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A CROSS-SECTIONAL STUDY OF ANTIDIABETIC MEDICATION ADHERENCE AMONG PATIENTS WITH TYPE-2 DIABETES MELLITUS IN THE NORTH-EAST RURAL AREA OF KOTA DISTRICT

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Abstract

Background:
Type-2 diabetes mellitus (T2DM) is a major public health challenge globally and particularly in developing countries like India. Adherence to antidiabetic medication is essential for achieving optimal glycemic control and preventing complications. However, medication adherence among rural populations remains suboptimal due to socioeconomic, behavioral, and healthcare-related factors.

Objectives:
To assess the level of antidiabetic medication adherence among patients with type-2 diabetes mellitus in the north-east rural area of Kota district and to determine factors associated with medication adherence.

Methods:
A community-based cross-sectional study was conducted among **400 patients with type-2 diabetes mellitus** in sub-centers of Rural Health Training Centre (RHTC), Digod, Kota district. Data were collected using a **semi-structured questionnaire**, including socio-demographic characteristics, clinical profile, and medication adherence assessment. Medication adherence was evaluated using the **Morisky Medication Adherence Scale (MMAS-8)**. Data were analyzed using **SPSS software**. Associations between medication adherence and independent variables were tested using **Chi-square test**, with $p < 0.05$ considered statistically significant.

Results:
Out of 400 participants, **moderate adherence was the most common category**, while a smaller proportion demonstrated high adherence to antidiabetic medications. Factors significantly associated with better medication adherence included **age group, education level, duration of diabetes, BMI and marital status**.

Conclusion:
Medication adherence among patients with type-2 diabetes in rural areas remains suboptimal. Strengthening **patient education, regular follow-up, and community-based diabetes management programs** is essential to improve adherence and prevent complications.

Keywords:
Type-2 Diabetes Mellitus, Medication Adherence, Rural Health, Morisky Scale, Community Medicine, India

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Introduction

Diabetes mellitus (DM), a collection of metabolic disorders, is rapidly increasing as a crucial public health issue. It is estimated that there are currently 285 million people with diabetes worldwide and this number is set to increase to 438 million by the year 2030.[1] India is presently estimated to have 41 million individuals affected by this disease with every fifth diabetic in the world being an Indian.[2] As per WHO report, the average adherence to long-term therapy for chronic diseases in developed countries is approximately 50%, and in developing countries the adherence rate is even lower.[3]

The WHO defines adherence for long-term treatment as "the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider".[8] Adherence with medication usage is defined as the proportion of prescribed doses of medication actually taken by a patient over a specified period of time.[4] With every 10% increase in medication adherence there is a decrease in HbA1c by 0.16 %.[5]

India has emerged as the **"diabetes capital of the world"**, with a rapidly growing burden of type-2 diabetes mellitus (T2DM). Rural areas, traditionally considered low-risk populations, are now experiencing a significant rise in diabetes prevalence due to changing lifestyles, dietary patterns, and reduced physical activity.

Effective management of T2DM requires a **multifaceted approach**, including pharmacological therapy, lifestyle modifications, and regular monitoring. Among these, **medication adherence** plays a critical role in achieving glycemic control and preventing complications such as: - Diabetic nephropathy, Diabetic neuropathy, Retinopathy & Cardiovascular disease

Poor medication adherence remains a major challenge, especially in **rural settings**, where factors such as: - low health literacy, economic constraints, limited access to healthcare & lack of awareness

Therefore, the present study was conducted to assess **antidiabetic medication adherence among patients with type-2 diabetes mellitus in the north-east rural area of Kota district**.

Aim

To estimate prevalence of adherence to anti-diabetic medication, selfcare practices and quality of life in patients of Type II Diabetes mellitus

Objectives

- To estimate adherence with antidiabetic medication among type-2 diabetes mellitus patients
- To find out association of medication adherence with Clinico-socio- economic and demographic factors among type-2 diabetes mellitus patients.

Materials and Methods

STUDY DESIGN - Community-based **cross-sectional study**.

STUDY AREA - The study was conducted at the sub centres attached to Rural Health Training Centre (R.H.T.C.), Digod under the department of Community Medicine, Government Medical College Kota, Rajasthan

STUDY POPULATION - People 41 to 60 years of age group having diabetes mellitus type-2 from rural area.

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INCLUSION CRITERIA - Patients of diabetes mellitus II in the age group 41-60 years, on anti-diabetic medication, both male and female, who gave written consent were included in the study.

EXCLUSION CRITERIA - Patients between 41 to 60 years of age group with diabetes mellitus-2 who refused to give informed consent, Patients who are known case of type 1 DM, Patients with verified psychiatric disorders & Critically ill patients.

SAMPLE SIZE - A total of **400 participants** were included in the study.

- Sample size in present study will be calculated on the basis of reported prevalence of antidiabetic medication adherence is 44%.[6]

SAMPLING METHODS- Multistage sampling technique was used to cover 400 people of 41- 60 year age group from sub-centers attached to R.H.T.C. Digod.

STUDY TOOL

A **semi-structured questionnaire** was used including: - Socio-demographic profile & Clinical characteristics & Medication adherence assessment

Medication adherence was assessed using the **Morisky Medication Adherence Scale (MMAS-8)**.

Adherence Categories - High adherence, Moderate adherence, Low adherence

- To assess the association between clinic-socio-demographic and medication adherence, high adherence consider as adherent and moderate & low medication adherence considered as non-adherent

DATA COLLECTION - Data were collected through **face-to-face interviews** after obtaining informed consent.

STATISTICAL ANALYSIS - Data were entered into **Microsoft Excel** and analyzed using **SPSS software**.

Statistical tests used: **Descriptive statistics**, **Chi-square test** & Significance level: **$p < 0.05$**

ETHICAL CONSIDERATIONS - Ethical approval was obtained from the **Institutional Ethics Committee of Government Medical College, Kota**. Informed consent was obtained from all participants.

Results

A total of **400 patients with type-2 diabetes mellitus** participated in the study.

DETERMINE THE CLINIC-SOCIO-ECONOMIC DEMOGRAPHIC CHARACTERISTIC OF PARTICIPANTS -

Variable	Category	No. of Patients	Percentage
Gender	Male	164	41%
	Female	236	59%
Age Group (years)	41–45	84	21%
	46–50	69	17.25%

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	51–55	109	27.25%
	56–60	138	34.50%
Educational Status	Illiterate	116	29%
	Primary/Middle school	104	26%
	High school	90	22.5%
	Higher secondary	62	15.5%
	Graduation/Post-graduation	28	7%
Occupation	Unemployed	72	18%
	Unskilled	128	32%
	Semiskilled	108	27%
	Skilled	28	7%
	Clerical/Executive	38	9.5%
	Professional	26	6.5%
Socioeconomic Status (Modified BG Prasad)	Upper class	50	12.5%
	Upper middle class	56	14%
	Middle class	161	40.25%
	Lower middle class	106	26.5%
	Lower class	27	6.75%
Religion	Hindu	349	87.5%
	Muslim	21	5.25%
	Sikh	30	7.25%
	Others	0	0%
Marital Status	Married	338	84.5%
	Unmarried	9	2.25%
	Widow	45	11.25%
	Separated	0	0%
	Divorced	8	2%
Duration of Diabetes	<5 years	130	32.5%
	5–10 years	170	42.5%

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	>10 years	100	25%
BMI	Underweight (<18.5)	23	5.75%
	Normal (18.5–24.9)	190	47.5%
	Overweight (25–29.9)	150	37.5%
	Obese (>30)	37	9.25%
Diabetic Status	Normal	20	5%
	Pre-diabetic	110	27.5%
	Diabetic	270	67.5%
Anti-Diabetic Therapy	Oral hypoglycaemics	383	95.75%
	Insulin	17	4.25%
	Combination therapy	0	0%

- The socio-demographic profile of study population had higher proportion of females (59%) compared to males (41%), 34.50% were falling in the age group 56-60 years, had low educational levels (29% illiterate and only 7% graduates/post-graduates), 87.5% were Hindus, followed by Sikhs (7.25%) and Muslims (5.25%). Peoples living with diabetes for 5-10 years were 42.5% and more than 10 years were 25%. 47.5% were having normal BMI and 47% of the study participants were overweight or obese. Medication adherence was highest among females (39.4%), graduates/post-graduates (57.1%), professionals (53.3%), upper-middle-class individuals, Sikhs, married individuals (39.9%), patients suffering from diabetes within a duration between 5-10 years (47.6%), normal BMI, and having normal blood sugar levels (Non-diabetic levels).

PREVALENCE OF ADHERENCE WITH ANTIDIABETIC MEDICATION (N=400) -

VARIABLE	NO. OF PATIENTS	PERCENTAGE
ADHERENCE		
High	145	36%
Medium	161	40%
Low	94	24%
	N=400	

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ASSOCIATION OF MEDICATION ADHERENCE WITH CLINIC-SOCIO-DEMOGRAPHIC FACTORS IN STUDY POPULATION -

- To assess the association between clinic-socio-demographic and medication adherence, high adherence consider as adherent and moderate & low medication adherence considered as non-adherent

Variable	Category	Adherent n (%)	Non-Adherent n (%)	P-value	Significance
Gender	Male	52 (31.7%)	112 (68.3%)	0.115	Not Significant
	Female	93 (39.4%)	143 (60.6%)		
Age Group (years)	41–45	21 (25%)	63 (75%)	0.011	Significant
	46–50	19 (27.5%)	50 (72.5%)		
	51–55	46 (42.2%)	63 (57.8%)		
	56–60	59 (42.8%)	79 (57.2%)		
Educational Status	Illiterate	34 (29.3%)	82 (70.7%)	0.020	Significant
	Primary/Middle School	32 (30.8%)	72 (69.2%)		
	High School	35 (38.9%)	55 (61.1%)		
	Higher Secondary	28 (45.2%)	34 (54.8%)		
	Graduation/Post-Graduation	16 (57.1%)	12 (42.9%)		
Occupation	Unemployed	22 (30.5%)	50 (69.5%)	0.112	Not Significant
	Unskilled	42 (32.8%)	86 (67.2%)		
	Semiskilled	36 (33.3%)	72 (66.7%)		
	Skilled	12 (50%)	12 (50%)		
	Clerical/Executive	17 (44.7%)	21 (55.3%)		
	Professional	16 (53.3%)	14 (46.7%)		
Socio-economic Status	Upper Class	18 (36%)	32 (64%)	0.050	Not Significant
	Upper Middle Class	28 (50%)	28 (50%)		

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	Middle Class	62 (38.5%)	99 (61.5%)		
	Lower Middle Class	31 (29.2%)	75 (70.8%)		
	Lower Class	6 (22.2%)	21 (77.8%)		
Religion	Hindu	122 (34.9%)	227 (65.1%)	0.130	Not Significant
	Muslim	7 (33.3%)	14 (66.7%)		
	Sikh	16 (53.3%)	14 (46.7%)		
Marital Status	Married	135 (39.9%)	203 (60.1%)	0.004	Significant
	Unmarried	2 (22.2%)	7 (77.8%)		
	Widow	7 (15.5%)	38 (84.5%)		
	Divorced	1 (12.5%)	7 (87.5%)		
Duration of Diabetes	<5 years	42 (32.3%)	88 (67.7%)	0.000064	Significant
	5–10 years	81 (47.6%)	89 (52.4%)		
	>10 years	22 (22%)	78 (78%)		
BMI	Underweight	9 (39.1%)	14 (60.9%)	0.221	Not Significant
	Normal	77 (40.5%)	113 (59.5%)		
	Overweight	50 (33.3%)	100 (66.7%)		
	Obese	9 (24.3%)	28 (75.7%)		
Anti-Diabetic Therapy	Oral Drugs	138 (36%)	245 (64%)	0.680	Not Significant
	Insulin	7 (41.2%)	10 (58.8%)		

- Low medication adherence was found in males, illiterate (33.6%), unemployed (32%) & lower socio-economic status individuals, Muslims, divorced patients (62.5%), patients suffering from diabetes with the duration of more than 10 years, obese, and having blood sugar levels in the diabetic range.
- There is a trend towards higher medication adherence rates with higher educational status and increase age group.
- Medication adherence was associated with socio-demographic factors like age group, education, marital status, Duration of diabetes and BMI but not with religion, socio-economic status, and diabetic status. Duration of diabetes and BMI were significantly associated with medication adherence.

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DISCUSSION

The findings of the present study are comparable with several previous studies conducted in similar populations. In this study, medication adherence was higher among females (39.4%) than males (31.7%), although the association was not statistically significant, which is consistent with studies by Ravi Kumar Medi et al[7]., Puneet Misra et al.[8] (2018), and Usha Rani S. Padmanabha et al[9]. (2020) who also reported slightly higher or comparable adherence among females, though the differences were minimal. Age showed a significant association with adherence, with higher adherence in older age groups, which is in agreement with findings reported by Usha Rani S. Padmanabha et al[9]. (2020), Jeby Jose Olickal et al[10]., Ravi Kumar Medi et al[7]., and Puneet Misra et al[8]. (2018), where older individuals demonstrated better adherence to medication. Educational status was also significantly associated with medication adherence in the present study, with higher adherence observed among graduates compared to illiterate participants, similar to observations reported by Usha Rani S. Padmanabha et al[9]. (2020), Jeby Jose Olickal et al[10]., Ravi Kumar Medi et al[7]., and Puneet Misra et al[8]. (2018), highlighting the role of education in improving awareness and compliance with treatment. Although higher adherence was seen among professionals and individuals from upper middle socioeconomic class, the associations with occupation and socioeconomic status were not statistically significant, which aligns with trends reported in studies by Usha Rani S. Padmanabha et al[9]. (2020), Jeby Jose Olickal et al[10]., Ravi Kumar Medi et al[7]., and Puneet Misra et al[8]. (2018). Similarly, marital status and duration of diabetes showed significant associations with medication adherence in the present study, with married individuals and those with 5–10 years duration of diabetes demonstrating better adherence, findings that are also supported by the studies of Usha Rani S. Padmanabha et al[9]. (2020), Jeby Jose Olickal et al[10]., Ravi Kumar Medi et al[7]., and Puneet Misra et al[8]. (2018). However, BMI and type of anti-diabetic therapy were not significantly associated with medication adherence in this study, although trends of better adherence among individuals with normal BMI were similar to patterns reported in the above-mentioned studies. Overall, the results of the present study are largely consistent with findings from previous research conducted by these authors.

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