

Original Research Article

Prevalence of non-adherence to management plan and lifestyle advice among type 2 diabetes mellitus patients and its associated factors in rural north Kerala: a community based cross-sectional study

Remya Thattarath Kottayi*, Usha Karunakaran

Department of Community Medicine, Government Medical College, Kannur, Kerala, India

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*Correspondence:

Dr. Remya Thattarath Kottayi,
E-mail: drremyadm@gmail.com

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ABSTRACT

Background: The prevalence of diabetes mellitus is increasing especially in developing countries, along with rise in obesity and sedentary lifestyle. The complication due to diabetes are also leading to serious public health problem.

Methods: A community based cross sectional study conducted among 240 study participants with type 2 diabetes mellitus above 18 years in north Kerala. Four wards are selected by using cluster sampling. Data was collected by interview using semi structured questionnaire with scoring, then categorized as non-adherent and good adherent for medication, diet and physical activity.

Results: There were 240 study participants with mean age of 63 ± 9.42 years. 63% were having comorbidity other than Diabetes, among them HTN (50.7%) was most common followed by dyslipidemia. 62% were taking treatment from public health sector. The duration of diabetes between 5 years and 10 years were 42.1% (majority). 19% were having complication. Among the 240 study participants only 7% were non adherent to medication, 34.5% to diet and 51.2% to physical activity. There was a significant association noted among non-adherence to physical activity in elderly age group and those who take treatment from government hospital. Those who were non adherent to diet had an unsatisfactory blood sugar value. Patients with short duration of diabetes, employed and those with no comorbidities were non adherent to medication.

Conclusions: The study shows that only 7% participants are non-adherent to diabetic medication. But more than half of the participants are non-adherent to exercise and one third are non-adherent to diet.

Keywords: Adherence, Diabetic, Diet and exercise, Non-adherence

INTRODUCTION

Approximately 830 million people worldwide have diabetes, with the majority living in low- and middle-income countries (LMICs). Over half of these individuals are not receiving treatment for their condition, and both the total number of people with diabetes and the number untreated have risen significantly in recent decades.¹ According to WHO, 77 million people in India above 18 years are suffering from type 2 diabetes. Adults with diabetes have a two-to-three-fold increased risk of experiencing heart attacks and strokes compared to those

without diabetes, due to damage caused by high blood sugar to blood vessels and nerves that regulate the heart and circulatory system. The disease is not only affecting individuals' health, but also influence the economic status of the individual. There is an increase in prevalence of diabetes in Kerala when compared to other states. The complication due to diabetes is also leading to serious public health problem

Diabetes mellitus is a systemic disorder that can seriously damage the eyes, heart, kidneys, nerves, and limbs, potentially leading to blindness, heart attacks, kidney

failure, and limb amputation; however, early diagnosis and timely, appropriate treatment can largely prevent or reverse damage to many organs.² To prevent the complication of diabetes, diabetics need to control blood sugar levels.

Effective management of diabetes is possible only if patient take a diabetic diet and do exercise along with drug intake.² So, adherence to this is the important factor to control diabetes. It lowers hospital admission, health cost and mortality.

There may be several reasons for non-adherence with diabetic lifestyle management. Either because of a false impression of medicine, ignorance of the illness and its complications, a lack of support from family members, or the inability to engage in physical exercise or financial difficulties or old age problems.

The objective of the study was to know about the nonadherence status of diabetic people towards medicine, lifestyle change and diet and also to determine the factors associated with non-adherence.

METHODS

A community based cross sectional study in north Kerala type 2 diabetes mellitus patients of above 18 years age who were residing in Cheruthazham Panchayath (village).

Bedridden patients, patients with mental disabilities and migrants were excluded from the study.

Sample size

According to a cross-sectional study done by Shankar et al in a rural area in Kerala the prevalence for non-adherence to diabetes medication was 74% so by taking formula Z^2pq/d^2 , the sample size of the study was 240.³

Sampling method was cluster sampling, Cheruthazham Panchayath has 17 wards, here wards were considered as the basic sampling unit. The number of clusters (wards) to be studied was measured as sample size/average number of responses per cluster = $240/60 = 4$.

Study period

The study took place for a period of 12 months from May 2023 to April 2024.

Study tool

Data was collected by interview using a questionnaire which includes details about socio demographic profile, diabetic profile, for calculating non-adherence to medication a validated 12 item questionnaire done by Anuradha et al after obtaining her permission, for diabetic diet a semi structured questionnaire included 20 questions and 9 question for physical activity.⁴ Most of the

questions were adopted from previous studies which were validated in their study, it was modified according to local needs of the study population for diet pattern and exercise.

The questionnaire in English was then translated by a language expert in to Malayalam. Another expert re-translated the Malayalam version back to English and this was correlated with the original questionnaire. Minor corrections were made accordingly. The Malayalam version was used to collect data from the community.

The questionnaire was pre tested for content by experts and pilot study done.

For medication, diet and physical activity the scoring was done as follows: medication non adherence- total score was 12, less than 4 reflects poor adherence. Diet non adherence- the scores were derived from dietary recall and questionnaire tools measuring the quality and quantity of diet consumed, with specific cut-off values for each type. Physical activity non adherence- less than 150 minutes of physical activity per week.

Operation definition

Adherence implies “person behaviour in taking anti diabetic medication and lifestyle changes, corresponds with agreed recommendations from a health care provider. Those who doesn’t follow the advice were considered as non-adherent”. Management plan means treatment with medicine. The control status of blood sugar value is defined as satisfactory if the recorded sugar value of the participant is less than 180 in case of post prandial and less than 125 in case of fasting blood sugar in diabetic patients.⁵

People living with chronic conditions should do at least 150-300 minutes of moderate-intensity aerobic physical activity; or at least 75-150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week.⁶ Moderate intensity aerobic physical activity means “person who worked hard enough to raise your heart rate and break a sweat (that means one may be able to talk, but not be able to sing while doing physical activity).” Example-brisk walking, cycling, running, climbing stairs, swimming, dancing, playing, yoga, gym etc.

Analysis

The data was coded, entered in Microsoft Excel spreadsheet and was analysed using SPSS (Statistical Package for Social Sciences) software 21. Continuous variables were expressed as mean, standard deviation, median and interquartile range. Categorical variables as frequencies and percentages. Inferential statistical techniques like Chi-square test, Fisher’s exact test was used to test significance of association between categorical variables. ‘p’ value of less than 0.05 was

taken as significant, where the data was normally distributed, independent sample t-test done and for skewed data Mann Whitney U test was done.

RESULTS

Study was conducted among 240 study participants of age more than 18 years. The mean age of the participants was 63 ± 9.42 years. The age of study participants ranged from 31 to 87 years. The majority 103 participants (42%) belonged to age group 61-70 years. The male and female participants were 96 (40%) and 144 (60%) respectively. The age group 61-70 years showed slight increase in male participants. The majority participants belonged to Hindu

religion (88.7%). It showed that majority were married (87%). The education status of patients, showed that majority 100 were studied up to high school (41.6%) and only 6 (2.5%) were illiterate. Employment status of participants shows that 98 (41%) were currently employed and 142 (59%) were unemployed (including pensioners and house wife). As per modified BG Prasad scale it showed that majority were upper middle class (32.9%) followed by middle class 26.3%, lower middle class 20.8%, upper class 15.4% and lower class 4.6%. The duration of diabetes, 42.1% were in between 5 years and 10 years, 32.5% belong to less than 5 years and 25.4% belong to more than 10 years. 19% were having complication.

Table 1: Frequency of food consumption in a week.

Name of food in a week	Never (%)	Sometimes (%)	Always (%)
Cereals (other than rice)	17 (7.08)	185 (77.08)	35 (14.58)
Pulses	19 (7.91)	192 (80)	29 (12.08)
vegetables	4 (1.66)	136 (56.66)	100 (41.66)
Fish	28 (11.66)	131 (54.58)	81 (33.75)
Meat	43 (17.91)	188 (78.33)	9 (3.75)
Fruits	32 (13.33)	156 (65)	52 (21.66)
Oily food	154 (64.16)	50 (20.83)	36 (15)

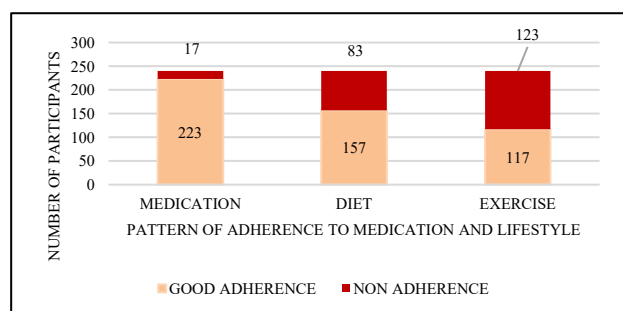


Figure 1: Non adherence to medication and life style.

Among the 240 study participants Non adherence to medication is 7%, diet 34.5% and physical activity 51.2%.

Among 240 diabetes patients 63% of the patients were having other comorbidities. Hypertension was the most common (50.7%) followed by dyslipidemia, coronary artery disease, thyroid disorder, COPD, CKD and cancer.

As per Asian BMI Classification it shows that among 240 participants 161 (67%) of the study participants were included under overweight and obese, whereas 73 (30.4%) were normal weight and 6 (2.5%) were underweight

Among the participants (240) only 19% had complication among that 78.2% cases presented peripheral neuropathy, followed by nephropathy (6.5%), retinopathy (4.3%) and others (10.8%). 59% were having unsatisfactory glycemic value.

The main reason for non-adherence was forgetfulness, that was around 50% followed by 21% skip medicine when they were better.

Among the participants 78.33% had 4 times meal and 10.41% had 5 times and above. The frequency of rice intake in a day was 1-2 times by most of the participants that was 203 (84.58%), followed by 33 had rice more than 3 time and 4 participants never had rice.

41.6% majority had vegetables daily, followed by fish (33.75%) and fruits (21.66%). The oily food is avoided by 64.16% participants. 74 (30.83%) always had sweets whereas 54.16% had sweets sometimes in a month, 14.98% never had sweets.

Among the participants the majority of the participants 123 (51.2%) were non-adherent to physical activity, whereas moderately intensive physical activity for 150 minutes in a week done by 35 (14.98%) participants only. Light intensive physical activities 150 minutes in a week done by 82 (34.16%) participants.

Factors associated with medication and lifestyle non adherence

There was a significant association noted among those who were non adherent to diet had an unsatisfactory blood sugar value and among non-adherence to physical activity in elderly age group and those who take treatment from government hospital and those with no complication.

Table 2: Age and medication non adherence.

Domain	Categories	Mean (years)	SD	P value
Age	Non adherence medication	58.04	10.6	0.023*
	Good adherence medication	63.44	9.24	

*t-test.

Table 3: Duration of diabetes with medication non adherence.

Domain	Categories	Mean	SD	Median	Interquartile range	P value
Duration	Non adherence	6.32	6.4	4	8	0.043*
	Good adherence	8.90	7.3	6	8	

*Mann-Whitney U test.

Table 4: Age and physical activity.

Domain	Categories	Mean	SD	P value
Age	Non adherence to physical activity	64.94	9.39	0.001*
	Good adherence to physical activity	61.09	9.08	

t-test *

Table 5: Duration of diabetes and physical activity non adherence.

Domain	Categories	Mean	SD	Median	Interquartile range	P value
Duration of diabetes	Non adherence	8.95	7.47	6	7.5	0.532*
	Good adherence	8.20	7.15	6	7.3	

Mann-Whitney Test *

Table 6: Factors associated with non adherence to medication.

Factors	Category	Non adherence (%)	Adherence (%)	P value
Gender	Male	5 (5.2)	91 (94.8)	0.355#
	Female	12 (8.3)	132 (91.7)	
Education	Above high school	6 (11.3)	47 (88.7)	0.221*
	High school and below	11 (5.9)	176 (94.1)	
Marital status	Married	16 (7.7)	193 (92.3)	0.325*
	Others	1 (3.2)	30 (96.8)	
Employment	Currently unemployed	6 (4.2)	136 (95.8)	0.038#
	Employed	11 (11.2)	87 (88.8)	
SES	Upper class	0	37 (100)	0.311#
	Upper middle class	7 (8.9)	72 (91.1)	
	Middle class	6 (9.5)	57 (90.5)	
	Lower middle	4 (8)	46 (92)	
	Lower class	0	11 (100)	
BMI	Normal and below	6 (7.6)	73 (92.4)	0.829#
	Overweight and above	11 (6.8)	150 (93.2)	
Comorbidities	Present	6 (3.9)	146 (96.1)	0.013#
	Absent	11 (12.5)	77 (87.5)	
Glycemic Control	Satisfactory	4 (4.1)	94 (95.9)	0.132#
	Unsatisfactory	13 (9.2)	129 (90.8)	
Facility from where treatment availed	Government	9 (6.1)	139 (93.9)	0.443#
	Private	8 (8.7)	84 (91.3)	
Complications	Present	5 (10.9)	41 (89.1)	0.333*
	Absent	12 (6.2)	182 (93.8)	
Checked blood sugar levels in last 3 months	Yes	17 (7.8)	202 (92.2)	0.185#
	No	0	21 (100)	

#Chi-square test, * Fisher exact test

DISCUSSION

A community based cross sectional study was conducted among 240 diabetes patients. The mean age of the study participants was 63 ± 9.42 years. The majority belong to 61-70 years followed by 51-60 years. This was similar to study conducted in Kerala by Jaya et al most patients were aged 46-69 years.⁷ The same study showed that more respondents were females (59%) than males (41%), which is similar to my study.

In this study only 7% of the participants were non-adherent to medication this was contrary to a study done in Kerala in 2013 by Shankar et al were 74% were non-adherent.³ This can be due to long gap in both study and it indirectly shows that there was a good improvement in the medication adherence status, but it was similar to a study conducted by Balamurugan et al in which 11% were non adherent to treatment.⁸

As per a study in Andhra by Pattnaik et al found non adherence to medication was only 9.7% and also shows that increasing age and time since diagnosis of diabetes was found to be significantly associated with good compliance this was similar to this study.⁹

According to Jahan et al, non-adherence rate for diet was 88% and for exercise 25%.¹⁰ There was significant relation found between non-adherence to diet and uncontrolled blood glucose on Chi-squared test, which was similar to this study, but diet non adherence in this study was 34.5%.

In the present study 51.2% were non-adherent to physical activity which was similar to study by Parajuli et al in which 42.1% were nonadherent.¹¹

In this study there was a significant association with increase in age and non-adherence to physical activity. Physical activity was undertaken by 34% of patients with diabetes according to Thomas et al in which they also noted a significant association with age.¹²

The main reason for medication nonadherence was forgetfulness which was similar to many studies some are, Padmanabha et al, Aladhab et al, Khardali et al, Mitiku et al and Alfulayw et al.¹³⁻¹⁷ This issue could be solved by educating the family member to support or remind them.

In this study there was a significant association noted among elderly and medication adherence, this was similar to study done by Mitiku et al, Khardali et al, Alfulayw et al etc. this can be due to their practical experience with medication.¹⁵⁻¹⁷

Another thing noted was duration of diabetes and medication, it was noted that longer the duration, more adherent they are, this was similar to studies done by Alfulayw et al.¹⁷ Longer duration of diabetes might have

made them more aware about the disease, same way multiple comorbid patients are more adherent to medication.

In this study the unemployed including pensioners and housewives are more adherent to medication, this was similar to study done by Mohammed.¹⁷ This could be due to the enough time they can spend for caring themselves.

As per a study by Mumu et al, about 72.9% patients who were non-adhered to diet and had uncontrolled blood sugar value, this was similar to this study in which unsatisfactory blood sugar value shown significant associated with diet non adherence.¹⁰

There was no significant association found in between healthcare type and adherence to diabetes medications and diet adherence in this study was similar to Alfulayw et al.¹⁷ But on contrary there was a significant association noted among physical activity non adherence and participants taking treatment from government hospitals.

This can be due to the health education effect given by private health care. They might be spending more time for the patients whereas it is not significant for medication adherence and diet adherence. These all were depended on patients' behaviour.

There was another significant association noted among participants without complication were more non adherent to physical activity. Those who had complication were more non adherent which was similar to study by Alfulayw et al.¹⁷

Health awareness should be more focused on diet and exercise. Medicine was available free of cost that might be one reason for good adherence to medication and non-adherence to other factors.

Limitations of the study are: self-reported dietary history by recalling and physical activity may be subjective. The blood sugar values were collected from the recorded values from the date of testing and current status of adherence may be different. These factors may underestimate patient's nonadherence status.

CONCLUSION

The study shows that only 7% participants are non-adherent to diabetic medication. But more than half of the participants are non-adherent to exercise and one third are non-adherent to diet. When age was considered, it was noted that younger patients were more non-adherent to medication and elder patients to physical activity.

Even though patients were good adherent to medication they were not equally adherent to diet or physical activity. The diet adherent patients got more satisfactory blood sugar value than the others. This shows that we need to concentrate more on dietary part of diabetes treatment.

This can be done by educating them, giving counselling, and suggesting follow up for diet management. The adherence for physical activity can be improved by introducing game or initiating yoga centres with the help of local self-government.

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Ethical approval: The study was approved by the Institutional Ethics Committee Government medical college, Kannur, Kerala

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