Original Research Article

A study to assess the treatment adherence among patients with type 2 diabetes mellitus in rural and urban population of Bengaluru, South India

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ABSTRACT

Background: Globally, around 425 million adults are victims of diabetes with increased prevalence being noted in low and middle income countries. Diabetes was seventh leading cause of death leading to 1.6 million deaths in 2016 (WHO report). Management of diabetes is multifaceted which includes diet, physical activity, screening for complications and medications. Adherence to pharmacotherapy plays an important role in glycemic control. Hence, this study was done to assess the magnitude of treatment adherence and its associated factors among type 2 diabetics.
Methods: A community based study was done on patients with type 2 DM in the rural and urban population of Bengaluru. A simple random sampling technique was followed. Medication adherence was assessed using 8 item Morisky's treatment adherence scale.
Results: A total of 250 subjects were interviewed, among them 59% were male and 41% were female. The mean age of the subjects was 60.93±10.1 years. The mean treatment adherence scores was 25.9±3.1 years. Among the 250 diabetics, 62% were adherent and 38% were non adherent to anti diabetic medications. Forgetfulness to take medications was one of the reasons for non-adherence with mean scores of 3.12+0.6.Being illiterate, labourers, aged above 60 years, obesity, frequency and multiple dosage was found to be significant factors for non-adherence (p<0.05).
Conclusions: Adherence to anti diabetic drugs was found to be 62%. Increased age, illiteracy, occupation, BMI, frequency and multiple doses of drugs were significant factors responsible for medication non adherence. There is a need for reinforcement of health education and motivation for diabetics to improve their medication adherence.

Keywords: Medication adherence, Rural and urban population, Type 2 diabetes

INTRODUCTION

Diabetes mellitus is no longer a disease of predominantly rich community, the prevalence of diabetes is increasing everywhere. According to the WHO factsheet, the number of people with diabetes has been risen from 108 million in 1980 to 422 million in 2014 and was the seventh leading cause of death leading to 1.6 million deaths in 2016.[1] Almost half of all deaths attributable to high blood glucose occur before the age of 70 years. The disease not only affects individuals' health but also imposes a large economic burden on global health care system and the wider global economy. Hence prevention and appropriate management are the two important factors in reducing the associated mortality and morbidity and one such key factor is self-management through treatment adherence.[2]

Adherence to medications as used in chronic disorder is defined as proportion of medication prescribed by the health care provider actually taken by the patient during specified period of time.[2] Adherence to diabetic medications is associated with better control of intermediate risk factors, lower odds of hospitalization, lower health care costs and lower mortality. Despite the benefits of therapy studies have shown that recommended glycemic levels are achieved in less than 50% of patients, which may be associated with decreased adherence to therapies. Lack of knowledge about prescribed medicine or side-effects of the medicine, lack of assistance, treatment complexity and forgetfulness could be the reasons for poor adherence.[3] Medication non adherence is one of the public health challenge among the diabetics which has led to poor health outcomes, lower quality of life and increased health care costs.[4]

Hence this study was undertaken to assess the treatment adherence and associated factors for non-adherence among patients with type 2 diabetes mellitus patients residing in rural and urban population of Bengaluru.

METHODS

The present study was a community based cross sectional study conducted over a period of 3 months from July-September 2018 in rural and urban field practice areas of Kanasawadi and Mallasandra which are attached to department of Community Medicine of a medical college, Bengaluru. Type 2 diabetic subjects of either gender aged 30 years and above on anti-diabetic medication for more than six months and who were permanent residents were included and those individuals with type I diabetes mellitus, gestational diabetes and with psychiatric disorders were excluded from the study.

Based on treatment adherence rate of 16.6% from an earlier study conducted by Sharma et al estimated sample size was 222, taking 10% as a non-respondents, the desired minimum sample size came upto 244 which was approximated to 250.[5] A complete list of households in both the areas was obtained from the health care workers. Households with diabetic subjects aged 30 years and above were interviewed by using simple random sampling technique. As per the International diabetes Federation report, every 1 in 6 adults are diabetic in India[6].

The first household with diabetic in the current study was selected randomly; then 50% (n=125) of our study subjects were selected from rural (Kanasawadi) and remaining half from urban population (Mallasandra). If more than one person matching the inclusion criteria was present in the house, one person in the higher age group or one with the long duration of disease status was considered for the study. If the house was found to be locked or if there were any non-respondents or non diabetics; then the next house matching the inclusion

criteria were selected randomly until the desired sample size was achieved.

A pilot study was done initially among 30 diabetics to check for the feasibility of study tool. A written informed consent was taken from selected subjects who were then interviewed by using a pretested questionnaire. Their participation was voluntary and anonymous. Study tool contained information about their socio-demographic profile, Morisky's treatment adherence scale and factors associated with non adherence.[7]

Operational definition

Adherence to anti diabetic medication: the extent to which a person's behaviour in taking anti diabetic medication corresponds with agreed recommendations from a health care provider.[8] Those patients who scored >26 was considered as adherent and those who scored <25.9 from the 8 item Morisky's treatment adherence scale was considered as non adherent in the current study.

Statistical analysis

The data was entered in Microsoft excel and analysed using SPSS version 20.0. The collected information was presented using descriptive statistics such as frequency, mean, percentages of qualitative data. The inferential statistics was done by chi-square test. Independent sample "t" test was done to compare the differences in mean treatment adherence scores of rural and urban population. A p value of <0.05 was considered to be as significant. The study was approved by Institutional Ethics Committee, SIMS and RC, Bengaluru.

RESULTS

A total of 250 subjects were involved in the study, among them 59% were male and 41% were female respectively. The mean age of the subjects was 60.93±10.1 years and among them half were aged above 60 years. Among the 250 subjects, majority of them, 78.4% were married, 92.8% were Hindu by religion, 34% were illiterate, 27.2% were involved in semi-skilled occupation and 21.2% were found to be unemployed. Nearly half of them, 40.8% belonged to class III socioeconomic status. Table 1 describes the socio demographic characteristics of the subjects.

The mean treatment adherence scores of the subjects was 25.9±3.1 years. Among the 250 subjects, 62% were adherent and 38% were non adherent to anti diabetic medications and non adherence rate was comparatively more in rural population- Kanasawadi (60%) with mean scores of 25.1 than urban population-Mallasandra (40%) with mean scores of 26.7 (p<0.001); Table 2. Forgetting to take medications was found to be one of the reason responsible for poor adherence with mean scores of 3.12 (Table 3).

Table 1: Sociodemographic characteristics of study participants.

Socio demographic variables	Frequency N (250)	Percentage N (100%)
Sex		
Male	147	59
Female	103	41
Age group (years)		
30-40	9	3.6
41-50	29	11.6
51-60	86	34.4
>61	126	50.4
Mean age±SD (years)	60.93 years±10.1	
Marital status		
Unmarried	2	0.8
Married	196	78.4
Widow/widower	50	20
Divorced/separated	2	0.8
Religion		
Hindu	232	92.8
Muslims	15	6
Christians	3	1.2
Educational status		
Illiterate	85	34
Primary to middle school	40	16
High school	63	25.2
Higher secondary (PUC)	45	18
Graduate	17	6.8
Occupation		
Skilled	16	6.4
Semi-skilled	68	27.2
Laborer	59	23.6
Homemaker	54	21.6
Unemployed	53	21.2
Socio economic status (Modified B. G. Prasad classification)		
Class I	37	14.8
Class II	35	14
Class III	102	40.8
Class IV	60	24
Class V	16	6.4

Table 2: Independent sample 't' test for comparison of treatment adherence scores: rural versus urban population.

Locality	N	Mean score	Std. deviation	t value	P value
Kanasawadi (Rural)	125	25.16	2.963	-4.076	<0.001
Mallasandra (Urban)	125	26.73	3.117		

Among the socio demographic factors non adherence was seen more among illiterates, labourers and individuals aged 60 years and above (p<0.05). Factors like obesity, those on more than two pills per day, frequency of medication showed a significant association with non adherence among the diabetics (p<0.05). Table 4 and Table 5 determine the factors associated with treatment non adherence using inferential statistics. Multivariate logistic regression with odds ratio at 95% of CI was performed after adjusting for other variables; which showed that subjects from semiskilled occupation were 5.69 times more adherent to anti diabetic medication than compared with others (p<0.05) (Table 6).

Table 3: Morisky's eight-item treatment adherence scale.

Morisky's treatment adherence scale	Mean scores±SD
1. Do you sometimes forget to take your anti diabetic medications	3.12±0.66
2. How often do you decide to not to take your routine medications?	3.26±0.56
3. How often do you miss taking your medicine because you feel better?	3.34±0.57
4. How often do you decide to take less of your medication dosage?	3.32±0.53
5. How often do you stop taking your daily medications because you feel sick due to the side effects of medicines?	3.34±0.57
6. How often do you forget to bring along your medicine when you travel away from home?	3.12±0.63
7. How often do you not take your medications because you run out of it at home?	3.18±0.61
8. How often do you have difficulty in remembering to take all your medicines?	3.27±0.54

DISCUSSION

The current study showed a mean treatment adherence scores of 25.9±3.1 among the study subjects in which, 62% were adherent and 38% were non adherent to anti diabetic medications. The findings were comparable to study done by Rwegerera et al where 58.2% were adherent and 41.8% were non adherent to anti diabetic medication.[9] Non adherence was seen to be associated with illiteracy in the present study (p<0.05) which reflected the findings of Jemal et al where nearly 70% of diabetics who were non adherent to their medications were found to be illiterates.[10] Kavitha et al in their study conducted in tertiary care hospital of Hassan and Venkatesan et al in his study conducted in rural Tamil Nadu also reflected illiteracy associated with non adherence.[3,11] Lack of awareness and knowledge about the disease could be one of factors for non-adherence. Subjects aged above 60 years showed poor treatment adherence in the current study which reflected the findings of Aminde et al where subjects aged above 60 years was a significant factor associated with poor treatment adherence.[12]

Table 4: Socio demographic factors associated with treatment non adherence among the diabetics.

Socio demographic factors	Non adherent (n=95)	Adherent (n=155)	Total 250 (100%)	Chi square P value
	N (%)	N (%)		
Age group (years)				
30-40	1 (1.1)	8 (5.2)	9 (3.6)	
41-50	10 (10.5)	19 (12.3)	29 (11.6)	0.036
51-60	26 (27.4)	60 (38.7)	86 (34.4)	
>61	58 (61)	68 (43.9)	126 (50.4)	
Gender				
Male	51 (53.7)	96 (61.9)	147 (58.8)	0.198
Female	44 (46.3)	59 (38.1)	103 (41.2)	
Literacy status				
Illiterate	40 (42.1)	45 (29)	85 (34)	
Primary to middle school	19 (20)	21 (13.5)	40 (16)	
High school	19 (20)	44 (28.4)	63 (25.2)	0.040
Higher secondary (PUC)	14 (14.7)	31 (20)	45 (18)	
Graduate	3 (3.2)	14 (9)	17 (68)	
Occupation				
Skilled	2 (2.1)	14 (9)	16 (6.4)	
Semi skilled	12 (12.6)	56 (36.1)	68 (27.2)	
Laborer	30 (31.6)	29 (18.7)	59 (23.6)	<0.001
Homemaker	25 (26.3)	29 (18.7)	54 (21.6)	
Unemployed	26 (27.4)	27 (17.4)	53 (21.2)	
Socio economic status				
Class I	11 (11.6)	26 (16.8)	37 (14.8)	
Class II	17 (17.9)	18 (11.6)	35 (14)	
Class III	41 (43.2)	61 (39.4)	102 (40.8)	0.113
Class IV	24 (25.3)	36 (23.2)	60 (24)	
Class V	2 (2.1)	14 (9)	16 (6.4)	

Note: Figures in parenthesis indicate percentage of column total

Table 5: Association between selected clinical characteristics and treatment non adherence among diabetics.

Clinical characteristics	Non adherent (n=95)	Adherent (n=155)	Total 250 (100%)	Chi square P value
	N (%)	N (%)		
BMI				
Normal	15 (15.8)	36 (23.2)	51 (20.4)	
Overweight	29 (30.5)	27 (17.4)	56 (22.4)	0.040
Obese	51 (53.7)	92 (59.4)	143 (57.2)	
Co morbidities				
Present	46 (48.4)	72 (46.5)	118 (47.2)	0.762
Absent	49 (51.6)	83 (53.5)	132 (52.8)	
Duration of disease				
<5 years	43 (45.3)	77 (49.7)	120 (48)	
5-10 years	45 (47.4)	69 (44.5)	114 (45.6)	0.737
11-19 years	5 (5.3)	8 (5.2)	13 (5.2)	
>20 years	2 (2.1)	1 (0.6)	3 (1.2)	
Number of pills taken per day				
One	36 (37.9)	93 (60)	129 (51.6)	
Two	55 (57.9)	57 (36.8)	112 (44.8)	<0.001
Three	1 (1.1)	5 (3.2)	6 (2.4)	
More than three	3 (3.2)	-	3 (1.2)	
Pattern of medication				
Monotherapy	36 (37.9)	71 (45.8)	107 (42.8)	
Combined OHA	56 (58.9)	72 (46.5)	128 (51.2)	0.094
Combined OHA+insulin	3 (3.2)	12 (7.7)	15 (6)	

Clinical characteristics	Non adherent (n=95)	Adherent (n=155)	Total	Chi square
	N (%)	N (%)	250 (100%)	P value
Frequency of daily dosage				
Once	36 (37.9)	86 (55.5)	122 (48.8)	
Twice	59 (57.9)	67 (43.2)	122 (48.8)	0.013
Thrice daily or more	4 (4.2)	2 (1.3)	6 (2.4)	

Note: Figures in parenthesis indicate percentage of column total.

Table 6: Binary logistic regression output showing factor associated with treatment adherence.

Occupation	Adjusted OR (95%CI)	P value	95% CI
Skilled	3.60	0.002	0.58-22.2
Semi skilled	5.69	0.166	2.00-16.1
Laborer	0.98	0.001	0.43-2.26
Homemaker	1.04	0.978	0.44-2.47
Unemployed	1 (ref)	0.918	

Non adherence was comparatively more in rural population- Kanasawadi being 60% with mean scores of 25.1 than urban population-Mallasandra, 40% with mean scores of 26.7. The findings was similar to study by Abate et al where 57% of diabetics living in rural area showed 2.35 times more likely to be non adherent than compared with 43% in urban population.[13] Accessibility to transportation and availability of drugs could be one of the factors for non adherence among the rural community in the current study. Forgetting to take medications was found to be one of reasons for non adherence in the current study which reflected the results of Jemel et al in Eastern Ethiopia.[10] Similarly, subjects who were employed had a better treatment adherence in the current study whereas a contrasting findings was seen in study done by Kavitha et al where being employed showed a poor treatment adherence.[3] This difference compared to our study could be due to better health seeking behaviour among the subjects who were employed. BMI was found to be a significant factor associated with medication adherence in the current study which reflected the findings of study done by Hashimoto et al where BMI was a significant predictor for medication adherence among the diabetics.[14] Multiple drugs and frequent dosing was a significant factor for non adherence in the current study. Sharma et al in their study reflected similar findings where multiple doses and frequency contributed to non adherence[5].Forgetfulness among the subjects could have attributed for missing the doses leading to poor adherence in our study.

A limited sample size of 250 could have restricted to see the association of factors like socioeconomic status, co morbidities, pattern of medications and duration of the disease with medication adherence. The treatment adherence was assessed using a pretested questionnaire, so there could be a possibility of recall bias in the present study.

CONCLUSION

The study showed more than 50% of diabetics being adherent to their medications. Urban population had a comparatively better medication adherence of 60% than the rural community of only 40%. Increased age, illiteracy, occupation, BMI, frequency and multiple doses of anti-diabetic drugs were found to be determinants for medication non adherence in the current study. Hence, there is a role of the treating physicians to enhance medication adherence through effective patient education and medication counselling and also to reduce the pill burden by customizing the drug regimen according to the patient's lifestyle. There is a need of reinforcement of health education about the risks and complications of diabetes that can occur due to non adherence.

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