



Original Article

Causes of Mortality in Hospitalized, PCR Positive Patients of Covid-19 at Tertiary Care Hospital of Sindh Pakistan

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ABSTRACT

In Pakistan, over 10,000 deaths have been reported due to COVID-19 while the exact course of illness and significant causes of mortality has not been found out. **Objective:** To enumerate the causes of death in hospitalized SARS CoV2 PCR positive patients and also to assess the relationship between COVID mortality and comorbidities. **Methods:** The cross-sectional study was conducted at Liaquat University Hospital after taken permission from the ethical review committee. Study included SARS CoV2 PCR positive patients, admitted at Liaquat university hospital and expired during hospitalization, aged greater than 15 year and belonged from either gender. Operated and RTA patients were excluded from study. **Results:** Patient's age ranged from 18 to 90 year. Mean age was 59.6-year, Male were 79% and female were 21%. Triad of fever, cough and SOB present in 48% of patients. Respiratory failure (54%) and respiratory failure with sepsis (38%) were the leading cause of fatality. Anova Test showed statistically significant correlation between causes of death and comorbidities with p-value 0.015. Both Diabetes and Hypertension were present in 25% of patients. **Conclusions:** The study concluded that male gender was the dominant sufferer of COVID-19 and in contrast to normal perception, younger age is not an exception for mortality due to COVID-19. Fever, cough and SOB were the most frequent complain. Respiratory failure alone and with sepsis, was found to be the leading reason for mortality. Causes of death were strongly linked with presence of comorbidities in covid 19 patients.

INTRODUCTION

Corona viruses belong from RNA viruses; have been a threat to mankind since long. These were the culprits behind many epidemics. SARS CoV-2 causing Covid 19 is one of the deadliest infectious disease world has ever encountered [1]. Being one of the highly populated countries Pakistan also shared enormous number of patients of this highly communicable disease. Pakistanis identified their first PCR positive case of COVID-19 on 25 February 2020 [2, 3]. COVID-19 is not only the reason of gigantic morbidities and mortalities of human beings but destroyed world economy as well. It has been observed that consequences of this highly communicable disease varied

widely. Different geographical regions of world showed dissimilar end results in terms of mortality [4, 5]. Astonishing fact regarding Covid-19 is that it caused more marked lethality in developed countries in spite of good health facilities, as compare to the third world [4]. Variances also noted in lethality by the disease in low-income countries or through the states of South-East Asia [5]. As the fatality of covid varies with different geographical regions a regional study estimated that death rate diverse from 1-5% to more than 30% [4]. Still many things are unclear about the factors leading to death in covid patients. Considerable debate is there over role of

metabolic abnormalities in relation to deaths in covid patients that's why we choose to focus on this point also [6]. We conducted this study to see the conditions which contributes in mortality of COVID-19. Whether they are same as of developed world or geographical variance plays its role. This study would help in the assessment whether patients were dying with covid or due to covid and help in understanding the most common complication which turn lethal. This study helped in understanding the most common complication which turned fatal in our patients towards demise so that proper care may be taken while dealing with such patients and prioritizing them.

METHODS

This cross-sectional descriptive study was conducted at Liaquat University Hospital after taking permission from the Ethical Review Committee of Liaquat University of Medical & Health Sciences (Letter No. LUMHS/REC/-57, Dated: 19/03/2021). Study included SARS CoV2 PCR positive hospitalized patients, admitted at Liaquat university hospital, and expired during hospitalization, aged greater than 15 year and belonged from either gender. Operated and RTA patients were excluded from study. Patients were selected through nonprobability convenience sampling, from March 2021 to February 2022. Data were collected on pre designed proforma. Information on clinical condition and comorbidities, lab investigations and medical management was obtained from patient's files and analyzed through SPSS version 23.0. We did not include the files which were not completed.

RESULTS

Our patient's age ranged from 18 to 90 year. Mean age was 59.6 years, maximum no of patients expired at 55 years of age. Male were 79 % and female were 21%. Triad of fever, cough and SOB present in 48% of patients. Figure 1 depicts the causes of death found in Covid-19 patients i.e., Respiratory Failure and Sepsis being the highest in number.

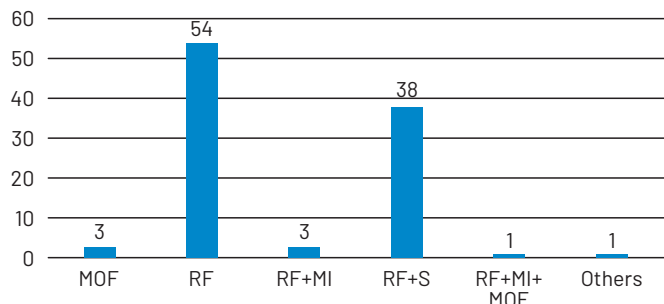


Figure 1: Causes of Mortality among Patients of Covid-19

MOF: Multi-Organ Failure
 RF: Respiratory Failure
 MI: Myocardial Infraction
 S: Sepsis

Figure 2 depicts the status of comorbidities among patients of Covid-19. Most of the patients had dual morbidities that lead to mortality. Anova Test was applied to assess relation between causes of death and comorbidities, it showed statistically signification correlation and p-value was 0.015.

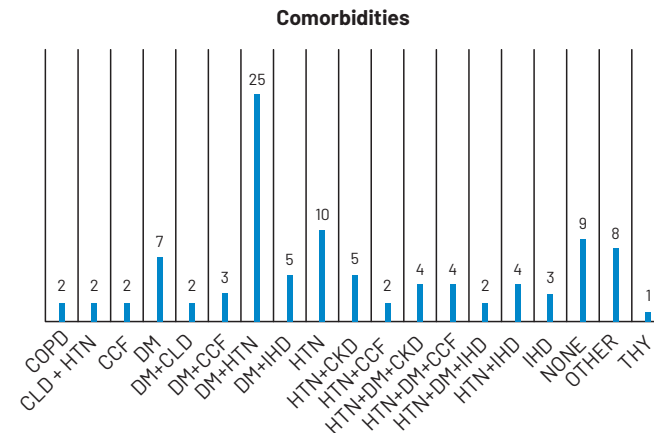


Figure 2: Comorbidities Status among Covid-19 Patients

COPD: Chronic Obstructive Pulmonary Disease
 CLD: Chronic Liver Disease
 HTN: Hypertension
 CCF: Congestive Cardiac Failure
 DM: Diabetes Mellitus
 IHD: Ischaemic Heart Diseases
 CKD: Chronic Kidney Diseases
 THY: Thyroid Disorders

As shown in Table 1, Chi square test revealed definite link between patients who perished due to "respiratory failure" and "respiratory failure with sepsis" with the presence of comorbidities and p-value comes 0.000 in both groups respectively. Regarding oxygen consumption 26% patients were on ventilator support 21% and 48% patients were kept on BiPAP and CPAP respectively. The association between Cause and Comorbidity was found to be statistically significant i.e., $p < 0.05$ via chi-square test.

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	57.026	1	57.02	6.188	.015 ^b
Residual	903.084	98	69.215		
Total	960.110	99			
a. Dependent Variable: Cause					
b. Predictors: (Constant), Comorbidity					

Table 1: Association between Cause and Morbidity

DISCUSSION

Covid pandemic crushed the health care system and economy of the world. Diverse mortality rates of covid were observed in different countries and regions of the world hence emphasizing the need to assess causes and elements leads to covid related loss of lives. Difference in Covid lethality has been noted not only in various sub

continents but even vary country to country e.g., India suffered much greater than Bangladesh and Indonesia [6, 7]. Our patient's age ranged from 18 year to 90 year and mean age was 59.6 year. This result showed that our patients expired relatively earlier than Hispanic (63 years) and white people (71 years)[8]. This was a common finding of many studies that aged person became the victim of this disease [9, 10]. Our majority of sufferer were male who were 79% while female was 21%. Males were the principal victim of this disease, as evident in other studies as well [11, 12]. This phenomenon may be understood by the particulars like expression of more immunity related genes to X chromosome and higher content of ACE2 receptors in males, which are utilized by SARS-CoV-2 virus for producing disease [13]. Mean duration of admission was 12 days while 9th day was crucial for most of the patients. Most common clinical presentation was fever cough and SOB as also noted by other researchers of Pakistan [14, 15]. We found respiratory failure as a cause of death for majority of patients, 54% died due to covid induced respiratory failure further 38 % died due to respiratory failure along with sepsis. MOF alone was responsible for only 3 deaths. An autopsy-based study on causes of death due to COVID-19 by Elezkurtaj *et al.*, revealed that SARS-CoV-2 infection was real cause of death behind fatalities of their studied population, on autopsy it is evidenced that 92.3% of patients deceased due to COVID-19, most of them expired due to virus induced pneumonia(53.8%)[15]. Like our study result they concluded respiratory failure and sepsis along with its complications like septic shock and multi organ failure as principal reason for end of the life of Covid patients [16-18]. In their autopsy-based studies researchers revealed SARS CoV2 induced microvascular thrombosis in pulmonary vasculature and diffuse alveolar damage as major offender in severe hypoxia and respiratory failure resulting in demise of the patients, not only this but Covid pneumonia's distinctiveness to activates immune system, producing cytokine storm, results in hypercoagulable state and thrombosis which further worsen the outcome [12, 13]. In their study Bryan *et al.*, also noted acute respiratory distress syndrome (ARDS) and septic shock were key contributor to death [9]. In our study we found that covid mortality is directly linked with co-morbidities. Majority of patients had double or triple pathologies, 33 patients had single chronic disease and only 9 patients expired without any other concomitant disease. Most commonly encountered chronic diseases were hypertension and diabetes. Combine hypertension and diabetes were present in 25% of our patients. Both these diseases lead to vascular endothelial abnormalities exhibited by decreased nitric oxide. Damage may be exaggerated by as SARS CoV2 direct toxic effects, hence

resulted in poor outcomes [14]. Other researchers also found diabetes and hypertension as high-risk factors for death they also pointed out that in age group 20-39 years old, presence of these risk factors result in high mortality [19]. Another study revealed hypertension, ischemic heart disease, and obesity as significant factors in resultant mortality [20]. Interestingly, we established statistically that respiratory failure and sepsis were significantly related with morbidities.

CONCLUSIONS

The study concluded that male gender was the dominant sufferer of COVID-19 and in contrast to normal perception, younger age is not an exception for mortality due to COVID-19. Fever, cough and SOB were the most frequent complain. Respiratory failure alone as well as with sepsis, was found to be the leading reason for mortality. Causes of death were strongly linked with presence of comorbidities in Covid-19 patients.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

- [1] Atif M and Malik I. Why is Pakistan vulnerable to COVID-19 associated morbidity and mortality? A scoping review. *The International Journal of Health Planning and Management*. 2020 Sep; 35(5): 1041-54. doi: 10.1002/hpm.3016.
- [2] Abid K, Bari YA, Younas M, Tahir Javaid S, Imran A. Progress of COVID-19 Epidemic in Pakistan. *Asia Pacific Journal of Public Health*. 2020 May; 32(4): 154-6. doi: 10.1177/1010539520927259.
- [3] Noreen N, Dil S, Niazi S, Naveed I, Khan N, Khan F, *et al.* COVID 19 pandemic & Pakistan; limitations and gaps. *Global Biosecurity*. 2020 May; 2(1): 1-11. doi: 10.31646/gbio.63.
- [4] Kung S, Doppen M, Black M, Braithwaite I, Kearns C, Weatherall M, *et al.* Underestimation of COVID-19 mortality during the pandemic. *ERJ Open Research*. 2021 Jan; 7(1): 1-7. doi: 10.1183/23120541.00766-2020.
- [5] Ali I, Sadique S, Ali S. Doctors dealing with COVID-19 in Pakistan: Experiences, perceptions, fear, and responsibility. *Frontiers in Public Health*. 2021 Dec; 9: 647543. doi: 10.3389/fpubh.2021.647543.
- [6] Mulchandani R, Babub GR, Kaur A, Singha R, Lyngdoha T. Factors associated with differential COVID-19 mortality rates in the SEAR nations: a narrative review. *IJID Regions*. 2022 Feb; 3: 54-67.

- doi: 10.1016/j.ijregi.2022.02.010.
- [7] Chakrawarty A, Ranjan P, Thrinath A, Aggarwal E, Isaac JA, Berry P, *et al.* Assessment of preventive practices followed by general public during COVID-19 pandemic—a cross-sectional survey from India. *Cureus*. 2020 Oct; 12(10): e11274. doi: 10.7759/cureus.11274.
- [8] Goodman KE, Magder LS, Baghdadi JD, Pineles L, Levine AR, Perencevich EN, *et al.* Impact of sex and metabolic comorbidities on coronavirus disease 2019 (COVID-19) mortality risk across age groups: 66 646 inpatients across 613 US hospitals. *Clinical Infectious Diseases*. 2021 Dec; 73(11): e4113–23. doi: 10.1093/cid/ciaa1787.
- [9] Bryan MS, Sun J, Jagai J, Horton DE, Montgomery A, Sargis R, *et al.* Coronavirus disease 2019 (COVID-19) mortality and neighborhood characteristics in Chicago. *Annals of Epidemiology*. 2021 Apr; 56: 47–54. doi: 10.1016/j.annepidem.2020.10.011.
- [10] Akhtar H, Khalid S, Rahman FU, Umar M, Ali S, Afridi M, *et al.* Presenting Characteristics, Comorbidities, and Outcomes Among Patients With COVID-19 Hospitalized in Pakistan: Retrospective Observational Study. *JMIR Public Health and Surveillance*. 2021 Dec; 7(12): e32203. doi: 10.2196/32203.
- [11] Baqi S, Naz A, Sayeed MA, Khan S, Ismail H, Kumar V, *et al.* Clinical characteristics and outcome of patients with severe COVID-19 pneumonia at a public sector hospital in Karachi, Pakistan. *Cureus*. 2021 Feb; 13(2): e13107. doi: 10.7759/cureus.13107.
- [12] Sarfaraz S, Shaikh Q, Saleem SG, Rahim A, Herekar FF, Junejo S, *et al.* Determinants of in-hospital mortality in COVID-19; a prospective cohort study from Pakistan. *PLoS One*. 2021 May; 16(5): e0251754. doi: 10.1371/journal.pone.0251754.
- [13] Chaudhry A, Ikram A, Baig MA, Salman M, Ghafoor T, Zakir H, *et al.* Mortality analysis of COVID-19 confirmed cases in Pakistan. *medRxiv*. 2020 Jun: 2020-06. doi: 10.1101/2020.06.07.20121939.
- [14] Olivas-Martínez A, Cárdenas-Fragoso JL, Jiménez JV, Lozano-Cruz OA, Ortiz-Brizuela E, Tovar-Méndez VH, *et al.* In-hospital mortality from severe COVID-19 in a tertiary care center in Mexico City; causes of death, risk factors and the impact of hospital saturation. *PLoS One*. 2021 Feb; 16(2): e0245772. doi: 10.1371/journal.pone.0245772.
- [15] Tazerji SS, Shahabinejad F, Tokasi M, Rad MA, Khan MS, Safdar M, *et al.* Global data analysis and risk factors associated with morbidity and mortality of COVID-19. *Gene Reports*. 2022 Mar; 26: 101505. doi: 10.1016/j.genrep.2022.101505.
- [16] Elezkurtaj S, Greuel S, Ihlow J, Michaelis EG, Bischoff P, Kunze CA, *et al.* Causes of death and comorbidities in hospitalized patients with COVID-19. *Scientific Reports*. 2021 Feb; 11(1): 1–9. doi: 10.1038/s41598-021-82862-5.
- [17] Wu C, Chen X, Cai Y, Zhou X, Xu S, Huang H, *et al.* Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Internal Medicine*. 2020 Jul; 180(7): 934–43. doi: 10.1001/jamainternmed.2020.0994.
- [18] Chen W and Pan JY. Anatomical and pathological observation and analysis of SARS and COVID-19: microthrombosis is the main cause of death. *Biological Procedures Online*. 2021 Dec; 23(1): 1–2. doi: 10.1186/s12575-021-00142-y.
- [19] Beigee FS, Toutkaboni MP, Khalili N, Nadji SA, Dorudinia A, Rezaei M, *et al.* Diffuse alveolar damage and thrombotic microangiopathy are the main histopathological findings in lung tissue biopsy samples of COVID-19 patients. *Pathology-Research and Practice*. 2020 Oct; 216(10): 153228. doi: 10.1016/j.prp.2020.153228.
- [20] Tian W, Jiang W, Yao J, Nicholson CJ, Li RH, Sigurslid HH, *et al.* Predictors of mortality in hospitalized COVID-19 patients: a systematic review and meta-analysis. *Journal of Medical Virology*. 2020 Oct; 92(10): 1875–83. doi: 10.1002/jmv.26050.