International Journal of Science and Healthcare Research
Vol.3; Issue: 4; Oct.-Dec. 2018
Website: www.ijshr.com
Original Research Article *ISSN: 2455-7587*

Effect of Polypharmacy on Medication Adherence in Patients with Type II Diabetes Mellitus

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ABSTRACT

Background: Diabetes mellitus (DM) is a cluster of metabolic diseases in which a person blood sugar is raised. Polypharmacy is the natural consequence of providing evidence based medical care to patients with type 2 diabetes. Typically, multi drug regimens are required to control hyperglycemia. Patient adherence to prescribed medications is crucial to the goal of reaching metabolic control.
Objectives: To assess the effect of Polypharmacy on medication adherence in patients with type 2 DM, to assess drug-drug interactions associated with anti diabetic medication and to educate regarding micro and macro vascular complications among diabetic patients.
Methodology: A prospective observational study was carried out for a period of six months at Medicine department of Basaveshwara Medical College & Hospital, Chitradurga.
Results: A total of 92 patients were enrolled for the study of which 52 were males and 40 were females. Male patients of age 51-60 are more prone to develop disease as compared to females. Most common co-morbidity observed in diabetic population is hypertension. The Morisky Medication Adherence Scale (MMAS-8) result showed the 0.000*. The major drug interactions were found in between metformin-levofloxacin. Out of 92 diabetic patients 41 patients were having macrovascular complications and only 3 patients were having microvascular complications.
Conclusion: The present study showed that the clinical pharmacist involvement in disease management has positive impact in creating awareness about the disease. The final result showed that the medication adherence was improved, while comparing the first visit to follow up.

Key words: Diabetes, Polypharmacy, Medication adherence, Hyperglycemia, Macrovascular, Microvascular.

INTRODUCTION

Diabetes is a group of metabolic disorders characterized by hyperglycemia. It is associated with abnormalities in carbohydrate, fat and protein metabolism and results in chronic complications including micro vascular, macro vascular, and neuropathic disorders. It requires medical care and education to prevent acute and long term complications. [1]

Polypharmacy is the natural consequence of providing evidence-based medical care to patients with type 2 Diabetes. Typically, multidrug regimens are required to control hyperglycemia and the associated metabolic risk factors of hypertension and hyperlipidemia. Patient adherence to prescribed medications is crucial to the goal of reaching metabolic control. [2]

The ability of doctors to identify non-adherence is deprived and intercessions to improve adherence have had varied outcomes. Deprived adherence to medication regimens is the reasons for extensive deterioration of illness; decrease and amplified well-being charges. Methods that can be used to improve adherence can be grouped into four general categories: Patient education; improved dosing schedules; increased hours when the clinics

open (including evening hours) and therefore shorter wait times; and improved communication between physicians and patients. Educational interventions involving patients, their family members, or both can be effective in improving adherence. [3]

According to the Diabetes atlas 2006 published by the International Diabetes Federation, the number of people with diabetes in India is currently around 40.9 million is expected to rise to 69.9 million by 2025. [1]

In 2003, the World Health Organization emphasized that "increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatment". Previous studies have demonstrated that non-adherence to anti-diabetic medications can result in poor glycemic control and can consequently lead to complications associated with disease progression, hospitalization, pre-mature disability, and mortality. [4]

When patients with diabetes do not adhere to their drug prescriptions the efficacy of the medication declines as does their control of glycemia. Accordingly, there is a higher risk of acute and chronic complications, leading to unnecessary hospital admissions. A systematic review of adherence to diabetes medication reported frequencies between 36% to 93%. Such variation was in part associated with the method used to determine adherence and indeed, while the adherence rate for patients taking sulfonylurea was 74.5% using electronic monitoring, self-reported adherence was 92.4%. It is clear that in terms of quality of life, chronically ill individuals had lower mean quality of life domain scores when compared to healthy adults or child bearing women. [5]

So, by considering above facts our study aimed to find out the effect of polypharmacy on medication adherence in patients with type 2 DM.

MATERIALS AND METHODS

Study Design: This was a prospective interventional study.

Study Site: The study was conducted in General Medicine, Corporative ward and Intensive care unit at Basaveshwara Medical College & Hospital, Chitradurga.

Study Period: The study was conducted over a period of six months from 2017 to 2018.

Study Subjects: All in-patients who were presented to the General Medicine, Corporative ward and Intensive care unit of the hospital as in-patients during the study period were enrolled into the study. Patient who met the following criteria were enrolled.

Inclusion Criteria:

- Subjects of both genders.
- Age group 40 and above.
- Subjects with a co-morbid condition.

Exclusion Criteria:

- Subjects who are Type 1 DM.
- Subjects with gestational diabetes.
- Subjects who are comatose.

Ethical approval:

The study was approved by the Institutional Ethical Committee of Basaweshwara Medical College Hospital& Research Centre, Chitradurga.

Sources of Data:

- Medical records of in-patients.
- Interaction with patients and/or care takers.

Study Procedure:

- The study was started after obtaining the approval from institutional ethical committee (IEC) of SJM college of Pharmacy.
- Patients who satisfied the above study criteria were included in the study after taking the informed consent.

The study was conducted on Diabetes patients with a co-morbid condition. The medical records of such patients were reviewed. The patient's demographics, history (medical/social), clinical data such as diagnosis, clinical condition, therapeutic data such as name of

the drug, dose, route and frequency were collected in data collection form and other relevant details are collected by interviewing the patient and the care givers of the patient.

A validated questionnaire was given to the patient at interview and assessed their adherence on medication.

In order to know the MA (Medication Adherence) of the patient were provided with specially designed questionnaire i.e., Morisky Medication Adherence Scale (8-item), and their follow up of the medication adherence be rechecked.

STATISTICAL ANALYSIS

The data were entered in Microsoft excel and data were analyzed by SPSS software version 19.

The results were calculated and analyzed by Paired student t-test.

RESULTS

Distribution of patients according to Gender

A total of 92 patients data were collected from in-patient of medicine, corporative ward and Intensive care unit from the hospital. Among the whole 92, 52 were males and 40 were females. The results are shown in Table 1.

Table 1: Distribution of patients according to Gender

Gender	Frequency	Percentage
Female	40	43.4
Male	52	56.6
Total	92	100%

Distribution Based on Number of Drug per Prescriptions

Out of 92 patients 19,8,4,20,24,17 were prescribed as Three drugs, Four drugs, Five drugs, Six drug, Seven drugs and more than seven drugs respectively. The results are shown in Table 2.

Table 2: Distribution Based on Number of Drug per Prescriptions

Number of drugs prescribed	Frequency	Percentage
Three drugs	19	20.7
Four drugs	8	8.7
Five drugs	4	4.4
Six drugs	20	21.8
Seven drugs	24	26
More than seven drugs	17	18.4

Distribution based on Medication Adherence

Out of 92 patients in the first visit 41 were low adherent to medications, 50 were medium adherent and 1 was found to be highly adherent. And in the follow up 1 was found to be low adherent, 64 were moderately adherent and 27 were highly adherent to their medication. The details are graphically illustrated in Table

Table 3: Distribution based on Medication Adherence

Adherence	First visit	%	2nd visit	%	P- value
High	1	1.1	27	29.4	0.000 (HS)
Medium	50	54.3	64	69.5	
Low	41	44.6	1	1.1	

Distribution of Drug Interactions

Out of 92 patients, 45 minor interactions, 33 moderate interactions and 5 major interactions were found. The details are graphically represented in Figure 1.

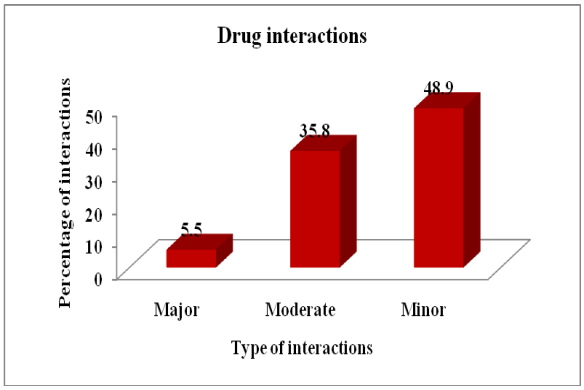

Fig 1: Distribution of Drug Interactions

Distribution of Macrovascular and Microvascular Complications

Out of 92 patients enrolled in the study, 41(44.5%) patients were found to be having Macrovascular complications whereas, 3(3.2%) were found to be having Microvascular complications. The results are shown in Table 4.

Table 4: Distribution of Macrovascular and Microvascular Complications

Complications	Frequency	Percentage
Macrovascular	41	44.5
Microvascular	3	3.2

DISCUSSION

Type-2 diabetes comprises multiple defects; therefore, choosing agents with

complementary mechanisms of action is another rational approach to enhancing outcomes. Although several therapeutic drug classes are available to aid clinicians in achieving glucose goals in type-2 diabetes, patients often have co morbidities that reduce the viable treatment options. Sixty percent of patients with diabetes have at least one co-morbidity, and approximately 40% have at least three. To add to this complexity, many patients require multiple agents for optimal disease management. [6]

Polypharmacy is unavoidable, given that multiple drug therapy has become the standard of care in most chronic conditions. Polypharmacy was observed in 81% of the patients which were prescribed with more than one diabetes related medicines including hypoglycemic agent and insulin. Most common related co morbidities were found to be hypertension, hyperlipidemia, and GI disorder, allergy, itching depression, and coagulopathies and delayed wound healing, each of which may require one or more drugs for adequate control. Thus the most commonly used therapy component used was both insulin and hypoglycemic agent. Despite the complexity of medical regimens, patients reported high level of compliance. [7]

The number of non-adherent patients with high fasting blood sugar levels increased as the number of drugs increased. [3]

In the present study a total of 92 diabetes patients were enrolled. Among 92 patients 40 were females and 52 were males. The male patients were more prone to develop diseases in age group between 51-60 as compared to the females. Similar study was conducted by Arifulla M *et al.,* on topic Patients' Adherence to Anti-Diabetic Medications in a Hospital at Ajman, UAE and the result obtained were a total of 132 patients participated in the study (69 males; 63 females). [4]

In this study Hypertension was the most common co-morbidity in diabetic patients. Similar study was done by Waheed S *et al.,* on topic Polypharmacy and Medication Compliance in Patients with Type 2 Diabetes and the results shows that most common related co morbidities were found to be hypertension, hyperlipidemia, and GI disorder, allergy, itching depression, and coagulopathies and delayed wound healing. [7]

In the first visit majority of patients were low adherent and after follow up it has been improved to moderate adherence. The counseling produced a significant improvement in the medication knowledge and medication adherence in this study. Khotkar K *et al.,* conducted a study on Assessment of Medication Adherence in Type 2 Diabetic Patients and the result shows that medication adherence was low in Type 2 Diabetic patients and better counseling was required for improving Medication Adherence.

In the current study, 38 interactions were noticed among which 5 were major drug interactions, 33 were moderate interactions in which insulin+phenytoin was predominant. A similar study was conducted by Ashok M *et al* but showed less concordance with the present study.

In the current study, macrovascular complications are higher compared to microvascular in which 41(44.5%) with macrovascular and 3(3.2%) with microvascular complications were observed. A similar study was conducted by McCullcoh DK *et al* shows that patient education can help in preventing complications in diabetes mellitus.

CONCLUSION

It can be concluded from the study findings that, Male patients and age group in between 51-60 are more diabetic patients. Hypertension was the most common co-morbidity in diabetic patients. The average numbers of drugs per prescriptions were seven.

The most commonly occurred drug interactions in the study were metformin with levofloxacin and insulin with phenytoin.

In the first visit majority of patients were low adherent and after follow up it has been improved to moderate adherence. The counseling produced a significant improvement in the medication knowledge and medication adherence. The study concludes adherence is very important aspect for optimal therapeutic outcome. The present study showed that the clinical pharmacist involvement in disease management has positive impact in creating awareness about the disease. The final result showed that the medication adherence was improved, while comparing the first visit to follow up. But still there is as need of continuous monitoring work to be carried out to reduce or to manage their disease quality of life in a constant manner.

ACKNOWLEDGEMENT(S)

I am highly indebted to my guide Mr. Abubaker Siddiq Asst. Professor, SJM college of pharmacy, Chitradurga, for their continuous support, motivation and guidance throughout the tenure of this work in spite of hectic schedule who truly remain driving spirit and their experience gave me light in this work and helped me in clarifying he abstruse concepts, requiring knowledge and perception, handling critical situations and understanding objective of this work. I am extremely thankful to Dr. Bharathi D R Professor SJM College of pharmacy for unwavering support, towards the accomplishment of the work.

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How to cite this article: Joseph AM, Siddiq A, Bharathi DR. Effect of polypharmacy on medication adherence in patients with type ii diabetes mellitus. International Journal of Science & Healthcare Research. 2018; 3(4): 274-278.

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