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Current Education *versus* Peer-Education on Walking in Type 2 Diabetic Patients based on Health Belief Model: A Randomized Control Trial Study

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Diabetes is a disease with several metabolic and organic symptoms. Physical activity plays a key role in controlling type 2 diabetes. Several researches confirm that educational strategies can lead to healthy behaviors and its continuation is effective and can indicate what type of relationship with the client is better. The purpose of this study is comparing the Effect of Current Education and Peer-Education on Walking in Type 2 Diabetic Patients based on Health Belief Model (HBM).

Methods. This was a clinical trial (RCT) study done on 80 people with type 2 diabetes. Patients were divided into two groups, Current education and Peer education groups. Data were collected using a questionnaire based on the health belief model, a checklist related to patients` practice and recording patients` HbA1c, 2HPP and FBS levels. Results were documented before and three months after intervention. The patients participated in 2 educational classes during three months of intervention, as the follow-up of the intervention.

Results. Mean scores for HBM Model variables, i.e. perceived susceptibility, perceived severity, perceived benefit and self-efficacy, were significantly increased in the peer education group compared to current education group after intervention. Also, behavioral walking, rates of HbA1c and FBS and 2HPP levels were improved significantly among the peer education group.

Discussion. Applying walking training program developed for diabetic patients and its implementation by the peers in order to control blood sugar using the health belief model is very useful and effective. During implementation of these control programs, monitoring and follow-up training is recommended.

Key words: Type 2DM, Current Education, Peer-Education, Walking, Health Belief Model.

Diabetes mellitus is a disease with several metabolic and organic complications such as cardiovascular, nephrologic, ophthalmologic and neurologic complications [1]. Constant physical activity has a key role in controlling diabetes type II especially in the control of blood sugar and correction of cardiovascular risk factors such as increasing blood insulin, improving tissue insulin sensitivity and correction of lipid profile. It can also cause significant decrease in HbA1C independent of weight loss. Physical exercise with moderate severity is also associated with 45%–70% decrease in mortality of diabetes type II patients by improving health status [2–8].

Several studies have shown that 37–60% of diabetic patients do not have enough physical activity [9, 10] or enough attention to health care staffs instructions about physical activity [11]. Estimations show that lack of physical activity causes 1.9 million deaths and 19 million DALY (Disability-adjusted Life Years) wasted over the world [12]. Canadian Diabetes Association recommended moderate physical exercises such as fast walking, bicycling and swimming for about 150 minutes weekly [13]. For increasing the extent of physical activity in diabetic patients monitoring of their activity behavior is important. For this purpose educational intervention strategies that can influence the behavior have a key role [14, 15].

Researchers tried to influence this process helping behavioral change models. One of the most suitable models in health education is Health Belief Model (HBM) that takes behavior as dependent on person's knowledge and attitude, and its components are in a manner that cause people to sense a health threat and guide them to a health behavior [8]; there are some evidences that it makes patient sensible to complications and severity of disease and benefits and barriers and guide to action can cause healthy behaviors and a higher level of self care decisions such as walking [1, 17]. Some other studies have shown usage of this model in foot care and regimen control in diabetes type II patients [16].

Research studies elucidated that educational strategies can be effective on the type of behavior and its continuity. A systematic review of 21 study results showed that the better is the communication with the patient the better are the educational results [18, 19]. One of the other educational strategies is Peer Education. Trained persons can involve their peers in such ways that health care staffs cannot. They can communicate with their peers and transmit information more effectively [20].

There are frequent studies on efficacy of Peer Education method on AIDS patients, reproductive health education and effectiveness of HIV prevention programs by peers and teachers on students [21–24]; but there are few studies on walking education by peers [25].

The present study compares the effect of walking education by current education (by health care staffs) and Peer Education in diabetes type II patients using HBM. Results of this study can be useful for future educational interventions based on HBM and can also be used by Diabetes control centers for a better control of blood sugar and a better monitoring of disease complications.

MATERIALS AND METHODS

This Randomized Controlled Trail (RCT) study was implemented on 80 patients who presented at Yazd Diabetes Research Center. Inclusion criteria for our study were using blood sugar decreasing drugs and absence of cardiovascular complications, diabetic foot or any other problems that prevent patients to do walking as physical exercises were excluded from study. Patients were divided into two groups by random block method. Before study we got letter of satisfaction from all patients. For collecting data we used a questionnaire containing demographic (10 questions), knowledge (18 questions), components of HBM model such as perceived susceptibility, severity, benefits, barriers and self efficacy (30 questions) and action guide (2 questions) questions. Information was collected by structured interviewing. Questions about function in relation to appropriate and effective walking in the control of blood sugar (13 questions) and a check list where we record data of fasting blood sugar (FBS), 2 hours post prandial (2HPP) and HbA1C which were filled in before and 3 months after educational intervention. We got viewpoints of experts and text books for assuring about validity of study. For reliability we used a questionnaire for collecting data from 15 patients repeatedly with 2 weeks time gap whose range of Alpha Chronbach was calculated between 0.65–0.93.

Knowledge questions had 31 scores totally, for right answers patient got score one and for wrong answers he got score 0. For questions about HBM constructs we used Lichort criteria that are for evaluation of attitude and have 5 parts where Scores were between 1 and 30. Practice question scores were calculated from a total number of 13. Fasting Blood Sugar (FBS) and 2 hours Post Prandial (2HPP) and HbA1C were measured by one laboratory center previously and 3 months after intervention.

Patients were divided into two groups (current education and Peer education groups) and intervention was implemented. In Peer education group 2 patients that have the best scores in first questionnaire evaluations were chosen as educator (if they had tendency to it). Then these persons attended some educational sessions done by the researcher and after that their readiness was evaluated. Education group was divided into two 20 patients groups. Peer educator was presented in two sessions and educates his audience with presentation, film and group conversation; in any possible problem researcher was in reach at the time of classes. In current education group patients had been educated by the researcher in the same manner. After these classes all information was given to audiences by pamphlets and booklets. In the next three months, patients were followed by some other classes to remember educated data and also by calling to patients. After 3 months we got the level of information from patients with the same questionnaire used at the beginning of the study. All gathered data for two groups were transferred to SPSS software and were analyzed by chi square, T-test, Wilcoxon and Mann Whitney.

RESULTS

Flow diagram of study is indicated in Fig. 1. Mean age and Standard Deviation (SD) for current education group was 50.3 ± 6.8 y/o and for peer education group it was 47.7 ± 6.7 y/o. The mean duration from diagnosing the disease (DM type 2) was 5.7 ± 3.9 years for current education group and 5.2 ± 3.3 years for peer education group. 20% of patients in current education group and 15% in peer

education group were men (80% in current and 85% in Peer education were women). 80% (32 people) in current education group were in diploma or lower level of graduation, in peer education group this was 85% (34 people). Because the level of graduation would influence on ultimate data of our study we analyzed this variable in our study. 92.5% of patients were married and 32.6% were employed.

As indicated in Table I there were no significant differences between the two groups before intervention. After intervention and based on independent T-test and Mann Whitney test there were significant differences between perceived severity, perceived self efficacy, perceived benefits, perceived barriers and function between the two groups. Paired T-test and Wilcoxon test show that there were significant differences between mean grades of perceived susceptibility, perceived efficacy, perceived benefits, perceived severity and 2HPP in Peer education group before and after intervention, while these grades were not significant in the current education group. Also there were significant differences between knowledge, perceived barriers, function, FBS and HA1C between the two groups.

Based on Table I, in independent T-test and Man Witney tests there was a significant relationship between function and mean scores of perceived severity, perceived benefits, perceived barriers and perceived efficacy in current education group and Peer education group before and after intervention whereas there was no significant correlation on other variables.

Peer education group also had better walking behavior function three months after educational program finishing, so FBS and 2HPP three months after educational intervention was decreased compared with the start of study ($p < 0.001$). Our data shows that before educational intervention most of information sources in groups were radio, TV, physician, family, friends, books, films and other diabetic patients. respectively; whereas after intervention the source of information changed to diabetic patients, books, family and friends, films, physician, radio and TV in Peer education group and books, physician, radio, TV, family and friends and diabetic patients in current education group respectively. These data show that patients in Peer education group have used other diabetic patients, family members and educational books more than before intervention as a scale for their exercise behavior (Table II).

Before educational intervention the most important motivators of patients for exercise were: increaseing of blood sugar, better mood after walking, fear of diabetes complications that after intervention these motivators have changed to better mood after walking, increase in blood sugar and fear of diabetes complications in current education group and better mood, fear of complications and increase in blood sugar in Peer education group respectively (Table III).

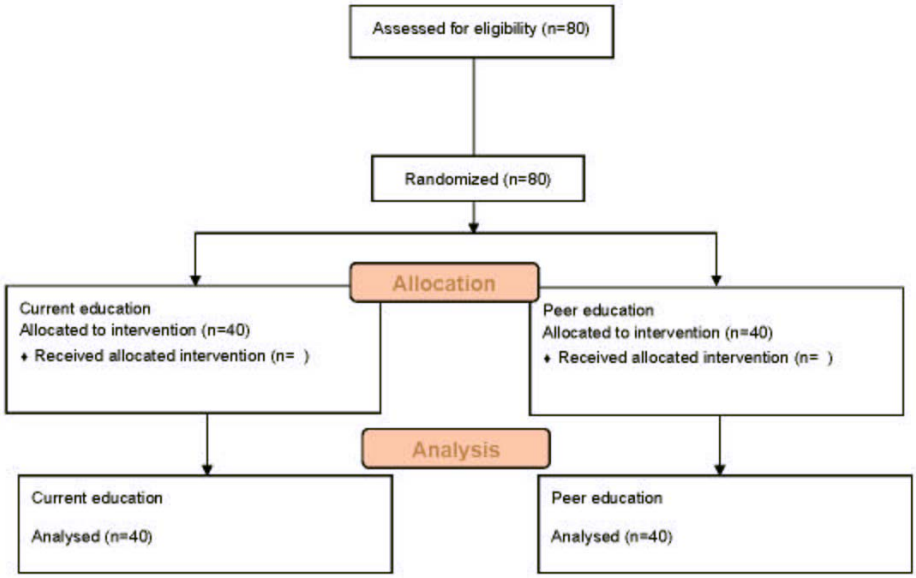

Fig. 1. Flow of the participants through the study: Current Education *versus* Peer-Education on Walking in Type 2 Diabetic Patients based on Health Belief Model: A randomized control trial study.

Table I
Comparison of mean scores for knowledge, Perceived severity, susceptibility, self sufficiency, benefits and barriers, function related to walking, Mean for FBS, 2HPP and HbA1C before and 3months after intervention between Current and Peer education groups

Variables	Groups	Before intervention Mean	SD	After intervention Mean	SD
Knowledge	Current education	15.02	5.55	23.87	4.89
	Peer education	16.07	5.74	23	5.41
	p	0.4		0.4	
Perceived susceptibility	Current education	20.3	5.18	21.5	3.14
	Peer education	20.62	3.86	22.22	1.98
	p	0.7		0.2	
Perceived severity					
	Current education	22.45	2.87	23.52	3.1
	Peer education	21.9	2.9	26.6	3.24
	p	0.6		0.002	
Perceived self- efficacy					
	Current education	25.32	2.9	26.4	2.25
	Peer education	25.95	2.8	27.5	2.38
Perceived benefits	P	0.3		0.02	
	Current education	21.72	1.89	22.67	1.99
	Peer education	22.12	2.26	25.42	1.72
Perceived barriers	p	0.4		0.001	
	Current education	20.57	4.36	13.35	3.36
	Peer education	21.92	3.59	11.37	3.09
Practice	P	0.2		0.007	
	Current education	5.12	3.44	8.37	2
	Peer education	3.7	3.45	12.3	1.09
FBS	P	0.07		.001	
	Current education	142.55	21.65	124.1	23.42
	Peer education	140.7	19.38	118.55	17.73
2HPP	p	0.6		0.2	
	Current education	190.65	40.01	174	41.96
	Peer education	194.25	36.03	169.1	38.16
HbA1C	P	0.6		0.5	
	Current education	6.91	0.54	6.14	0.64
	Peer education	7.02	0.58	6.1	0.6
	p	0.3		0.7	

Table II
Frequency of external guide related to walking based on viewpoints of patients before and after intervention in two groups

Groups	Before intervention				After intervention			
External guide	Current education		Peer education		Current education		Peer education	
	No	percent	No	percent	No	percent	No	percent
Radio and television	24	60	16	40	14	35	11	27.5
Book and booklet	4	10	2	5	18	45	26	65
Film	4	10	5	12.5	4	10	20	50
Physician	10	25	10	25	16	40	13	32.5
Family and friends	6	15	10	25	8	20	20	50
Diabetic patients	3	7.5	3	7.5	2	5	30	75

Table III
Frequency of internal guide related to walking based on viewpoints of patients before and after intervention in two groups

Groups	Before intervention				After intervention			
Internal guide	Current education		Peer education		Current education		Peer education	
	No	percent	No	percent	No	percent	No	percent
Increase the blood sugar	16	40	16	40	16	40	18	45
Health status	1	2.5	2	5	2	5	3	7.5
Fear of complication of diabetes	8	20	7	17.5	13	32.5	18	45
Better mood	10	25	8	20	24	60	31	77.5

DISCUSSION

Patients got 50% of scores before study; it means that they had a moderate level of knowledge. Considering this fact that 30% of patients had presented in similar educational classes, this level of knowledge can be related to these sources of information that they have gained. These results are concomitant with other studies. Shamsi *et al*. showed that the knowledge of diabetic patients about the effect of walking on controlling blood sugar is in moderate level [17]. In another study Heydari *et al*. have shown that knowledge of diabetic patients about importance of diet on diabetes is about 68% [26]. Aghamohammadi *et al*. concluded that knowledge of diabetic patient about foot care after education has improved significantly [28]. These results show the effect of education on knowledge. Afkhami *et al*. also showed that knowledge of general population about complications of diabetes is in moderate level [28].

Scores for perceived severity before intervention in our study were in moderate level. In Mark Daniel *et al*., Beranth C. *et al*. and Sharifirad *et al*. studies the score of perceived severity was in moderate level too [29–31].

Mean scores for perceived severity before intervention for the two groups show that the level of perception about the severity of consequences of leaving walking was moderate and there was no significant difference between scores of perceived severity before intervention in the two groups; but after intervention mean scores raised up from 22.45 to 23.52 in current education group and from 21.9 to 26.6 in peer education group that shows considerable improvement in Peer education group scores. Beranth C. in his study showed that after education perceived severity about blood sugar control was increased [30]. Our results are concomitant with those of Sharifirad *et al*., who in his study perceived severity score raised from 57.6 to 97.7 that was significant comparing with control group [31]. Also Chjayei *et al*. have shown similar results [32].

Before intervention the situation of perceived benefit in the two groups was in moderate range (21.72 in current education group and 22.12 in Peer education group); these scores have increased in Peer education group significantly more than in current education group (score: 25.24). Koch J. showed that there was a significant relationship between perceived benefits and walking behavior in diabetes type 2 women [33]; in both studies the perceived benefit was linked to a better mood following walking and help to blood sugar control. Robinson' study and also another study in Thailand showed that there is a significant correlation between the perceived benefits and physical exercise [34, 35]. There were similar results in some other studies [17].

Data shows that after intervention the perceived barrier was decreased in both groups but it was more prominent in Peer education group. In a study Polly RK showed that there was a significant relationship between perceived severity and barriers with blood sugar control [36]; Also Mark Daniel in his study indicated similar results after 18 months [29]. These results have been repeated in Shamsi *et al*. study [17].

Mean scores for perceived self efficacy before intervention was in moderate situation, but after intervention mean scores were improved in both groups; that was significant in Peer education group. Perceived Self efficacy in diabetic patients was in moderate scores in Mazlomy, Bernal, Palurtchaivong and Kamrani studies [44–46]. In Shamsi study function of diabetic patients about walking was in unfavorable situation [19], but after intervention mean scores were improved significantly; this condition has been repeated in some other studies [16].

Sarah-Jeanne Salvy showed that obese children interacted with peers have spent more time for exercise [48]. Frank van der Mass showed that knowledge and behavior of children improved significantly by Peer education [49].

In our study FBS before intervention was 142.55 and 140.7 mg/dl for current education and Peer education respectively. After intervention, means for FBS became 124.1 in current education and 118.88 in Peer education group. Afshari, Kamrani, Shamsi and Afshar reached similar results in their studies [17, 38, 47]. This improvement in FBS control is attributable to education.

2HPP in current and peer education groups were 190.65 and 194.25 respectively before education, but after intervention they became 174 for current education and 169.1 for peer education group, this improvement being significant in peer education group ($p = 0.001$).

In our study mean grades for HbA1C were 6.91% in current education group and 7.02% in peer education group. In other studies in Iran, Baghianimoghadam and Shamsi reported 9.84% and 9.5% for HbA1C respectively [17, 39]. In the US, Koch and O'Connor reported 8.2% and 7.1% of HbA1C respectively [33, 40]. These appropriate grades for HbA1C in our study can be attributable to our patients who were selected from patients of a clinical research center where its patients were under good follow-ups.

After intervention means for HbA1C improved to 6.14% and 6.1% for current and peer education groups respectively.

Shamsi *et al.* showed that after 3 months of education HbA1C will decrease 9% [17]. Hassabi *et al.* suggested aerobic exercises like walking are appropriate for diabetics [41]. Kordi *et al.* suggested that exercise more than 30 minutes daily can decrease 14–15% of blood sugar [42]. Shoban *et al.* have noted that exercise can decrease blood sugar and circulation and also can make a positive attitude in diabetic patient [43].

CONCLUSION

Diabetic patients need appropriate information and knowledge about the factors which can have effect on disease control. It seems that education of patients with Peers using Health Belief Model (HBM) can improve the level of perceived susceptibility, severity, benefits and self-efficacy by practical education with pictures and can increase the level of knowledge and practice.

The present study reached notable results about the effect of walking on blood sugar which appropriate education about physical exercise and improving scores of patients` function led to a better control of blood sugar. Decrease in HbA1C and FBS and 2HPP after education can indicate the effect of education on a better control of blood sugar. On the other hand, an internal practical guideline to motivate the patient toward walking and collaboration of other patients as an external motivator are effective to increase the level of function about walking. Increased mean scores of perceived susceptibility, severity, benefits and self-efficacy and decrease in blood sugar in peer educated group comparing with the current educated one indicating the effect of education by peers. Because of effectiveness and cost benefiting of this educational method in Health Education we suggest it for these purposes, of course choosing educational method contents of educational package and target age group are important, and considering these parameters the best educational method must be selected.

This study also can be helpful in collecting structured educational information for health education and prevention. Effect of peers as consultant especially when they learn communication skills is important and cost beneficial. We suggest Peer education for education of health matters. We also suggest more studies on other health problems using this educational method.

We could not see walking of patients; therefore for checking this part we used self-reporting of patients and this is one of our study' pitfalls.

Finally, we note that preparing educational programs for diabetic patients by themselves (peers) using HBM is appropriate and effective, whereas control, screen and follow-up of educational programs are necessary.

Acknowledgement. We kindly appreciate the efforts of Yazd Diabetes Research and Clinical Center and we also thank all patients presented in this study for their kind collaboration.

Diabetul zaharat este o afecţiune cu multiple manifestări metabolice şi organice. Activitatea fizică joacă un rol important în controlul diabetului de tip 2. Mai multe cercetări au arătat că strategiile educaţionale pot duce la comportamente sănătoase, iar continuarea lor este eficientă şi poate arăta ce tip de relaţie cu pacientul este mai bună. Scopul acestui studiu este compararea metodelor curente de educaţie cu cele de educaţie asistată asupra modelului de viziune asupra sănătăţii (MVS).

***Metode**. S-a efectuat un studiu clinic randomizat pe 80 de pacienţi cu diabet zaharat de tip 2.*

Aceştia au fost împărţiţi în două grupuri: educaţie clasică şi educaţie asistată. Datele au fost colectate folosind un chestionar bazat pe MVS şi dozându-se HbA1c, glicemia à jeun şi glicemia la 2 ore după masă. Pacienţii au participat la 2 cursuri educaţionale care au durat 3 luni.

***Rezultate**. Scorurile medii ale variabilelor pentru MVS, de exemplu, susceptibilitatea percepută, severitatea percepută, beneficiul perceput şi eficienţa proprie au crescut semnificativ în grupul de educaţie asistată comparativ cu grupul de educaţie clasică. De asemenea s-au îmbunătăţit semnificativ în acest grup HbA1c, glicemia à jeun şi glicemia la 2 ore după masă.*

***Discuţii**. Aplicarea programului de mers dezvoltat pentru pacienţii diabetici şi implementarea lui pentru controlul glicemiei, folosind modelul de viziune asupra sănătăţii, este foarte utilă şi eficientă.*

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