

## Treatment Adherence Status And Its Barriers Among Adult Diabetics In A Rural Area Of West Bengal

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### Abstract

**Background:** Rural areas face unique barriers to adherence, including poor healthcare infrastructure, socioeconomic constraints, and limited awareness.

**Objectives:** To determine the level of treatment adherence among patients with diabetes and to assess the knowledge and awareness of patients regarding their condition.

**Methodology:** This cross-sectional study was conducted at a rural area among 90 diabetes patients in a health and wellness centre. Out of all patients attending the Centre, those satisfying the inclusion and exclusion criteria were consecutively selected. Data analysis were done by MS office excel ver.2021 and IBM SPSS ver.2025.

**Results:** Among 90 diabetic patients majority were 51-70 yrs old (64.4%), males (55.6%), married (83.3%), having secondary education (74.4%), skilled workers (47.8%) and belong to upper middle & upper lower class (92.2%). Males had good adherent to medication than females ( $\chi^2 = 2.141$ ,  $df = 1$ ,  $p = 0.037$ ). There is no significant association between adherence to medication with age ( $\chi^2 = 4.020$ ,  $df = 1$ ,  $p = 0.431$ ), marital status ( $\chi^2 = 1.920$ ,  $df = 1$ ,  $p = 0.255$ ), educational status ( $\chi^2 = 0.099$ ,  $p = 0.449$ ,  $df = 1$ ), occupation ( $\chi^2 = 1.519$ ,  $p = 0.500$ ,  $df = 4$ ), SES ( $\chi^2 = 1.569$ ,  $p = 0.053$ ,  $df = 1$ ). Significant association presents between knowledge of diabetes and SES ( $\chi^2 = 5.473$ ,  $p = 0.022$ ,  $df = 1$ ). There is no significant association among knowledge of diabetes with age ( $\chi^2 = 0.496$ ,  $p = 0.989$ ,  $df = 1$ ), gender ( $\chi^2 = 8.616$ ,  $p = 0.298$ ,  $df = 1$ ), marital status ( $\chi^2 = 0.374$ ,  $p = 0.795$ ,  $df = 1$ ), educational status ( $\chi^2 = 1.595$ ,  $p = 0.343$ ,  $df = 1$ ) and occupation ( $\chi^2 = 1.200$ ,  $p = 0.477$ ,  $df = 1$ ) of study population.

**Conclusion:** It found that nearly half of the participants exhibited low adherence level, influenced by the factors such as forgetfulness, lack of knowledge and financial challenges. This study highlights critical barriers to diabetes treatment adherence and offer a foundation for developing context strategies.

**Keywords:** Treatment adherence, rural area, diabetes patients.

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### I. Introduction

Diabetes mellitus is a significant public health issue in India, with the rural population increasingly affected due to lifestyle changes and limited healthcare access. Effective diabetes management relies on consistent adherence to medications, dietary changes, physical activity, and regular monitoring to prevent complications. Rural areas, such as those in West Bengal, face unique barriers to adherence, including poor healthcare infrastructure, socioeconomic constraints, and limited awareness. Identifying adherence levels and the factors influencing non-adherence is critical to designing targeted interventions for better diabetes management in resource-limited areas.

In contrast to Western populations, where diabetes predominantly affects older individuals, Asian countries experience a disproportionately higher burden of the disease among young and middle-aged adults (07,08).

Although the prevalence of type 1 diabetes is rising, the epidemic is primarily driven by type 2 diabetes, which constitutes over 90% of all cases. India currently has the highest number of individuals with diabetes worldwide and is therefore regarded as the “diabetes capital of the world.”(09). The International Diabetes Federation (IDF) estimates that India currently has approximately 40.9 million individuals with diabetes, a figure projected to increase to 69.9 million by 2025.(10)

This study was done to determine the level of treatment adherence among patients with diabetes in primary healthcare settings and to assess the knowledge and awareness of patients regarding their condition and the importance of adherence to treatment. Also to explore the barriers faced by patients in adhering to their treatment regimens.

## II. Materials And Methods

The present study was observational, descriptive, institution based and cross-sectional design. It was conducted in the Chamrail Health and wellness centre under Jagadeshpur BPHC, West Bengal, India. Study duration was two months (from 15<sup>th</sup> June,2024 to 14<sup>th</sup> August,2024). All the Diabetic patients who attended Chamrail health and wellness centre were included in the study. The sample size was calculated on the basis of 6.2% prevalence of diabetes among adult population in a rural area of India based on a previous research (16). The sample size was 90 (taking  $4pq/d^2$  where  $p=0.062$ ,  $q= 1-p= 0.938$ , and  $d=5\%$  absolute precision). Sampling technique was simple random sampling.

Out of all patients attending the Centre, those satisfying the inclusion and exclusion criteria and willing to participate in the study were consecutively selected till the desired sample size was achieved.

All adult male and female, diagnosed diabetic patients and consent for their participation in the study, were included in the study.

Age of participant was not less than 18 years and more than 70 years.

Patients having severe comorbidities or medical condition (eg advanced cardiovascular, kidney disease and severe mental disease) were excluded from this study. Pregnant mothers and lactating mothers were also excluded in this study. Study tools were pre-designed, pre-tested ,semi structured schedule and Updated BG Prasad scale for the year 2024 (01). Data collection were started after getting permission from the head of the Department of Community Medicine and Institutional Ethical Committee approval was taken before conducting the study. All study subjects were interviewed after obtaining an informed consent from them and by maintaining full anonymity. The proposal was submitted to institutional ethics committee. After getting their approval and permission from hospital authority the process of data collection was started. Data was collected by a pre-designed, pre-tested ,semi structured schedule which had two parts. The first part had details of socio-demographic variables, the second part had questions related to the to level of treatment adherence among patients with diabetes and knowledge, awareness of patients regarding their condition & the importance of adherence to treatment. The barriers faced by patients in adhering to their treatment regimens were also explored. The data were compiled in MS office excel (version 21) and data analysis were done in IBM SPSS ver. 2021. Distribution part of data presented with frequency(%) and analytical part were done by chi square test. P value taking consideration with 95% significant level.

## III. Results

### Socio Demographic Characteristic of the study subjects (n=90):

Socio Demographic Profile		Frequency (%)
Age in years	30-50	32 (35.6)
	51-70	58 (64.4)
Gender	Female	40(44.4)
	Male	50(55.6)
Marital status	Married	75(83.3)
	Unmarried	15 (16.7)
Educational status	Above secondary	23(25.6)
	Secondary	67(74.4)
Occupation	Unskilled worker	13(14.4)
	Home maker	24(26.7)
	Semi-Skilled worker	6 (6.7)
	Skilled worker	43(47.8)
	Small Business	4 (4.4)
No of family members	<=3	33(36.7)
	4	45(50)
	>=5	12 (13.3)
SES(Updated BG Prasad Scale 2024)	Upper middle and upper lower	83(92.2)
	Lower middle and lower	7(7.8)

From Table 1 it was found that majority of study subject's age were between 51-70 years(64.4%), majority of study subject's were male(55.6%), majority studied up to secondary level(74.4%) and majority were skilled worker(47.8%). 50% study subjects had four family members. 92.2% study subject's belong to upper middle and upper lower socio-economic status as per Updated B G Prasad scale 2024.

**Table 2: Association between socio demographic profiles and adherence to medication (n = 90)**

Variables	Categories	Irregular (poor adherence)	Regular (good adherence)	Total	Chi Sq P value df
Age(in years)	30-50	4(4.44)	28(31.11)	32(35.56)	X <sup>2</sup> =4.020 P=0.431 Df=1
	51-70	11(12.22)	47(52.22)	58(64.44)	
	Total	15(16.67)	75(83.33)	90(100)	
Gender	Female	3(3.33)	37(41.11)	40(44.44)	X <sup>2</sup> =2.141, P= 0.037 Df=1
	Male	12(13.33)	38(42.22)	50(55.56)	
	Total	15(16.67)	75(83.33)	90(100)	
Marital status	Married	14(15.56)	61(67.78)	75(83.33)	X <sup>2</sup> =1.920, P=0.255, Df=1
	Unmarried	1(1.11)	14(15.56)	15(16.67)	
	Total	15(16.67)	75(83.33)	90(100)	
Educational level	Secondary	10(11.11)	57(63.33)	67(74.44)	X <sup>2</sup> =0.099, P=0.449, Df=1
	Above secondary	5(5.56)	18(0.2)	23(25.56)	
	Total	15(16.67)	75(83.33)	90(100)	
Occupation	Home maker	2(2.22)	22(24.44)	24(26.67)	X <sup>2</sup> = 1.519, P=0.500. Df=1
	Semi skilled worker	1(1.11)	5(5.56)	6(6.67)	
	Skilled worker	10(11.11)	33(36.67)	43(47.78)	
	Small business	0(0)	4(4.44)	4(4.44)	
	Unskilled worker	2(2.22)	11(12.22)	13(14.44)	
	Total	15(16.67)	75(83.33)	90(100)	
Socio-economic status (updated BG Prasad Scale)	Upper and upper middle class	3(3.33)	4(4.44)	7(7.78)	X <sup>2</sup> =1.519, P=0.053, Df=1
	Middle and lower middle class	12(13.33)	71(78.89)	83(92.22)	
	Total	15(16.67)	75(83.33)	90(100)	

From Table 2 it was found that males had good adherent to medication than their female counterpart. This difference (X<sup>2</sup>=2.141,p=0.037,df=1) is statistically significant.

There is no significant association between adherence to medication with age (X<sup>2</sup>=4.020,p=0.431,df=1), marital status (x<sup>2</sup>=1.920,p=0.255,df=1), educational status (x<sup>2</sup>=0.099, p=0.449,df=1), occupation (X<sup>2</sup>=1.519,p=0.053,df=1) and socio-economic status (x<sup>2</sup>=1.519, p=0.053,df=1) of study population (p>0.05).

**Table 3: Association between socio demographic profiles and knowledge of diabetes (n=90)**

Variables	Categories	Yes n(%)	No n(%)	Total n(%)	Chi sq P value df
Age (in years)	30-50	27(30.0)	5(5.6)	32(35.6)	X <sup>2</sup> =0.496, P=0.989 Df=1
	51-70	49(54.4)	9(10.0)	58(64.4)	
	Total	76(84.4)	14(15.6)	90(100)	
Gender	Female	32(35.6)	8(8.9)	40(44.4)	X <sup>2</sup> =8.616, P=0.298, Df=1
	Male	44(48.9)	6(6.7)	50(55.6)	
	Total	76(84.4)	14(15.6)	90(100)	
Marital status	Married	63(70)	12(13.3)	75(83.3)	X <sup>2</sup> =0.374. P=0.795, Df=1
	Unmarried	13(14.4)	2(2.2)	15(16.7)	
	Total	76(84.4)	14(15.6)	90(100)	
Educational level	Secondary	58(64.4)	9(10.0)	67(74.4)	X <sup>2</sup> =1.595, P=0.343. Df=1
	Above secondary	18(20.0)	5(5.6)	23(25.6)	
	Total	76(84.4)	14(15.6)	90(100)	
Occupation	House wife	19(21.1)	5(5.6)	24(26.7)	X <sup>2</sup> =1.200, P=0.477, Df=4
	Semi skilled worker	14(15.6)	2(2.2)	16(17.8)	
	Skilled worker	39(43.3)	4(4.4)	43(47.8)	
	Small business	3(3.3)	1(1.1)	4(4.4)	
	Unskilled worker	11(12.2)	2(2.2)	13(14.4)	
	Total	76(84.4)	14(15.6)	90(100)	
Socioeconomic Status (Updated)	Upper & upper Middle class	5(5.6)	2(2.2)	7(7.8)	X <sup>2</sup> =5.473, P=0.022,

B G Prasad Scale)	Middle & lower middle class	71(78.9)	12(13.3)	83(92.2)	Df=1
	Total	76(84.4)	14(15.6)	90(100)	

**Table 03 shown** participants belong to middle & lower middle class had more knowledge of diabetes than participants belong to upper & upper middle class. This difference is statistically significant( $\chi^2=5.473$ ,  $p=0.022$ ,  $df=1$ ). There is no significant association between knowledge of diabetes with age ( $\chi^2=0.496$ ,  $p=0.989$ ,  $df=1$ ), gender ( $\chi^2=8.616$ ,  $p=0.298$ ,  $df=1$ ), marital status ( $\chi^2=0.374$ ,  $p=0.795$ ,  $df=1$ ), educational status and occupation of study population ( $\chi^2=1.200$ ,  $p=0.477$ ,  $df=1$ ).

#### IV. Discussion

The present study found that majority of study subject's age were between 51-70 years (64.4%), majority of study subject's were male (55.6%), majority studied up to secondary level (74.4%) and majority were skilled worker (47.8%). 50% study subjects had four family members. 92.2% study subject's belong to upper middle and upper lower socio-economic status as per Updated B G Prasad scale 2024(01).

Another similar study done by Ajeetha B et al (02), which included 216 participants with Type 2 Diabetes Mellitus, found that 82.9% were adherent to their medications while 17.1% were non-adherent. Statistical analysis revealed that several factors were significantly associated with higher rates of non-adherence, including being over the age of 60, residing in rural areas, having a family size larger than five, and failing to follow dietary modifications. Furthermore, multivariate analysis identified that individuals over 60 years old were 2.97 times more at risk, and rural residents were 22.163 times more at risk for medication non-adherence. Other notable findings included increased non-adherence among patients experiencing complications (31.6%), those utilizing both public and private follow-up services (37.5%), individuals taking a combination of oral drugs and insulin (40.0%), and those dependent on family members for medication reminders (38.5%).

In this present study it was seen that males had good adherent to medication than their female counterpart. This difference ( $X^2=2.141$ ,  $p=0.037$ ,  $df=1$ ) is statistically significant.

Another study done by Satyajit Pattnaik et al (03), a total of 155 previously diagnosed Type 2 diabetes mellitus patients were studied, with a mean age of 58.7 years; 57.4% were males and 42.6% females. Overall, 140 (90.3%) participants were compliant with treatment, with compliance slightly higher among females (92.4%) than males (88.7%). The majority of participants belonged to the 60-69 years age group (36.1%), followed by 50-59 years (30.3%). Treatment compliance was found to be significantly associated with age ( $\chi^2=11.979$ ,  $p=0.017$ ) and duration of diabetes ( $\chi^2=8.681$ ,  $p=0.008$ ), with patients having >10 years of disease showing 100% compliance, while no significant association was observed with gender, literacy, occupation, or socioeconomic status. Most patients (131; 84.5%) sought treatment from the private sector. Among noncompliant individuals, the most common reasons were the asymptomatic nature of the disease (60%) and high cost of treatment (33.3%). Regarding glycemic control, only 59 (38%) had good control (HbA1c <7%), 30 (19.4%) had satisfactory control (HbA1c 7-8%), and a substantial proportion, 66 (42.6%), had poor glycemic control (HbA1c >8%), indicating that despite high treatment compliance, a large number of patients did not achieve adequate glycemic control.

In this present study, there is no significant association between adherence to medication with age ( $\chi^2=4.020$ ,  $p=0.431$ ,  $df=1$ ), marital status ( $\chi^2=1.920$ ,  $p=0.255$ ,  $df=1$ ), educational status ( $\chi^2=0.099$ ,  $p=0.449$ ,  $df=1$ ), occupation ( $X^2=1.519$ ,  $p=0.053$ ,  $df=1$ ) and socio-economic status ( $\chi^2=1.519$ ,  $p=0.053$ ,  $df=1$ ) of study population ( $p>0.05$ ).

Shuvankar Mukherjee et al (04) done a similar study, in that study a total of 470 patients with Type 2 diabetes mellitus were included in the study, with a mean age of  $42.64 \pm 15.70$  years; 66.4% were males and 33.6% females, 20.6% were illiterate, 76.8% were married, and 36.6% had a per capita monthly income of <₹1000. The overall compliance rate to anti-diabetic drugs was 57.7% (271/470), while 42.3% (199/470) were non-compliant. Only 36.4% followed the prescribed diet and 27.0% adhered to the exercise schedule. Compliance decreased significantly with increasing age ( $p=0.039$ ), being lowest in those  $\geq 60$  years (48.3%), and was significantly lower among males (53.2% vs 66.5% in females,  $p=0.006$ ), illiterates (47.4% vs 60.3%,  $p=0.022$ ), and those with income <₹1000 (51.2% vs 61.4%,  $p=0.03$ ). Patients with  $\geq 5$  years duration of diabetes had lower compliance (51.8% vs 64.5%,  $p=0.005$ ). Compliance varied significantly with treatment type ( $p=0.000$ ), being highest with oral hypoglycaemic agents alone (69.3%) and lowest with combined oral drugs and insulin (43.4%). Patients with knowledge of complications had better compliance (63.4% vs 49.2%,  $p=0.002$ ). Logistic regression showed higher odds of non-compliance with increasing age (OR=2.96 for  $\geq 60$  years), longer disease duration (OR=5.61), combination therapy (OR=9.31), and lack of knowledge (OR=7.24), while female gender (OR=0.67), literacy (OR=0.83), and higher income (OR=0.77) were protective. The most common reasons for non-compliance were forgetfulness (44.7%), financial constraints (32.7%), being busy (23.1%), and polypharmacy (15.6%).

From the present study it was observed that participants belong to middle & lower middle class had more knowledge of diabetes than participants belong to upper & upper middle class. This difference is statistically

significant ( $\chi^2=5.473$ ,  $p=0.022$ ,  $df=1$ ). There is no significant association between knowledge of diabetes with age ( $\chi^2=0.496$ ,  $p=0.989$ ,  $df=1$ ), gender ( $\chi^2=8.616$ ,  $p=0.298$ ,  $df=1$ ), marital status ( $\chi^2=0.374$ ,  $p=0.795$ ,  $df=1$ ), educational status and occupation of study population ( $\chi^2=1.200$ ,  $p=0.477$ ,  $df=1$ ).

In a study done by K. Yuvaraj et al (06), a total of 260 patients with noncommunicable diseases were included (response rate 93.8%), of whom 42.7% were aged  $\geq 60$  years, 66.2% were females, 43.5% had no formal education, and 70% were unemployed. The majority of participants had hypertension (71.2%) followed by diabetes mellitus (56.2%), while 8.5% were current tobacco users, 10.8% consumed alcohol, and 60% were physically inactive. The prevalence of low medication adherence was 32.7% (95% CI: 27.2–38.6), indicating that nearly one-third of participants were nonadherent. Bivariate analysis showed that age  $\geq 60$  years (49.5% vs 20.1%), female gender (37.2% vs 23.9%), and unemployment (37.9% vs 20.5%) were associated with higher nonadherence. Multivariate analysis revealed that elderly participants had 2.51 times higher likelihood of nonadherence (aPR=2.51; 95% CI: 1.70–3.70;  $p<0.001$ ), and females had 1.64 times higher risk (aPR=1.64; 95% CI: 1.04–2.58;  $p=0.03$ ), while education and occupation were not significantly associated after adjustment.

## V. Conclusion

This study demonstrates that treatment adherence among diabetic patients in a rural area of West Bengal remains suboptimal, with a notable proportion of participants exhibiting poor adherence to medication. The majority of participants were aged 51–70 years, predominantly male, with secondary level education and belonging to middle or lower-middle socioeconomic groups. A statistically significant association was observed between gender and medication adherence, with males showing better adherence than females, while no significant association was found between adherence and other socio-demographic variables such as age, marital status, educational status, occupation, and socioeconomic status. Most participants demonstrated adequate knowledge regarding diabetes, and a significant association was identified between socioeconomic status and knowledge of the disease. These findings underscore the importance of strengthening patient education, improving awareness, and addressing practical barriers such as forgetfulness and financial limitations. Targeted interventions at the primary healthcare level may help enhance treatment adherence and improve overall diabetes management in rural populations.

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