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## Effect of an educational program on self-care management among Diabetic Patients In Health Insurance Sector at Zagazig City

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**ORIGINAL ARTICLE****Self-Care Management Educational Program Diabetic Patients in Health Insurance Sector At Zagazig City**

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**ABSTRACT**

**Background:** Diabetes mellitus (DM) is one of the most common non-communicable diseases (NCDs) globally. There is substantial evidence that it is epidemic in many economically developing and newly industrialized countries.

**Objectives:** Improving health of diabetic patients by assessment of knowledge, attitude and practice of patients towards self-care management, implementation and evaluation the health education program. **Subjects and methods:** An interventional study was conducted during the period from March 2019 to August 2019 on eighty two diabetic patients attending the out-patient clinic in health insurance sector in Zagazig city by dividing them into two groups of diabetic patients; a control group and an intervention group for execution of the project for initial assessment of awareness, initial examination and initial investigations (**Hemoglobin A1c (HBA1c) and Fasting Blood Sugar (FBS)**) then health education messages were delivered and after three months reassessment of awareness, examination and investigations were done. **Results:** There was statistically significant improvement ( $p < 0.05^*$ ) among intervention group regarding total score for adequate diabetes self-management post intervention to become (87.8%) while it was (56.1%) before the intervention and the total score for inadequate diabetes self-management pre intervention was (43.9%) that decreased to (12.2%) post intervention. **There was statistically significant worsen ( $P < 0.05^*$ ) among control group regarding total score for diabetes self-management post intervention.**

**Conclusion:** The study results indicated that the diabetes self-management program was effective for improving metabolic control of diabetes.

**Key words:** Diabetes mellitus, health education, knowledge and practice.

**INTRODUCTION**

**T**hree hundred sixty six million people have diabetes in 2011; by 2030 this will have risen to five hundred fifty two million. So the number of people with type 2 diabetes is increasing in every country.<sup>(1)</sup>

The crude prevalence rate of known diabetes in Egypt in 2015 was five percent in women and four and half percent in men.<sup>(2)</sup>

It is estimated that 63% of the Egyptian population 20 years of age and older are sedentary, 27% are obese, five percent have diagnosed diabetes and four percent have previously undiagnosed diabetes.<sup>(3)</sup>

Among Egyptian population 20 years of age and older nine percent have impaired glucose tolerance (IGT).<sup>(4)</sup>

Prevalence rate of impaired glucose tolerance (IGT) is progressively increasing with age; it's more prevalent in agricultural areas, than desert and shows least prevalent in urban areas<sup>(5)</sup>

Type 2 Diabetes is more common (about 90% of cases). It is more preventable by strict life style modification for diagnosed impaired glucose tolerance (IGT) or impaired fasting glucose (IFG) and its complications can be prevented as well<sup>(6)</sup>

Sufficient knowledge can be acquired in diabetes education programs, which not only develop patients' awareness and understanding of the disease and strengthen motivation and self-care, but also reduce the economic costs of diabetes treatment by preventing complications.<sup>(7)</sup>

In order to be effective over the longer term, it is important that patient education be a continuous process and not a one-time intervention.<sup>(8)</sup>

So The Aim Of these study was

Improving health of diabetic patients attending diabetes outpatient clinic in health insurance sector through the objectives which Improving health of diabetic patients by assessment of knowledge, attitude and practice of patients towards self-care management ,implementation and evaluation the health education program.

### **SUBJECTS AND METHODS**

Type of study: An interventional study.

Study setting: It was carried in an outpatient clinic in health insurance sector in Zagazig city.

This place selected due to high rate of patients commitment for regular visits.

#### **Study population**

Diabetic patients attending the outpatient clinic of health insurance sector in Zagazig city.

#### **Inclusion Criteria:**

Diabetic patients who had regular visits to diabetic outpatient clinic in health insurance in Zagazig city.

Type 2 DM confirmed more than 1 year.

#### **Exclusion criteria:**

Any associated chronic disease i.e.: ischemic heart disease (IHD), heart failure(HF), hepatitis c virus(HCV).

Lack of consent.

Cases with incomplete data and those lost to follow-up were excluded.

Diabetic patients type 1

Severely ill hospitalized patients.

#### **Sample size:**

As a percent of improvement of knowledge about complications(heart complications) in males from 47% before intervention and 79% after intervention<sup>(9)</sup>so sample was 82 cases divided to 41 cases for intervention and 41 control.

Sample was calculated using open Epi program with confidence level 95% and power 80%.

#### **Sample technique**

Systemic random technique was used for selection of studied sample assuming the non respons the sample was 90 divided to 45 cases for intervention and 45 control by simple random sample.

#### **Tools**

All patients were subjected to:.

Socioeconomic questionnaire<sup>(10)</sup> and Initial assessment for the knowledge, attitude and practice about self-management by the modified questionnaire<sup>(11)</sup> the questionnaire including 4 partitions:

Sociodemographic data e.g.: age, sex, marital status, occupation, education, number of years of diabetes.

Knowledge questions which were about general awareness of diabetes mellitus , nutritional instructions, medication taking, , complications , smoking and foot care.

Attitude questions which were inquiring about their attitude regarding the usefulness of modifying some life style behaviors in the management of the disease.

Practice questions which were to inquire about their practices regarding most items of the program e.g: exercise, monitoring of blood glucose, dealing with complication,

blood pressure monitoring, foot care, and neurological examination.

Measuring HBA1C and fasting blood sugar at the lab of diabetic clinic in health insurance at Zagazig.

Foot examination.

Time schedule of this study. From the beginning of March 2019 To the end of August 2019.

## 2.Operational design:

### Pilot study:

The chosen Questionnaire <sup>(11)</sup> was tested on some patients.

Tools of the study were tested on 10 patients and accordingly the following were done:

Some questions were modified to suit the patients in translation and simplifying the meanings.

Regarding the program there were some items simplified to be more comprehensible and time of the session was adjusted to be half an hour.

10% of sample that was not be included in the research as it was modified.

### Fieldwork:

- The clinical work was divided into three levels the first visit (pre-intervention), the intervention (health education messages) then the second visit (post-intervention).

- **The Pre-intervention Visit (for both groups):**

- Personal History includes: Age, sex, marital state, education, smoking, family history of DM& work.
- Initial assessment for the knowledge , attitude and practice about self-management by the modified questionnaire.
- Foot examination also was done.
- Investigations including HBA1C and fasting blood sugar.

- **The Intervention (Health Education)(for intervention group only):**

- Patients of intervention group received the health education program through

three different sessions; one session per week with duration of two hours for each session.

- The health education messages were given to the patients about self-management; diet, exercise, complications of diabetes and compliance to treatment and investigations of DM .It was given orally and assisted by using many material as cartoon films and printed pamphlets that were given to the patients<sup>(12)</sup>
- Skills were learned like regular foot care & the insulin injection technique.
- Repetition of each health care message was done before giving the new message.
- **The Post-intervention Visit (for both groups):**
- After three month's reassessment of the patients' Knowledge , attitude and practice were done by repeating the questionnaire.
- HBA1C and fasting blood sugar were done for 2 groups at first of study and at the end by sending the patient to do it and brought the results. The researchers encourage them by discussing the importance of Hbalc measure.

### Administrative design:

- Approval was obtained from family medicine Department of Zagazig University.
- Approval was obtained from ethical committee of faculty of medicine.
- Approval was obtained from Institutional Review Board (IRB).
- **Approval was obtained from health insurance sector in Zagazig city.**
- Informed written consent was obtained from all patients included in the study and information was assured to be confidential .
- Data management & Statistical Design
- 1-Scoring systems:

- Scoring of social class:
- Social class was classified according to (Fahmy et al., 2015) into low, medium, and high level depending on the score calculated (48). As follow
- High social class ( $\geq 70\%$ ) if the score was between 33.6–48
- Medium social class (40- $<70\%$ ) if the score was between 19.2- $<33.6$
- Low social class ( $<40\%$ ) if the score was between  $<19.2$
- Scoring of diabetes self management:
- Total score of diabetes self-management was (45) on the basis of scoring the answers as follow:
- Questions regarding medications, nutrition, exercise, checking blood sugar, foot care, and Knowledge: Correct= 2                      Incorrect =1
- Question regarding foot examination: Normal= 2                      Abnormal =1
- Question regarding foot risk category: No loss of sensation=3, Loss of sensation=2, Loss with high pressure=1, History of ulcer=0
- Blood glucose level (FBG or Hb A1c): Controlled=2                      Uncontrolled=1
- Percent of change in total score was compared
- Adequacy of total score was as follows: cut off point is median whereas:  $>$  median was considered as adequate total score and  $\leq$  median was considered as inadequate total score.
- The same cut off was used to categorize change to satisfactory and unsatisfactory.
- 2-Data analysis:
- The collected data were coded, entered, presented, and analyzed by computer using a data base software program, Statistical Package for Social Science (SPSS) version 20.
- Qualitative data were represented as frequencies and percents.
- Chi square ( $X^2$ ) and Fisher's exact tests

were used to detect relation between different qualitative variables.

- For quantitative variables mean, standard deviation (SD), and median (for not normally distributed data) were computed.
- Independent t-test (t) and Mann-Whitney U Test (for not normally distributed data) were used for detection of difference between different groups while MC 'Nemar test (MN) was used for detection of difference in the same group Pre-Post intervention and paired t test for quantitative data on the same group.
- The results were considered statistically significant and highly statistical significant when the significant probability (P value) was  $< 0.05^*$  and  $<0.001^{**}$  respectively.

The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

## RESULTS

Regarding demographic and some history taking characteristics of studied participants (Table 1),

the mean age/years of included patients was  $53.82 \pm 9.68$  and  $55.54 \pm 7.17$  among intervention

and control groups respectively , more than half of them were female , most had low or middle

social class, most of them had positive family history to DM, most of them were non-smokers, working now, married and didn't had eye examination. As in table (1) shows that there was no statistically significant difference ( $P \geq 0.05$ ) between intervention and control groups regarding demographic and clinical characteristics; ensuring homogeneity of both groups. This study proved that educational program can improve the awareness, attitude and practice among diabetic patients. As there was statistically significant improvement ( $p < 0.05^*$ ) among intervention group regarding

total score for adequate diabetes self-management post intervention to become (87.8%) while it was (56.1%) before the intervention and the total score for inadequate diabetes self-management pre intervention was (43.9%) that decreased to (12.2%) post intervention as in figure(1). Regarding medications, meal plan, Eating 3 meals daily, Eating 2-3 snacks daily, exercise, and checking blood sugar and there was statistically significant improvement ( $P < 0.05^*$ ) post intervention. Regarding inspection of feet daily, self-feet exam daily, cut toenails, feet examination and feet risk

category there was statistically significant improvement ( $P < 0.05^*$ ) table (4). There was highly statistical significant improvement ( $P < 0.001^{**}$ ) among intervention group regarding all items of diabetes self-management knowledge except for controlled diabetes with 80-130 mg/dl there was statistically significant improvement ( $P < 0.05^*$ ) post intervention table(2). Also table(3) shows that there was highly statistical significant improvement ( $P < 0.001^{**}$ ) among intervention group regarding blood glucose level (FBG and Hb A1c) post intervention.

**Table (1): Demographic & Clinical characteristics of the studied participants (n=82).**

Variables	Intervention (n=41)	Control (n=41)	Test	P value
Age (years)				
Mean± SD	53.82±9.68	55.54±7.17	a0.907	0.376
Sex No (%)				
Female	23 (56.1%)	21 (51.2%)	b0.196	0.658
Male	18 (43.9%)	20 (48.8%)		
Work No (%)				
Yes	32 (78%)	26 (63.4%)	b2.121	0.145
No	9 (22%)	15 (36.6%)		
Education No (%)				
Primary	12 (29.3%)	9 (22%)	b3.219	0.20
High school	16 (39%)	24 (58.5%)		
University	13 (31.7%)	8 (19.5%)		
Marital No (%)				
Yes	31 (75.6%)	33 (80.5%)	b0.285	0.594
No	10 (24.4%)	8 (19.5%)		
Social Class No (%)				
Low	15 (36.6%)	14 (34.1%)	b1.918	0.383
Middle	25 (61%)	23 (56.1%)		
High	1 (2.4%)	4 (9.8%)		
Family history No (%)				
Yes	35 (85.4%)	35 (85.4%)	b0.0	1
No	6 (14.6%)	6 (14.6%)		
Smoking No (%)				
Yes	11 (26.8%)	10 (24.4%)	b0.064	0.80
No	30 (73.2%)	31 (75.6%)		
Eye exam No (%)				
Yes	6 (14.6%)	3 (7.3%)	Fisher	0.298
No	35 (85.4%)	38 (92.7%)		
Diabetes duration (years)				
Mean± SD	4.7±2.9	3.9±0.94	c737	0.337
Median	4	4		

a Independent t-Test, b Chi square test (X2), d Mann-Whitney U Test

**Table (2): Diabetes self-management regarding knowledge among intervention group pre-post intervention (n=41).**

Variables	Pre intervention		Post intervention		<sup>a</sup> MN	P value
	No	(%)	No	(%)		
<b>Low bl.sugar &lt;70 mg/dl</b>						
Correct	18	(43.9%)	41	(100%)	28.51	<0.001
Incorrect	23	(56.1%)	0.0	(00%)		**
<b>High fasting bl. sugar&gt;130 mg/dl</b>						
Correct						
Incorrect	20	(48.8%)	40	(97.6%)	24.85	<0.001
	21	(51.2%)	1	(2.4%)		**
<b>Controlled diabetes with 80-130 mg/dl</b>						
Correct	19	(46.3%)	33	(80.5%)	10.30	0.001*
Incorrect	22	(53.7%)	8	(19.5%)		
<b>Check diabetes by urine</b>						
Correct	7	(17.1%)	37	(90.2%)	44.14	<0.001
Incorrect	34	(82.9%)	4	(9.8%)		**
<b>Drugs more important than diet and exercise</b>						
Correct	9	(22%)	33	(80.5%)	18.11	<0.001
Incorrect	32	(78%)	8	(19.5%)		**
<b>Know any diabetes complications</b>						
Correct						
Incorrect	21	(51.2%)	37	(90.2%)	15.08	<0.001
	20	(48.8%)	4	(9.8%)		**
<b>Hb A1c is a measure for last 6 months</b>						
Correct	19	(46.3%)	38	(92.7%)	20.77	<0.001
Incorrect	22	(53.7%)	3	(7.3%)		**

<sup>a</sup> MC 'Nemar test (MN)**Table (3): Blood glucose level among intervention group pre-post intervention (n=41).**

Variables	Pre intervention		Post intervention		<sup>a</sup> MN	P value
	No	(%)	No	(%)		
<b>FBG</b>						
Controlled (80-130 mg/dl)	2	(4.9%)	24	(58.5%)	27.26	<0.001
Uncontrolled (>130 mg/dl)	39	(95.1%)	17	(41.5%)		**
<b>Hb A1c</b>						
Controlled (≤ 7%)	1	(2.4%)	27	(65.9%)	36.66	<0.001
Uncontrolled (>7 %)	40	(97.6%)	14	(34.1%)		**

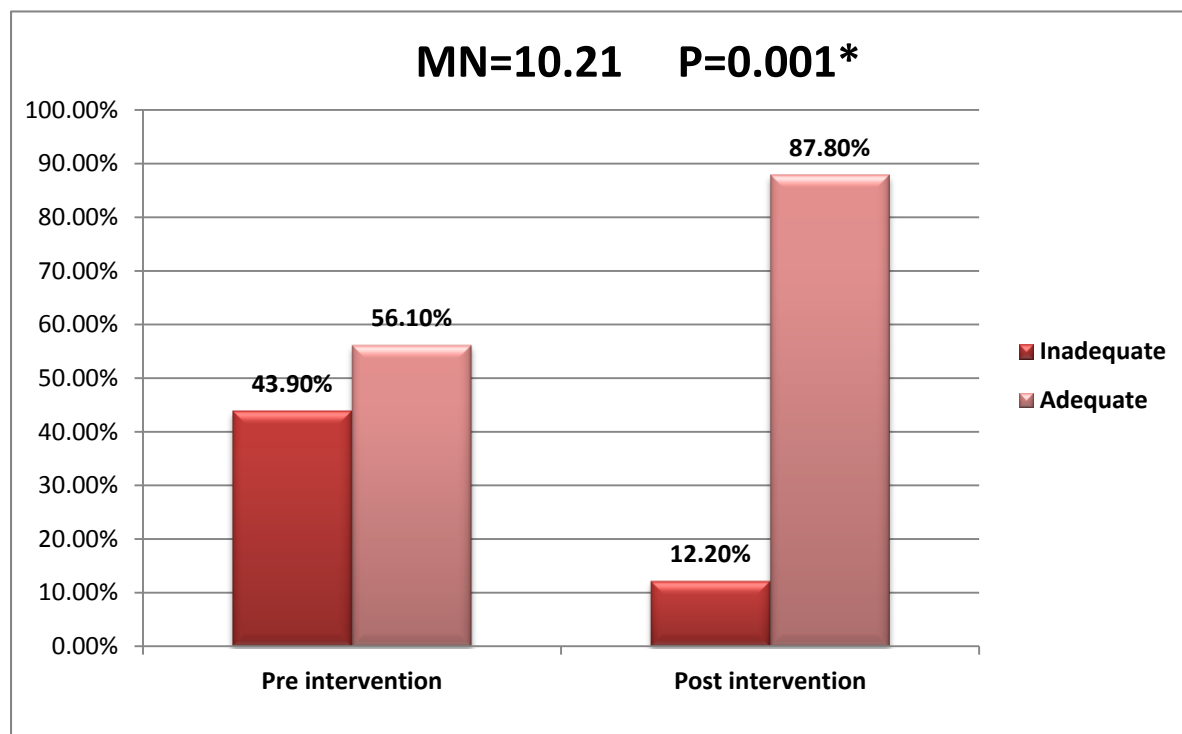
<sup>a</sup> MC 'Nemar test (MN)

**Table (4): Diabetes self-management regarding foot care and examination among the studied participants post intervention (n=82).**

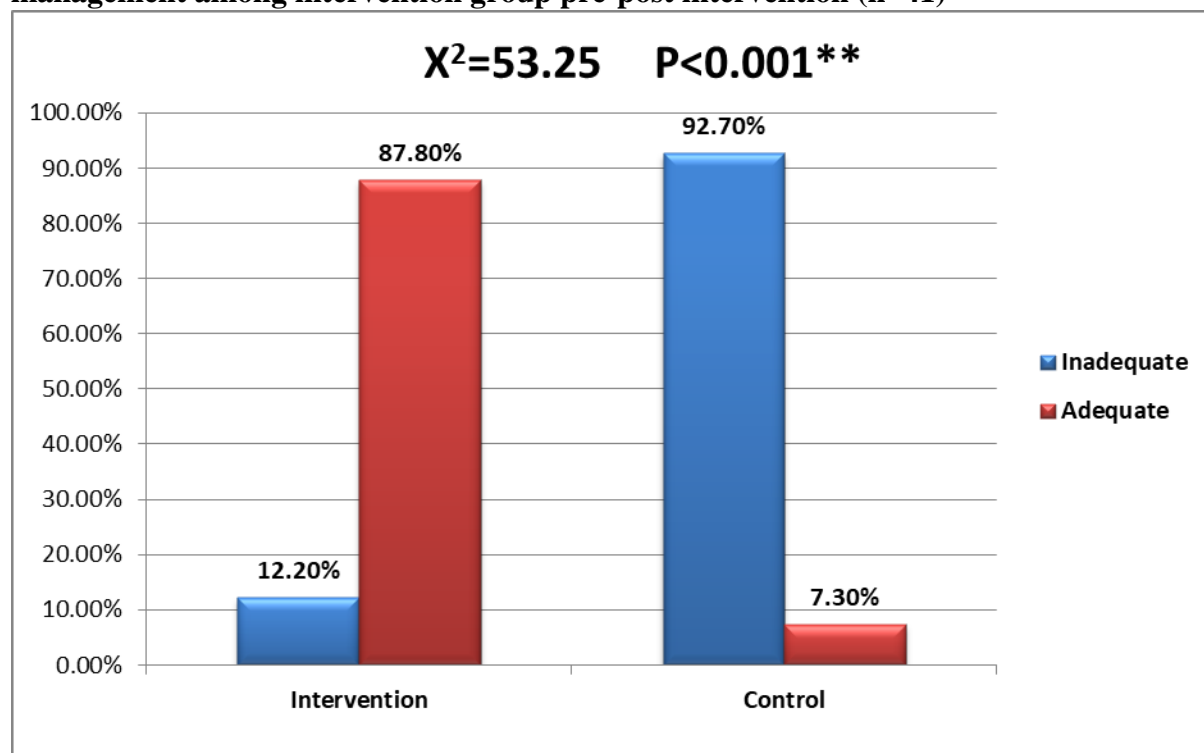
Variables	Intervention (n=41) No (%)	Control (n=41) No (%)	<sup>a</sup> X <sup>2</sup>	P value
<b>Inspect feet daily</b>				
Yes	41 (100%)	5 (21.2%)	64.17	<0.001
No	0.0 (00%)	36 (87.8%)		**
<b>Wash feet daily</b>				
Yes	41 (100%)	33 (80.5%)	8.865	0.003*
No	0.0 (00%)	8 (19.5%)		
<b>Cut toenails</b>				
Straight	41 (100%)	22 (53.7%)	24.73	<0.001
Curved	0.0 (00%)	19 (46.3%)		**
<b>Self feet exam daily</b>				
Yes	35 (85.4%)	3 (7.3%)	50.22	<0.001
No	6 (14.6%)	38 (92.7%)		**
<b>Feet examination</b>				
Normal	36 (87.8%)	26 (63.4%)	6.613	0.01*
Abnormal	5 (21.2%)	15 (36.6%)		
<b>Level of foot management:</b>				
No loss of sensation	35 (85.4%)	25 (61%)	6.60	0.086
Loss of sensation	4 (9.8%)	11 (26.8%)		
Loss with high pressure.	2 (4.8%)	4 (9.8%)		
History of ulcer..	0.0 (00%)	1 (2.4%)		

<sup>a</sup> Chi square test (X<sup>2</sup>)





**Figure (1):** Bar chart for percent of adequate and inadequate total score for diabetes self-management among intervention group pre-post intervention (n=41)



**Figure (2):** Bar chart for percent of adequate and inadequate total score for diabetes self-management among the studied participants post intervention (n=82).

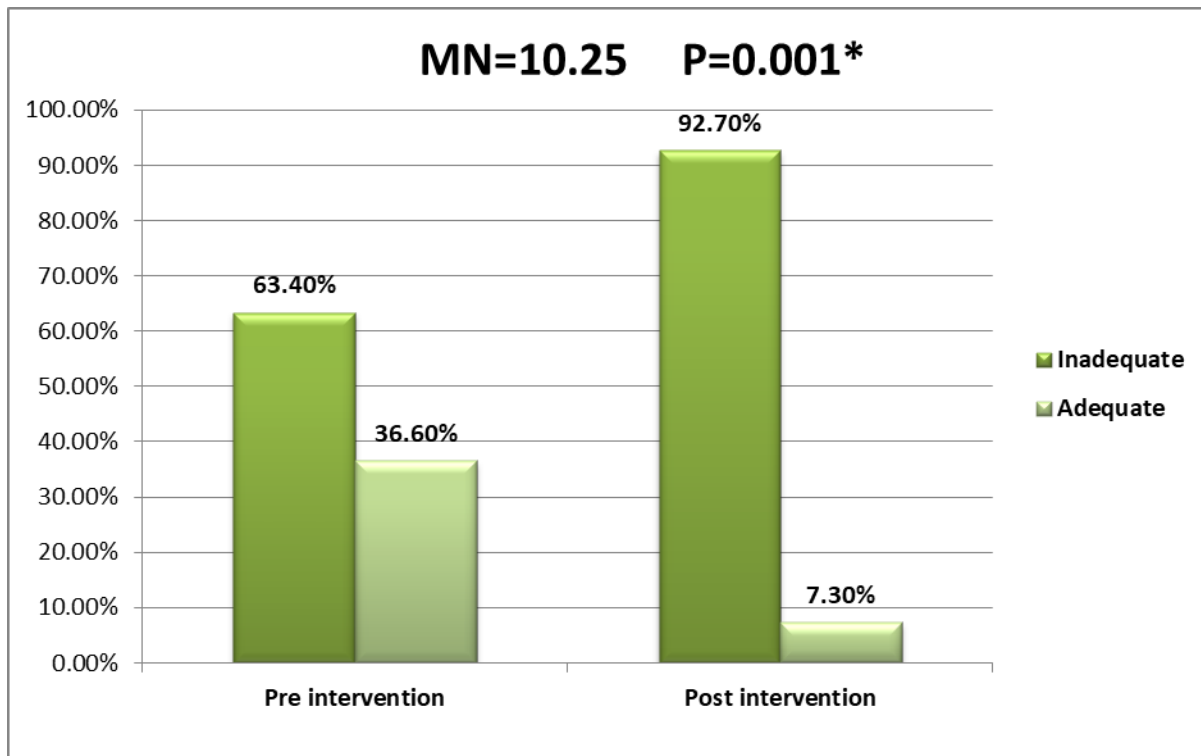


Figure (3): Bar chart for percent of adequate and inadequate total score for diabetes self-management among control group pre-post intervention (n=41).

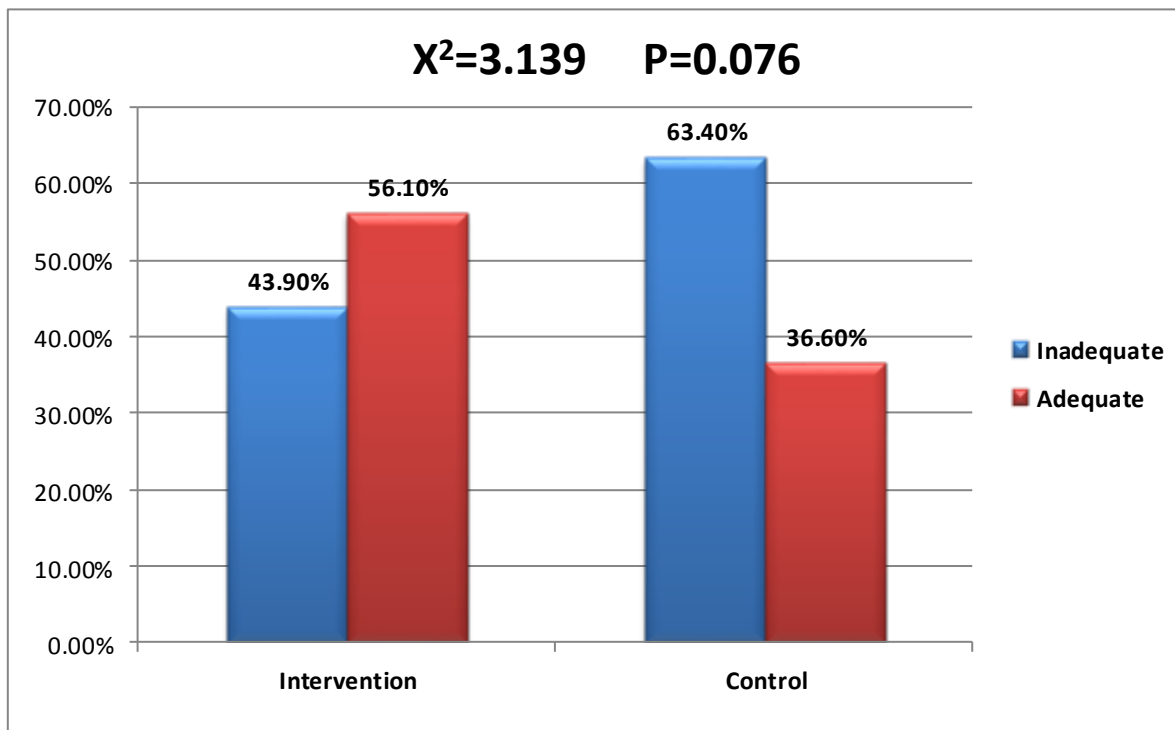


Figure (4): Bar chart for percent of adequate and inadequate total score for diabetes self-management among the studied participants pre intervention (n=82).

## DISCUSSION

Diabetes is a chronic disease associated with high morbidity and mortality rate because of its acute and chronic complications<sup>(13)</sup>. It is known that diabetes increases the risk of coronary artery disease, stroke, blindness, kidney failure, leg amputation, and early death<sup>(14)</sup>. Scientific evidence shows that diabetes-related complications may be prevented if a good metabolic control is achieved. To achieve good metabolic control, it is important not only to measure glycated hemoglobin (HbA1c) levels regularly, but also to educate patients on diabetes. Sufficient knowledge can be acquired in diabetes education programs, which not only develop patients' awareness and understanding of the disease and strengthen motivation and self-care, but also reduce the economic costs of diabetes treatment by preventing complications<sup>(1,7)</sup>. Despite clear evidence on the benefits of tight glycemic control in diabetics, many patients are not able to reach an optimal glycemic target and thus fail to significantly reduce a long term cardiovascular risk<sup>(15,16)</sup>. Moreover, it has been shown that inadequate knowledge about diabetes negatively affects behavior and self-care<sup>(17,18)</sup>.

The study was an interventional study carried out on 82 diabetic patients attending the out-patient clinic in health insurance sector in Zagazig city by dividing them into two groups of diabetic patients; a control group and an intervention group for execution of the project for initial assessment of awareness, initial examination and initial investigations (HbA1c and FBS) then health education messages were delivered and after three months reassessment of awareness, examination and investigations were done. The research question was to what extent the educational program changed the awareness, attitude and practice of diabetic patients regarding their self-care management? This study proved that educational program can improve the awareness, attitude and practice

among diabetic patients by 31.7%. As there was statistically significant improvement ( $p < 0.05^*$ ) among intervention group regarding total score for adequate diabetes self-management post intervention to become (87.8%) while it was (56.1%) before the intervention and the total score for inadequate diabetes self-management pre intervention was (43.9%) that decreased to (12.2%) post intervention.

This study included 82 cases, in the intervention group there was 23 females (56.1%) and 18 males (43.9%) and in the control group there was 21 females (51.2%) and 20 males (48.8%). These results are in agreement with those reported by<sup>(19)</sup> who reported that, females represent 65.5% and males represent 34.5%. In addition,<sup>(20)</sup> reported that, females represent 65% and males represent 35% of their participants. These results are in contradiction to those reported by<sup>(21)</sup> who reported that, men constituted 62% of the study group and women 38%. This quiet difference may be attributed to different inclusion criteria, sample size and racial factors which may be responsible for this contradiction. As regard marital status, in the intervention group (75.6%) of cases were married and in the control group (80.5%) of cases were married. These results are in agreement with that of<sup>(22)</sup> who reported that, the majority (96%, n=96) were married. In addition<sup>(19)</sup> reported that 98.0% of studied cases were married. In the present study, in the intervention group smokers represent (26.8%) and non-smokers were (73.2%) and in the control group smokers represent (24.4%) and non-smokers were (75.6%). These results are in agreement with those reported by<sup>(23)</sup> who reported that, 20.4% were current smokers. In the present study, in the intervention group (78%) were employed and (22%) unemployed and in the control group (63.4%) were employed and (36.6%) had not worked. These results are in contradiction with<sup>(24)</sup> reported that, unemployed were higher among the diabetic

patients. In addition, <sup>(19)</sup> reported that, Thirty-two (21.6%) participants were employed, and (79.4%) were unemployed. This may be due to that all the participants in this study were taken from the out-patient clinic of diabetes in health insurance sector so most of them are still working in governmental jobs. Regarding age in the present study, it was younger than that reported by <sup>(23)</sup> who reported that, the mean age of responders was 62.3 years (range 13–94 years) compared to our mean age in in the intervention group which was 53.82±9.68 years and 55.54±7.17 years in the control group. This may be attributed to different sample size as they included 365 patients compared to 82 patients in the present study. In addition, they included only patients with diabetic ulcers, this complication occurred in late stage of diabetes, not all diabetic patients.

In the present study, positive family history of diabetes was reported in (85.4%) of cases. These results are in agreement with that reported by <sup>(25,26)</sup> that type 2 diabetes shows positive family history. The present study has revealed that the patients in the intervention group and the control group had unsatisfactory knowledge, attitude and practice before the intervention. These findings are in agreement with <sup>(27)</sup> who has similarly reported that patients with diabetes mellitus often lack proper knowledge about their illness, and thus usually have inadequate self-management behaviors. On the same line, <sup>(28)</sup> has reported that it is estimated that 50-80 percent of people with diabetes lack knowledge and skills required to adequately manage their diabetes. Therefore, it is important to learn persons with newly diagnosed diabetes self-management and its impact on blood glucose level, and overall health in order to improve clinical outcomes and to prevent complications.

Different Egyptian studies demonstrated that most of the examined patients had low levels

of satisfactory information as respect distinctive parts of diabetes such as manifestations of the malady, side effects of hypoglycemia and its avoidance, impact of diabetes on the eye and foot and treatment <sup>(29,30)</sup>. <sup>(31)</sup> has determined patient health education is the cornerstone of care for patients with Type 2 diabetes mellitus, and this got on the same line with this study that uncovered high significant difference between control and intervention group after the program in knowledge, attitude and practice. Intervention group received the program and got higher level in knowledge, attitude and practice. The current study revealed significant improvement of knowledge, attitude and practice of diabetic patients in the intervention group post intervention. This in accordance with <sup>(32)</sup> who discovered the success of the intervention in enhancing the knowledge of diabetic patients in the study group, and the change was held following three months of follow-up. While there was no significant difference in control group who didn't received program of self-management education. The present study indicated critical change in HbA1c after the project in the intervention group, this is coordinate with <sup>(33)</sup> who reported that to achieve sufficient glycemic control, patients ought to accomplish a satisfactory harmony between various components of an exhaustive treatment, for instance, diet, exercise, prescription, glucose checking and perpetual training. Also, he included that better self-care connected with lower HbA1c levels which mean better glycemic control. Additionally this finding is in accordance with different studies <sup>(34,35)</sup> who reported that better self-care lead to better glycemic control (low HbA1c). An Egyptian study in regards to glycosylated hemoglobin (HbA1c) and irregular glucose indicated factually noteworthy change in their mean levels after presentation of instructive message. This outcome uncovers that the progressions that

happened in the concentrated on patients concerning their insight and mentality towards diabetes were helpful in changing patients' conduct with respect to diabetes into a more beneficial one<sup>(29)</sup>

On the other hand, the results of the present study are in agreement with those reported by<sup>(36)</sup> who reported that, HbA1c and FBG levels were significantly lower in patients who received diabetes education.

Comparing awareness at the second visit to those of the first visit; it was found that, there was statistically significant increase of correct answers of questions. These results are in line with other studies, showed that patients who attended a diabetes education program had a better awareness of their disease<sup>(20)</sup> In agreement with results of the present study, it was reported that, professional interventions aimed at influencing patient behavior in relation to diabetes by the provider–patient interaction would have to address patient behavior determinants. The education program is one of the interventional methods that can enhance patients' awareness of their health condition and self-management<sup>(37)</sup>

While this is not the case regarding control group as there is no improvement in HbA1c in control group after the program, this is in accordance with other study which found that significant differences in HbA1c level were not observed in control group before and after intervention<sup>(38)</sup> An informed approach can lead patients to have a better awareness of the parameters relating to their care, and to take an active part in their own care<sup>(38)</sup>. Accurate diabetes knowledge can help patients make more informed decisions, but they will not act on this information unless they are strongly motivated to do so<sup>(39)</sup>. The study results indicated that the diabetes self-management program was effective for improving metabolic control of diabetes. Additionally, fasting blood glucose and glycosylated hemoglobin levels altogether declined after the project mirroring the

viability of the wellbeing instruction message in changing the examined patient's practices.

### LIMITATIONS

This study had limitations that it was conducted on small number of patients in one region of Sharkia government (Zagazig city) and our results cannot be generalized.

The study relied upon a written structured questionnaire for information on lifestyles and health behaviors, such as exercising, fast food , salt consumption, and smoking behavior.

Some patients had very little formal education, which presented a substantial barrier to understanding messages. This took more time and effort.

### CONCLUSION

Knowledge, attitude and practice level can be raised through individual diabetes education.

### RECOMMENDATIONS

As a result of conclusion of the current research, the following suggestions are proposed:

Strengthening the role of health care services of family units in diabetes management through training of health care providers and learning about diabetic self-care program and encourage them to make regular sessions for diabetics and the health education program should be delivered continuously to ensure retaining of the knowledge and good Diabetes Self Management Skills (DSMS).

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