

ASSESSING ADHERENCE TO DIABETES MEDICATION THERAPY MANAGED BY PHARMACISTS

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ABSTRACT

There are several microvascular and macrovascular complications that are associated with diabetes such as retinopathy, nephropathy, and myocardial infarction, which can be prevented or delayed if the patient adheres to prescribed medication regimens. Pharmacist-managed DMTAC program is intended to improve patient medication adherence, glycaemic control, and lipid parameters. Data were extracted from patients who had completed eight pharmacy visits and had glycosylated haemoglobin (HbA1c) >8%. A review of patient records and DMTAC forms was conducted in order to obtain demographic information, medications regimens, adherence, laboratory parameters, and pharmacists' interventions. The results of the study examined HbA1C levels, fasting blood glucose levels, low-density lipoprotein cholesterol levels, triglyceride levels and high-density lipoprotein cholesterol levels. Patients' medication adherence data were also evaluated MMMAS; high affiliation was defined as scores >8, medium adherence as scores 6 to 8, and low adherence as scores less than 6. Among the 43 patients included in the study, 53.5% were females; 46.5% were TamilNadu, 44.2% were Karnata, and 9.3% were Kerala. We achieved a mean reduction in HbA1c of 1.73 percent (p0.001), a mean reduction in fasting blood glucose of 2.65 millimol/l (p=0.01), and a mean shorten in low-density lipoprotein cholesterol of 0.38 millimol/l (p=0.007). HDL cholesterol and TG cholesterol did not differ significantly. The mean MMMAS score for patients improved significantly after the completion of the DMTAC program from 7.00 to 10.84 (p 0.001). Efforts to improve HbA1c, glucose, LDL cholesterol, and medication adherence in diabetic patients through significant improvements were achieved as a result of the pharmacy-managed DMTAC program.

Keywords: Evaluation, Pharmacist, Medication, Hemoglobin, Antidiabetics

INTRODUCTION

A report released by the World Health Organization in 2012 indicates that more than one hundred million people worldwide were living with diabetes mellitus at the time, and that this number is expected to double by after ten years. 14.9% of people over 30 have type 2 diabetes [1, 2]. Diabetic complications caused by poorly controlled diabetes are macro- and microvascular. Microvascular complications and macrovascular complications of diabetes are decreased by intensive glycaemic control [3-5]. It is imperative that patients adhere to their medication regimens in order to achieve good glycaemic control. Patients are still having difficulty adhering to oral hypoglycemic agents and insulin, however, because of adherence issues [6]. Patients' adherence and glycaemic control improve when patient education is provided [7].

Through routing counseling, pharmacists collaborate with physicians to improve glycaemic control by educating patients about diabetes [8]. Patients' adherence to prescriptions is crucially dependent on pharmacists' routing counseling [9, 10].

DMTAC (Diabetes Medication Therapy Adherence Clinic) combines pharmacists and physicians in diabetes care. DMTAC is located in a specialized diabetes endocrine clinic at the Hospital since it was established.

DMTAC enrolls patients with poorly controlled glycaemic control (8% HbA1c, glycosylated haemoglobin). During their routine follow-ups, pharmacists identify them through physician reports or by selecting them themselves.

Upon enrollment in the program, patients will see pharmacists every minimum months consecutive visits. An individual counseling session and educational session is provided at every visit. Diabetes and its complications, hypoglycemia and hyperglycemia symptoms, medications, diet, and exercise are all part of the diabetes education. The MMMAS is used during every visit to assess patient compliance to medications regimens. If you score >8 , you are in high adherence, if you score 6 to 8, you are in medium adherence, and if you score 6, you are in low adherence. [11]. A pharmacist also adjusts insulin dosage based on a patient's self-monitored blood glucose level. When a pharmacist and physician work together to follow up on a patient, the pharmacist will recommend dose adjustments and additional medications (such as low cholesterol drugs, diabetic drugs, or aspirin) as needed. DMTAC is still a young program and is still undergoing development. This program isn't well studied, so there isn't much information about its effectiveness. An investigation of DMTAC's effectiveness in improving control and parameters of glycemic, lipids and patients' adherence in a specialized endocrine clinic aims to determine whether the program helps patients.

METHODS

This study evaluated the GC, LP, and medication adherence of participants in the hypoglycemic Medication Therapy Adherence Clinic organized in India. Diabetes mellitus patients with glycosylated haemoglobin (HbA1c) increase than 8% who attended the Endocrine Clinic and were identified by physicians or pharmacists a study was conducted that included. We reviewed only the data of patients who had visited the pharmacist eight times. Those patients who were not followed-up with by their pharmacists or forward with them were excluded from the study. Retrieval and review of medical records as well as DMTAC forms took place. Patients' demographics, medications, and laboratory data were included in the records. A Modified Morisky Medication Adherence Score audit was conducted on patients according to the Modified Morisky Medication Adherence Score. As well, pharmacists' interventions, including antidiabetic agent additions, statins, insulin, and dosage adjustments, were examined. Pre- and post-intervention HbA1c values were compared to determine the primary outcome. Furthermore,

patients' adherence to medication regimens was also measured, along with differences in FBG, LDL-C, HDL-C and triglycerides. The medication regimens of patients and the use of sulfonylureas, thiazolidinediones, alpha-glucosidase inhibitors, insulin, and statins were analyzed. A Windows version of SPSS 16.0 was used for data analysis. The mean of the two groups was compared using a paired t test values of HbA1c, FBG, and LDL collected from the collected data. Wilcoxon signed-rank tests were used to analyze HDL, TG, and MMMAS data because their distributions were skewed. P values reduce than 0.05 were statistically significant.

RESULTS

The DMTAC program enrolled 76 patients. 43 patients (43%) scheduled visits with pharmacists but were either not scheduled or lost to follow-up. Forty-three patients (57%) completed and had before and after intervention data from the pharmacists. In this study, the data of 43 patients who had completed all eight appointments were included. In Table 1, we present the demographics and medications regimens of 43 patients. As shown in Figure 1, oral hypoglycaemic agents are used to lower blood sugar levels.

There were forty-three patients who finished eight visits, 15 (34.9%) with a body mass index (BMI) above twenty-five, and 12 (27.9%) with an overweight BMI above 30. In total, 52 interventions were performed by pharmacists (Figure 2). DMTAC pharmacists' interventions were well accepted by physicians. As can be seen in Table 2, the mean outcome measures before and after intervention are similar. Compared to 10.82 (SD =0.31), HbA1c decreased by -1.73% to 9.09 (SD =0.24) ($p<0.001$). The DMTAC program resulted in the reduction of HbA1c in 26 patients (61%) (Figure 3). Also significant was the reduction in mean FBG of 2.65 mmol/l ($p=0.011$). There was also a significant reduction in LDL cholesterol by 0.38 mmol/l ($p=0.007$). The mean TG, however, did not decrease significantly. A reduction in HDL cholesterol of 0.05 mmol/l ($p=0.333$) did not reach significance despite a decrease of 0.05 mmol/l. In this study, adherence to MMMAS increased significantly from medium adherence, 7.50 (SD=0.61) to high adherence, 10.84 (SD=0.10) ($p<0.001$). All patients were high adherent after the intervention.

Table 1: Medication regimens and patient demographics

Anthropology	No. of Patients (%),n=43
Life time(y)	47.93 (SD=2.18)
Character	
Men	20 (46.5%)
Women	23 (53.5%)
Race or Ethnicity	
TamilNadu	20 (46.5%)
Karnataka	19 (44.2%)

Kerala	4 (9.3%)
Type of Diabetes	
Type I	7 (16.3%)
Type II	36 (83.7%)
Body Mass Index	
<18.5	2 (4.6%)
18.5-24.9	14 (32.6%)
25-29.9	15 (34.9%)
≥30	12 (27.9%)
Treatment	
oral hypoglycaemic agents † only	6 (14.0%)
oral hypoglycaemic agents † + basal insulin	13 (30.2%)
Full insulin + oral hypoglycaemic agent †	16 (37.2%)
Insulin only	8 (18.6%)
Statins	41 (95.3%)
*BMI=body mass index, †OHA=oral hypoglycaemic agent	

Outcome measures	Pre-Intervention	Post-Intervention	Mean difference	P-value
HbA1c (%)	10.82 (0.31)	9.09 (0.24)	-1.73	<0.001
Fasting Blood Sugar (mmol/l)	11.34 (0.85)	8.69 (0.62)	-2.65	0.011
Low Density Lipoprotein-Cholesterol (mmol/l)	3.22 (0.18)	2.84 (0.18)	-0.38	0.007
Triglycerides (mmol/l)	2.00 (0.20)	1.88 (0.15)	-0.12	0.631
Low Density Lipoprotein-Cholesterol (mmol/l)	1.19 (0.06)	1.14 (0.04)	-0.05	0.333
Patient Adherence (MMMAS)	7.00 (0.61)	10.84 (0.10)	3.84	<0.001

Figure 1: Hypoglycemic agents administered orally

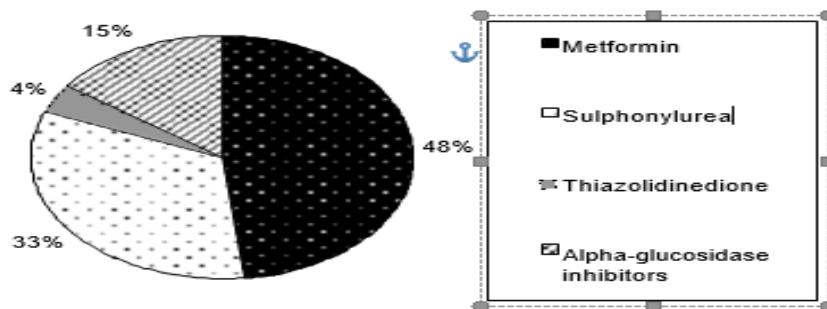


Figure 2: Pharmacists from the DMTAC completed the intervention. An oral hypoglycemic agent is an OHA.

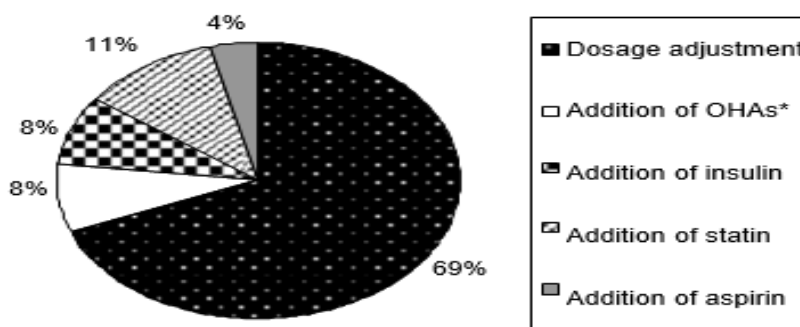
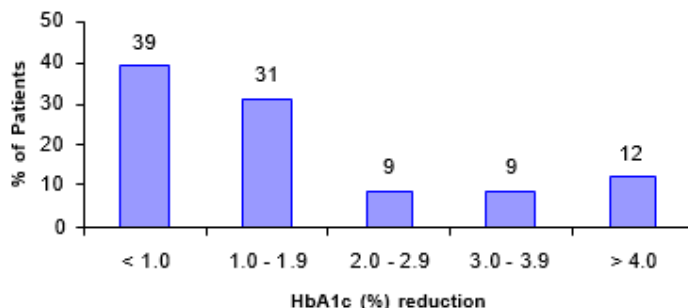


Figure 3: Instances in which the HbA1c level has been reduced by a specified percentage.



DISCUSSION

Moreover, adherence to the DMTAC program administered by pharmacists improved significantly in GC, Low Density Lipoprotein-Cholesterol, and patient satisfaction. Patients enrolled in pharmacist-coordinated diabetes management programs had significant improvements in glycaemic control as demonstrated in a retrospective chart review (n=109). Pharmacists could prescribe medications in prospective studies, which resulted in a greater reduction in HbA1c than this study. In the DMTAC program, 61% of patients had at least a 1% drop in HbA1c. This study found that every 1% reduction of HbA1c decreases the risk of microvascular complications by 37%. Consequently, the DMTAC program in Penang Hospital indirectly impacted microvascular endpoints in the 61% of patients, significantly improving their quality of life.

In addition, the level of LDL cholesterol in patients decreased significantly from 3.22 mmol/l to 2.84 mmol/l. There was a greater reduction than in a study conducted by which a mean reduction of 0.28 mmol/l was reported. The LDL cholesterol of patients in other retrospective studies, however, did not decrease significantly at the end of the study. According to the Ministry of Health Clinical Practice Guidelines, 95 percent of patients with diabetes over 40 were taking statins, and 95 percent were taking statins as directed by the DMTAC program. Neither of the two patients without statins had been taken in more than a year. According to several landmark studies²⁰⁻²², statins can reduce triglycerides by 10 to 20%, but this study showed only a 6% reduction in triglycerides and was not statistically significant. A similar study by Leal et al¹³ found no significant difference in HDL cholesterol. However, mean HDL cholesterol exceeded 1 mmol/l.

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Patients enrolled in the DMTAC program were educated and counseled by pharmacists. As of the MMMAS 7.00, prior to enrolment, patients' glycaemic control was poor, while their adherence was medium. To improve their adherence and clinical outcomes, patients need to understand the nature of their disease and medication regimens. Compared to a study that showed pharmacists providing patient education improved patient adherence, this study showed significant improvements in patient adherence. Contrary to Odegard et al., this study did not show improvement in adherence among pharmacist managed groups. Furthermore, this study has certain limitations. Retrospective analysis suggests that the diabetes population is not as large as it appears from this study. In this study, the program was tested for a short period of time and its long-term efficacy is unknown. Due to the lack of control group in this study, comparing DMTAC program effectiveness with physician-managed care may be challenging. Nevertheless, this study aimed to demonstrate the effectiveness of the Diabetes Medication Therapy Adherence Clinic program and to raise awareness of pharmacists' contribution to diabetes care among other healthcare professionals. These limitations can only be addressed by a randomized controlled prospective study.

CONCLUSIONS

Patients' glycaemic control and low-density lipoprotein cholesterol improved significantly after participating in the pharmacist-managed Diabetes Medication Therapy Adherence Clinic. Diabetes mellitus complications will eventually be delayed or decreased by improving these clinical markers. Additionally, medication adherence improved significantly for patients. Pharmacy involvement in diabetes care is proven to be effective, according to the findings of this study.

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