Pamungkas, R. A., Chamroonsawasdi, K. & Usman, A. M. (2025)
Jurnal Keperawatan Soedirman – Vol 20, No 1 page 26-34
http://jos.unsoed.ac.id/index.php/jks/index

ORIGINAL ARTICLE

A MIXED-METHODS EVALUATION OF THE FEASIBILITY OF A HEALTH COACHING PROGRAM TO IMPROVE NEUROPATHY SCREENING PRACTICES AND PREVENT FOOT ULCERS IN DIABETIC PATIENTS AT RISK OF COMPLICATIONS

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Article Information
Received: 2 September 2024
Revised: 8 January 2025
Accepted: 3 March 2025

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DOI
10.20884/1.jks.2025.20.1.12947

ABSTRACT

Neuropathy was crucial to develop foot ulcer complication. The study aimed to understand the needs and barriers to program implementation, assess feasibility, and examine the effects of diabetes health coaching programs on outcomes. This pilot study applied a sequential exploratory mixed-methods design that consisted of a quasi-Intervention design, pre-test, and post-test in the first phase, followed by a qualitative study in the second phase. Content analysis was applied to describe the qualitative findings. A paired t-test and independent t-test to measure mean differences within and between groups. The intervention group participated in a 12-week health coaching program including problem-solving coaching, narrative-based coaching, mindfulness coaching, skill coaching, and self-reporting. The keys findings were: 1) bridging the mind and body for consistency; 2) a heightened perception of susceptibility; 3) timing for being mindfulness; 4) inadequate knowledge and skills on diabetes complication; 5) a sense of embracement regarding diabetes complications. The quantitative study confirmed that patients who participated in the program showed significant improvements in knowledge, neuropathy screening, and foot ulcer prevention. Additionally, the program led to better clinical outcomes in preventing diabetic foot ulcer compared the control group. A health coaching program was feasible for implementation in the community health center.

Keywords: *Diabetic neuropathy; foot ulcers; health coaching; pilot study; public health nurses*

ISSN : 1907-6637 **e-ISSN : 2579-9320**

INTRODUCTION

Diabetes mellitus (DM) has emerged as a significant public health issue worldwide over the past two decades. The World Health Organization (WHO) estimated that more than 346 million people have been diagnosed with diabetes (WHO, 2018). DM and its complications substantially contribute to the increasing financial burden on healthcare system, while also reducing life expectancy and quality of life among the population (Pamungkas & Chamroonsawasdi, 2020b). In Indonesia, approximately 179,720,500 million people are reported to be living with diabetes mellitus, with 10.8% of adult population experiencing uncontrolled glycemia (International Diabetes Federation, 2021).

Glycemic uncontrolled can be defined as a condition characterized by persistently elevated blood glucose levels that remain above the target range despite treatment efforts (Liu et al., 2020). This condition can impact diabetic complications such as retinopathy, nephropathy, and neuropathy, leading to long-term disability, premature death, and a decreased quality of life (WHO, 2016).

Patients with diabetic neuropathy often experience a loss of sensitivity in their feet, which increases the risk of injury and potential foot amputation. The World Health Organization (WHO) estimates that 60-70% of the 347 million people worldwide with diabetes exhibit symptoms of neuropathy (Arersa et al., 2020). In Indonesia, approximately 16.2% of

individual with diabetes mellitus develop diabetic foot ulcers, which may necessitate amputation. This is largely due to a lack of awareness regarding the complications associated with diabetes and foot ulcers. A study reported that the main complications of DM include neuropathy (13% - 78%), microvascular complications (16% - 53%), and diabetic foot ulcers, which range from 7.3% to 24% (Abrar et al., 2020).

Management of Diabetic Peripheral Neuropathy (DPN) is crucial for preventing diabetic foot ulcers and amputations. Public Health Nurses (PHNs) play a vital role in screening neuropathy and providing appropriate interventions to enhance the capacity of patients and their family members in dealing with related problems. A previous study reported that PHNs have an essential role in preventing and managing chronic diseases. They are on the front lines and serve as the most reliable point of communication with the patients in most cases (Zandiyeh et al., 2015). Another study found that PHNs have a pivotal role in providing health education and self-management knowledge to patients with DM regarding insulin preparation, glucose monitoring, medication adherence, and regular follow-up (Zandiyeh et al., 2015).

Another the preliminary study found that several PHNs lack the skills necessary to manage foot ulcers and screen for neuropathy among patients with DM. The primary reason for this deficiency is insufficient capacity building for the PHNs. Therefore, PHNs should enhance their skills in managing foot ulcers and screening for neuropathy by participating in a neuropathy-focused coaching program to better support their patients. In order hands, A neuropathy-based coaching program proved to be an effective method for improving the patients' knowledge and skills in preventing diabetes complications and improving the neuropathy screening practices (Pamungkas et al., 2022).

Besides examining the patient outcomes, the study aimed to understand the needs and barriers to program implementation, determine feasibility, and assess the impact of diabetes health coaching programs on improving the neuropathy screening and preventing diabetic foot ulcers. The integration of Transformative Learning Theory with health-based coaching concept was to develop the neuropathy-focused coaching program aimed at enhancing the skills of PHNs in supporting DM patients with DM regarding foot ulcers prevention and neuropathic complications, ultimately improving clinical outcomes (Ryan et al., 2022). This program emphasizes participatory learning, with PHNs as the central focus, and incorporates several strategies, including reflection and sharing, goal setting, problem-solving-based coaching, narrative-based coaching, mindfulness-based coaching, and skill-based coaching. Grounded in the principles of Transformative Learning Theory, the program highlights the significance experience, critical reflection, dialogue, and creativity in the learning process. Thereby, the intervention was constructed using a capacity-building and coaching strategy for PHNs to improve their capability in addressing patient's barriers to preventing foot ulcers and neuropathy.

A pilot study helps address key gaps before full-scale mixed-methods evaluation of a health coaching program. To fill the feasibility issue by testing whether participants understand the intervention and whether the mixed-methods approach is practical for patients with diabetes mellitus. Another reason why the integration of method needs to be conducted to understand how qualitative and quantitative data complement each other for a comprehensive evaluation the outcomes. Therefore, the findings from this study can be implemented in community health centers to strengthen the capabilities of public health nurses in assisting diabetic patients in preventing complications related to diabetes.

METHODS

Research Design

A sequential exploratory mixed-methods study was carried out in three phases. The first phase aimed to explore the needs and barriers to program implementation and the existing services practices regarding neuropathic screening using the in-depth interview and FGD. The second phase was program development based on the integration of Transformative Learning Theory with health coaching concept. The content of program was developed based on the findings of qualitative study. The third phase was a quasi-Intervention study utilizing a pre-test, post-test design with a non-equivalent control group, which was conducted to examine the effects of health coaching program on knowledge and awareness of neuropathic screening practices (NSP), and skills in providing NSP among PHNs in community health centers, as well as the clinical outcomes for patients with DM before and after the implementation of the neuropathy-based coaching program.

Study Aims

There are two main aims in this study: 1) to determine the feasibility and to evaluate the effect of a neuropathy-based coaching program on PHNs' skills, including blood glucose monitoring, neuropathy screening practices, and foot care to prevent foot ulcers; and 2) to determine the feasibility and to examine the effect of a neuropathy-based coaching program on the knowledge and skills of PHNs in delivering diabetes self-management education and practices aimed at preventing foot ulcers in patients with diabetes mellitus. This includes enhancing neuropathy screening practices (NSP) among public health nurses in community health centers and improving clinical outcomes fort patients with DM.

Sample and Setting

The participants were purposively selected from community health centers based on the specific inclusion criteria. The inclusion criteria were; 1) uncontrolled patients with HbA1c levels greater than 7%, 2) individuals aged 35to 59-year-old, 3) those who had been living with DM more than 2 years, 4) be able to communicate in the Indonesian language, both verbally and in writing, and 5) a willingness to participate in this study. Patients with serious complications, such as foot ulcers, chronic renal diseases, and retinopathy, were excluded from this study.

The sample size calculation considered the clinical outcomes of patients after receiving the NSP and diabetes self-management education from the NHPs who participated in the neuropathy-based coaching program. A power analysis was conducted using an effect size (d) of 1.83 from a previous study, (Cai & Hu, 2016) with an alpha level of 0.05 and a power of 0.80. Consequently, a minimum of 30 participants was required patients for both the Intervention and control groups. Given that this was a pilot study, the researcher calculated a sample size of 10-20% of the actual study size, resulting in the recruitment of 12 participants for this pilot study. The researcher then randomly assigned patients to the intervention group (n=8) and the control group (n=8). The intervention group received the neuropathy-based coaching program, while the control group received a standard care from the community health centers.

This study was conducted at community health centers as an essential service for diabetes management on West Sulawesi

province since the number of diabetes rising up.

Conceptual Framework

The integration of health-based coaching and Transformative Learning Theory was utilized to develop the health coaching program proposed by Mezirow (1997). The program focuses on five key components: 1) Problem-solving-based coaching, 2) Narrative-based coaching, 3) Mindfulness-based coaching, 4) Skill-based coaching, and 5) Self-reporting. A summary of the conceptual framework used in this study is presented in Figure 1.

Ethical Consideration

This study was approved by the ethical consideration at Mahidol University, under the approval number MUPH 2018-173. Informed consent was obtained from each participant who was agreed to participate in this study.

HEALTH COACHING PROGRAM		
The focal point of the health coaching program	**Strategies**	**Main activities**
Problem-solving based coaching	• Reflection and sharing • Problem solving • Goal setting	• Reflection and sharing experiences • Enhance problem-solving skills • Goal setting on preventing foot ulcer of DM patients
Narrative-based coaching	• Brainstorm • Case study • Small group discussion	• Brainstorm on diabetes complications and neuropathy, and how to prevent the problems • Case study on diabetes foot care and neuropathy screening practice • Discussion on diabetes self-management practices
Mindfulness-based coaching	• Positive responsiveness • Sharing experience • Roleplay	• Emotional support to DM patients • Encourage DM patients on diabetes self-management practices to prevent foot ulcers • Roleplay on practicing of neuropathic screening
Skill-based coaching	• Individual coaching • Roleplay	• Practice on neuropathy screening • Roleplay on neuropathic screening using monofilament test and Ipswich touch test • Appraise neuropathic problems and blood glucose monitoring
Self-report	• Self-report • Follow-ups	• Weekly self-report • Regularly face-to-face follow-up and telephone follow-up.

Outcomes:
- Knowledge of foot ulcer prevention
- Blood glucose monitoring
- Awareness of screening risk of neuropathy
- Foot care behavior
- Clinical outcomes

Figure 1. Conceptual Framework

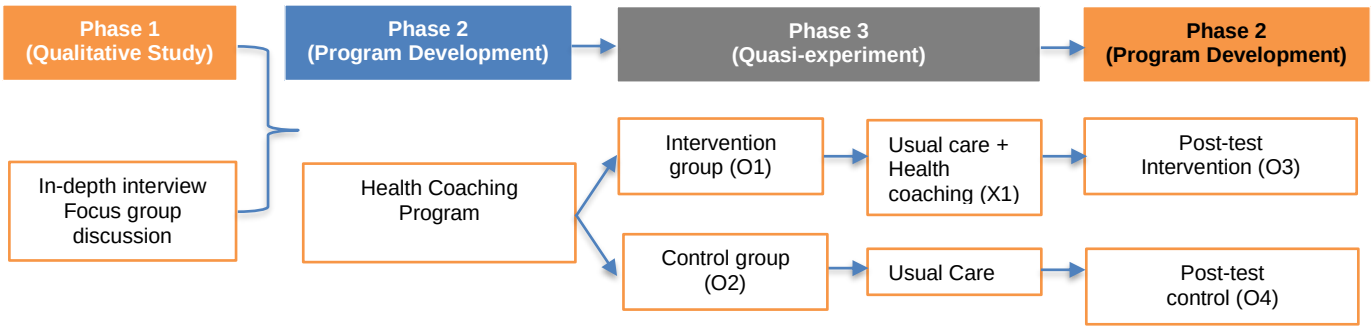

Figure 2. A sequential exploratory mixed-method

Data Collection Procedure

This study implemented sequential data collection procedure. The researchers informed the head and staff at community health centers about the study and the data collection process. Subsequently, diabetic patients and the public health nurses who are responsible for the diabetes unit were identified. At the scheduled appointment time, potential participants were assessed for eligibility to participate in this study. Informed consent was obtained after they expressed their willingness to participate. Finally, the data collection was carried out using both face-to-face and telephone methods.

Phase I: Qualitative

The in-depth interview and focus group discussion strategies were used to gather the data from patients. The content of interview guideline to explore the needs and barriers to program implementation. The FGD activities to discuss what the existing services practices regarding neuropathic screening had been done in the community health center. The researchers developed the in-depth interview and focus group discussion guidelines using steps including 1) define the research objectives by ensuring objectives align with the research questions; 2) identify key themes and topics based on research objectives; 3) develop open-ended questions

and structure the interview guideline; and 4) pilot testing by conducting trial interview to identify unclear or redundant question and revise based on feedback.

The questionnaire was approved for validity and reliability test by three experts from Mahidol University. Each interview was conducted at a community health center and lasted approximately 60 to 90 minutes. All interviews were audio recorded and subsequently were transcribed by the interviewer and the research assistants.

Phase II Program Development

The health coaching program was a 12-week of intervention designed to improve the knowledge, blood glucose monitoring, awareness on preventing diabetic foot ulcers, and foot care behavior. Developing a health coaching program based on qualitative study findings requires translating key insights into structured and actionable intervention. The process of program development including 1) analyze qualitative study findings to identify common health barriers, understand the participant preferences for coaching; 2) define the program objective, in this study, we empower individuals to make sustainable lifestyle changes through personalized health coaching to improved health outcomes; 3) design the health coaching model; and 4) pilot testing, it was conducted using the small group to adjust based on participant experiences and engagement levels.

The program consisted of problem-solving-based coaching through reflection and sharing, problem-solving, and goal setting. Additionally, narrative-based coaching was facilitated through small group discussions and case studies. Mindfulness-based coaching; and skill-based coaching were also incorporated, which involved practicing on neuropathy screening, role-playing with the monofilament screening test and Ipswich touch test, and assessing appraisal of neuropathy issues. Weekly self-reports, along with regular face-to-face and telephone follow-ups, were conducted to monitor the implementation and progress of program. The intervention group participated in the health coaching program, while the control group received the standard care. Details of the strategies and main activities are illustrated in Figure 3.

The focal point of the health coaching program	Strategies and main activities	
	For Nurses	**For Patients**
Problem-solving based coaching	• Reflection and sharing experiences on health coaching and caring for diabetes patients • Sharing the barriers to caring for diabetes patients and how to solve the problem • Goal setting for maintaining healthy behaviors and preventing foot ulcers in patients with DM	• Sharing experience on diabetes self-management • Goal setting and problem-solving regarding diabetes self-management barriers
Narrative-based coaching	• Brainstorming to prevent diabetes complications and maintain healthy behaviors • Case study on diabetes foot care and neuropathy screening practices • Discussion on diabetes self-management practices	• Self-management diabetes education and its complications • Case study on preventing neuropathy and foot ulcers
Mindfulness-based coaching	• Training to support patients with DM in controlling blood pressure • Enhancing flexibility, kindness, and emotional intelligence to support patient with DM in self-management practices	• Emotional support to patients with DM • Encouragement of patients with DM on diabetes self-management practices to prevent foot ulcers • Mindfulness practice on self-control, mental clarity, self-acceptance and emotional intelligence
Skill-based coaching	• Roleplay practicing neuropathic screening using monofilament test and Ipswich touch test • Appraise neuropathic problems and blood glucose monitoring • Roleplay on home-based blood glucose monitoring • Roleplay foot care behavior	• Receiving the neuropathic screening using monofilament test and Ipswich touch test from healthcare provider • Learn how to check blood pressure • Identification of neuropathic symptoms

Figure 3. Strategies and main activities of health coaching

Phase III Intervention Strategies

Patients in the intervention group involved in a health coaching program designed to enhance knowledge and awareness of neuropathic screening practices (NSP), and to improve skills in providing NSP and self-management education to patients with diabetes mellitus. This group was purposively selected based on the specific inclusion criteria to ensure full participation in the health coaching program. Individuals who were absent or withdrew from the coaching program were excluded from the study. The control group consisted of patients with DM who received services from the community health center.

Data Analysis

The Chi-Square test and independent t-test were applied to examine the differences between the intervention and control groups. Prior to selecting the appropriate statistical analyses, the assumptions of normality and homogeneity of variance were tested in this study. The researcher also utilized the independent t-test to compare the mean score of patients' outcomes and public health nurses' outcomes between the intervention and control groups. Additionally, the paired t-test was applied to assess the differences in mean scores before and after participants received the neuropathy-based coaching program. To explore the perception of healthcare providers and patients with DM regarding the implementation of health coaching to improve the neuropathy screening practices and preventing foot ulcers, the qualitative study has been carried out.

RESULTS

Qualitative Findings

To understand the needs and barriers associated with program implementation, qualitative data audio-taped,

transcribed, and entered into qualitative software (NVivo). The data were analyzed using content analysis techniques, which involved an iterative process of data reduction, data display, conclusion drawing and verification. The information from the qualitative study served as a baseline for developing content of the intervention. In-depth interviews were conducted to explore patients' perceptions regarding feasibility, benefits, and barriers to implementing the health coaching program aimed at improving knowledge, blood glucose monitoring, awareness of neuropathy screening, and foot care behaviors. The themes of this study include: 1) bridging the mind and body to be consistency; 2) a heightened perception of susceptibility; 3) the timing in practicing mindfulness; 4) inadequate knowledge and skills to prevent the diabetes complication; and 5) a feeling of embracement regarding diabetes complications.

Feasibility

This study aligns with the participating organization's timeline for implementing the diabetes program, and has been developed in consultations with experts to ensure feasibility, support, and compatibility with organizational direction, initiatives, and training strategies

Demographic Data and Health Information of Patients with Diabetes Mellitus

The majority of patients in the intervention group patients (62.5%) and the control group (75%) were female. In the intervention group, patients had an equal distribution on level of education: 25% graduated from primary school, 25% from secondary school, 25% from high school, and 25% held a bachelor's degree. In contrast, 75% of control group graduated from high school. More than half of the participants identified as were Javanese in both the intervention and control group (62.5%). Regarding the duration of diabetes, over half of the patients in the Intervention group had been diagnosed with diabetes by a medical doctor within 1 to 3 years (62.5%), while 25% had been diagnosed within 3 to 5 years. There was no significant difference in the clinical characteristics of the subjects between the intervention and the control groups.

Table 1. Demographic data and health information of diabetic patients

Personal Information	Intervention group (n=8)		Control group (n=8)	
	n	%	n	%
Age (year)				
Less than 30 years' old	0	0	0	0
Between 31-40 years' old	0	0	3	37.5
More than 40 years 'old	8	100	5	62.5
Sex				
Male	3	37.5	2	25
Female	5	62.5	6	75
Education background				
Primary school	2	25.0	0	0
Secondary school	2	25.0	1	12.5
High school	2	25.0	6	75
Bachelor and over	2	25.0	1	12.5
Ethnicity				
Javanese	5	62.5	5	62.5
Mandarnese	1	12.5	3	37.5
Buginese	2	25.0	0	0
Occupation				
Housewife	3	37.5	6	75
Seller	2	25.0	2	25
Entrepreneur	2	25.0	0	0
Government officer	1	12.5	0	0
Duration with T2DM (years)				
Between 1 to 3 years	5	62.5	4	50
Between 3 to 5 years	2	25.0	4	50
More than 5 years	1	12.5	0	0

Effect of a health coaching program on knowledge, blood glucose monitoring, awareness of neuropathy screening and foot care behavior among patients with Diabetes Mellitus

Table 2 shows the mean scores of among patients with DM regarding knowledge, blood glucose monitoring, awareness of neuropathy screening, and foot care behavior in both of the intervention and control groups. The findings show that prior to the implementation of the health coaching program, there were no significant differences in knowledge, blood glucose monitoring, awareness of neuropathy screening, and foot care behavior among DM patients between the two groups. However, after participating in the health coaching program, the intervention group demonstrated significantly improved skills in foot ulcer prevention, including knowledge of foot ulcer prevention ($p < 0.001$), blood glucose monitoring ($p < 0.001$), neuropathy screening practices ($p < 0.001$), and foot care ($p < 0.001$) compared to the control group.

Table 2. The comparison of mean scores on blood glucose monitoring, awareness of neuropathy screening practice, and foot care among patients before and after receiving the health coaching program between the intervention and control group

PHNs Skills in prevention of foot ulcers	Experiment group		Control group		t	p
	Mean	SD	Mean	SD		
Pre-test						
Knowledge of foot ulcer prevention	8.77	2.128	8.8	2.976	-.050	. 064
Blood glucose monitoring	4.53	1.776	4.07	1.574	1.077	.614

PHNs Skills in prevention of foot ulcers	Experiment group		Control group		t	p
	Mean	SD	Mean	SD		
Awareness of screening risk of neuropathy	1.90	2.074	1.97	1.810	-.133	.316
Foot care behavior	2.57	1.382	3.03	1.790	-1.130	.149
Post-test						
Knowledge of foot ulcer prevention	13.03	2.988	8.37	1.159	7.975	<.001*
Blood glucose monitoring	10.23	1.478	7.40	1.354	7.741	<.001*
Awareness of screening risk of neuropathy	6.27	1.258	2.13	1.196	13.046	<.001*
Foot care behavior	4.97	.999	3.10	.607	8.742	<.001*

Effect of a health coaching program on clinical outcomes among patients with diabetes mellitus

Table 3 presents a comparison of mean scores for clinical outcomes among diabetic patients in both the Intervention and control groups. Prior to the implementation of the health coaching program, there were no significant differences in clinical outcomes, including HbA1c levels, systolic blood pressure (BP), diastolic BP, body mass index (BMI), total cholesterol, high-density lipoprotein (HDL), and low-density lipoprotein (LDL). However, following the health coaching program, several clinical outcomes showed significant differences between the Intervention and control group: HbA1c levels ($p < 0.001$), systolic BP ($p = 0.003$), diastolic BP ($p = 0.035$), total cholesterol ($p = 0.024$), HDL ($p = 0.001$), LDL ($p = .005$). In contrast, the body mass index did not demonstrate a significant difference between the Intervention group, which received the health coaching program, and the control group, which received the standard care from community health centers ($p = .329$).

Table 3. The comparison of mean scores on clinical outcomes among diabetic patients before and after receiving the health coaching program between the Intervention and control group

Clinical outcomes of patients with DM	Intervention group		Control group		t	p
	Mean	SD	Mean	SD		
Pre-test						
a. HbA1c	8.043	1.960	8.553	2.952	-.788	.434
b. Systolic BP	128.67	13.83	128.33	18.21	.080	.937
c. Diastolic BP	83.33	7.112	82.00	8.867	.643	.523
d. Body mass index	23.70	3.529	24.32	3.510	-.680	.499
e. Total cholesterol	204.33	32.661	199.73	41.355	.478	.643
f. HDL	65.17	14.406	65.47	23.815	.895	.953
g. LDL	117.63	49.611	107.50	37.246	-.059	.375
Post-test						
a. HbA1c	6.440	1.144	8.240	2.605	-3.464	.001
b. Systolic BP	120.00	11.142	129.67	12.72	-3.130	.003
c. Diastolic BP	72.50	8.685	78.00	10.95	-2.155	.035
d. Body mass index	23.58	2.800	24.28	2.690	-.984	.329
e. Total cholesterol	176.13	22.38	198.30	38.479	-2.315	.024
f. HDL	91.80	20.73	61.57	19.349	5.839	.000
g. LDL	89.10	14.910	109.57	35.663	-2.900	.005

DISCUSSION

In this study, the improvements of knowledge, blood glucose monitoring, awareness of neuropathy screening, and foot care behaviors among diabetes patients has been revealed. The enhancement of knowledge and skills related to foot ulcer prevention for diabetic patients was attributed to the development of a coaching program consisted of problem-solving-based coaching, narrative-based coaching. This program which was conducted through small group discussions and case studies. Additionally, mindfulness-based coaching and skill-based coaching were incorporated, which involved practicing neuropathy screening, role-playing using monofilament test and Ipswich touch test, and appraising of neuropathy problems. This finding is consistent with the previous studies indicating that diabetes self-management-based coaching has enhanced patients' knowledge and skills regarding diabetes self-management behaviors and prevention of diabetes complications (Pamungkas & Chamroonsawasdi, 2020a; Pamungkas et al., 2022).

Mindfulness-based coaching provides emotional support that helps patients deal with the stress and anxiety associated with diabetes management. This approach improves the positive communication and empowers patients to meet the target of glycemic control, which is essential for preventing complications related to diabetes (Whitebird, Kreitzer, Vazquez-Benitez, & Enstad, 2018). Additionally, mindfulness improves self-awareness of health behaviors, allowing patients to recognize the importance of regular foot care and blood glucose monitoring. As a result, patients are more proactive in preventing foot ulcers (Chen et al., 2019). Another study confirmed that distress becomes a crucial factor on health behaviors. Thereby, preventing the distress and enhancing the emotional support are essential to improve behaviors and blood glucose level (Rondhianto, Ridla, & Budi, 2023).

Narrative-based coaching through small group discussions and presentation of a personal case study on managing diabetes and preventing foot ulcers significantly enhanced the knowledge and skills of diabetic patients. During this session, the researcher provided individualized coaching focused on preventing diabetes-related complications and the early detection of neuropathy. A case study addressing diabetes foot care and neuropathy screening practices was also discussed to improve the patients' understanding. These strategies were crucial points to enhance the communication skills, analytical skills for goal setting, and problem-solving skills. This aligns with previous studies that reported that individual-based coaching programs can improve the patients' skills in diabetes management and health outcomes (Pamungkas & Chamroonsawasdi, 2020b; Sherifali et al., 2016).

In this study, the researchers trained patients to screen symptoms of symptoms using a straightforward method. They were required to act as public health nurses when they recognized these symptoms. Additionally, family caregivers were provided with information about the neuropathy symptoms and how to screen those symptoms using simple methods, such as the monofilament test and the Ipswich touch test. Training and coaching could improve the knowledge, self-efficacy, and behavioral transfer of nursing skills, such as medication management and communication skills (Richardson, Wicking, Biedermann, & Langtree,2023; Yao, Zhou, Xu, Lehman, Haroon, Jackson, & Cheng, 2021). Another study demonstrated that registered nurses are significantly improving and well-suited to implement health coaching for preventing and managing chronic illness, as well as to motivate the patients (Barr & Tsai, 2021).

The strategies of appraisal of neuropathy problems found that patients and their family members felt confident in managing neuropathy symptoms and preventing other complications associated with diabetes. The current findings are congruent with a previous study that found that a family functional-based coaching program significantly improved the health behavior related to glycemic control (Pamungkas & Chamroonsawasdi, 2020a). Additionally, another study also revealed that health coaching serves as a collaborative approach to enhance self-management, prevent exacerbations of chronic illness, and support lifestyle changes (Park,Moon, Ha, & Lee, 2017).

Weekly reports, along with regular face-to-face and telephone follow-ups, were conducted among public health nurses to monitor the progress of program implementation. This strategy was a crucial strategy in addressing barriers and enhancing patients' confidence to implement a neuropathy-based coaching program. The finding is similar to the previous study indicating that weekly follow-ups improve the diabetes health behaviors and clinical biomarkers, thereby preventing diabetes complications (Pamungkas & Chamroonsawasdi, 2020b; Powers et al., 2015).

The clinical outcomes, such as HbA1c level, blood pressure, and cholesterol profiles, were measured before and after the implementation of the neuropathy-based coaching program. The finding reported that all clinical outcomes, except for BMI status, in the Intervention group are significantly improved after receiving the program compared to the control group. The improvement of the clinical outcomes can be attributed to several reasons, such as:

Firstly, the researchers implemented a skill-based coaching method that focused on self-management behaviors, including dietary management and regular active physical exercise. The researchers also coached patients in monitoring their blood glucose levels according to established recommendations. The current findings are consistent with previous studies that confirmed the positive impact of strict dietary control on clinical outcomes for diabetes patients (Hurst et al., 2020; Pamungkas et al., 2015).

Actively engaging in physical exercise has significantly to improving the clinical outcomes among diabetic patients. In this study, the researchers coached the appropriate physical activity based on the established recommendation. All participants actively performed aerobic exercise at public health centers once a week. This approach proved most beneficial in preventing the progression of diabetes, enhancing glucose disposal, maintaining blood glucose levels, and preventing foot ulcers. These findings are consistent with previous studies mentioned that anaerobic exercise can reduce blood glucose levels and HbA1c, thereby improving the quality of life for patients (Fajriyah et al., 2020). Another study reported that aerobic exercise positively impacts blood glucose levels by altering body composition and reactivating insulin sensitivity (Tomas-Carus et al., 2020). A review study revealed that aerobic exercise significantly affects cholesterol profiles such as HDL, LDL, and total cholesterol levels (Mann, Beedie& Jimenez, 2013). In contrast, with the BMI status, physical exercise has not positively affected maintaining the BMI status and body fat percentage. However, it may reduce the risk of being overweight and having a high body fat percentage (Widiastari, Taufik, & Mukhtar, 2020).

CONCLUSION AND RECOMMENDATION

This pilot study concludes and supports the feasibility and acceptability of neuropathy-based coaching implementation with diabetic patients. The findings showed the neuropathy-based coaching program significantly enhanced the public health nurses' skills in preventing foot ulcers. In addition, It positively influenced the knowledge and skills of diabetic patients, leading improved clinical outcomes and prevent diabetic complications after six weeks of the program. Further study is needed to evaluate the neuropathy-based coaching program to achieve the best reliability across a larger number of sample size and in various settings.

CONFLICT OF INTEREST

The authors declared no conflict of interest in writing the manuscript

ACKNOWLEDGEMENT

We would like to thank all participants and community health center for supporting the study. Special thanks to funder for supporting the budget allocation for data collection.

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