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Instructional Guidelines Using Conversation Maps to Improve Self- Management for Diabetic Patients

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ABSTRACT

Diabetes conversation map was developed as a new educational initiative tool that engages patients with type 2 diabetes in group discussions. It combines various educational theories and has proven to be an internationally effective diabetes education for self-care management. **Aim:** To evaluate the effect of educational guidelines using diabetes conversation map for diabetic patients **Design:** A quasi-experimental research design was used. **Setting:** The study was conducted at the diabetic outpatient clinic, affiliated to El Nasr Hospital for Health Insurance, Helwan, Egypt. **Sample:** A purposive sample of 160 patients was equally divided into two groups (conversation map and control). **Tools:** Two tools were used: (1) Structured interview questionnaire it include: Patient demographic characteristics, medical history, and Patients' level of knowledge regarding diabetes mellitus. (2) Diabetes Self-Management Questionnaire. **Results:** there were statistically significant improvements regarding mean knowledge scores and self-management pre to post implementation of diabetes conversation map within the conversation map group. **Conclusion**: The diabetes conversation map had an improvement effect on diabetic patients' level of knowledge and self-management activities among conversation map group compared to control group. **Recommendations:** Further researches are indicated on a wide range to counsel diabetic patients about the impact of diabetes conversation map on improving level of knowledge and self-management activities.

Keywords: *Diabetes conversation map, Diabetes mellitus, self- management*

Introduction

Diabetes mellitus (DM) is a chronic progressive metabolic disorder characterized by hyperglycemia mainly due to either absolute insulin deficiency (type 1 DM) or relative deficiency of insulin hormone (type 2 DM) (Farag, et al. 2021). Diabetes is an important cause of disability because of its various complications such as blindness, lower limb amputation, and heart attack. Because of various reasons including financial and logistic ones, the prevalence of diabetes increases rapidly in middle-income and low-income countries. Many people have a low awareness about diabetes, so they do not know the symptoms and therefore do not go to healthcare institutions and receive adequate health care on a timely basis. According to International Diabetes Federation, about 49.7% of the people living with diabetes worldwide are undiagnosed (Cho, et al. 2018).

Conversation Map program was developed as a new educational initiative tool that engages patients with type 2 diabetes in group discussions which include diabetes-related topics: living with diabetes, how diabetes works (e.g., the role of insulin and glucose), healthy eating and being active, starting insulin treatment, foot care, and understanding the many factors involved in managing diabetes. These discussions are moderated mainly by certified nurses who provide the opportunity to formulate strategies for

behavior change using map as a visual illustration of people living with diabetes, activity cards, conversation questions, facilitator, group interaction, and action plans (Srulovici, et al.2020).

The diabetes conversation map is an educational strategy created by the International Diabetes Federation, developed on the basis of playful, interactive illustrations, containing descriptions on the chronic condition of diabetes and the daily situations experienced by health services users. It can serve as a medium for sharing personal experiences and encompasses feelings, support networks and healthy lifestyle practices (Besen, et al. 2018). Conversation maps combine various educational theories and have proven to be an internationally effective diabetes education for self-care management (Carvalho, et al. 2018).

The self- management education program is a systematic intervention involving active patient participation in self-monitoring and / or decision making, providing diabetic patients with the knowledge and skills needed to carry out self-care behavior, allowing them to manage crises and to make effective lifestyle changes. Program activities include support from others in their daily needs in terms of regulating their condition continuously from the baseline to the end or even when outside of the self-management training (Beck et al., 2018). The available evidence indicates that early diagnosis and effective management can improve the prevention of complications, and improve the client's condition, especially in the biological, social and psychological aspects (Fajriyah etal. 2019).

The multiprofessional health team should promote the development of self-management skills in order to make patients with DM responsible for their treatment by modifying or maintaining healthy habits and strengthening self-confidence. Therefore, self-management should be understood as a learned behavior and performed by the individual for their own benefit. The evaluation of self- management actions of DM patients should be integrated with the care provided by health professionals (Hooshmandja, etal. 2019). Self- management activities are generally carried out by the primary care team and are aimed at making people more aware of their chronic health conditions in order to better manage them. Nurses are one of the health professionals who achieve good results as a facilitator of these educational activities for self-care management (Marques, et al. 2019).

Significance of the study

One of the health challenges of society in this world is diabetes mellitus. This is the fifth most common cause of death in high-income countries, and it is rapidly becoming an epidemic in low- and medium-income countries (Fajriyah, et al. 2019). Based on the statistics of the World Health Organization in 2016, 1.6 million deaths worldwide were directly related to diabetes (WHO, 2018). Diabetes mellitus is a prevalent disease that is highly encountered by health care professionals. The world has observed more than four times increase in the number of cases of adult diabetes during the last four decades **(**Qasim, et al., 2020).

The prevalence of type 2 diabetes was estimated as 8.8% worldwide and is continuing to increase and is estimated to reach 9.9% among people aged 20‑79 in 2045. This corresponds to 628.6 million individuals living with type 2 diabetes globally (Alsous, et al. 2020). In Egypt, the incidence of diabetes in adults estimated to be 15.2% and total cases of diabetes in adults estimated to be 8,850,400 (International Diabetic Federation, 2020).

Aim of the Study

To evaluate the effect of instructional guidelines using conversation maps to improve self- management for diabetic patients through:

1. Assessing level of knowledge and self-management activities of diabetic patients.
2. Planning and implementing instructional guidelines using diabetes conversation map for diabetic patients according to their needs.
3. Evaluating the effect of instructional guidelines using diabetes conversation map on diabetic patients' level of knowledge and self-management activities.

Hypotheses:

H1: Diabetes conversation map will have a positive effect on diabetic patients' level of knowledge for diabetes conversation map group than control group.

H2: Diabetes conversation map will have a positive effect on diabetic patients' self-management activities for diabetes conversation map group than control group.

Operational Definition:

Diabetes conversation Map is an educational tool that provides visual cards to enable diabetic people improve their knowledge and self-management practices with regard to their condition. Conversation Maps are designed to represent surroundings that are familiar to the participants, for instance, a park, making the discussion meaningful for the participants.

Subjects & Methods

I. Technical design:

Research design:

A quasi-experimental research design was used in this study.

Quasi experimental design is one that resembles an experiment but lacks at least one of its defining characteristics **(Singh, 2021)**. In quasi experimental design, the experimenter presents some independent variables to two preexisting groups. The experimenter mayn't know whether the difference in behavior was caused by difference between the groups or by the independent variable. A quasi experiment leaves open the possibility that other differences exist between the experimental and control conditions and thus permit other potential differences to remain **(Singh, 2020)**.

Setting:

The study was conducted at the diabetic outpatient clinic, affiliated to El Nasr Hospital for Health Insurance, Helwan, Egypt. The clinic has one room, with one bed for receiving one patient.

Sample:

A purposive sample of 160 patients, from total 274 patients attended in the above mentioned setting in the previous year. They were selected according to the following

Inclusion criteria:

- Adult patient, from both genders.
- Willing to participate in the study.
- Able to communicate and answer questions.

Sample size calculation:

The sample size was calculated by adjusting the power of the test to 80%, and the confidence interval to 95% with a margin of error accepted adjusted to 5% using the following equation:

Type I error (α) = 0.05%

Type II error (B) = 0.20%

With power of test 0.80%

$$n = \frac{N \times p(1-p)}{\left[\left[N-1\times\left(d^2 \div z^2\right)\right]+ p(1-p)\right]}$$

N x p(1-p)	=274x 0.5 x (1-0.5)
N-1	=(274-1)x
d^2/z^2	=0.0025 / 3.8416+
p(1-p)	=0.5x (1-0.5)
N	= 160.1= 160

N= Community size

z= Class standard corresponding to the level of significance equal to 0.95 and 1.96

d= The error rate is equal to 0.05

p= Ratio provides a neutral property = 0.50 ***(Suresh & Chandrashekara, 2012).***

Based on the above equation, the sample size is 160 patients participated in this study. They were divided randomly into two groups.

Tools for data collection:

Tool I: Structured interviewing questionnaire: It was developed based on recent literature (**Qasim et al. 2020); (Srulovici et al. 2020); (De Moraes etal., 2020)**, and filled in by the researchers. It included three parts:

Part A: Patient's demographic characteristics as: age, gender, level of education, occupation and monthly income.

Part B: Patient's medical history such as: duration of diabetes, type of diabetes treatment, body mass index and smoking.

Part C: Patients' level of knowledge regarding diabetes mellitus

This tool was developed based on recent literature **(Alsous, et al. 2020); (Adam, etal. 2018)**, and filled in by the researchers and was used to assess the knowledge level of patients about diabetes mellitus. It consists of 34 questions and reflecting 8 parts: (1) Meaning and risk factors of the disease; (2) Signs and symptoms of diabetes mellitus; (3) Diabetes mellitus management; (4) Diabetic diet; (5) Blood glucose monitoring; (6) Diabetic foot care; (7) Physical exercise; and (8) Acute and chronic complications of diabetes mellitus.

Scoring system of patients' level of knowledge regarding diabetes mellitus

The patients' level of knowledge consisted of (34) closed-ended questions and formed of multiple choice, the score 2 for the correct and complete answer, score 1 for the correct and incomplete answer, and 0 for incorrect answer. The total knowledge score was (68) which were classified as satisfactory if the score ≥ 75% of the total score and unsatisfactory < 75% of total scores.

Tool II: Diabetes Self-Management Questionnaire

This questionnaire was adapted from (**Schmitt, et al. 2013)** to evaluate the diabetic patients' self‑management activities in the past 8 weeks, before and after the implementation of diabetes conversation map. The questionnaire included 13 items that are divided into four subscales: dietary scale (3 items), physical activity scale (3 items), health‑care use scale (3 items), and glucose management scale (4 items).

Scoring system of Diabetes Self-Management Questionnaire

Each item was rated on a 3 point Likert scale (Never, Sometimes, Always), with a total score ranging from 13-39. The highest score represent the better self-management.

Scoring of the questionnaire involved reversing negatively worded items so that higher values are indicative of more effective self- management. These items are (item 2 in dietary scale, items 5 & 6 in physical activity scale, item 8 in health‑care use scale & item 13 in glucose management scale).

II. Operational design:

a- Preparatory phase:

It includes reviewing the available literatures and diverse studies related to diabetes mellitus and diabetes

conversation map using books, articles, and internet to develop the study tools for data collection.

Content Validity

The study tools were tested for validity by a panel of 3 experts from the Faculty of Nursing (Medical Surgical Nursing) for judgment of clarity, comprehensiveness, relevance of sentences, and appropriateness of content.

Reliability of the tools

All tools used in the present study showed good reliability. It calculated as follows: Patients' level of knowledge regarding diabetes mellitus Cronbach's Alpha =0.789, Diabetes Self-Management Questionnaire Cronbach's Alpha =0.88

Ethical Considerations

Prior to collecting the data an informed oral consent was obtained. Patients also received the information on this study including the purpose, benefits of this study and data collection procedures. Patients were informed about their rights to refuse or withdraw at any time without any reason. Also, they were assured that the information given will be remained confidentially and used for the research purpose only.

b- Pilot Study

A pilot study was conducted on 10 % (16) of the patients to test the applicability and clarity of the tools and estimate the time needed to fill in the tools, this sample analyzed and no modifications were done on the tools. So those who participated in the pilot study were not excluded from the main study sample.

c- Field Work

Data collection was completed within 9 months in the period from beginning of January 2021 until the end of September 2021, and done through the following steps:

- Official letter delivered from the Faculty of Nursing, Helwan University, including the aim of the study, was forwarded to the administrator of the diabetic outpatient clinic, to obtain permission to conduct the study.
- The researchers interviewed the patients then introduced themselves to them. They were available at the clinic one day /week.

Data collection was done through the following four phases:

The first phase (Assessment phase):

In this phase, the researchers collected data from both groups by using pretest to determine the baseline knowledge level and self-management activities of patients. The total time needed for filling different data collection tools was 30-40minutes for each patient.

Second Phase (Planning phase):

- Based on the outcome of the assessment phase, the diabetes conversation map sessions were designed after reviewing of the related literature.
- The researchers prepared training places for implementing conversation map sessions.

Third Phase (Implementation phase):

- In this phase, the researchers implemented the developed diabetes conversation map sessions. The diabetes conversation map group was divided to 8 subgroups; each group was (10 patients). The number of sessions was four for each group; each one had its objectives and these sessions were conducted 1 week apart. Each session time was (45-60) minutes with total hours of the sessions were (3-4) hours for each patient group.

1) For diabetes conversation map group:

- **Diabetes conversation Maps** are a series of educational tools that provide a visual platform and aim to enable people with diabetes to learn about

behavior change and improve self-management with regard to their condition

- Conversation Maps are designed to represent surroundings that are familiar to the participants, for instance, a busy street or a park, making the discussion meaningful for the participants
- The researchers modified and translated conversation maps in to Arabic to be more applicable to the studied patients.

Description of Diabetic sessions using diabetes conversation maps

Each Map is a large piece of laminated paper with colorful images and text that patients can gather round, view and discuss.

Map 1: How Diabetes Works

Colorful drawing map which was used to teach patients with diabetes, how it occurs, and how to manage potential complications that help patients to understand the disease, as well as, demonstrating how to monitor blood sugar levels.

Map 2: Healthy Eating and Keeping Active

Colorful drawing map that was used to teach patients about healthy eating habits dietary choices and contents of diabetic diet, lifestyle habits and different types of physical activity.

Map 3: Starting Insulin or oral antidiabetic medication

Colorful drawings map that was used to teach patients about the use of insulin or other oral medications. It includes potential benefits of insulin, demonstration of how to self-inject insulin, and identifying sites and route of injection.

Map 4: Diabetic foot steps

Colorful drawing map which was used to teach patients about personal foot care (daily inspection, washing and cleaning foot, nail care, and selecting appropriate shoes)

- Each map includes six components, including the visual, information-sharing, activity cards, group interaction, educator guide, and a goal-setting card. Each session lasts approximately 45-60minutes depending on the needs of the group and the time availability.
- The researchers used probing questions to generate discussion and encourage self- reflection and sharing of the experience of patients living with diabetes, as well as, enable myths to be dispelled, so that the patients leave with accurate information.
- Each map session was implemented according to the following steps:

- The researchers asked mostly open questions.
- Patients come up with their own solutions.
- The researchers demonstrated active listening.
- Everyone was involved so that no one participant is dominating the session.
- Patients had an opportunity to set a goal for themselves.
- Implementation of map sessions included practical demonstration of monitoring blood sugar levels, self-inject of insulin, and diabetic foot care.

Evaluation phase:

This phase was performed for both groups post implementation of diabetic sessions using diabetes conversation map. It included reassessment using the same tools of data collection which aimed to evaluate the effect educational guidelines using diabetes conversation map on diabetic patients' level of knowledge and self-management.

III. Administrative design

The official permission was obtained from the administrator of El Nasr Hospital for Health Insurance, Helwan to conduct the study in diabetic outpatient clinic. This is by letters of request delivered to them from Faculty of Nursing, Helwan University, with explanation of the aim and expected outcome of the study.

IV. Statistical design

The collected data were organized, tabulated and statistically analyzed using the Statistical Package for Social Sciences (SPSS), version 20. For Numerical data, mean and standard deviation were calculated. Qualitative data were presented as frequencies and percentages. Comparison between groups was done by chi-square test. A p-value ≤ 0.05 was considered statistically significant.

Results:

Table (1): Distribution of the Studied Patients According to Demographic Characteristics (n= 160).

Items	Diabetes conversation map group (*n*=80)	Control group (*n*=80)	*Chi square*	*P value*
Age				
20- < 30	12 (15.0)	10 (12.5)	0.80	>0.05
30- < 40	14 (17.5)	14 (17.5)		
40- < 50	**36 (45.0)**	**32 (40.0)**		
50 and more	18 (22.5)	24 (30.0)		
Mean ± SD	**51.4 ± 4.14**	**50.7 ± 6.02**		
Gender				
Male	**48 (60.0)**	**50 (62.5)**	0.78	>0.05
Female	32 (40.0)	30 (37.5)		
Educational level				
Not read or write	7 (8.75)	6 (7.5)	6.11	>0.05
Read and Write	11 (13.75)	14 (17.5)		
Secondary education	29 (36.25)	26 (32.5)		
University education	**33 (41.25)**	**34 (42.5)**		
Occupation				
Working	**58 (72.5)**	**56 (70.0)**	6.03	>0.05
Not working	22 (27.5)	24 (30.0)		
Monthly income				
Adequate	**50 (62.5)**	**56 (70.0)**	3.65	>0.05
Inadequate	30 (37.5)	24 (30)		

***Statistically significant at p = ≤ 0.05**

Table (1): Shows that 45% and 40% respectively in the diabetes conversation map and control groups were aged from 40 to less than 50 years, with mean age (51.4 ± 4.14) and (50.7 ± 6.02) respectively. (60% & 62.5% respectively) of both groups were males. (41.25% and 42.5% respectively) of both groups had university education. While, (72.5 &70.0 respectively) of both groups were working and (62.5 &70.0 respectively) of them had adequate monthly income.

There were no statistically significant differences among diabetes conversation map and control groups regarding all items of demographic characteristics.

Table (2): Distribution of the Studied Patients According to Their Medical History (n= 160).

Items	Diabetes conversation map group (*n*=80)	Control group (*n*=80)	*Chi square*	*P value*
Duration of diabetes				
<5 years	**40 (50.0)**	**37 (46.25)**	1.92	>0.05
5‑10 years	12 (15.0)	17 (21.25)		
>10 years	28 (35.0)	26 (32.5)		
Types of diabetes treatment				
Diet and exercise only	13 (16.25)	11 (13.75)	2.71	>0.05
Oral antidiabetic only	**28 (35.0)**	**36 (45.0)**		
Oral and insulin treatment	22 (27.5)	20 (25.0)		
Insulin treatment only	17 (21.25)	13 (16.25)		
Body mass index				
18.5- <25	10 (12.5)	12 (15.0)	1.14	>0.05
25- < 30	26 (32.5)	28 (35.0)		
≥ 30	**44 (55.0)**	**40 (50.0)**		
Smoking				
Current	**50 (62.5)**	**51 (63.75)**	3.05	>0.05
Nonsmoker	20 (25.0)	17 (21.25)		
Ex-smokers	10 (12.5)	12 (15.0)		

***Statistically significant at p = ≤ 0.05**

Table (2): presents that 50.0% and 46.25% respectively of both groups had less than 5 years duration of diabetes and 35.0% & 45.0% of them were receiving oral antidiabetic only.

Regarding patients' body mass index and smoking, (55.0% & 50.0%) respectively of both groups had a body mass index of more than 30, and (62.5% & 63.75%) respectively of them were current smokers.

Table (3): Comparison of Mean Scores of Knowledge among Diabetes Conversation Map group throughout the study phases

Items	Diabetes conversation map group		
	Pre	Post	P-value
	Mean ±SD	Mean ± SD	
Meaning and risk factors of diabetes mellitus.	١,٠٦ ± 0.711	2.40 ± 0.75	<0.001**
Signs and symptoms of diabetes mellitus.	1.60 ± 1.21	3.22 ± 0.84	<0.001**
Diabetes mellitus management.	1.88 ± 1.15	4.96 ± 0.80	0.032*
Diabetic diet	1.87 ± 1.15	4.12 ± 0.84	<0.001**
Blood glucose monitoring.	1.34 ± 0.82	2.26± 0.85	<0.001**
Diabetic foot care.	2.30 ± 1.29	3.34 ± 1.73	0.001*
Physical exercise.	2.43 ± 1.20	3.04± 0.90	<0.001**
Acute and chronic complications of diabetes mellitus.	1.76 ± 1.07	3.30± 0.76	<0.001**
Total (34 items)	12.24 ± 5.61	27.64 ± 3.50	<0.001**

***Statistically significant at p = ≤ 0.05**
****Highly statistically significant at p= ≤0.001**

Table (3): illustrates that there were high statistically significant differences of mean knowledge scores pre to post implementation of diabetes conversation map within the conversation map group with (p= < 0.001).

Table (4): Comparison of Mean Scores of Knowledge among Control group throughout the study phases

Items	Control group		
	Pre	Post	P-value
	Mean ±SD	Mean ± SD	
Meaning and risk factors of diabetes mellitus.	0.82 ± 0.69	٠,٩١± 0.75	0.٨02
Signs and symptoms of diabetes mellitus.	1.26 ± 0.92	١,٤٤± 0.84	0.269
Diabetes mellitus management.	1.94 ± 1.16	٢,٣٣± 0.80	0.0٥0 *
Diabetic diet	1.56 ± 0.97	١,٦٨± 0.84	0.0٧1
Blood glucose monitoring.	1.04 ± 0.66	١,٠٨± 0.85	0.743
Diabetic foot care.	1.20 ± 0.67	١,٥± 1.73	0.0٣3*
Physical exercise.	1.84 ± 0.93	١,٨٢± 0.90	0.913
Acute and chronic complications of diabetes mellitus.	1.34 ± 0.82	١,٢٨± 0.76	0.636
Total (34 items)	11.00 ± 4.18	١١,٢٠± 1.59	0.072

***Statistically significant at p = ≤ 0.05**

Table (4): reveals that there were no statistically significant differences of mean knowledge scores pre and post implementation of diabetes conversation map within the control group with (p= >0.05), except for diabetes mellitus management and diabetic foot care.

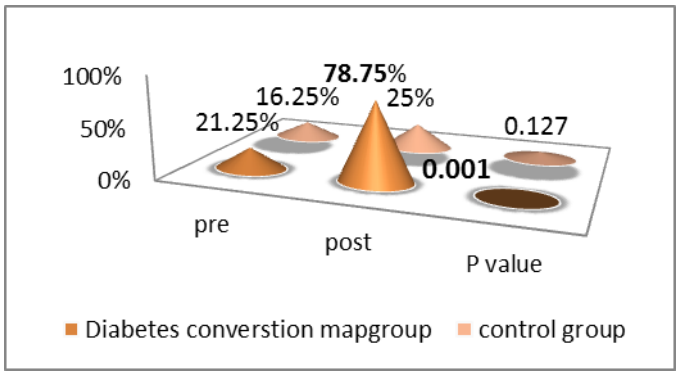

Figure (2): Percentage Distribution of Total Satisfactory Knowledge Scores for Diabetes Conversation Map and Control Group throughout the study phases

Figure (2): Reveals that there was a high statistically significant improvement of diabetes conversation map group's total satisfactory knowledge scores post-implementation of diabetes conversation map with high statistically significant differences between pre and post where (p = 0.001). While, there were no statistically significant differences in total satisfactory knowledge scores of control group between pre and post where (p= 0. 127).

Table (5): Comparison of Dietary Scale Scores among Diabetes Conversation Map and Control Groups through the Study Phases (n =160)

	Diabetes conversation map group (*n*=80)		*P value*	Control group (*n*=80)		*P value*
	Pre (%)	Post (%)		Pre (%)	Post (%)	
1. The food I choose to eat makes it easy to achieve optimal blood sugar levels						
Never	50.0	13.75		52.5	47.5	>0.05
Sometimes	27.5	16. 25	<0.001 **	27.5	30.0	
Always	22.5	**70.0**		20.0	22.5	
2. Occasionally I eat lots of sweets or other foods rich in carbohydrates						
Never	15.0	**61.25**		17.5	17.5	>0.05
Sometimes	67.5	31.25	>0.05	52.5	48.75	
Always	17.5	7.5		30.0	33.75	
3. I strictly follow dietary recommendations given by my doctor						
Never	47.5	12.5	<0.001**	37.5	40.0	>0.05
Sometimes	30.0	15.0		30.0	28.75	
Always	22.5	**72.5**		32.5	31.25	
Mean score of dietary scale	4.35±1.35	7.27±2.01	<0.001 **	4.35±2.35	5.27±1.91	>0.05

***Statistically significant at p = ≤ 0.05**
****Highly statistically significant at p= ≤0.001**

Table (5): illustrates that (70.0% & 72.5% respectively) of diabetes conversation map group had eaten the food that achieve optimal blood sugar levels and had strictly followed dietary recommendations post diabetes conversation map implementation, in comparison to 22.5% of them pre implementation.

There were statistically significant improvements among diabetes conversation map group regarding all

items of dietary scale post implementation than pre (p= <0.001), while there were no statistically significant improvements among control group (p=>0.05) .

Table (6): Comparison of Physical Activity Scale Scores among Diabetes Conversation Map and Control Groups through the Study Phases (n =160)

	Diabetes conversation map group (*n*=80)		*P value*	Control group (*n*=80)		*P value*
	Pre (%)	Post (%)		Pre (%)	Post (%)	
4. I do regular physical activity to achieve optimal blood sugar levels						
Never	45.0	7.5	<0.05	37.5	35.0	>0.05
Sometimes	45.0	**62.5**		47.5	47.5	
Always	10.0	30.0		15.0	17.5	
5. I avoid physical activity, although it would improve my diabetes						
Never	37.5	**60.0**	<0.05*****	37.5	40.0	>0.05
Sometimes	50.0	33.75		45.0	40.0	
Always	12.5	6.25		17.5	20.0	
6. I tend to skip planned physical activity						
Never	33.75	**57.5**	>0.05	35.0	33.75	>0.05
Sometimes	45.0	35.0		47.5	47.5	
Always	18.75	7.5		17. 5	18.75	
Mean score of physical activity scale (mean ± SD)	5.81 ± 2.30	7.42 ± 1.05	<0.05*****	4.71 ± 2.63	5.12 ± 1.31	>0.05

***Statistically significant at p = ≤ 0.05**

Table (6): reveals that 45.0% of diabetes conversation map group were doing regular physical activity to achieve optimal blood sugar levels pre diabetes conversation map implementation, increased to 62.5% of them post implementation.

There were statistically significant improvements among diabetes conversation map group regarding some items of physical activity scale post implementation than pre (p= <0.05), while there were no statistically significant improvements among control group (p=>0.05) .

Table (7): Comparison of Health Care Use Scale Scores among Diabetes Conversation Map and Control Groups through the Study Phases (n =160)

	Diabetes conversation map group (*n*=80)		*P value*	Control group (*n*=80)		*P value*
	Pre (%)	Post (%)		Pre (%)	Post (%)	
7. I keep all doctors' appointments recommended for my diabetes treatment						
Never	50.0	8.75	<0.001******	45.0	46.25	>0.05
Sometimes	37.5	16.25		40.0	37.5	
Always	12.5	**75.0**		15.0	16.25	
8. I tend to avoid diabetes-related doctors' appointments						
Never	22.5	**70.0**	<0.05*****	25.0	27.5	>0.05
Sometimes	45.0	17.5		37.5	35.0	
Always	32.5	12.5		25.5	25.0	
9. Regarding my diabetes care, I should see my medical practitioner (s) more often						
Never	25.0	11.25	<0.001******	25.0	22.5	>0.05
Sometimes	40.0	11.25		32.5	37.5	
Always	35.0	**77.5**		42.5	40.0	
Mean score of health care use scale (mean ± SD)	5.10 ±1.49	7.90 ± 1.17	<0.001******	3.90 ±1.62	5.30 ± 1.57	>0.05

***Statistically significant at p = ≤ 0.05**

****Highly statistically significant at p= ≤0.001**

Table (7): presents that (75.0% & 77.5% respectively) of diabetes conversation map group had kept all doctors' appointments recommended for diabetes treatment and had seen their medical practitioner (s) more often post diabetes conversation map implementation, compared to (12.5% & 35.0% respectively) of them pre implementation.

There were statistically significant improvements among diabetes conversation map group regarding all items of health care use scale post implementation than pre (p= <0.001), while there were no statistically significant improvements among control group (p=>0.05) .

Table (8): Comparison of Blood Glucose Management Scale Scores among Diabetes Conversation Map and Control Groups through the Study Phases (n =160)

	Diabetes conversation map group (*n*=80)		P value	Control group (*n*=80)		P value
	Pre (%)	Post (%)		Pre (%)	Post (%)	
10. I check my blood sugar levels with care and attention						
Never	40.0	6.25	<0.001******	35.0	35.0	>0.05
Sometimes	35.0	13.75		37.5	40.0	
Always	25.0	**80.0**		27.5	25.0	
11. I take my diabetes medication (e.g. insulin, tablets) as prescribed						
Never	47.5	5.0	<0.001******	47.5	42.5	>0.05
Sometimes	27.5	13.75		26.25	33.75	
Always	25.0	**81.25**		26.25	23.75	
12. I record my blood sugar levels regularly						
Never	47.5	12.5	<0.05*****	37.5	35.0	>0.05
Sometimes	22.5	17.5		35.0	33.75	
Always	30.0	**70.0**		27.5	31.25	
13. I tend to forget to take or skip my diabetes medication (e.g. insulin, tablets)						
Never	37.5	**76.25**	<0.001******	37.5	42.5	>0.05
Sometimes	25.0	12.5		18.75	25.5	
Always	37.5	11.25		43.75	32.5	
Mean score of blood glucose management scale	6.30 ± 1.80	9.2 ± 1.90	<0.001******	5.80 ± 1.66	6.35 ± 1.83	>0.05

***Statistically significant at p = ≤ 0.05**

****Highly statistically significant at p= ≤0.001**

Table (8): shows that only 25.0% of diabetes conversation map group were checking blood sugar levels with care and attention and were taking diabetes medication as prescribed pre diabetes conversation map implementation, improved to 80.0% & 81.25% respectively post implementation.

There were statistically significant improvements among diabetes conversation map group regarding all items of blood glucose management scale post implementation than pre (p= <0.05), while there were no statistically significant improvements among control group (p=>0.05) .

Discussion

Diabetes is not only a chronic disease but also a worldwide health concern. The prevalence of diabetes has been rapidly increasing and has become a major worldwide health problem of this century. Diabetes self‑management education is an ongoing process of facilitating the knowledge, skill and ability necessary for diabetes self‑care (**Farag, et al. 2021)**. Diabetes conversation map is a useful approach to improve diabetic control and prevent diabetes‑related morbidity and mortality and must be encouraged and used widely for all diabetic patients from the time of diagnosis. A multidisciplinary team, active learning and follow‑up of diabetic patients are an integral part of the success of the Diabetes conversation map. (**Srulovici etal., 2020).**

Regarding the demographic characteristics of patients, approximately less than half of patients in the conversation map and control groups were in the same age group from 40 to less than 50 years, with mean age (51.4 ± 4.14) (50.7 ± 6.02) respectively . This finding matched the results of **Besen et al. (2018),** who clarified in their study about "Effect of Conversation Maps Based Diabetes Education on Metabolic Parameters in Diabetes"; found that the mean age of their studied sample was (55.4 ± 10.01).

On the other hand, This result was in disagreement with **Qasim et al. (2020),** who conduct their study in Iran about " Diabetes conversation map - a novel tool for diabetes management self-efficacy among type 2 diabetes patients: a randomized controlled trial ", and mentioned that two thirds of the studied sample were in the same age group from 45 to 60 years

Concerning gender, the results of the present study revealed that more than half of the studied patients were males. This result was inconsistent with **Dehdari & Dehdari (2019),** in Iran, who reported in their study about "The determinants of anti-diabetic medication adherence based on the experiences of patients with type 2 diabetes", showed that more than half of the studied sample was females.

Considering educational level, the current study results indicated that less than half of both groups had university education. This result was supported by **Adam et al., (2018)** in Canada, who studied "Evaluating the Impact of Diabetes Self-Management Education Methods on Knowledge, Attitudes and Behaviors of Adult Patients with Type 2 Diabetes Mellitus"; stated that approximately half of the studied patients had university education. While this result was inconsistent with a study done by **Torres et al., (2018)**, in Barasil about "Evaluation of the effects of a diabetes educational program: a randomized clinical trial", found that majority of the studied sample were illitrate.

The study result illustrated that more than two thirds of the diabetes conversation map and control groups were working. This result was inconsistent with **Dehdari & Dehdari (2019),** who mentioned that approximately one third of their study samples were working. This may be due to that about two thirds of the sample was in their fourth and fifth decades of age, in addition to less than half of them had secondary degree education which qualified them for working.

In relation to monthly income, the study result mentioned that about two thirds of both groups had adequate monthly income. This may be due to the patients of the study sample received their treatment from health insurance hospital. This result was consistent with **Marques et al., (2019)**; who studied "Educational intervention to promote self-care in older adults with diabetes mellitus," indicated that the majority of their study samples had average individual and family incomes.

As regard to duration of diabetes, the present study results illustrated that about half of the studied patients had less than 5 years duration of diabetes. This finding was dissimilar to **Srulovici et al. (2020)**, in their study entitled "Long-term effectiveness of the

Diabetes Conversation Map Program on health outcomes: A case–control retrospective cohort study", in Israel, they stated that nearly half of the study and control groups had duration of disease from 5-10years.

Regarding Types of diabetes treatment, the present study revealed that more than one third of the conversation map and control groups were receiving oral antidiabetic only. This could be due to the duration of the disease of less than 5 years in about half of the studied patients and may reflect that the disease was managed by life style modification and oral antidiabetic medications. This result is disagreement with **De Moraes etal., (2020)**, in Brazil, in their recent study titled " Knowledge about Diabetes Mellitus and Self-Care Activities before and after an Educational Program: A Pilot Study," stated that majority of the studied sample were receiving oral antidiabetic drug.

Considering the body mass index, the present study indicated that more than half of the diabetes conversation map and half of control groups were overweight, This may be due to that weight gain is a predisposing factor for DM. this result is in accordance with **Srulovici et al. (2020)**, found that approximately half of the program participants and control group had a body mass index of 30 or higher

By assessing smoking history, the present study showed that two thirds of the diabetes conversation map and control groups were current smokers, This may indicate that smoking is a predisposing factor for DM. this result was incongruent with **Hung et al., (2017)** who studied " Long-term effectiveness of the Diabetes Conversation Map Program A pre post education intervention study among type 2 diabetic patients in Taiwan", stated that majority of the studied sample weren't smokers.

In relation to demographic characteristics, the current study results showed that there were no statistically significant differences between diabetes conversation map and control groups regarding all aspects of demographic characteristics; this result indicates that both groups were compatible. This result is in accordance with **Veras et al. (2019),** whose paper titled " the use of conversation maps in the metabolic control of diabetes in Brazilians: a randomized clinical trial" and mentioned that there was no statistically significant difference regarding all aspects of demographic characteristics between the two groups.

By evaluating patients' level of knowledge, the present study results illustrated that, the highest mean scores of knowledge among diabetes conversation map were diabetes management and diabetic diet post conversation map implementation .This finding is similar to the results of **Alsous, et al. (2020),** in Jordan, in their recent study titled " Effect of an educational intervention on public knowledge, attitudes, and intended practices towards diabetes mellitus", stated that the highest mean scores of knowledge among study group were medication, and complications of diabetes mellitus post program implementation

Additionally there were high statistically significant differences of mean knowledge scores post DCM implementation among DCM group. This can be explained by the high educational level of patients raised their awareness of diabetes and its complications and motivated them to improve their knowledge level. Therefore, DCM implementation produced a high statistically significant improvement in patients' knowledge level. This result was in the same line with **Adam et al., (2018)**, who stated that the difference in mean scores of knowledge was high statistically significant after DCM implementation.

Regarding total satisfactory knowledge scores, the results of the current study revealed that there was statistically significant improvement among DCM group's total pre-posttest satisfactory scores of knowledge. While there was no statistically significant improvement in the control group; this might be due to

the effectiveness of DCM implementation on improving the motivation of diabetic patients to learn self-management of their disease. This result goes in line with **Alsous, et al. (2020),** who stated that patients' knowledge improved significantly after the program application.

The above mentioned results proved the hypothesis number (1) of the present study which revealed that Diabetes conversation map will have a positive effect on diabetic patients' level of knowledge for diabetes conversation map group than control group.

Concerning dietary scale, the present study finding revealed that there were statistically significant improvements among conversation map group regarding all items of dietary scale post implementation of diabetes conversation map than pre , while there were no statistically significant improvements among control group ; This may be attributed to the effect of DCM implementation in providing in-depth understanding of diabetic diet planning and selecting dietary choices that control blood sugar level, this result is in accordance with **Marques et al., (2019),** who stated that there was a significant improvement in the dietary domain of diabetes self‑care assessment in the form of better selection of food items that do not induce an increase in the blood sugar level and following dietary recommendations.

As regards to physical activity scale, the study results showed that less than two thirds of conversation map group were doing regular physical activity to achieve optimal blood sugar levels post conversation map implementation compared to less than half of them pre implementation. This may due to the lack of awareness among diabetic patients about role of physical activity in controlling diabetes mellitus; this result is disagreement with **De Moraes etal., (2020)**, who stated that there was no significant improvement in the physical activity domain, but there was a significant improvement in the aspect of understanding the role of physical activity in improving diabetes control.

Relating to health care use scale, the study finding illustrated that majority of conversation map group had kept all doctors' appointments recommended for diabetes treatment post conversation map implementation; also there were statistically significant improvements among them regarding all items of health care use scale post implementation than pre. This may be due to DCM had an improvement effect on patients' utilization of health care that is essential to improve diabetes management and prevent complications; This result was consistent with **Reisi etal.,(2017),** in Iran, who studied " Effects of an educational intervention on self‑care and metabolic control in patients with type II diabetes," stated that there was a significant improvement in health care use after the intervention but the improvement in the attitude on frequent health care use was still not significant.

Considering blood glucose management scale, the current study results indicated that majority of conversation map group were checking blood sugar levels and were taking diabetes medication as prescribed. Also there were statistically significant improvements regarding all items of blood glucose management scale post implementation than pre, while there were no statistically significant improvements among control group; This could be due to written educational material with the practical demonstration were effective and achieved a better improvement regarding blood glucose monitoring. This finding matched the results of **Siddique (2017),** who studied " Diabetes knowledge and utilization of healthcare services among patients with type 2 diabetes mellitus in Dhaka, Bangladesh," stated a significant improvement was observed in blood glucose management in the form of a positive attitude in terms of regular monitoring and

recording of blood glucose levels with regular intake of medications.

This prove the research hypothesis number (2) which stated that the Diabetes conversation map will have a positive effect on diabetic patients' self-management activities for diabetes conversation map group than control group.

Conclusion:

According to the results and hypothesis of the current study; the diabetes conversation map had an improvement effect on diabetic patients' level of knowledge and self-management activities among conversation map group compared to control group.

Recommendations:

- Training courses for endocrinology nurses about applying diabetes conversation map for diabetic patients.
- Further researches are indicated on a wide range to counsel diabetic patients about the impact of diabetes conversation map on improving level of knowledge and self-management activities.

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