

# Interventional Education Program Increases Knowledge, Illness Perception, and Self-efficacy Levels in Type 2 Diabetes Mellitus Patients: A Pilot Study Findings from Vietnam

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**Abstract— Introduction:** Diabetes mellitus (DM) is a metabolic disease whose global incidence is on a continuous rise. Its main variant- type 2 DM (T2DM) constitute about 90% of the diabetic population. The control of glycemic index and complications is vital in the care and management of T2DM, for which knowledge on the various aspects of the disease among the patients plays a significant role. **Objectives:** To study the effects of intervention based on the Common-Sense Model education program in knowledge, illness perception and self-efficacy of T2DM patients. **Methodology:** A quasi-experimental pilot study with 15 T2DM patients were researched using the questionnaires to assess demographic characteristics, knowledge on diabetes, illness perception of participants, self-efficacy, and instrument for research intervention such as booklet, video on exercise and posters on food exchange. **Results:** The mean score for knowledge was significantly improved from  $8.06 \pm 2.03$  to  $20.93 \pm 1.44$  after intervention in the participants. Similarly, illness perception dimensions and self-efficacy scores were significantly higher in participants after the interventions compared to initial. **Conclusions:** Our CSM based interventional education program was effective in improving knowledge and illness perception, and self-efficacy among T2DM patients in the study. The findings of this pilot study can serve as a platform for a large scale research which could be vital in the diabetes management in the region.

**Keywords—** T2DM, knowledge, illness perception, self-efficacy, Vietnam.

## I. INTRODUCTION

Diabetes mellitus (DM) is a disease of carbohydrate metabolism characterized by hyperglycemia. Importantly, it is causing an enormous global burden in terms of cost and mortality. Published reports indicate that about 425 million of global population suffered from DM in 2017, and this figure is expected to reach 629 million by 2045 [1]. In Vietnam, data indicates that DM was the sixth leading cause of death in the year of 2017 [2]. Among its major types-Type 1 DM and Type 2 DM (T2DM), the later one is prevalent in almost 90% - 95% of the patients [1, 2]. Uncontrolled DM in a long term may result in cardiovascular diseases, nephropathy, neuropathy and other severe health conditions resulting poor quality of life as well.

Glycemic control is central to the management of the disease and it is associated with many factors, such as age, gender, lack of knowledge on diabetes, self-management behaviours, self-efficacy, discontinuity of care, duration of DM, use of insulin, lack of standard health education programs, lack of health policies and social factors such as cultural barriers, marriage status, religions, social support and others [3-8]. According to the Vietnamese prospective, most patients do not achieve optimal glycemic control due to lack of knowledge, negative attitudes about DM, non-compliance with lifestyle regulation, and no incentive to change behaviour [9].

Patients' knowledge on diabetes is the understanding that patients obtain from diabetes education, observation, experience, self-perception, and self-action to make choices or adopt an attitude that helps to better react to requirements [10]. A high knowledge score on diabetes has been associated with improved levels of blood glucose [10-13]. Similarly, illness perception which is beliefs of individuals about their illness is also closely linked to the level of glycemic control [14]. Moreover, high-level self-efficacy has been considered related to optimal glycemic control and improved self-care behaviours [15].

Education to enhance knowledge, illness perception, and self-efficacy for proper glycemic control and self-management has been part of diabetes treatment for a long time. However, patients with T2DM in Vietnam have some limitations in implementing self-management [16]. Take, for example, brief information by doctor and nurse due to time constraints, and lack of health manpower is not adequate for the patients. Also, no standard diabetes health education with proper teaching materials has been witnessed. Therefore, we designed a small scale study to applying the Common-Sense Model (CSM) based education program among T2DM patients and measure its effectiveness on knowledge, illness perceptions, and self-efficacy. It is believed that our findings will be crucial to design full-scale research that in turn will help to manage diabetes in the country.

## II. METHODOLOGY

### A. Study Design and Setting

This quasi-experimental study was conducted in T2DM patients living in Buon Ma Thuot City, which is situated in Dak Lak Province, Vietnam. The patients were selected randomly from two health centres in the community with medical management radius of less than 5 kilometres. This study was approved by the Ethical Committee of Human Research at Khon Kaen University (KKU), Thailand (HE632132).

### B. Sample Size

A general flat rule to use at least 15 subjects or greater in a study group to estimate a parameter was used in the study [17].

### C. Research Instruments

Instruments for data collection including Demographic Data Collection Questionnaire, Diabetes Knowledge Questionnaire (DKQ-24), Brief Illness Perception Questionnaire (BIPQ) and Thai Diabetes Management Self-Efficacy Scale (T-DMSES); and instrument for research intervention comprising diabetes knowledge booklet, poster of food exchange and physical activities video were used in the study.

The demographic questionnaire was designed to collect general information's of patients such as age, gender, occupation, marital status, an education level as well as duration of diabetes, use of oral medication and/or insulin injections. Next, DKQ-24 originally developed by Garcia et al. (2001) was applied to evaluate the knowledge of DM patients when statement on DM knowledge in insulin production and hyperglycemia, treatment regimen, and the impacts of misconceptions on blood glucose control, DM complications, and signs and symptoms of hypoglycemia were answered as "yes", "no", or "do not know," and marked as correct or incorrect [18]. One point for each correct answer and 0 for incorrect answers or "do not know" was awarded.

The BIPQ used to evaluate illness perceptions included nine items - consequence, timeline, personal control, treatment control, identity, concern, understanding, emotional response, and causal representation. A score of 0-10 was rated for all item except causal representation, which was an open-ended question that encourages participants to explain their view on three most common causes of diabetes [19]. T-DMSES used to assess diabetic patients' confidence in their abilities to manage the disease was based on monitor (4 items), diet (9 items), physical (4 items), and regimen (3 items) [20]. All items were rated on a 5-point Likert scale from strongly disagree to agree strongly. The T-DMSES score was sum up of all items and higher score shows greater confidence in patient's ability to perform certain activities.

Finally, an interventional education program based on Leventhal's CSM was applied in the participants, whose content covered aspects of diabetes knowledge and illness perceptions [21]. A booklet with various information on diabetes (coherence, identity, timeline, personal and treatment control, and consequences), posters on food exchange (food

groups, nutrition pyramid, foods that provide more and less sugar, and portion size) and a video for physical activities were developed for the intervention. A video of 20 minutes consisted of basic exercise steps to aid patient's practice.

### D. Quality of the Instruments

The reliability of the DKQ-24, BIPQ, and T-DMSES was 0.75, 0.78, and 0.82, respectively. The content validity index (CVI) of the intervention tools as evaluated by three experts in diabetes was 0.98.

### E. Data collection

A simple random sampling technique was used to select participants in communities of Buon Ma Thuot city. A separate room was set in the community health centre for data collection and intervention. Upon a brief introduction and explanation about the aim of the research, participants were signed for their consent to participation. The participants were provided with demographic survey form including DKQ-24, BIPQ, and T-DMSES, which took around 45 minutes to fill up. After collecting pre-test data an intervention educational program on diabetes was conducted with three sessions taking about 60 minutes. Next, the participants were asked to repeat filling up of the questionnaires to measure the effectiveness on our intervention strategy.

### F. Data Analysis

Data were analysed with the Statistical Package for Social Sciences 20 (SPSS 20). The qualitative variables were reported in frequency and percentage, whereas quantitative variables were mentioned as mean  $\pm$  standard deviation. Student t-test was used to compare data and considered significant at  $p < 0.05$ .

## III. RESULTS

### A. Characteristics of the Participants

The demographic characteristics of the study participants are illustrated in Table 1. The male and female patients were almost equally numbered whereas the mean age of the participants was 51.0 years (S.D. =5.30). Nearly all were married and more than half of the participants had elementary-level education. Farming was the main occupation followed by daily wage workers. About 13% of the participants were having DM for more than ten years however majority (66.67%) were suffering from it within five years. Moreover, the percentage of participants on oral medicine was 93.33.

### B. Knowledge, Illness Perception and Self-Efficacy Scores

On comparing pre and post intervention data, we revealed that score of knowledge, illness perceptions (all dimensions), and diabetes management self-efficacy were statistically significant. All the scores were increased after intervention educational program in the study. The mean score for knowledge was significantly improved from  $8.06 \pm 2.03$  to  $20.93 \pm 1.44$  after intervention. A striking impact of intervention was observed in all the components of illness perception, but highest in emotional response and consequences. The scores in diet and regimen as self-efficacy

factors were the most changed and physical was the least enhanced upon intervention, as shown in Table 2.

TABLE 1. Demographic characteristics of the participants (n=15).

Variables	Characteristics	Frequency	Percentage
Gender	Male	7	46.67
	Female	8	53.33
Age ( Year)	Mean = 51.0, S.D. =5.30		
	40 – 49	4	26.67
	50 – 59	11	73.33
Marital Status	Married	12	80.0
	Widowed/Divorced	3	20.0
Level of Education	Elementary School	8	53.33
	Junior High School	4	26.67
	High School	3	20.0
Occupation	Farmer	7	46.67
	Housewifery	1	6.67
	Retire	2	13.33
	Seller	2	13.33
	Worker	3	20.0
Duration of Diabetes (Year)	Mean= 6.26, S.D.=5.56		
	1 - 5	10	66.67
	6 - 10	3	20.0
	> 10	2	13.33
Type of medication	Oral medication	14	93.33
	Oral medication and Insulin Injection	1	6.67

TABLE 2. The pre and post-test scores of the participants for knowledge, illness perceptions, and self-efficacy (n=15).

Variables	Pretest		Post-test		t	df	P-value
	Mean	SD	Mean	SD			
<b>Illness Perceptions</b>							
Consequences	5.13	0.64	8.33	0.72	-12.828	28	0.000
Timeline	5.00	1.00	8.13	0.74	-9.739	28	0.000
Personal Control	5.27	1.16	8.07	0.88	-7.425	28	0.000
Treatment Control	5.87	1.06	8.13	0.74	-6.780	28	0.000
Identity	5.33	0.90	8.20	0.94	-7.648	28	0.000
Concern	6.20	0.86	8.27	0.59	-10.429	28	0.000
Understanding	3.73	0.79	7.67	0.94	-12.079	28	0.000
Emotional Response	7.73	0.80	8.60	0.74	-3.088	28	0.002
<b>Knowledge</b>	8.60	2.03	20.93	1.44	-19.213	28	0.000
<b>Self-Efficacy</b>							
Diet	21.26	1.62	29.53	1.50	-14.456	28	0.000
Monitor	8.86	1.06	13.26	0.79	-12.838	28	0.000
Physical	11.20	1.14	13.00	0.84	-4.894	28	0.000
Regimen	8.53	0.64	11.13	0.64	-11.126	28	0.000

Moreover, before the start of the intervention 80% of the participants were unknown to the cause of DM, which was changed to 100% participants knowing the cause in post-test data (Table 3).

TABLE 3. Frequency and percentage of perceived cause of DM among the participants in pretest and post-test (n=15)

Cause of DM	Pretest		Post-test	
	Frequency	Percentage	Frequency	Percentage
Don't know	13	80.0	0	0.0
Know the cause	2	20.0	15	100.0

#### IV. DISCUSSION

We applied an educational intervention and measured the change in the score of knowledge, illness perception, and self-efficacy in T2DM diabetes patients. The most participants in the study were above 50 years of age and the majorities were married, which agree with the previous research mentioning that a high number of married people suffering from T2DM in Vietnamese society [3]. However, this has some good aspects as poor glucose control and more complications are reported in unmarried patients [20]. Most participants in this study were diagnosed with DM between 1-5 years (mean= 6.26 years). Higher mean duration of diabetes among participants than in our study has also been reported in the previous study [22]. This including the proportion of the participants on oral medicine which was over 90%, a bit higher (86.3%) than earlier report could possibly be due to the small sample size in our pilot study [23].

Our intervention strategy showed a statistically significant impact on participants when compared for mean score of diabetic knowledge. This indicates that our method and contents of educational counselling during the intervention by grouping participants into small groups of 8-9 was extremely effective. The content of the education program were easy to understand as well as information on diet were illustrated with examples of Vietnamese foods. Previously, it's been shown that face-to-face individual and group diabetes educational sittings with newly diagnosed as well as poorly controlled diabetes patients have improved the glycemic index, blood pressure and cholesterol compared with control subjects [24, 25]. Therefore, the findings in the study were up to our expectation.

All dimensions of illness perception in post intervention were significantly improved than before. Corroborating to our findings, a psychological family-based intervention study did earlier report that illness perceptions dimensions except consequence and timeline were considerably increased among T2DM patients [26]. Meanwhile, the DESMOND program has also stated statistically significant changes in domains of understanding, timeline, personal control, and seriousness on applying interventions [27]. In our study, the understanding domain was the lowest of all before the intervention indicating a poor level of familiarity on disease condition by the participants but improved to a high level after intervention. Similarly, the initial mean score in the timeline domain was at a mild level which means that the participants do not expect a long life with DM, but was improved to a high level at the end. It is to mention that diabetes is a chronic disease and extended life is possible with proper care and medication, and this was one of the focuses in our booklet used for intervention.

Self-efficacy is defined as a patient's confidence to perform a variety of diabetes self-management behaviors, and our educational program was effective to increase its level. A greater diet self-efficacy and greater diet self-management behavior have good glycemic control and we observed drastic increment in self-efficacy for diet after intervention [28]. Not less important, self-efficacy subscales are known to be



associated with patient habits, such as a history of alcohol consumption that has a higher probability of worse diet and regimen self-efficacy [20]. However, no such analysis was carried out in this study.

Finally, this study has some limitations. Most importantly it's a pilot study with a limited number of participants. Next, it includes participants from a community, therefore, does not represent the entire Vietnamese population. Furthermore, immediate measurements of the parameters after intervention may have influenced the results. Nevertheless, our findings are valuable as a baseline study.

## V. CONCLUSIONS

The CSM-based educational program was applied among T2DM patients in the study who were mostly in oral medication and diagnosed within the disease within 1-5 years, and strong improvement in knowledge, illness perception, and self-efficacy was observed after intervention. These findings can be applied to a large scale study, whose findings, in turn, may be crucial in the management of DM in Vietnam and other countries with similar socio-economics, cultures, and geography.

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