

Knowledge of Pharmacists about Diabetes Mellitus

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Abstract

Objective: This study aimed to evaluate the knowledge among pharmacists towards DM diagnosis and management. **Methods:** This was a comparative study that 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 2015. The study consists of three phases 1) a pre-test survey for the pharmacist regarding their knowledge on diabetes by using the Michigan Diabetes Knowledge Test (MDKT); 2) a training program that delivered for five consecutive days; 3) a post-test survey consisting the same component used for pre-test component but was implied to check any improvement achieved after the training program. **Findings:** Out of 15 pharmacists taking care of diabetic patients, nine pharmacists who work at the out-patients clinic were randomly selected to participate in this study. The impact of the training program on the outpatients' pharmacists' knowledge was investigated before and after the training. The knowledge of the pharmacist significantly improved after the training. Pharmacists' knowledge about T2DM has mean pre-score of 17.22, mean post-score of 20.78, and mean difference of -3.556 ($P=0.005$). **Conclusion:** The training program on pharmacists contributed to an improvement in the pharmacists' knowledge, furthermore, enhanced their communication with the patient about T2DM. Pharmacists in all settings have a positive role in the health management process.

Keywords: Pharmacist, DM. Knowledge, Saudi Arabia

INTRODUCTION

The autoimmune destruction of pancreatic β -cells is one of the pathogenic processes that cause the development of diabetes.^[1] This disease is associated with disturbance in carbohydrate, fat and protein metabolisms caused by the deficient insulin action on target tissues.^[2] Deficient insulin action results from inadequate insulin secretion. Type 2 diabetes mellitus (T2DM), or non-insulin-dependent diabetes, is one of the 3 types of diabetes and comprised the majority of diabetic patients (90–95%).^[3]

A pharmacist is an important “care of elderly” team member and educational resource for a physician, health provider, caregiver, and older patients.^[4] Due to the non-compliance with a complicated medication regimen, there are adverse side effects of drug-drug interactions and drug-disease interactions.^[5] According to Turnheim, 2004 the population-is aging, and the right kind of people to do drug therapy management, who can demonstrate certain competencies, are needed.^[6]

The primary medical evaluation of patients with DM involves a variety of strategies to provide adequate education to the patients and to consider diabetes self-management education as an integral part of diabetes management with dietary planning, pharmacotherapy, and exercise.^[2, 7] For good implementation of self-management in therapeutic plans, a combination of behavioral strategies to improve self-

management requires a multidisciplinary team effort from physicians, pharmacists, and nurses.^[2]

By offering the highest level of drug treatment, the pharmacist can play an active role in the management of the DM medication and its associated complications.^[8, 9] The pharmacist can also use the patient education approach to ensure that his or her older patients have a thorough understanding of their illness and treatment, thus leading to the attainment of successful clinical results.^[10] Therefore, in this study, we aim to investigate the knowledge among pharmacists towards DM diagnosis and management.

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METHODS

Study Design:

This was a comparative study used longitudinal method to compare the patient's adherence before (pre-intervention period) and after the intervention (post-intervention period). This study 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 2015. The study consists of three phases. The first phase was a pre-test survey for the pharmacist regarding their knowledge of diabetes by using the Michigan Diabetes Knowledge Test (MDKT). Secondly, a training program that delivered for five consecutive days involving the group of Saudi registered pharmacists working at King Saud Hospital. Thirdly, is a post-test survey consisting of the same component used for the pre-test component but was implied to check any improvement achieved after the training program. The study was approved by the Qassim Research Ethics Committee and the Faculty of Pharmacy, Universiti Teknologi Mara.

Study Population:

Out of 15 pharmacists taking care of diabetic patients, nine pharmacists who work at the out-patients clinic were randomly selected to participate in this study. Pharmacists working in the outpatients' department (9 pharmacists) with minimum experience of one year in the pharmacy department were selected for this study. The selected pharmacists were trained and equipped with the necessary information about medication intervention to improve T2DM patients. Random techniques and clinical results obtained from the hospital were used to ensure that accurate numbers are represented. The sample chosen is used to represent the given population in the study and to generalize the research findings. Random sampling techniques are perhaps the most accessible method where every elderly patient has an equal chance of being included in the study.

Inclusion Criteria:

The inclusion criteria of pharmacist selection were included: 1) works at outpatients department; 2) minimum of one year experience; 3) obtained a license from Saudi Arabia council; 4) minimum of degree holders; 5) works at the King Saud Hospital.

Exclusion Criteria:

Trainee pharmacist, diploma degree holder, and pharmacists who refused to participate in the present study.

Intervention Program:

The training program included all 9 pharmacists who involved in outpatient care that were recruited into the study. The researcher selected all those pharmacists because they were working in the outpatients' department, and were responsible for counseling and recommendation of medication in the hospital. The program was aimed at improving the knowledge of the pharmacist specifically for T2DM patients. This is an in-service training program

adapted from an established certified Medication Therapy Adherence Clinic (MTAC) program for pharmacists in Malaysia. The contents of the educational materials were customized to include issues on medication adherence on elderly diabetic patients. The materials were delivered through informative lectures, demonstrations and experimental learning components including hands-on attachments at the specific diabetic clinics. Posters and leaflets were also distributed to explain the major issue of the research in one paper. The program was delivered within five days over a total of 10 contact hours. One module was taught per day while two modules comprising case studies and tips for elderly diabetic Mellitus patients were delivered to the pharmacist on the fifth day. The modules aimed to provide the pharmacist with the knowledge of medication therapy adherence on elderly diabetic patients and the necessary skills to provide diabetic counseling for elderly diabetic patients.

Knowledge Test for Pharmacists:

The survey documented evaluated the pharmacists' diabetes knowledge based on a validated 23 item questionnaire. The survey instruments are based on The Michigan Diabetes Research and Training Centre (MDRTC). The pre-post and post-test of pharmacist knowledge were conducted before and after the training program respectively.

Statistical Analysis

Data were analyzed through Statistical Package for Social Science (SPSS) for Windows, version 22.0. The level of statistical significance was set at $p < 0.05$ for all analyses. Exploration of the data was performed before determining missing values and the normality of the variables. Both descriptive and inferential statistics were used in the process of data analysis. The data were analyzed using both independent sample t-test and ANOVA to investigate if there are any significant differences among the variable.

RESULTS

Demographic Data:

Nine outpatient pharmacists were selected from the King Saud Hospital, Unaizah City, where, the majority of the pharmacists were males that comprised of the total percentage of 88.9% compared to the female pharmacists which were cited to be only around 11%. This result indicates that, in the context of Saudi Arabia, 65% of the working pharmacists were males and 35% were females.

The pharmacists' ages within 31–35 years old group comprised the majority of total pharmacists (44.4%) working in the King Saud Hospital. 77.8% of the pharmacist were Saudi Arabian. Furthermore, 77.8% of the pharmacists were within the U52 grade. Only 22.2% of pharmacists have more than eleven years of working experience. The majority of the pharmacists were married (88.9%). Also, 88.9% of the pharmacists were bachelor degree holders, Table 1.

Results of intervention Program:

The intervention program provided for the outpatient pharmacist was used to describe a specific area of interest in this study. Knowledge of T2DM among the pharmacists was obtained using the research items comprising 23 multiple-choice questions. A score of 1 was given for each correct answer and 0 for the conflicting. The maximum obtainable score was 23 and the minimum was 0.001. The pharmacists' overall pre-test and post-test scores were compared based on the number of questions answered correctly. Descriptive analysis deduced from Chi-square regarding pharmacists' knowledge was used to compare before and after the training program as shown in Table 2. Pharmacists' knowledge about T2DM has a mean pre-score of 17.22, a mean post-score of 20.78, and a mean difference of -3.556. Paired sample t-test difference of -4.880 and was significantly related at 0.001 and 0.005 levels.

DISCUSSION

The lack of suitable counseling from medical and paramedical staff is a major contributor to poor adherence.^[11] It is evident that pharmacists have a significant impact on improving patient's adherence by providing proper counseling, and such counseling should be well-synchronized with the prescribed eradication therapy.^[12] This is because patients require a thorough explanation addressing the treatment rationale and the possible side effects that they may encounter during the therapy.^[13] Also, pharmacists should participate in the medical matter in designing, implementing and monitoring the patient's therapeutic behavior to yield favorable outcomes for the patient. Furthermore, pharmacists are expected to recognize the potential drug reactions, resolve and prevent such potential drug reactions while providing patients with the required counseling.^[14]

The American Society of Health-System Pharmacist (ASHP) guidelines have shown that the process of patient education and counseling is more effective when conducted in a room or a space that protects the patient's privacy.^[15] Such education and counseling improved the understanding of the clinical features of DM and provided the pharmacological knowledge regarding medications among elderly patients, which consequently enhanced adherence to the medications.^[16]

In a review article by Bartels (2004), many factors including patient beliefs about diabetes, lack of information (the inability to understand the disease and the treatment regimen), concomitant disease status, social support, elderly, poor communications with health care providers and financial factors contributed to poor medication adherence in T2DM.^[17] The information from those two reviews was supported by the newly published systematic review of the literature regarding medication adherence and diabetes by Odegard and Capoccia's^[18] and Bartels, 2004.^[17]

The impact of the training program on the outpatients' pharmacists' knowledge was investigated before and after the training. The knowledge of the pharmacist significantly

improved after the training. The training program seeks to explore pharmacists' knowledge about T2DM. The program comprised of pre-intervention and post-intervention corresponding to the response before and after the intervention. The training program served as an important platform to understand the depth of knowledge of the pharmacist to significantly improve medication adherence. Findings of the study show that the knowledge about the classes of food (i.e., fat, carbohydrate) improved after the intervention. Knowledge about the HbA1c test that was used to measure average blood glucose levels among the elderly with T2DM improved after the intervention program. The effect of exercise as a way to control blood glucose improved as well as the symptoms of numbness and tingling as related to patients with T2DM. The pharmacist intervention extended to incorporate the signs associated with ketoacidosis, the intermediate-acting insulin (NPH or Lente) reaction on patients. The knowledge was dedicated to enhancing the awareness and the measure to combat T2DM among the elderly. Knowledge about low and high blood glucose and its causes were among important knowledge-based training initiated to improve the elderly with T2DM in this study. This implies that pharmacists' knowledge can be positively used to improve a patient's health. The training program enhances the effectiveness of T2DM medication in Saudi Arabia. The pharmacist training program about T2DM is essential to improve medication conditions.^[19]

Findings show that pharmacists require a training program to strengthen their knowledge of specific health care. The pre-test and post-test on the knowledge about the best method for testing blood glucose; the effect of unsweetened fruit juice on blood glucose was the same before and after the intervention program. Knowledge about the causes of infection and the recommended way to take good care of elderly feet among those with T2DM received no improvement before and after the intervention program.^[1, 20, 21] The knowledge of the pharmacist on the effect of an insulin reaction and the impact of skipping insulin on the blood glucose level was the same after the training. Lack of improvement witnessed during the training program was attributed to distraction.^[22] Therefore, to improve the outcome of the training, tape or recorded information can be used during the training to replay and to ensure that all that was taught was fully understood by the pharmacist.

Findings show that the training program has no impact on some items that were evaluated during the program. Pharmacists' knowledge about the diabetes diet and the effect of infection on T2DM patients reduced after the training. The appropriate ways to take good care of patients' feet and to treat low blood glucose were among important knowledge that is not addressed by pharmacists. These findings showed that the knowledge of pharmacists before the program was better in their understanding of patients with T2DM.^[23] This reduction in knowledge could be attributed to misunderstanding the learning content that was delivered during the program. It is believed that with tapes and CDs,

pharmacists can replay and remember exactly what was initially taught and thus improve their learning outcome. Based on the statistical analysis, training program significantly improved pharmacists' knowledge and were useful in administering T2DM medication. The result of this study indicates that the training program significantly gave a positive impact on pharmacists' knowledge regarding the management of elderly patients with T2DM. The results of several studies were consistent with the result of a recent study.^[24, 25]

Limitations:

The training program performed to a limited number of pharmacists working in King Saud Hospital, which required a large number of pharmacists to investigate the real impact of the training program on pharmacists' knowledge more than one health center. 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.

Recommendations:

The pharmacists need to undergo series of training to possess the capability of improving the clinical outcome in elderly diabetic patients that requires patients to carry out and to sustain a complex set of self-care behaviors, including taking medications, monitoring blood glucose levels, following a diet, engaging in regular exercise, and caring for their feet.

CONCLUSION:

The study investigates the impact of the training program on the pharmacist to improve the knowledge of pharmacists on T2DM among the elderly in Unaizah, Saudi Arabia. The present study showed that training programs on pharmacists contributed to an improvement in the pharmacists' knowledge, furthermore, enhanced their communication with the patient about T2DM. Pharmacists in all settings have a positive role in the health management process. The present study could encourage pharmacists in Saudi Arabia to design initiatives to increase the frequency and quality of monitoring in community pharmacy. Pharmacists can help to improve the quality of adherence to medications in T2DM elderly patients at the diabetic clinic in King Saud Hospital, Unaizah City in Saudi Arabia.

The pharmacists in Saudi Arabia can use the finding of this study to improve their training programs and education about elderly patient's adherence to diabetes education. The present study found that the intervention program enhanced knowledge and medication adherence. Thus diabetes knowledge is a necessity in management and care of T2DM. Knowledge of T2DM is an integral part of the health need for DM care. The findings of the present study can be used for decision-makers to improve vision 2030 medication in the King Saud Hospitals.

Pharmacists initiated training programs that need to be taken into consideration when designing adherence interventions for elderly patients. Pharmacists expressed interest in asking monitoring related questions. It is important to improve patient-centered communication to provide medication adherence. Knowledge of T2DM enhances medication outcomes.

Pharmacists should be trained to seek out patient's perspectives about their health. This study provided pieces of evidence from pharmacist's knowledge supporting medication. Interaction with the patients is an important step to increase medication monitoring and to promote health to the elderly with T2DM in Saudi Arabia.

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Conflict of Interest:

None

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Table 1: Descriptive Statistics of Pharmacist Demographics (n= 9)

Pharmacist demographics variables		Frequency, n (%)
Gender	Male	8 (88.9)
	Female	1 (11.1)
Age (Years)	25-30	3 (33.3)
	31-35	4 (44.4)
	36-40	2 (22.2)
Ethnicity	Saudi	7 (77.8)
	Non-Saudi	2 (22.2)
Grade	U54	2 (22.2)
	U52	7 (77.8)
Years in Practice	<5 years	3 (33.3)
	6-10 years	4 (44.4)
	11-15 years	2 (22.2)
Marital Status	Single	1 (11.1)
	Married	8 (88.9)
Education Level	Degree	8 (88.9)
	Masters/PhD	1 (11.1)

Data presented in n (%)

Table 2: Comparison of Pharmacist Knowledge of Diabetes Mellitus Before and After the Training Program

Questions	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:	9 (100%)	0	7 (77.8%)	2(22.2%)	N/A
2. Which of the following is highest in carbohydrate?	6 (66.7%)	3(33.3%)	9 (100%)	0	N/A
3. Which of the following is highest in fat?	6 (66.7%)	3(33.3%)	9 (100%)	0	N/A
4. Which of the following is a “free food”?	7 (77.8%)	2(22.2%)	8 (88.9%)	1(11.1%)	0.222**
5. Glycosylated haemoglobin (haemoglobin A1) is a test that is a measure of your average blood glucose level for the past:	4 (44.7%)	5(55.6%)	6 (66.7%)	3(33.3%)	1.0**
6. Which is the best method for testing blood glucose?	9 (100%)	0	9 (100 %)	0	N/A
7. What effect does unsweetened fruit juice have on blood glucose?	6 (66.7%)	3(33.3%)	6 (66.7%)	3(33.3%)	1.0**
8. Which should <u>not</u> be used to treat low blood glucose?	7 (77.8%)	2(22.2)	9 (100%)	0	N/A
9. For a person in good control, what effect does exercise have on blood glucose?	7 (77.8%)	2(22.2%)	9 (100%)	0	N/A
10. Infection is likely to cause:	8 (88.9%)	1(11.1%)	7 (77.8%)	2(22.2)	1.0**

11. The best way to take care of your feet is to	9 (100%)	0	8 (88.9%)	1(11.1%)	N/A
12. Eating foods lower in fat decreases your risk for:	8 (88.9%)	1(11.1%)	8 (88.9%)	1(11.1%)	0.111**
13. Numbness and tingling may be symptoms of:	7 (77.8%)	2(22.2%)	9 (100%)	0	N/A
14. Which of the following is usually <u>not</u> associated with diabetes:	7 (77.8%)	2(22.2%)	8 (88.9%)	1(11.1%)	0.222**
15. Signs of ketoacidosis include:	8 (88.9%)	1(11.1%)	9 (100%)	0	N/A
16. If you are sick with the flu, which of the following changes should you make?	4 (44.4%)	5(55.6%)	9 (100%)	0	N/A
17. If you have taken intermediate acting insulin (NPH to have an insulin reaction in: or Lente), you are most likely	1 (11.1%)	8 (88.9%)	7 (77.8%)	2(22.2%)	1.0**
18. You realize just before lunch time that you forgot to take your insulin before breakfast. What should you do now?	4 (44.4%)	5(55.6%)	7 (77.8%)	2(22.2%)	1.00**
19. If you are beginning to have an insulin reaction, you should:	9 (100%)	0	9 (100%)	0	N/A
20. Low blood glucose may be caused by:	6 (66.7%)	3(33.3%)	9 (100%)	0	N/A
21. If you take your morning insulin but skip breakfast your blood glucose level will usually:	8 (88.9%)	1 (11.1%)	8 (88.9%)	1 (11.1%)	0.111**
22. High blood glucose may be Caused by:	6 (66.7%)	3(33.3%)	8 (88.9%)	1 (11.1%)	0.333**
23. Which one of the following will most likely cause an insulin reaction:	9 (100%)	0	9 (100%)	0	NA

*Chi-square test, ** Fisher's exact test, N/A: Not Applicable (no statistics are computed because questions are constant)