

A Cross-Sectional Study Assessing Medication Adherence to Diabetes Mellitus Treatment Among Adults in A Tertiary Care Hospital in the National Capital Region, Delhi

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ABSTRACT

Introduction: India has earned the dubious distinction of being the diabetic capital of the world. Poor adherence to diabetes treatment is common now a days that can lead to severe health complications and is related to increased morbidity and mortality. Keeping this in mind, the present study had been planned to assess medication adherence to diabetes mellitus treatment among adults in a tertiary care hospital.

Methodology: A descriptive cross-sectional study was conducted among adult patients attending the outpatient department of tertiary care hospital from October 2022 to September 2023 on 320 type 2 diabetes mellitus patients (T2DM) using the Morisky Medication Adherence Scale. The Statistical Package for Social Sciences (SPSS) software was used for statistical analyses.

Results: In 320 study subjects, the mean age came out to be 43+12.5 years. Prevalence of poor adherence was found to be 62% (95% confidence interval = 58.2-69.3). The average MMAS score came out to be 4.22. Of the total 320 diabetic patients, around 50.3% (161) came into low, 25.6% (82) in medium, and 24.1% (77) were in high adherent group respectively. Age, education, tobacco, alcohol consumption and suffering from any other chronic illness had significant effects on the adherence to treatment of T2DM.

Conclusion: Poor adherence to diabetes was found. Adherence to medication needs to be improved for better control and management of disease.

Keywords: Diabetes, Cross-sectional, adherence, adults, North India

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INTRODUCTION

As we moved into the 21st century, India has earned the dubious distinction of being the diabetic capital of the world.¹ The International Diabetes Federation (IDF) indicates that in 2021, it is estimated that 537 million people have diabetes, and this number is projected to reach 643 million by 2030, and 783 million by 2045.¹ Presently, more than three-quarters of the estimated 179 million people with diabetes are in 40-59 years of age.² The person having diabetes has to adhere to a normal glucose level to maintain health, avoid complications in body and attain a healthy lifestyle. In treating a chronic disease, the role of doctor as well as patient adherence is important. Adherence is defined as the measure to which a person's behavior taking medication, following a diet plan or adopting lifestyle changes, meets the recommendations suggested by a health professional.³ However, poor adherence to diabetes treatment is common that causes severe health complications and increased morbidity and mortality.³ The treatment adherence has many barriers such as complex treatment regimens that includes drugs, injectable, lifestyle modification along with long-term therapies, the side effects due to multiple therapies and sometimes insufficient, confusing information or instructions provided by the health care provider.⁴ Education, socioeconomic issues, memory disturbances, personal beliefs and socio cultural practices in the patient side also play a challenging role in maintaining the adherence. So, patients with chronic diseases like diabetes often experience difficulty adhering to recommended treatment regimen as instructed by their healthcare personnel. Recently, diabetes has found to be associated with the severity and complications of the novel coronavirus disease (COVID-19), that raises the importance of improving medication adherence for diabetic patients. In the control of diabetes mellitus (T2DM), the lack of treatment adherence is a challenge often faced by health care practitioners also. The factors include timely diagnosis, accessibility and availability of drugs in health services, acceptability of the medication, the chronicity of disease, friends, and family attitudes towards patient, the relationship between user and health professional, knowledge, therapeutic regimen, understanding of the disease and treatment.⁵ So, patients with T2DM often fail to adhere to treatment for numerous reasons mentioned above. Keeping all this in mind we have planned to this particular study in our hospital settings.

The study was conducted to assess medication adherence to diabetes mellitus treatment among adults in a tertiary care hospital and to find the association between T2DM medication adherence and various socio-economic factors.

METHODOLOGY

A descriptive cross-sectional study was conducted to

assess the adherence of type 2 diabetes mellitus (T2DM) treatment and its factors among patients attending the outpatient department of tertiary care hospital in Delhi National Capital Region. The study was conducted from October 2022 to September 2023. By convenient sampling technique, 320 patients with already diagnosed T2DM who attended OPD during the study period were included in the study. Patients with Type 1 diabetes mellitus and gestational diabetes mellitus (GDM) were excluded. For data collection of the study, two instruments were used. First is a semi structured questionnaire containing socio-demographic variables (gender, age, education, and household income), clinical (time of diagnosis, co-morbidities, chronic complications) and second one is a validated 8-item Morisky Medication Adherence Scale⁶ to collect information on adherence (Data collection was done by medical students, previously selected and trained). The average duration of the interview conducted was 30 minutes. The self-reported eight-item MMAS was used to evaluate medication adherence among type 2 diabetes mellitus patients.⁶ Questions 1 through 7 have categorical responses (yes/no). Item 8 has a five-point Likert scale. All the questions except question 5 are reverse coded to avoid participants responding in the same manner to a series of questions irrespective of their content; each "No" is coded "1" and each "Yes" is coded "0".⁶ For question 8, if the participant selects "0", the given score is "1", while if they select response "4", the given score is "0". Categorical responses "1, 2, 3" are respectively coded "0.25, 0.75, 0.75". The total MMAS-8 scores range from 0-8. The adherence level is considered low if the MMAS-8 score is less than 6 (score <6), medium if in the range of 6-7, and high if equal to 8.⁶ Descriptive statistics such as mean, percentage and standard deviation were used to describe the data collected in the present study. The chi-square test was used to assess the association between various factors and treatment adherence with a 95% confidence interval. The results were considered statistically significant with p value <0.05. All statistical analyses were performed using Statistical Package for Social Sciences (SPSS) 21 trial version, International Business Machines Corporation (IBM, New York, USA).

RESULTS

The mean age of study participants was 43 ± 12.5 years and more than half of them were male 172 (53.3%) and around 120 (37 %) of the study participants were illiterate. The majority of the population was married 311(97.1) as depicted in Table number 1. The proportion of participants who had diabetes for less than one year, 1-5 years, 5-9 years, and more than 10 years were 23(7.1%), 102 (31.8%), 125(39%) and 70(21.8%) respectively. Amongst them, 46(14.3%) of them had a positive family history of T2DM. Among the chronic diseases, the majority of the participants had only T2DM (no other

Table 1: Socio-demographic profile of study subjects (N=320)

Demographic Variables	Cases (%)	Medical Adherence			P-value
		Low 161 (50.3)	Medium 82 (25.6)	High 77 (24.1)	
Gender					
Male	172(53.75)	85(52.7)	42(51.2)	45(58.4)	0.621249
Female	148(46.25)	76(47.2)	40(48.7)	32(41.6)	
Age group					
30-39	57(17.8)	30(18.6)	22(26.8)	5(6.5)	<0.00001
40-49	76(23.75)	42(26.1)	21(25.6)	13(16.9)	
50-59	104(32.5)	55(34.2)	29(35.4)	20(26.0)	
>60	83(25.9)	34(21.2)	10(12.2)	39(50.6)	
Marital status*					
Married	311(97.1)	156(96.9)	79(96.3)	76(98.7)	0.90399
Widowed/Separated	8(2.5)	5(3.1)	2(2.4)	1(1.3)	
Unmarried	1(0.31)	0(0)	1(1.2)	0(0)	
Religion*					
Hindu	299(93.4)	148(91.9)	78(95.1)	73(94.8)	0.512233
Muslim	4(1.25)	2(1.2)	1(1.2)	1(1.3)	
Sikh	16(5.00)	11(6.8)	3(3.6)	2(2.6)	
Christian	1(0.31)	0(0)	0(0)	1(1.3)	
Educational level*					
Illiterate	120 (37.5)	76(47.2)	23(28.0)	21(27.3)	0.000053
Just literate	4(1.2)	4(2.5)	0(0)	0(0)	
Primary school	67(20.9)	32(19.9)	22(26.8)	13(16.9)	
Middle school	72(22.5)	35(21.7)	17(20.7)	20(25.9)	
High school	24(7.5)	4(2.5)	12(14.6)	8(10.4)	
Intermediate	24(7.5)	8(4.9)	6(7.3)	10(13.0)	
Graduate/postgraduate	9(2.5)	2(1.2)	2(2.4)	5(6.5)	
Socio economic status**					
Upper	39(12.1)	12(7.4)	13(15.6)	14(18.2)	0.099258.
Upper middle	56(18.6)	24(14.9)	14(17.1)	18(23.4)	
Middle/lower middle	101(31.5)	56(34.7)	21(25.6)	24(31.2)	
Lower/upper lower	70(21.8)	40(24.8)	19(23.2)	11(14.3)	
Lower	54(16.8)	29(18.0)	15(18.3)	10(13.0)	

*After applying Yates Correction; **Modified BG Prasad scale 2022

Table 2: Association behavioral characteristics with the adherence of diabetes (N=320)

Variables	Total Cases (%) (N=320)	Low (n=161) (50.3)	Medium (n=82) (25.6)	High (n=77) (24.1)	P-value
Duration of DM (in years)					
<1	23(7.1)	8(4.9)	7(8.5)	8(10.4)	0.423702.
1-5	102(31.8)	59(36.6)	23(28.0)	20(25.9)	
5-9	125(39.0)	59(36.6)	36(43.9)	30(39.0)	
>10	70(21.8)	35(21.7)	16(19.5)	19(24.7)	
Family history of DM					
yes	46(14.3)	23(14.3)	11(13.4)	12(15.6)	0.925895.
no	274(85.6)	138(85.7)	71(86.6)	65(84.4)	
Consumption of tobacco in any form (Current use)					
yes	160(50.0)	78(48.4)	56(68.3)	26(33.8)	0.000066.
no	160(50.0)	83(51.6)	26(31.7)	51(66.2)	
Alcohol consumption (Current use)					
yes	147(45.9)	96(59.6)	35(42.7)	14(18.2)	< 0.00001.
no	173(54.1)	65(40.4)	47(57.3)	63(81.8)	
Treated with					
Oral hypoglycemic agents (OHAs)	293(91.5)	156(96.9)	72(87.8)	65(84.4)	0.001917.
OHAs and Insulin	27(8.4)	5(3.1)	10(12.2)	12(15.6)	
Other chronic illnesses					
Yes	152(47.5)	80(49.7)	46(56.1)	26(33.7)	0.013
No	168(52.5)	81(50.3)	36(43.9)	51(66.2)	
Average number of tablets for diabetes					
1	44(13.7)	21(13.0)	12(14.6)	11(14.3)	0.638193.
2	197(61.5)	96(59.6)	55(67.3)	46(59.7)	
3	59(18.4)	34(21.1)	9(11.0)	16(20.8)	
>3	20(6.2)	10(6.2)	6(7.3)	4(5.2)	

The result is significant at $p < .05$

chronic illnesses) and nearly 152(47.5 %) of the study subjects were also suffering from hypertension, COPD, thyroid disorders, etc. The diabetes related risk factors like tobacco use and alcohol consumption were reported among 160 (50%) and 147(45.9%) of the study participants respectively too more in males. The majority of the participants 293(91%) were taking oral hypoglycemic drugs and the rest of them were taking both insulin and oral hypoglycemic drugs as seen in table number 2. The 8-item Morisky Medication Adherence Scale (MMAS) was used to collect information on adherence. Prevalence of poor adherence is 62% (95% confidence interval = 58.2-69.3). Age and education status were

found to be significant factors in the adherence to treatment and among the behavioral characteristics, current use of tobacco and alcohol along with the types of therapy were found to be significant about adherence of diabetes as depicted in table number 2. An additional disease has also a significant impact on the adherence to treatment the ones who had only diabetes have high adherence 51(66.2) as seen in table number 1 & 2. The average MMAS score came out to be 4.22, with 95% confidence intervals of 3.8 and 5.2. Of the total 320 diabetic patients, around 50.3% (161) came into low, 25.6% (82) in medium, and 24.1% (77) were in high adherent group. Table 3 presents the results of each item related to MMAS-8.

Table 3. Table representing responses of the questions on Morisky Medication Adherence Scale (MMAS).

MMAS items	Participants (N=320)
Sometime forget to take hyperglycemic medication	34(10.6)
Over the past two weeks, there were days when did not take hyperglycemic medicine	7(2.2)
Ever cut back or stopped taking medication without telling doctor because felt worse when took it	46(14.4)
When traveling or leaving home, sometime forgot to bring along diabetic medications	10(3.1)
Took hyperglycemic medicine yesterday	320(100)
When feel like blood glucose is under control, sometimes stop taking medicine	40(12.5)
Taking medication every day is an inconvenience for some people. Ever feel hassled about sticking to hyperglycemic treatment plan	37(11.6)
Difficulty remembering to take all hyperglycemic medication	Never 127(39.7%) Sometimes 93(29.1%) Rarely 85 (26.6%) Often 5(1.6%) Always 10(3.1%)

DISCUSSION

The present study was conducted to determine medication adherence and factors associated with poor adherence in adults with diabetes in Northern India. A cross-sectional survey was conducted among 320 diabetes patients attending the OPD. The majority of the study population were male, similar to the findings of Shankar UV⁷ and R Singh⁸. The majority of the participants 293(91%) were taking oral hypoglycemic drugs and the rest of them were taking both insulin and oral hypoglycemic drugs. These findings are similar to that of a study done by Ho PM⁹ and Dedicom survey¹⁰ in which the treatment with oral and injectable forms has a significant effect on adherence unlike study done by Shankar UV⁷. Prevalence of poor adherence was 62% which is lower in comparison to study done in Kerela⁷, Delhi¹¹ and much lower to a study done in abroad¹². These findings are quite similar to the study in North India¹¹ more in comparison to study done by Shobana R.¹³ This might be due to the time period of the studies conducted and also the area of the study. The average MMAS score was 4.22, a bit lower in comparison to the findings of Asheq A.¹⁴ In our study we have found that out of the total 320 T2DM patients, (n = 161, 50.3%), (n = 82, 25.6%), and (n = 77, 24.1%) were low, medium, and high adherent groups, respectively. These finding are very variable in contrast to the findings of a study done in Chandigarh¹⁵

and tertiary care hospital in Delhi¹¹ and another study during COVID 19 Pandemic¹⁴. The possible causes here might be the timings of study conducted. In our study average number of tablets was not found to be significant factor on adherence unlike the study of Islam¹⁶. Consumption of tobacco and alcohol were found to be significant factors among the non-adherent subjects similar to studies done in 2011, 2016 & 2023.^{15,17,18} Through our results, gender hasn't found to be significant factor for adherence unlike the results by Pudar and Venkataraman¹⁹.

STRENGTH AND LIMITATIONS

Adherence is a big problem that accounts for treatment of a chronic disease that we considered. A detailed validated questionnaire is used. The sample size is small and we took patients from the outpatient department only. Furthermore, adherence to lifestyle modification wasn't taken into account.

CONCLUSION

Prevalence of poor adherence was 62% of the total 320 diabetic patients. Age, education, current use of tobacco and alcohol along with the types of therapy given to the patient were found to be significant factors in relation to adherence of diabetes management.

RECOMMENDATIONS

Adherence to medication needs to be improved for better control of diabetes mellitus. Adherence can be improved by patient education, motivational strategies, improving doctor-patient relationship and considering the cost of oral hypoglycemic drugs. Apart from this, focus should be enhanced on counselling like physical activity, dietary modifications, simplifying the dosage regimen, foot care, and ophthalmology check-ups also to tackle the complications.

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