

Effect of Interactive Conversation Map on Self-management, Self-efficacy and Distress for Patients with Type 2 Diabetes

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Abstract

Background: Conversation map is an innovative education method has been used to facilitate education for patients with type 2 diabetes. **Aim:** To assess the effect of interactive conversation map on self-management, self-efficacy, and psychological distress for patients with type 2 Diabetes. **Research design:** a quasi-experimental study was conducted with pre, post and follow-up. **Setting:** The current study was recruited at Diabetic and endocrine outpatient's clinic at Al Kaser Al Ani Hospital, affiliated to Cairo university, Cairo, Egypt. **Subjects:** Participants were selected by convenient sampling consisted of 340 adults' patients from both gender with type 2 diabetes. **Tools for data collection:** Five tools were used for data collection **I.** Structured interview questionnaire consists of **1.** Patient demographic characteristics as, age, gender, education level, and occupation). **2.** Patient medical history. **3.** Patient knowledge regarding diabetes mellitus. **II.** Diabetes self-management questionnaire, **III.** Diabetes management self-efficacy scale (DMSES). **IV.** The diabetes distress scale (DDS), **V.** The world Health organization -5 well-being index (WHO-5). **Result:** The finding of the study concluded that type 2 diabetic patients who receive educational program via interactive conversation map had improvement in level of knowledge, self-management, diabetes self-efficacy, and wellbeing. In addition, decreasing psychological distress **Conclusion:** Interactive conversation maps have a positive effect in improving patient level of knowledge, enhancing self-management, improving self-efficacy, lowering psychological distress, and improving well-being for type 2 diabetic patients. **Recommendation:** Healthcare providers should consider incorporating interactive conversation map into diabetes education to optimize self-management, self-efficacy and decreasing psychological distress for patients with Type 2 Diabetes.

Keywords: *Interactive conversation map, Self-management, Self-efficacy, Psychological distress & type 2 diabetes.*

Introduction:

Diabetes mellitus is a long-term disease that can negatively impact both physical and mental well-being (**International Diabetes Federation, 2018**). Diabetes is a metabolic disorder characterized by high blood sugar levels, often resulting from insufficient (type 1 DM) or ineffective insulin production (type 2 DM) (**Farag, et al., 2021**).

The economic burden of diabetes is growing due to rising healthcare costs and an aging population. Half of all people with diabetes over 65 years old are hospitalized at least once a year, and severe and life-threatening complications often contribute to the increased rates of hospitalization. The main goals of diabetes management are to maintain stable blood sugar levels and prevent both short-term and long-term complications. Nurses are crucial in helping people with diabetes learn how to manage their condition independently (**Hinkle, et al., 2021**). Obesity, an inactive lifestyle, and burdens on the quality of life all worsen the problem. In addition,

psychological distress is a common issue among patients with T2DM. The stress of managing a chronic condition can lead to anxiety, depression, and other psychological issues (**Sukartini, et al., 2023**). Self-efficacy (SE) is considered an important pre-requisite for the initiation and coping with healthy lifestyle habits. In 1977, Albert Bandura described SE as one's ability to influence or perform actions that affects life and to exercise control over these actions. Researches have demonstrated the link between self-efficacy and diabetes management, blood glucose levels, quality of life and dietary patterns among individuals living with diabetes (**Qasim, 2019**). Self-efficacy is seen as a crucial component, which can play an important part in managing T2DM. Recently, psychosocial research in diabetes linked T2D to diabetes-specific emotional distress (diabetes distress), which captures a much broader affective experience than depression; constituting distinctive emotional concerns within the 'spectrum of patient

experience' for those living with an advanced and chronic condition (Speight, et al., 2020).

Diabetes distress is a term used to describe psychological anguish that is unique to having diabetes. It can include a wide range of feelings, such as being overwhelmed by the responsibilities of maintaining a healthy diet, regular exercise, and adherence to prescription medication regimens. Individuals diagnosed with type 2 diabetes may experience anxiety and remorse, especially in regard to obesity, worry about current comorbidities, fear hypoglycemia, and worry about potential consequences. (Perrin, et al., 2017).

Managing T2DM can be challenging, particularly for patients who struggle with self-efficacy and psychological distress (Cunningham, et al. 2018). A low awareness of diabetes can result in people not noticing the symptoms and consequently not seeking timely medical care. (Hasan, & Ramadan, 2022). As stated by International Diabetes Federation 2018, nearly 49.7% of those suffering with diabetes worldwide go undiagnosed. Therefore, patients with T2DM are in need for a systematic intervention maintaining them to handle emergencies and cope with a successful modification of lifestyle.

Interactive Conversation Maps (ICMs) are innovative tools that have been developed to help patients better understand their condition and develop an action plan to improve their health outcomes. These maps are visual aids that provide patients with a framework for discussing their condition with their healthcare providers and identifying areas for improvement. Using conversation maps as a new tool for educational initiatives that participate people with T2DM in a group discussion, moderated mainly by certified nurse utilizing a map that serves as a visual representation of the diabetes community, activity cards, discussion starters, a facilitator, group activities, and action plans. These programs include diabetes-related topics: living with diabetes, how diabetes works, healthy eating habits, foot care, and understanding how to manage their disease (Faridi et al., 2021).

Furthermore, it is important to recognize that self-management is a taught attitude and carried out by the individuals for their own gain. The assessment of self-care practices of T2D patients should be interactive with the care given by medical specialists (Qiu, et al., 2020).

Finally, T2DM is a chronic condition that lasts a lifetime. Patients' motivation to comply with therapy and maintain their own health is waning, which makes their sickness worse. Therefore, that requires regular self-management to prevent complications and improve health outcomes. ICMs as an innovative tool can help patients better understand their

condition and develop an action plan to manage their health effectively, which consequently may influence patients' self-management self-efficacy and psychological distress levels.

Significance of the study:

Type 2 diabetes was prevalent in about 8.8% in the world, is going on to rise, and is predictable to attain 9.9% of the 20–79 age group in 2045. This translates to 628.6 million people worldwide who have type 2 diabetes. (Alsous, et al. 2020).

It is anticipated that the adult diabetes incidence rate in Egypt will be 15.2%, with an estimated 8,850,400 adult cases of diabetes. (International Diabetic Federation, 2020). Globally, the prevalence of type 2 diabetes is high and rising across all regions. Population ageing; economic development and increasing urbanization, leading to lifestyles that are more inactive. On the other hand, it is estimated that 94% of the increase in the number of people with diabetes by 2045 will occur in low and middle-income countries, where population growth is expected to be greater, in which Egypt It ranks tenth on the list (Abouzeid, et al., 2022)

T2DM is a significant and growing health concern worldwide, with a high prevalence and significant physical problems and psychological distress, which may consequently, contributes negative impacts on their quality of life and health outcomes. It is important to continue to raise awareness of the condition and invest in prevention and management strategies through a highly structured intervention program. (Metwally, et al., 2019).

Aim of the Study:

To assess the effect of interactive conversation map on self-management, self-efficacy and psychological distress for patients with Type 2 Diabetes.

Through:

1. Measuring type 2 diabetes patients' level of knowledge
2. Evaluating self-management activities for patients with diabetes type 2
3. Planning and implementing interactive educational program with conversation map for patients with diabetes type 2
4. Measuring self-efficacy for patients with diabetes type 2.
5. Evaluating the level of diabetes psychological distress for patients with diabetes type 2.
6. Assessing level of well-being of patients with diabetes type 2.

Research Hypotheses:

H1: Patients with diabetes type 2 who will be received to interactive conversation map will have higher level of knowledge post program implementation than level pre-program.

H2: Patients with diabetes type 2 who will be received to interactive conversation map will have higher self-management scores post program implementation than scores pre-program.

H3: Patients with diabetes type 2 who will be received to interactive conversation map will have higher self-efficacy scores post program impregnation than scores pre-program.

H4: Patients with diabetes type 2 who will be received to interactive conversation map will have a lower psychological distress score post program implementation than scores pre-program

H5: Patients with diabetes type 2 who will be received to interactive conversation map will have a higher well-being level post program implementation than level pre-program

Operational Definition:

The Diabetes Conversation Map is an educational resource, offering graphic cards to help patients with diabetes enhance their understanding and self-management skills related to their condition. These maps are crafted to depict familiar environments, such as a park, ensuring that the discussions remain relevant and meaningful for the participants.

Materials & Methods:

Study design: A quasi-experimental design (one group pre, post and follow-up intervention) was utilized to accomplish this study's purpose. A quasi-experimental design is a research approach that shares similarities with experimental designs but lacks full randomization of participants into group. In quasi-experimental designs, an independent variable is manipulated without randomization. Quasi-experimental studies may have both pre- and post-intervention evaluation, as well as nonrandomly selected control groups. This type of study design attempts to evaluate interventions but does not rely on randomization to prove that one intervention causes an outcome (Thomas, 2023).

Setting: The current study subject was enrolled from Diabetic and endocrine outpatient's clinic at Al Kaser Al Ani Hospital, which were affiliated to the Cairo university, Cairo, Egypt. The setting consisted of two patient waiting area, 6 clinics including one diabetic clinic, one for endocrinology, one for obesity, one for ultrasound, laboratory, and pharmacy. In addition to teaching room for health education and patient education sessions. The clinics provide basic care for diabetic patients and follow up.

Subject: A convenient sample of 340 adult patients (20-60) from both gender with diagnose type 2 diabetes, conscious and alert. From total population

700 patients attended to the previous mentioned sitting. Who accept to join in the study.

Sample size calculation:

With the EpiCalc program, the sample size was determined by setting the test's power to 90%, the confidence interval to 95%, and the acceptable margin of error to 5%.

Tools of data collection

Five tools were used to collect data relevant for this study. They included the following:

A Structured Interview Questionnaire

The researchers designed it using basic Arabic after thoroughly examining the most recent research in the field; (Srulovici et al. 2020 & De Moraes et al., 2020), and it was composed of three parts:

Part 1: Patient's Socio Demographic Characteristics: The purpose of this section was to gather the baseline data on the type 2 diabetes patients under study (age, gender, educational level, occupation, activity pattern, and monthly income).

Part (2): Patients' Medical History: This part collects the medical history of the patients with diabetes type 2 and it consisted of six questions including (family history of diabetes, duration of diabetes, body mass index, types of diabetes treatment, comorbidities, and Hemoglobin A1c (HbA1c) levels.

BMI = (weight in kilograms) / (height in meter) 2: It was divided into four levels: underweight (BMI < 18.5), normal BMI (≥ 18.5 - 24.0), overweight (25.0 - 29.0) and obese (BMI ≥ 30 - 40) morbid obese (> 40).

Part (3): Patients' knowledge regarding diabetes mellitus, it developed to assess the patient's knowledge regarding diabetes mellitus (meaning of diabetes, complications, diabetic dietary regimen, physical exercises, medications, laboratory investigations, hygienic care, foot and nails care, wound care, and follow-up).

Tool II: Diabetes Self-Management Questionnaire (DSMQ):

This questionnaire will adapt from (Schmitt, et al. 2013) to assess the self-management practices of the diabetic patients over the previous eight weeks, both before and after the diabetes conversation map was put into place. There were thirteen items total, broken down into four subscales: three for the dietary scale, three for physical activity, three for the use of health care, and four for glucose management.

Scoring system:

Every item was categorized using a 3-point Likert scale (never, occasionally, and always), and the final score could be anything between 13 and 39. The best self-management is indicated by the highest score. Reversing negatively phrased items in the questionnaire's scoring system makes higher scores suggest more effective self-management. These

include items 2 in the dietary scale, 5 and 6 in the physical activity scale, 8 in the health care usage scale, and 13 in the glucose management scale.

Tool III: Diabetes management self-efficacy Scale (DMSES):

This Scale will adapt from (Kara, et al. 2006) to evaluate the diabetic patient’s confidence regarding to diet, medical management, and exercise. DMSES contains 20 questions to measure psychosocial self-efficacy perceptions, is concentrated on functional diabetes management behaviors. Moreover, it is constructed on self-care activities for T2D patients in order to manage their diabetes and prevent complications.

Scoring system

Each patient circles a number on the scale from 0 (totally unable) to 10 (fully able) to indicate how capable they are on each topic. The range of

responses for each patient is then from 0 to 10. For instance, monitoring blood sugar levels and maintaining a nutritious diet even when traveling. Higher scores indicate higher levels of self-efficacy. Items are evaluated on a numerical scale from 0 to 10.

Tool IV: The diabetes distress scale (DDS)

This Scale will adapt from (Polonsky, et al. 2005) and (Fisher, et al. 2012). The DDS is a 17-item scale that contains four critical dimensions of distress: emotional burden, regimen distress, interpersonal distress and physician distress.

Scoring system:

- It scaled from 1 (not a problem) to 6 (a very serious problem).
- A mean item score 2.0 – 2.9 considered ‘moderate distress,’
- A mean item score > 3.0 considered ‘high distress

Total DDS Score:	a. Sum of 17 item scores. _____			
	b. Divide by: _____	17		
	c. Mean item score: _____			
	Moderate distress or greater? (mean item score > 2)	yes	no	
A. Emotional Burden:	a. Sum of 5 items (1, 4, 7, 10, 14)	_____		
	b. Divide by: _____	5		
	c. Mean item score: _____			
	Moderate distress or greater? (mean item score > 2)	yes	no	
B. Physician Distress:	a. Sum of 4 items (2, 5, 11, 15)	_____		
	b. Divide by: _____	4		
	c. Mean item score: _____			
	Moderate distress or greater? (mean item score > 2)	yes	no	
C. Regimen Distress:	a. Sum of 5 items (6, 8, 3, 12, 16)	_____		
	b. Divide by: _____	5		
	c. Mean item score: _____			
	Moderate distress or greater? (mean item score > 2)	yes	no	
D. Interpersonal Distress:	a. Sum of 3 items (9, 13, 17)	_____		
	b. Divide by: _____	3		
	c. Mean item score: _____			
	Moderate distress or greater? (mean item score ≥ 2)	yes	no	

Tool V: The World Health Organization-5 Well-Being Index (WHO-5)

This scale, established by the World Health Organization 1998, to measure psychological well-being, a main component of quality of life. The questionnaire comprised five items with responses on a six-point Likert scale: never, sometimes, sometimes, more than half the time, and less than half the time.

Scoring system:

The sum of the five responses' figures yields the raw score. The raw score is a number between 0 and 25, where 0 denotes the lowest potential quality of life and 25 the most. Furthermore, the entire score is

rescaled to fall between 0 and 100. A score of less than 50 denotes poor psychological health, and a score of less than 28 suggests probable depression.

Content validity:

A panel of three professors from the Medical Surgical Department, and three professors from Psychiatric Mental Health Nursing. Faculty of Nursing, Helwan University and Cairo University, checked the tools for relevancy and clarity. comprehensiveness, knowledge and applicability.

Reliability of the tools:

All tools used in the current study presented good reliability. It calculated as follows: structured

interview questionnaire Cronbach's Alpha =0.791, Diabetes Self-Management Questionnaire (DSMQ) Cronbach's Alpha =0.78, Diabetes management self-efficacy Scale (DMSES) Cronbach's Alpha =0.829, The diabetes distress scale (DDS) Cronbach's Alpha =0.89, and The World Health Organization-5 Well-Being Index (WHO-5) Cronbach's Alpha =0.879

Pilot study

Before commencing the primary data collection, a preliminary study was undertaken, involving 10% of the study's patients (34). The purpose was to evaluate the feasibility of recruitment and the effectiveness of the study tools. Patient who participated in the pilot study were subsequently incorporated into the main study subject as no variations were observed in the recruitment procedure. The outcomes of the pilot study affirmed the feasibility of the overall research.

Ethical considerations:

Administrative process:

Approval has been taken for carrying out this study in the selected area from the Medical and Nursing director of Kaser Al Ani hospital which affiliated to Cairo University.

Obtaining ethical committee permission:

The scientific ethical research committee of the Helwan University faculty of nursing accepted the study on October 19, 2022. The participants received an explanation of the research's purpose. Following a clarification of the study aim and methodology, each patient gave their written agreement to participate. Participants received information about their rights to withdraw participation and to leave at any moment without facing any consequences. The research data provided by study participants was kept confidential.

Field work:

The study was recruited in nine months from the starting in January 2023 and ending in September 2023, and carried out throughout the subsequent stages (planning, execution, assessment, and evaluation). Textbooks, evidence-based articles, online periodicals, and journals were employed to gather relevant literature for the study problem during the preliminary (preparatory and assessment) phase.

Preparatory and assessment phase:

Patients who participated in the study were interviewed by the researcher before the data collection to clarify aim of the study, and take their approval to join in the study, then the needs assessment was done and data was collected to be as a baseline information (patient's knowledge, diabetes self-management, diabetes management self-efficacy Scale, diabetes distress scale, and the World Health Organization-5 Well-Being Index). For the illiterate patients, the researchers' filled out the questionnaire.

The total time required for data collection for each patient was 45 minutes nearly.

Planning phase:

It included extensive reviewing of the relevant literatures to design the interactive conversation map sessions.

Implementation phase:

The patient was divided into groups (5-6 patients) at each group. The sessions of conversation map were divided into four sessions for each group of patients, the session takes about 40-50 minutes with total time of four sessions 2.30-3.30 hours for each group.

The researchers attend to the outpatient clinic 3 times a week (Saturday, Monday, and Tuesday); from 9am till 2pm. The researchers get the WhatsApp phone number of each patient and sent the conversation map and instructions for follow up to the patients during the next three months after the intervention.

Interactive conversation maps present familiar scenarios, such as a busy street or park, to engage participants in meaningful discussions. To satisfy the cultural needs of the study population, researchers adapted and translated the maps into Arabic. DCMPs are a set of instructional resources designed to give type 2 diabetes patients access to a visual platform where they may learn about behavior modification and encourage self-management specific to their condition.

Each session incorporates six components: visual aids, information sharing, activity cards, group interaction, an educator guide, and goal-setting cards. Sessions last 45-60 minutes, depending on the group's needs. Researcher encouraged discussion with open-ended questions, promoting self-reflection and dispelling myths to ensure accurate understanding. Each session uses a large, colorful laminated map with images and text for group discussion.

- **Map 1:** How Diabetes Works: Explains how diabetes occurs, its complications, and how to screen blood sugar effectively, aiding in patient understanding.
- **Map 2:** Healthy Eating and Keeping Active. Teaches healthy eating, diabetic diets, and physical activities, promoting lifestyle changes.
- **Map 3:** Starting Insulin or oral medications. Provides guidance on insulin and oral medications, demonstrating self-injection and injection sites.
- **Map 4:** Diabetic Foot Care. Focuses on daily foot care, including inspection, cleaning, and appropriate footwear selection.

The researchers use Open-ended questions led participants to find their own solutions. Researchers practiced active listening. All participants were engaged equally in the discussion. Participants were encouraged to set personal goals. Practical

demonstrations included blood sugar monitoring, insulin injection, and foot care.

Evaluation phase:

The post intervention assessment was completed three months after the intervention and (patient's knowledge, diabetes self-management, diabetes management self-efficacy Scale, diabetes distress scale, and the World Health Organization-5 Well-Being Index) was reassessed and analyzed. In addition, follow-up intervention assessment was completed six months after the intervention (patient's knowledge, and the World Health Organization-5 Well-Being Index) was reassessed and analyzed aimed to assess the effect of applying ICM on level of knowledge, self-Management level, Self-efficacy, and psychological distress level for patients with T2D.

Statistical analysis:

The acquired data was categorized, evaluated, tabulated, and analyzed using a number and percentage distribution. The computer performed statistical analysis, and appropriate statistical tests were applied to evaluate whether or not significant differences existed. Numbers, percentages, means, chi-square (X²) tests, and P values were used in the statistical analysis. The significance of the finding was assessed based on the P value significance level. A P value < 0.05 was regarded significant, a P value > 0.05 was considered non-significant, and a P value < 0.001 was considered highly significant. The current study's statistical presentation and analysis were carried out using SPSS V20, which included the mean, standard deviation, t-test.

Results:

Table (1): Percentage distribution of the studied patients according to socio- demographic characteristics (N=340)

Variable	NO	%
Age		
20 < 30	27	7.9%
30 < 40	69	20.3%
40 < 50	148	43.5%
50-60	96	28.3%
Mean= 47 ±2.984		
Gender		
Male	182	53.5%
Female	158	46.5%
Education level		
Illiterate	11	3.3%
Read and write	52	15.3%
Secondary school	103	30.2%
University	174	51.2%
Occupation		
Not working	105	30.9%
Working	235	69.1%
Activity pattern		
Active	292	85.9%
Sedentary	48	14.1%
Monthly income		
Adequate	214	62.9%
Inadequate	126	37.1%

Table (2): Percentage distribution of the studied patients regarding medical History (N=340)

Variable	NO	%
Family history of diabetes		
Yes	284	83.5%
No	56	16.5%
Duration of diabetes		
< 5 Years	186	54.7%
5 - 10 Years	59	17.4%
> 10 years	95	27.9%
Body mass index		
18.5 < 25	74	21.8%
25- 30	88	25.9%
> 30	178	52.4%
Mean \pm SD		
Types of diabetes treatment		
Oral ant diabetic only	153	45%
Oral ant diabetic and insulin	122	35.9%
Insulin only	65	19.1%
Comorbidities		
Kidney disease	96	28.2%
Eye disease	43	12.6%
Neurological disease	39	11.5%
Foot complications	54	15.9%
Peripheral circulation complications	25	7.4%
Hemoglobin A1c (HbA1c) levels (Mean \pm SD)		
Before intervention	9.6 \pm 1.5	
Post intervention (three months)	8.3 \pm 1.2	
Follow-up (six months)	6.8 \pm 1.2	

Table (3): Mean score of patients' knowledge among diabetes and therapeutic regimen (N=340)

Knowledge	Pre Intervention	Post Intervention	Follow-up	F	(P-value)
	Mean \pm SD	Mean \pm SD	Mean \pm SD		
Overview of DM	5.85 \pm 2.4	16.24 \pm 3.02	16.1 \pm 2.08	-6.742	(0.00**)
Complications of DM	10.02 \pm 5.12	34.17 \pm 6.4	32.14 \pm 5.26	-6.475	(0.000**)
Diabetic dietary regimen	0.73 \pm 1.35	7.95 \pm 2.25	7.38 \pm 2.51	-6.733	(0.000**)
Physical exercises	1.10 \pm 1.04	9.56 \pm 1.45	9.00 \pm 2.05	-6.863	(0.000**)
Medications.	3.20 \pm 1.77	13.25 \pm 5.21	12.27 \pm 5.41	-6.762	(0.000**)
Investigations	1.10 \pm 1.04	5.56 \pm 1.45	5.00 \pm 2.05	-6.812	(0.000**)
Hygienic care	1.32 \pm 0.65	7.68 \pm 1.21	7.23 \pm 2.05	-7.147	(0.000**)
Foot and nails care	1.41 \pm 1.76	10.15 \pm 1.19	9.58 \pm 2.10	-6.762	(0.000**)
Wound care	0.08 \pm 0.28	2.70 \pm 0.69	2.53 \pm 0.89	-7.105	(0.000**)
Follow-up	1.32 \pm 0.65	3.10 \pm 0.51	3.05 \pm 0.56	-6.987	(0.000**)
Total	25.34 \pm 10.47	110 \pm 12.25	103.12 \pm 15.2	-6.854	(0.000**)

**Highly statistically significant at $p = \leq 0.001$

F: ANOVA

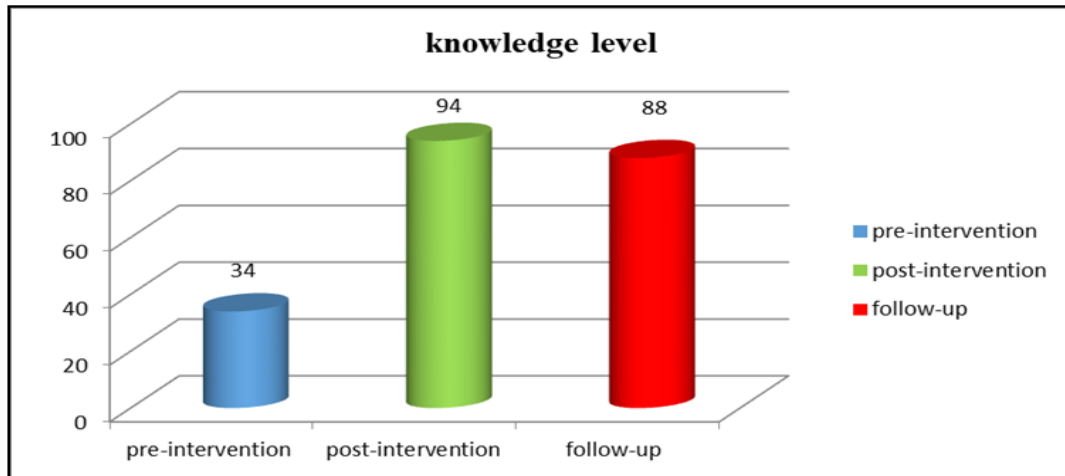


Figure (1): Total patients’ knowledge among diabetes and therapeutic regimen (N=340)

Table (4): Mean Score of Diabetes Self-Management for the studied patients before and after intervention (N=340)

Scale	Pre intervention	Post intervention	P Value
Dietary scale	4.52±1.14	7.15±1.14	0.000**
Physical activity scale	5.47±2.17	7.23±1.25	0.000**
Health-care use scale	3.48±2.05	7.25±1.19	0.000**
Glucose management scale	4.58±2.15	9.47±3.59	0.000**

**Highly statistically significant at $p = \leq 0.001$

Table (5): Mean score comparison of diabetes management self-efficacy Scale (DMSES) for the studied patients before and after intervention (N=340)

Factor	Pre intervention	Post intervention	P Value
Factor1: Exercise & weight control (Mean ± SD)	37.1 ± 9.1	56.2 ± 10.5	0.001**
Factor 2: Health seeking and diabetes treatment (Mean ± SD)	28.3 ± 5.6	36.1 ± 4.9	0.001**
Factor 3: Blood sugar monitoring (Mean ± SD)	11.7 ± 2.8	16.6 ± 3.1	0.001**
Factor 4: Diet control (Mean ± SD)	4.6 ± 2.2	6.6 ± 2.3	0.001**
Overall DMSE score after 6 months of enrolment (Mean ± SD)	81.9 ± 15.8	115.5 ± 18.0	0.001**

**Highly statistically significant at $p = \leq 0.001$

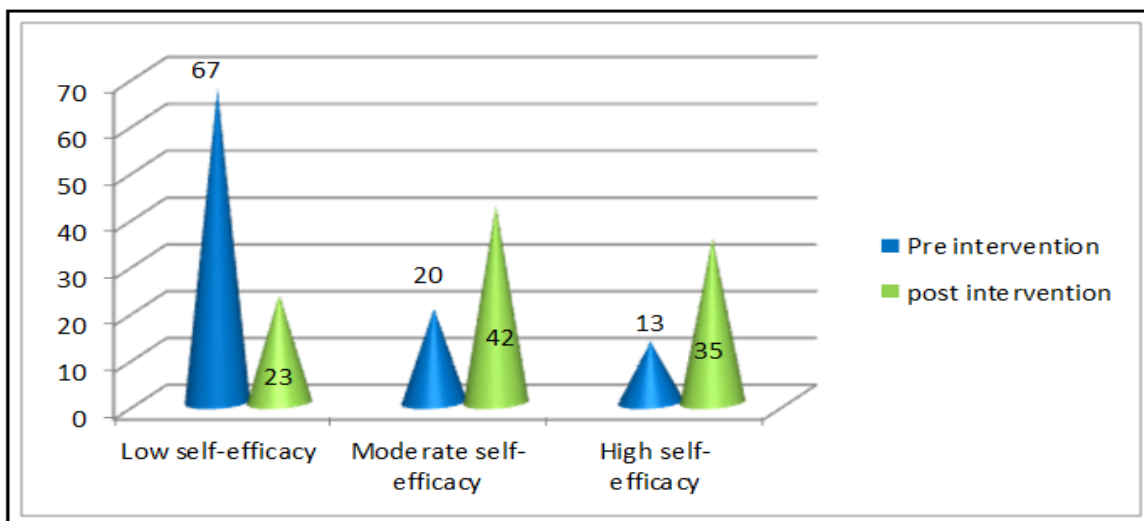


Figure (2): Patients’ level of self-efficacy for the studied patients before and after intervention (N=340)

Table (6): Mean score comparison of diabetes distress scale (DDS) for the studied patients before and after intervention (N=340)

Item	Pre intervention	Post intervention	P Value
Emotional Burden	3.01±1.2	2.0±0.57	0.003**
Physical Distress	2.47±1.4	1.5±1.1	0.001**
Regimen Distress	3.12±1.8	2.5±1.2	0.001**
Interpersonal Distress	1.21±1.45	1.01±0.87	0.000**
Overall DDS score after 6 months of enrolment (Mean ± SD)	42.08 ± 10.92	22.79 ± 4.5	0.003**

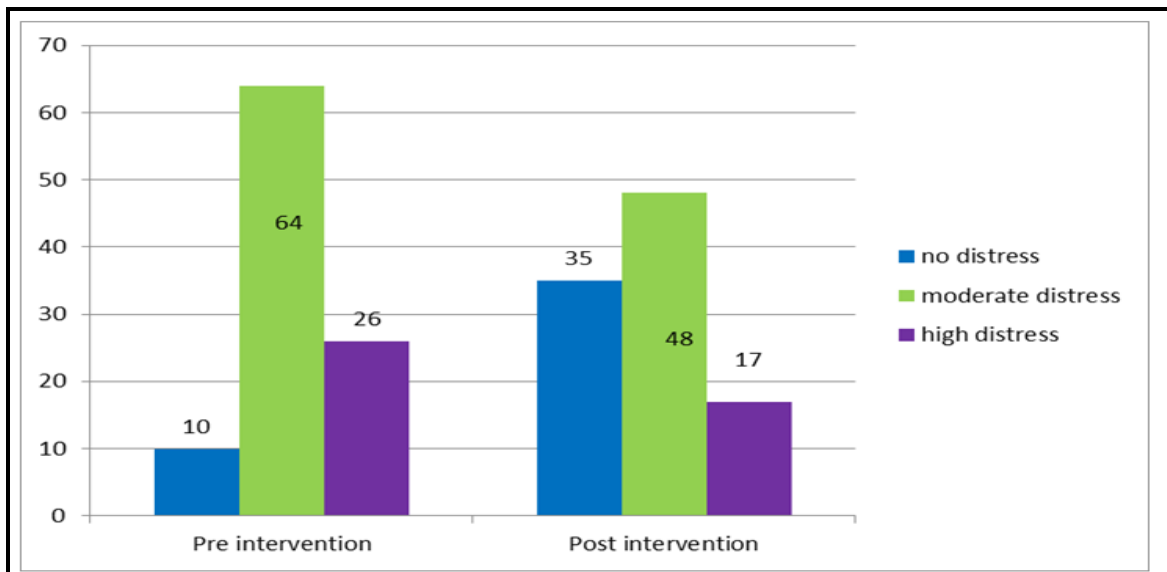


Figure (3): Patients' level of distress

Table (7): Percentage distribution of the studied patient's responses according to The World Health Organization-5 Well-Being Index (WHO-5) (N=340)

Level of will-being	Pre-intervention		Post intervention (3 months)		Follow up intervention (6months)		χ^2	Df	P
	N	%	N	%	N	%			
Good psychological state (> 50score)	31	9.1	116	34.1	155	45.6	76.84	25	<0.001**
poor psychological state (≤ 50score)	189	55.6	145	42.6	150	44.1			
Depression (≤ 28score)	120	35.3	79	23.3	35	10.3			

Table (1): Represents that 43.5% among the studied patients were between the ages of 40 and under 50, having a mean age of 47 ±2.984. Also 53.5% were males, and 51.2% of them had university education. While, 69.1% were working, 85.9% of them have an active life pattern and 62.9% of them had adequate monthly income.

Table (2): Illustrations that 83.5% of studied patients had a family history of diabetes, and 54.7% of them had diabetes for fewer than five years. Regarding patients' body mass index 52.4% of the patients under

study had a BMI more than thirty. 45% of them, however, were just taking oral antidiabetics. Concerning comorbidities 28.2% of them has kidney diseases. And regarding Hemoglobin A1c (HbA1c) levels (Mean ± SD) there are improvement in their level before, post three months, and post six months of intervention (9.6±1.5, 8.3±1.2, and 6.8±1.2) respectively.

Table (3): There were substantial statistical variations in the mean knowledge scores before, after, and after the follow-up with (p< 0.001).

Figure (1): Illustrate that 94% of study subject had a satisfactory total level of knowledge in post intervention, whole 88% of them had a satisfactory level in post 6 months' intervention in follow-up.

Table (4): This table represents that there is a highly significant improvement in the self-management level regarding studied patients at all dimensions post ICM application.

Table (5): Reveals that there was a highly statistically significant difference in DMSE score between pre intervention, and post intervention (p value < 0.001).

Figure (2): Illustrates that 67% of study subject has a low self-efficacy in pre intervention phase while just (20% and 13%) have a moderate and high self-efficacy respectively. While in post intervention phase (23%, 42% and 35%) of them have low, moderate, and high self-efficacy respectively.

Table (6): This table shows that 3 months after the application of ICM there was a highly statistically significant improvement in the diabetes distress subscales especially in emotional and regimen distress which has a high distress level at the pre intervention and improved in post intervention to be moderate distress. While regarding interpersonal distress there was no distress considered in pre or post intervention compared to other dimensions. Also, regarding the total score of DDS was significantly lower in the studied patients (42.08 ± 10.92 vs 22.79 ± 4.5 , $P=0.003$).

Figure (3): Illustrates that 64% of study subject has a moderate level of distress in pre intervention phase compared to 48% in post intervention. While 10% of the studied patients has no distress and increased to become 35% in post intervention.

Table (7): Represents that there was a highly statistically significant improvement in the level of will-being concerning studied patients between pre, post 3 months and post 6 months of intervention. Which is clear from the table that there was 35.3% of the studied patients had a depression state in pre intervention while just 10.3% in the post six months. Also, there was increase in the patients had a good psychological state from 9.1% in pre intervention to 45.6% in follow up of intervention.

Discussion:

Globally, diabetes mellitus (DM) is a significant health issue. The prevalence of age-adjusted diabetes in Egypt is the tenth highest in the world. T2DM accounts for 90% of all DM patients worldwide, making it the most common kind of the disease (Ahmed, et al., 2022). ICM is a valuable method to promote diabetic care and prevent diabetes-related complications and from the moment of diagnosis, it needs to be promoted and extensively used for all people with diabetes. Many factors play an important

role for the success of the diabetes conversation map as a multidisciplinary team, active learning and follow-up of diabetic patients (Zakaria, et al., 2023). Concerning characteristics of the study group, the study subject was one group of the T2 diabetic patients undergoing education program by ICM (pre & post, follow up). Regarding patient characteristics, according to this analysis the mean age of studied patients was 47 ± 2.984 . As regards to gender, the result of More than half of the patients in this trial were men, a finding that wasn't consistent with Hasan, & Ramadan, (2022), In Egypt, who reported in their study about "Instructional Guidelines Using Conversation Maps to Improve Self- Management for Diabetic Patients", made clear that men made up the majority of the patients under study. The majority of the patients in the study were active, about half had a university degree, two thirds were employed, and less than two thirds had a sufficient monthly income. From the researcher point of view despite studied patients were having a high level of education, many patients with T2DM still require increased knowledge about their condition to manage their health effectively. This indicates a highly needs of T2DM patient to update and improve their knowledge and to cope with their disease. Additionally using ICM has been showed significantly enhance understanding, raise awareness, and motivate them to manage their disease (Ghafoor, et al, 2015).

Concerning medical history, most studies patients had positive family history of DM. One third of patients have a BMI of more than 30. This indicates the presence of obesity. This interpret that, those patients were highly needs to control their wight to control in blood glucose level. They need education program to help them to control and mage their disease. HbA1c slightly improves in post and follow up phase after implementation of program.

Regarding patients' total level of knowledge. The finding of current study mentioned that there was a highly statistically significant improvement in all aspects of knowledge regarding diabetes milieus disease after implementation of ICM ($P>0.001$). In addition, there was an elevation of total mean score level of knowledge of studied patient (pre, post, and follow up). Most studied patients improve their knowledge immediately after program implementation. While the percentage of improvement slightly decreases in follow-up. The clarification of the previous finding may be attributed with implementation of ICM provide patients with comprehensive information regarding T2 DM. This knowledge significantly improves patients' understanding of their health conditions, which in turn progresses their ability to manage these conditions effectively.

The previous finding was in the same line with **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", mentioned that the improvement of patient satisfactory level of knowledge post program intervention. The reasoning of previous finding may be elucidated by the high educational level of patients enhanced their awareness of diabetes and its complications and inspired them to improve their knowledge.

As regards diabetes self-management, the finding of this study revealed that, there was a highly statistically significant improvement in all elements of diabetes self-management (dietary, physical activity, healthcare, and glucose management scale) pre and post implementation of ICM ($P>0.001$). This could be related to how well ICM applications provide detailed knowledge of diabetic diet planning and selecting foods that regulate blood sugar levels. In addition, ICMs sessions cover the major aspect of diabetes management including diet, exercise, blood sugar monitoring, and medication. Studied patients learn about the effect of their life style choice their health, which empower them to apply what they learned. The structure nature of the ICM sessions provide patients to set realistic goal and developed applicable action plan of care and motivate them to manage their condition (**Ghafoor, et al,2015**).

The current finding was in accordance with **Hasan, & Ramadan, (2022)**, who mentioned that the dietary domain of the diabetic self-care evaluation showed a statistically significant improvement, and the study group also showed statistically significant improvements in some of the physical activity scale items after adoption ($P<0.05$). However, among the control group, there were no statistically significant improvements ($p=>0.05$). The interpretation of the previous finding may because the effect of ICMs to increase awareness in diabetic patients to improve their activities to control of blood glucose level. Also, there were statistically significant improvements among diabetes study group regarding all items of health care, and blood glucose management scale post implementation ($P>0.001$).

Regarding diabetes management self-efficacy of the studied patients, the result of this study mentioned that there was a highly statistically significant improvement in all elements of diabetes self-efficacy scale (DMSE) pre and post implementation of ICM ($P>0.001$). The interpretation of the previous finding may be attributed with conversation map program is utilizing colorful graphics and a highly interactive approach to provide patients greater active access to the health information they are learning and support them in creating treatment plans that are appropriate.

Especially about one fifth of studied patient were illtreat and read and write, ICM is a suitable, simple, and attractive way of learning (**Huang, &Hung, 2023**).

In addition, patients' level of self-efficacy, it was clarified that majority of studied patients were in the low self-efficacy stage in the pre-program implementation. While less than half of them distributed in moderate &high self-efficacy post program implementation. The previous finding was in the same line with **Qasim, et al. (2020)** in their study of "Diabetes conversation map - a novel tool for diabetes management self-efficacy among type 2 diabetes patients in Pakistan". They mentioned that there was Significant improvements in the ICM group's DMSE subscales (diet management, blood sugar monitoring, exercise and weight control, and health seeking and diabetes treatment) as compared to the randomized control group.

Concerning psychological distress of studied patients, the finding of current study mentioned that there was a highly statistically significant improvement in all elements of distress scale (emotional, physical, regimen, and interpersonal) before and after the interactive chat map was put into use ($P>0.001$). In addition, more than half of them in studied patients had moderate distress either in pre and post application of ICM. The previous result was in a coherence with **Li et al., (2016)** on their study of "Impact of Conversation Maps on diabetes distress and self-efficacy of Chinese adult patients with type 2 diabetes: a pilot study". They clarified that the implementation of ICM has been shown to have a positive effect on psychological distress among patient with T2diabetes. The interpretation of the previous finding may because ICM approach help studied patient to change their behavior, lifestyle, coping, and acceptance of diabetes management. Which raise awareness and decrees psychological stress.

The previous finding was in the same line of **Penalba, et al. (2014)** in their study of Impact of "Conversation Map tools on understanding of diabetes by Spanish patients with type 2 diabetes mellitus: A randomized, comparative study". They explained that psychosocial efficacy regarding diabetes perceived by the patient improved to a greater extent with ICM than with randomized control group. These improvements in patient described outcomes may have attributed to the high degree of satisfaction with care and goal achievement, also reflected in the high information retention rates in both groups.

Regarding well-being of studied patients, the result of current study clarified that, there was a highly statistically significant improvement the level of will-

being (pre, post 3 months and follow up 6 months of intervention) ($P > 0.001$). Also, which is clear from the study finding more than one third of the study subject had depression before the intervention, while one tenth of the studied patients had depression post program intervention post six months. Which indicates the effect of ICM to decrease stress for type2 diabetic patients. In addition, there was increase the patients had a good psychological state from less than one tenth of studied patients in pre intervention compared of less than half of studied patients in the follow up state. The previous finding was in the same line with **Massey, et al, (2018)** in their study of “Well-Being Interventions for Individuals with Diabetes: A Systematic Review” in UK. They indicate that, the education program through ICM can effective method to promote psychological well-being, reduce diabetes-distress which is commonly experienced by patients with T2DM. Psychological distress is linked to lower treatment adherence and poorer health outcome, making its reduction vital for effective diabetic management

Conclusion

Interactive conversation maps have a positive effect in improving patient level of knowledge, enhancing self-management, improving self-efficacy, lowering psychological distress, and improving well-being for type 2 diabetic patients.

Recommendations:

Based upon the results of this study, the following recommendations are advised: -

- Healthcare providers should consider new education tools as ICM into diabetes
- Education to optimize both clinical and psychosocial outcomes.
- Nurses is working with diabetic patients should receive periodic in-service training programs to update their knowledge regarding self-management, self-efficacy, psychological distress, and well-being.
- A simplified illustrated and comprehensive brochure and posters including knowledge, self-management, self-efficacy, psychological distress, and well-being for T2DM education program should be available at health care settings to improve patient awareness and improve outcomes.
- Replication of this research on a larger statistical sample size drawn from various geographical areas and with a long-term follow-up is recommended to obtain more generalizable results.

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