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RESEARCH ARTICLE

CONVERGENCE OF COMORBIDITY AND COVID-19 INFECTION TO FATALITY: AN INVESTIGATION BASED ON HEALTH ASSESSMENT AND VACCINATION AMONG OLDER ADULTS IN KERALA, INDIA

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ABSTRACT

OBJECTIVE

To investigate the impact of age, comorbidity, and vaccination in the fatality of older COVID-19 patients in the state of Kerala, India.

METHODS

A cross sectional study, adopting a mixed method approach was used and conducted among the older population in Kerala. To study the health profile of study participants 405 older people were surveyed and 102 people were interviewed in-depth at their households between June to November 2020. The results of the study were triangulated with elderly COVID-19 fatality data available from the citizen-science dashboards of the research team and Department of Health, Kerala. Vaccination data was retrieved from the Co-WIN government website (cowin.gov.in) to study its impact. The data was analyzed using the IBM SPSS version 22.0.

RESULTS

Age is a predictor of COVID-19 fatality. Diabetes, hypertension, CAD, CKD and COPD are the significant predictors of elderly COVID-19 fatality in Kerala. The current comorbidity profile of the total older population matches with the comorbidities of the COVID-19 elderly death cases. CFR and IFR have declined even when the CMR is high in the second wave of COVID-19 with more deaths. This is attributable to vaccination even though there exists a lesser chance for breakthrough infection.

CONCLUSIONS

Age and comorbidities can predict potential fatality among older COVID-19 patients. Timely and accurate health data and better knowledge of high-risk factors such as comorbidity can easily guide the healthcare system and authorities to efficient prevention and treatment methodologies. Knowledge on prevailing NCDs can drive early preparedness before it converges with an epidemic like the present zoonotic disease. Vaccination is an effective tool in preventing infection compared to the unvaccinated even though the chance for breakthrough infection is there, particularly, in people with comorbidities.

KEYWORDS

Comorbidity, Convergence, COVID-19 Mortality, Fatality, Older population, Vaccination.

INTRODUCTION

It is already acknowledged that health conditions deteriorate when age increases and ageing goes hand in hand with many behavioral issues and disabilities, contagious infections, lifestyle, and chronic diseases. Therefore, the impact of multi-morbidity on various aspects such as quality of life, functionality and risk of mortality becomes a matter of present discussions worldwide. In India, the elderly face NCDs' threats, including cancers, CVD (cardiovascular disease), respiratory diseases, and diabetes and one out of every two older people suffers from at least one chronic disease requiring life-long medication, particularly in urban areas [1].

Kerala's older population has increased by one million people every consecutive year since 1981 [2]. If this trend continues incessantly, it is expected to surpass the proportion of young and old people in between 2021 and 2031 [2]. In 2020, 4.8 million people of Kerala were above 60 years of age of which 15 percent of them were above 80 years, the fastest-growing group among the older population [3]. Kerala has higher hospitalization rates indicating higher morbidity levels [4]. The reported common ailments were paralysis, urinary problems, CVD and cancer in 2010 [5]; hypertension, diabetes mellitus, cataract and heart disease in 2011 [4]; CVD, diabetes, musculoskeletal, and respiratory disease in 2016 [6]; and diabetes, abdominal obesity, and hypertension in 2016-17 [7]. Based on these previous studies, it can be assumed that the significant prevalent diseases of older people in Kerala are hypertension, diabetes, CVD, cancer, and respiratory diseases.

THE COVID-19 FATALITY

Kerala reported the first COVID-19 case in India in January 2020 and was the first state that saw the first wave of the disease spread in the country. The spread of COVID-19 affected mostly older people. Patients with chronic comorbidities, including malignancy, CVD, diabetes, hypertension, kidney and respiratory disease are prone to the fatal outcome of COVID-19 infection [8–11]. Various studies [8–10] found that for CVD and hypertension, the use of renin-angiotensin system inhibitors may accelerate the susceptibility to SARS-CoV-2 infection.

Despite the long COVID-19 studies describing comorbidities and the poor clinical outcomes leading to fatality, the results are inconsistent. Throughout the COVID-19 outbreak, wide variations in CFR (Case Fatality Rate) and IFR (Infection Fatality Rate) estimates have been noted. There is a dearth of studies on COVID-19 and comorbidity while having timely data on the health profile of a population. Likewise, the study findings related to the health status, comorbidity profile, and the NCDs scenario of the older people over a decade in Kerala are also inconsistent [4–7] and there is no study on the impact of vaccination among the older population. In this context, this study is intended to fill the above knowledge gaps and plans to relate the comorbidity profile of the older people in Kerala in the COVID-19 scenario to the elderly mortality rate of COVID-19, which will help to identify the severity of risks. It is essential to draw a clear picture of the health status and morbidity levels of the older people amidst the pandemic to assess the possible implications of comorbidities and thereby frame geriatric treatment policies while it converges with infectious diseases.

This study is unique as it measured the comorbidity level of the older people, while the pandemic is ongoing with simultaneous assessment of the older people COVID-19 deaths due to the suspected comorbidity levels. Even though it is too early to assess the impact of vaccination, the study attempted to show its impact on COVID-19 mortality in the elderly.

METHODOLOGY

This study is based on a mixed methodology approach. The study used a concurrent timing strategy where both the quantitative and qualitative strands occurred during a single phase, from June 2020 to November 2020. Quantitative data was collected from 405 older people from 36 panchayats (village level council) of Kerala, adopting multi-stage sampling techniques, using a structured questionnaire. The study area was divided into three zones, South, Central and North Kerala. From each zone, three districts were selected at random. Four panchayats from each district were selected by drawing lots, making 36 panchayats of Kerala under study. From each selected panchayath, 11 households with older people were selected randomly.

The survey questionnaire included questions on socio-demographic profile and the disease profile of the elderly. The respondents were asked to mark appropriate responses against the names of different diseases they

have in a 5-point scale ranging from 'Always to Never'. The data was analyzed with the IBM SPSS version 22.0. The percentage of a particular disease is calculated exempting the 'never' and 'rarely' responses, therefore including 'always', 'frequently' and 'sometimes.'

Using a panchayat-wise list, received from Anganvadi and Asha workers (local health workers), older people above 60 years of age were selected randomly for the qualitative interview. The interviews were conducted at their households for about 30 - 45 minutes. An average of seven interviews per district were conducted and therefore 102 in-depth interviews were undertaken from all the fourteen districts of Kerala. They were asked about the present ailments. To further enrich the data, 12 interviews were conducted with Vayomithram (a public project for elderly care) district coordinators of 12 districts in Kerala.

Directorate Health Services (DHS) website (http://dhs.kerala.gov.in) gives updates about the COVID-19 spread. However, access to primary data is not complete and therefore, a multi-disciplinary team of experts compiled data through a citizen science initiative, managed by the researchers of this study [11]. A systematic analysis of the above mentioned two dashboards on CFR and comorbidities was done. The data was extracted from the death cases reported in Kerala with COVID-19 infection between January 2020 and September 20, 2021 (Fig. 1). Vaccination data was retrieved from the centralized C0-WIN portal in India (cowin.gov.in). To check and identify a consistent pattern in the association between age and COVID-19 mortality, an extensive review of the literature was carried out. The quantitative and qualitative strands were triangulated and integrated at the point of interpretation and drawn inferences from them.

The study is conducted in line with the guidelines of the ICSSR (Indian Council of Social Sciences) New Delhi, India under the ICSSR – IMPRESS scheme (F. No. IMPRESS/P1132/428/2018-19/ICSSR). The sanctioned study on geriatric health was carried out while the pandemic is ongoing, enabling the research team to simultaneously investigate older people COVID-19 deaths due to the suspected comorbidity levels. Before the qualitative and quantitative data collection, the participants were briefed about the study's purpose, and informed consent was obtained. COVID-19 protocol was adhered to while collecting the data.

Effective and safe vaccines are the pharmaceutical interventions to prevent this pandemic and different types of vaccines are getting acceptance. Over 90 per cent of the population in Kerala has been administered the first dose of the Covid-19 vaccine as of September 20, 2021, a target achieved within 247 days since beginning on January 16. The vaccination for the Age-Appropriate category (persons over 60 years of age, and persons between 45 and 59 years with comorbid conditions) started from March 1, 2021, onwards. Hence, we considered mortality data after April 1 for comparison with that of pre-vaccination data.

RESULTS

The socio-demographic profile (Table 1 Supplementary Data) shows that 55.3% were males, and 44.7% were females. Around 50.1% were in the 60-69 age category, followed by 31.6% in the 70-79 category(n=405).
Covid-19 Deaths in Kerala-Age wise

Figure 1 shows that age is a predictor of increased mortality rate. Till May 31, 2021, the number of COVID-19 deaths in Kerala were 8815, of which 6546 (73.24%) were elderly, where the majority (28.2%) belongs to the 60-69 age group (Fig.1). On September 20, 2021, the number of COVID-19 deaths in Kerala rose to 23683 (0.52% of the total infected), of which 17533 (74.03%) were elderly, where the majority is in the 70-79 age (27.0%) (Fig. 1).

COMORBIDITY OF ELDERLY PEOPLE IN KERALA

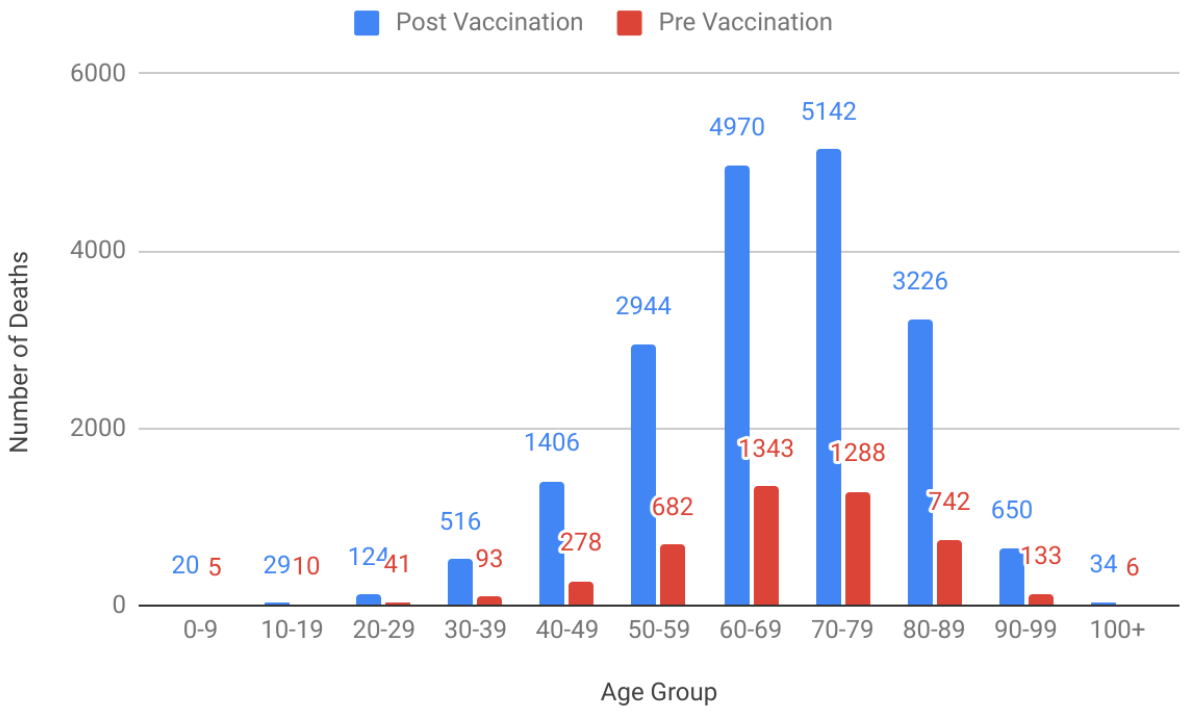
Table 1 shows that older people of Kerala suffer from Hypertension (59.3%), Diabetes (49.8%), Heart Disease (20.5%), Lungs Disease (13.4%), Cancer (5.9%), Rheumatic Disease (31.6%), Urinary Disease (20.7%) and Abdominal Disease (17.1%). Many of them have two or more diseases (comorbidities) (Table 2). Interviews with the elderly and Vayomithram coordinators also showed that most of them had lifestyle diseases like Hypertension, Diabetes, Heart Disease, Cancer, and Cholesterol (Table 2 supplementary data).

ELDERLY PEOPLE COVID-19 DEATHS AND COMORBIDITY

The study used the comorbidity data of the total death cases of COVID-19 as separate elderly comorbidity data is not available. As set out in the Death Audit report, which is available until March 2021, published by the Department of

Health, Kerala, out of the 4,621 people who died, 4,420 (95.65%) of them had comorbidities (Table 2 and Figure 2). Major comorbidities were diabetes (59.14%), hypertension (47.95%), CAD (25.84%), CKD (18.81%), COPD (11.32%) and only 4.35% had no comorbidities (Table 2 and Figure 2).

FIGURE 1. COVID-19 DEATHS IN KERALA-AGE WISE TILL SEPTEMBER 20, 2021



Source: DHS, Government of Kerala, COVID-19 Dashboard

TABLE 1. ELDERLY DISEASE PROFILE IN KERALA

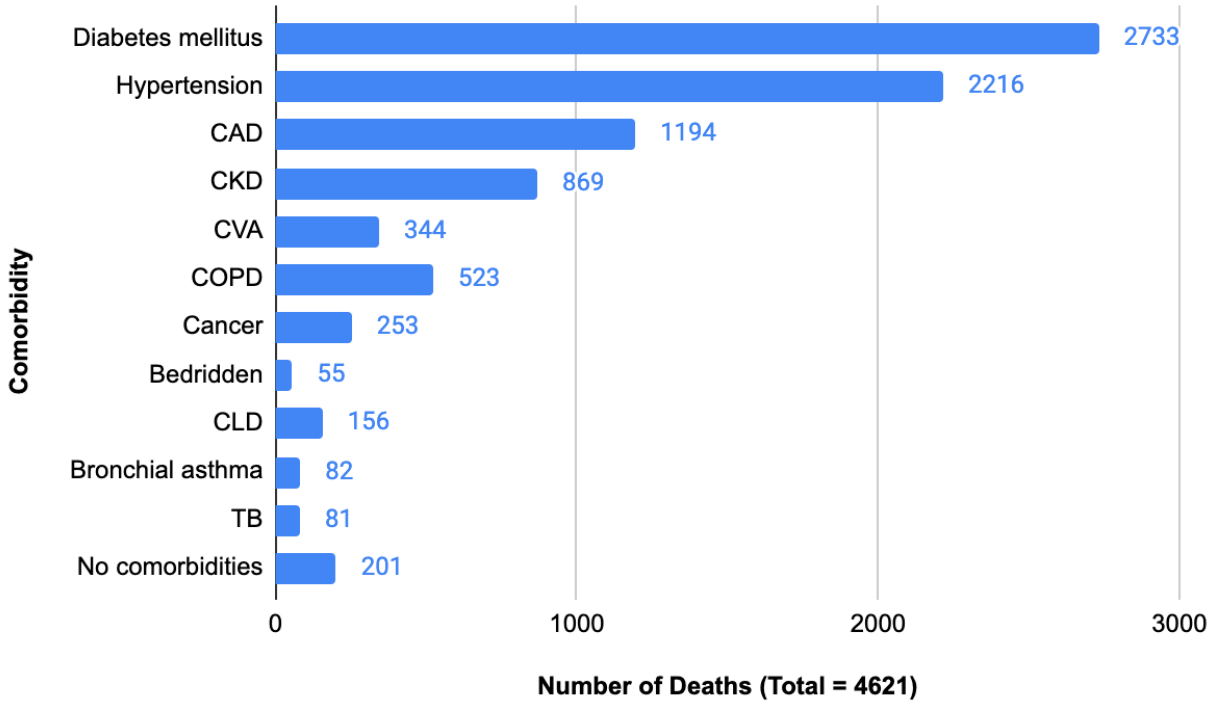
TYPE OF DISEASE	ALWAYS	FREQUENTLY	SOMETIMES	RARELY	NEVER
Diabetes	156 (38.5%)	37 (9.1%)	9 (2.2%)	6 (1.5%)	197 (48.6%)
Hypertension	145 (35.8%)	66 (16.3)	29 (7.2%)	19 (4.7%)	146 (36%)
Urinary Disease	24 (5.9%)	27 (6.7%)	33 (8.1%)	43 (10.6%)	278 (68.6%)
Lungs Disease	32 (7.9%)	8 (2%)	14 (3.5%)	25 (6.2%)	326 (80.5%)
Heart Disease	46 (11.4%)	18 (4.4%)	19 (4.7%)	9 (2.2%)	313 (77.3%)
Cancer	17 (4.2%)	4 (1%)	3 (0.7%)	3 (0.7%)	378 (93.3%)
Rheumatic Disease	57 (14.1%)	35 (8.6%)	36 (8.9%)	42 (10.4%)	235 (58%)
Abdominal Disease	25 (6.2%)	13 (3.2%)	31 (7.7%)	42 (10.4%)	294 (72.6%)

TABLE 2. TYPES OF COMORBIDITY PREVALENT IN FATALITY CASES OF COVID-19

COMORBIDITY	MONTHS (2020-21)								TOTAL
	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	
Diabetes mellitus	120	130	173	287	565	708	317	433	2733 (59.14%)
Hypertension	116	119	169	302	536	661	313	391	2216 (47.95%)
CAD	54	57	89	130	252	308	130	174	1194 (25.84%)
CKD	36	52	103	96	178	221	96	137	869 (18.81%)
CVA	17	22	20	33	80	101	36	35	344 (7.44%)
COPD	23	22	34	63	98	130	71	82	523 (11.32%)
Cancer	15	16	19	27	53	45	26	52	253 (5.48%)
Bedridden	5	16	3	5	3	11	6	6	55 (1.19%)
CLD	8	12	6	14	29	44	19	24	156 (3.38%)
Bronchial asthma	---	3	4	16	11	22	6	20	82 (1.77%)
TB	---	1	6	14	16	18	9	17	81 (1.75%)
No comorbidities	2	2	12	18	51	69	30	17	201 (4.35%)
Total deaths	**223**	**230**	**302**	**519**	**998**	**1258**	**585**	**701**	**4621**

Source: Death Audit Reports up to March 2021, DHS, Government of Kerala (Department of Health & Family Welfare, accessed on September 20, 2021)

FIGURE 2. TYPES OF COMORBIDITIES PREVALENT IN FATALITY CASES OF COVID-19



Source: Death Audit Reports up to March 2021, DHS, Government of Kerala (Department of Health & Family Welfare, accessed on September 20, 2021)

IMPACT OF VACCINATION

Total vaccinations given in Kerala (Covaxin and Covishield) is 2,38,07,401 (89.14% above 18 years and 67.08% of the total population) as on September 20, 2021, of which more than 96% of people aged over 45 years are vaccinated with a single dose. Though the vaccination was started only from March 1, 2021, a decline (2.44%) in elderly mortality has been noticed between the pre-vaccination and post-

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vaccination period (Table 3 and Fig. 1) even when total mortality is high after the onset of second wave (from February onwards) while the average age of death remains static.

TABLE 3 IMPACT OF VACCINATION ON COVID-19 MORTALITY AMONG OLDER ADULTS

DEATHS	PRE-VACCINATION (JANUARY 30, 2020 - MARCH 31, 2021)	POST VACCINATION (APRIL 01, 2021 - SEPTEMBER 20, 2021)	OVERALL (JANUARY 30, 2020 - SEPTEMBER 20, 2021)
All age groups	4621	19062	23683
Older Adults	3512 (76.0%)	14022 (73.57%)	17535 (74.04%)
60-79 group	2531 (56.94%)	10112 (53.01%)	12744 (53.81%)

Source: https://dashboard.cowin.gov.in, accessed on September 19, 2021

The effect of this pandemic can be studied by using CFR, Crude Mortality Rate (CMR), and IFR [12]. CFR helps to recognize the disease severity, risks, and healthcare system quality. CFR and recovery rates are important indicators during epidemics and pandemics which will help clinicians in stratifying patients in terms of the extent of care required, and in turn, increase the possibilities of survival from the deadly pandemic [13]. The CFR of an ongoing pandemic is calculated using the formula:

$$CFR(\%)=\frac{Total\ number\ of\ deaths}{Number\ of\ deaths + Number\ of\ recoveries}\times 100\%$$

Since the data for the number of infected and recovered older people is not available, COVID-19 epidemiology data on total number of infections and recoveries have been used.

Therefore, CFR=0.54%, IFR=0.52% ($IFR\ (\%) = \frac{Number\ of\ deaths\ from\ disease}{Total\ number\ of\ cases}\times 100\%$), CMR = 66.73% ($IFR\ (\%) = \frac{Number\ of\ deaths\ from\ the\ disease}{Total\ population}\times 100\%$), till September 20, 2021 (Table 4). Here CMR estimates the probability of any individual in a population dying from the disease [12] and IFR estimations give the proportion of fatality among all infected. Table 4 shows that CFR and IFR have declined even when the CMR is high in the second wave of COVID-19 with more deaths, which is attributable to vaccination.

TABLE 4. COVID-19 INDICATORS (CFR, CMR, IFR)

TYPE OF DATA	NO. OF INFECTED CASES	NO OF DEATHS	CFR %	CMR (X100000)	IFR %
DHS Dashboard *(as on 31 March 2021)*	1,124,584	4621	0.42	13.02	0.41
DHS Dashboard *(as on 20 September 2021)*	4,524,158	23683	0.54	66.73	0.52

Note: The 2021 Projected population of Kerala is 3,54,89,000 as per the report of National Commission on Population of India. The number of the elderly population is projected as 52,71,660.

DISCUSSION

The emergence of the COVID-19 disease has spread with surges and resurges. In this context, this paper is intended to associate older people's health scenario with COVID-19 comorbidity and fatality rates, using a concurrent mixed-method approach and to analyze the impact of vaccination.

Comorbidity profile of older population, age-wise COVID-19 death report, and the type of comorbidities of COVID-19 death cases in Kerala clearly show that the older

population has been adversely affected by the pandemic, which is consistent with the international studies [8,14–16]. Fatalities have been mostly reported from the 60-79 age category, which can be explained by using Kerala's socio-demographic profile (Table 1 supplementary data). It is to be noted that during the entire period of the pandemic from the first death to September 18, 2021, the median age of deaths remains static indicating that even after the second wave of COVID-19 infection with increased mortality rates, the association between the age and fatality remains. Here it is to be noted that the occupational structure of Kerala elderly (Work Participation Rate) has considerably increased as they continue as the major contributor to the household since 1983 by working in informal, low paying occupations in poor work environments [17]. This exposure to the outside environment during the pandemic might have led them to COVID-19 infection.

Despite these demographical factors, many older people are incapacitated due to attributable age-related diseases. This is consistent with the previous report [6] that, in the last two decades, the morbidity burden has grown faster than the rest of India wherein the Proportion of Ailing Population (PAP) in Kerala during 1995-96 was 109 against the national average of 55 which was increased to 251 in 2004, and to 308 in 2014, showing, an increase of 57 points in the overall morbidity rate against national average increase of just seven points during the 2004-2014 period. Existing evidence on the health profile suggests that Kerala has been going through a demographic transition with an unprecedented increase in the NCDs burden (Table 1). Qualitative data also validate this finding (Table 1 supplementary data). This is akin to the previous study results of Kerala over a decade [4,6,7].

This disease profile (Table 1) validates the comorbidity status of the older COVID-19 deaths (Table 2) where the most prevalent comorbidities were hypertension, diabetes, heart disease, COPD (Chronic Obstructive Pulmonary Disease) and CKD (Chronic Kidney Disease) where about 95% of the deceased had one or other comorbidities and the majority of them had multiple comorbidities. Many previous studies on COVID-19 have obtained the same results [12,18–21]. To be more specific, the major comorbidity found in Kerala's COVID-19 death cases is heart disease, followed by diabetes which are major predictors of COVID-19 fatality [22,23]. It is found that, for the total population in Kerala, the incidence of type 2 diabetes (T2DM) is 21.9% [24]. This can be attributable to risky health behaviors such as lack of exercise and an unhealthy diet which necessitates urgent implementation of healthy behavior policy initiative. Previous studies on Middle East Respiratory Syndrome (MERS-CoV) also found comorbidity leads to MERS-CoV infection [12,25]. Therefore, it can be assumed that a high proportion of older people with NCDs prevalence leading to multi-morbidities can be attributed to the increased older people fatality of COVID-19 in Kerala. Nevertheless, this study discards the findings that there is no significant relationship between COVID-19 infection and diabetes [21,22].

The outcome of convergence of NCDs and COVID-19 infection is serious and it is fatal when there is multi-morbidity. Multi-morbidity gives rise to multiple interactions between one condition and the treatment recommendations for another which necessitates simultaneous multiple drug use leading to complications. The susceptibility of the older people to COVID-19 is explained by immunosenescence where the innate immune cells' function is impaired when there is a decrease in the naïve T as well as B cells production, consequently leading to a situation where the innate immunity cannot fight the infection [26]. Another characteristic of ageing immunity is the CSSI (Chronic Subclinical Systemic Inflammation), which results in an elevation of inflammatory cytokines in serum due to the failure to resolve severe inflammation, which is a critical pathogenic mechanism in COVID-19, contribute to poor clinical outcome in older people [27]. This phenomenon called cytokine storm/ hypercytokinemia, associated impairment begins with the damage of the lungs' epithelial barrier. Subsequently, this initiates a cascade of tissue damage in other vital human organs, including the heart, kidneys, brain, and blood vessels, leading to Multiple Organ Dysfunction Syndrome (MODS), which may be even more fatal [28].

Studies report that most recovered patients experienced different manifestations even up to 30 days following diagnosis. Sequelae of COVID-19 may be manifested in a patient even if the virus is cleared and test shows negative. Once a person is tested positive for COVID-19, it is important to monitor the health status for at least 30 days, especially for elderly age groups with comorbidities. Here is the significance of the evaluation of elderly health profiles in predicting both COVID-19 fatality and post COVID syndrome as a clear understanding of these risk factors will help the healthcare system, particularly the clinicians, to identify and implement protocols to mitigate the fatal outcomes. Organized preventive and curative care for

infectious diseases and NCDs must be ensured for older people in the line of the Vayomithram project of Kerala, where free health check-ups and medicines are available in proximity, particularly when Kerala is undergoing demographic transition with largest proportion of elderly in India.

Since epidemiology has a holistic approach on wellness and maintenance, priority must be given to the complete vaccination of elderly as it has brought down the elderly mortality to 73.57 percent in the second wave from 76% in the first wave in Kerala (Figure1 and Table 4). Moreover, more than 90.2% of the infected and 78.21% of the deceased from June to August 2021 (post-vaccination period) were unvaccinated [29]. However, In August 2021, the death rate was 78.21% among the non-vaccinated, 12.47% among those with one dose vaccinated and 5.12% among the fully vaccinated, indicating that vaccinated people also may get infected, termed as breakthrough infections, but chances of worsening the symptoms leading to severe disease is relatively very less when compared to non-vaccinated individuals.

Ageing is inevitable, and often, the promotional and preventative aspects of geriatric care are neglected with a notion that it is 'unavoidable' and 'genetically determined' neglecting the impact of healthier lifestyle to decrease healthcare expenditure [30]. To ensure geriatric care, there must be an attitudinal change and subsequent efforts from the policymakers to ensure 'quality ageing.' Furthermore, the public healthcare system should ensure documentation of incidents and causes of death to estimate 'excess deaths' occurring during outbreaks, when it becomes difficult to estimate the CFR. Weekly/ monthly death counts can be collated with trends over the years to ascertain whether it is significantly higher than the expected count. This estimation can provide information about the potential burden of mortality and fatality, associated with the infection, directly or indirectly [31].

The study findings on older people's comorbidity level and their subsequent mortality, determine the etiology of COVID-19 and therefore, prevention strategies can be implemented to avoid further spread and increased fatalities. Moreover, the study findings l adds to the existing knowledge realm on the spectrum of comorbidities among the older people and its converged impact on the phase of epidemics spread. Future studies can be undertaken to assess the impact of vaccination after vaccinating the total older population in Kerala.

The study has its limitations. First, this study was carried out among the older people in Kerala, and therefore, the results may not be suitable in an international context. Second, getting authentic and correct primary data in calculating CFR of the elderly was a limitation. Third, there may be underestimations, hidden cases, and asymptomatic or mild symptomatic cases affecting the actual COVID- 19 data. Fourth, there will be vulnerable segments of the population who keep themselves away from COVID-19 testing and hesitate to undergo treatment. Finally, the COVID-19 infection might have influenced the responses of study participants.

CONCLUSION

It is found that older patients with chronic diseases are more susceptible to COVID-19 infection. Knowledge of these risk factors and the present health profile of the older population in Kerala necessitate a more focused approach to introduce a spectrum of interventions to protect the lives of the older people when there is a convergence of epidemics and NCDs. The study emphasizes the need for having timely and accurate health data of a population, which can easily guide the healthcare system and authorities to more efficient prevention and treatment methodologies in health care emergencies.

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SUPPLEMENTARY TABLE 1. SOCIO-DEMOGRAPHIC VARIABLES

VARIABLE	CATEGORY	FREQUENCY	PERCENT
GENDER	Female	181	44.7
	Male	224	55.3
AGE	60-69	203	50.1
	70-79	128	31.6
	80-89	60	14.8
	Above 90	9	2.2
MARITAL STATUS	Married	314	77.5
	Not Married	11	2.7
	Partner Died	75	18.5
	Divorced	3	0.7
EDUCATION	No formal Education	74	18.3
	School	267	65.9
	College/University	53	13.1
	No response	4	1
MONTHLY INCOME	No income	125	25.9
	Less than INR 10,000	228	56.3
	INR 10,000-20,000	37	9.1
	INR 21,000-30,000	20	4.9
	Above INR 30,000	5	1.2
SOURCE OF INCOME	Job	18	4.4
	Pension	211	52.1
	Income from assets	29	7.2
	Business	35	8.6
	Income from agriculture	49	12.1
	Income from other sources	15	3.7

SUPPLEMENTARY TABLE 2. ELDERLY DISEASE PROFILE IN KERALA

ATTRIBUTE	RESPONSES (DISTRICT-PARTICIPANT ID, GENDER, AGE)
Disease	..I have Diabetes for the past 35 years, severe joint pain, back pain... (Palakkad, F, 70-75) …there are number of diseases in this age…headache, back pain, blood pressure, disk problem, cholesterol (Pathanamthitta, F, 60-65) I am taking medicines for blood pressure regularly…. (Pathanamthitta, M, 60-65) ….I had a block in my heart, for which cardiac surgery was done. Check-up is done every three months. Then I had prostate cancer… follow up visits once in six months. I am a diabetic patient too... (Thrissur, M, 65-70) …angioplasty was done ….taking medicines for blood pressure twice a day." (Kozhikode, F, 70-75) "I am a cardiac patient, using a pacemaker…. (Palakkad, F, 70-75) "Taking medicines for thyroid, sugar, BP daily… (Thiruvananthapuram, F, 65-70) "My current health problems are Asthma, Cholesterol, Sugar, blood pressure, thyroid, Cardiac diseases…… (Kollam, F, 70-75) I have cancer, BP, Heart problem, doing chemotherapy (Malappuram, M, 70-75)