

Full Length Research

Effectiveness of diabetes self- efficacy specific intervention among Jordanian type two diabetes patients: Results of a randomized controlled trial

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This study aimed to test the effectiveness of diabetes self efficacy specific intervention among Jordanian patients with type two diabetes on diabetes self efficacy. Randomized clinical trial design was used to collect the data three times; pre-intervention (baseline), 2 weeks and 3 month follow up. Multistage random sample of 149 were assigned to the intervention group (n=76) and the control group (n=73). The intervention group participants received the diabetes self efficacy specific intervention package based on self-efficacy theory .The study instruments was self efficacy scale. To assess the group differences of dependent variable changes, repeated measures ANOVA were used. Significant improvements in self efficacy were observed 2 weeks and 3 month post-intervention. The findings from this study can direct the health providers to incorporate diabetic intervention that might enhance patients self efficacy.

Key words: Type two diabetes mellitus, Self Efficacy.

INTRODUCTION

Increased in the prevalence of both type one diabetes mellitus (DM1) and type two Diabetes Mellitus (DM2) have been observed in all societies studied in the last 30 years (Who & Consultation, 2003). However DM2, is showing a greater rate of increase than DM1 is mainly due to urbanization, population growth, aging, physical inactivity and increase the incidence of obesity (Ginter and Simko, 2013). Near 382 million people worldwide, or 8.3% of adults, had DM in 2013. If these trends continue, by 2035, 592 million people will have DM. This means three new cases every10 seconds, or nearly 10 million per year (IDF, 2014).

LITERATURE REVIEW

Research assures that people with higher DM self-efficacy have better care practices (Glasgow and Osteen, 1992).The literature offers different examples of

programs based on enhancing self-efficacy (Bodenheimer, Lorig, Holman, and Grumbach, 2002; Siu, Chan, Poon, Chui, and Chan, 2007). As can be understood, enhancing patients' self-efficacy programs in self care management can improve patients health care outcomes (Corbett, 1999; Taal, Rasker, Seydel, and Wiegman, 1993) .

Marks and Allegrante (2005) stated in their article that different disease management strategies used to alleviate patients pain and prevent their disability, and the role of patient self efficacy as a framework for education intervention. Their article synthesizes and identifies the main research evidences for an educational intervention that designed to enhance patient self-efficacy and provides implications for enhancing practices in patient education for chronic diseases.

Self efficacy intervention in the research used commonly to manage chronic diseases including DM such as Fu *et al.* (2003) who implemented the chronic disease self efficacy disease management program in China, observed that the program improved health behavior, self-efficacy, and health status among participants in the intervention group. This study was

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done for 954 volunteer patients with a medical record that confirmed a diagnosis of arthritis, DM, chronic lung disease, heart disease, hypertension and stroke. They found that the intervention group patients managed their own disease more effectively compared with control group patients.

The theoretical framework of the current study is based on self-efficacy theory that developed by Albert Bandura (1977). Most of the studies did not incorporate an intervention and lack results on behavior changes relying upon Bandura four sources of efficacy information. In Jordan particularly, no researchers are engaged in self-efficacy research with interventions in relation to patients with DM2. Therefore the aim of this study is to evaluate the effectiveness of diabetes self-efficacy-specific intervention for patients with DM2. The evaluation focused on improvements in diabetes self-efficacy.

Study hypothesis

Patients who participated in diabetes specific self efficacy intervention (DSESIP) had higher levels of diabetes self care management behaviors following completion of the DSESIP at 2 weeks post-intervention, and at a three month follow-up evaluation, more than who did not receive the intervention.

Additional question

Are there differences in the control and intervention group baseline scores for the outcome variable based on the demographic and disease history data?

METHODS

Study design

Repeated measure (2x3) Randomized Controlled Trial (RCT) design was used.

Study intervention

The study intervention was based on four information resources of self efficacy model for Bandura (1977) (Table 1 and Figure 1).

Data collection procedure

The data collection in the current study was occurred in three phases as the following. Time 1: screening (pre - intervention or baseline). Time 2: two weeks following screening (post intervention). Time 3: three months follow up. The study adopted a multistage simple random

sampling method in order to select at least 168 participants (84 participants in each group). Then the researcher randomly assigned the participants to the intervention or the control group using random table. Both the control and intervention groups received the standard diabetic educational program .The intervention group participants received the DSESIP.

Patients were entitled for the study if they were aged 25 years, patients who accurately diagnosed DM2, patients who are taking oral medication, spoke and understood Arabic, and had and able to use a telephone. Patients were excluded from the study if they had major complications such as severe stroke.

Study instrument

The diabetes self efficacy scale. The Diabetes Self-Efficacy Scale (DSES) constructed by the Stanford Patient Education Research Center (University of Stanford, 2009). It is an 8-item self-report measure of diabetes self-efficacy, when performing various diabetic activities the individuals were required to rate their level of confidence. The items on the questionnaire are rated on a ten-point likert type scale. The anchors range from "Not at all confident" to "Totally Confident." The score for the scale is the mean of the eight items. Originally developed and tested in Spanish 186 subjects for the Diabetes Management Study Program at the Stanford Patient Education Research Center, the instrument was later translated to English to use with other subjects (Pajares, Hartley, and Valiante, 2001).

Ethical considerations

Ethics approval was received from the human research ethics committee of nursing faculty/The University of Jordan.

Data analysis

The study data were analyzed by SPSS version 21. Descriptive statistics including the frequency distribution and percentages were used for the analysis of nominal data .Independent t-tests were used to analyze differences on continuous data between mean scores for the intervention and control groups. The progressions of the study variable between the intervention group and the control group were described independently for pre- and post-periods respectively. Independent sample *t*-test and chi square were used to compare the demographic data and baseline data between both groups. To assess the group differences of dependent variable changes (the effect of the intervention DSESIP on the study dependent variable); the researcher used ANOVA, for repeated measures.

Table 1. DSESIP: Diabetes Self Efficacy Specific Intervention Package.

Source of information used	Intervention	Content
Vicarious experience (VE)	17 minutes DVD viewing	The DVD showed, knowledge, brief statistics about DM and one patient with DM2 as model that was used self care management activities (Youtube, 2013).
Vicarious experience (VE) & Performance accomplishments (PA)	Receives the “Diabetes Self care management” booklet	The booklet emphasized more on DM2 about how to perform their daily self care management activities including diet control, physical activity, blood glucose testing, adherence to medication regime, and foot care. It is the translated Arabic copy for diabetes self care management booklet which was developed by Wisconsin Diabetes Prevention and Control Program (2013).
Performance accomplishment (PA) Vicarious experience (VE) Verbal persuasion (VP) Self-evaluation (SE)	Efficacy-enhancing counseling rehearsal sessions	One efficacy-enhancing counseling rehearsal sessions was conducted in one of the DM center room; this session was conducted by the researcher which aims to increase patients’ confidence in their ability to DM2 self care management and improve their psychological wellbeing. Participants were participated in groups that were limited to 3-4 participants in each group. The session with DVD showing lasted for 30-40 minutes and contained self-efficacy enhancing skills and self-goal setting which was validated by nurse counselor. The booklet was used in the session. The researcher asked the participants questions about the content of the booklet which can promote discussions Goal-setting sheets for DM2 self care management were included in the booklet to encourage people to keep a record of their own DM control as seen in the booklet (see appendix G).
Performance accomplishment (PA) and Verbal persuasion (VP)	Telephone follow-up	Telephone follow-up were provided for the intervention group. The purpose of calling was to foster continued performance accomplishment (PA) via verbal persuasion (VP).



Figure 1: The original self efficacy model
Source: Bandura (1977).

RESULTS

Description of the study sample

The patients’ number that was included in this study was 149 participants were assigned to the intervention group (n=76) and the control group (n=73). Table 2 shows the sample characteristics.

Checking differences between groups

Before evaluating the effects of the DSESIP, differences between the groups on a range of demographic and disease history variables were examined. No significant differences were found between the intervention and the control groups on demographics, and disease history variables and dependent variable (Tables 3 and 4).

Table 2. Demographics and disease history variables.

Variables	% (n)
Gender	
Male	46.30%(69)
Female	53.69%(80)
Marital status	
Married	71.14%(106)
Single	8.72% (13)
Divorced	8.05% (12)
Widowed	12.08%(18)
Employment status	
Employed	36.20% (54)
Not employed or retired	63.79(95)
Current therapy	
Oral Hypoglycemia only	60.40% (90)
Oral Hypoglycemia and insulin	39.59%(59)
The level of education	
Intermediate	8.72%(13)
Secondary	81.20%(121)
Postgraduate	10.06%(15)
Chronic diseases	
Hypertension	38.92%(58)
Other diseases	10.06%(15)
No other chronic disease	51.00%(76)
Diabetes complications	
Retinopathy	13.42% (20)
Nephropathy	8.05%(12)
Foot Complication	8.72% (13)
Macrovascular disease	8.05%(12)
Neuropathy	10.73% (16)
No Complication	51.00% (76)
Other education	
Yes	11.41%(17)
No	88.59%(132)

Table 3. Differences between groups based on the study dependent variable at baseline time

Study variable	Group	N	Mean	SD	t**	p*
Self efficacy	Intervention	76	13.66	3.82	-0.53	0.59
	Control	73	13.97	3.73		

Result of the study hypothesis

Two-way repeated measures ANOVA was used to

examine the differences in the diabetes self efficacy between groups and three time points.

The self efficacy variable main effect of time was

Table 4. Comparisons of the demographics and diseases history between intervention and control groups.

Variables	Intervention (n= 76)		Control (n=73)		Significance (p)*
	Mean	SD	Mean	SD	
Demographics					
Age	50.73%	6.95	52.20%	6.76	t=-1.31 , p=.39
Length of diagnosis (years)	6.15	4.62	6.80	4.21	t =.89, p=.37
Gender					
	Count	%	Count	%	X2=.004, P=.95
Male	35	46.05%	34	46.58%	
Female	41	53.94%	39	53.42%	
Level of education					
					X2=.29 P=.87
Intermediate	6	7.90%	7	9.60%	
Secondary	63	82.90%	58	79.50%	
Postgraduate	7	9.20%	8	11%	
Marital status					
					X2=.17, P=.98
Married	55	72.37%	51	69.86%	
Single	6	7.89%	7	9.59%	
Divorced	6	7.89%	6	8.21%	
Widowed	9	7.89%	9	12.32%	
Employment status					
					X2=.03, P=.85
Employed	27	35.5%	27	37%	
Not employed or retired	49	64.5%	46	63%	
Current therapy					
					X2=1.0, P=.30
Oral Hypoglycemia only	49	64.5%	41	56.2%	
Oral Hypoglycemia and insulin	27	35.5%	32	43.8%	
Chronic Diseases					
					X2=1.4, P=.48
Hypertension	26	34.2%	32	43.8%	
Other diseases	8	10.5%	7	9.6%	
No other chronic disease	42	55.3%	34	46.6%	
Diabetes complications					
					X2=.69, P=.98
Retinopathy	9	11.84%	11	15.06%	
Nephropathy	6	7.89%	6	8.21%	
Foot Complication	6	7.89%	7	9.59%	
Macrovascular disease	6	7.89%	6	8.21%	
Neuropathy	8	10.52%	8	10.95%	
No Complication	41	53.94%	35	47.95%	
Other education session					
					X2=1.44, P=.23
Yes	11		6		
No	65		67		

significant, (Wilks Lambda =0.71, $F = (2, 146) = 29.19, p < .001$). The interaction effect of group is also significant ($F (1.147) = 58.08, p < .001$). And the main effect of group by time was also significant, (Wilks Lambda 0.70, $F (2, 146) = 30.74, p < .001$). The associated Partial Eta square was 0.28 indicating small effect size (Table 5).

To interpret the self efficacy variable significant main effect of time, paired t test was done for each group to assess the change between (Time 1-2), (Time 1-3) and (Time 2-3). The follow-up paired t -test comparisons for the intervention group showed significant change for self efficacy between Time 1-2 ($t = -7.74, p < .001$), Time 1-3

Table 5. Repeated measure analysis of variance for the self efficacy variable.

Variable	F value	Wilks Lambda	p value	Partial Eta Square
Self efficacy				
Group	58.08		<0.001	0.28
Time	29.19	0.71	<0.001	0.28
Group x Time	30.74	0.70	<0.001	0.28

Table 6. Paired t test results for self efficacy variable.

Group	Time	t**	p*
Intervention group	1-2	-7.74	<0.001
	1-3	-7.95	<0.001
	2-3	-1.00	0.32
Control group	1-2	0.77	0.45
	1-3	1.14	0.26
	2-3	0.63	0.53

*Level of significance for two tailed test $p < 0.05$.

** Paired t-test.

Table 7. Comparisons of self efficacy variable by time of groups (Independent-t Test).

Time	t**	p*
1	-0.53	<0.59
2	7.6	<0.001
3	7.8	<0.001

*Level of significance for two tailed test $p < 0.05$.

** Independent sample t-test.

($t = -7.95$, $p < .001$), and no significant change between Time 2-3 ($t = -1.00$, $p = 0.32$). The follow-up paired t-test comparisons for the control group showed no significant change for self efficacy between Time 1-2 ($t = 0.77$, $p = 0.45$), Time 1-3 ($t = 1.14$, $p = 0.26$), and Time 2-3 ($t = .63$, $p = 0.53$) (Table 6).

To interpret the significant interaction of group by time for the self efficacy variable, independent sample t test were conducted to examine the differences on self efficacy score at Time 1, 2 and 3 between the intervention and control group. This test showed that the intervention group had significantly better self efficacy than the control group at Time 2 ($t = 7.6$, $p < .001$), and Time 3 ($t = 7.8$, $p < .001$) but no significant differences between the control and the intervention group at Time 1 baseline data ($t = 0.53$, $p = 0.59$) (Table 7).

These results supported hypothesis 1: Patients who participated in diabetes self efficacy specific intervention (DSESIP) had higher levels of DM self-efficacy following completion of the DSESIP at two weeks post-intervention, and at a three month post-intervention

follow-up evaluation, more than who did not receive the intervention (Figure 2).

DISCUSSION

The present findings indicated that the self efficacy was enhanced through the Diabetes Self Efficacy Specific Intervention Package (DSESIP) at two weeks post intervention and three months follow-up. The participants of both groups had low self efficacy at baseline time that was increased to a moderate level of self efficacy for the intervention group after two weeks post intervention and three month follow up. While no change in self efficacy for the control group.

These results support those of researchers who have examined the effect of DM intervention or education based on self-efficacy such as Sperl-Hillen *et al.* (2013) who conducted a RCT of 624 adults with DM2, patients with (HbA1c) $\geq 7\%$ assigned either to receive individual Intervention (II), group Intervention (GI), or usual care

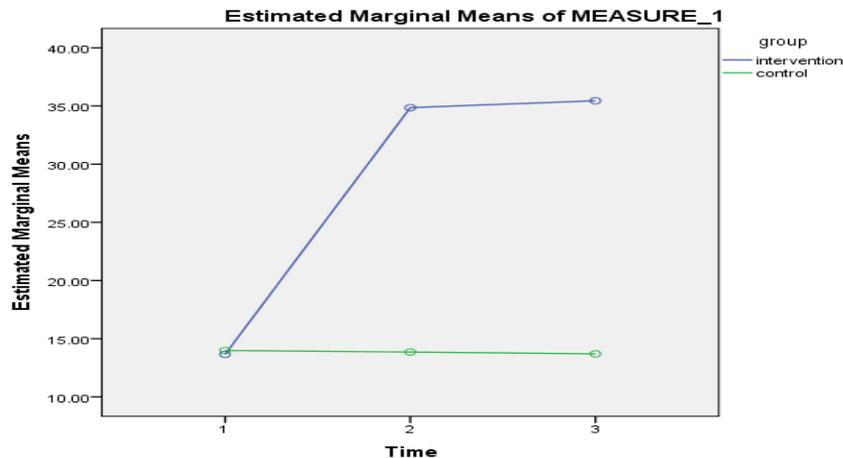


Figure 2. The Interaction between time and group for self efficacy.

(UC) with no Intervention. Self efficacy and HbA1c were measured at baseline and 12 month of follow up through mailed questionnaire. Self efficacy and HbA1c were significant after 12 month only for (GI). This means that patients need ongoing support to achieve behavioral change and glycemic control.

Also, Atak, Gurkan, and Kose (2008) conducted a RCT study to evaluate the effect of patient education on self efficacy in patients with DM2 who found that patient education had significant effect on self efficacy in patients with DM2. Moreover, Patient education that enhances one's self efficacy is of greatest importance for enhancing patient outcomes in chronic diseases.

Moriyama *et al.* (2009) developed a 12 month self management intervention for patients with DM2, based on self efficacy. Randomly, the patients were divided into an intervention group who attended the study intervention and a control group who attended usual clinical care. The intervention group received <30 minutes of monthly interviews based on the program's textbook and biweekly telephone calls from a nurse educator throughout the 12 months. After 12 months. HbA1c and self-efficacy were significant by two way repeated measures ANOVA.

Self efficacy intervention in the research used commonly to manage chronic diseases including DM2 which result also is consistent with the current study findings such as Fu *et al.* (2003) implemented the chronic disease self efficacy disease management program in China, it was found that the program improved health behaviors, self-efficacy, and health condition among patients in the intervention group. This study was done for 954 patients with medical files that confirmed a diagnosis of arthritis, DM2, lung disease, all heart diseases, hypertension and stroke. They found that the intervention group patients managed their own disease more effectively compared with control group patients.

The result of the current study supports its theoretical framework. According to the self efficacy theory of Bandura (1977), self efficacy leads to behavioral change. Bandura noted that self efficacy is based on four major sources of information: performance accomplishments (PA), verbal persuasion (VP), vicarious experience (VE) and self-evaluation (SE). All of these sources were used in the current study intervention and lead to enhance the patients self efficacy.

Conclusion

The study findings indicate that the DSESIP can advance levels of self-efficacy at two weeks and three month post intervention. The findings from this study, also can direct the health providers to be trained to provide intervention that can enhance patients with DM2 self efficacy.

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