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Mortality Trends In Pre COVID And Pandemic Era In A Tertiary Care Setting

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Abstract

Objective: The coronavirus pandemic has emphasized stay-at-home and social distancing policies. Since the beginning of the outbreak of COVID-19, there has been a declining trend of hospital mortality indicating that the pandemic might keep patients from seeking emergency care in a hospital setting. This study was carried out to determine the mortality trends pre-COVID and pandemic periods in a tertiary care hospital.

Methods:

Study design: Retrospective observational study

Place and Duration: 1st January 2019 to December 2021 at Federal Government Polyclinic (FGPC) Hospital Islamabad

It was a retrospective review done on death data of pre-COVID (January-December 2019) and pandemic(January 2020-December 2021) period. Data on death was retrieved from medical male and female wards, medical ICU and isolation ward. The mortality rate was measured for both pre-COVID and pandemic periods along with co-morbid for the pandemic period. Descriptive statistics were measured with the SPSS software version. 23. Association with age, gender and mortality was observed using a chi-square test taking p value ≤ 0.05 as significant.

Result: In this study of the 366 deaths, the average age of patients in the pre-COVID and pandemic era was57.40±17.910 and 64.31±16.065 respectively. The males and females were 50.9% and 49.1% in the pre-COVID period while 61.5% and 38.5% in the pandemic period. The frequency of deaths was 46.7% in the pre COVID and 53.3% in the pandemic period with a p-value <0.05. Patients with co-morbid died more in the pandemic era.

Conclusion: It was observed that hospital mortality trends were in decline during the COVID-19 pandemic in our setting which may be associated with lockdown, decreased access to the hospitals or fear of going to hospital.

Keywords: Covid-19, Mortality, Pandemic, Pre COVID era, pandemic era

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1. Introduction

The magnitude and rate of mortality are influenced by factors such as time and location that aggravated during the COVID-19 pandemic. A country must have an accurate measurement of the death rate due to the pandemic to analyze its impact on public health which would help in understanding the determinants of variation in the infection, and fatality rate and devising alternative policy options.[1]

Mortality has always been influenced by outbreaks and pandemics.[2] The latest pandemic of the decade and the third coronavirus outbreak of the world, COVID-19 began in China in December 2019, spread rapidly and caused a huge increase in mortality across the world.[3] To assess the excess mortality clinicians compared the mortality trends in pre and pandemic eras. Such studies were conducted across the world with an increase in mortality trends seen in a few countries and a decrease in trends in a few other countries, where an overall increase of 50% more deaths than expected was observed during the pandemic. At the same time, other countries like Australia and New Zealand, reported fewer deaths than normal.[4]

By the end of the year 2021, a total of nearly 289 million COVID-19 cases and over 5.4 million deaths have been reported globally contributing to COVID-19.[5] Hence the pandemic, a public health emergency, caused a massive impact on the world, especially developing countries.

Pakistan, a low to middle-income country, with a ranking of 152nd among 189 countries of the world on the Human Development Index[6], unexpectedly stood 128th on the list of COVID-19-positive cases after the first wave of the pandemic.[7] The disease burden increased with time to 31st ranking among the high-burden countries but the mortality was still low at only 2% by the middle of the second year of the pandemic.[8] By 31st December 2021 there were 1290,000 COVID-19 patients and related death measured to 28,909 only.[9]

Despite being very low in the socioeconomic list of countries, Pakistan has faced this biggest pandemic of the world in a very challenging way, with much lower mortality reported as compared to many other developing as well as developed countries, hence flattening the curve.[7]

There were several biases involved in mortality, which could be epidemiological trends-based, co-morbid, and access to healthcare facilities. All these factors created a lot of confusion in documenting and relating mortality whether it should be attributed solely to COVID-19, COVID-19 with other diseases, or overall poor access to health care owing to the strict lockdown during our two study years of pandemic.

To date, there are very few studies conducted in Pakistan documenting the mortality in pre COVID pandemic era. The present study was undertaken to evaluate the mortality trends in both eras. With the current economic crisis and unstable health care system, the policymakers can benefit from our study as it gives an insight into an epidemiological drift of mortality amidst a pandemic and hence helps in assessing the control strategy effectiveness and making timely decisions in case of future infectious outbreaks.

2. Materials & Methods

It was a Retrospective, Observational study which was conducted among mortality data reviews of patients admitted with ERB no.FGPC.1/12/2020/Ethical Comittee in the medical department of Federal Government Polyclinic Hospital. The Department of Medicine comprises of General Medical ward, medical isolation solely converted to COVID isolation during the pandemic as well as a Medical ICU. All patients more than 13 years of age, excluding the pediatric population were included in the study. Detailed records of all patients admitted to the Department of Medicine between the periods of 1st January 2019 (pre-COVID) to December 2021(COVID pandemic)were analyzed. We divided all admitted patients into two groups.

1. Confirmed COVID cases based on RT-PCR- COV2 or HRCT chest findings.
2. Clinical COVID cases in which results of COVID PCR/HRCT chest were pending till the time of death of a patient and wherein no other plausible cause of their clinical presentation could be explained.
3. COVID-negative cases who were not suspected to be COVID based on either lab parameters or clinical presentation and their cause of presentation was any other medical illness.

Confirmed COVID and clinical COVID cases were further subdivided into two other groups which were the ones with Co-morbid and the other ones without Co-morbid.

Causes of hospital mortality were studied among these two groups and subgroups during a total time duration of 3 years, including pre-COVID as well as the pandemic era. Mortality was compared between pre-COVID and the pandemic era to substantiate the fact that this trend in mortality could be attributed to COVID solely or otherwise.

All the graphical and tabulated analysis was made by using Statistical Package for the Social Sciences (SPSS.22). Descriptive analyses were done for both categorical and continuous variables. Continuous variables including age were presented as means and standard deviations for normally distributed values. Median and interquartile values were used for variables that were not normally distributed. Categorical variables including gender, COVID causes and mortality were presented by frequency and percentages. The chi-square test and Fisher Exact Test were used to measure the association between the variables. p-value ≤ 0.05 will be considered as significant.

The reference number of the Ethical Review Board (ERB) certificate is No. FGPC.1/12/2020/Ethical Committee.

3. Results

There were 366 patients enrolled in a study among them 171 (46.7%) in the pre-COVID and 195 (53.3%) patients in the pandemic group. Participants in our study included 207 (56.6%) males and 159 (43.3%) females while 87 (50.88%) males and 84 (49.12%) females from pre COVID group and pandemic group 120 (61.54%) males and 75 (38.46%) females were discussed. The age of pre-COVID patients was 57.40 ± 17.91 and for COVID-19 pandemic patients 64.31 ± 16.065. When we analyzed mortality it was observed that 46.7% of deaths occurred in 2019, 8.5% in 2020 and 44.8% in 2021 justifying the significant association $p < 0.05$.

A comparison of demographic features and clinical characteristics between both groups was summarized. Chi-square statistics were used to examine the

association between Gender and age group with reasons for mortality. There is an insignificant association at a 5% significance level between Gender and reasons for the mortality of respondents (Chi-Square =11.963, df = 11, p = .366). Hence, H1 was not supported while with age group p = 0.039 H1 was supported. When mortality results were analyzed based on the COVID-19, pandemic era with gender and age group then significant results. Pre COVID with gender p = 0.231, age p= 0.289. COVID Pandemic with gender p = 0.484, age p= 0.180.

Table 1: Distribution of COVID-19 Cases Based on Positive and Suspected Categories, Co-morbidities, and Identified Reasons

Causes/ Covid categories	Positive 127(65.1%)		Suspected 68(34.9%)	
	With co-morbid	Without co-morbid	With co-morbid	Without co-morbid
	106(83.46)	21(16.53)	61(89.7)	7(10.3)
HTN	12(11.3)	0(0)	3(4.9)	0(0)
DM	10(9.4)	0(0)	5(8.2)	0(0)
Respiratory	3(2.8)	0(0)	5(8.2)	0(0)
Others	24(22.6)	0(0)	27(44.3)	0(0)
Multiple	51(48.1)	1(4.8)	21(34.4)	0(0)
No reason identified	0(0)	20(95.2)	0(0)	7(100)
P value	<0.05		<0.05	

In our research, we categorize reasons for deaths like Hypertension (HTN), Diabetes, Chronic kidney disease (CKD), decompensated chronic liver disease (DCLD), myocardial infarction (MI), stroke, respiratory illness, Cancer, sepsis, Multiple reasons (two or more from any of these). Others included causes of mortality other than all the above-mentioned reasons and None denotes no reasons for death was identified. The major cause of mortality in pre COVID era is other than these categories (24%), 15.2% with DCLD and respiratory illness, cancer 14%, stroke 8.8%, multiple reasons 7.7% and 15.1%with all remaining causes. The major cause of mortality in the pandemic era has multiple reasons among these categories (37.4%), other than these categories (26.2%), 13.8% having none of these reasons, 7.7% with HTN and DM, and 7.2% with all remaining causes. There is a significant association between pre- and pandemic with the cause of mortality $p \leq 0.05$. The pandemic era was categorized as COVID-19 positive and COVID suspected and found significant association with causes of mortality by using the Fisher exact test and p = 0.043, further, these categories were subcategories with co-morbid and without comorbid and significant results were calculated. The major cause of mortality among COVID-19 positive with co-morbidities having multiple reasons is 48.1%, others 22.6% and HTN 11.3%, While without any co-morbid 95.2%. The same results were analyzed for COVID suspected and it was observed that 44.3% had other than defined morbid, 34.43% had multiple co-morbid and 8.2% had DM and respiratory illness.

4. Discussion

The present study aimed to measure trends of mortality pre-COVID and pandemic in a cohort of community representatives of the Pakistani population in a tertiary care hospital setting. We also estimated the causes of mortality with the hypothesis that during the COVID period, mortality from other causes decreased significantly. To the best of our knowledge, this is the first study in Pakistan analyzing the in-hospital cause-specific mortality in a tertiary care hospital, providing a complete picture of the short-term consequences of COVID-19 and non-COVID-19 patients. In our study, we divided our patients into two eras pre-COVID and pandemic, with pre- pre-COVID period being in 2019 and the pandemic being in 2020 and 2021. We observed through our research that in one year of data of 2019, the frequency of mortality was 171/366 (46%.) While during the COVID period number of deaths was 195/366 (53.3%), these results showed that more deaths occurred pre-COVID period than during COVID. This decreased trend in mortality may be due to the lockdown implemented, the closure of OPD-restricted indoor admission for patients and the conversion of wards to COVID wards.

Our study results were consistent with a few other studies done internationally. There was a significant decline in the medical and surgical admission rates in Alberta Canada during COVID-19 days. Medical patient incident rate ratio (IRR) 0.86,p<0.001) and surgical (IRR 0.82, p<0.001)Despite low admission rates the impact of COVID -19 on health care systems was great.[10]Another study by Samidurai A et al also found admission rates were less during COVID, delay in seeking care and health care access, resulted in an increased burden of adverse outcomes.[11] One more study favored our outcomes by reporting that a decrease in

healthcare visits was associated with fear associated with the hospital environment.[12] A study done in Canada Patients' emergency visits dropped to 24.9% during the COVID period. Visits to the hospital due to respiratory tract infection increased to 14.1% but due to other causes like trauma to 53.6% musculoskeletal causes decreased to 52.5%, acute coronary syndrome to 49.9%, and stroke to 17.6%.[13]

The catastrophic impact of Covid -19 in terms of mortality along with adverse neurological and cardiovascular outcomes has been reported in literature worldwide.[14] In some parts of the world mortality rate was higher during the time of COVID-19. This could be the countries where death due to COVID-19 exceeds the death due to other causes of mortality.

In one article results of 10 studies done on 50123 patients were assessed. There was a significant decline in overall admission rates in hospitals due to ST-segment elevation myocardial infarction(STEMI) but there was no significant difference in mortality in STEMI patients admitted before and during covid pandemic. Increased trend of in-hospital complications during hospital stays and higher mortality rates were noted in Italy during the COVID-19 era. It appears that many factors could worsen a patient's condition. These could be lockdowns, and system delay times, potentially causing increased mortality trends during the pandemic. [15 Studies] reported that patients admitted with diseases had severe conditions at the time of admission.[16]

When we compared gender distribution in our study there was an insignificant association between gender and age with mortality in pre-COVID and pandemic time and the reason for death between males and females also showed no association (p-value>0.05).In one study by Bwire GM reported that mortality rates were higher in males than in females, higher trends could be due to better immune systems in females than males.[17]

Mortality trends regarding age showed that in pre pre-COVID era average age was 57.40 ±17.910and, and in the pandemic era average age was 64.31±16.065 showing an insignificant association. However, one study showed that higher mortality trends were seen in the younger age group of 20-40 years than in the older age of 40-60 years. This may be due to higher exposure of young to outside than old age. One study showed contrasting results that morality was also more in the old age group than in the young due to a higher rate of co-morbidity in the older age group.[17] But This trend did not seem in another study.[18] In our study, the major causes of mortality in the pre-COVID period were multiple co-morbid including HTN, DM, Coronary heart disease, and stroke. The second major co-morbid morbid was disseminated chronic liver disease and respiratory illness. In the pandemic era, the same trend was identified. Patients who died with co-morbid (83.46%) were greater in number than those without any co-morbid (16.53%).

One study done in Pakistan was also consistent with our results that age, ischemic heart disease, and hypertension were important co-morbidity for death.[19] There was a significant association between the causes of mortality in pre-COVID and the pandemic era in our study. One study done in China also suggested that diabetes, hypertension, and other chronic diseases also increased the chance of death then young and healthy. [20]

In our study, HTN was a major co-morbid with frequency of 11.4% among all-cause mortality. One clinical trial done in Italy also showed that hypertension was in 75% of cases of COVID who died. Showing that people with hypertension are more susceptible to COVID-19 infection.[21] Cardiovascular events caused by this virus increase the risk of complications and death.[22] Cardiovascular services decreased by 60-100% in different hospitals in England, China, and Italy during the pandemic. The relative risk of mortality in patients with COVID and cardiovascular (CVD) was higher as compared to CVD and non-COVID- 19, with the risk increasing more with co-morbidities. In China, an 83.4 % reduction was observed in referrals to hospitals. Services remained low in England and Italy even after easing lockdown in the Covid period.[23]

In our study, DM was also one of the co-morbid with 9.4% of patients died with COVID. Wu Z et al in a study reported that with co-morbidity like diabetes mellitus mortality trend increased from 2.3% in diabetics compared to non-diabetics.[24]

A study by Santi et al, done in Italy showed that the emergency visits were reduced in all age groups. During the COVID-19 period hospital deaths of all causes mortality rate was 43.2%. while considering cause-specific mortality rate for carcinoma this was 76.7%, for metabolic, nutritional, and endocrine was 79.5% and for cardiovascular 32.7%. The pandemic caused a sudden drop in hospital visits during the lockdown,[25] which was consistent with other studies.[26]

During the pandemic safety interventions were implemented and the COVID-19 vaccine application led to a significantly improved feeling of safety among healthcare workers. The healthcare community has made marvellous progress in the provision of PPE along with the vaccine for the safety of both patients and healthcare providers. Understanding of in-ground experience of health care workers during a pandemic can now help to build up efficient and effective practices from now onward to deal with such epidemics and pandemics.[27] Some recommendations were provided during that period for communities in large for implication of safety measures and prevent transmission of infection like restriction on indoor dinning, public gatherings, visiting shopping malls and even nursing homes and hospital. Lockdowns were imposed that have caused limited access to hospitals and timely management of diseases other than covid-19.[28]

Study Limitation

Our major limitation was that this study was done in a single centre, which may not represent the mortality rates of other healthcare settings. There might be bias factors such as lack of in-home mortality or dead on arrival that may have hampered the results. This study was done in a single medical department only which could not give data of true mortality data of whole hospital setting. We were unable to collect data on demographic factors, which would be crucial for understanding this decline in mortality trends.

5. Conclusion

Decreasing hospital mortality trends were observed during COVID-19. This could be the effect of lockdown and fear of coming to hospital. Death with co-morbid was more as compared to without any associated disease. Future research is recommended for a better understanding of decline in the emergency visits during pandemics and long-term follow-ups to observe the consequences of pandemics. Health care specialists must take our findings of research into account regarding lockdowns and staying at home may affect potential severe outcomes.

CONFLICTS OF INTEREST- None

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Contributions:

F.S - Conception of study
H.S.K - Experimentation/Study Conduction
T.F - Analysis/Interpretation/Discussion
R.A - Manuscript Writing
S.I.D - Critical Review
M.A - Facilitation and Material analysis

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