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Original Research Article

Treatment seeking behaviour and control status of selected parameters among non-communicable disease patients

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ABSTRACT

Background: Non-communicable diseases (NCDs) represent a growing health burden worldwide, particularly in India, where access to healthcare is limited. These chronic conditions, including diabetes, hypertension and cardiovascular diseases, require continuous management to prevent complications. This study explores the treatment seeking patterns and current health control status of NCD patients in a rural setting, aiming to identify gaps in healthcare utilization and areas for improvement. To assess treatment seeking behaviour and to determine the control status of selected parameters among NCD patients.

Methods: This is a community based cross-sectional study conducted among individuals residing in Chathamangalam Grama Panchayat of Kozhikode district in Kerala, India. A total of 120 sample participants, aged 35 and above, were selected from the NCD register regarding their diagnosis of hypertension, diabetes mellitus, stroke, coronary artery disease (CAD) and other NCDs. The study collected demographic, behavioural and clinical data, including laboratory results and the treatment adherence status to identify barriers to effective disease management. The data was collected by direct interview using a pretested semi structured questionnaire.

Results: Among 120 NCD patients, about 80% of the hypertensives and 78% of the diabetics were under control. Majority of the patients (60%) were having medical insurance and about 43% rely on public healthcare facilities as their source for medications. The study highlights that only 3.33% of the patients had good treatment adherence, while 42.5% of the participants had poor treatment adherence.

Conclusions: The study findings reflect the inadequate treatment adherence of NCD patients especially hypertension and diabetes in rural settings. There is a present need for comprehensive public health strategies focusing lifestyle modification, regular follow up and direct monitoring.

Keywords: Diabetes, Hypertension, Medication adherence, Non-communicable diseases, Treatment seeking behaviour

INTRODUCTION

Non-communicable diseases (NCDs) are chronic diseases of long duration and generally with slow progression and are the result of a combination of genetic, physiological, environmental and behavioral factors. The main NCDs are: cardiovascular diseases, cancers, respiratory diseases, diabetes and hypertension. Globally, 41 million people die from NCDs each year, which is 74% of all deaths. More than 80% of premature deaths are due to NCDs in low- and middle-income countries.[1] According to World Health Organization (WHO) projections, the total annual number of deaths from NCDs will increase to 55 million by 2030, if timely interventions are not done for prevention and control of NCDs.[2] NCDs have emerged as a major public health challenge in Kerala, accounting for nearly 70% of the disease burden, necessitating strengthened primary care interventions for early

detection, treatment and control. Kerala is considered the diabetic capital of India, with 19.4% prevalence rate.[3] An ICMR-INDIAB study found that Kerala's diabetes prevalence is 23.6%, ranking it third in the country.[4] The effective management of NCDs at the primary level in Kerala emphasizes a decentralized approach through family health centers, which integrate preventive, promotive and curative services to address the rising prevalence

As per WHO, 1 in 4 Indians has a risk of dying from an NCD before they reach the age of 70. According to National Family Health Survey 5 (NFHS 5) report, the prevalence of diabetes is 2.9% and 4.2% in females and males respectively and prevalence of hypertension is 9.9% in females and 16.7% in males.[5]

With NCD burden in India, Ministry of Health and Family Welfare has launched. The National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) since 2010 up to District level under the National Health Mission, now designated as NPNCDS. It has a focus on awareness generation for behavior and life-style changes, screening and early diagnosis of persons with high level of risk factors and their referral to appropriate treatment. The strengthening of infrastructure for screening, early detection, treatment and referral is also envisaged.

Control rates among hypertension patients on treatment has increased from 13% to 38.1% and for the first time defaulters were tracked and was able to decrease the defaulter rate to 27.6% from 55%.[6] Among these factors, adherence, is an important factor in prevention of complications. Non-adherence to treatment plays a major role in increasing the all-cause hospitalization, mortality and out of pocket expenditure among patients with diabetes and/ or hypertension.

This study is particularly relevant in highlighting how rural communities navigate healthcare for chronic conditions and what interventions could improve overall health outcomes. By focusing on treatment seeking behaviour, control status, financial constraints, treatment adherence and access to healthcare services, this research aims to fill the gap in understanding NCD management in underserved rural areas.

METHODS

Study design and setting

A community based cross-sectional study was conducted among people residing in ward 14 of Chathamangalam Grama Panchayat of Kozhikode district, Kerala. This is the community field practice area under Family Adoption Program (FAP), which includes 1300 study population. All the adults (≥30 years and <85 years) diagnosed with at least one NCD one year prior to the study period (June 2024 September 2025) and listed in the NCD register maintained under the Department of Community Medicine has been included in the study (n=120). Data was collected using pre tested semi structured validated questionnaire. The questionnaire consisted of sections like

Demographics

Age, gender, marital status, number of family members, occupation and monthly income. Income was categorized according to standard societal financial classes relevant to rural India.

Medical conditions

Participants reported their diagnosed medical conditions, including the age of diagnosis and whether treatment was initiated immediately. We also collected data on monthly medication costs and whether the participants had medical insurance coverage.

Behavioral data

Data on medication adherence, reasons for discontinuation of treatment, dietary habits, frequency of exercise and physical activity were collected. Additionally, participants were asked about any counseling received for managing their conditions, such as diabetes or hypertension.

Laboratory measurements

Key clinical markers, including random blood sugar (RBS), Fasting blood sugar (FBS), postprandial blood sugar (PPBS) and blood pressure (systolic and diastolic), were measured both at the time of diagnosis and after treatment to assess progression and adherence.

Statistical analysis

The patients were contacted prior to the study, took appointments and conducted direct interview method and rechecked with phone call. All collected data was entered in Microsoft Excel version spread sheet and analysed using SPSS version 26.0 software. The quantitative statistical methods like mean, standard deviation frequencies and proportions were used and qualitative statistics like Chi -square test Fischer's exact test, t tests were used to test significance of association between variables such as gender, socio-economic status and medication adherence. A 'p' value of less than 0.05 was taken as significant.

Ethical consideration

Ethical approval was obtained from the institutional ethics committee. Informed consent was obtained from all participants prior to data collection, ensuring confidentiality and voluntary participation.

Operational definition

Adherence scale

Morisky Medication Adherence Scale (MMAS-8) is used. Patients having a score of 8 were considered to have good adherence. Patient with scores of 6-7 were considered to have moderate adherence. Patients with scores of<6 were considered to have low adherence.[7]

Body mass index

BMI less than 18.49 is underweight,18.5-22.9kg/m2 is normal 23 and 24.9 is overweight, between 25 and 29.9 is obese class I and 30 or more is obese class II according to Asian classification standards. Hypertension is considered controlled if systolic blood pressure is<140 mmhg and diastolic blood pressure<90 mmhg, while diabetes is considered controlled if fasting blood sugar FBS is<126 mg/dl and PPBS >200 mg/dl.

House hold size

Small household (less than 3 members), Medium (4-6 members) and Large (more than 7 members).

RESULTS

The study included a total of 120 participants with various socio demographic backgrounds. The mean age of the study participants was 60.8±9.5 years with minimum of 35 years and maximum of 85 years. In the study, majority (53.33%) belong to the age group 51–65 years. Males constituted 55% of the sample, while 45% were females. Most participants (70%) lived in medium-sized households (4–6 members), while small (15.83%) and large households (14.17%) were less common (Table 1).

Socio-economic classification showed that the majority belonged to the middle-income (38.33%) and upper-middle-income groups (39.17%), with lower-middle (20.83%) and low-income categories (1.67%). Regarding insurance coverage, 60% of participants were insured under any scheme. More than 50% of NCD patients relied on private healthcare for medication, compared to 43.33% using public services and about 42.5% seek treatment from government sector and 58% from private sector.

Multiple NCDs were detected among the participants, with hypertension and diabetes mellitus being the most common, affecting 68.3% and 60%, respectively, as shown in Table 2. The control status among the participants highlights several key concerns that may contribute to poor health outcomes in relation to NCDs. The control status of different parameters is given in Table 3. A significant relationship (p=0.022) was observed, with 44.6% of participants showing controlled fasting blood sugar and 55.4% having uncontrolled levels. Also, a significant difference (p=0.028) was noted in systolic blood pressure levels based on the frequency of diastolic BP control. The study identified uncontrolled risk factors among participants, particularly in lifestyle habits and clinical indicators. Active smoking was reported by 12.5% of participants, while alcohol consumption was noted in 5%. Physical inactivity emerged as a significant concern, with 49.17% of participants engaging in less than 150 minutes of exercise per week.

Elevated systolic blood pressure (>140 mmHg) was observed in 11.17% of participants and 19.17% had diastolic blood pressure exceeding 90 mmHg. Additionally, fasting blood sugar (FBS) levels>110 mg/dL were recorded in 30% of participants and postprandial blood sugar (PPBS) levels>140mg/dL were found in 35.83%. Regarding dietary habits, the majority (86.67%) of participants consumed a mixed diet, with only 13.33% following a vegetarian diet.

The data highlights that only 3.33% of participants exhibited high medication adherence, while 49.17% showed moderate adherence and 42.5% demonstrated poor adherence. Males (55%) exhibited higher adherence than females (45%), with a significant association (p=0.005).

Among participants, 41.7% were diagnosed during routine check-ups, 30% based on symptoms and 28.3% following specific tests, indicating the role of both symptom awareness and preventive screenings in diagnosis. Nearly all participants (99.2%) adhered to allopathic medicine, with 55.8% obtaining medications from private sources and 43.3% relying on government facilities, reflecting diverse access to essential treatments. Healthcare services were primarily accessed at private (56.7%) and government (42.5%) centers (Table 4).

About 92.9% reported hypoglycemia symptoms such as sweating and dizziness, while 67.2% experienced hyperglycemia symptoms, including thirst and frequent urination, highlighting widespread glucose regulation issues. Hypertension-related symptoms, such as headache and vision changes, were reported by 98.6%, while dizziness was common among those with hypotension. Stroke follow-up practices varied, with 1.67% attending follow-ups every six months, 5.83% reporting no follow-ups and 25% seeking follow-ups based on symptoms.

Counselling for diabetes or hypertension was received by 33.5%, primarily through camps or consultations with doctors. Self-care practices were commendable, with 95.8% inspecting their feet, 100% maintaining daily hygiene and 99.2% wearing well-fitting shoes, all of which are essential for managing diabetes-related complications. The study also revealed complications; 80% reported eye problems, 51.4% experienced leg pain, 22.9% suffered hearing loss and 5.7% developed dementia.

Table 1: Socio demographic characteristics.

Category	Frequency (N)	%
Age group (in years)		
51-65	64	53.33
65+	40	33.33
35-50	16	13.33
Gender		
Male	66	55.00
Female	54	45.00
Household size		
Small household	19	15.83
Medium household	84	70.00
Large household	17	14.17
Socio-economic class		
Low income (class v)	2	1.67
Lower-middle income (classiv)	25	20.83
Middle income (class iii)	46	38.33
Upper-middle income (class ii)	47	39.17
Marital status		
Married	111	92.50
Unmarried	9	7.50
Medical insurance		
Yes	72	60.00
No	48	40.00
Source of medication		
Private	67	55.83
Public	52	43.33

Table 2: Distribution of non-communicable diseases (n=120).

Condition	Frequency (N)	%
Hypertension	82	68.3
Diabetes mellitus	72	60
Coronary artery disease	1	0.83
Stroke	2	1.67
Total (n)	120	100

Table 3: Control status among participants (n=120).

Parameters	Frequency (N)	%
BMI		
<23	105	87.50
≥23	15	12.50
Smoking		
Current smoker	15	12.50
Former smoker	4	3.33
Non smoker	101	84.17
Alcohol		
Active consumer	6	5.00
Former consumer	6	5.00
Never consumed	108	90.00
Physical exercise (>150 min/week)		
Yes	61	50.83
No	59	49.17
Systolic BP		
≤140 mmHg	97	80.83
>140 mmHg	14	11.67

Continued.

Parameters	Frequency (N)	%
Not Tested (within 3 months)	9	7.50
Diastolic BP		
≤90 mmHg	88	73.33
>90 mmHg	23	19.17
Not Tested (within 3 months)	9	7.50
FBS		
≤126 mg/dl	94	78.33
>126 mg/dl	6	5.00
Not Tested (within 3 months)	21	17.50
PPBS		
≤200 mg/dl	66	55.00
>200 mg/dl	7	5.00
Not Tested	48	40.00

Table 4: Distribution of participants based on treatment Adherence.

*Adherence scale	Frequency (N)	%
High medical adherence	4	3.33
Moderate medical adherence	65	49.17
Poor medical adherence	51	42.50

*Morisky Medication Adherence Scale (MMAS-8)

DISCUSSION

Demographic characteristics

In our study, we observed a significant prevalence of hypertension (68.3%) and diabetes mellitus (60%) among participants. The age distribution was as follows: 51–65 years (53.33%), 65+ years (33.33%) and 35–50 years (13.33%). Gender distribution included 55% males and 45% females.

These findings align with existing research from Kerala, where NCD rates are notably high. For instance, a study reported a diabetes prevalence of 20% and prediabetes at 11% in central Kerala (BMC Public Health). Another study indicated an age-standardized prevalence of diabetes ranging from 4% in coastal regions to 17% in urban areas (BMC Public Health).[1] Regarding hypertension, a study in rural North Kerala found a prevalence of 32.5%.[2]

Symptoms

In our study, 92.9% of participants reported hypoglycemia symptoms such as sweating and dizziness, while 67.2% experienced hyperglycemia symptoms including thirst and frequent urination. Additionally, 98.6% reported hypertension-related symptoms like headaches and vision changes. These findings align with existing research, indicating that a significant proportion of individuals with diabetes and hypertension experience such symptoms. For instance, a study in India found that 57.44% of patients with type 2 diabetes reported hypoglycemia symptoms, with 10.7% experiencing severe episodes.[7] Another study reported that 76.1% of individuals with hypertension had been screened, with 44.7% aware of their diagnosis, suggesting that a substantial number may experience symptoms without proper management.[8]

Diagnosis and follow up

In our study, 41.7% of participants were diagnosed through routine checkups, 30% based on symptoms and 28.3% following specific tests. This distribution underscores the importance of regular health screenings in the early detection of NCDs. A study in Kerala reported that 35% of diabetes cases were identified during routine health examinations, highlighting the role of proactive screening in disease management.[9] Additionally, research indicates that symptom-based diagnosis often leads to delayed detection, adversely affecting treatment outcomes.[10] These findings emphasize the need for widespread implementation of routine health checkups to facilitate early diagnosis and improve health outcomes.

Our study revealed varied follow-up practices among participants, 1.67% adhered to a 6-months schedule, 5.83% reported no follow-up and 25% attended based on symptoms. These patterns highlight inconsistencies in post-diagnosis care. Regular follow-up is crucial for managing NCDs, as it ensures continuous monitoring and timely intervention. A study in Kerala found that consistent follow-up was associated with better glycemic control among diabetes patients, emphasizing its importance in disease management.[11] Conversely, irregular follow-up can lead to poor health outcomes and increased healthcare costs.[12] Our findings underscore the need for structured follow-up protocols to enhance patient outcomes.

Source of treatment

The study found that 55.8% of participants relied on private healthcare providers, while 43.3% utilized public healthcare. This mirrors national trends, where private healthcare is often preferred due to perceptions of higher quality, despite the availability of public services.[5] In rural Kerala, efforts to strengthen public health infrastructure continue, but private healthcare remains a major resource for many, despite its financial burden on households.[6]

Complications

In our study, 80% of participants experienced eye problems, 51.4% reported leg pain, 22.9% had hearing loss and 5.7% developed dementia. These findings align with existing research indicating a high prevalence of complications among individuals with NCDs. For instance, a study in India reported that 18% of diabetic patients had diabetic retinopathy, a leading cause of vision impairment.[13] Additionally, peripheral neuropathy, which can manifest as leg pain, was found in 44.9% of type 2 diabetes patients in a rural South Indian population.[14] While specific data on hearing loss and dementia among NCD patients in India are limited, the observed prevalence in our study underscores the need for comprehensive management strategies addressing these complications.

Control status

Our study identified several significant risk factors among participants: 12.5% were active smokers, 5% consumed alcohol and 49.17% engaged in less than 150 minutes of physical activity per week. These lifestyle behaviors are well-established contributors to NCDs. A study in Kerala reported that 21.4% of adults were current smokers and 19.5% consumed alcohol, highlighting the prevalence of these behaviors in the region.[15] Additionally, research indicates that 54.4% of adults in Kerala are physically inactive, underscoring the need for interventions promoting active lifestyles.[16] Addressing these risk factors through targeted public health strategies is essential for reducing the burden of NCDs.

Addictions

In our study, 12.5% of participants were active smokers and 5% were current alcohol consumers even after diagnosis. These figures are slightly below the state averages reported in the National Family Health Survey-5 (NFHS-5), where 18.8% of men and 0.2% of women in Kerala consume alcohol.[17] Similarly, a regional study found that tobacco use was prevalent in 19.6% of adults.[18] The findings highlight the need for ongoing public health interventions focused on addiction cessation to reduce the risks associated with these behaviors.

Physical activity and lifestyle modifications

In our study, only 25% of participants engaged in regular physical activity, while 49.17% reported exercising less than 150 minutes per week. These findings are consistent with other studies that link sedentary lifestyles to high non-communicable disease (NCD) prevalence in rural Kerala1. The significant association between adherence and socioeconomic class (highlights disparities in health behaviors among socioeconomic groups, a finding supported by previous research on access and adherence issues in lower socioeconomic classes.[2] This underscores the need for targeted health education and lifestyle interventions to promote physical activity and improved health management in rural communities.

Out-of-pocket expenditure

A significant proportion (89.17%) of participants spent less than ₹1,000 per month on medications and 60% lacked medical insurance. This reflects broader trends across rural India, where insurance coverage remains low, leaving patients to bear high out-of-pocket expenses and poor adherence.[7] These findings underscore the need for more comprehensive health insurance programs including outpatient care, alongside efforts to reduce the cost of medications and improve healthcare accessibility.

Medication Adherence

In our study, we observed that only 3.33% of participants exhibited high medication adherence, 49.17% demonstrated moderate adherence and 42.5% displayed poor adherence. These findings are concerning, especially when compared to national trends. For instance, a study in Punjab reported that 64.5% of diabetic patients had high adherence, 29.7% had moderate adherence and only 5.8% had low adherence.[3] Similarly, research from South India found that 61.44% of patients were promoters (high adherence), 19.90% were passives (moderate adherence) and 18.66% were detractors (low adherence).[4]

CONCLUSION

The study highlights the inadequate control status and treatment adherence among NCD patients, particularly those with hypertension and diabetes, in rural settings. This underscores the need for comprehensive public health strategies emphasizing lifestyle modification, regular follow-up and direct monitoring. Significant associations were observed between gender and disease prevalence, as well as between socio-economic status and treatment adherence, indicating critical areas for targeted intervention. These findings call for gender-sensitive healthcare approaches, enhanced health education, robust public health systems and strengthen the NCD control program to address the persistent challenges faced by NCD patients in rural communities.

Further research is needed to explore the barriers to healthcare access, particularly in relation to the financial burden of NCD management and the role of socio-economic factors in shaping health behaviours. Expanding the availability of affordable healthcare services and insurance coverage in rural areas will be critical to improving long-term health outcomes for these populations.

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