 2018).

This research shows that the highest level of education for type 2 DM patients is at elementary school/equivalent level, 12 people (42.9%). Other research also states that the highest number of people with diabetes education is at the primary level, namely 60 people (47.6%) (Arania *et al.*, 2021). ccording to the Ministry of Health (2013), the number of people with diabetes in groups with primary or low education levels is much higher (Arania *et al.*, 2021). The level of education is very closely related to the knowledge possessed by a person, where from the education received, individuals can develop the potential they desire and quickly obtain information related to their health and improve their health status (Ningrum, et al., 2021). Notably, this educational profile may be characteristic of populations in some agricultural or rural settings where access to higher education might be comparatively limited (Putri and Suryanto, 2021), highlighting the importance of accessible, practical educational interventions tailored to this context.

This research shows that most people with type 2 DM do not work, namely 16 people (57.1%). Work is one of the factors that has a significant influence on the incidence of DM. Work that contains light physical activity results in minimal energy burning in the body, resulting in an impact in the form of excess energy in the body, which is then stored in the form of fat and causes obesity, where excess body weight is one of the risk factors for DM (Suiraoka, 2012). Individuals whose physical activity is very minimal will increase the risk of developing DM et al., 2021). Furthermore, regardless of reported occupation (only one participant was formally a farmer), residing in an agricultural area presents potential unique factors such as distinct environmental foot hazards (e.g., from terrain or farming-related activities even if not primary job) and potentially different levels of access to specialized foot care services compared to urban populations (Health, 2021; Pender and Purnell, 2022). These factors are crucial considerations for foot ulcer prevention in this setting.

This research shows that the marital status of respondents was as many as 15 people (53.6%). Other research also shows that 112 people with diabetes (86.15%) out of 120 people with diabetes are married (Rondhianto et al., 2023). Married couples are at risk of developing diabetes due to their shared lifestyle and behavior and are also influenced by environmental factors (Appiah et al., 2019). An individuals who have a partner, the level of fruit consumption and physical activity decreases, but there is an increase in junk food consumption (Schoeppe *et al.*, 2018). In essence, while individual characteristics like age and marital status align with broader T2DM trends, factors such as educational attainment and the environmental/access considerations potentially linked to the agricultural setting highlight specific contextual nuances for this population. This underscores the need for tailored, community-based interventions focused on practical self-care empowerment.

Self-Efficacy Theory Based Program for foot self-care behaviour and Foot Care Confidence

The results of this study show that before the intervention was carried out, the score was deficient, namely, 21 people (75.0%). The results of this study also show that the self-efficacy value of people with diabetes before the intervention was carried out was deficient, namely, 27 people (96.43%). Several factors that influence diabetic foot care include self-efficacy, level of knowledge, family support, level of education,

quality of life, theory-based education, and health belief (Maulida, T and Hermino, 2020).

The majority of people with diabetes understand self-care management, but the majority of people with diabetes do not know how to prevent DM complications, especially diabetic ulcers (Kalsum *et al.*, 2020). diabetic foot ulcers can mostly be prevented by patients independently. Empowering people with diabetes requires active participation from the person with diabetes, their family, and the community (Jannah and Uprianingsih, 2020). Self-management actions strongly support preventive measures because DM is a chronic disease that requires ongoing medical supervision (Kereh & Rellam, 2023). another strategy that can be carried out as a preventive measure for the occurrence of diabetic foot ulcers and DM complications is by providing health education, multidisciplinary treatment, close monitoring, and prevention in the form of foot care (Mcinnes *et al.*, 2011; Jannah and Uprianingsih, 2020). Health education by health workers for people with diabetes can be carried out to increase knowledge about foot problems, primarily related to foot care behavior, and reduce foot problems themselves, such as lesions, neuropathy, disability, tinea pedis, and callus (Ahmad Sharoni *et al.*, 2016).

Several behavior change theories can be used in providing health education to DM patients (Rosman, Yusuf and Tahir, 2021). The concept of self-efficacy is based on Bandura's social cognitive theory, which explains that an individual's beliefs can influence the individual's ability to carry out healthy behavior and select which behaviors should and should not be carried out (Andini et al., 2021). Self-efficacy in people with diabetes refers more to the confidence of people with diabetes to self-manage DM independently (Saad *et al.*, 2017). Self-efficacy positively correlates with behavior and accuracy of independent foot care actions for outpatients with diabetes. The formation of self-efficacy in people with diabetes can refer to the four pillars of self-efficacy in Bandura's social cognitive theory, which consist of successful experiences in carrying out previous self-care, exchanging stories and sharing experiences with others, support obtained from people around, and emotional factors and psychological conditions (Andini, Efendi and Suprajitno, 2021).

The intervention results showed that most respondents' foot care self-efficacy data was very high. Namely, 20 people (71.43%), and the independent foot care behavior of people with diabetes mainly was very high, 19 people (67.86%). This aligns with previous research by Kulsum *et al* (2020) which showed that most participants' foot care behavior at home after being given the 3STEPFUN intervention was good. That is, 28 respondents (93.4%) carried out their foot care at home appropriately and routinely. These results emphasize that a high level of self-confidence in performing foot care will impact good foot care behavior.

Education is decisive in increasing a person's knowledge to do important things for their health (Suriani et al., 2023). Programs to increase foot care self-efficacy must be supported to be implemented further, not only to increase people with diabetes' knowledge about foot care but also their confidence in carrying out foot care (Nguyen *et al.*, 2019). All education should aim to increase self-efficacy and be sustainable to translate knowledge into behavior. Demonstrating foot care can increase self-efficacy in foot care behavior by providing active mastery and experience to people with diabetes (KırBiçer and Enç, 2016). Nurses can maximize their role as educators to be able to help clients by increasing the level of health knowledge, recognizing the symptoms of disease, and even being able to carry out the actions given so that changes in the behavior of people with diabetes occur as an output after health education is carried out (Suriani, Alhuda and Roslaini, 2023). Individual self-efficacy levels should be evaluated at each visit, and appropriate individual strategies to facilitate learning should be developed to ensure compliance with foot care and to increase educational attainment (KırBiçer and Enç, 2016).

Self-Efficacy Theory Based Program for Diabetic foot ulcers risk

Lack of health management and DM self-care management can have an impact on worsening the condition of diabetes and causing complications. The failure to treat DM is caused

by people with diabetes not complying with therapy, controlling risk factors, lack of knowledge, and family involvement in caring for people with diabetes. People with diabetes are at risk of developing diabetic foot ulcers. The incidence of diabetic foot ulcers can be caused by non-compliance with preventive measures, lack of medical treatment, inappropriate activities, excessive body weight, non-compliance with foot examinations and maintaining foot hygiene, inappropriate use of footwear, lack of knowledge regarding blood glucose monitoring and foot care (Kereh & Rellam, 2023). Diabetic foot problems are a chronic complication that can cause physical disability (Jannah and Uprianingsih, 2020). Diabetic ulcers often attack the lower extremities of the feet (Kalsum *et al*., 2020).

Foot problems are the most severe complication. High costs and extra care are needed for diabetes with foot problems. This is because diabetic foot ulcers are a type of complication directly related to mortality, significant morbidity, and reduced quality of life (Nistiandani *et al.*, 2023). Irregular diabetes management can cause uncontrolled blood sugar levels. High blood sugar levels can trigger diabetic ulcers. It is difficult for wounds to dry in DM patients, and the condition of closed wounds allows contamination and infection to occur. When this condition continues, it will result in tissue decay and widespread infection, so further amputation is needed to be able to save the patient (Sensusiati and Suprapti, 2021).

Management that can be done to prevent the risk of diabetic ulcers is by caring for diabetic feet. People with diabetes must routinely care for their feet and nails to prevent infection, soft tissue injury, and the appearance of foot odor (Nistiandani *et al.*, 2023). Continuous foot care can reduce the risk of diabetic foot ulcers by 50-60%. However, to do this, you must have the determination and will, namely powerful motivation and self-efficacy, because diabetic foot care must be carried out routinely and continuously (Suyanto and Sulistyowati, 2020). Nowadays, many theory-based interventions in providing diabetes health education to prevent the occurrence of diabetic foot ulcers have been published (Kalsum *et al.*, 2020). Social cognitive theory or self-efficacy, which is a theory from Bandura, is one of the many theories most frequently applied in foot care education studies that can be identified, and the effectiveness of theory-based foot care education programs is also confirmed to be effective in providing health education (KırBiçer and Enç, 2016). By increasing awareness and knowledge of people with diabetes, educating them about foot care can prevent foot-related complications (KırBiçer and Enç, 2016).

The results of implementing the 3STEPFUN intervention in this study showed that the majority of respondents' foot care self-efficacy data was very high; namely 20 people (71.43%), and also the majority of respondents were in the no-risk category, namely 11 people (39.3%) from Previously, almost the majority of people with diabetes were in the moderate risk category, 14 people (50.0%). Foot care self-efficacy for people with diabetes after receiving foot care education is higher than for people with diabetes who do not receive education (KırBiçer and Enç, 2016). Another study with the same intervention showed that the possibility of ulceration in the treatment group was 22.22 times much lower than in the control group over six months (Nguyen *et al.*, 2019). These results emphasize that a high level of self-confidence in carrying out foot care will have an impact on reducing the risk of developing diabetic ulcers.

This study effectively reduces the proportion of risk factors for mild ulceration of the feet. People with diabetes who have received health education based on self-efficacy theory are found to use moisturizers and footwear more often (Nguyen *et al.*, 2019). This intervention showed a substantial increase in complication-prevention measures for more than six months of intervention (Pratiwi, Haryanto and Wahyudi, 2023). The involvement of family members in implementing foot care educational program interventions based on self-efficacy theory is recommended, especially for older people with diabetes, because family support influences the effectiveness of increasing self-management and health behavior (Nguyen *et al.*, 2019; Andini, Efendi and Suprajitno, 2021). Apart from family support, group support and social support are

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needed for people with DM as a support system so that their self-efficacy is high (Suyanto and Sulistyowati, 2020).

Limitations of the Study

Several limitations should be acknowledged when interpreting the findings of this study. Firstly, the primary limitation is the pre-experimental, one-group pretest-posttest design, which lacks a control group. Consequently, while significant improvements were observed post-intervention, we cannot definitively attribute these changes solely to the 3STEPFUN program, as extraneous factors such as maturation, external events, or the Hawthorne effect could have influenced the outcomes, limiting the internal validity. Secondly, the generalizability of the findings may be restricted due to the relatively small sample size (N=28) and the single-center setting (Sumbersari Community Health Center). The characteristics and experiences of participants in this specific agricultural area may not fully represent all individuals with type 2 diabetes in other agricultural or non-agricultural settings. Thirdly, the assessment of key outcomes, namely foot self-care behavior and foot care confidence, relied on self-report questionnaires, which are susceptible to social desirability and recall biases. Finally, the six-month follow-up period provides insight into short-to-medium term effects, but the long-term sustainability of the observed improvements remains undetermined.

Suggestions for Further Research

Based on the promising findings and inherent limitations of this study, several avenues for future research are recommended. Firstly, conducting a Randomized Controlled Trial (RCT) comparing the 3STEPFUN program against a control group receiving standard care is crucial to establish causal effects and enhance internal validity. Secondly, future studies should aim for larger, more diverse samples recruited from multiple health centers or agricultural communities to improve the generalizability of the findings. Thirdly, incorporating more objective outcome measures, such as regular clinical foot examinations, objective adherence assessments, and concurrent tracking of glycemic control (HbA1c), alongside self-report data, would provide a more comprehensive evaluation. Fourthly, extending the follow-up period beyond six months (e.g., to 12 or 24 months) is necessary to assess the long-term sustainability of the program's impact. Additionally, evaluating the cost-effectiveness of the 3STEPFUN intervention would be valuable for practical implementation. Finally, further research, potentially using qualitative or mixed-methods approaches, could explore the underlying mechanisms of change and the specific contextual factors within agricultural settings that influence the program's success.

Conclusions:

The findings of this research indicate that the Self-Efficacy Theory-Based Program intervention reduces the risk of diabetic foot ulcers, increasing independent foot care and self-efficacy for foot care for people with diabetes in the working area of the Sumbersari Community Health Center, Jember Regency. Nurses are expected to be able to provide holistic nursing care, especially in terms of providing health education based on self-efficacy theory, because apart from increasing knowledge of people with diabetes, this intervention can also reduce the risk of diabetic foot ulcers, increase independent foot care behavior, and increase foot care self-efficacy.

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