Type II Diabetic Patients' Knowledge after Application of Pharmacist Counseling Program

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Abstract

Background: It has been suggested that patients' knowledge is very essential to improve the outcomes of diabetes. Therefore, this study aimed to determine the impact of the intervention program on the patient's knowledge of T2DM and HbA1c. Methods: This was an interventional study, which was carried out in the diabetic clinic in a governmental hospital at King Saud Hospital, Unaizah city, in Saudi Arabia, for eight months, starting from June 2017. One hundred and two patients were selected to be included in this study. Michigan Diabetes Knowledge Test (MDKT) was used to assess knowledge. Results: There was a significant improvement in the overall program although individuals responded differently to each item. Patients' knowledge scores significantly (p=0.001) increased after the intervention program from 9.05±1.92 to 12.29±1.00. The level of patient's knowledge before the intervention found 4.9% was low level, 70.6% was moderate, and 24.5% was high. In contrast, the level of patient's knowledge after intervention found 4.9% was moderate level, and 95.1 was high level. The difference between the patient knowledge post-test and the comorbidities of the patient was not significant p> 0.05. Conclusion: The intervention program has improved knowledge among elderly patients with T2DM. The improvement in knowledge suggests important roles of the pharmacist in the patient's health management process. There is a need for a complete understanding of diabetes by the patients to improve management and to address problems such as lack of awareness, self-care, and knowledge.

Keywords: Adherence; Satisfaction; HbA1c, MMAS-8, T2DM

INTRODUCTION

The prevalence of diabetes is frequently reported as one of the highest among endocrine diseases worldwide.[1] It is estimated that about 246 million adults had diabetes in 2007 throughout the world. This value has increased by 52 million from the amount in 2003, and soon expected to reach up to 380million in 2025.[2]

In the Kingdom of Saudi Arabia (KSA), rapid economic growth during the last four decades and urbanization have led to changes in a lifestyle characterized by unhealthy diets and diminished physical activity. Accordingly, major heal-related diabetes have increased and created public and financial problems.[3]

Improvements in socioeconomic status and urbanization, which are related to rapid changes in lifestyle, diet, obesity, and physical activity, are important risk factors for diabetes[4]. In most developing countries, rural areas reported less prevalence than those of the urban areas, almost two folds.[5] Lack of knowledge of both patients and healthcare providers are the major barriers to enhance diabetic control. External physical barriers, such as poor quality of services and inappropriate diabetic care, also influence the patient's diabetic care. Psychosocial barriers include lack of public awareness and community support, and also psychological

factors such as health belief, poor motivation, low self-efficacy, and emotional stress.[6] Thus, it is judicious to evaluate all these factors frequently, thoroughly, and properly.[7] Knowledge score may decrease by about 3% every ten years of the patient's life [8, 9]

Unfortunately, there are limited studies regarding the patients' knowledge among T2DM Saudi Arabian elderly patients. Therefore, this study aims to determine the impact of the intervention program on the patient's knowledge of T2DM and HbA1c.

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PATIENTS AND METHODS

Study Design

This is an interventional pre-post study design that was conducted in the diabetic clinic in a governmental hospital at King Saud Hospital, Unaizah city, in Saudi Arabia. The ethical approval and the protocols were approved by the Ethical Committee in the hospital and regional committee. Before the collection of data, authorization was obtained from the selected diabetic clinic in King Saud Hospital located in Unaizah City to distribute the questionnaire to the patients. The data collection was conducted for eight months, starting in June 2015.

Study Population

One-hundred and two patients aged above 60 years old and were on a regular care medication on T2DM were selected. This study generally involved Saudi Arabian elderly patients and pharmacists in the King Saud Hospital, Unaizah City. The clinic focuses on the treatment of diabetic patients in the area. Therefore, the targeted population was the patients and the pharmacists in that Hospital. We included all patients with 1) Minimum of 60 years old; 2) any gender; 3) diagnosed with T2DM for more than 6 months; 4) willing to participate and have submitted written consent to participate in the study; and 5) Fasting plasma glucose (FPG) ≥ 7.0 mmol/l (126 mg/dl); 6) glycated hemoglobin (HbA1c) ≥ 6.5% / 48 mmol/mol; or 7) Random plasma glucose ≥ 11.1 mmol/l (200 mg/dl) in the presence of classical DM symptoms.

Patients with 1) Type 1 DM; 2) Gestational diabetes; 3) living outside Unaizah city; 4) unable to comply with the follow-up requirements; or 5) have not had HbA1c test in the prior year were excluded from this study.

Study Intervention

Patients received their intervention through three visits. In the first visit, they received an overview of diabetes, therapeutic goals, using medications, adverse events, and self-mentoring of blood glucose. In the second visit, they informed the risks, benefits, and options of the improvement of blood glucose control. In the third visit, they received information about the hypoglycemic reaction, exercise benefits, patients' concerns, and prevention of patients' complications. Figure 1 shows the framework of the study and patients' intervention.

Knowledge Test for Elderly Patients

Data was collected directly from the patient through one self-report, which included previously validated instruments and T2DM patients who attended the diabetic clinic in King Saud Hospital. The DKT that is valid, reliable, and short,[10] was imposed to assess patients' knowledge about diabetes and thus, DKT was a convenient choice for use in the present study. The survey documented evaluated the patients' diabetes knowledge based on a validated 14 item questionnaire. The survey instruments are based on The Michigan Diabetes Research and Training Centre (MDRTC).

The pretest and posttest of patient knowledge were conducted before and after the intervention program respectively.

Statistical Analysis

All the data were collected and analyzed by Mini tab 17. The level of statistical significance was set at p<0.05 for all analyses. Data were analyzed based on their normal distribution and type of data. Both independent sample t-test and ANOVA to investigate if there are any significant differences among the variable.

RESULTS

Demographic Data

The socio-demographic characteristics of the patients by their different age, gender, marital status, education, monthly incomes, and their smoking status were summarized in table 1.

The Impacts of the Intervention Program on Patient Knowledge

The knowledge of diabetes mellitus reported among elderly patients was assessed through 14 multiple-choice questions. A score of 1 was given for each correct answer and 0 for the conflicting. The maximum obtainable score was 14 and the minimum was 0.01. The result of statistical analysis for patients' knowledge about T2DM before and after the intervention program is shown in Table 2. There was a significant improvement in the overall program although individuals responded differently to each item. Patients' knowledge scores significantly (p=0.001) increased after the intervention program from 9.05±1.92 to 12.29±1.00.

The level of patient's knowledge was categorized into three levels; low, moderate and high. Figure 2 shows the percentage of three levels of knowledge before and after the intervention among the study population. The level of patient's knowledge before the intervention found 4.9% was low level, 70.6% was moderate, and 24.5% was high. In contrast, the level of patient's knowledge after intervention found 4.9% was moderate level, and 95.1 was high level.

The Association between Patient's Gender and Knowledge

The result of the study depicted the insignificant differences in the level of knowledge among the gender with a mean difference (0.34, P=0.147). Thus, the result showed that the null hypothesis is rejected based on the knowledge of the T2DM elderly patient's medication is at the same level among the patients.

The Association between Patient's Education Levels and Knowledge

There was a significant difference between patients' level of education with their knowledge, adherence, and satisfaction in the post-test (P= 0.001). One-way ANOVA test showed the result of the significant differences in the patients' knowledge of medication post-test and their educational

levels. Furthermore, posthoc test analysis presented in Table 3 was used to examine the mean difference in the level of education and patients' knowledge after the intervention program. Some of the significant difference is noticeable in some relationship. However, the differences between no formal education, and primary, secondary, and tertiary were significant (p=0.002, p=0.006 and p<0.001, respectively).

The Association between Patients' Comorbidities and Knowledge

The patients' comorbidities were justified based on different kinds of diseases associated with diabetic patients such as hypertension, asthma, hyperlipidemia, and more than one disease. The difference between the patient knowledge post-test and the comorbidities of the patient was not significant p> 0.05. One-way ANOVA test analysis explained that knowledge of T2DM has no impact on the comorbidities among elderly patients in Saudi Arabia. This knowledge is vital for an intervention among T2DM patients in Saudi Arabia especially the elderly who have severe health complications.

Discussion

The study focuses on the main variables that explain the intervention program as illustratively shown in the research framework. This was done to make the research comprehensible for the public and to directly recommend an appropriate strategy to improve future studies. This was helpful to explain the needs for the study and the increasing danger associated with complexity in medication for T2DM in Saudi Arabia. The setting of this study provided great depth of insight and specifically highlighted important variables that enhanced medication of diabetic patients. Besides the new knowledge gained in this study, the research findings opens up intervention strategy considering the importance of knowledge about T2DM.

Our analysis reported in this section focuses on the intervention program provided to the elderly with T2DM. The analysis conducted to evaluate patient's knowledge about T2DM is discussed based on the data collected from the elderly aged more than 60 years old. Fourteen different items were used for discussion and counseling during the program. Knowledge of the elderly on average, significantly improved after the program.

The patient's knowledge about the diabetes diet and the classes of food such as carbohydrates and fat shows that the patients were aware and remember different food classification after the intervention program.[11] The knowledge about "free food" and HbA1c test used to determine the average blood glucose level was better after the intervention program. The elderly remember the effect of unsweetened fruit juice on blood glucose and how participating in regular exercise helps in reducing their blood glucose.[12] The effect of infection on the health condition of T2DM as well as the appropriate way to take care of the patient's feet was considered among the important

knowledge that recorded significant improvement during the intervention program.[13] The elderly with T2DM recall the symptoms of numbness and tingling usually associated with diabetic patients. Knowledge of the elderly with T2DM did not change before and after the intervention program about the right food to eat to lower fat and to decrease their health risk.[14] The elderly might easily forget what was taught as their age might affect their learning process.

However, the knowledge of the elderly about the best method for testing blood glucose reduced after the intervention. The outcome of the intervention program can be improved by providing a comprehensive explanation of the learning content in CD form to enable them to replay at their convenience. Replaying the intervention program can remind the elderly about the recommended food, exercise and body care measures discussed during the training. Paired t-test analysis conducted on the pre-test and the post-test test showed that the intervention program significantly improved the knowledge of the elderly with T2DM. Before the intervention program, patients' knowledge of T2DM was very low. The intervention program improved the knowledge of the patients. This result was consistent with several other studies that demonstrated the positive impact of an education program on patients' knowledge.[15, 16] The patients included in this study are of a good representation of the diabetes population. The situation is feasible as far as Saudi Arabia's context is concerned. Based on the result of this study male patients with 73.5% greatly outnumbered the female counterpart. However, the recent epidemiological review of diabetes in Asia found that, in Malaysia, males are comparable to females in terms of diabetes prevalence.[17, 18]

In the present study, the association between gender and patients' knowledge is not significant and this could be attributed to the fact that the females and males in Saudi Arabia have the same lifestyle (i.e., education, routine daily work, no control diet). This finding is similar to the findings with a recent study that found out that gender does not significantly associate with patients' knowledge.[19] On the other hand, several studies have shown that gender significantly related to patients' knowledge.[20-22]

In the present study, there was a significant difference between the education levels and the corresponding patients' knowledge with P <0.05. This is attributed to the positive effect of patient's education level on their knowledge, where patients with higher education levels have better knowledge regarding their disease, complications, medications and medication side effects. Several studies have demonstrated the association between patients' education level and their knowledge, which were consistent with the present study result.[23-25]

The present study discovered that the association between the knowledge of the elderly with T2DM and their comorbidities was not significant, which means there was no impact of comorbidities on patients' knowledge, positively nor negatively. The number and the type of comorbidities did not affect the knowledge and this could be attributed to the fact that the patients' education program regarding different diseases was ineffective in King Saud Hospital. The finding of present study was consistent with a study conducted among patients with chronic obstructive pulmonary disease (COPD), where there was no significant association between the knowledge of those patients with COPD and comorbidities.[26] Also, a study among patients with stroke and other comorbidities also demonstrated that there was no association between patient's knowledge and the presence of comorbidities.[27] On the other hand, a study conducted among patients with asthma found that patient's knowledge significantly impacted the presence of comorbidities.[28] Another study on T2DM patients found that the comorbidities have a direct positive impact on patient's knowledge.[29]

Limitations

The tool used to determine diabetes knowledge was self-reported. There was a possibility of under-reporting or over-reporting of these variables. The study only targeted the elderly with T2DM in Unaizah City Clinic Saudi Arabia, which did not represent all Saudi Arabia elderly patients with diabetes. However, the sample size was large enough to represent all diabetic patients managed in the outpatient clinic of the hospital in that city. The condition of the patients during data collection may affect the result reported in this study as most of the elderly patients have multiple health complications. There was no pharmacist education program in Saudi Arabia, especially in King Saud Hospital. For that matter, the researcher had adopted the DM education program regarding elderly patients with T2DM and patient counseling from several references.

CONCLUSION

The intervention program has improved the knowledge among elderly patients with T2DM. The improvement in knowledge suggests important roles of the pharmacist in the patient's health management process. Patient's education level was significantly associated with patient's knowledge. However, there was no significant association between gender and patients' knowledge.

ACKNOWLEDGEMENT

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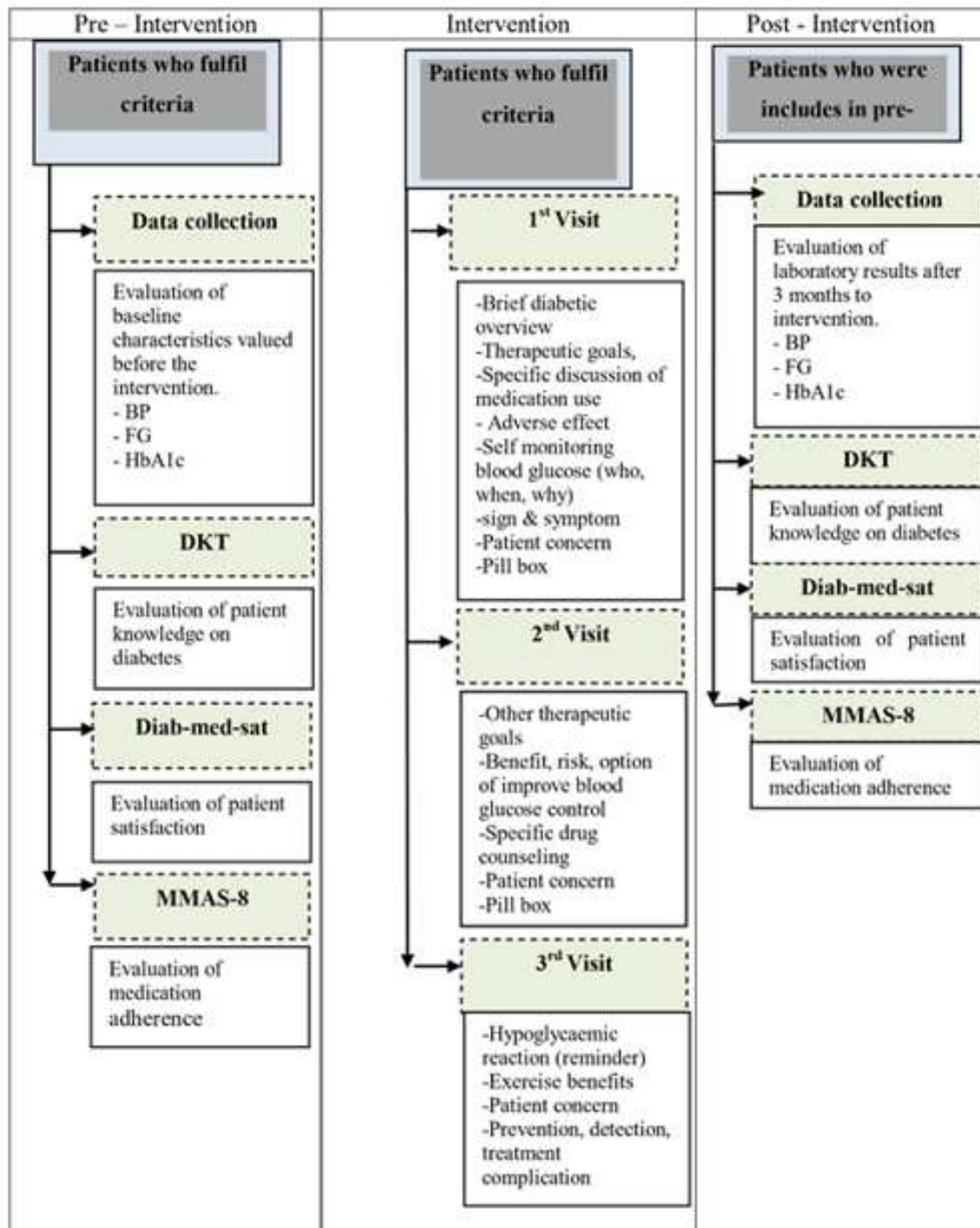
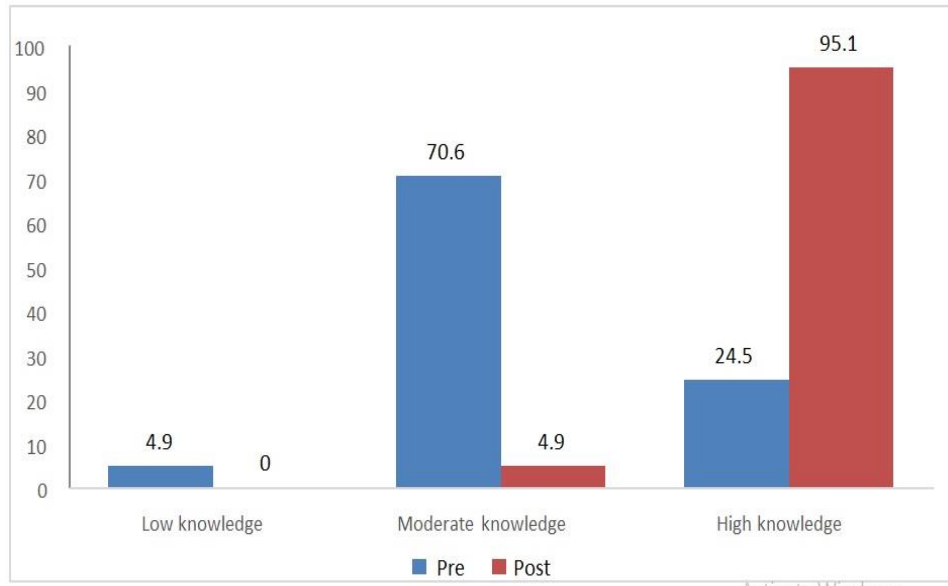**Figure 1:** The framework of the study and Patients intervention

Figure 2: Level of Patient's Knowledge Before and After Intervention

Table 1: The Demographic of the Patients (n= 102)		
Patients Demographic Variables		Frequency n (%)
Age (years)	61-70	83 (81.4)
	71-80	9 (8.8)
	81-90	9 (8.8)
	≥ 91	1 (1.0)
Education	No formal education	16 (15.7)
	Primary	22 (21.6)
	Secondary	23 (22.5)
	Tertiary	41 (40.2)
Accompanying person	None	55 (53.9)
	Spouse	6 (5.9)
	Children	28 (27.5)
	Others	13 (12.7)
Co-morbidities	Hypertension	54 (52.9)
	Asthma	5 (4.9)
	Hyperlipidemia	10 (9.8)
	More than one disease	33 (32.4)

BMI: Body Mass Index; SAR: Saudi Arabia Riyal

Table 2: Comparison of Patients' Knowledge about Diabetes Mellitus Before and After Interventional Program					
Question	Correct response before intervention, *n* (%)	Incorrect response before intervention, *n*(%)	Correct response after intervention, *n* (%)	Incorrect response after intervention, *n* (%)	P value

1. The diabetes diet is:	27 (26.5)	75 (73.5)	87 (85.3)	15 (14.7)	0.01**
2. Which of the following is highest in carbohydrate?	63 (61.8 %)	39 (38.2)	101 (99)	1 (1.0)	1.0**
3. Which of the following is highest in fat?	95 (93.1 %)	7 (6.9)	102 (100)	0 (0)	N/A
4. Which of the following is a "free food"?	12 (11.8 %)	90 (88.2)	73 (71.6)	29 (28.4)	0.018**
5.Glycosylated hemoglobin (hemoglobin A1) is a test that is a measure of your average blood glucose level for the past:	3 (2.9 %)	99 (97.1)	20 (19.6)	82 (80.4)	0.007**
6. Which is the best method for testing blood glucose?	101 (99 %)	1 (1.0)	100 (98)	2 (2.0)	1.0**
7. What effect does unsweetened fruit juice have on blood glucose?	7 (6.9 %)	95 (93.1)	70 (68.6)	32 (31.4)	0.429**
8. Which should not be used to treat low blood glucose?	77 (75.5 %)	25 (24.5)	102 (100)	0 (0)	N/A
9. For a person in good control, what effect does exercise have on blood glucose?	93 (91. 2 %)	9 (8.8)	102 (100)	0 (0)	N/A
10. Infection is likely to cause:	88 (86.3 %)	14 (13.7)	102 (100)	0 (0)	N/A
11. The best way to take care of your feet is to	74 (72.5 %)	28 (27.5)	102 (100)	0 (0)	N/A
12. Eating foods lower in fat decreases your risk for:	102 (100 %)	0 (0)	102 (100)	0 (0)	N/A
13. Numbness and tingling may be symptoms of:	90 (88.2 %)	12 (11.8)	96 (94.1)	6 (5.9)	0.002**
14. Which of the following is usually not associated with diabetes:	92 (90.2 %)	10 (9.8)	95 (93.1)	7 (6.9)	0.01**

** Fisher's exact test, N/A: Not applicable (no statistics are computed constant).

Table 3: Multiple Comparisons of Educational difference for Post Test Knowledge

Education		Mean Difference	P-value
No formal education	Primary	-1.09659*	0.002
	Secondary education	-0.99185*	0.006
	Tertiary education	-1.29726*	<0.001
Primary	No formal education	1.09659*	0.002
	Secondary education	0.10474	0.980
	Tertiary education	-0.20067	0.839
Secondary education	No formal education	0.99185*	0.006
	Primary	-0.10474	0.980
	Tertiary education	-0.30541	0.574
Tertiary education	No formal education	1.29726*	0.000
	Primary	0.20067	0.839
	Secondary education	0.30541	0.574

BMI: Body Mass Index; SAR: Saudi Arabia Riyal