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Outcome and mortality rate of COVID-19 infection among health workers and general population

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Abstract---Objective: To determine the outcomes and mortality rate of Covid-19 infection among health workers and general population. Material and methods: An observation study was conducted in Department of Pulmonology Pak Red Crescent Medical College & Teaching Hospital,Dina Nath, Kasur, Punjab. Total 210 Covid-19 patients which were divided in two groups equally, group A healthcare workers and group B general population. Outcomes and mortality rate were assessed between both groups using Chi Square and Independent Samples T-test. Results: Mean age in group A was was 41.29±11.37 years while 42.61±16.15 years in group B. ICU admissions was significantly lower in group A 7 (6.7%) while 22

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(21.0%) in group B. Mechanical ventilation need was significantly lower 6 (5.7%) in group A than group B 19 (18.1%). Mortality rate was significantly lower in group A than group B 4 (3.8%) vs 15 (14.3%). The mean hospital stay in group A was significantly shorter 9.41±3.333 days than in group B 13.18±3.956 days. Conclusion: From our study we conclude that the mortality rate was higher in the general population as well as the admission to ICU and need for mechanical ventilation as compared to the healthcare workers.

Keywords---COVID-19, healthcare workers, general population, mortality, outcomes, pandemic.

Introduction

Significant disease outbreaks in East Asia and the Middle East have been linked to coronaviruses (CoVs) throughout the past two decades. Both SARS (severe acute respiratory syndrome) and MERS (Middle East respiratory syndrome) first appeared in the two decades between 2002 and 2012. In late 2019, a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged and has since caused a pandemic in several nations and territories around the world [1].On 12 December 2019, a novel coronavirus (nCoV) emerged in Wuhan City, Hubei Province, China. Since then, health workers throughout the world have been working to prevent potential disease outbreaks caused by this virus [2, 3].

The public health hazard posed by newly developed CoVs is significant worldwide. COVID-19 is the third CoV to arise in humans in the last 20 years [4, 5]. There are currently no viable treatments for COVID-19 since there are no vaccines or medicines licensed for addressing human CoV infections [6-8]. The majority of countries are presently implementing methods to halt the spread of this potentially fatal virus. Since then, the covid-19 immunization has been demonstrated to be safe and successful in healthy volunteers [9, 10], and it has been gradually introduced to the adult population of the United Kingdom. Despite the excellent outcomes, the risk for catastrophic covid-19 outcomes (including hospital admission or death) still exists even after vaccination. In vaccinated populations, exposure, a breakthrough infection after exposure, and severe sickness all increase the risk of a bad outcome. However, relevant risk factors are unknown because clinical trials have excluded many people (e.g., the elderly, people with complex comorbidities, or cancer patients receiving chemotherapy and/or radiotherapy) in whom vaccine response might be suboptimal [10].

The global spread of the COVID-19 outbreak has created a physical and emotional challenge for healthcare workers. The healthcare workers have a higher risk of exposure to COVID-19 than the general population [11] because of their direct contact with patients. [12, 13] However, because they are generally healthier than the general public, they should have lower rates of hospitalization and mortality. Infected healthcare workers endanger their families, coworkers, and patients.[14] The risk of transmitting infection to others, long working hours, and perceived guilt from family and society can all contribute to a decline in mental

health, including poor sleep quality, anxiety, symptoms of post-traumatic stress disorder, stress, and depression. A measurement of such risk is necessary for the development of further infection control strategies to protect healthcare workers. The findings may also serve as a proxy for assessing the effectiveness of current hospital safety protocols. The purpose of this study was to determine how many healthcare workers are infected with COVID-19 and what effects this has on them compared to the general population.

Material and Methods

We conducted this observational study at Department of Pulmonology Pak Red Crescent Medical College & Teaching Hospital,Dina Nath, Kasur, Punjab after taking ethical clearance from the hospital's ethical committee. We selected 210 Covid-19 infected patients which we divided equally using lottery method in two groups, 105 healthcare workers while 105 general population patients having age between 18 to 70 years of either. All the patients were assessed for clinical symptoms of Covid-19 infection including fever, cough, Acute Respiratory Distress Syndrome along with diarrhea, shortness of breath and loss of taste and appetite. Basic demographic information like age, gender and comorbid along with the outcomes oxygen therapy, use of mechanical ventilation, hospital stay and mortality were recorded on a pre designed pro forma.

The sample size was calculated using openepi sample size calculator with parameters; previous frequency of mortality in general population and healthcare workers 13.9% vs 3.2%[20], power of test 80% and confidence interval 95%. Statistically analysis were performed using IBM SPSS 22. Frequencies and percentages were used for qualitative variables while mean and standard deviation was used for quantitative variables. We applied Chi Square test between both groups for comparison of qualitative outcomes keeping P value less than 0.05 as significant while Independent Samples T test was applied for comparison of quantitative variables keeping P value less than 0.05.

Results

A total of 210 Covid-19 infected patients were selected and divided equally in two groups. Group A patients were healthcare workers while group B patients were general population. The mean age in group A was 41.29±11.37 years while 42.61±16.15 years in group B. Regarding the gender distribution there were 57 (54.3%) male while 48 (45.7%) female patients in group A while there were 62 (59%) male while 43 (41%) female patients in group B. About 15.2% patients were diabetic in group A while 25.7% were diabetic in group B. Hypertension was observed in 41.9% patients in group A while 30.5% patients in group B. Cardiovascular diseases were seen in 12.4% patients in group A while 7.6% patients in group B.

Regarding the outcomes and mortality, in group A the frequency of ICU admissions was 7 (6.7%) while 22 (21.0%) in group B, there difference was statistically significant. In group A mechanical ventilation need was significantly lower 6 (5.7%) than group B 19 (18.1%). In group A mortality rate was significantly lower than group B 4 (3.8%) vs 15 (14.3%). The need for oxygen

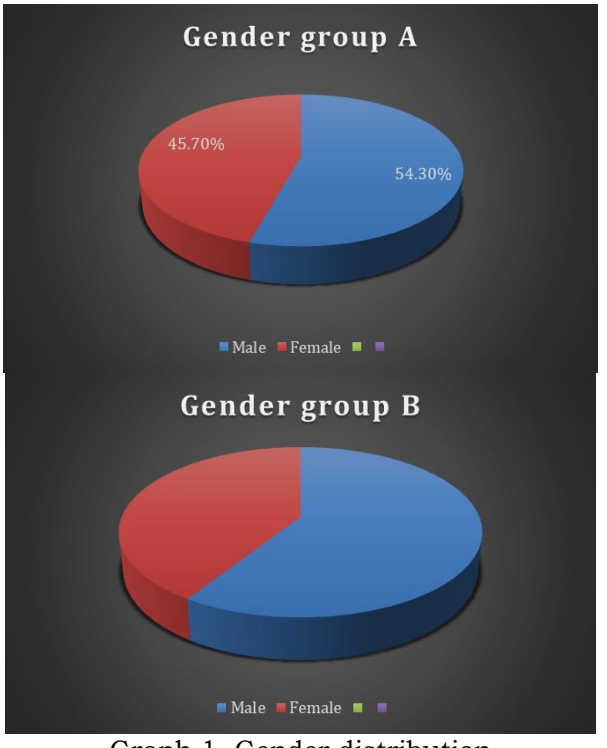
therapy in group A was 19 (18.1%) while 20 (19%) in group B, there difference was not statistically significant. The mean hospital stay in group A was significantly shorter 9.41±3.333 days while 13.18±3.956 days in group B.

Table 1
Basic demographics

Demographics	Group A	Group B
Age	41.29±11.37	42.61±16.15
Diabetes	16 (15.2%)	27 (25.7%)
Hypertension	44 (41.9%)	32 (30.5%)
Cardiovascular diseases	13 (12.4%)	8 (7.6%)

Table 2
Outcomes and mortality rate between both groups

Outcomes and mortality rate	Groups		P value
	Group A	Group B	
ICU	7 (6.7%)	22 (21.0%)	0.003
Mechanical ventilation	6 (5.7%)	19 (18.1%)	0.006
Mortality	4 (3.8%)	15 (14.3%)	0.008
Oxygen therapy	19 (18.1%)	20 (19.0%)	0.85
Hospital stay (days)	9.41±3.333	13.18±3.956	0.0001



Graph 1. Gender distribution

Discussion

Late in December 2019, hospitals in Wuhan found the cause to be a new coronavirus (SARSCoV2). They did this by using a surveillance method for "pneumonia of unknown etiology" that was built after the 2003 Severe Acute Respiratory Syndrome Coronavirus (SARSCoV) outbreak to help find new infections early. The World Health Organization (WHO) said on January 30, 2020, that Covid19 is a public health emergency of worldwide significance.[15]

Most of the time, coronaviruses can be put into four main genetic groups: Alpha, Beta, Gamma, and Delta. Most of the diseases they cause are in the lungs and stomach. Most of the animals infected by the first two genera are mammals. Most of the animals infected by the third and fourth genera are birds. Six kinds of human coronavirus have been found so far.[16] Alpha coronaviruses include HCoVNL63 and HCoV229E, while Beta coronaviruses include HCoVHKU1, HCoVOC43, Middle East Respiratory Syndrome Coronavirus (MERSCoV), and SARSCoV. Before the SARS pandemic in 2003, not many people knew about coronaviruses. Then came the MERS outbreak in 2012, and most recently, the Covid19 outbreak. The single-stranded RNA genome of SARS-CoV2 is about 30 kb in size and is the same as those of other viruses. The RNA tells the cell how to make both structural and nonstructural proteins.[17] Spike glycoprotein (S is made up of two sections called S1 and S2), an envelope protein (E), a membrane protein (M), and a nucleocapsid protein (N) are all structural proteins that are near the third end of the strand. SARS-CoV mostly affects the lungs, and like other respiratory illnesses, it spreads mostly through the droplets made when people sneeze or cough. Most people who have had an infection feel feverish, cough, tired, and short of breath. Some people also lose their ability to smell and taste. But it is normal to have other symptoms like headaches, dizziness, and stomach problems like nausea, vomiting, and diarrhea.[18]

Healthcare workers (HCWs) are especially likely to get sick because they are in close touch with Covid19 patients so often. So, it is very important to follow strict cleanliness rules to keep from spreading diseases from patients to staff. HCWs are more likely to get sick because they did not know about the outbreak in the first few weeks, they did not have enough Personal Protective Equipment (PPE) or training, there were not enough rapid diagnostic tests for Covid19, they worked long hours in highrisk environments, and there was still community spread and exposure in homes. To stop the virus from spreading in hospitals, especially among patients and workers who are at high risk, it is important to find out the clinical features, outcomes, and risk factors of HCWs who are infected with SARS-CoV-2. This knowledge is very important for screening plans and ways to stop infections, especially in places where there are a lot of diseases but not enough resources or protective gear. [19]

We conducted our study on 210 Covid-19 patients and divided them in two groups. We enrolled 105 healthcare workers in group A while general population were allocated to group B. The mean age in group A was 41.29±11.37 years while 42.61±16.15 years in group B. To our observation in both groups the majority of the patients belonged to male population as compared to female gender, similar

observation has been shown in a study which reported majority of their healthcare workers and general population under study to be males.[20]

We assessed the outcomes and mortality rate between the both groups admitted for Covid-19 infection. We observed that the mean hospital stay in group A was significantly shorter as compared to group B and the difference was statistically significant, similar finding was reported by a study which concluded that the hospital stay of the general population infected with Covid-19 was significantly longer.[20] Other outcomes assessed in our study were ICU admission need, mechanical ventilation need and oxygen therapy. In group A patients who were healthcare workers, the need for ICU admission was significantly lower as compared to the general population. It was also noted that the need for ventilation was also significantly lower in the healthcare worker's group as compared to the general population and the aforementioned study also reported similar findings as ours[20]. However the need for oxygen therapy in both groups had no statistical difference, this observation is at part with as study which reported no significant difference.[21]

Regarding the mortality rate we observed that the healthcare worker's group had significantly lower rate of mortality as compared to the general population group. Similar findings have been observed by a couple of studies which reported that mortality rate was lower in the healthcare worker group.[20,21] The possible explanation to this difference is that since the healthcare workers are the frontline of this pandemic, they have completed their due courses of vaccination which significantly enhances the immunity needed against Covid-19 infection.

Conclusion

From our study we conclude that the mortality rate was higher in the general population as well as the admission to ICU and need for mechanical ventilation as compared to the healthcare workers. We recommend timely screening of Covid-19 infection as well an emphasis on vaccination to deal with this global pandemic.

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