Factors Influencing Oral Anti-Diabetic Medication Adherence among Type 2 Diabetes- Southern India

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ABSTRACT

Background: Medication adherence is a major challenge in treatment of type 2 diabetes. Hence the present study was undertaken to assess the factors influencing drug adherence in Type 2 diabetes Bengaluru.

Methods: A descriptive study was conducted in urban health training centre Bengaluru for a period of 9 months. A total of 70 type 2 Diabetes patients only on oral drugs willing to give informed consent were included. Institutional Ethical Committee clearance was obtained and pre-tested semi structured proforma was administered and the probable factors that affect adherence was included. Data was entered in Microsoft excel and analyzed in SPSS-21. Descriptive statistics and inferential statistics like Binary logistic regression was used to assess the factors influencing drugs.

Results: Around 92.8% consumed ≤2 drugs and consumed single or combination of drugs. Most common anti-diabetic drug consumed was Biguanides in 64(91.4%). Good adherence (0-2 score) to oral anti-diabetic drugs was observed in 43 (61%) study subjects the factor significantly associated with poor adherence in Binary Logistic Regression Model is sometimes forgetting to consume the medication.

Conclusion: The factors that influenced oral anti-diabetic drugs good adherence is consuming the medications without forgetting. Efforts are needed to improve adherence and self-management techniques to prevent complications.

Keywords: Diabetes mellitus, Type 2, medication adherence, factors, oral anti-diabetic, Urban area

INTRODUCTION

Diabetes Mellitus is a major public health concern globally, especially the number of adults living with type 2 diabetes rose from 108 million in 1980 to 422 million in 2014.[1] India contributed to 77 million diabetics in 2019 in the adult group between 20-79 years and is projected to be 101 million by 2030.[2] An integrated multi-sectoral, population-based approaches are the need of the hour to reduce the prevalence of modifiable diabetes risk factors.[1]

Adherence to medication forms one of the important aspects for preventing the complications of diabetes.[3,4] Oral anti-diabetic drugs are the major treatment for Type 2 Diabetes Mellitus patients for the control of blood sugar levels. These agents lead to a decrease in micro-vascular complications, such as nephropathy and retinopathy. Self- reporting of patients can be a simply and effectively measure to adherence. Inadequate self-management of drug therapy increases the burden of diabetes. To improve patient adherence, it is important to understand why non-adherence occurs and take the necessary measures to prevent it.[5-7]

There are numerous factors which affect treatment adherence and there is no consensus on which has the greatest impact. Patient adherence to drug ther-

apy can be divided into four groups of factors: patient-related; related to patient-provider relationship, therapeutic regimen, and the disease itself. A complex variety of determinants clearly plays a role in patient adherence to the therapeutic regimen and contributes to non-adherence of those with chronic conditions like diabetes.[6-8] Hence the present study was undertaken to assess medication adherence and the factors influencing medication adherence in type 2 diabetes mellitus.

MATERIALS AND METHODS

The descriptive study was conducted in the urban health training centre, of a medical college, Bengaluru. The study subjects who visited the urban health training centre for follow-up visits were recruited for the period of 2 months and it was 70. It was a purposive sampling method. The centre mainly catered to the slum population. Institutional Ethical Committee Clearance was obtained. All adult Type 2 Diabetes Mellitus patients only on oral anti-diabetic medications for ≥6 months were included in the study. A pilot study was conducted for the validation of the proforma. After explaining the purpose of the study, informed written consent was obtained. A pre-tested semi structured proforma was administered by interview method for assessing oral anti-diabetic drug adherence. It included 8 questions and total score obtained ranged from 0–8, 0-2 score is considered good adherence, 3-8 score as poor adherence.[9]

Factors influencing drug adherence included duration of diabetes, number of prescribed drugs, adverse drug reactions, affordability to prescribed drugs, last health education session, understanding the drug regime, forgetting taking drugs changing of medication by the physician and family support. Random blood sugar reading was done using glucometer to all the study subjects.

Current morbidity status among of study subjects was assessed by clinical history, general physical, systemic examination, records of investigation done, and treatment given. The anthropometric measurements like height and weight, of study subjects were performed using standard procedures. The Data was entered in Microsoft excel and analyzed using SPSS-21 version. Descriptive statistics such as percentages, mean, standard deviation was computed. Binary logistic regression to assess the factors influencing oral anti-diabetic drugs.

RESULTS

According to Asia Pacific Guidelines, most of the study subjects belonged to Obese 31(44.2%). The overall Mean ± SD of BMI was 24.21±2.22 kg/m². Majority of the study subjects i.e., 45(64.3%) random blood sugar level was not under control RBS ≥200 mg/dl. Family history of diabetes was found in 32(45.7%) of study subjects.

Table 1: Distribution of study subjects according to epidemiological and treatment regimen (n=70)

Variables	Cases (%)
BMI	
Normal (18-22.9)	19 (27.2)
Overweight (23-24.9)	20 (28.6)
Obese (>25)	31 (44.2)
Duration (years) of Diabetes	
<1	11 (15.71)
1-5	32 (45.72)
5-10	18 (25.72)
>10	9 (12.85)
Family history of diabetes	
Present	32 (45.7)
Absent	38 (54.3)
Co-morbidities	
Present	35 (50)
Absent	35 (50)
Type of oral anti-diabetic drug*	
Sulphonylureas	56 (80)
Biguanides	64 (91.4)
Alpha- glucosidase inhibitors	4 (5.7)
Thiozolidinediones	10 (14.3)
Random Blood sugar(mg/dl)	
<200	25 (35.7)
≥200	45 (64.3)

Table 2: Factors influencing drug adherence among study subjects

Variable	Adherence	
	Good (n=43) (%)	Poor (n=27) (%)
Sometimes forgot to consume medication		
Yes	9(20.9)	21(77.8)
No	34(79.1)	06(22.2)
Stopped medication because they felt worse		
Yes	01(2.3)	04 (14.8)
No	42(97.7)	23(85.2)
Suffering from other comorbidities		
Yes	18(41.9)	17(63.0)
No	25(58.1)	10(37.0)
Cost of medication		
≤500 INR	20(46.5)	21(77.7)
>500 INR	23(53.5)	06(22.3)
Change of medication by the physician		
Yes	18(41.9)	17(63.0)
No	25(58.1)	10(37.0)
Experienced Side effects due to medication		
Yes	18(41.9)	10(37.0)
No	25(58.1)	17(63.0)
Support from family in consuming medications		
Yes	32(74.4)	18(66.6)
No	11(25.6)	09(33.4)
Health education session on diabetes and treatment		
Yes	39(90.7)	24(88.9)
No	04(9.3)	03(11.1)
Difficulty in getting the prescribed medication		
Yes	10(23.2)	06(22.2)
No	33(76.8)	21(77.8)
Busy due to work to get the prescribed medication		
Yes	13(30.2)	08(29.6)
No	30(69.8)	19(70.4)
Unpleasant taste of the medication		
Yes	16(37.2)	11(40.7)
No	27(62.8)	16(59.3)

Table 3: Association between factors influencing drug adherence by Binary Logistic Regression#

Variables in the Equation	B*	SE (B)	Wald	df	P value	Odds ratio (aOR)	95% C.I. for OR	
							Lower	Upper
Step 1ᵃ								
Sometimes forget (1)	2.8	0.73	14.793	1	<0.001	16.51	3.956	68.938
Stopped medication (1)	21.44	14526.27	2.17 x E^{-06}	1	0.999	2.05E+09	0	
Suffering from other comorbidities (1)	1.28	0.78	2.732	1	0.098	3.61	0.788	16.554
Cost of medication (1)	1.22	1.04	1.375	1	0.241	3.37	0.442	25.716
Change of medication (1)	0.29	0.74	0.163	1	0.686	1.35	0.318	5.701
Constant	-22.95	14526.27	2.49 x E^{-06}	1	0.999	1.08 x E^{-10}		
Step 5ᵃ								
Sometimes forget (1)	3.22	0.67	23.267	1	<0.001	25.16	6.784	93.277
Constant	-1.06	0.41	6.62	1	0.01	0.35		

a. Variable(s) entered on step 1 were Sometimes forgot to take the medication, stopped medication because they felt worse, suffering from other comorbidities, Cost of medication ≤500, Change of medication by the physician; *B – Coefficient constant; SE= Standard Error

In the present study 35 (50%) subjects with Type 2 Diabetes Mellitus had co-morbidities. The most common co-morbidity present in study subjects was Hypertension 33 (94.2%), followed by Asthama 1 (2.9%) and Thyroid 1 (2.9%).

Present study showed that 43 (61%) individuals with Type 2 diabetes had good adherence (0-2 score) to oral anti-diabetic drugs and remaining 27 (38%) had poor adherence (3-8 score).

Binary logistic regression

To assess the factors associated with drug adherence, to oral anti-diabetic medication among Type 2 diabetic subjects, the factors like sometimes forgot to take the medication, stopped the medication because they felt worse, suffering from other co-morbidities, cost of medication, change of medication were included into the Binary Logistic Regression Model. The other factors collected during the data collection were not significant in the chi-square test, so they were not included in the Binary Logistic Regression Model.

The method used is backward- Wald, which initially includes all the factors gradually in a step wise calculation, removes those factors which are not contributing much towards assessing the risk associated with the outcome of the study.

In this study it was intended to assess the factors influencing on poor adherence as an outcome variable. Therefore, good adherence was coded 0 and poor adherence was coded as 1 in the dependant variable. The other factors listed earlier which were basically categorical were coded as 0, 1 with 0 as a reference value. In the step 1, all the 5 variables are in the model with sometimes forgot to take the medication with an Odd's Ratio of 16.51. The factor like stopped medication because they felt worse, had a very high Odd's Ratio of 2052151441, while factor like suffering from other co-morbidities had 3.61, cost of medication ≥500 had Odds Ratio of 3.72, change of medication by the physician with an Odd's Ratio of 1.35.

However, in the final model after Step 5, the factor, only sometimes forgot to take the medication, remained in the model, with an Odds Ratio of 25.16 with a 95% CI of 6.782 to 93.28. This shows that study subjects who sometimes forgot have 25.16 times more chances of poor adherence.

DISCUSSION

Medication adherence is a key component of self-management for patients with diabetes. Adherence to prescribed medications is of paramount importance. It contributes to strong correlations between medication adherence, patient outcomes, and treatment costs. Omission of medication doses is the most common type of non-adherence. This may be intentional or unintentional.

The present study revealed 64.3% of study subjects random blood sugar level was not under control RBS ≥200 mg/dl. In a study by Shrestha SS et al. 50.50% patients had uncontrolled FBG (>130 mg/dl) level and 39% had uncontrolled HbA1c (≥7%) level. This may be due to different parameters used to measure blood sugar levels.[4]

Regarding family history of diabetes, 45.7% of study subjects reported positive family history. In Pal R et al 23.3% reported family history of diabetes.[10]

In the current study co- morbidities were reported in 50% of study subjects. The most common co-morbidity was hypertension accounting to 94.2% of the total co-morbidities. A study done by Medi et al., where hypertension was reported in 71.42%.[11] This difference can be attributed to cross sectional study design.

Majority of study subjects had Type II Diabetes Mellitus for 1-5 years 45.72% followed by 5-10 years 25.72%. It was similar to the study by Kasznicki J et al. where diabetes ≤5years accounted 39.5% and >5 years 60.5%.[12]

Regarding consumption of drugs 92.8% consumed ≤2 drugs and 7.2% >2 drugs. Similarly, Sweileh et al study, reported an average of 1.8 ± 0.7 anti- diabetic medications and 4.3 ± 2.1 (median = 5; Q1-Q3: 4 – 7) different medications taken on daily basis. 41.5% reported taking ≥5 medications on a regular basis.[13]

In the present study biguanides were consumed in 91.4%, sulphonylureas in 80%, thiozolidinediones in 14.3% and alpha- glucosidase inhibitors 5.7%. It was similar to the observations of Wabe et al study where biguanides and sulfonylureas were most frequently used.[14] Monotherapy was observed in 46% of patients, whereas 48% used 2 medication classes in Sweileh et al study.[9] In Wabe et al. study about 88.9% patients on oral hypoglycaemic agent were on mono therapy 11.1% where on combination therapy.[14] In contrast in the present study 31.4% were on monotherapy and 68.6% were on combination therapy.

In the present study 43 (61%) individuals with Type 2 diabetes had good adherence (0-2 score) to oral anti-diabetic drugs and remaining 27 (38%) had poor adherence (3-8 score). Study conducted by Anurupa et al showed 45% high adherence, 18% poor adherence.[15]

Tiv M et al revealed 39% good adherence, 49% medium adherence and 12% poor adherence.[3] In a study conducted by Arulmozhi S. et al 49.3% showed high adherence, 24.7% medium adherence and 26% low adherence.[16] Gimenes HT et al. 78.3% were adherent and 21.7% were non-adherent to drug therapy.[17] Suhana Banu et al. 67.8% were adherent while 32.2% were not adherent. The most common reason for missing medications constituting 30% comes under the category 'Others', which includes lack of motivation, forgetfulness, tiredness, alternative medications, too many medications, long duration of treatment, neglects due to drinking, sugar control by diet.[18]

The present study subjects had better medication adherence. This could be explained by increasing awareness among the population about Diabetes mellitus and its complication over the years. Difference in the adherence could be usage of different methods for evaluation of medication adherence.

In the present study Some-times forgot have 25.16 times more chances of poor adherence, it was similar to the study conducted by Lawton et al. who found that non-adherence was related more towards patient forgetfulness than to specific concerns about medications or interaction with physicians.[19] In a study by Koprulu et al patient-related factors such as forgetfulness (OR= 0.29, CI = 0.13 - 0.61) was significant with non-adherence.[20]

Study by Arulmozhi S. et al poor family support were 2.4 times (95% CI: 1.2 to 4.6) more likely to have low adherence.[16] Similarly, a study done in rural south India reported that lack of family cooperation was one of the reasons for non- adherence.[12] In a study by Jacek Kasznicki et al. the most important factors affecting patient adherence with drug therapy included: patient knowledge about the treatment of diabetes (P= 0.005; OR, 13.89), insulin therapy (P =0.027; OR, 0.26) and other people's support (P = 0.010; OR, 0.14).[12]

CONCLUSION

Good adherence to oral anti-diabetic drugs was found to be 61%. The factors that influenced oral anti-diabetic drugs good adherence is consuming the medications without forgetting. Hence health education regarding diabetes and importance of drug adherence should be given to encourage people to consume oral anti-diabetic drugs as prescribed by the physician.

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