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A Cross-Sectional Study on Socio-Demographic and Associated Risk Factors of COVID19 Deaths in a Tertiary Care Centre in Chengalpattu District, Tamil Nadu

Sujatha S¹, Getrude Banumathi P^{2*}, Parameshwari P³, Arul Murugan A⁴, Ravishankar P⁵

¹Assistant Professor, ^{2,3}Associate Professor, ⁴Postgraduate

¹⁻⁴Department of Community Medicine, Chengalpattu Medical College, Chengalpattu, Chengalpattu,

Tamilnadu, India

⁵Department of Public health Dentistry, Raja Dental College and Hospital, Kavalkinaru, Thirunelveli District, Tamilnadu, India

> *Corresponding Author: Dr. Getrude Banumathi P

Associate Professor, Department of Community Medicine, Chengalpattu Medical College, Chengalpattu

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Abstract

Background: Due to the unprecedented outbreak of COVID19 worldwide, little is known about the underlying health conditions may impact a person's likelihood of dying with COVID19. This study focus on the factors influencing the COVID19 deaths.

Objective: To identify the socio-demographic determinants associated with COVID19 Deaths. To explore the associated risk factors for COVID19 Deaths. To estimate the age wise case fatality rate.

Methodology: A cross-sectional study was conducted in Chengalpattu Medical College Hospital, Chengalpattu district among all the COVID19 patients(n=4285) who attended the triage OP during the months of March to Mid - July 2020. All the COVID19 Positive Deaths(n=120) among the admitted in-patients during the study period were included. Data was collected by using Case Investigation Format and for critically ill patients' details were obtained from their care givers. Institutional Ethical Committee Approval obtained. The data was entered in MS Excel and analyzed using SPSS Software Version 25. Both descriptive and inferential statistical analysis done.

Results: In this study, out of 120 COVID19 deaths ,85(70.83%) were males. Mean age among the COVID19 death patients was 59.61±13.81 years and 65(54.16%) were in the age group 51-70 years. Among the deaths 98(81.7%) had any one of the comorbidities. Most common comorbidity was found to be Diabetes mellitus followed by Hypertension. The average duration of hospital stay for death patients was found to be 5.38 ± 4.12 days. Age wise case fatality rate raises with increase in age. The overall case fatality rate was found to be 2.8%. There was a statistically significant association found between the age group \geq 50years (p value 0.000) and comorbid patients (p value 0.000) with the outcome of COVID 19 patients. Binary logistic regression was done, the overall regression model was significant with p-value 0.000, R²=0.383, the predictors accounts for 38% of the variance in the outcome variables.

Conclusion: The study findings concludes that the age group \geq 50 years and Comorbid patients were at higher risk for mortality. The mortality rate of COVID19 increases with age. Intensified contact tracing, special care for elderly and comorbid patients, strengthening of vaccination programmes should be focused.

Keywords: COVID19 deaths; Comorbidity; Case Fatality Rate; Chengalpattu; Tamil Nadu.

INTRODUCTION

The first case of Coronavirus disease (COVID-19) was identified in December 2019 in the city of Wuhan in Acute Respiratory Syndrome Corona Virus 2 (SARS-

Dr. Getrude Banumathi P al International Journal of Medical Science and Current Research (IJMSCR)

CoV-2) has continued to spread around the world, resulting in several thousand reported cases in multiple countries^[1]. The COVID-19 pandemic is one of the most important challenges facing the world today. Despite the large number of infected individuals and confirmed deaths, large uncertainties on the properties of the virus and the infection remain. Given the uncertainties in the COVID19 fatality rate, it is important to explore other paths for obtaining it^[2]. Most cases of COVID19 are asymptomatic, but some are severe and lethal. Mortality is the simplest marker of COVID19 vulnerability^[3].

In the context of an emerging infectious disease with pandemic potential, assessing its efficiency at spreading between humans is critical, as is determining the associated risk for death from the disease^[1]. The Covid19 pandemic has claimed many lives in India and globally. Over 9,36,181 cases and 24,309 deaths have occurred in India and with Tamil Nadu contributing 1,51,820 cases and 2,167deaths as on15thJuly 2020^[4].Epidemiological and clinical characteristics of patients with COVID19 have been reported but risk factors for mortality have not been well described.Lying south of the state capital, Chengalpattu in TN has emerged on the national map of districts witnessing a surge in coronavirus cases after its proximity to Chennai made it easy for the virus to spread to the peripheral areas. Further, not many studies have been done related to COVID19 Deaths in Tamil Nadu. Taking all these into consideration, this study has been planned to study the mortality pattern and associated risk factors of COVID19 deaths in a Tertiary Care Hospital in Chengalpattu District, Tamil Nadu.

OBJECTIVES:

1.To identify the socio-demographic determinants associated with COVID19 Deaths.

2.To explore the associated risk factors for COVID - 19 Deaths.

3.To estimate the age wise case fatality rate

METHODOLOGY:

study Α cross-sectional was conducted in Chengalpattu medical college hospital, Chengalpattu district among all the COVID-19 patients(n=4285) who attended the triage OPD during the months of March to Mid - July 2020. All the COVID-19 Positive Deaths(n=120) among the admitted in-patients in the institution during the study period were included. Data was collected during admission by using Case Investigation Format and for critically ill patients' details were obtained from their care givers. Institutional ethical Committee Approval obtained No. IEC-CMC/Approval/19/2021 dated;29.01.2021. The data was entered in MS Excel and analyzed using SPSS Software Version 25. Univariate analysis and Logistics Regression was done for risk factor analysis . P-value <0.05 was taken as significant.

OPERATIONAL DEFINITION:

COVID 19 Case Definition: A person with laboratory confirmation of COVID 19 infection (RT-PCR), irrespective of clinical signs and symptoms was considered as COVID 19 case^[5].

COVID 19 Death: A death due to COVID 19 is defined for surveillance purpose as a death resulting from a clinically compatible illness in a confirmed COVID 19 case unless there is a clear alternative cause of death that cannot be related to COVID disease. There should be no period of complete recovery from COVID 19 between illness and Death^[6].

Case Fatality Rate(CFR): It is the proportion of individuals diagnosed with a disease who die from that disease and is therefore a measure of severity among detected cases^[7].

CFR (%)=(Number of deaths due to the disease)/(Number of confirmed cases of the disease)*100

RESULTS:

Category	COVID19 Cases (4285)	COVID19 Deaths(120)
Male	2748(64.1%)	85(70.83%)
Female	1537(35.9%)	35(29.17%)
Symptomatic	1864(43.5%)	120 (100%)
Asymptomatic	2421 (56.5%)	0
With Comorbidity	937 (21.86%)	98 (81.7%)
Without Comorbidity	3348 (78.14%)	22 (18.3%)

 Table 1: Descriptive analysis of COVID 19 Cases and COVID 19 Deaths

As mentioned in the Table 1, Among the COVID 19 patients and also in COVID19 deaths male predominance were seen. Out of 120 deaths nearly 81.7% had any one of the comorbidities.



Figure 1: Age and Gender Distribution among the COVID 19 Deaths

As shown in the Figure 1, majority of the COVID 19 Deaths (65) has occurred in the age group 51-70 years, which accounts for 54.16%. Mean age of COVID 19 death was 59.61±13.81 years .No deaths were reported below 20 years during the study period.





As shown in the Figure 2, 98(81.7%) deaths has occurred in patients with comorbidity. The most common comorbidity found were Diabetes mellitus 45(45.91%) followed by Hypertension 31(31.63%).



Figure 3: Types of Comorbidity among Death Patients (98/120)

As mentioned in Figure 3, The most common comorbidity found were Diabetes mellitus followed by Hypertension, Chronic kidney disease, heart disease, respiratory disorders, Cerebro Vascular Disease, Malignancy, Morbid obesity and other comorbidities identified were MCTD, SLE, Schizophrenia with burns, Rheumatoid arthritis & active TB.

Duration of hospital stay	Frequency	Percentage
<24 Hours	9	7.50%
1-3 Days	39	32.50%
4-6 Days	39	32.50%
7-10 Days	18	15%
>10 Days	15	12.50%

 Table 2: Duration of hospital stay among COVID 19 Deaths

As mentioned in the Table 2, Among the 120 deaths, 87(72.5%) death had occurred within 6 days of hospital admission and 9(7.50%) deaths had occured during the first 24 hours of hospital stay.

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Variable	Mean±SD
Reporting time	4.65 ± 2.68
(date of onset of symptoms to date of admission in Hospital)	
Duration of Stay in Hospital	5.38 ± 4.12
(date of admission to date of death in Hospital)	
Duration of Outcome	8.49 ± 5.34
(date of onset of symptoms to date of death)	

Table 3: Time Parameters of COVID-19 Deaths

As mentioned in the Table 3, the average time taken for the patients to get admission in the hospital after the onset of symptoms was found to be 4.65 ± 2.68 days. The average hospital stay for the COVID 19 death patients was found to be 5.38 ± 4.12 days.

Age Distribution	COVID19 cases	COVID19 Death	Age wise case fatality rate			
<10 Years	147	0	0			
11-20 years	272	0	0			
21-30 years	1082	4	0.36%			
31 -40 years	1038	12	1.15%			
41-50 years	736	13	1.76%			
51-60 years	572	31	5.41%			
61- 70 years	304	34	11.18%			
71-80 years	94	18	19.14%			
>80 years	40	8	20.0%			
Total	4285	120	2.8%			

Table 4: Case Fatality Rates in different Age groups

As depicted in the above Table 4, the case fatality rate increases accordingly with increase in age. The overall case fatality rate was 2.8% during the study period.

Page371

Variables		Outcome of COVID19 Cases		Tost value	р-	Unadjusted odds	
		Survivors	Non- Survivors	1 est, value	value	95%CI	
Gender	Male(2748)	2663(96.9%)	85(3.1%)	Chi Square Test Value 2.41 df = 1	0.1204	0.73 (0.490-1.088)	
	Female(1537)	1502(97.7%)	35(2.3%)				
Age group	<50 Years(3259)	3230(99.1%)	29(0.9%)	Chi Square TestValue 182.534	0.000*	10.84 (7.092 -16.568)	
	≥50 Years(1026)	935(91.1%)	91(8.9%)	df = 1			

Table 5: Demographic profile of COVID 19 Cases Vs Outcome

As mentioned in Table 5, out of 120 COVID 19 deaths, 91(8.9%) were occurred in the age group \geq 50 years which is higher when compared to age <50 years 29(0.9%). This difference is highly significant (p-value 0.000*).

Variables		Outcome of Cases	COVID19	Statistical Test	р-	Unadjusted odds
		Survivors	Non- Survivors	Value	value	95% CI
Symptom status	Asymptomatic (2421)	2421(100%)	0(0%)	Fisher Exact Test Value 160 349		1.069 (1.056- 1.082)
	Symptomatic (1864)	1744(93.6%)	120(6.4%)	df = 1		
Comorbid status	Without comorbidity (3348)	3326(99.3%)	22(0.7%)	Chi- Square Test Value 258.399 df = 1	0.000*	17.659 (11.053- 28.213)
	With Comorbidity (937)	839(89.5%)	98(10.5%)			

Table 6: Clinical profile of COVID19 cases Vs Outcome

As shown in Table 6, all COVID19 deaths were symptomatic and mortality rate was found to be higher in patients with Comorbid conditions. The symptom status and Comorbid status has a statistically significant influence on the outcome of the COVID19 patients.

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Category	Beta	S.E	df	P value	Adjusted odds	95% CI for Exp(B)	
						Lower	Upper
Age Group	1.469	0.233	1	0.000	4.346	2.755	6.856
≥50years*							
Comorbidity status	1.923	0.253	1	0.000	6.843	4.164	11.245
With Comorbidity*							

 Table 7: Binary Logistic Regression between Age group, Comorbidity status Vs Outcome of COVID 19 cases

* Reference Category

As depicted in the Table 7, Binary logistic regression were done between the predictor variables and COVID19 outcome. The overall regression model was significant with p-value 0.000^* , $R^2=0.383$, the predictors accounts for 38% of the variance in the outcome variables. The predictor variables such as age group , comorbidity status influence the outcome variable independently.

DISCUSSION:

In this study ,out of 120 COVID deaths, male deaths were found to be 85(70.83%) and female deaths were 35(29.17%) which was very similar to the findings of the following studies like Wuhan study done by Zhou et al^[8], out of 54 COVID non survivors male deaths contributed 38(70%) and female deaths 16(30%) and in Bangladesh study by Biswas M et al^[9], in Chen2020 ,the male death was 83(73.45%) and female death was 30(26.55%). Male COVID death predominance was also reported in England study done by Williamson et al^[10]. Mortality is higher in men than in women, because aging is faster in men. The X chromosome contains high density of immune related genes ,therefore, women are comparatively less affected and mortality also lesser than men^[11].

In our study the mean age of COVID death was found to be 59.61 years which was almost nearer to the study done in China^[12] reported mean age of COVID death patients were 63 years .In Brazil study done by Baqui et al^[13], the mean age among the non survivors were found to be 65.3 years. Aging is associated with diseases of immune hyperfunction such as autoimmune disorders with paradoxical increase in certain signaling pathways and cytokine levels as mentioned by Blagosklonny et al^[14].Age related diseases such as ischemic heart disease (IHD), hypertension, diabetes, cancer, obesity may also contribute to mortality. In this study ,age \geq 50 years showed higher mortality which is similar to the findings of the studies such as , multricentric cohort analysis study of critically ill COVID 19 patients in US^[12], Italian retrospective cohort study and in a study done in China^[12]which showed 84% of the COVID19 deaths were in the age group more than 60 years.

In present study, out of 4285 COVID 19 patients 937(21.86%) had any one of the Comorbidity. Among the patients with comorbidity 98(10.5%) patients had expired.In a study done in Wuhan by Zhou et al^[8], out study participants 91(47.64%) had of 191 comorbid comorbidity, among the patients 36(39.56%) had expired. it clearly shows comorbidity plays a vital role in COVID19 mortality.

The most common Comorbidity identified among death patients were Diabetes (37.5%) followed by Hypertension (25.83%) in this study. Almost Similar findings were found in the study done by Williamson et al^[10] in England.In Brazil Study done by Sousa et al^[15], 49.1% of the COVID 19 deaths had Diabetes. But in the study done in Wuhan by Zhou et al ^[8], the most common comorbitity observed were Hypertension followed by Diabetes. Comorbid patients should be given atmost care for early detection and intensive treatment to prevent mortality.

In this study ,the time interval between onset of symptoms to death was found to be 8.49 days which is almost similar to the findings(9.9days) of a study done in China^[12] during March 2020. But in Wuhan study done by Zhou et al^[8] the interval was found to be 18.5 days which is contrast to the current study

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findings .In Wuhan study done by Zhou et al^[8], the time interval between illness onset to hospital admission was found to be 11 days .But in this study the interval between illness onset to hospital admission was found to be 4.65 days and this difference in findings was due to earlier identification of cases and referral by health workers in our state.

During the study period ,the overall case fatality rate was 2.8% .In the study done in Italy by Onder et al^[16], the CFR of china was found to be 2.3% and Italy was found to be 7.2% during the period of February and March 2020 and in the Swedon study done by Cao et al^[17], the CFR was found to be 3.3% which is closer to our study findings.The CFR in older person \geq 80 years was found to be 20% in this study. Similar finding was observed in Italy (20.2%) by Onder et al^[16].

CONCLUSION: Male predominance among COVID 19 cases and deaths were observed in the current study. The study findings concludes that the age group \geq 50 years and Comorbid patients were at higher risk for mortality. The mortality rate of COVID19 increases accordingly with age. Diabetes and Hypertension were the most common comorbidities found among COVID deaths. The over all case fatality rate during the study period was found to be 2.8%. Out of 120 COVID 19 deaths 87(72.5%) deaths had occurred with in 6 days of hospital admission. Early testing and Intensive Contact tracing should be emphasized. Eminent care should be given for elderly patients and patients with comorbid conditions in both preventive and treatment aspect.

LIMITATIONS:

This study focused on swab positive (RT-PCR positive) COVID 19 patients and death. If we also include the deaths among Severe Acute Respiratory Illness patients (swab negative) and CT findings suggestive of COVID 19 infection will give more insight regarding the risk factors for COVID 19 fatality.

RECOMMENDATIONS:

1. Detailed COVID19 death auditing should be carried out in both Institution level and District level to know the gaps in treatment seeking, providing care and case management protocols and prompt referral for the COVID19 patients in Government and private COVID Hospitals.

- 2. Autopsies should be emphasised among all COVID 19 deaths to understand the pathogenesis of SARS-CoV-2 infection since it causes multisystem involvement.
- 3. Future studies should focus to identify the factors influencing the male predominance in both cases and deaths of COVID 19.
- 4. State wise and district wise multi centric research should be carried out in our country to know the regional differences in the factors influencing the risk of infection / risk of death among the COVID 19 patients.
- 5. Vaccine Coverage should be intensified at all levels and different age groups.

STATEMENT OF ETHICS: Institutional ethical Committee Approval obtained No. IEC-CMC/Approval/19/2021 dated;29.01.2021.

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4

Page 3

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