

Assessment of Patient Related Factors Associated with Medication Adherence in type II Diabetes Mellitus

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Abstract

Original Research Article

Poor and insufficient glycaemia management in people with Type 2 diabetes mellitus (DM) is a major public health issue that hastens the onset of diabetes related complications. Poor medication adherence among type 2 diabetes mellitus patients is associated with inadequate glycaemia control, increased hospitalization, increase the risk of complications, increased mortality and morbidity. The main objectives of the study was to assess patient related factors associated with medication adherence and assess knowledge about diabetes and related complications among type II diabetes mellitus patients visiting an out-patient clinic, Bangalore. Data was entered and analyzed by using Microsoft excel and SPSS 22 version 29.0. It was found that, mean age of the study subjects was 49.89 years, majority of the subjects were male, of the respondents 30 (51.7%), 19 (32.75%) and 9 (15.5%) had good, average and poor level of diabetic knowledge respectively. 34 (59%) and 24 (41%) were adherent and non-adherent respectively. In this study, factors like male gender, having higher income, high socio-economic levels, following diabetic diet, maintaining physical activity on a regular basis, good knowledge about the disease and having stronger beliefs about medicines and their use were highly adherent to anti-diabetic medications indicating high medication adherence levels. Healthcare professionals such as pharmacists should implement effective health education interventions required to improve diabetes knowledge and beliefs regarding the disease and medications for better management of the disease which thereby results in improved quality of life, in addition medication compliance ensures a strategic diabetic management and therapeutic outcome.

Keywords: Type 2 Diabetes mellitus, Medication adherence, glycaemic control, complication, morbidity, mortality.

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INTRODUCTION

Globally, Type 2 diabetes is thought to impact 462 million people worldwide that comprises of 6.28% of the total population. Worldwide, the prevalence of type 2 diabetes mellitus is high and rising, particularly in developing nations like India. In India, there are currently believed to be 77 million diabetics, and by 2045, there are expected to be over 134 million [2]. The majority of instances of diabetes (around 90%) are type 2, making it the most prevalent kind. It is a widespread and serious global health issue that has developed in connection with cultural, economic, and social change, an ageing population, due to rapid urbanization, dietary changes, such as an increase in the consumption of sugary drinks and highly processed foods, obesity, sedentary lifestyles, poor behavioral patterns, and greater fetal exposure to elevated blood sugar levels during pregnancy. Although, lately it is increasingly seen in kids and teenagers. The common risk factors involved in

diabetes mellitus are increased blood pressure, tobacco and alcohol consumption, physically inactive, dietary pattern and obesity Type 2 Diabetes is a chronic disease which can have a negative impact on the quality of life and health outcomes in individuals [3].

Most common complications may be seen in type 2 diabetes mellitus associated with the abovementioned factors include blindness, lower limb gangrene, diabetic neuropathy, diabetic retinopathy and diabetic nephropathy [4]. Poor and insufficient glycemic management in people with Type 2 diabetes mellitus (DM) is a major public health issue that hastens the onset of diabetes related complications [2]. Poor medication adherence among type 2 diabetes mellitus patients often leads to inadequate glycaemia control, increased hospitalization, increase the risk of complications, increased mortality and morbidity [5].

Patient demographics (youth, poor education, and low income), crucial patient views about their drugs (perceived treatment ineffectiveness), and perceived patient burden surrounding obtaining and administering their medications (treatment complexity, treatment costs, etc.) are all linked to poor medication adherence [5]. Earlier studies suggest that having good knowledge and education of disease among diabetes patients enhances good care, early detection, prevention and minimizing of complications, as well as improvements in the quality of life in patients with diabetes mellitus [6].

Patients' beliefs regarding the need for and concerns with taking their prescribed medications, as well as the relationships among these opinions and observed adherence. The subject's opinion on the necessity of taking the prescribed medication to maintain their health both now and in the future, as well as their worries about any negative side effects e.g., becoming too dependent on the medication or that regular use would lead to long-term adverse effects [8]. The patient's adherence to their medication may be affected by the beliefs they hold regarding medicines being used. In the treatment of DM, patient beliefs are a crucial component for attaining optimal glycaemia control, the subsequent management of DM, and the decrease of its complications. Patient views about medicine are an important variable that determines achieving good medication adherence [9].

Medication adherence is a complicated process that depends on a wide range of variables. Poor and insufficient glycaemia management in people with Type 2 diabetes mellitus (DM) is a significant public health concern that hastens the onset of diabetes related complications [5]. Adherence to diabetic medication has a major role in management and achieving good glycaemia control. Hence, prevents mortality and morbidity due to diabetes mellitus. This study helps to promote improved diabetes management by identifying the patient related factors like (knowledge about the disease, socioeconomic status, medication beliefs, diet, physical activity, direct cost involved in the treatment) and its association with the medication adherence among diabetes patients. Identifying these factors among patients helps to improve the diabetes therapeutic outcome by increasing adherence to medication. Thus, helps to reduce incidence of complications related to type 2 diabetes mellitus.

MATERIALS AND METHODS

Study site: The study was conducted in an out-patient Eshwar day care out-patient clinic Sahakar nagar, Bengaluru.

Study Design: This is a Cross Sectional Observational Study.

Duration: 6 months (2022)

Study Criteria: A total of 62 subjects were collected out of which 58 subjects were selected for the study.

Inclusion Criteria

1. Patients diagnosed with type II DM and prescribed with at least one oral anti diabetic medication.
2. Patients who are willing to provide consent to the study.

Exclusion Criteria:

1. Pregnant women diagnosed with diabetes mellitus
2. Patients diagnosed with type I DM and other types

Ethical approval: The study was approved by Institutional Ethics Committee of Acharya and BM Reddy College of pharmacy, Bengaluru-560107, Karnataka, India.

Data Collectors: Self-Administered questionnaire was used, distributed by investigators and collected from the patients.

Data Collection Tools: Questionnaire was prepared in English and kannada comprising of 4 parts to record data regarding demographic characteristics, diabetes knowledge questionnaire, Simplified medication adherence scale consists of 5 questions and beliefs about medicine consisting of total of 8 questions. The demographic details included age, gender, educational and Occupational status, monthly income, family history of diabetes and co-morbidities.

Study Procedure: This was an observational cross-sectional study; subjects for the study were identified by the investigators visiting an out-patient clinic based on the inclusion and exclusion criteria. The subjects were explained about the purpose of the study and the consent was obtained. Relevant data (Subjects demographic/ socio-economic details) were recorded on the data collection form, and the subjects were administered other study tools to obtain relevant data on diabetes knowledge, medication adherence and belief about medicines. The data then, obtained was entered in Microsoft Excel Sheet and the obtained was analyzed appropriately.

Statistical Analysis: All recorded data were entered using MS Excel software and analyzed using SPSS 22 version 29.0 software for determining the statistical significance. The correlation was done using Pearson product correlation coefficient between two different variables (knowledge and medication adherence/ socio-economic levels and medication adherence/ medication adherence and fasting blood sugar levels). The results were expressed based on significance of p-value and the correlation between the variables were expressed if they

had direct relationship or inverse relationship between two variables.

RESULTS & DISCUSSION

The study included a total of 58 subjects as per the inclusion criteria and exclusion criteria after obtaining consent from the subjects. The study was conducted for a period of 3 months at an out-patient clinic in Sahakar Nagar, Bengaluru.

Age Distribution of Subjects

Out of 58 subjects who participated in the study, 11 (18.9%) subjects belonged to age group of 30-39, 17 (29.3%) subjects belong to age group of 40-49 and, 17 (29.31%) subjects belonged to age 50-59, 10 (17.24%) subjects belonged to the group 60-69 and 3 (5.1%) subjects belong to the group 70-79. The mean age was found to be 49.89.

Table 1: Distribution of Subjects According to Age (Years)

Age in years	Number of subjects (n)	Percentage (%)
30-39	11	18.9
40-49	17	29.31
50-59	17	29.31
60-69	10	17.24
70-79	03	5.1
Total	58	100

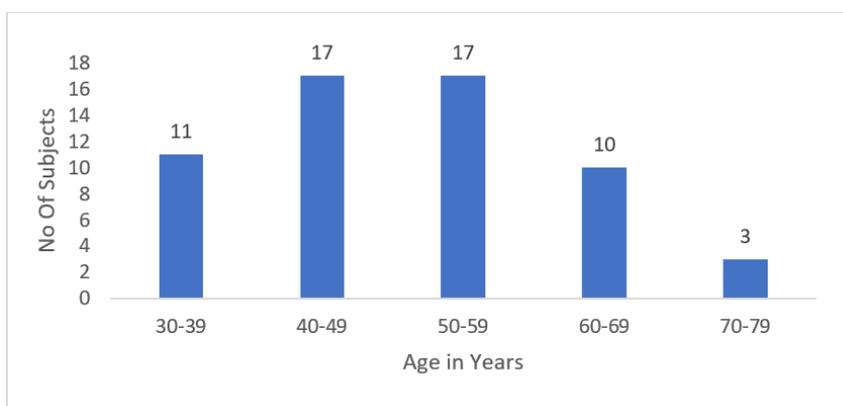


Figure 1: Distribution of subjects according to age (years)

Distribution of Subjects by Gender: Out of 58 subjects included, 31 (53.4%) subjects were male and 27 (47.5%) subjects were female.

Table 2: Distribution of Subjects Based on Gender

Gender	Number of subjects (n)	Percentage (%)
Male	31	53.44
Female	27	47.5
Total	58	100

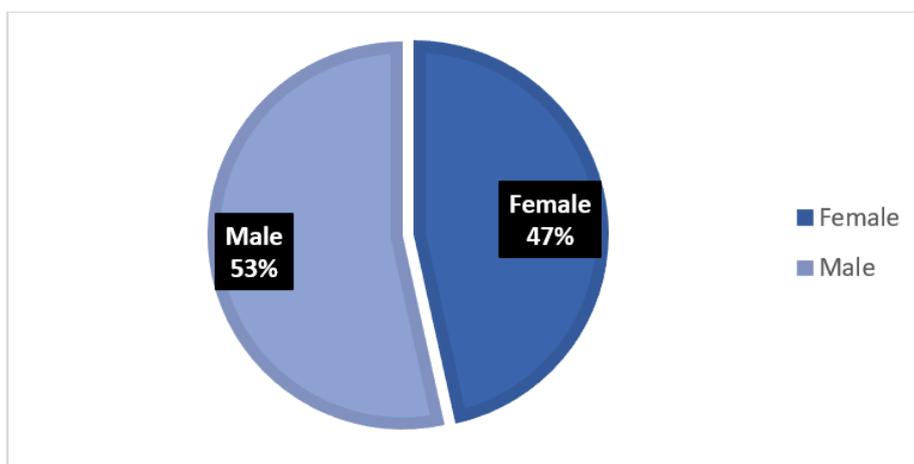


Figure 2: Distribution of subjects based on gender

Distribution of Subjects Based on Educational Status:

Out of 58 subjects included in the study, the subjects were categorized based on educational status of

head of the family as follows. Majority of subjects 24 (41.37%) belong to graduate level and least no of subjects belong to middle school level and post graduate level 3 (5.17%).

Table 3: Distribution of Subjects on Educational Status

Education of head	No of subjects (n)	Percentage in (%)
Post graduate or professional degree	3	5.17
Graduate degree	24	41.37
Higher secondary certificate	12	20.68
High school certificate	4	6.89
Middle school certificate	3	5.17
Illiterate	12	20.6
Total	58	100

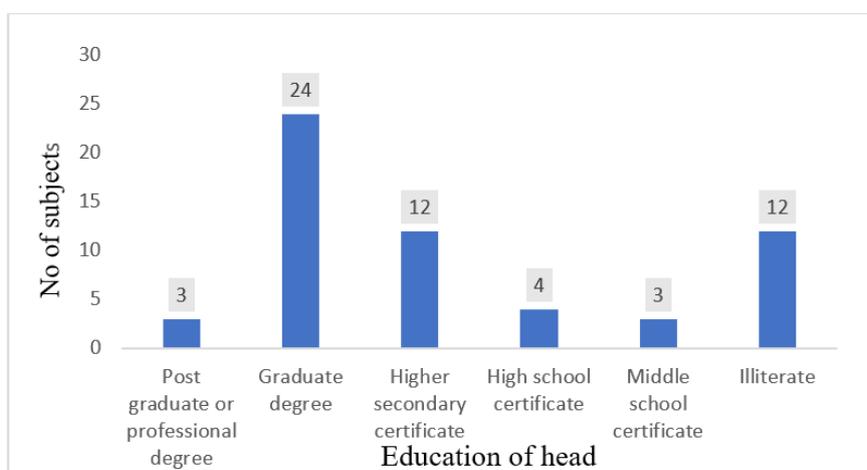


Figure 3: Distribution of subjects on educational status

Distribution of Subjects Based on Occupational Status:

Out of 58 subjects, the subjects were categorized based on occupational status of the head of the family. Majority of the subjects 24 (41.38%) involved

in the study were professionals, other subjects 11 (18.97%) were skilled workers, 8 (13.79%) were semi-professional, 7 (12.07%) were unemployed, 4 (6.9%) were unskilled, 3 (5.17%) were semi-skilled workers and 1 (1.72%)

Table 4: Distribution of Subjects Based on Occupational Status

Occupation	No of subjects	Percentage (%)
Professional	24	41.38
Semi-professional	8	13.79
Arithmetic skill jobs	1	1.72
Skilled worker	11	18.97
Semi-skilled worker	3	5.17
Unskilled	4	6.90
Unemployed	7	12.07

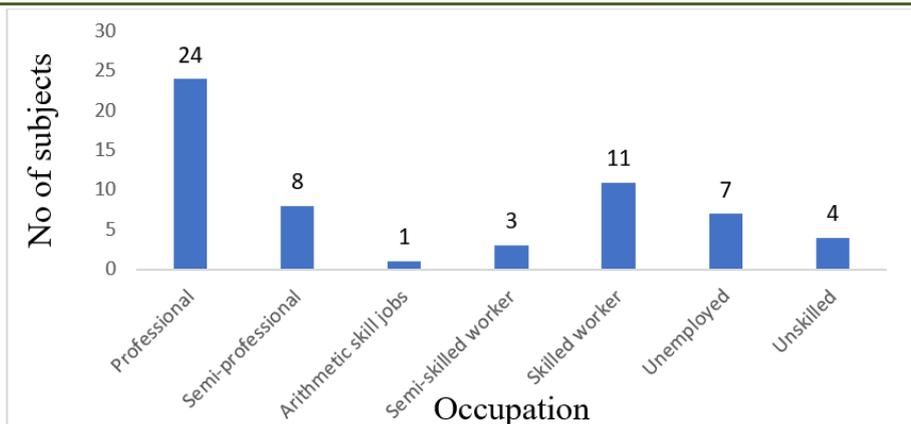


Figure 4: Distribution of subjects based on occupational status

Distribution of Subjects Based on Monthly Income:

A total of 58 subjects involved in the study, the subjects were categorized based on monthly income of head of family. Majority of subjects 17 (29%) had

monthly income of rupees 47348 and above and least no of subjects 3 (5%) had monthly income of rupees 2390 or less.

Table 5: Distribution of Subjects Based on Monthly Income

Monthly income (Rs)	No of subjects (n)	Percentage (%)
Less than 2390	3	5
2391 - 7101	5	9
7102 – 11836	6	10
11837 – 17755	9	16
17756 – 23673	4	7
23674 - 47347	17	24
47348 and above	14	29
Total	58	100

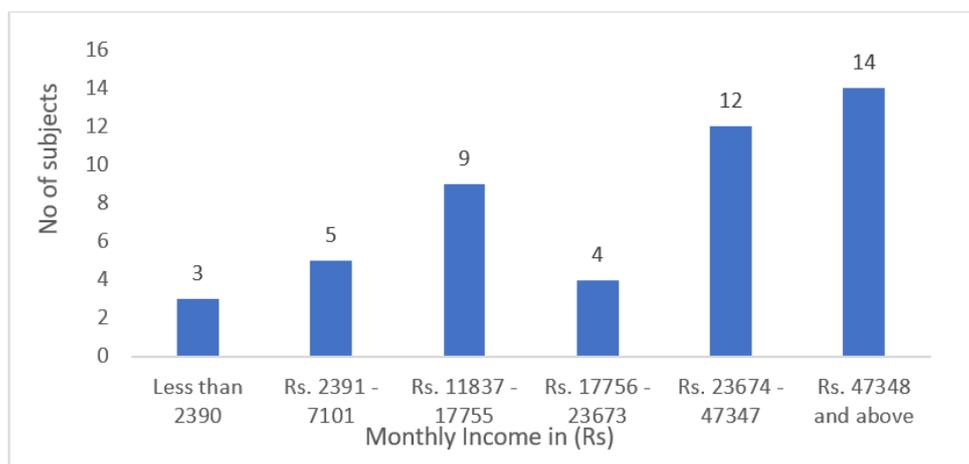


Figure 5: Distribution of subjects based on monthly income

Distribution of Subjects Based on Family History of Diabetes:

Among 58 subjects included in the study, 48 (83%) subjects presented with family history of diabetes irrespective of gender of the subject.

Distribution of Subjects Based on Type of Screening Test:

Out of 58 subjects included in the study, different types of diagnostic tests used among the

subjects were FBS, PPBS and HBA1C. Among these, most commonly used test was found to be FBS 42 (74 %) followed by PPBS 11 (19 %) and HBA1C 7 (7%).

Distribution of Subjects Based on Diabetic Diet:

Among the total subjects involved in the study, 35 (60%) of the study subjects followed diabetic diet on daily basis while 23 (39%) of the study subjects did not follow diabetic diet or followed other diet plans.

Distribution of Subjects Based Consumption of Alcohol /Smoking:

Among 58 subjects involved in the study, 31 (53%) among them had no habits and 19 (33%) of the total subjects reported to consumption of alcohol and 8 (14%) among the subjects reported to smoking.

Distribution of Subjects Based on Physical Activity:

Among the total subjects involved in the study, 31 (53%) of the study subjects followed routine physical activity like walking/ Brisk walking/climbing stairs/cycling on daily basis while 27 (46.57%) of the study subject were not indulged in any kind physical activity.

Table 6: Distribution of Subjects Based on Physical Activity

Physical activity	No of subjects (n)	Percentage (%)
Yes	31	53.43
No	27	46.57
Total	58	100

Distribution of Subjects Based on Socio-Economic Status:

Classification of subjects to varied socio-economic levels was done using the Kuppaswamy socio-economic status scale. Among 58 subjects involved in

the study, 36, (62%) subjects belong to upper and upper middle class, 8 (14%) subjects belong to lower middle class, 11 (19%) subjects belong to upper lower class and 3 (5%) of the subjects belong to lower class.

Table 7: Distribution of subjects based on Socio-economic status

Socio-economic status	No of subjects (n)	Percentage (%)
Upper	18	31
Upper middle	18	31
Lower	8	14
Upper lower	11	19
Lower	3	5
Total	58	100

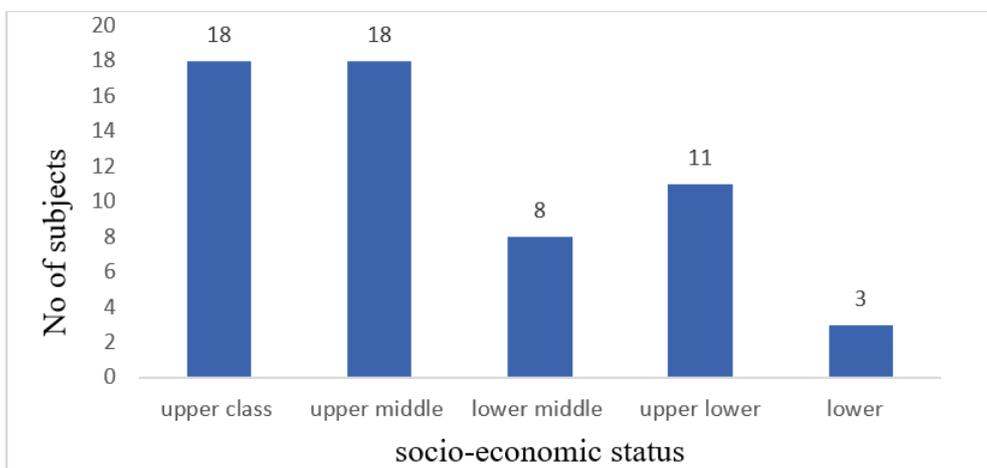


Figure 6: Distribution of subjects based on Socio-economic status

Distribution of Subjects Based on Co-Morbidities:

Most commonly seen co-morbidities among the included study subjects was found to be hypertension, and thyroid disorders. Among 58 subjects 41 (71%) were found to have no co-morbidities and 13 (22%) had hypertension and 4 (7%) had thyroid disorders.

Distribution of Subjects Based on Knowledge Score:

Knowledge score was assessed for twenty-four questions included in diabetes knowledge test

questionnaire. Scoring was done by was assigning 1 point to each incorrect answer for all 24 questions. The level of knowledge was classified as Good, Average and poor with scores of 1-8, 9-16 and 17-24 respectively. Among 58 subjects involved in the study, 30 (51.7%) subjects had scores between 1-8, indicative of good knowledge about disease, 19 (32.75%) subjects had scores between 9-16 indicative of average knowledge about disease and 9 (15.5%) subjects had scores between 17-24 indicative of poor knowledge.

Table 8: Distribution of Subjects Based on Knowledge Score

Level of knowledge	Score	No of subjects (n)	Percentage (%)
Good	1-8	30	52
Average	9-16	19	33
Poor	17-24	9	16
Total		24	58

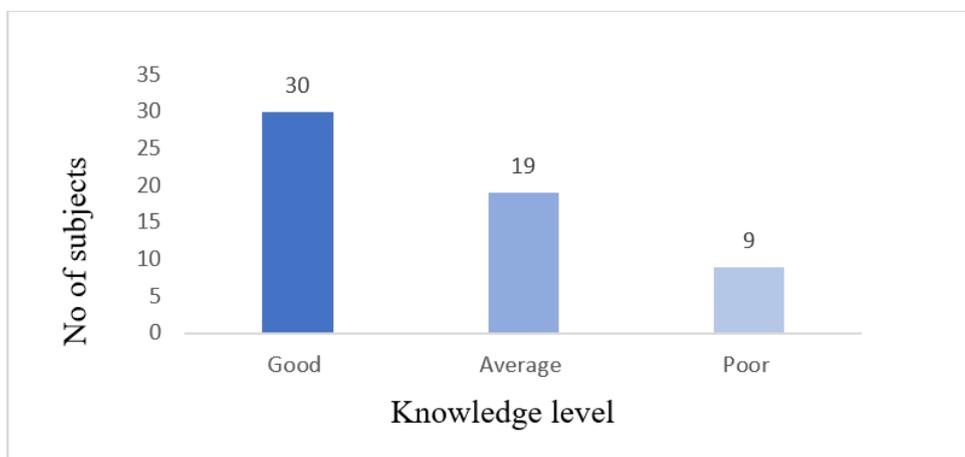


Figure 7: Distribution of subjects based on knowledge score

Analysis of Medication Adherence on Subjects Using Medication Adherence Questionnaire

Medication adherence score was assessed for 5 questions included in Simplified Medication Adherence Questionnaire. Scoring was done by was assigning 1 point to each incorrect answer for all 5 questions. Subjects with score of 3 and >3 were considered non-adherent and a score of <2 were considered adherent to medication.

The scoring was done based on the subjects’ responses, providing one point to below questions. If subjects’ response was seen as mentioned below then the subject was considered non-adherent. Based on scoring the subjects were assigned with scores and subjects were categorized as ‘Adherent’ and ‘Non -adherent’ as shown in table 9.

Table 9: Distribution of Subjects Based on Medication Adherence Score

Medication Adherence	No of Patients (n)	Percentage (%)
Adherent	34	59
Non-Adherent	24	41
Total	58	100

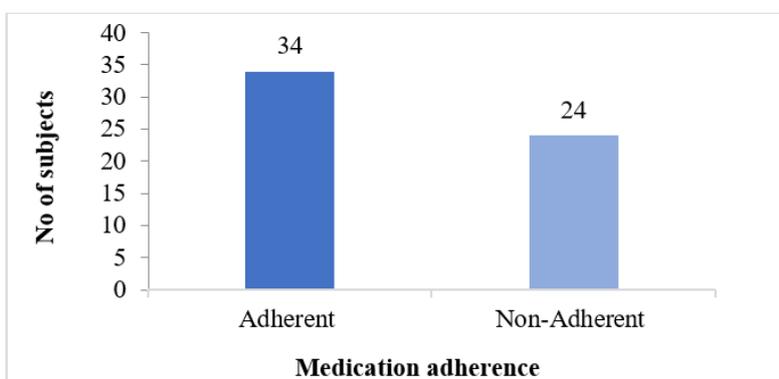


Figure 8: Distribution of subjects’ response based on medication adherence score.

Distribution of Subjects Based on Response to Beliefs about Medicine Questions:

Subjects were administered a belief about medicine questionnaire to assess patients’ beliefs about

the medication used for diabetes mellitus. The beliefs of the subjects towards the medication being used, is indicative of subject’s perspective about their use of medicine and its influence on disease management and

how it effects the subject’s adherence levels. A total of 8 questions were administered to the subjects to assess their beliefs about medication.

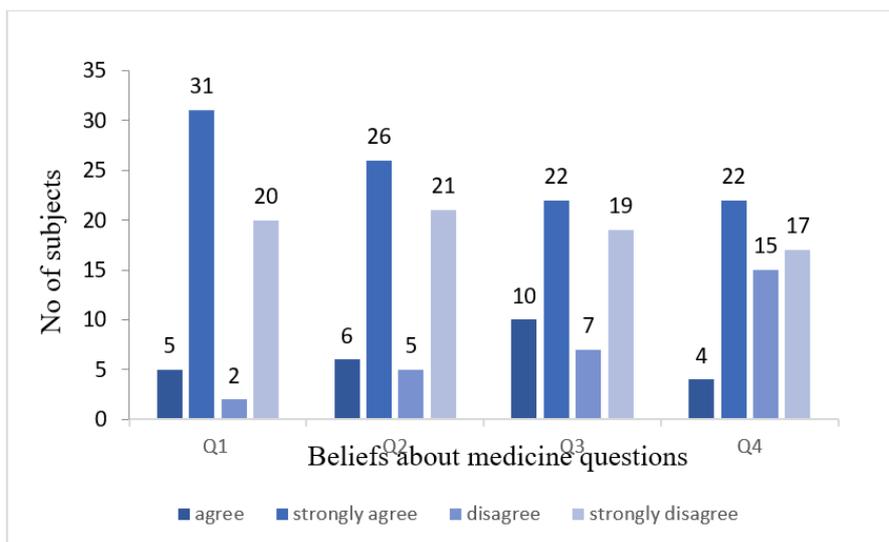


Figure 9.1: Distribution of subject’s response based on beliefs about medicine questions (B1-B4)

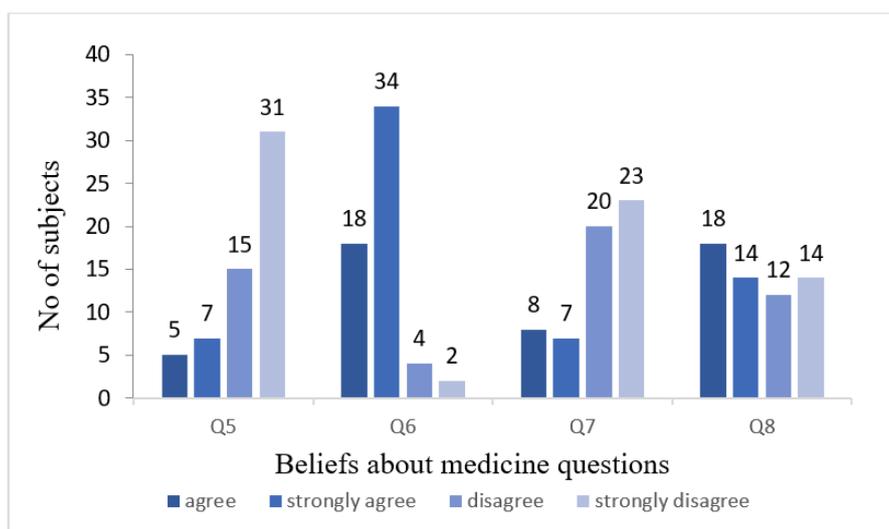


Figure 9.2: Distribution of subject’s response based on beliefs about medicine questions (B5-B8)

The association between variables and medication adherence was done using Pearson product correlation coefficient between two different variables (knowledge and medication adherence/ socio-economic levels and medication adherence/ medication adherence and fasting blood sugar levels).

Association Between Knowledge About Diabetes and Medication Adherence

The study observed a high positive correlation (r=0.532) between medication adherence and diabetes knowledge indicating good knowledge about disease among patients increase medication adherence.

Table 10: Association between knowledge about diabetes and medication adherence

		Diabetes Knowledge	Medication Adherence
Diabetes Knowledge Score	Pearson Correlation	1	.532**
	Sig. (2-tailed)		<.001
	N	58	58
Medication Adherence	Pearson Correlation	.532**	1
	Sig. (2-tailed)	<.001	
	N	58	58

Association between Socio-Economic Status and Medication Adherence

The study observed that, socio-economic levels of the subject when associated with levels of diabetes medication adherence, Subjects with a higher monthly family income had higher adherence and those with lower monthly income had lower adherence. There is a high positive correlation (r=0.595) (p value)

Association between Medication Adherence and Glucose Levels

The study observed a low positive correlation (r=0.087) (p-value 0.517) between medication adherence

and glucose levels indicating high medication adherence was associated with better glycaemic control.

Association between Knowledge About Diabetes and Socio-Economic Status and Medication Adherence

The study observed a high positive correlation (r=0.595) between socio-economic status and medication adherence (r=0.144) (p value < 0.001). It was also observed that there is a low positive correlation between socio-economic status and glucose levels with significance value of 0.282. Good socio-economic levels showed increase in medication adherence and was associated with better glycaemic control among the subjects.

Table 11: Association Between Knowledge About Diabetes, Socio-Economic Status and Medication Adherence

		Medication Adherence	Glucose Level	SES
Medication Adherence	Pearson Correlation	1	.087	.595**
	Sig. (2-tailed)		.517	<.001
	N	58	58	58
Glucose Level	Pearson Correlation	.087	1	.144
	Sig. (2-tailed)	.517		.282
	N	58	58	58
SES	Pearson Correlation	.595**	.144	1
	Sig. (2-tailed)	<.001	.282	
	N	58	58	58

Association Between Knowledge About Diabetes and Socio-Economic Status and Medication Adherence for Normal FBS

The study observed a high positive correlation (r=0.594) (p value 0.003) between diabetes knowledge,

socio-economic status and medication adherence for respondents with normal glucose levels indicating having good knowledge, better socio-economic status had better medication adherence among the subjects associated with good glycaemic control.

Table 13: Association Between Knowledge About Diabetes, Socio-Economic Status and Medication Adherence for Normal FBS

		Medication Adherence	SES	Diabetes Knowledge
Medication Adherence	Pearson Correlation	1	.594**	.542**
	Sig. (2-tailed)		.003	.008
	N	23	23	23
SES	Pearson Correlation	.594**	1	.481*
	Sig. (2-tailed)	.003		.020
	N	23	23	23
Diabetes Knowledge	Pearson Correlation	.542**	.481*	1
	Sig. (2-tailed)	.008	.020	
	N	23	23	23

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Glucose Level = Normal

Association between Knowledge about Diabetes and Socio-Economic Status and Medication Adherence for Elevated Fbs

The study observed a high positive correlation (r=0.536) (a p value less than 0.001) between diabetes

knowledge, socio-economic status and medication adherence for elevated glucose levels indicating a direct relationship between the all three variables as shown in table 14.

Table 14: Association between knowledge about Diabetes, Socio-Economic Status and Medication Adherence for Elevated FBS

		Medication Adherence	SES	Diabetes Knowledge
Medication Adherence	Pearson Correlation	1	.604**	.536**
	Sig. (2-tailed)		<.001	<.001
	N	35	35	35
SES	Pearson Correlation	.604**	1	.759**
	Sig. (2-tailed)	<.001		<.001
	N	35	35	35
Diabetes Knowledge	Pearson Correlation	.536**	.759**	1
	Sig. (2-tailed)	<.001	<.001	
	N	35	35	35
**. Correlation is significant at the 0.01 level (2-tailed). a. Glucose Level = Elevated level				

Relating various other factors and medication adherence affecting therapeutic outcomes can be assessed. This study can be used in enhancing strategical management of diabetes among diabetes mellitus patients. The study will provide guidance to the health care professionals in educating patients about the importance of medication adherence and glycaemic management among diabetes patients. This study can be conducted in larger population including both urban and rural population to assess major patient related factors affecting medication adherence among diabetes patients.

CONCLUSION

Diabetes is a chronic and advancing disease with an increasing worldwide burden of the disease. Poor medication adherence among type2 diabetes mellitus patients is associated with inadequate glycemic control, increased hospitalization, increase the risk of complications, increased mortality and morbidity. Medication adherence plays a prominent role in the management and prevention of diabetes and diabetes related complications.

In this study, it was found that significant factors like being male, having higher income, high socio-economic levels, following diabetic diet, maintaining physical activity on a regular basis, good knowledge about the disease and having stronger beliefs about medicines and their use were highly adherent to anti-diabetic medications indicating high medication adherence levels.

Subjects with high levels of medication adherence had a good glycemic control. Subjects having good knowledge about the disease had better medication adherence and was associated with better glycemic control.

Beliefs about medicines was suboptimal, with subjects having stronger beliefs towards use of medicine were comparatively highly adherent to medicines than those who had negative beliefs about medicines. Subjects' knowledge and beliefs about medicine are

crucial factors that are significantly associated with medication adherence. By improving and educating patients knowledge.

Regarding the disease and medications may have a good impact on medication compliance and management of the disease.

Counselling the subjects regarding the importance of self-care behavior, following a diabetic diet and being physical active in addition to medication compliance ensuring a strategic diabetic management and therapeutic outcome.

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