Impact of Severity of Poly Pharmacy on Medication Adherence in Patients with type II Diabetes Mellitus

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ABSTRACT

Back ground: Diabetes mellitus is a complex chronic disease and people with diabetes estimated to reach 552 million by 2030 worldwide. World Health Organization stated that only 50% of patients diagnosed with a chronic illness were fully compliant with their treatment regime. **Objectives:** To test the hypothesis that adherence decreases with increase in number of medications prescribed in patients with type II diabetes mellitus. **Materials and methods:** It was a comparative cross sectional study conducted in the department of medicine, medical college, Kozhikode. Patients visiting in the outpatient department of general medicine who satisfy the inclusion criteria were enrolled into the study. Patient medication adherence was measured by medication adherence questionnaire. Results analyzed using student's t test. **Results:** A total of 218 type II diabetic patients enrolled in this 6 months study in which minor poly pharmacy accounts for 18 patients, and the remaining were major poly pharmacy regime. The average number of drugs prescribed was 4.71 ± 2.12. The mean value of medication adherence score is more in major poly pharmacy group (3.48) when compared with minor poly pharmacy group (1.96). Higher the value of medication adherence score lower is the value of medication adherence of the patient. **Conclusion:** Polypharmacy continues to be a significant issue and little research has been conducted regarding the relationship between medication adherence and poly pharmacy. Medication adherence is affected by certain factors other than the number of drugs prescribed.
Key words: Diabetes mellitus, Polypharmacy, Medication adherence, Patients, Compliance.

INTRODUCTION

In recent decades the prodigious developments in pharmaceutical field perked up the efficacy of chronic disease management. On the other side of the coin there is a proportional increase in the complexity of treatment in the form of polypharmacy regimens for comorbidities among disease states.[1]

Diabetes mellitus is a chronic complex disease state and an augmenting worldwide problem with the number of diabetes patients estimated to reach 552 million by 2030.[2,3] Type 2 diabetes accounts for 90% of all cases of diabetes and is associated with microvascular complications like retinopathy, nephropathy and neuropathy. Macrovascular complications include ischemic heart disease, coronary artery disease,

stroke and diabetic foot ulcer.[4] Dyslipidemia, obesity, renal disease, gastrointestinal problems are also associated with diabetes. In long term it is arduous to manage the condition with dietary control alone and pharmacotherapy becomes the cornerstone. The factors that favor polypharmacy in

type II diabetes are the need to manage deficiency in both insulin sensitivity and insulin production, along with micro and macro vascular complications to surpass quality of life and life expectancy.[4] Thus polypharmacy is the natural consequence of providing evidence based medical care to patients with type 2 diabetes.[5]

In its simple sense, polypharmacy is the concurrent use of multiple medications in the same patient, and is defined as the prescription, administration or use of more medications than are clinically indicated. Even though polypharmacy more commonly has a negative connotation, in the case of conditions like diabetes mellitus it is unavoidable and termed as therapeutic polypharmacy.[6]

According to World Health organization adherence is the extent to which a person's behavior of taking medication, following a diet, and/ or executing life style changes corresponds with agreed recommendations from the health care provider.[7] Recently WHO stated that only 50% of patients diagnosed with chronic illness were fully compliant with their treatment regimen, and it has been hypothesized that polypharmacy and adherence to prescribed medications are contradictory. Less is known about medication adherence in the setting of polypharmacy.[8,9] This study was carried out with the objective to find out the impact of severity of polypharmacy in type II diabetes mellitus and to prove medication adherence decreases with increase in number of medications.

MATERIALS AND METHODS

Study settings

A comparative cross sectional study conducted in the department of General Medicine, Govt Medical College, Kozhikode. Approval of research project was obtained from the institutional Ethics Committee (IEC) of Govt Medical College Kozhikode.

Patients and data collection

A total of 218 patients with type 2 diabetes and associated complications were enrolled into the study from January 2013 to May 2013 after signing the written consent form. All patients were taking two or more than two drugs which include insulin and oral medications. Data were collected from OP sheets, laboratory reports and patient interview with medication adherence questionnaire. Adherence questionnaire prepared based on Morisky 8 item medication adherence questionnaire was prepared. In our study the questionnaire consists of 12 questions, additional 4

questions regarding dose, frequency, route of administration and economic issues affecting the refill of drugs.

The number of medications in each prescription was noted. Those who taking two to four drugs were categorized as minor polypharmacy and five or more drugs were categorized as major polypharmacy. For each questions there were 3 possible answers. Adherence was score for never=0, sometimes=1 and always=2. Adherence was calculated based on total score. Patient's medication adherence decreases as the score of the questionnaire increases. Score >2 is low adherence, score 1 or 2 medium adherence and score 0 indicates high adherence Data was tabulated with their percentage values.

RESULTS

Demographic details

A total of 218 patients enrolled into the study. The mean age was found to be 56.28($\pm$10.45) years. Among them 56.4 % were females. 175 male patients had no history of smoking, 5 were smokers,and remaining 38 patients were ex smokers. 5 male patients were alcoholic, 30 males were ex alcoholic.

Co-morbidities

Among the diabetes associated co-morbidities, hypertension was found in majority of patients (57.8%), followed by neuropathy (45%), hyperlipidemia (28.9%), coronary artery disease (23.9%), diabetic foot (12.8%), retinopathy, (10.1%), cerebrovascular accident (4.6%), and diabetic nephropathy (4.1%)

Duration of diabetes

35 patients had been diagnosed with diabetes for a period of 1-5 years. 46 were taking medications for a period of 6-10 years, 53 patients for 11-15 years. 43 patients were on diabetic treatment for the past 16-20 years, 18 patients were 21-25, and the remaining 23 were above 25 years of treatment.

Anti diabetic drugs used

Majority of the patients 88 (40.4%) were taking insulin+ metformin, followed by 41 patients (18.8%) taking metformin+sulphonylurea. 31 patients were taking insulin (14.2%) and insulin+metformin+sulphonylurea by another 31 patients. Only 11 patients (5%) were taking metformin +sulphonylurea+pioglitazone.

Table 1: Medication adherence based on poly pharmacy						
	Poor adherence		Moderate adherence		Good adherence	
Poly pharmacy	No of patients	%	No of patients	%	No of patients	%
Minor polypharmacy 4 or less drugs	37	34.3	44	40.7	27	25.0
Major poly pharmacy More than 4 drugs	68	61.8	26	23.6	16	14.5

Table 2: Relationship between number of drugs and medication adherence	
No of Drugs	Mean of adherence score
2	1.3
3	3.7
4	3.0
5	4.3
6	4.0
7	2.2
8	2.7
9	4
10	5
11	1

Types of polypharmacy

110 patients (50.5%) were under the category of major poly pharmacy and the remaining 108 patients (49.5 %) were under minor polypharmacy.

Number of drugs used

Among the 218 patients 40 were taking 2 drugs and another 40 were taking 3 drugs. 28 patients 4 drugs, 36 were taking 5 drugs, 22 were on 6 drugs, 24 patients on 7 drugs, 21 patients 8 drugs, 5 patients 9 drugs and one patient each taking 10 and 11 drugs. These includes anti diabetic medications and medications for the management of co morbidities (Table 1).

DISCUSSION

Majority of patients enrolled in this study had been diagnosed with diabetes and was taking anti diabetic drugs for a period of 11-15 years. Hypertension was found in majority of patients.

The minimum number of drugs taken was 2 and maximum number was 11. The mean were found to be 4.71(±2.12). From the results it is clearly identified that medication adherence is significantly lower in major polypharmacy group i.e. (61.8%) of poor adherence when compared with

34.3% poor adherence for minor polypharmacy group. Moderate adherence is higher in minor polypharmacy patients. Good adherence rate were higher in minor polypharmacy (27%) than major polypharmacy (16%). The mean value of medication adherence score is more in major polypharmacy group (3.48) when compared with the minor polypharmacy group indicates lower medication adherence in major polypharmacy group.

Medication adherence of a patient decreases as the adherence score increases. The mean of adherence score of patients taking two drugs was found to be 1.3. The score for those taking 3 drugs were 3.7. This means that those who taking 2 drugs has more adherence than 3 drugs. The score for those taking 4 drugs were found to be 3.0. This means that medication adherence was higher in this group than those taking 3 drugs. The medication adherence score for patients taking 5 drugs were 4.361, which is higher than 4 drugs group, i.e., adherence is decreased. The adherence of patients taking 6 drugs was more comparing to 5 drugs. Similarly those taking 7 drugs shown higher adherence than 6 drugs group. The adherence for those taking 8 drugs was lower when comparing to those taking 7 drugs. Similar result in the case of 9 drugs and 10 drugs. But in the case of 11 drugs adherence was higher than 10 drugs (Table 2).

In this study, medication adherence was lower in major polypharmacy group compared to minor polypharmacy group. But, the result is not in accordance with the hypothesis that medication adherence decreases with increase in number of drugs prescribed. In our study we could not find a direct relationship between number of drugs and medication adherence. A study by Grant *et al*[10] also concludes that patients reported very high medication adherence rate regardless of the number of medications. Medication adherence is also affected by certain other factors than the number of drugs.

Polypharmacy continues to be a significant issue and little research has been conducted regarded the relationship between medication adherence and polypharmacy. Experience with literature review showed that this area requires more attention of Diabetes mellitus.

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