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Original article

Non-communicable disease management: Access to healthcare during COVID-19 pandemic in rural Kerala, India

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ABSTRACT

Background: Globally, data on the coronavirus disease (COVID-19) pandemic showed a higher risk of infection and complications in people with non-communicable diseases (NCDs). In India, the prevalence of NCDs and their risk factors vary significantly between states. Compared to other states, Kerala has the highest prevalence of non-communicable diseases in the country, along with the highest proportion of the elderly population. The study evaluates the disease management patterns and changes in healthcare behaviors among adults with NCDs in Kerala during the COVID-19 pandemic.

Methods: A cross-sectional study was conducted among 410 adult NCD patients in rural Thiruvananthapuram district, Kerala. Using a semi-structured interview schedule, the present study gathered information on socio-demographic characteristics, disease patterns, healthcare utilization, and behavioral change during the pandemic.

Results: Mean age of the participants was 62 years (range: 37–88; women: 64%). The most prevalent NCD was hypertension (74%) and diabetes (65%) followed by chronic respiratory disease (12%), cardiovascular disease (11%), and cancer (2%). Nearly 76% had difficulty in obtaining consultation/medical follow-up. Around 10% relied on telecommunication and 32% reported increased stress during the pandemic. Those with low socio-economic status and with a single NCD were more vulnerable to the challenges faced during the pandemic.

Conclusion: A higher proportion of adults with NCDs faced difficulties in healthcare access and had negative healthcare behaviors during the pandemic. The findings highlight the need to ensure better healthcare for people living with NCDs during the times of pandemic.

1. Introduction

While the world's attention is focused on the novel coronavirus, there is a risk that other illnesses could be overlooked during this time. The emerging epidemiological evidence about the pandemic has underlined its widespread health impacts and the vulnerability of those suffering from underlying morbidities including chronic non-communicable diseases (NCDs) like hypertension, type-2 diabetes mellitus, cardiovascular diseases, chronic obstructive pulmonary diseases, and cancers.[1] NCDs are attributed to more than half of all deaths in India but NCD expenditure accounts for less than a third of the country's total health expenditure (29%).[2,3] The direct pathophysiological impact is worsened by the effects of financial and psycho-social constraints created as part of the systemic response to the pandemic. According to World Health Organization, people living with NCDs are more susceptible to coronavirus disease-19 (COVID-19) and its impact on them would vary greatly from person to person.[4] Measures of physical distancing, quarantine, and/or isolation can significantly challenge adherence to self-care, which is most critical for patients living with non-communicable diseases. The restrictions in transport facilities, movement, and insecure financial conditions can worsen the impact of the pandemic among those living with chronic conditions, the primary effect being the development of unhealthy behaviours including poor dietary control, substance abuse, and physical inactivity. All these risk factors have increased the vulnerability to depression and obesity as well as the risk of diabetes and cardiovascular diseases (CVD). Thus, the current pandemic has changed the way healthcare is being delivered and prioritized as the limited access to healthcare and pharmacies has

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complicated the management of non-communicable diseases.[1]

The Indian state of Kerala has a very high prevalence of chronic non-communicable diseases (NCDs) like type-2 diabetes mellitus, hypertension, and cardiovascular diseases.[5] The state of Kerala was lauded for its prompt response to the pandemic, which was comprehensive in its approach. One of the aspects that were given some emphasis during this early response was the allocation of essential medical services for the community, especially the vulnerable sections.[6] However, the situation has gone for an almost drastic shift consequent to the expatriation of non-resident Keralites from other parts of the country and the world and there has been a second wave of the pandemic. There are sharp spikes in disease clusters all over the state and it is one of the first states in the country to officially confirm community transmission.[7] The health system was also faced with the repercussions of monsoon-related natural disasters of floods and landslides along with the sweeping rise of the pandemic. These circumstances could have naturally overwhelmed the state health system further complicating matters for people living with chronic conditions. Under these circumstances, it is critical that we explore the extent to which people living with chronic non-communicable diseases have been able to access healthcare, medications and maintain self-care and understand the challenges they faced. Such an exploration would not only support a realistic assessment of the indirect indemnities of the pandemic but also help us understand the multidimensional nature of health challenges and the need for an expansion of global health governance in recognition that integration between initiatives to reduce non-communicable and communicable diseases can provide a sustainable foundation for emergency preparedness. The objective of the present study is to assess disease management patterns and changes in healthcare behaviours among adults with chronic non-communicable diseases in the state of Kerala during the COVID-19 pandemic.

2. Methods

A cross-sectional study was conducted among adults ($\geq$ 18 years) with non-communicable diseases in the Thiruvananthapuram district in Kerala, India. The study was conducted during August and September 2021 using multi-stage random sampling. At the time of the survey, there were no studies published on the disease management difficulties of patients with NCDs during the COVID-19 pandemic in Kerala. So, we anticipated that 50% of NCD patients had difficulty reaching medical services during the COVID-19 pandemic period. Based on this prevalence and a precision of five, we estimated the sample size as 384, which was rounded off to 400.

In Kerala state, the government run non-communicable diseases control program, named "*Amrutham Arogyam*", covers the whole state including all 14 districts. The services are rendered through all district/general hospitals, sub-district level hospitals, community health centres, primary health centres, and sub-centres. The program aims to reduce the NCD risk factors through primary level activities like health education, secondary level activities like screening of NCDs for the population above 30 years of age and free supply of medicines for all diagnosed with NCDs.

The present study was conducted in Thiruvananthapuram, the capital district of the state. There is a total of 73 *grama panchayats* (the lowest administrative division in rural areas covering a population of 5000–7000 population) in the selected district. Among them, *Kadakkavoor grama panchayat* was selected based on the feasibility to conduct the study. This *grama panchayat* is under *Keezhattingal* primary health centre (PHC). Weekly NCD clinics are functioning at all the PHCs (each PHC in the state covering a population of 20,000 to 30,000) and sub-centres (covering a population of around 5000) in Kerala, to screen and follow up on lifestyle diseases. The study collected the list of adult patients registered in the NCD clinic of *Keezhattingal* PHC and from the five randomly selected sub-centres under the PHC. All NCD patients in the selected centres were sequentially numbered. Using computer-generated random number, we selected 600 patients and all of them were contacted by telephone. Finally, complete details from 410 patients were collected and used for detailed analysis.

Data was collected by telephonic interview using a pre-tested structured interview schedule consisting of socio-demographic details, disease history, treatment-seeking behaviour, and the impact of the COVID-19 outbreak on their healthcare practices and treatment follow-up. Specific questions on their difficulty in usual NCD care due to the pandemic, difficulty in getting doctor consultation or medical follow-up and details of difficulties in getting medication during the pandemic period were included. Low socio-economic status (SES) was defined as a pink or yellow ration card (an official document given by the state government and the colour of the card is based on the SES) holders and high SES as blue or white cardholders.

2.1. Ethics

Ethical clearance was obtained from the Institute Ethics Committee of the host institution. Oral informed consent was obtained from all the participants in the study.

2.2. Statistics

Data was analysed using SPSS version 21.0 (IBM SPSS Statistics for Windows, Version 21.0.Armonk, NY:IBM Corp). Bivariate analysis was performed to assess the association between difficulties reported relating to NCD care and background characteristics. A p-value of <0.05 was considered for statistical significance.

3. Results

The basic characteristics of the participants are presented in Table 1. The mean/median age of the participants was 62 years (SD $\pm$ 9.1) ranging from 37 to 88 years; 63.9% were women. Sixty-three percent of

Table 1
Basic socio-demographic and behavioral characteristics of the study participants.

Variables	N(%)
Age group (in years)	
<60	150(36.6)
≥60	260(63.4)
Sex	
Men	148(36.1)
Women	262(63.9)
Education	
Illiterate	1(0.2)
Primary	339(82.7)
Secondary	52(12.7)
Graduates	17(4.1)
Post-graduates	1(0.2)
SES	
Low	236(57.6)
High	174(42.4)
Employment	
Employed	159(38.8)
Non-employed	251(61.2)
Source of treatment	
Government only	273(66.6)
Private or government	137 (33.5)
Have health insurance	
Yes	91(22.2)
No	319(77.8)
Smoking	
Yes	37(9.0)
No	373(91.0)
Alcohol use	
Yes	64 (15.6)
No	346(84.4)

SES: Socio-economic status.

the participants were older adults (≥60 years). A large proportion of the participants were having primary education only (82.7%), 12.7% had secondary education, 4.1% were graduates, one postgraduate, and one person had no formal education. More than half of them (61.2%) were unemployed at the time of the survey. Fifty-seven percent of the participants belonged to low socioeconomic status and 42.4% to high SES. One-fifth of the participants (19.5%) were smokers or alcohol users.

Table 2 presents the proportion of NCDs and multimorbidity of participants with each of the NCDs. The proportion of major NCDs was as follows: hypertension (74%), diabetes (64%), chronic respiratory disease (12%), and cardiovascular disease (11%). A total of 198 (48.3%) had only one NCD, and the remaining 51.7% had multiple (more than one) NCDs. Nearly 41% had any of the four NCDs, 10.2% had three and two persons (0.5%) had all the four NCDs. Diabetes and hypertension, both were prevalent among 41% of the participants. All the participants with CVDs had at least one other NCD. The majority (83%) of those with chronic respiratory diseases had multi-morbidity (Table 2).

Table 3 shows difficulties reported relating to NCD care by socio-demographic characteristics and the number of NCDs present. Participants with multiple NCDs reported comparatively less difficulty in getting proper medications when compared to those with a single NCD ($p = 0.025$). Participants of low socio-economic status reported a substantially higher difficulty in usual care compared to individuals with a higher socioeconomic status ($p < 0.0001$).

Based on the participants' responses, during the COVID-19 pandemic, 76.3% had difficulty getting doctor consultations/medical follow-ups. Among the other difficulties faced, fear of the pandemic (66.1%) was the most significant challenge for seeking treatment; transportation (33.7%) was the second most common challenge. Around 16.6% faced financial difficulties which made it more challenging to visit hospitals or purchase medications.

Before the COVID-19 pandemic, participants were able to manage their NCD conditions by regularly visiting hospitals or physicians. But the frequency of clinical visits decreased (78.3%) compared to pre-pandemic times as almost all participants ranked their regular treatment as a lower priority than the threat posed by COVID-19. Furthermore, their healthcare decisions were influenced by their fear of contracting COVID-19 (66.1%). The restrictions in transport facilities, movement, and insecure financial conditions worsened the impact of the pandemic among those living with chronic conditions and led to decreased sleep (34.4%), and increased stress (31.7%). Fig. 1 details the changes in healthcare behaviours during the pandemic. Around 25% of the participants were able to attend direct consultation with the physician while 9.8% relied on telecommunication during the pandemic. Also, 64.9% had their consultation disrupted.

4. Discussion

This study aims to assess disease management patterns and challenges experienced by adults with NCDs during the COVID-19 pandemic in Kerala. In this study, almost half of the participants reported having difficulty in their routine NCD care and more than half of them had difficulties in obtaining a consultation or follow-up with the doctor for managing their NCD-related care. Transportation arrangements, financial constraints, and fear of the pandemic were the major impediments to routine NCD care. Telecommunication-enabled healthcare has progressively evolved as an alternative strategy for managing NCD in developed countries during the pandemic due to disrupted consultations. But in this study, only 9.8% of participants used telemedicine for consultation as developing countries are yet to utilize telemedicine consultations to an effective level due to the fragile health system.[8,9]

For individuals with NCDs, COVID-19 is regarded as a synergistic pandemic that interacts with pre-existing medical conditions as well as social, ecological, and political factors to worsen existing NCDs.[10,11] Certain preventive measures used during this pandemic, such as social distancing, lockdowns, self-isolation, and quarantine have caused an increased reliance on unhealthy processed foods, restrictions to physical activities, and increased consumption of nicotine products and alcohol as coping strategies.[12,13] All of these variables contribute to weight gain,[14] which raises the risk of diabetes, CVDs, and related mortality. As a result, tackling NCDs and their risk factors should be an essential component in the management of COVID-19.

Kerala has the largest proportion of elderly individuals aged 60 and more, at 12.6%, compared to 8.6% for India as a whole. Furthermore, the state has one of the highest rates of non-communicable diseases and related risk factors in the country.[15,16] During the pandemic, many tertiary care hospitals in the state were converted into COVID-19 hospitals,[17] thus restricting access to routine medical care and elective surgeries. Particularly for elderly individuals with NCDs, frequent medical check-ups and access to medications are crucial measures to prevent the severe consequences of disability or mortality. The combined effect of a large geriatric population and a high prevalence of chronic diseases has created a serious challenge to the state's COVID -19 management.

A household's socioeconomic status is another crucial element in predicting the outcomes of shocks and vulnerabilities during the pandemic. Studies have demonstrated that households with higher SES have better access to quality healthcare, knowledge, and nutrition when compared to lower SES households.[18,19] Similarly, in the present study, 57.6% of the participants had a low SES and had a higher rate of NCDs compared to those with a higher SES. A cross-sectional study in Bangladesh by Mistry et al. reported that older adults with NCDs or multimorbidity face significantly greater challenges in accessing routine medications when compared to individuals with a single comorbidity.[20] But in the present study, participants with a single NCD disclosed greater difficulty in obtaining proper medications when compared to participants with multiple NCDs ($p < 0.05$). A possible hypothesis could be that individuals with more comorbidities would receive more opportunities for higher quality care compared to individuals with fewer comorbidities. Thus, the coordination between non-profit organisations, volunteer groups, and healthcare workers in the delivery of essential medications for the management of NCDs, particularly to socioeconomically vulnerable elderly individuals and those without mobility or social support should be encouraged.

The study also showed that increased stress (31.7%) was one of the most common confounders affecting NCD management during the pandemic. Participants with chronic stress have a higher risk of developing depression which causes greater difficulty in managing their NCDs and acquiring prescribed medications.[21,22] Individuals suffering from depression could be impacted by this pandemic by exacerbated symptoms of dread, insecurity, and hopelessness. Thus, psychiatrists need to get familiar with screening and triage methods during this period and collaborate with doctors and public health workers to reduce the risks that patients with mental illnesses may encounter.

Since 59% of the participants in the present study reported a decrease in routine check-ups during the pandemic, using online platforms to provide information on self-management, and lifestyle modifications for NCDs and COVID-19 is a crucial step.[23] Patients with NCDs

Table 2
Proportion of NCDs and related characteristics.

NCDs	Prevalence N (%)	Mean duration Mean ± SD	Multi-morbidity[a] N(%)
Hypertension	303(73.9)	7.0 ± 6.1	181(68.3)
Diabetes mellitus	265(64.6)	8.5 ± 6.8	198(65.3)
Chronic Respiratory Diseases	48 (11.7)	13.3 ± 11.7	40(83.3)
Cardio Vascular Diseases	46(11.2)	7.9 ± 7.0	46(100.0)
Cancer	6 (1.5)	5.4 ± 3.1	5(83.3)

NCD: Non-communicable diseases, SD: Standard Deviation.
[a] More than one NCD.

Table 3
Difficulties reported relating to NCD care by socio-demographic characteristics and number of NCDs present.

Variables	Reported difficulties related to NCD care						Total N(%)
	Usual care N(%)	P value	Getting doctor consultation N(%)	P value	Getting proper medication N(%)	P value	
Age group							
>60	76(50.7)	0.307	121(80.7)		16(10.7)	0.750	150(100.0)
≥60	118(45.4)		192(73.8)	0.147	31(11.9)		260(100.0)
Sex							
Males	63(42.6)	0.151	106(71.7)		18(12.2)	0.749	148(100.0)
Females	131(50.0)		207(79.0)	0.115	29(11.1)		262(100.0)
SES							
Low	132(55.9)	<0.0001*	188(79.7)	0.078	31(13.1)	0.272	236(100.0)
High	62(35.6)		125(71.8)		16(9.2)		174(100.0)
Number of NCD present							
Single	95(48.0)		152(76.8)		30(15.2)		198(100.0)
Multiple	99(46.7)	0.843	161(75.9)	0.908	17(8.0)	0.025*	212(100.0)
Total	**194(47.3)**		**313(76.3%)**		**47(11.5%)**		**410(100.0)**

P value was obtained from Chi-square test. *p < 0.05, SES: Socio-economic status, NCD: Non-communicable diseases.

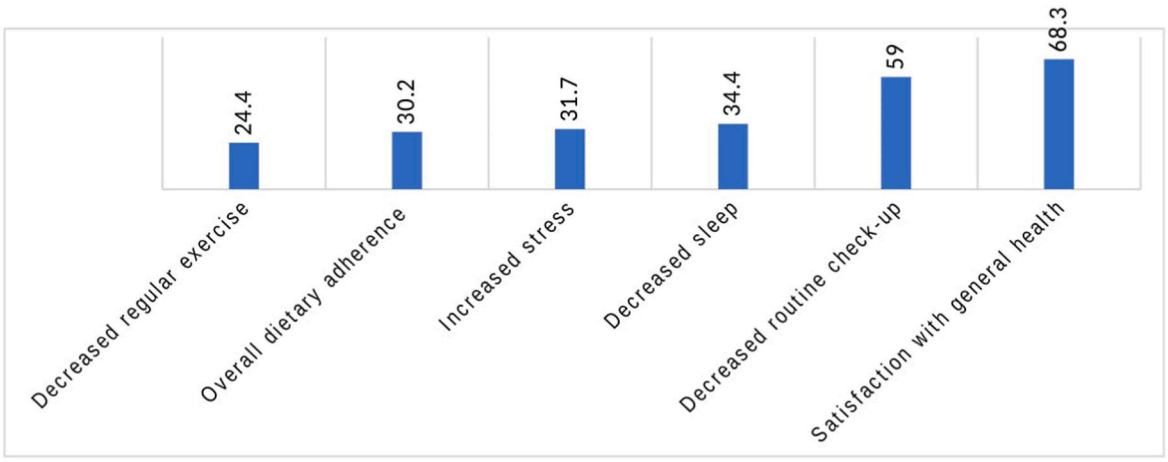

Fig. 1. Behavioural change of sample population during the pandemic.

can benefit from increased health literacy and empowerment to better access healthcare, use technology to contact physicians, enhance problem-solving skills, and maintain healthy lifestyle habits. In this study among the NCD patients, older adults (≥ 60 years) and patients in low SES were the most vulnerable to the COVID-19 pandemic. Hence, a detailed assessment of these specific patient subgroups is required. During this health workforce shortage, particularly in rural areas of developing countries, expanding existing community health worker roles is critical to the self-management of NCDs and COVID-19 as well as for the provision of basic healthcare services to NCD patients.

There are certain limitations to this study that must be addressed. The study design may have contributed to recall bias among the participants. Since the interview included questions regarding personal habits and diet, there is a possibility of response bias due to fear of social stigma. The present study is unable to obtain access to the participants' medical records in order to confirm the severity of their chronic illnesses. To our knowledge, this is the first comprehensive study about disease management patterns and challenges experienced by NCD patients during the COVID-19 pandemic in Kerala, which is the main strength of the study. Moreover, the findings contribute to highlighting the disease management difficulties in a state with the highest NCDs, education and healthcare access in India.

5. Conclusion

The study demonstrated that a high proportion of people with NCDs faced difficulties in healthcare access and had adverse healthcare behaviours during the pandemic. This will have both short-term and long-term impacts on the health of people with NCDs, which highlights the need for essential healthcare delivery during emergencies. Also, future healthcare programs need to consider NCD patients with low SES, and single morbidity who are more vulnerable to the challenges faced during public health emergencies. Thus, developing new protocols to characterize risk based on the presence of NCDs, as well as bolstering initiatives and funds to reduce the risk in the vulnerable segment of the population, should be considered as top priorities by the government during the times of pandemic.

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Declaration of competing interest

There are no conflicts of interest.

Statement

The manuscript has been read and approved by all the authors. The corresponding author will take all responsibilities for communication.

Declaration of competing interest

None.

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