Determinants of outcome in covid-19 cases: a cross-sectional analytical study

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Abstract: *Background:* In December 2019, in Wuhan a new contagious disease outbreak occurred. In Aurangabad, the first case of Covid19 was reported on 3rd March, 2020. There is paucity of data on clinical characteristics and treatment outcomes. *Objective:* To find out the determinants of outcome in Covid19 patients. *Method:* A cross- sectional analytical study was done on patients of Covid19 admitted in Dedicated Covid Hospital- Government Medical College, Aurangabad from 1st April, 2020 to 31st July, 2020 to identify potential risk factors of mortality by using Cox proportional Hazards model. *Results:* Out of total 1442 patients admitted during study period 831(56%) recovered and 636(25%) died. Hypertension (21.4%) and Diabetes (18.5%) were most common underlying comorbidities. Age>65 years, associated comorbidities like Hypertension, Diabetes, COPD, Thyroid disorder were predictors of mortality among Covid19 patients (p<0.05). *Conclusion:* Older age and comorbidity are significant risk factors for death in Covid19.
Keywords: Covid19, Cox proportional Hazards, Outcomes.

Introduction

In December 2019, a new contagious disease, named COVID-19 pneumonia and caused by a novel coronavirus (SARS-CoV-2), emerged in Wuhan City, Hubei Province, China [1]. In Aurangabad, the first case of Covid19 was reported on 3rd March, 2020 [2]. On 11th March, 2020, the World Health Organization declared the COVID-19 outbreak as a global pandemic [3]. Since then it is spreading fast across the world and India is no exception to this. SARS-CoV-2, a beta-coronavirus, shares 88% of 2 bat-derived SARS-like coronaviruses and distances from SARS-CoV (around 79%) and Middle East respiratory syndrome coronavirus (around 50%) [4].

According to the World Health Organization (WHO), as of the 8th July 2020, there have been 11,669,259 cases and 539,906 COVID-19 related deaths worldwide [5]. The situation is rapidly evolving and unfortunately we do not have much information about the disease course [1]. Some of the studies conducted outside India indicate that old age, smoking and other comorbidities lead to poor prognosis [5]. In this regard, the

Government of India has also proposed conducting research to see the relation between non-communicable disease and Covid19 outcomes [6]. This study was undertaken to identify factors associated with outcome of Covid19.

Material and Methods

Total 1442 patients admitted in DCH-GMC during the study period were included in the study. The study was carried out after obtaining approval from Institutional Ethics Committee. The data related to Covid19 patients were obtained from department of Medicine, Paediatrics, Neonatology, Obstetrics and Gynaecology and Surgery. The information regarding socio-demographic details eg; name, age, contact details, occupation, socioeconomic status, date of onset of symptom, date of hospitalisation, any associated comorbidity and addiction history were collected for the study.

Sample size: All the patients of Covid19 admitted in Dedicated Covid Hospital- Government Medical College (DCH-GMC),

Aurangabad from 1st April, 2020 to 31st July, 2020 were included in this study.

Data collection and analysis: Using SPSS23.0 (trail version) frequencies were calculated, for knowing significance level-chi-square test was applied as and when required. By applying univariate and multivariate analysis in Cox proportional hazard model, the effect of different specified factors on Covid19 outcome was evaluated.

Results

A total of 1442 Covid19 cases were admitted to the DCH-GMC. Out of them 820 (56.9%) were males and 622 (43.1%) were females. Overall mean age was 49.7years, with minimum age of 1 day (newborn) and the maximum age was 89 years. Majority of the cases 24.5% belonged to 51-60 years age group. On the basis of their residence, 302(20.9%) were from rural areas and 1140(79.1%) belonged to urban areas. Out of total patients included for the study, 831(56%) cases recovered and 363(25%) died (fig.1). Recovery and deaths were maximum i.e. 28.1% and 21.9% respectively in the 51-60 years age group. Monthly trends showed increasing recovery rate (fig.2).

Table-1: Socio-demographic profile of patients(n*=1194)			
Characteristics	**Outcome**		
	Death (%)	**Recovered (%)**	**Total (%)**
Age group			
0-10	1(0.2)	18(1.8)	19(1.3)
11-20	2(0.6)	36(4.7)	48(3.3)
21-30	8(2.2)	136(17.7)	182(12.6)
31-40	24(6.6)	125(16.2)	197(13.7)
41-50	63(17.4)	137(17.8)	250(17.3)
51-60	102(28.1)	169(21.9)	353(24.5)
61-70	96(26.4)	94(12.2)	245(17)
71-80	55(15.2)	45(5.8)	118(8.2)
>80	12(3.3)	14(1.8)	30(2.1)
Sex			
Male	224(61.7)	396(51.6)	820(56.9)
Female	139(38.3)	373(48.4)	622(43.1)
Residence			
Rural	113(31.1)	149(17.9)	302(20.9)
Urban	250(68.9)	682(82.1)	1140(79.1)
Tobacco use			
Never	108(13.0)	561(67.5)	833(57.8)
Current	164(28.9)	243(29.2)	567(39.3)
Unknown	3(7.1)	27(3.3)	42(3.0%)
Comorbidity#			
Diabetes mellitus	138(51.7)	129(48.3)	267(18.5)
Hypertension	189(61.4)	119(38.6)	308(21.4)
COPD	10(55.6)	8(44.4)	18(1.2)
Tuberculosis	04(40.0)	6(60.0)	10(0.7)
Heart disease	57(82.6)	12(17.4)	69(4.8)
CVA	8(57.1)	6(42.9)	14(1)
Thyroid disorder	17(65.4)	9(34.6)	26(1.8)
Kidney disease	13(65.0)	07(35.0)	20(1.4)
Neoplasm	5(71.4)	2(28.6)	7(0.5)
Bronchial asthma	3(21.4)	9(78.6)	14(1.0)
*248 patients were still admitted, @ others include Hindus, Buddhists, Christians etc. # multiple responses considered			

Fig-1: Pie chart showing distribution of covid19 patients
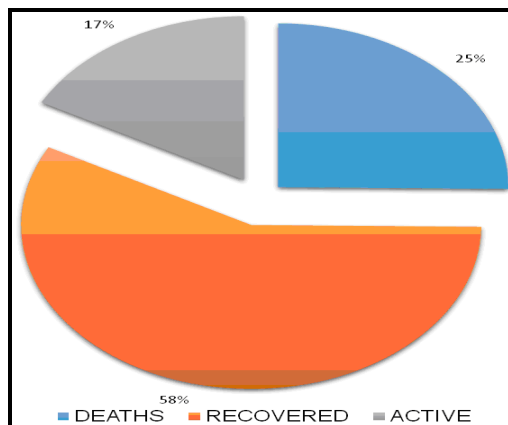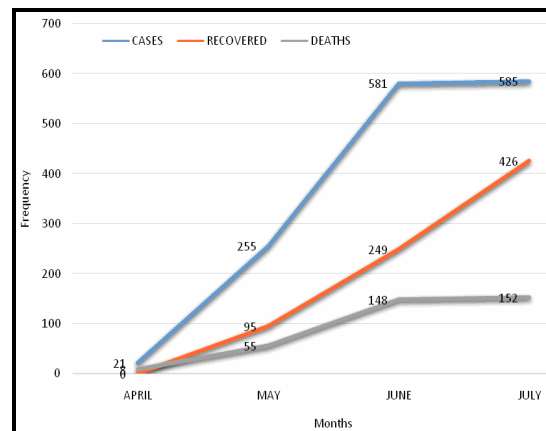

Fig-2: Monthly distribution of Covid 19 cases, recovery and deaths

Among underlying comorbidities, Hypertension (21.4%) and Diabetes (18.5%) were most common. By using Cox proportional hazard, age>65years, male sex, history of smoking, associated comorbidities like diabetes mellitus, hypertension, heart disease, kidney disease, thyroid disorder, COPD and cancer were found to be significant predictors of adverse outcome on univariate analysis. However, on multivariate analysis, diabetes, hypertension, COPD and cancer were found to be significant predictors (Table 2).

Table-2: Severity prediction by Cox proportional hazard (n=1442)				
Variable	**Univariate HR (95% CI)**	**p-value**	**Multivariate HR (95% CI)**	**p-value**
Age (>65yr)	1.43(1.27-1.59)	0.009		
Sex (males)	1.15(1.03-1.28)	0.000		
Smoking (current/former)	0.6(0.3-0.9)	0.00		
Diabetes	0.47(0.37-0.58)	0.000	0.59(0.45-0.77)	**0.000**
Hypertension	0.52(0.42-0.64)	0.000	0.70(0.54-0.91)	**0.008**
COPD	0.48(0.24-0.96)	0.03	0.49(0.24-1.00)	**0.05**
Heart disease	0.51(0.35-0.74)	0.000	0.72(0.49-1.06)	0.09
Tuberculosis	1.56(0.39-6.26)	0.5	2.3(0.6-9.3)	0.31
Kidney disease	0.49(0.27-0.94)	0.03	0.57(0.30-1.07)	0.08
Thyroid disorder	0.49(0.27-0.89)	0.02	0.69(0.37-1.27)	0.24
Bronchial Asthma	1.15(0.37-3.59)	0.8	0.99(0.43-2.27)	0.9
CVA	0.57(0.25-1.29)	0.18	1.23(0.53-2.37)	0.62
Neoplasm	0.21(0.07-0.56)	0.002	0.18(0.07-0.49)	**0.001**

Discussion

In this study, there was male preponderance which is similar to then study of Gupta N. et al [7] which also had more male patients. 4.6% participants were below the age of 20 years, this was found to be different from the study of Bhandari S, et al [8] done in Rajasthan in which 22.4% were below 20 years of age. However, in this study female participants were slightly more 43.1% than that reported by Bhandari S, et al [8], 39.08%. This difference was probably due to different geographical distribution as well as sex ratio of the two states.

This study reported presence of diabetes in 18.5% and hypertension among 21.4% cases of Covid-19. This was similar to the study of Du R-H et al [1], which found 18.4% diabetics and 32.4% Hypertensives. However, the prevalence of heart disease (4.8%), COPD (1.2%), tuberculosis (0.7%) and cancer (0.5%) was much less than the study of Du R-H et al

[1]. The findings of this study were similar to the findings of Li et al [4], which reported COPD (3.1%), tuberculosis (1.6%), cancer (4.7%) respectively and Robilotti EV et al [9] which reported diabetes in 20% participants. The overall recovery rate was 56% this was more than the study of Bhattacharjee A, et al [10] which found 47.99% recovery rate. Month-wise distribution of outcome showed an increasing trend of recovery. This might be due to introduction of newer treatment protocol, and early diagnosis with rapid diagnostic kits.

Cox proportional hazards model, predicted age>65years, male sex, history of smoking, associated comorbidities like diabetes mellitus, hypertension, heart disease, kidney disease, thyroid disorder, COPD and cancer to be risk factors for death on univariate analysis. However, on multivariate analysis, diabetes, hypertension, COPD and cancer were found to be significant predictors. These findings were similar to the study of Aggarwal A et al [11], done in New Delhi which found underlying diabetes and hypertension as a risk for severe outcome.

Conclusion

This study found that age >65 years and male sex was related with adverse outcome. Also presence of associated comorbidities like diabetes, hypertension, heart disease, kidney disease and cancer are also predictors of worst outcomes.

Acknowledgement

Financial Support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest.

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