

CO-MORBIDITIES IN FATAL CASES OF SARS-COV-2 IN RAWALPINDI/ISLAMABAD PAKISTAN

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ABSTRACT

Objective: To determine the frequency of comorbid illnesses in fatal cases of COVID-19 in various hospitals of Rawalpindi/Islamabad during the first three months of pandemic in Pakistan.

Study Design: Case series study.

Place and Duration of Study: Combined Military Hospital Rawalpindi (CMH), Pak Emirates Military Hospital Rawalpindi (PEMH), Benazir Bhutto Hospital (BBH), Rawalpindi Institute of Urology (RIU) and Pakistan Institute of Medical Sciences Islamabad (PIMS), from 20th Feb 2020 to 19th May 2020.

Methodology: A total of 51 adult fatal cases were studied retrospectively during the subject period. The patients were admitted in any of above mentioned hospitals for variable time during the study period. There were 35 males and 16 females. Patients' ages ranged from 24 to 90 years. The cases were studied for presence of various comorbid illnesses that could have aggravated the complications of COVID-19 and contributed towards mortality.

Results: Out of 51 fatal cases 23/51 (45%) had Diabetes mellitus (DM), 18/51 (35%) had Hypertension, 12/51 (23%) Ischemic Heart Disease, 03/51 (06%) had Chronic Renal Failure and Cancer, 02/51 (4%) had Chronic Obstructive Pulmonary Diseases (COPD) and Tuberculosis (TB).

Conclusion: Diabetes mellitus and cardiovascular illnesses were the commonest comorbid in patients who died of COVID-19 followed by Chronic Renal Diseases, Malignancy, Tuberculosis (TB) and Chronic Obstructive Pulmonary Diseases (COPD).

Keywords: COVID-19, Comorbid, Fatal, Pandemic.

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INTRODUCTION

In December 2019, an aggressive pneumonic illness affected a number of people in Wuhan, the capital city of Hubei province in China and later in January 2020, it was discovered that a new type of corona virus is culprit in these patients¹. This new virus from corona viridae family was further discovered to be part of same genus (beta coronavirus) to which severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome corona virus (MERS-CoV) also belong². On February 11, 2020, the International Committee on Taxonomy of Viruses gave it the name SARS-CoV-2³. SARS-CoV-2 is the third virus from same family to have caused a pandemic. However, SARS-CoV-2 has far more

infective potential as compared to the other two viruses, having the ability to maintain transmissibility such that every affected person can infect 2-3 persons on an average through respiratory droplets⁴. According to the Center for Systems Science and Engineering at John Hopkins University, over 4,200,000 cases were reported worldwide till May 12, 2020⁵. On January 30, 2020, the epidemic of SARS-COV2 (then known as 2019-nCoV) was declared a public health emergency of international concern (PHEIC) by the World Health Organization (WHO). On February 11, 2020, the disease was given the official name of COVID-19 (coronavirus disease) by the WHO. COVID-19 was ultimately announced to be a pandemic by WHO on March 11, 2020, when the epidemiological criterion (infection in more than 100,000 people in 100 countries) was fulfilled⁶. The damage done to humanity by COVID-19 pandemic is much more severe and worse than

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Received: 17 Jun 2020; revised received: 09 Jul 2020; accepted: 10 Jul 2020

that caused by SARS in 2002 or MERS in 2012⁷. Worldwide, the disease has overwhelmed the medical resources along with social and economic crises, so much so that many countries are facing shortage of essential medical equipment including ventilators⁸.

Most patients suffering from COVID-19 experience only mild to moderate symptoms and recover fully. However, severe cases may develop adult respiratory distress syndrome, multi-organ failure or even death. According to various studies, death rate of COVID-19 ranges from minimum 1.4% to maximum 4.3%⁴. The virus has been shown to trigger an unrestricted but ineffective immune response that leads to severe lung injury. The CT scans of affected COVID-19 patients reveal ground glass opacities similar to what used to be seen in patients with SARS and MERS⁹. Acute cardiac and kidney injury are also often present in addition to ARDS¹. There is still much more to be learnt about the pathophysiology and disease mechanisms. So far, no vaccine or antiviral treatment is available, though a lot of research in these fields is currently underway.

The middle-aged and elderly patients with longstanding chronic illnesses diabetes, cardiovascular diseases & hypertension are considered to be more at risk of complications especially ARDS and death⁹. Studying the prevalence of chronic conditions is of prime importance in order to reduce COVID-19 complications & mortality¹⁰. In our study, we aimed to evaluate the prevalence of various chronic illnesses including Diabetes Mellitus, Hypertension, Ischemic heart disease and cancer in patients dying of complications from COVID-19. This epidemiological data may prove helpful in triaging the patients who are susceptible to severe complications, so that early admission and monitoring may prevent a deadly outcome.

METHODOLOGY

It was case series study. It was conducted at various tertiary care hospitals of Rawalpindi and Islamabad including Combined Military Hospital (CMH), Pak Emirates Military Hospital

(PEMH), Pakistan Institute of Medical Sciences (PIMS), Benazir Bhutto Hospital (BBH), and Rawalpindi Institute of Urology (RIU) for three months (20th February 2020 to 19th May 2020). Total 51 subjects with positive PCR for SARS CoV-2 were included in the study over aforementioned period through non probability convenient sampling technique. Ethical committee of hospital granted approval vide ERC/IERB approval certificate number 85/06/20(26). Clinical records were evaluated, scrutinized and important epidemiologic and demographic details including age, gender and presence of chronic comorbidities were noted. The data was analyzed on SPSS-22. Mean, standard deviation and percentages were calculated accordingly.

RESULTS

This study included total 51 laboratory-confirmed COVID-19 patients. Mean age was 63 ± 6.5 years (ranging from 24 years to 90 years), 29 (56.86%) were older than 60 years, 20 (39.21%) were aged between 40-60 years and 2 (3.92%) were younger than 40 years. This indicated that increased age increases the susceptibility for complications and death. Out of 51 enrolled patients,

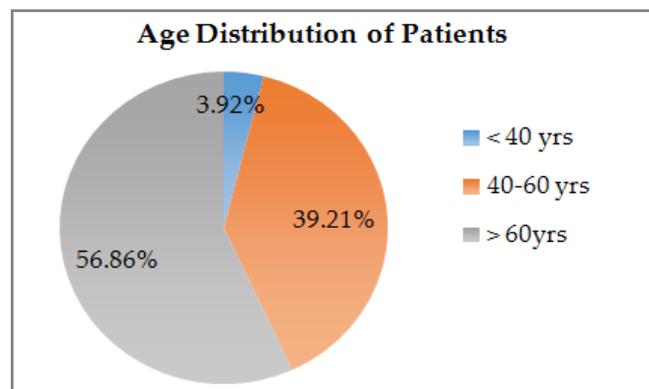


Figure-1: Age distribution of patients.

35 (69%) were males and 16 (31%) were females showing a male preponderance. 40 (78%) patients had some comorbid illness, out of whom 17 (33%) had only one and 34 (67%) had two or more comorbidities. The average time from admission to death was 6.7 ± 2.1 days (ranging from less than a day to 20 days), 15 patients (29%) deteriorated

rapidly and succumbed to multi-organ failure, especially respiratory and cardiac failure. In our

Table-I: Gender of Patients.

Gender	Patients	Percentage
Male	35/51	69
Female	16/51	31

Table-II: Comparison of Co-morbidities.

Comorbidities	n	%
Diabetes Mellitus (T2DM)	23/51	45.09
Hypertension (HTN)	18/51	35.29
Ischaemic Heart Diseases (IHD)	12/51	23.52
Malignancy	03/51	5.88
Chronic Kidney Disease (CKD)	03/51	5.88
Chronic Obstructive Pulmonary Disease (COPD)	02/51	3.92
Tuberculosis (TB)	02/51	3.92
Obesity	02/51	3.92

study, the most common chronic illness in deceased individuals was Diabetes mellitus 23/51 (45%) followed by hypertension 18/51 (35%), Ischaemic heart diseases (IHD) 12/51 (23%).

Table-III: Prevalence of comorbid illnesses in fatal cases of COVID-19 in various hospitals of Rawalpindi and Islamabad.

Co morbid	PEMH (n)	CMH (n)	PIMS (n)	BBH (n)	RIU (n)	Total (n)
Diabetes Mellitus	3	8	3	4	5	23
Hypertension	5	6	-	2	5	18
IHD	2	6	1	1	2	12
Malignancy	1	-	-	1	1	3
CKD	-	2	-	-	1	3
COPD	-	1	-	1	-	2
TB	1	1	-	-	-	2
Obesity	1	1	-	-	-	2

There was no significant difference in incidence of malignancy 3/51 (6%), CKD 3/51 (6%), COPD 2/51 (4%), TB 2/51 (4%) and obesity 2/51 (4%).

DISCUSSION

This case series study demonstrated various risk factors for complications and death in hospitalized COVID-19 adults. There have been many recent studies on same issues all over the world especially China. Since the pandemic is still on-going, the exact mortality and risk factors may not be determined until some further data is available. However, the findings of our study do match with those of other similar studies. A large

study conducted at China reported that among 72,314 cases, no deaths occurred in less than 9 year age group. On the other hand, death rate in cases aged 70-79 years and older than 80 years reached 8% and 14.8%, respectively¹¹. Similar observation has been made in Italy, where a substantially high death rate (20.2%) was documented in cases older than 70-80 years¹². Old age was also reported to be an independent predictor of mortality in SARS and MERS pandemics¹³. Our data also supported that age more than 60 years was associated with adverse outcomes. Furthermore, males appear more susceptible to complications and death¹⁴. The X chromosome and sex hormones may have a protective effect on females but it needs further evaluation¹⁵. This observation is similar to our study results where majority of deceased COVID-19 patients were males. Most studies have suggested association of comorbidities with risk of death due to COVID-19. Chronic illnesses such as hypertension,

diabetes, CHD/cardiovascular disease, cerebrovascular disease, and chronic renal disease have all been found in significant number of COVID-19 patients who succumbed to the disease.

Various observed complications that ultimately lead to death in COVID-19 cases encompass sepsis, septic shock and cardiac problems comprising heart failure, rhythm disturbances, myocardial infarction and cardiac arrest¹⁶. 3% of patients with respiratory tract infection experience cardiac arrest¹⁶. The risk of these complications is increased in old patients with pre-existing cardiovascular diseases having severe pneumonia at presentation¹⁷. Cardiac biomarkers including cardiac

troponins and brain natriuretic peptide (BNP) have been found raised in severe and fatal cases. In past also, ischemic heart disease was found to have association with cardiac complications and fatal outcomes in cases of viral respiratory infections¹⁷.

The available data also reveals that apart from underlying cardiovascular disease, hypertension, Diabetes and CKD also increase the risk of death due to COVID-19¹⁸. In many studies, hypertension was found to be the commonest comorbidity among deceased patients (56.8%), with diabetes (31.2%) and cardiovascular disease (21.5%) following in second and third places¹⁹. It has been suggested that hypertension contributes to more than 2.5 times increased risk of mortality from COVID-19²⁰. Different studies found Diabetes to be the second most common comorbidity in fatal COVID-19 cases²¹, and it is considered to double the mortality risk from COVID-19²². Moreover, the presence of ≥ 2 comorbidities has been found to increase the risk of death/poor outcomes by almost 5 times. However, our study results are different where diabetes was the commonest comorbidity while hypertension was second and cardiac disease third. Others such as cancer, CKD, COPD and obesity were present in only a minority of patients.

The basis of association between cardiovascular disease and COVID-19 needs further research to be determined. However, it has been suggested in some studies that infection-related increased work load on myocardium aggravates ischemia which causes myocardial injury or myocardial dysfunction²². An inflammatory storm triggered by virus leading to shock and consequent ischemic injury is also a speculated culprit. Endothelial dysfunction with diminished supply of nitric oxide is also considered to be an initial occurrence in cardiac disease as well as hypertension, diabetes, and sometimes renal dysfunction, with increased mortality in COVID-19 patients having these comorbidities²³. Various inflammatory markers including interleukin-6, C-reactive protein, and erythrocyte sedimentation rate (ESR), lactate dehydrogenase, creatine kinase,

D-dimers are also found raised in patients with severe pneumonia who died²⁴. According to other studies, chronic obstructive pulmonary disease (COPD) or smoking is not significantly associated with increased mortality. Similar findings are observed in our study where only 2 out of 51 fatal cases had COPD²⁵.

A further detailed and deep analysis of the effect of chronic comorbid illnesses on clinical course of COVID-19 patients is essential in order to develop guidelines for effective treatment plans, especially for the elderly patients.

CONCLUSION

Our study concludes that presence of older age, male gender and multiple co-morbidities with target organ damage at admission may be associated with increased risk of mortality or unfavourable outcomes in PCR confirmed hospitalized COVID-19 patients. These results may prove helpful in the battle against the COVID-19 pandemic.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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