



Effect of Diabetic Foot Ulcer Prevention Education on the Knowledge, Attitude, and Practices of PKK Cadres in Suruh Kalang, Karanganyar

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A B S T R A C T

Diabetic foot ulcers are characterized by a disruption of skin integrity or infection that may extend to subcutaneous tissue, muscles, tendons, or bone. In Indonesia, the prevalence of diabetic foot ulcers is approximately 15%, with amputation rates of around 30% and mortality rates reaching up to 32%. One key strategy for preventing diabetic foot ulcers is health promotion conducted by community health cadres, who serve as frontline agents in public health initiatives.

Preventive efforts include proper foot care practices and the implementation of diabetic foot exercises. The knowledge, attitudes, and behaviours of healthcare cadres play a crucial role in the success of both preventive and promotive interventions. Adequate knowledge supports the formation of positive attitudes, which subsequently encourage appropriate health behaviours. Structured educational programs that incorporate lectures, group discussions, demonstrations, and pre- and post-intervention evaluations are effective in improving the knowledge, attitudes, and behaviours of health cadres. Evidence from such interventions demonstrates a statistically significant improvement in these domains (p -value = 0.000). Therefore, the implementation of a sustainable and continuous education program is essential to strengthen diabetic foot ulcer prevention efforts by health cadres within the community and to ultimately reduce the incidence of diabetic foot ulcers.

INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disease characterized by elevated blood glucose levels, which increases the risk of various serious complications, one of which is diabetic foot ulcer (Guyton & Hall, 2011). Elevated blood glucose levels are partly caused by a diet high in sugar that persists over time without being balanced by adequate physical activity. The highest prevalence of DM cases among individuals aged 20–79 years is found in China, the United States, and India, with 116.4 million, 77 million, and 31 million cases, respectively. Indonesia ranks seventh globally, with a DM prevalence of 10.7 million (Kemenkes, 2020). Patients with both type 1 and type 2 DM have a 25% risk of developing diabetic foot ulcers (Manna, 2020). A diabetic foot ulcer is a DM complication characterized by damage to the integrity of skin tissue, accompanied by infection that may spread to subcutaneous tissue, tendons, or bones. This condition is often exacerbated by neuropathy, peripheral artery disease, improper foot care, or the use of inappropriate footwear (Sofyanti Nur Deviana, Naziyah; Hidayat Rizki, 2022). Diabetic foot ulcers are a major cause of morbidity and mortality, with an increasing prevalence. The condition also imposes a significant economic burden due to the high cost of medical care. However, diabetic foot ulcers can be prevented through measures such as compression, debridement, infection control, proper foot and wound care, and regular diabetic foot exercises (Muhammad et al., 2022).

Education is a crucial strategy in preventing diabetic foot ulcers, as it facilitates improvements in knowledge, attitudes, and behaviours. Nevertheless, prior studies indicate that adequate knowledge and positive attitudes do not always result in healthy preventive behaviours, suggesting the need for more intensive and targeted educational interventions (Alsaigh et al., 2022). Research in Guilan, Iran, revealed that most diabetes patients demonstrated low knowledge regarding foot care, and half reported poor preventive behaviours, underscoring the importance of ongoing education (Pourkazemi et al., 2020).

Diabetic foot ulcers cause not only physical impairment but also psychological distress and economic hardship due to long-term treatment needs and high medical costs. Preventive measures, therefore, should aim to enhance patients' knowledge, attitudes, and behaviours through sustainable community-based health education, particularly involving community health cadres. Evidence suggests that knowledge shapes attitudes and behaviours, while positive attitudes contribute significantly to preventive practices (Budi Raharjo et al., 2022; Anam et al., 2019). Several studies have demonstrated the positive impact of health education on diabetic foot ulcer prevention. Research found a significant association between knowledge and attitudes and the level of preventive efforts among type 2 diabetes patients reported that 50.7% of respondents had moderate knowledge, 50.7% had good attitudes, and 53.7% demonstrated moderate preventive efforts. The study revealed a significant relationship between knowledge and attitudes in preventing diabetic foot ulcers among type 2 DM patients. Prevention efforts should not only be carried out individually but also involve community participation and healthcare providers to foster accurate and effective knowledge, attitudes, and preventive behaviours (Sofyanti Nur Deviana; Naziyah; Hidayat Rizki, 2022). Similarly, another research found that health education significantly improved attitudes and practices for prevention. Health education can enhance behavioural changes toward ulcer prevention among type 2 DM patients (Fatmawati, 2020).

Furthermore, research by Sukartini et al., (2020) on behavioural models for diabetic foot ulcer prevention reported that predisposing factors, such as knowledge and enabling factors, such as healthcare provider roles and family support, influence attitudes and preventive behaviours. Continuous education by healthcare professionals to patients and their families regarding DM management, lifestyle modification, and regular foot care can reduce the risk of diabetic foot ulcers. Based on these findings, the novelty of the present study lies in its intervention targeting PKK cadres as a strategy to improve knowledge, attitudes, and preventive behaviours for diabetic foot ulcers. The results of this intervention may serve as a basis for community health promotion efforts, particularly in preventing diabetic foot ulcers.

METHOD

This study employed a quantitative design with a quasi-experimental one-group pretest–posttest approach. The research was conducted in Suruh Kalang Village, Karanganyar Regency, in May 2025.

The population, defined as the generalization area consisting of subjects with specific characteristics determined by the researcher (Sugiyono, 2019). Comprised all PKK cadres in Suruh Kalang, totalling 30 individuals. The sample, representing the entire population and serving as the source of data, was selected using a total sampling technique, in which all members of the population were included in the study. The inclusion criteria were: (1) having at least six months of experience as a PKK cadre, and (2) the ability to communicate effectively. The exclusion criteria were: (1) having limitations in reading and writing, (2) experiencing hearing impairments, and (3) incomplete questionnaire responses. Data were collected using a self-developed questionnaire measuring knowledge, attitudes, and practices. Data analysis was performed using SPSS with the Wilcoxon signed-rank test.

RESULT

This study obtained ethical clearance from the Ethics Committee of Universitas Aisyiyah Surakarta (No. 379/III/AUEC/2025) on March 8, 2025. Following ethical approval, the researcher coordinated with the Suruh Kalang Midwifery Service to obtain permission and schedule the research activities. Data were collected from 30 respondents, all of whom were PKK cadres in Suruh Kalang. Each respondent completed the informed consent form and the research questionnaire in full.

Table 1. Distribution of Respondents' Characteristics

Characteristics	Frequency (f)	Percentage (%)
Age		
>35-45 years	22	73%
>45 years	8	27%
Education		
Senior High School	25	83%
Higher Education	5	17%
Occupation		
Unemployed	16	53%
Private sector/self-employed	12	40%
Civil servant	2	7%

Based on Table 1, the majority of respondents were aged 35–45 years (73%), had completed senior high school education (83%), and were unemployed (53%).

Table 2. Descriptive Statistics of Knowledge, Attitude, and Practice

Variable		N	Minimum	Maksimum	Mean	Std. Deviation
Knowledge	Pre Test	30	1	5	3.47	0,937
	Post Test	30	4	6	5.23	0,728
Attitude	Pre Test	30	6	15	11.70	1,950
	Post Test	30	16	20	17.90	1,373
Practices	Pre Test	30	11	16	13.53	1,196
	Post Test	30	13	16	14.40	0,894

Based on the data presented in Table 2, the pre-test knowledge scores ranged from a minimum of 1 to a maximum of 5, with a mean score of 3.47 and a standard deviation of 0.937. After the intervention (post-test), the knowledge scores ranged from 4 to 6, with a mean of 5.23 and a standard deviation of 0.728.

For the attitude variable, the pre-test scores ranged from 6 to 15, with a mean of 11.70 and a standard deviation of 1.950. Following the intervention, the scores ranged from 16 to 20, with a mean of 17.90 and a standard deviation of 1.373.

Regarding practice, pre-test scores ranged from 11 to 16, with a mean of 13.53 and a standard deviation of 1.196. After the intervention, the scores ranged from 13 to 16, with a mean of 14.40 and a standard deviation of 0.894.

The prerequisite test was conducted to determine whether the hypothesis testing should use parametric or non-parametric statistics. The normality test applied was the Shapiro–Wilk test. If the data were normally distributed, the hypothesis testing would be performed using parametric statistics, specifically the paired t-test.

Table 3. Normality Test

Variable		Shapiro-Wilk		
		Statistic	df	Sig.
Knowledge	Pre Test	.885	30	.004
	Post Test	.793	30	.000
Attitude	Pre Test	.943	30	.109
	Post Test	.902	30	.009
Practice	Pre Test	.938	30	.082
	Post Test	.881	30	.003

The results of the normality test presented in the table above show that, for the knowledge variable, the pre-test data had a significance value of 0.004 and the post-test data had a significance value of 0.000. Since both significance values were less than 0.05, it can be concluded that the knowledge variable data were not normally distributed. For the attitude variable, the pre-test data had a significance value of 0.109, and the post-test data had a significance value of 0.009. Since the post-test value was less than 0.05, it can be concluded that the attitude variable data were not normally distributed.

For the practice variable, the pre-test data had a significance value of 0.082, and the post-test data had a significance value of 0.003. Since the post-test value was less than 0.05, it can be concluded that the practice variable data were not normally distributed. Overall, these results indicate that the data for all variables were not normally distributed; therefore, hypothesis testing was performed using a non-parametric statistical test, namely the Wilcoxon signed-rank test.

Table 4. Wilcoxon Signed-Rank Test Result

Variable		N	Mean Rank	<i>p value</i>
Knowledge (Post Test - Pre Test)	Negative Ranks	1 ^a	5.50	0.000
	Positive Ranks	26 ^b	14.33	
	Ties	3 ^c		
	Total	30		
Attitude (Post Test - Pre Test)	Negative Ranks	0 ^a	0.00	0.000
	Positive Ranks	30 ^b	15.50	
	Ties	0 ^c		
	Total	30		
Practice (Post Test - Pre Test)	Negative Ranks	1 ^a	9.00	0.000
	Positive Ranks	21 ^b	11.62	
	Ties	8 ^c		
	Total	30		

a : Number of respondents with post-test scores < pre-test scores

b : Number of respondents with post-test scores > pre-test scores

c : Number of respondents with post-test scores = pre-test scores

Based on the table above, the comparison results for the Knowledge variable show that almost all respondents (26 individuals) had higher scores (*positive ranks*) after the post-test, 3 respondents had the same scores (*ties*), and 1 respondent had a lower post-test score (*negative rank*). The p-value of 0.000 is smaller than 0.05 ($\text{sig} < 0.05$), indicating a significant difference in knowledge before and after the test, with respondents' knowledge increasing after receiving the intervention (post-test).

For the Attitude variable, all respondents (30 individuals) had higher scores (*positive ranks*) after the post-test. The p-value of 0.000 is smaller than 0.05 ($\text{sig} < 0.05$), indicating a significant difference in attitude before and after the test, with respondents' attitudes improving after receiving the intervention (post-test).

For the Practice variable, almost all respondents (21 individuals) had higher scores (*positive ranks*) after the post-test, 8 respondents had the same scores (*ties*), and 1 respondent had a lower post-test score (*negative rank*). The p-value of 0.000 is smaller than 0.05 ($\text{sig} < 0.05$), indicating a significant difference in practice before and after the test, with respondents' practices improving after receiving the intervention (post-test).

DISCUSSION

Knowledge plays a vital role in disease prevention, including the prevention of diabetic ulcers. Adequate knowledge enables individuals to identify risk factors and early signs of the disease, as well as to adopt effective preventive measures. Previous studies have demonstrated that well-delivered health education can enhance individuals' understanding of specific diseases, thereby empowering them to take proactive steps in preventing potential health problems (Suryani, S. and Dewi, 2017; Okoro, R. N. and Odume, B. B. and Nduka, 2020). In the context of diabetic ulcers, education provided to PKK cadres enhances their understanding of the significant risks diabetes poses to foot health, the importance of regular foot

examinations, optimal blood glucose management, and appropriate foot care practices. With improved knowledge, PKK cadres are better equipped to deliver educational outreach to the broader community, particularly to individuals living with diabetes.

The development of positive attitudes toward diabetic ulcer prevention is equally important, as attitude serves as a key determinant in facilitating behavioural change. While adequate knowledge is essential, it alone may be insufficient to drive behavioural modification without the support of a positive and proactive attitude (Fishbein, M. and Ajzen, 2010). In the context of diabetic ulcers, providing education to PKK cadres significantly enhances their understanding of the substantial risks that diabetes poses to foot health, the necessity of regular foot examinations, optimal blood glucose management, and appropriate foot care practices. Strengthened knowledge equips PKK cadres to more effectively deliver educational outreach to the wider community, particularly to individuals living with diabetes.

Equally important is the cultivation of positive attitudes toward diabetic ulcer prevention, as attitude is a critical determinant in driving behavioural change. While sufficient knowledge forms the foundation, it may not be enough to prompt behavioural modification without the reinforcement of a supportive and proactive mindset (Hisham, M. and Rahman, N. and Wahab, 2020). An improved attitude toward diabetic ulcer prevention is expected to positively influence PKK cadres' behaviour in delivering education to the community and in engaging the families of individuals with diabetes in preventive efforts.

The behavioural measurements in this study also showed significant results, although these findings differ from several previous studies. One possible explanation is that behavioural change often requires a longer period of time compared to changes in knowledge or attitude. According to behavioural change models, such changes typically occur in multiple stages, and not all individuals will immediately alter their behaviour after receiving information or education.

Moreover, social factors play an important role in shaping behaviour. Glanz et al. (2015) highlighted that behavioural change is more effective when there is strong social support, whether from family, friends, or the broader community (Glanz, K. and Rimer, B. K. and Viswanath, 2015). If PKK cadres are unable to obtain support from other stakeholders, or if the community does not share the same level of understanding regarding the importance of diabetic ulcer prevention, behavioural change will be difficult to achieve. Preventive behaviours related to diabetic ulcers, such as regular foot examinations and optimal blood glucose management, require systematic support and adequate facilities. Although PKK cadres may have received education, they may not have direct access to the necessary resources or facilities to implement these preventive measures effectively, particularly in conducting foot examinations for individuals with diabetes. Furthermore, many people living with diabetes in the community may lack easy access to healthcare facilities or medical professionals capable of performing routine foot examinations.

CONCLUSION

Education on the prevention of diabetic ulcers has a significant positive impact on the knowledge and attitudes of PKK cadres, but does not have a significant effect on their behaviour. This finding indicates the need for a more comprehensive and sustainable approach, including systematic support and adequate facilities to foster more tangible behavioural change. Based on these results, several recommendations for future research and interventions are proposed, including continuous mentoring, the provision of supportive facilities, and the strengthening of social support. Communities, families, and other relevant stakeholders should be actively involved in supporting PKK cadres to promote behavioural change in diabetic ulcer prevention.

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