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Original Research Article

Adherence to treatment in type 2 diabetes mellitus patients receiving multiple drug therapy

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ABSTRACT

Background: objective of the study was to evaluate adherence to therapy and factors associated with non-adherence in type 2 diabetes mellitus patients on multiple drug therapy.
Methods: A prospective, cross-sectional, questionnaire based study conducted on 100 type 2 DM patients in a tertiary teaching hospital. They were interviewed using self-designed, semi-structured questionnaire to assess adherence to medication and diet/exercise schedule. Morisky medication adherence questionnaire was used to calculate overall adherence.
Results: 71%patients had some co-morbidity and were on multiple medications. Average daily modifications taken by patients was 4.1±2.23 (mean+SD). Only 47% patients were found adherent. Illiteracy (11%), Language (10%), complicated dosages (8%), adverse drug events (6%), heavy outpatient load (6%), psychological illness (6%), and financial (4%) were common reasons for non-adherence. Surprisingly, total number of medicines prescribed did not interfere with adherence.58% patients were aware of the importance of medication, diet and exercise but 42% patients were not aware of the consequences of non-adherence. 65% patients adhered to diet control and 43% patients followed exercise schedule.
Conclusions: 53% of type 2 DM patients on multi-drug therapy were not adhering to prescribed medication making it a major hurdle to its management. The most important cause of non adherence were not comprehending instructions due to various reasons like illiteracy, language issues, complicated schedules and less doctor-patient interaction due to heavy OPDs. Also 42% of the patients were not aware of the consequences of non adherence to therapy, diet and exercise. Hence, a multidimensional approach with adequate medication and emphasis on adherence to prescribed medication, diet and exercise schedule requires implemented. Health professionals can play a major role in improving adherence by increasing interaction with patients.

Keywords: Adherence, Morisky questionnaire, Polypharmacy, Type 2 diabetes

INTRODUCTION

Adherence is the extent to which a patient correctly follows medical advice.[1] Adherence is higher in acute illnesses and it has been estimated by World Health Organization that only 50% of people with chronic diseases are adherent to medication.[1,2] Type 2 diabetes patients are initially advised lifestyle changes followed by one or more oral anti-diabetic drugs and later may include injectable drugs.[3] Studies show that almost 45% of patients with type 2 diabetes do not achieve adequate glycemic control (HbA1c <7%) and poor medication compliance and adherence is a major contributor.[4] Diabetes being a lifestyle disease, most patients present with other co-morbidities and conditions like hypothyroidism, heart failure, osteoporosis certain cancers, cognitive impairment, dyslipidemias, fatty liver disease, fractures, hearing impairment, hypertension, low

testosterone levels in men, obesity, obstructive sleep apnoea and, periodontal disease.[5-7] Most patients are on multiple drugs from multiple sources leading to complicated dosing schedules and polypharmacy Excessive and inappropriate use of medicines or polypharmacy is recognized as a public health problem resulting in increased incidence of adverse drug reactions, potential duplication of therapy, decreased adherence to treatment, more complications and emergencies, hospitalization, additional medical or surgical intervention, decreased quality of life and increased healthcare costs.[8,9] Of these, adverse drug reactions and events are very common and are claimed to be fourth leading cause of death.[10]

The various causes of poor adherence to therapy in diabetes are complexity of treatment, negative social environment, the degree to which the patient's everyday life is affected, high cost of treatment, fear of adverse effects, lack of belief in the treatment and psychological problems, and variables such as age, medication knowledge and co morbidities.[11,12]

One of the greatest challenges in treatment of type 2 DM is ensuring that patients take oral anti-diabetic medications as prescribed. Rather than changing the drugs, increasing the dose or adding a new drug; improving the adherence to get the desired therapeutic goal should be explored.[1] Extensive adherence studies in chronic diseases are being carried out in developed countries but there is lack of data in this field in Indian setup. Therefore it was considered worthwhile to conduct such a study given the variable literacy and socioeconomic conditions relevant to the Indian scenario.

Objective of the study was To evaluate the adherence to therapy and study factors associated with non-adherence in patients of type 2 diabetes mellitus (DM) on multiple drug therapy. neurosurgeons.

METHODS

This was a prospective, cross-sectional questionnaire based study approved by the institutional ethics committee. It was conducted in the endocrinology outpatient clinic of a tertiary care teaching hospital.

Inclusion Criteria

The 100 ambulatory patients suffering from type 2 DM for at least six months of either gender, above 20 years of age and receiving more than one anti-diabetic agent were included in the study. Only informed volunteers were recruited in this study.

Exclusion Criteria

Patients below 20 years of age and having been diagnosed less than 6 months earlier to this study were not included. Patients being managed by a single drug for type 2 DM were also excluded from the study.

Patients meeting the inclusion criteria were briefed about the trial and written informed consent taken from the volunteers. The participants were interviewed with the help of a semi-structured, open-ended questionnaire specifically designed to elicit the following information: demographic characteristics, educational status, medication details including non-prescription drugs, adherence to medication, diet control, exercise, blood glucose monitoring, awareness about disease, long-term complications, importance of adherence to medication and other measures. The questionnaire was pre-tested in a pilot study of five patients and suitable modifications were done. The medical records available were also evaluated for verifying the patient's knowledge regarding their medication. Morisky's medication adherence questionnaire consisting of four questions was also given to the participants for assessing adherence to medication and the patients who answered in negative to all four questions were considered to be adherent to the prescribed treatment.[13] The patients were interviewed while they were waiting for doctor's consultation. The data obtained was compiled and analyzed.

Statistical analysis

Values are expressed as counts, means and percentages. The t test has been used to establish the correlation between the number of drugs being taken and the adherence to prescribed therapy.

RESULTS

Out of the 154 type 2 DM adult patients visiting the OPD during the course of this study, 22 were diagnosed less than 6 months prior, 4 were not on any medication being managed by diet and exercise alone and 9 did not give consent, hence they were not included in the study. Of the remaining 119, 19 were on a single anti-diabetic agent so theses were excluded too. 100 patients who finally met the inclusion criteria participated in the study, of which 64 were men and 36 women. Only 16% were illiterate (taken as not being able to read and write) and average age was 61.12±12.17 (mean±SD) years. Most patients were taking 2-3 (2.5±0.79 i.e. mean±SD) anti-diabetes medicines along with other medications. Demographic variants are depicted in Table 1.

Out of the 100 patients, 71 had some other co-morbidity along with type 2 D; 28 having a single co-morbidity and 43 having 2 or more other conditions.35 patients had hypertension, 20 had dyslipidemias, 16 had ischemic heart disease (IHD), 15 had osteoporosis, 10 were obese, 8 had cataract, 8 had hypothyroidism, 7 had cancer breast, 4 had parasthesias, 3 had tuberculosis and 1 had cancer colon (Figure 1).

Average number of medicines taken by each patient per day was 4.13±2.23 (mean±SD). The common anti-diabetic drugs being prescribed were metformin, glimeperide, and glyptins and 10 patients were on injectable preparations (Figure 2). The other drugs prescribed most frequently to these patients were statins, aspirin, angiotensin receptor blockers, angiotensin converting enzyme inhibitors, calcium and multivitamins. In some patients, beta blockers, calcium channel blockers, thyroxin, methylcobalamin, alprazolam were also being prescribed (Figure 3). The majority of patients responded that they consult a physician before taking any drug, but a considerable proportion of this population self-medicated taking advice of other patients and family. They would use leftover drugs, over the counter drugs and in some cases used alternative therapies like ayurvedic& bitter guard juice.

Table 1: Demographic variants.

Variable	Category	Frequency (n= 100)
Age	21-30	02 (2%)
	31-40	07(7%)
	41-50	13 (13%)
	51-60	15 (15%)
	61-70	48 (48%)
	71-80	11 (11%)
	81-90	04 (4%)
Gender	Male	64 (64%)
	Female	36 (36%)
Education status	Illiterate	16 (16%)
	School	47 (47%)
	Graduate	23 (23%)
	Post graduate	14 (14%)

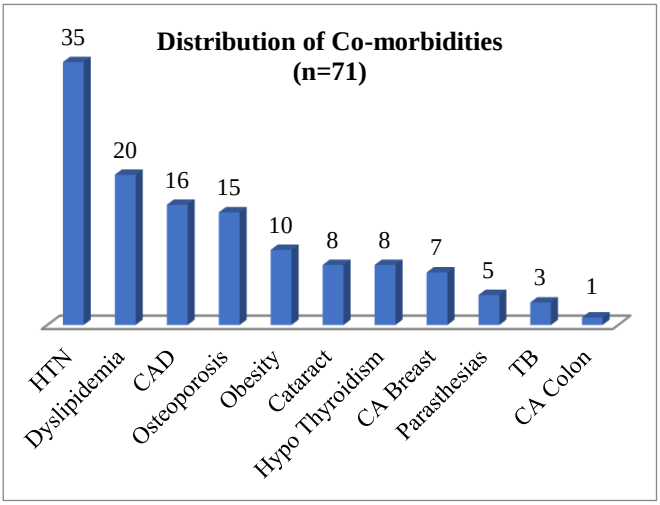

Figure 1: Percentage of patients with other co-morbidities.

As per the Morisky's instrument only 47% of the study participants were adherent to the prescribed medication (i.e. the patients who answered all the four questions in negative) with 53% being non-adherent. The importance of diet control and exercise was known to58% patients, but only 65% patients adhered to diet control and 43% patients followed exercise schedule. 42% patients, though knew that being adherent to therapy diet and exercise was important but were not aware of the consequences of non-adherence to medication and lifestyle modifications. 29% of the patients did not adhere to the therapy as they could not understand the schedules due to illiteracy, language issues or the treatments being too complicated. Of these, 11 patients did not know the medicines being taken and others were not aware of the dose and frequency of administration. 5 patients had severe adverse effect and had totally stopped most medications. Heavy outpatient load leading to poor doctor patient communication, psychological illness and nonspecific reasons were the other causes of non adherence (Figure 4). Heavy outpatient load leading to poor doctor patient communication, psychological illness and nonspecific reasons were the other causes of non adherence.

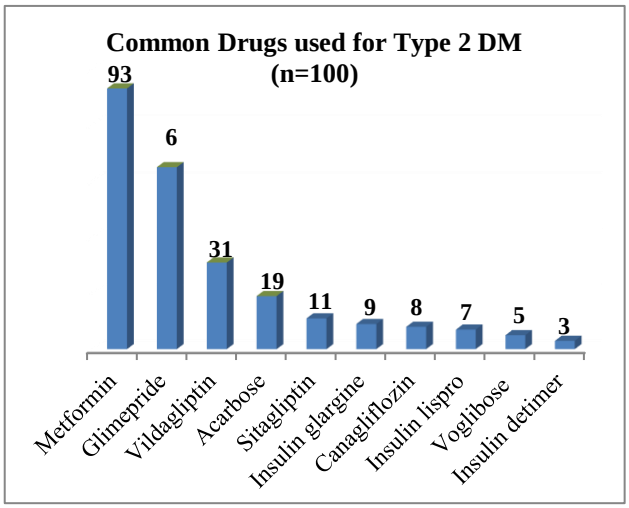

Figure 2: Common anti-diabetic drugs used.

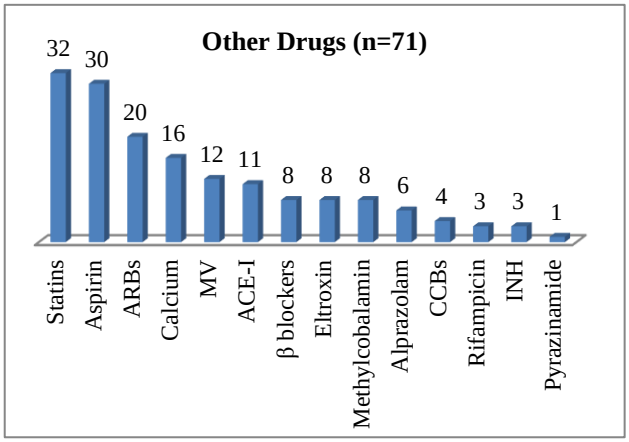

Figure 3: Drugs being used for other co-morbidities.

This study showed that the total number of medicines prescribed did not interfere with medication adherence. Though adherence was best in the group taking 2 to 5 medications there was no statistically significant

difference between the group on 2 drugs and those on 6 or more drugs. (z score = –0.3531 with p value= 0.72634) (Table 3).

Table 2: Morisky's instrument Results.

Morisky's instrument	No of patients who answered 'No' (n=100)
1. Did you ever forget to take your medication?	57 (57%)
2. Were you careless at times about taking your medication?	65 (65%)
3. When you felt better, did you sometimes stop taking your medication?	74 (74%)
4. Sometimes, if you felt worse when you took your medicine did you stop taking it?	69 (69%)

The patients who said 'No' to all four questions were considered adherent

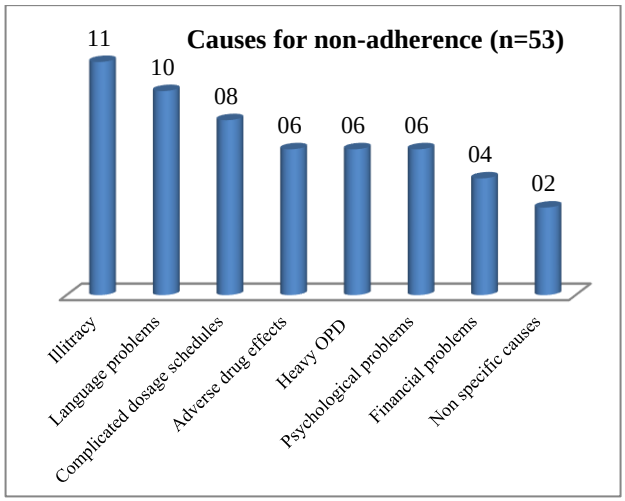

Figure 4: Common causes of non adherence.

Table 3: Relation of no of drugs to adherence.

No of drugs	Total no of patients	No of patients adherent to prescribed medication	Percentage adherent
2	33	13	39%
2-5	35	21	60%
>6	32	13	40%

DISCUSSION

Most diabetic patients were multiple drug therapy (2-3 anti-diabetic drugs). Most patients (71%) were suffering from other co-morbidities and were on multiple other drugs. The common co-morbidities were hypertension, dyslipidemia, coronary artery disease, osteoporosis, obesity, cataract, hypothyroidism, parasthesias, tuberculosis and certain cancers. Many patients (43%) were suffering from multiple co-morbidities. This observation was similar to other studies been done earlier on the morbidity pattern in diabetic patients.5-7 Common drugs being prescribed for other illnesses were statins, aspirin, angiotensin receptor blockers, angiotensin converting enzyme inhibitors, calcium and multivitamins. Others like beta blockers, calcium channel blockers, thyroxin, methylcobalamin, alprazolam were the also being prescribed.

Poor patient adherence to the medications was a problem in almost 53% of the patients in this study. Not comprehending the doctor's advice due to illiteracy, language problems, complicated dosage schedule, heavy outpatient load leading to poor doctor patient communication was the main cause. Other reasons were psychological illness, financial problems, and nonspecific reasons were the common reasons for non-adherence to therapy. Surprisingly total number of medicines prescribed did not interfere with medication adherence as has been shown by other studies though there are some studies that show that no of drugs does not reduce adherence to therapy.[8,9,14,15] Though the adherence was better in the group taking 3-5 drugs, there was no statistically significant difference taking 2 drugs and those taking more than 6 drugs suggesting that number of drugs may not be a contributing factor in non-adherence. Prior studies also show that adherence is just about 50%.in patients with chronic illnesses.[2]

Only 5% of the patients had suffered from some kind of adverse drug reaction, most of which had been harmless in this study. This is in agreement with other outpatient studies, though not with hospital studies where the adverse effects are generally more serious.[16] An increased risk of adverse effects with the number of drugs used simultaneously, as reported in other studies, was not confirmed in our study.[16]

CONCLUSION

Patients with Type-2 DM tend to have other chronic conditions and diseases as co-morbidities. Furthermore, these patients tend to be on multiple drugs and complicated schedules, and this poses a challenge to adherence. Our study showed a low adherence of only 47%. The main causes of non-adherence were not being able to correctly comprehend the instructions of the doctor due to various reasons like illiteracy, language issues, complicated schedules and less doctor patient interaction due to heavy OPDs. Perhaps surprisingly, the number of medicines the patient was on did not seem to influence adherence. 42% of the patients were not aware of the consequences of non adherence to therapy, diet and exercise. Hence, a multipronged approach with adequate medication and emphasis on adherence to prescribed medication, diet and exercise schedule needs to be implemented. Health professionals can play a major role

in improving adherence to therapy by increasing interaction with patients.

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