



Impact of Physician and Patient Education on Type 2 Diabetes Outcome in Primary Health Care Units, Al-Gharbiyah Governorate, Egypt

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Diabetes mellitus (DM) leads to multiple complications that include macrovascular and microvascular complications. Proper management will result in decreased morbidity and mortality. The aim of this study was to evaluate the impact of Physicians and patients' education on diabetes outcome in primary health care units, Al-Gharbiya Governorate, Egypt.

Methods: The study was carried out on primary health care physicians and their assigned patients in Al-Gharbiyah Governorate from October 2015 till October 2017. Study was carried-out in 2 phases. **Phase 1 (Physician's phase):** A sum of forty of primary health care physicians working in primary health care were recruited in the study. **Phase 2 (Patient's phase):** Those 200 patients were engaged in an educational program for self-management of diabetes using IDF (International Diabetes Federation) education maps.

Results: Knowledge and attitude of physicians were significantly higher after completion of educational program than Baseline. The mean Body mass index (BMI), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Glycated Haemoglobin HbA1c after 1 year and after 6 months were significantly lower than before and after 1 year than after 6 months. The number of patients who have exercised activities after 1 year and after 6 months were significantly higher than before and after 1 year than after 6 months.

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Conclusions: The educational program applied in this study led to significant improvement of physician's knowledge and attitude which helps in providing better care of diabetic patients. The educational program applied in this study led to significant improvement of diabetic patients' lifestyle and outcome, which will subsequently lead to reduction in diabetic complications.

Keywords: Physician education; patient education; diabetes mellitus; primary health care units.

1. INTRODUCTION

Diabetes mellitus (DM) is a syndrome of chronic hyperglycemia due to insulin deficiency or resistance or both [1].

Diabetes mellitus leads to multiple complications that include macrovascular and microvascular complications. The macrovascular complications include coronary artery disease, peripheral vascular disease and cerebral vascular disease. However microvascular damage causes diabetic retinopathy, nephropathy and neuropathy [1]. Proper management will result in decreased morbidity and mortality [2].

Failure to care adequately for patients with diabetes mellitus may be assigned to a triad of lack of patient education, lack of physicians' knowledge and skill level or insufficient funding and organization of necessary program in the current health care system [3].

So, we examined to what extent physician and patient education would affect physician and patient knowledge, attitude, skills, and compliance with therapeutic regimens and relevant physiologic and metabolic patient health outcomes.

The aim of this study was to evaluate the impact of Physicians and patients' education on diabetes outcome in primary health care units, Al-Gharbiya Governorate, Egypt.

2. PATIENTS AND METHODS

The study was carried out on primary health care physicians and their assigned patients in Al-Gharbiyah Governorate from October 2015 till October 2017 after approval from the Ethical Committee of Faculty of Medicine, Tanta University (approval code 30670/12/15). Informed written consent was obtained from all participants after full explanation of benefits and risks of the study.

The study was carried-out in 2 phases:

2.1 Phase 1 (Physician's Phase)

Forty of primary health care physicians working in primary health care units in Al-Gharbiyah Governorate were recruited in the study. Physicians who are working for a year or more prior to recruitment and are going to work in their primary health unit for one more year at least and physicians who are motivated and willing to participate actively in a diabetes education program were included while physicians who are not engaged in management of diabetes in their primary health care units were excluded.

Physicians were evaluated prior to initiation of education program regarding level of knowledge and attitude towards diabetes using Questionnaire of Diabetes and Endocrine Unit of Tanta Faculty of Medicine (QDEU-TFM)[4]. Then they were re-evaluated 1 year after the completion of the educational program.

Areas of defect in the knowledge and attitude of primary health care physicians towards diabetes are going to be addressed and handled through an educational program directed to primary health care physicians depending on American Diabetes Association (ADA) standards of medical care of diabetes 2015.

QDEU-TFM: The needed data were obtained through a self-designed and adjusted questionnaire sheet (shown in appendix) according to the results of preliminary pilot study. The questionnaire sheet included questions of inquiry about personal data: name, age, sex & place of work, duration since graduation, highest qualification, number of additional courses, number of patients attending to center weekly, knowledge concerning (diagnostic criteria of diabetes, complications of diabetes, doses of different antidiabetics, adverse effects of different antidiabetics and clinical guidelines) and Physician attitude about 10 statements in favor of good care of diabetic patients.

Data were tabulated then transformed to qualitative form using the following scoring system: Knowledge of physicians:0-50: poor,

>50-75: fair and >75-100: excellent. Attitude of physicians was scored as following: Strongly disagree 0%, disagree 25%, neither agree nor disagree 50%, agree 75% and strongly agree 100%.

2.2 Phase 2 (Patient's phase)

Two hundred diabetic patients among who are assigned to recruited physicians were recruited and evaluated for exercise activity, Body mass index (BMI), blood pressure and Glycated HaemoglobinHBA1c prior to initiation of educational program of their treating physicians and 6 months after completion of the 1-year program.

Those patients were engaged in an educational program for self-management of diabetes using IDF (International Diabetes Federation) education maps. Six months after completion of patient's education program, patients were re-evaluated for exercise activity, BMI, blood pressure and HBA1c.

Type 2 diabetic patients who are older than 18 years and motivated to participate in the study and are willing to be engaged in diabetes self-management education programme (DSME) and patients who are on regular follow up in their primary health care unit for DM were included while Patients who are following many physicians for their diabetic condition were excluded.

Research report: A progress report was submitted every 3 months, and a final report at the end of the study.

Conversation maps (a series of images and metaphors on 0.91 meters by 1.52 meters tabletop display) were used as a facilitation tool for healthcare professionalstoengage groups of participants in conversations around a healthcare topic (in this study the topic was diabetes). The healthcare professional engages 3-10 participants in interactive activities that identify facts and myths about diabetes and uncover information on key topics related to it.Each Conversation Map takes about 60 to 120 minutes to go through. Conversation maps used in this study were provided to us by the IDF.

2.3 Statistical Analysis

Statistical analysis was done by SPSS v25 (IBM Inc., Chicago, IL, USA). Numerical variables were presented as mean and standard deviation (SD) and compared by paired Student's t- test (two comparisons) or repeated measures

ANOVA (three or more comparisons). Categorical variables were presented as frequency and percentage (%) and were analyzed utilizing the Chi-square test or Fisher's exact test when appropriate. A two tailed P value < 0.05 was considered significant.

3. RESULTS

Out of the 40 studied physicians, 23 were females. The mean age of physicians was 27.22 ± 1.80 years. The mean duration of work was 19.07 ± 6.15 months. Eighteenphysicians (45%) took an additional training program/course. Fraction of diabetic patients from the total attendants was 0-25% in 22 (55%) centers and 25-50% in 18 (45%) centers in most of the studied patients were females (53.5%). The mean age of patients was 48.78 ± 10.79 years. The mean duration of DM was 11.94 ± 6.73 years [Table 1].

Knowledge of physicians was significantly higher after completion of educational program than Baseline. Attitude of physicians was significantly higher after 6 months than Baseline.

The mean BMI in diabetic patientsafter 1 year and after 6 months were significantly lower than Start of the educational program. The mean BMI after 1 year was significantly lower than after 6 months. The mean HbA1c after 1 year was significantly lower than after 6 months [Fig. 2].

The mean Diastolic Blood Pressure (DBP)after 1 year and after 6 months were significantly lower than before. The mean Systolic Blood Pressure (SBP)after 1 year was significantly lower than after 6 months. the mean HbA1c after 1 year and after 6 months were significantly lower than before. The mean SBP after 1 year and after 6 months were significantly lower than before. The mean SBP after 1 year was significantly lower than after 6 months [Fig. 3].

4. DISCUSSION

It is important for diabetes educators to develop and provide customized effective diabetes management education by understanding each patient's conditions. This will promote self-efficacy in self-care behaviors and continued diabetes management. Studies have continued on the development of treatment methods that can prevent diabetic complications and premature deaths, as well as effective education methods [5].

Table 1. Physicians’ characteristics data and Patients’ characteristics data

Physicians’ characteristics data		N	%
Age	Range	25 - 30	
	mean ± SD	27.22 ± 1.80	
Sex	Male	17	42.5%
	Female	23	57.5%
Duration of work (months)	Range	12 – 36	
	mean ± SD	19.07 ± 6.15	
Additional training program/course	Yes	18	45%
	No	22	55%
Number of patients attending to the center / week	≤100	13	32.5%
	100-500	13	32.5%
	500-1000	14	35%
	≥1000	0	0%
Fraction of diabetic patients from the total attendants	0 - 25%	22	55%
	25 - 50%	18	45%
	50 - 75%	0	0%
	75 - 100%	0	0%
Patients’ characteristics data		N	%
Age	Range	26 - 66	
	mean ± SD	48.78 ± 10.79	
Sex	Male	93	46.5%
	Female	107	53.5%
Duration of DM (years)	Range	1 – 23	
	mean ± SD	11.94 ± 6.73	

SD: standard deviation

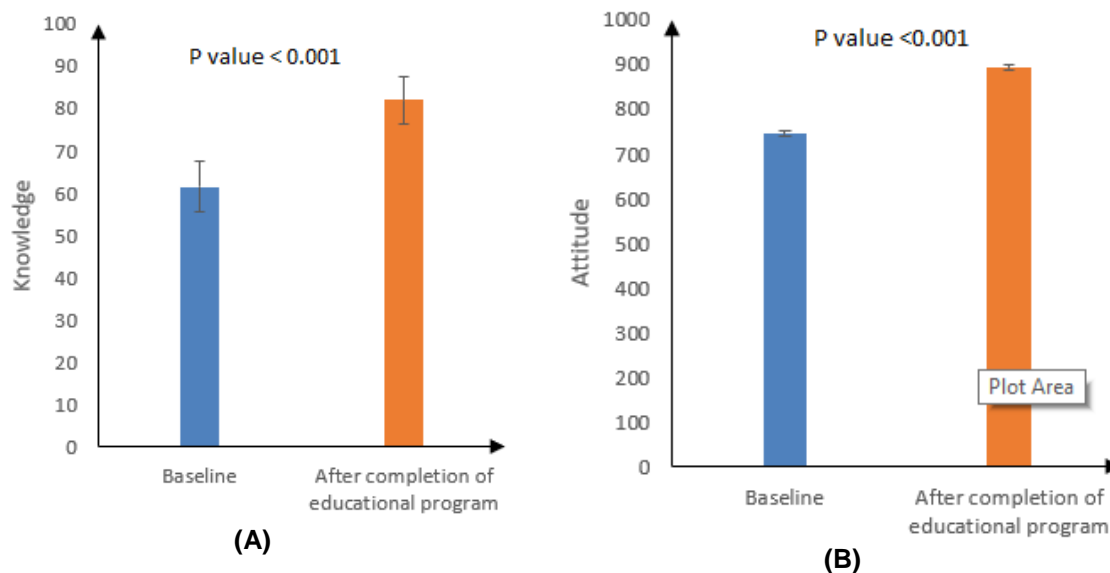


Fig. 1. Comparison between Baseline and After completion of educational program as regard Knowledge of physicians (A) and attitude of physicians (B)

The present study showed that knowledge was significantly higher after completion of educational program than baseline values. Attitude was significantly higher After 6 months than Baseline values.

Educational intervention was observed to have improved the diabetic patients’ knowledge of the disease and self-care and the long-term control of the disease according to the study by Tan et al. [6]. Their study was carried out on an

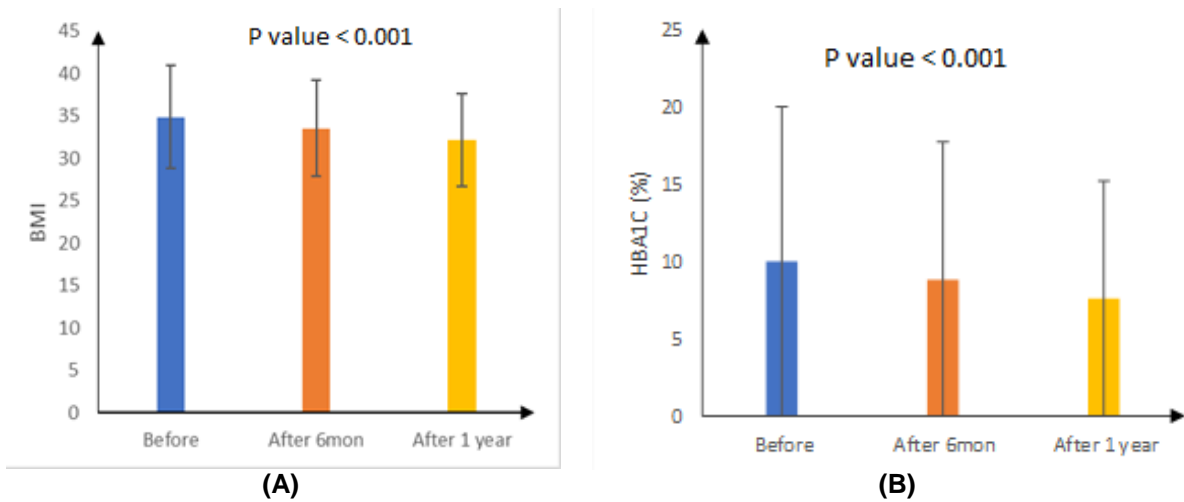


Fig. 2. Comparison between Baseline, after 6 months and after 1 year as regard BMI (A) and HbA1c (B)

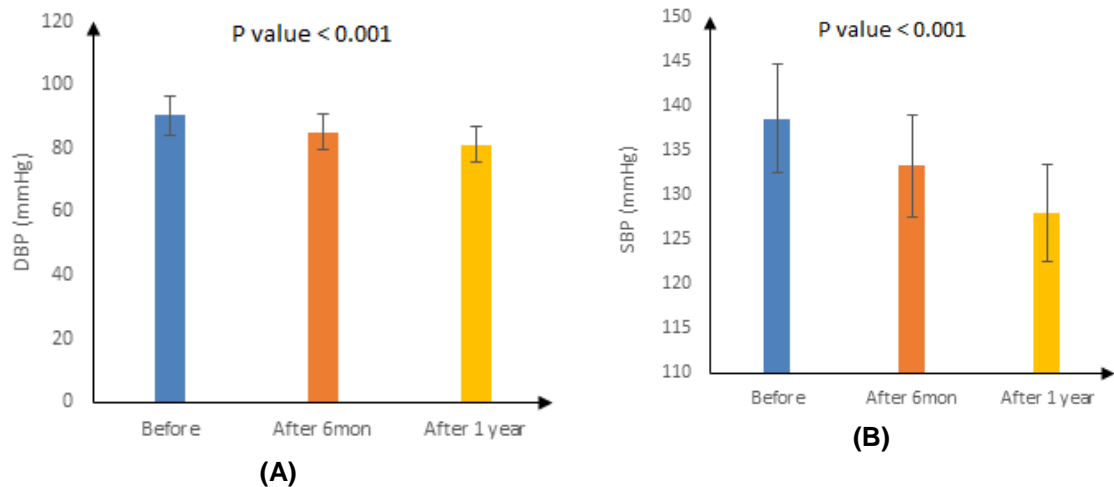


Fig. 3. Comparison between Baseline, after 6 months and after 1 year as regard DBP (A) and SPB (B)

intervention group of 183 diabetic patients who completed the education programmed and a control group of 95 diabetic patients who attended the clinic during the period of the study. When the patients were assessed regarding their knowledge of diabetes and its actual practice (dietary practice, compliance, home monitoring) the intervention group showed a significant and greater improvement in the knowledge of the disease and self-care and in the dietary practice (taking more unpolished rice/high fiber food, reducing calories intake, and cutting down oily/fatty food) compared to the control group. Compliance with medication and the mean HbA1c levels were also better in the intervention group. In a study conducted by **Garcia and Suarez [7]**, when a five year follow up was done

on an interactive educational programmer established for diabetic patients above 60 years of age, it was found that there was a significant increase of knowledge among the patients who attended the educational program. The results of another study conducted in Netherlands [9] in which follow up was done after 12 months, indicated that primary care programs which integrated education into structured care were able to improve both the type 2 diabetic patient's knowledge about the disease and their self-care behavior. These improvements persisted even after the completion of the programs which suggested that they initiated lasting changes in the way patients handled their disease. When the long-term effect of a structured diabetes teaching and training programmed was assessed, it

showed that all the patients who could be evaluated after 2 years had a significantly better knowledge of diabetes and diet. According to Stankiewicz and Zablocki[8], a very significant increase in patient's knowledge was observed after introduction of an educational programme. Also, Lee et al. [5] reported that changes in self-efficacy before and after training increased by 0.93 for three months before and after PM (Pattern management). The control group increased 0.42, less than half of the PM group after three months of training. After the education program, self-efficacy improved more in the PM group than in the control group, in line with previous findings that diabetes education programs are effective in improving self-efficacy.

The current study showed that the mean BMI After 6 months and After 1 year were significantly lower than before patient education ($P < 0.001$). The mean BMI after 1 year was significantly lower than after 6 months ($P < 0.001$). The Exercise activity before study was 28 patients (14%) and after 6 months become 85 patients (43%) finally after 1 year was 127 patients (64%). Our results were supported by studies of Mohamed et al. [9] and Jahangard-Rafsanjani et al. [10] as they reported that showed a statistically significant improvement in BMI for patients in the IG (intervention group; in educational program) compared to those in CG (control group). On the other hand, a study conducted by Al Mazroui et al. [11] performed a direct comparison between pre- and post-BMI values in both diabetic patients and control, in which only patients in the IG showed a significant improvement post-DSME. The mean improvement of BMI in the IG was -0.44 ± 0.19 kg/m² (-0.2 to -0.65), while the mean change in the CG for BMI was $+0.18 \pm 0.2$ kg/m² (0 to $+0.4$). However, Trento et al. [12] demonstrated that BMI decreased over 5 years among group care (-1.4 , 95% CI; -2.0 to -0.7), but there was no statistically significant difference observed. Furthermore, a difficulty in reducing the BMI was mentioned in the study by Scain et al. [13], which also showed no differences when compared with normal care, although the BMI did decrease significantly when compared with the baseline. The difference between them and our study may be attributed to different inclusion criteria.

In this study, the mean SPB after 1 year is lower than before and after 6 months (127.97, 138.55, 133.22 respectively) this was statistically significant. The mean DBP After 1 year is lower

than before and After 6 months (81.22, 90.35, 85.22 respectively) this was statistically significant. Our results were in line with studies of Al Mazroui et al. [11] and Jarab et al. [14] as they showed a statistically significant improvement in systolic and diastolic BP for patients in IG compared to those in CG. The mean change in SBP and DBP of the IG was -2.6 ± 2.96 mmHg and -4.55 ± 4.26 mmHg, respectively; meanwhile, the mean change in the CG for SBP and DBP was -0.55 ± 1.35 mmHg, and -0.05 ± 1.39 mmHg, respectively. The meta-analysis carried out by Duke et al. [15] pointed out that the mean adjusted reduction was 1.86 mmHg after 12–18 months. The study showed a reduction of 7% in the risk of mortality owing to cardiovascular disease and 10% in the risk of mortality owing to ictus with every 2 mmHg decrease in SBP.

The present study showed that the mean HbA1c After 1 year is lower than before and After 6 months (7.60, 9.96, 8.82 respectively). Our results were supported by study of Kiblinger and Braza, [16] as they reported that a total of 501 patients had an IV (initial visit) and an FUV (follow-up visit) Between visits, mean HbA1c level decreased significantly from 7.9% to 6.7%; mean weight decreased significantly from 198.6 lb to 196.0 lb; systolic blood pressure decreased from 132.8 to 131.5 mm Hg and diastolic blood pressure decreased from 79.4 to 77.1 mm Hg; medication adherence increased from 5% to 21% for 4 classes of medication; exercise increased from 58% (284) to 80% (403) of patients; and self-monitoring of blood glucose levels increased from 53% (260) to 98% (476) of patients. More than half of the 89% (446) of patients who set goals at the W met their goals. Lee et al. [5] revealed that HbA1c, a physiological index, showed the mean of 9.62 ± 1.25 and 7.72 ± 0.58 before and six months after the education program, respectively, in the PM group. In the control group, the mean HbA1c was 9.69 ± 1.34 before the education program and 8.20 ± 1.1 six months after the program. Since the score decreased by 0.41 in the PM group after the education program, the decrease in HbA1c with time was significant. Furthermore, Ebrahimi et al. [17] and Reisi et al. [18] showed a statistically significant improvement in HbA1c in IG compared to CG. The mean change of HbA1c after the DSME program in IG was $-1.15\% \pm 0.55$ with a range of (-0.33 to -2%), while the mean change in the CG was $-0.08\% \pm 0.18$ with a range of ($+0.1$ to -0.52%). According to, Zhang & Chu, [19] the reduction in HbA1c (-0.67%) observed in their study is higher than that achieved by

other health education strategies. The study carried out by Salinero-Fort et al. [20] showed a reduction in HbA1c of -0.18% after a 2-year follow-up period. The meta-analysis by Norris et al. [21] showed a decreased HbA1c from the baseline of -0.26% (95% CI; -0.05 to -0.48) at ≥ 4 months. In different pharmacological intervention studies, a decrease in HbA1c levels has shown a reduction in microvascular and macrovascular complications after long-term follow-up [22]. In the United Kingdom Prospective Diabetes Study (UKPDS), patients were treated with diet and exercise for 3 months, with an average reduction in HbA1c from approximately 9% to 7%. Associated with this improvement in glycemic control, there was a reduction in the risk of microvascular complications in the group receiving intensive treatment. These results as well as those obtained in their study suggest that pharmacological treatments need to be complemented with booklets, exercise, and lifestyle-modifying strategies. In aggregate, Zhang & Chu, [19] study provides evidence that systematic health education can generate sustained improvements in BP, glucose control, and metabolic control. The control group also sustained substantial reductions in HbA1c (-0.38%), but there was no significant difference. This is showing that booklets and face-to-face lectures can significantly improve HbA1c over 24 months [23].

5. CONCLUSIONS

The educational program applied in this study led to significant improvement of physician's knowledge and attitude which helps in providing better care of diabetic patients. Moreover, educational program applied in the study led to significant improvement of diabetic patients' lifestyle and outcome, which will subsequently lead to reduction in diabetic complications.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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