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Pilot Testing A Community-Based Diabetes Health Promotion Intervention: A Study in a Rural Community in Chiang Mai, Thailand

Peeranuch LeSeure[1], Benchamat Thatsaeng[2]

[1]The College of Nursing and Health Sciences, University of Massachusetts Dartmouth, USA
Email: pleseure@umassd.edu
[2]McCormick Faculty of Nursing, Payap University, Chiang Mai, Thailand
Email: tadsang@yahoo.co.th

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Corresponding author:
Peeranuch LeSeure
The College of Nursing and Health Sciences, University of Massachusetts Dartmouth, 285 Old Westport Rd. Dartmouth, MA, 02747, USA.
Email: pleseure@umassd.edu

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Abstract. Introduction: In Thailand, the demand for adult health care has risen due to the rapidly increased prevalence of diabetes mellitus; therefore, it is challenging to successfully implement diabetes management in rural areas due to a shortage of doctors and nurses. **Objective:** The purpose of this pilot study was to determine the effectiveness of a health promotion intervention developed by community village health volunteers (VHVs). **Method:** Twenty patients with diabetes and their family support persons living in Talat Khwan Sub-district, Chiang Mai, Thailand, participated in a diabetes health promotion intervention. The intervention consisted of diabetes education, a health campaign, and home visits. The outcomes measured were 1) fasting blood sugar levels (FBS) and 2) family involvement in health promotion behaviors using the Family Involvement Questionnaire. **Results:** After the intervention, FBS and family involvement were significantly improved ($ES = 1.40$, $t = 2.76$, $p < .05$) and $ES = 1.65$, $t = 3.82$, $p < .001$, respectively), indicating that the diabetes health promotion intervention improved glycemic control and enhanced family involvement. **Recommendation:** Further study is needed to determine the sustainability of diabetes health-promoting behaviors as a result of the intervention

Keywords: community participation, diabetes, health promotion, fasting blood sugar, family involvement

INTRODUCTION

The prevalence of diabetes in adults (20–79 years) tripled between 2000 and 2019 worldwide. A total of 463 million people were diagnosed with diabetes. This number is projected to reach 578 million by 2030 and 700 million by 2045 (1). Currently, Thailand is in the top ten countries for impaired glucose tolerance in adults (1). Moreover, diabetes is the third leading cause of death in the country (2).

In Thailand, the sub-district health promotion hospital (SPH) is the minor health institute in the health system. It is responsible for providing primary healthcare and services to people in the community where the hospital is located (3). These services include treatment for minor trauma or non-serious illness, infection control, non-communicable disease prevention, health promotion services, and supportive care for long-term conditions (4).

Primary care service is the frontline for health promotion, prevention, and treatment of diabetes. However, services at this level of care across the nation have experienced a longstanding shortage of professional staff. Accordingly, Talat Khwan Sub-district Health Promotion Hospital (TK-SHPH), a local health promotion hospital in Chiang Mai Province, is overwhelmed by healthcare demand. Having inadequate professional staff is a significant obstacle to care delivery for individuals with diabetes(5). Consequently, this population of patients are underserved and at risk for acute and chronic complications of diabetes. Using monthly FBS as an indicator for diabetes control at the primary care level, 55% of patients (n = 65) who visited TK-SDHPH between 2015 and 2016 had a diagnosis of diabetes, and 50% of that population had uncontrolled diabetes (FBS > 130 mg/dL) and were at risk of developing diabetes complications (6).

Successful diabetes management requires collaboration among patients, caregivers, and health care providers. Thus, health care providers must work closely with the person with diabetes and their family members and significant others to improve diabetes knowledge and enhance self-care behaviors. However, managing diabetes in the TK-Subdistrict community is very challenging unless engaged community participants work collaboratively with TK-SHPH hospital staff to improve community health through health promotion activities.

In Thailand, VHVs are non-health professional community health workers who play a significant role in connecting community members and the hospital staff. Their responsibilities include disseminating health information to the villagers, collecting health survey data, and assisting with patient referrals to the network health center. Planning and decision-making for the services occur at the hospital staff level, then implemented by the VHVs.

Studies have shown that community-based participatory interventions that engage patients with diabetes, family support persons, and stakeholders in the planning and invention process enhance diabetes health intervention success (7–11). Based on this evidence, TK-SHPH and McCormick Faculty of Nursing partnered to develop a community-based research project. The project aimed to improve diabetes health promotion services, increase knowledge and self-care among people with diabetes, enhance family participation in diabetes health promotion, and improve blood sugar control. The project consisted of five phases: mutual commitment establishment, situational analysis and needs assessment, health promotion development and planning, implementation of the intervention, and evaluation. Throughout the project, community members were involved in all phases of the study.

The purpose of this study was to determine the effectiveness of diabetes health promotion intervention delivered by VHVs. The intervention aimed to improve 1) FBS levels and 2) family involvement in promoting patients' self-care behaviors. For this study, health promotion is defined as interventions that enhance knowledge and promote self-care behaviors among patients with diabetes. This article presents Phase 3 to Phase 5, during which time the VHVs engaged in diabetes health promotion planning, implementation, and

evaluation. More details about Phase 1 and Phase 2 are described elsewhere (12).

METHODS

Study Design and Participants

The researchers used a one-group pretest and posttest study design to measure the effectiveness of the health promotion intervention developed, planned, and implemented by the VHVs. Fasting blood sugar (FBS) and family involvement were assessed before and after implementing the intervention.

Data were collected between October 2016 and March 2017. The Faculty approved the research protocol of the Nursing Research Ethics Committee at Chiang Mai University. This research institute provides ethical reviews for research conducted in the universities in Chiang Mai, Thailand.

Participants were selected using purposive sampling. The hospital staff recruited thirty-five diabetes patients who received health services at TK-SHPH and their caregivers (one of each) during a monthly follow-up visit. Thirty-three participants and their caregivers signed up to participate in the intervention. Inclusion criteria for patients and caregivers were 18 years old or older, able to communicate in Thai. Additionally, eligibility as a patient participant included having at least one caregiver who agreed to participate in the intervention.

Exclusion criteria included the presence of a physical or mental health condition (such as coronary heart disease, stroke, and cognitive impairment) that would limit participation in health promotion activities. During the intervention, patients referred to a higher level healthcare facility due to diabetes complications or moved out of TK-Subdistrict during the intervention were removed from the study because they no longer received treatments at TK-SDHPH. Also, participants who did not participate in every health education session were excluded from data analysis because they missed the knowledge needed to facilitate proper self-care behavior.

Instruments

The PI developed a data collection instrument, the Family Involvement Questionnaire, comprised of two sections. Section 1 is the demographic characteristics, including gender, age, marital status, educational level, income, living arrangement, years since diagnosis, and comorbidities. Section 2 consists of 25 statements related to family involvement in promoting self-care behaviors recommended by the Diabetes Association of Thailand (DAT) 2017 Clinical Practice Guideline for Diabetes. Item scores ranged from 0 to 2; 0 indicated not or rarely involved, one indicated involved sometimes, and two showed always involved. Possible scores ranged from 0-50.

The questionnaires were examined for content validity by three diabetes experts. The content validity index (CVI) was 0.81, which indicated a high level of validity. The internal consistency reliability was tested by 15 diabetes patients who received diabetes care from the other SHPH in the same district. Cronbach's alpha coefficient of 0.67 indicated an acceptable reliability level (13).

Health Promotion Intervention Development and Implementation

In Phase 3, intervention development and planning, TK-SHPH staff (community researcher) and the thirteen VHVs discussed the diabetes health promotion issues and the community needs identified in Phase 2. The three components of diabetes health promotion intervention, including diabetes education, a health campaign, and home visits, were highlighted. Then, they set health promotion goals and developed an action plan for health promotion intervention. During the meetings, the hospital staff served as facilitators and consultants, giving advice, feedback, and suggestions as needed to ensure that the proposed plan was viable.

In phase 4, implementation of the intervention, the intervention consisted of three components (12). The VHVs implemented a five-month-long diabetes health promotion intervention, as shown in Table 1.

Table 1. *Diabetes health promotion activities*

Month	Health promotion activities
1-month (October)	Health education: diet and exercise
2-month (November)	Health education: local herbs and spices
3-month (December)	Health education: relaxation, stress management, diabetic foot care, home visit 1
4-month (January)	Health campaign
5-month (February)	Home visit 2
6-month (March)	Evaluation (Data collection)

Diabetes Health Education. Three health education sessions were held one month apart and lasted approximately three hours per session. The six diabetes education topics covered were those suggested by the patients and caregivers in Phase 2: diabetic diet, exercise, local herbs and spices, relaxation, stress management, and diabetic foot care. To ensure the accuracy of information delivered in this educational activity, the VHVs team invited diabetes care experts from McCormick Faculty of Nursing, Payap University, to teach these topics.

Community Health Campaign. A health campaign, "*Food Festival: Diabetes Food for Good Health,*" was arranged one month after completing the third health education session. This intervention was designed to encourage the participants to apply their knowledge to their daily living and motivate involvement.

Home Visit. The VHVs were trained to visit patients with diabetes in their homes. Their responsibilities were to remind the patients to eat healthily, take medications as directed, and exercise regularly. Each VHV visited the same participants twice during the intervention and used the guideline to direct their conversation with the patient and family support persons.

In Phase 5, evaluation of the intervention (6th month), VHVs who was not involved in the intervention development and implementation delivered the questionnaires to the participants' homes to avoid bias in data collection. Each family support person completed and returned the questionnaire to the VHV who had the questionnaire. Patient participants also underwent FBS testing at TK-SHPH.

Data Collection

Participants were informed of the study's purpose and design. The researchers clarified that participation was voluntary, the information collected would be treated confidentially, anonymity would be ensured, and free to withdraw at any time. All participants gave written informed consent before data collection. FBS was collected by a TK-SDHPH nurse at the hospital using the hospital protocol. FBS tested on the month before the first health education started was used as a pretest result. The FBS measured on the month after completing the last home visit was used as a posttest result.

The Family Involvement Questionnaire is a self-reported questionnaire. The participants completed the questionnaire before attending the first health education session and within two weeks after the last home visit was completed. For the participants who had limited ability to read and write, the questionnaire was administered by the VHVs. The VHVs who collected the data were not involved in the intervention development and implementation.

Data Analysis

Data were entered into IBM Statistical Package for the Social Sciences (SPSS), and descriptive analysis was performed to show demographic information. An Independent paired t-test was used to compare FBS levels and

family involvement scores before and after participating in the intervention.

RESULTS

Thirty-three participants and their caregivers participated in the intervention. However, only twenty pairs attended at least two education sessions among the patients and

caregivers who attended health education together. The most frequent reason for being absent was the time conflict between the education schedule and unplanned activities, such as family events and doctor visits.

DISCUSSION

The purpose of this pilot study was to determine the effectiveness of a health promotion intervention developed by community VHVs on glycemic control and caregiver involvement.

Table 2. FBS mean scores compared between before and after the health promotion intervention (N=20)

Outcomes	Before the intervention		After the intervention		Paired t-test	P-value
	Mean	SD.	Mean	SD.		
FBS (mg/dL)	159.50	38.85	144.75	36.08	-2.76	.05

Table 3
Family participation mean scores compared between before and after the health promotion

Outcomes	Before the intervention		After the intervention		Paired t-test	P-value
	Mean	SD.	Mean	SD.		
Family participation	22.30	3.13	25.65	1.98	31.95	.001

After the intervention, the mean scores of FBS significantly improved, from 159.50 to 144.75, for the effect size of 1.40 ($t = 2.76$, $p < .05$), as displayed in Table 2.

Family involvement also improved significantly, as indicated by pretest and posttest mean scores of 22.30 and 25.65, respectively, and an effect size of 1.65 ($t = 3.82$, $p < .001$). See Table 3.

The mean age of the patients and their family support persons was 64.26 ($SD = 9.21$) and 45.85 ($SD = 16.22$). Caregivers were children who lived with the patients (45%) or spouses (55%). Seventeen patients (85%) and 12 family support persons (60%) were female. Most of them had only primary education (Grade 4) (88.24%) and were married (70.59%). The mean duration of diabetes from diagnosis was ten years. Fourteen patients had at least one comorbidity, including hypertension (10), heart disease (4), dyslipidemia (1), and chronic obstructive pulmonary disease (1)

This study showed that the outcomes were promising when the VHVs and patients' family support persons were involved in diabetes health promotion intervention. Three elements that facilitated the success of this health promotion program were the intervention's components, VHVs involvement, and family support person involvement.

The interventions are more appropriate and applicable when the community members are involved (7). In this study, the CBPR allowed the researchers and TK-SDHPH to collaborate with patients with diabetes, their family support persons, and VHVs to design a diabetes health promotion intervention that served the community's needs. The community-recommended health promotion intervention comprised diabetes education, a health campaign, and home visits. Thus, participants learned about diabetes through the health promotion intervention, which improved their self-care behaviors and glycemic control.

With the active engagement of the VHVs, key persons in the rural Thai community,

activities related to diabetes health promotion were offered more frequently than could be managed by the TK-SHPH workforce alone. This improvement showed that community involvement led to leadership development and prepared a workforce for TK-SDHPH. The effectiveness of the health promotion intervention in reducing FBS levels demonstrated in this study is consistent with previous studies that showed the success of community involvement in health promotion (8,10,14,15).

Also, a home visit is a proactive strategy that fosters patient and family involvement in diabetes health promotion. Other CBPR studies have also shown improvement in family participation due to home visits (8,10,16). The previous study (8) established a home visit model based on collaboration between nurses and VHVs, which the results showed that FBS was improved after implementing the model. Although the FBS values in this pilot study did not reach 100 to 130 mg/dL, as recommended by the Diabetes Association of Thailand (17), the results showed that the diabetes health prometon intervention successfully improved glycemic control, reducing 14.47 mg/ dl FBS value. FBS not reaching a required level might relate to the patients' age and their physical activity. In older adults, FBS levels tended to be higher than those of participants in the other studies. Also, almost half of the rural Thai elderly, aged 67 years and older, are physically inactive and do not exercise (18). For this reason, the patient's FBS levels remained higher than the recommended range, although a significant improvement was found after participating in the intervention.

The family support persons participated in every step of the project; therefore, they were motivated to support the patients when they were at home. Active support and care from the family members, who lived with the patients, greatly influenced diabetes self-care behaviors and positively affected patient outcomes (19). When the family support persons participated in the education sessions, they gained knowledge and were motivated to involve in the patients' self-care behavior. In a similar study by Wayobut and Sutra, the findings illustrated that most patients demonstrated improved FBS when patients, family, community leaders, and VHVs engaged in diabetes self-care interventions (10).

The study's limitations, including not randomly sampling participants and the exclusion of 40% of diabetes patients and their family support persons from data analysis, might limit the application for other researchers regarding the effectiveness of diabetes health. Moreover, most participants in this study were females, 17 diabetes patients (85%), and 12 family support persons (60%). Therefore, the results of this diabetes intervention were probably somewhat influenced by females Thai persons.

CONCLUSION/ RECOMMENDATIONS

The VHVs involvement in program implementation successfully reduced the patients' blood glucose levels and improved family support person involvement. Thus, a VHVs involvement approach can serve as a prototype for diabetes health promotion, especially in rural communities facing a shortage of nurses and doctors. However, when planning health education in the community, the participants' day-to-day life often interferes with participation. The community hospital staff should fill this gap by providing individualized instruction to the patients and caregivers at their homes or hospital visits for a follow-up appointment. This proactive plan will allow the patients and caregivers to benefit from health education.

Further research is needed to determine the long-term sustainability of this intervention. A community-based leadership training program to prepare a community workforce to work collaboratively with the community healthcare staff will be a proper solution for staff shortage at the community health care level. Also, future research should clearly describe the role of family support persons in the intervention and compare patient outcomes with and without family involvement.

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