ISSN 2673-0200 (print) ISSN 2673-0251 (online)

Original article

Article history
Received: Sept 4, 2018;
Accepted: Apr 27,2019;
Published: Apr 30,2019

Lifestyle-Appropriate Peer Supports for Glycemic Control among Type 2 Diabetes Patients in Thailand

Boosaba Sanguanprasit[1], Pimsurang Taechaboonsermsak[2], Kanonkarn Mekanantachai[1], and Sirinun Charoenphol[1]

[1]Boromarajonani College of Nursing Nopparat Vajira[1] Mahidol [2]University Faculty of Public Health

Abstract

Diabetes, a worldwide health problem, is a chronic, lifelong condition which requires continuous self-care management to keep glycemic level under control. More often than not, self-care management is short-lived if not appropriately supported. This quasi-experimental study, three-group pre-post-test was carried out to assess the effects of context and lifestyle appropriate peer support models in an agricultural and non-agricultural communities. A total of 58 and 30 type 2 diabetes patients were recruited into the intervention and comparison groups, respectively. Out of 58 patients in the intervention group, 29 patients each were selected from an agricultural community and from non-agricultural community to observe different peer support models and glycemic levels between these two groups and in the comparison group. The inclusion criteria included aged 35 – 75 years, fasting blood sugar (FBS) lied between 30 – 300 mg/dl, and systolic blood pressure did not exceed 200 mmHg. Trans-theoretical Model, participatory learning, inclusive planning, and social support were used to guide the intervention activities to increase knowledge and self-care management behaviors. Twenty village health volunteers in the experimental areas were recruited and trained to function as peer supporters. The intervention lasted six months from July to December 2011. After the intervention, patients in both experimental groups significantly improved their self-care management and reduced HbA1C from 8.02 to 7.5% (p-value<0.05) in agricultural and from 8.54 to 7.60% in non-agricultural group (p-value<0.01), while those of the comparison group slightly increased. Two different peer support models were identified in the agricultural and non-agricultural communities. Results from this study showed that peer supports appropriately tailored to the context and lifestyle of diabetes patients could significantly increase knowledge, improve self-care management, reduce BMI and blood sugar levels of the patients. It is suggested that peer support using context and lifestyle appropriate strategies be integrated into country health care system to make self-care management among chronically ill patients sustainable.

Key words: glycemic control, lifestyle-appropriate peer supports, self-care management

Corresponding author: Boosaba Sanguanprasit Email: boosaba@bcnnv.ac.th

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

Introduction

Diabetes mellitus (DM) is a worldwide health problem and has been increasing in numbers. It was estimated that 629 million adults of the world population would have diabetes in 2045 and over 60% of which lived in Asia. Thailand is no exception. The prevalence of diabetes in the country rose from 7.7% in 2009 to 9.9% in 2014 and caused 30,000 DM related deaths annually (Aekplakorn et. al, 2018). Only about 30% and 41% of diabetes patients in urban and in rural areas, respectively, were able to control their blood glucose within normal blood levels (Pethchit, 2015; Worawongprapa, 2008; Mayurasakorn et. al, 2009). Uncontrolled glycemic level can lead to complications, and the severity of which is well documented (ADA, 2008; WHO, 2007; Sanguanprasit et. al, 2016).

Self-care management which includes healthy eating, proper exercise, stress management, and foot care, mostly affected by individuals' gender, age, education and sufficiency of household income (Henderson et. al, 2011), is essential for type 2 diabetes patients to effectively control their glycemic levels and reduce the risks of acquiring associated complications. However, such self-care management is often short-lived and faded soon after the end of an education program (Becker, 1974).

Evidences from previous studies showed that the majority of diabetes patients in Thailand had inappropriate self-care management in controlling eating and exercise behaviors (Aekplakorn et. al, 2018; Mayurasakorn et. al, 2009; Sanguanprasit et. al, 2016). Healthy behaviors can be promoted by raising persons' perceived threat of developing serious complications and developing their self-efficacy in diabetes self-care management through learning processes (Bandura, 1977; Lerman& Glanz, 1997; Henderson et. al, 2011; Brownson & Heisler, 2009). Since diabetes self-care management is a life-long practice, the patients need suitable, context appropriate supports to maintain their health behaviors (Brownson & Heisler, 2009; Fisher et. al, 2015; Fisher et. al, 2010; Sanguanprasit et., al, 2011; Fisher et. al, 2012). To this end, the concept of peer supports will be an effective strategy in helping the patients to develop and sustain their self-care management.

Peer support, defined as the provision of support from an individual with experiential knowledge based on a sharing of similar life experiences, is broadly feasible and sustainable, usually provided within a volunteering framework and can be delivered in many ways, including group or individual support or through more remote formats such as telephone or internet-based support that are appropriate for patients' lifestyle and context. Peers can be family members, friends, community people, volunteers, or peer patients. Supports provided by peer include assistance in daily management of diabetes, social and emotional support and linkage between community and health system. Nonprofessionals could well contribute to supporting patients' self-care management and glycemic control (Sanguanprasit et. al, 2011; Dale et. al, 2009; Sacco et. al, 2009). The approach has been widely implemented using different methods of support. However, most peer support programs previously carried out, the activities of which were predominately determined and designed by researchers and the sustainability of the programs was questionable (Fisher et al, 2015).

Village health volunteers (VHVs) which is part of Thailand's primary health care were chosen to function as peer supporters in this study because they have been trained to help local health staffs in various health promotion and disease prevention programs as well as to undertake simple tasks as taking temperature, measuring blood pressure, wound dressing, and first aid. Therefore, they could be a good choice for peer support to promote self-care management among DM type 2 patients (Sanguanprasit et. al, 2016).

Currently, there are few health promotion programs for diabetes patients in Thailand that yield sustainable benefits. To make behavior modification sustainable requires innovative approaches that are suitable for context and lifestyle of the subjects. Take agricultural and non-agricultural communities as an example, these two communities differ in terms of structure, lifestyle, daily activities, and

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

facilities such that no one health promotion program can fit both. Therefore, the aim of this study was to assess the effectiveness of the context and lifestyle appropriate peer support models in agricultural and non-agricultural communities using VHVs as peer supporters to develop and sustain self-care management among diabetes type 2 patients. Inclusive planning, team learning, and social supports would be used to empower the patients in designing and implementing activities as well as monitoring and evaluation of their health behaviors.

It was hypothesized that type 2 diabetes patients who participated in the program in both agricultural and non-agricultural communities, compared with their base-line information and with the comparison group, would have higher mean scores of diabetes knowledge, self-care management, reduced body mass index (BMI) and HbA1C level by the end of the program. Glycemic control in this study was defined as patients' ability to reduce their glycemic levels as measured by HbA1C. Non-agricultural community is defined as the community where more than 50% of income generation is associated with wage work or self-employment including agro-processing and setting up a small or adaptive (switching from cash crop cultivation to commodity trading) business (Davis and Pearce, 2001).

Research Methodology

The study was a quasi-experimental design, three-group, pre-post-test.

Study Population and Sample

Two provinces, Suphan Buri in the central, and Nakhon Ratchasima in the northeast region, were selected based on high prevalence of type 2 DM and the willingness of the provincial chief medical officer to participate in the study. An agricultural and a non-agricultural community were selected from Suphan Buri province as an experimental and comparison group, respectively. A non-agricultural community was selected from Nakhon Ratchasima province. All groups were selected from comparable settings in terms of age, gender, and sufficiency of household income.

Sample size

The number of the patients included in the study was calculated by using the mean HbA1C of diabetes patients before the intervention which was 8.2 and the mean reduction in HbA1C level from baseline among patients without an intervention which was 0.2% with standard deviation of 1.5% (Howteerakul et. al, 2007). We believed that the intervention would further decrease patient's HbA1C level by 2% with the smallest change of HbA1C level was 0.15. A total of 84 patients (28 patients in each group) are needed to achieve 80% power at two-sided 5% significance level (Lwanga &Lemeshow, 1991).

The inclusion criteria were having type 2 diabetes, age between 35 – 75 years; and blood glucose not exceed 300 mg/dl. The patients were excluded if being treated with insulin; having severe complications such as renal failure, gangrene, or psychologically ill; and resting systolic blood pressure over 200 mmHg. A total of 58 and 30 patients were recruited into the experimental and comparison groups, respectively.

Steps of the study

The study was carried out in three phases: preparation, implementation and evaluation.

1. Preparation phase

Intervention mapping (Bartholomew et. al, 2001), a theoretical and evidence-based intervention, was used to guide the development of the intervention project. A structured questionnaire was developed to collect the data from the patients which included socio-demographic information, height, body weight, HbA1C, knowledge about diabetes mellitus, and diabetes self-care management. The questionnaire was validated by experts in health behaviors, nutrition, and exercise; field tests for reliability were carried out in these two provinces but not in the study areas. The Cronbach alpha of self-care management was 0.84 and KR-20 for knowledge was 0.79.

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

A preliminary survey was carried out using face-to-face interview. Six focus group discussions were carried out among patients, volunteers and health staffs to identify problems and determinants related to patients' self-care management and the volunteers' ability to support diabetes patients. The results were used to develop a training curriculum for the village health volunteers to enhance their capacities in encouraging and supporting diabetes patients to develop and maintain their self-care management.

The researchers met with VHVs in the respective experimental and comparison communities to inform them about the project and their roles. Ten VHVs each were recruited in the experimental groups to act as peer supporters. The criteria for selection included having at least two participating diabetes patients under his/her own care, being able to read and write Thai language, and willing to participate until the end of the study. Those who agreed to participate in the project signed the consent form. Twenty VHVs in the experimental groups were trained to enhance their knowledge and skills in diabetes management, inclusive planning, and context and lifestyle appropriate supports.

2. Implementation

After the training, VHVs and respective local health staffs met with diabetes patients to inform them about the study and asked them to join on voluntary basis and signed consent form. Medical records of those who agreed to join were reviewed to ensure their eligibility to join the study. They were then interviewed to assess health behaviors and lifestyle, and physically examined (height, weight, and blood pressure) and blood checked for HbA1C.

In each experimental group, discussions among the participating patients, VHVs, and local health staffs, who provided technical supports was carried out to set behavior and glycemic control goals, map out activities plan including monitoring and evaluation, and support strategies and schedule, as agreed by the patients and the VHVs. The researchers and responsible health staffs met with VHVs and patients in each group once a month to discuss activities, problems and obstacles; advice and moral supports were then provided accordingly. The intervention lasted six months.

In the comparison group, the patients and VHVs were invited to participate in the pre and post intervention surveys. These patients received usual care and supports provided by public health personnel and VHVs which included health education on diabetes mellitus, self-care management, and conventional home visit by health staffs and VHVs.

3. Evaluation

Face-to-face interview using structured questionnaire was used to evaluate the intervention; focus group discussions were used to identify the participants' satisfaction. The indicators used in the evaluation were:

Process measures included knowledge about diabetes mellitus and self-care management (eating and exercise behaviors, foot care, and stress management).

Output measures or physiologic endpoints included HbA1C and body mass index(BMI).

Data Management and analysis

Field supervision was carried out during data collection by the research team to ensure the quality of the data. The mean scores of knowledge, self-care management behaviors, BMI, and HbA1C levels between the two intervention and comparison groups were compared before and after the intervention, both within and between groups. Dependent t-tests was used to test the differences of the mean scores of the indicators within group and One-way ANOVA was used to test the differences between the experimental groups against the comparison group. Due to unequal mean scores of the indicators among the three groups prior to the intervention, the mean changes of these variables were used to compare between groups.

Ethical Approval

The ethical clearance of this study No. MUPH2009-112 was issued by the Research Ethic Committee of the Faculty of Public Health, Mahidol University, Thailand.

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

Results

1. Peer Support Models

Non-agricultural group

The approaches used in this group were more formal and individualistic. A half-day diabetes camp was organized by the VHVs and local health staffs to provide the participants knowledge about diabetes and enhance their self-care management skills. Methods used in the diabetes camp included group discussions and sharing information among participants, demonstration and practice.

The patients were divided into three zones according to the distribution of VHVs. Each zone consisted of 9 – 11 patients with 3-4 VHVs who collaboratively worked with the patients to identify self-care problems and determinants, set appropriate goals, identify means to achieve these goals, methods and tools used to assess their actions. VHVs in each group took turn to visit the patients at home once every two weeks, as agreed upon by the patients. During the visit, VHVs observed and discussed the patients' self-care management and provided advice and support accordingly. Most patients chose to exercise individually by brisk walking and bicycling. There was no formal gathering among the patients in the zone, but they occasionally met to share their experiences and provided each other moral support.

Local health staffs functioned as technical supporters for the VHVs as needed.

Agricultural group

The approaches used by this group were predominantly non-formal and team-based. All VHVs and participants worked inclusively, from sharing information and experiences about diabetes, problems in glycemic control, planning for actions to be taken, implementing and monitoring the activities. Team learning was the main stream of all activities and the patients took active roles in proposing and leading the activities. Exercise, done in group, led by the patients using appropriate technology such as stick (Mai Plong) exercise and hoo-la-hoop, was carried out daily at a VHV's house. A community organic garden was founded, a stationary bicycle was installed and used as an electricity generator for a water pump. The patients cycled the bike as a mean for exercise and at the same time watered the plants.

Every two weeks all VHVs and the patients met at the health center to discuss their progress and obstacles. Local health staffs were also present to provide additional information or advice if needed. After discussions, everyone would exercise and then cook a healthy meal which was served for lunch.

Regular home visits were undertaken at least twice a month, on days agreed upon by VHVs and their patients. Patient folder was used to track patient's progress and to provide guidance during home visits. VHVs in near-by villages worked as a team (usually 3-4 members per team) to visit patients under their care. During home visit the VHVs discussed the progress or any obstacles in diabetes management. Any problems beyond their capacity, the VHVs would call the local health staff for help and advice.

2. Characteristics of the patients

The three groups had comparable characteristics in terms of age, gender, education, and duration of having diabetes mellitus. About 55% of the participants in the agricultural group engaged in agricultural activities, while only 31% of those in the non-agricultural group did and the comparison group fell in between. Results of the pre-test revealed that all groups were not statistically significant difference in terms of duration of having DM, knowledge about DM, self-care management, and HbA1C (tables 1 and 2).

3. Within group comparison

Table 3 presents within group comparison of knowledge, selfcare management, BMI, and HbA1C levels of all groups.

Knowledge about DM

After the intervention, out of the total score of 28, the knowledge about diabetes mellitus of the experimental-agricultural group significantly increased from 18.5 to 24.6 (p-value <0.001). This was the only group that the mean score of the knowledge has significantly increased. While the knowledge of the non-agricultural group reduced but not statistically significant; likewise, though the knowledge of the comparison group increased from 16.8 to 17.6, this was not statistically significant.

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

Table 1. Socio-demographic characteristics of experimental and comparison groups before intervention

Factors	Agricultural (n=29)		Non-agricultural (n=29)		Comparison (n=30)		*p-value*
	N	%	N	%	N	%	
Age (Mean)	60.69		61.72		59.43		NS
(SD)	9.11		11.30		8.47		
Sex (% female)	23.00	79.30	20.00	69.00	24.00	80.00	NS
Education level							NS
- No formal education	-	-	-	-	2	6.70	
- Primary	29	100.00	25	86.20	25	83.30	
- Secondary or higher	-	-	4	13.80	3	10.00	
Occupation							NS
- Agriculture	16	55.17	9	31.03	14	46.70	
- Unskilled worker	4	13.89	7	24.14	9	30.00	
- Others	2	6.89	8	27.58	-	-	
- Unemployed/housewives	7	24.13	5	17.24	7	23.39	
Household income							NS
- Sufficient	12	41.30	13	44.82	15	50.00	
- Insufficient	17	58.70	16	55.18	15	50.00	

Table 2. Mean scores of diabetes related information of experimental and comparison groups before intervention

Factors	Agricultural (n=29)		Non-agricultural (n=29)		Comparison (n=30)		*p-value*
	Mean	SD	Mean	SD	Mean	SD	
Duration of DM (Years)	6.07	4.79	8.80	5.60	6.00	3.80	NS
Knowledge	18.06	5.09	18.55	4.19	16.83	5.18	NS
Self-care management	77.00	7.13	76.18	7.10	76.60	8.67	NS
BMI	25.89	4.17	25.82	3.26	26.64	4.12	NS
HbA1C	8.02	1.88	8.54	2.34	7.57	1.68	NS

Self-care management and BMI

After the intervention, out of the total score of 100, the mean score of self-care management of the agricultural experimental group significantly increased from 77.00 before the intervention to 82.52 (p-value <0.01); while those of the non-agricultural group and the comparison group were not significantly increased. The BMI among the agricultural and non-agricultural experimental groups significantly decreased from 25.8 to 24.53 (p-value<0.05) and from 25.82 to 25.10 (p-value<0.05), respectively; while that of the comparison group stayed almost the same.

Glycemic control

Despite the non-significant knowledge, and behavioral changes among the non-agricultural experimental group, the reduction of HbA1C in this group was more prominent and significant, from 8.54 to 7.6% (p-value<0.01) than that of the agricultural group, from 8.02 to 7.50% (p-value<0.05). While that of the comparison group non-statistically increased from 7.57 to 7.99%.

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

Table 3. Within group comparison of mean scores of factors, before and after intervention

Factors	Before	After	*p-value*
Knowledge			
Agricultural (n=29)	18.06 (5.09)	24.62 (2.42)	<0.01
Non-agricultural (n=29)	18.55(4.19)	18.34(3.89)	0.16
Comparison (n=30)	16.83(5.18)	17.63(4.20)	0.52
Self-care Management			
Agricultural	77.00(7.13)	82.52(5.38)	<0.01
Non-agricultural	76.18(7.10)	76.20(6.14)	0.42
Comparison	76.60 (8.67)	77.13 (7.39)	0.20
BMI			
Agricultural	25.89 (4.17)	24.53 (4.00)	0.05
Non-agricultural	25.82 (3.26)	25.20(3.05)	0.05
Comparison	26.64(4.12)	26.84 (4.78)	0.30
HbA1C			
Agricultural	8.02(1.88)	7.50 (1.50)	0.03
Non-agricultural	8.54 (2.34)	7.60(1.81)	<0.01
Comparison	7.57 (1.68)	7.99 (2.00)	0.32

Note: Numbers in brackets are standard deviations

Table 4. Comparison of mean score changes of knowledge, self-care management, BMI, and HbA1C after the intervention of the two experimental groups as compared against comparison group

Factors	Mean difference	Standard error	p-value
Knowledge			
Agricultural	-5.80	1.46	<0.01
Non-agricultural	2.10	1.49	0.17
Self-care Management			
Agricultural	-4.86	0.21	0.02
Non-agricultural	0.76	0.21	0.72
BMI			
Agricultural	-0.95	0.41	0.02
Non-agricultural	-0.94	0.41	0.02
HbA1C			
Agricultural	-0.87	0.37	0.02
Non-agricultural	-1.29	0.37	<0.01

4. Between groups comparison

Results from One-way ANOVA and Bonferroni test showed that after the intervention the agricultural experimental group significantly out-performed the comparison group in all aspects, knowledge, self-care management, BMI, and HbA1C (the significant levels ranged from p = 0.02 to p-value<0.01). The non-agricultural group, however, had significantly out-performed the comparison group only in the reduction of BMI (p-value <0.05) and HbA1C (p-value<0.01).

Discussion and Conclusions

Results from this study showed that trained VHVs could be an effective tool in supporting type 2 diabetes patients to significantly gain more knowledge, improve self-care management, reduce BMI and blood sugar levels; and that patient-centered, context and lifestyle appropriate methods remarkably effective in engaging and retaining the participants in the activities. The results of this study were consistent with previous studies

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

which found peer supports could help the patients to significantly reduce HbA1C levels and increase self-care management mean score of the participants in the intervention group (Sanguanprasit et. al, 2011; Thom et. al, 2013; Long et. al, 2012; Lorig et. al, 2009; Bauman & Dang, 2012).

Different approaches used by agricultural and non-agricultural were in accord with patients' contexts and lifestyles. In the non-agricultural community, most houses located along the main road due to the tenants' livelihood that they needed to commute to the main business district for their work. As such the approaches used in this group were more formal and individualistic; the participants did their own exercise and diet with the supports of respective VHVs. Whereas in the agricultural community the majority of the participants engaged in agricultural and labor activities, most people lived close by, such that they could conveniently do activities together. Group activities such as traditional exercise and cooking that fit their lifestyle effectively inspired each individual to do better and adhere to healthy behaviors. The activities at the community organic garden, which was both fun and economically productive, provided them the opportunity to exercise and to have organic produce for household consumption. This effectively made the participants perceived the benefits of and adhered to the activities which is an essential element in sustaining people's behaviors (Sanguanprasit et. al, 2016; Long et. al, 2012; Lorig et. al, 2009; Bauman & Dang, 2012).

In the focus group discussions, the participants indicated that they enjoyed the supports provided by VHVs, sharing experiences and supporting each other among themselves. This had lifted up their spirits and inspired them to do better. Setting goals for diet control really helps them to manage their diets. The personal record helped them discern positive changes after joining the activities and kept them adhered to the activities (Becker, 1974; Bandura, 1977). Members in the agricultural group said that by allowing them to have a free-hand in designing their own activities, supported by VHVs and local health staffs, they could design the activities that were consistent with their daily life and made them adhere to the activities. Such comments supported previous studies which found people-centered health promotion program with minimum competing interests could yield better and sustainable health behaviors (Brownson & Heisler, 2009, Fisher et. al, 2015; Sanguanprasit et. al, 2011).

The intervention could significantly reduce BMI and HbA1C, but not significantly increase the knowledge and self-care management among the participants of non-agricultural group. This could be explained, as mentioned above, that the peer supports in the non-agricultural group was mostly done individually. As a result, the patients had less chance to share and reinforce their knowledge and experiences regularly. However, knowledge by itself may not have much effects on health behaviors (Becker, 1974; Bandura, 1977; Henderson et. al, 2011). Although their overall self-care management was not significantly increased, their eating behavior significantly increased from 38.11 to 40.10 (p-value = 0.02). Detailed information on self-care management suggested that the agricultural group needed to improve their eating behavior. Manyof them ate more rice than what is recommended. This could be due to the fact that about 69.00% of the participants engaged in labor-intensive work such that they needed more energy to carry out daily hard work. These can become a major barrier to achieving behavioral goals (Bauman & Dang, 2012).

Strengths of the study

The intervention of this study was carefully designed by using the concept of intervention mapping (as explained above). Preliminary quantitative and qualitative study was conducted and the results of which were used to design a training program for VHVs and peer supports to ensure that the activities were suitable for and attractive to the participants, thus the results were expected to be sustainable.

Training of data collector and field supervision were carried out to ensure the quality of the data. Both quantitative and qualitative data were used to ensure the accuracy and usefulness of the study.

Limitations of the study

Seasonal variation had great impacts on patients' self-care management, especially among the agricultural community. Their daily routine including eating and sleeping schedules had changed and reduced during planting and harvesting seasons and made it difficult for them to maintain self-care behaviors. The

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

intervention did not take into account for the seasonal variation, the harvest season, which may affect the daily routines and livelihood and health behaviors of the participants in the agricultural community.

Conclusions

This study has demonstrated that village health volunteers, if properly trained, can be an effective tool in supporting type 2 diabetes patients to gain more knowledge and improve their self-care management, reduce BMI and blood sugar levels.

Research Implications and Recommendations

VHVs should be trained to enhance their competencies in providing direct and indirect supports as appropriate to build self-confidence and self-efficacy among the patients. To make glycemic control sustainable, the patients should take an active role in setting appropriate goals, identify means to achieve these goals, and regularly assess the results of their actions. Tools for self-monitoring should be made available to the patients to reinforce their self-care management. Peer support by using context and lifestyle appropriate strategies for sustainable self-care management among chronically ill patients should be integrated into health care system of Thailand since the model is culturally, socially and economically appropriate.

More research is needed to determine whether the effects of peer support can be sustained beyond six months. Family members should be involved in supporting self-care of the patients, especially in agricultural community where seasonal variations affect patients' behaviors. More study is also needed to understand how to best prepare and support peer leaders so that they can be more effective in supporting the patients to maintain their behaviors over a long period of time.

Acknowledgement

We are thankful for Peer for Progress, A program of the American Academy of Family Physician Foundation which financially supported this study; Professor Edwin B Fisher, the global director of Peer for Progress who tirelessly provided technical supports and opportunities to learn from each other; our local research assistants who actively did all they could to help us carry out all activities in the field; local administrators in both provinces who facilitated us during the course of the project; last but not least, all the participants in our project both experiment and comparison groups, without whom, this study would not be completed.

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

References

Aekplakorn, W., Chariyalertsak, S., Kessomboon, P., Assanangkornchai, S., Taneepanichskul, S.,&Putwatana P. (2018). Prevalence of Diabetes and Relationship with Socioeconomic Status in the Thai Population: National Health Examination Survey, 2004–2014.*Journal of Diabetes Research.*Article ID 1654530, 8 pages.Retrieved March 22, 2019, from https://doi.org/10.1155/2018/1654530.

American Diabetes Association. *Diabetes Learning Center for the Recently Diagnose.*Retrieved 20th August 2008 from: http://www.diabetes.org/all-about-diabetes/diabetes-learning-center.jsp.

Bandura, A. (1977). *Social Learning Theory***.**Englewood Cliffs: Prentice Hall.

Bartholomew, LK., Parcel, G.S., Kok, G., & Gottlieb, N.H. (2001). *Intervention Mapping:designing theory-and evidence-based health promotion program*. Mountain View, California: Mayfield Publishing Company.

Baumann, LC., Dang, Thanh, & Ngoc, Tran. (2012).Helping patients with chronic conditions: overcome barriers to self-care. *The Nurse Practitioner***,** 37(3):32-8.

Becker M.H. The Health Belief Model and personal health behavior**.**(1974). New Jersy: Slack. Thorofare.

Brownson, CA., & Heisler, M. (2009).The role of peer support in diabetes care and self-management. The Patient-Centered Outcomes Research. Retrieved 11th December 2011 from: http://adisonline.com/the patient/Abstract/2009/02010/The_Role_ of_Peer_Support_in_Diabetes_Care_and. 2.aspx.

Bureau of Policy and Strategy, Ministry of Public Health. (2007).*Thailand Health Profile Report.Bangkok*.Express Transportation Organization Printing Press.

Dale, J., Caramlau, I., Sturt, J., Friede, T., & Walker, R. (2009). Telephone peer-delivered intervention for diabetes motivation and support: the telecare exploratory RCT. *Patient Educ Couns*, 75(1):91–8.

Fisher, EB., Ayala, GX., Ibarra, L., Cherrington, AL., Elder, JP., Tang, TS., et al,.(2015). Contributions of Peer Support to Health, Health Care, and Prevention: Papers from Peers for Progress. *Annals of Family Medicine,* 13(Suppl 1): s2-s8.

Fisher, EB., Earp, JA., Maman, S., &Zoloter, A. (2010). Cross-cultural and international adaptation of peer support for diabetes management. *Fam Pract*, 27(Suppl 1):i6-i16.

Fisher, EB., Boothroyd, RI., Coufal, MM., Bauman, LC., Mbanya, JC., Rotheram-Borus, MJ., Sanguanprasit, B., &Tanasukarn, C. (2012). Peer Support For Self-Management of Diabetes Improved Outcomes in International Settings. *Health Affairs*, 31(1):130-139.

Heisler, M., Vijan, S., Makki, F., &Piette, JD. (2010). Diabetes control with reciprocal peer support versus nurse care management: a randomized trial. *Ann Intern Med*, 153(8):507–15.

Henderson, S., Kendall, E., & See, L. (2011). The effectiveness of culturally appropriate interventions to manage or prevent chronic disease in culturally and linguistically diverse communities: a systematic literature review. *Health and Social Care in the Community*, 19(3):225-249.

Howteerakul, N., Suwannapong, N., Rittichu, C., &Rawdaree, P. (2007).Adherence to Regimens and Glycemic Control of Patients with Type2 Diabetes Attending a Tertiary Hospital Clinic**.***Asia Pac J Public Health*,19(1): 43-49.

Junior Davis and Douglas Pearce (2001). The Non-Agricultural Rural Sector inCentral and Eastern Europein 'The Challenge of Rural Development inthe EU Accession Process'. Lerman, Z and Csaki, C. (editors).World Bank Technical Publication.

Lerman, C., & Glanz, K. (1997). Stress, Coping and Health Behavior. In Glanz, K., Lew's, F.M., &Rimer, B.K. (Eds.) Health Behavior and Health Education: Theory, Research, and Practice. 2nd Edition(pp. 211-230).San Francisco:Jossy-Bass Publishers.

Long ECJ, JA., Richardson., DM., Loewenstein, G., &Volpp, KG. (2012).Peer mentoring and financial

ISSN 2673-0200 (print) ISSN 2673-0251 (online)

incentives to improve glucose control in African American veterans. *Ann Intern Med*,156:416–24.

Lorig, K., Ritter, PL., Villa, FJ., &Armas, J. (2009). Community-based peer-led diabetes self-management: a randomized trial. *Diabetes Educ*, 35(4):641–51.

Lwanga, SK., &Lemeshow, K. (1991). *Sample size determination in health studies: A practical manual*.World Health Organization, Geneva.

Mayurasakorn K, Sornthip N, Caengow S, Chulkarat N, Wanichsuwan M. (2009). Glycemic control and microvascular complications among type 2 diabetes at primary care units. *J Med Assoc. Thai*, 92(8):1094-1101.

Pethchit R. (2015). Self-Care Behaviors and Blood Sugar Control among Patients with Diabetes Mellitus at Khiensa Hospital, Suratthani Province. *The Southern College Network Journal of Nursing and Public Health*, 6(2):15-28

Sacco,WP., Malone, JI., Morrison, AD., & Friedman, A., & Wells, K. (2009). Effect of a brief, regular telephone intervention by paraprofessionals for type 2 diabetes. *J Behav Med*, 32(4):349–59.

Sanguanprasit, B., Leelaphan, P., Techaboonsermsak, P., &Jongsuwat, R. (2016).Village health volunteers as peer supports for glycemic control among type2 diabetes patients in Thailand. *Journal of Public Health and Development*, 14(2): 49-60.

Sanguanprasit, B., Leelaphan, P., Techaboonsermsak, P., &Jongsuwat, R. (2011). Community volunteers help control diabetes in Thailand.*Health in South-east Asia*, 4(2): 7-10.

Thom, DH., Ghorob, A., Hessler, D., De Vore ,D., Chen, E., & Bodenheimer, TA. (2013). Impact of peer health coaching on glycemic control in low-income patients with diabetes: a randomized controlled trial. *Ann Fam Med*,11(2):137-144.

Toobert, DJ., Hampson, SE., &Glasgow, RE. (2002). *Diabetes Care*, 23(7): 943 – 950.

Worawongprapa O (2008). Glycemic control in diabetes with metabolic syndrome in community hospital. *J Med Assoc. Thai*,21(5):641-647.

World Health Organization, Department of Noncommunicable Disease Surveillance. (1999). *Definition, Diagnosis and Classification of Diabetes Mellitus and its complications*. WHO, Geneva.