Original Article

Infection And Case Fatality Rate Of Healthcare Workers From COVID-19: A Cross-Sectional Study In Azad Kashmir

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Abstract

Background: The pandemic COVID-19 disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has become a significant health problem globally. In the wake of ongoing pandemic (COVID-19), services of healthcare workers are noteworthy. Health-care workers (HCWs) warrant special attention because of their substantial task of diagnosing and treating critically ill patients putting themselves at the risk for exposure to patients or infectious materials. The aim of this study was to estimate the number of COVID-19 infections and case fatality rate of HCWs in Azad Kashmir during the pandemic period. **Methods:** A Descriptive, cross-sectional was carried out in the COVID 19 Sentinel Unit, in Directorate General Health Office Muzaffarabad from March 15, 2020 to October 12, 2021. The study population included HCWs of different ranks working in either public or private hospitals in Azad Kashmir. Non-probability, consecutive sampling technique was used for sample collection. Both symptomatic and asymptomatic HCWs were tested for COVID-19 with a Real-time reverse transcriptase-polymerase chain reaction (RT-PCR) following the standard protocol. COVID-19 positivity was correlated with demographic characteristics, working location, and medical history. **Results:** A total of 962 laboratory-confirmed infections and 9 deaths were documented in HCWs with a mean age of 35.16 with SD 11.24 years, ranging 18 to 70 years. Infections were mainly observed in doctors (64.2%), followed by paramedical staff (28.5 %) and nurses (7.3%, n=76). A significant number of infected HCWs were asymptomatic (67.9%), while in symptomatic patients, the most prevalent symptoms were fever 35.4%%, myalgia (42%) and cough (41.4%). Total number of deaths was 9, out of which 6 were doctors (66.7%). The highest case fatality rate was highest in nurses. **Conclusion:** A significant number of HCW were reported to be infected with COVID-19 during COVID-19 pandemic, with overall case fatality rate of 0.93%.

BACKGROUND

Coronavirus pandemic usually known as COVID-19 started in China in 2019 and affected five hundred and ninety million people worldwide and took 6.4 million lives in its first course. (1) World Health Organization declared

COVID-19 as a global emergency on January 30th, 2020. The healthcare workers are frontline fighters and are prone to disease more than common people. There has been a study on prevalence of COVID-19 among healthcare workers (HCW). And HCW account for 14% (period prevalence) of the total burden of cases. The disease is affecting healthcare workers physically and mentally. The increased workload, fear of death and higher burnout may cause depression in health care workers. The factors that contribute to fatality are old age and existing comorbid (diabetes, hypertension, asthma, chronic kidney disease, heart diseases, HIV and chronic kidney disease). (2)

The period prevalence among health care workers ranged from 3.4% to 35% in different countries of the world. The highest risk group is staff nurses who are directly contracting infection every day. The second group is doctors, the other hospital staff including paramedical staff, cleaning staff, people involved in supplies and transport comes afterwards. The period prevalence was dependent on other factors also. The first wave affected healthcare workers the most, the deaths declined as the facilities had provided staff with safety equipment by the time second wave came. The risk of contracting disease was higher in facilities not specialized for COVID-19 as these facilities lacked proper safety for the staff. The HCW contracted diseases from their colleagues (45%) and patients (29%). In some hospitals the staff got infection from outside the hospital (61.3%), community acquired. Most of the infections were contracted due to lack of personal protective equipment (PPE), lack of training on use of PPE, lack of systematic approaches at hospital and also the severity and burden of pandemic which caught the world unprepared. (3)

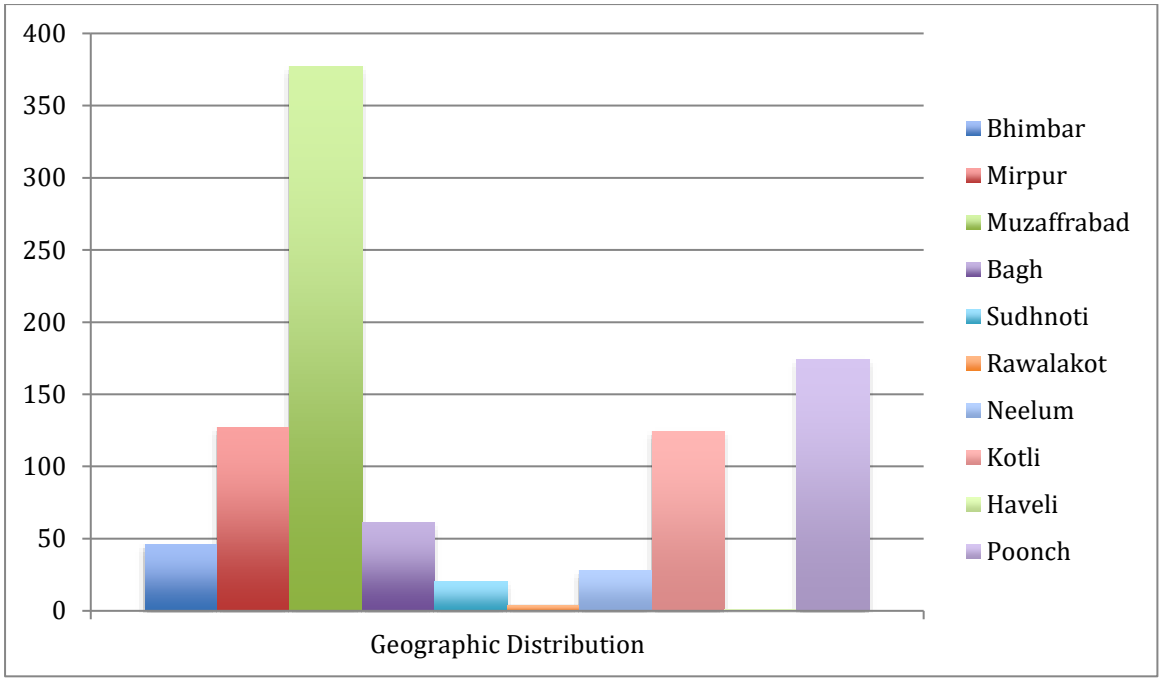
RATIONALE: Health-care workers (HCWs) warrant special attention because of their substantial task of diagnosing and treating critically ill patients putting themselves at the risk for exposure to patients or infectious materials. The aim of this study was to estimate the number of COVID-19 infections and case fatality rate of HCWs in Azad Kashmir during the pandemic period.

METHODS

Type of study and study setting: A Descriptive, cross-sectional was carried out in the COVID 19 Sentinel Unit, in Directorate General Health Office Muzaffarabad from March 15, 2020 to October 12, 2021.

Population and Inclusion/Exclusion: The study population included HCWs of different ranks working in either public or private hospitals in Azad Kashmir. Both symptomatic and asymptomatic HCWs were tested for COVID-19 with a Real-time reverse transcriptase-polymerase chain reaction (RT-PCR) following the standard protocol. COVID-19 positivity was correlated with demographic characteristics, working location, and presence or absence of symptoms. The HCW who tested negative were not taken into study and there is no data collected for the negative cases. Details were obtained for the HCW who tested positive for COVID-19. **Sampling:** Non-probability, consecutive sampling technique was used for sample collection.

Data Collection: The data contained the details of the affected health care workers including their names, ages, gender, district at which they were serving, the geographic area where the staff belonged and the professional status. The health care workers belonged to three categories: doctors, staff nurses and community healthcare workers. The HCWs were examined for presence or absence of symptoms and again screened for the particular symptom present in each individual. These symptoms included fever, myalgia and cough. The total number of HCW included in the study was 962. Total number of deaths was 9 and 7 HCW were still under treatment when we completed gathering this data on October 12, 2021. The area from where the data was obtained was divided into ten geographic regions: 1=Bhimbar, 2=Mirpur, 3=Muzaffarbad, 4=Bhag, 5=Sudhnoti, 6=Rawalakot, 7=Neelum, 8=Kotli, 9=Haveli, 10=Poonch.



Data Analysis: Data analysis was done using SPSS 20.0 version. The variables were defined and labeled. The frequency analysis was done to determine the percentage of deaths, presence of symptoms and percentage of each category of health workers who were affected by each symptom to determine case fatality in each group. The chi-square test was applied to determine associations between the variables. Any value $p< 0.05$ will be considered as positive association. The regression analysis was done to determine the odds ratios.

RESULTS

A total of 962 laboratory-confirmed infections and 9 deaths were documented in HCWs with a mean age of 35.16 with SD 11.24 years, ranging 18 to 70 years. Infections were mainly observed in doctors (64.2%), followed by paramedical staff (28.5 %) and nurses (7.3%, n=76). A significant number of infected HCWs were asymptomatic (67.9%), while in symptomatic patients, the most prevalent symptoms were fever 35.4%%, myalgia (42%) and cough (41.4%). Total number of deaths was 9, out of which 6 were doctors (66.7%)

Table 1 : Basic characteristics of the study population
The findings are expressed in percentages. Frequency analysis was done in SPSS

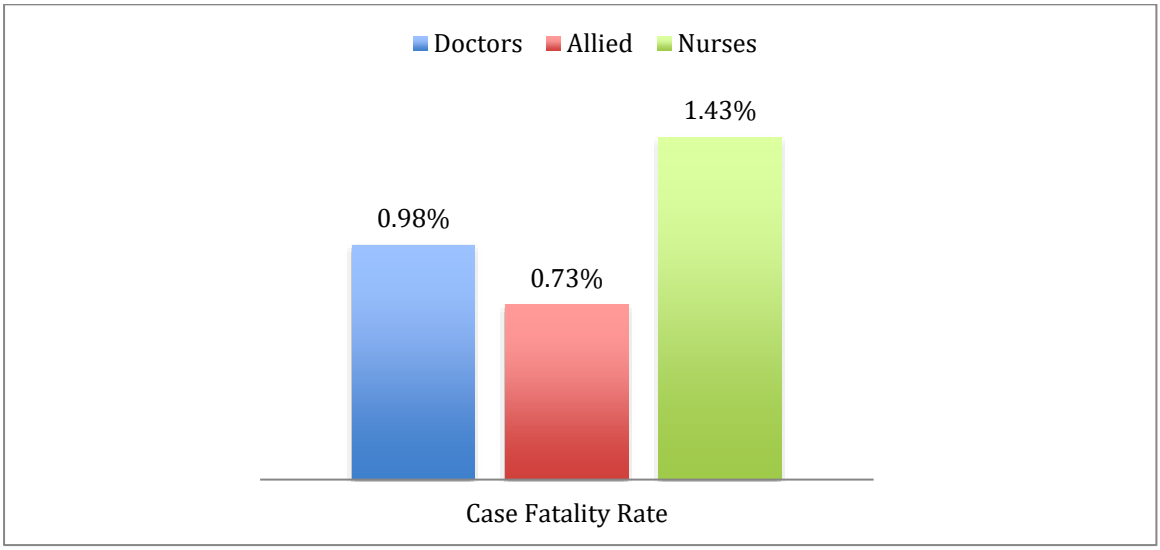
Gender		Symptoms		Fever		Myalgia		Cough	
Male (52.1%)	Female (47.9%)	Symptomatic (32.1%)	Asymptomatic (67.9%)	No (64.6%)	Yes (35.4%)	No (58%)	Yes (42%)	No (58.6%)	Yes (41.4%)

Profession			Disease Status		
Doctors	Allied staff	Nurses	Recovered	Dead	Symptomatic
64.2%	28.5%	7.3%	98.3%	0.9%	0.7%

Profession of the study subjects and disease status is determined. *Symptomatic means the subject had symptoms when the data collection procedure was closed.

Case fatality rate: Total Case fatality rate and fatality in each group of HCWs was calculated by formula. No. of Deaths by a certain disease/Total number of study subjects

The case fatality rate (CFR) was determined by dividing the total number of deaths (n) to total number of positive cases (N). n/N= 9/962=0.938. The overall case fatality rate was 0.94%. CFR was calculated for doctors, nurses and allied health workers separately. CFR was highest among staff nurses 1.43% (1/70) despite being the least infected group as compared to doctors 0.98% (6/618) and paramedical staff 0.73 % (2/274).



Tests of significance

Table 2 The tests of significance were applied to find the association between variables.

	Male (501)			Female (461)			p-value
Disease Status	Recovered	Died	Symptomatic	Recovered	Died	Symptomatic	< .604
	492	6	3	454	3	4	
Symptoms	Asymptomatic		Symptomatic	Asymptomatic		Symptomatic	< .018
	178		323	131		330	
Fever	No		Yes	No		Yes	< .306
	331		170	291		171	
Myalgia	No		Yes	No		Yes	< .855
	291		209	266		195	
Cough	No		Yes	No		Yes	< .334
	300		199	263		198	

2*2 contingency tables were obtained from SPSS analysis. Chi-square test was applied

There was no association of gender with status of disease or disease symptoms including fever, myalgia and cough. The gender is positively associated with being symptomatic or asymptomatic p< .018. 35.5% of males were asymptomatic and 28.3% of females were asymptomatic. Females have developed symptoms more than males in our study.

Profession		p-value			p-value
Disease Status	Recovered=946	< .766	Symptoms	Asymptomatic= 309	< .000
	Dead =9			Symptomatic = 653	
	Symptomatic=7				
Fever	No= 621	< .005	Cough	No=563	< .039
	Yes =341			Yes=397	

Development of symptoms, development of cough and having fever are associated with profession of the HCWs. The p values are < .05 and the association of significance.

Regression analysis: Regression analysis was done to confirm the associations.

Symptoms	Sig.	Odds Ratio (OR)	95.0% C.I.for EXP(B)		Sig.	a(OR)	95.0% C.I.for EXP(B)

			Lower	Upper				Lower	Upper
Gender(1)	.180	1.217	.913	1.621	Gender(1)	.301	1.180	.863	1.613
Profession	.002				Doctors (1)	.996	4.38	-	-
Profession (1)	.645	1.075	.790	1.464	Allied (2)	.996	4.55	-	-
Profession (2)	.000	4.297	1.913	9.653	Nurses (3)	-	-	-	-
Status	.809				Recovered (1)	.001	4.52	1.903	10.73
Status(1)	.515	1.698	.345	8.366	Dead(2)	.001	4.66	1.900	11.40
Status(2)	.999	8.3088	.000	.	Symptomatic(3)	-	-	-	-

Fever	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
			Lower	Upper
Gender(1)	.712	1.055	.795	1.400
Profession	.009			
Profession(1)	.359	1.153	.850	1.564
Profession(2)	.003	2.206	1.320	3.688

DISCUSSION

In our study the percentage of nurses affected by COVID-19 is the lowest while in previous studies in world the nurses were affected more. In previous study in Malaysia the nurses were not the highest affected group. Despite the fact, that nurses are the most exposed health professional among all categories. In our study the doctors had the highest rate of infection. The case fatality for nurses was the highest. Maybe because the nurses are exposed to all kind of patients and also to community so they contract more variants of the virus. The difference among different groups of the professionals maybe attributed to the nature of the job and extent to exposure of virus. If we follow this logic the community health workers must be the most affected group but they don't have the highest fatality. So it needs further exploration for personal, demographic and morbid characteristics of the person affected. (3)

Previous studies have identified age as a risk factor for the development of symptoms and severity of symptoms but in our study we did multivariate analysis for age and none of the age was associated with development of symptoms. Studies also had shown association with gender on regression analysis and our study showed association on contingency tables ($p < .018$) , the association was not confirmed on the regression analysis. (2)

In a previous study geographic association of cases were found. In our study the highest number of cases was reported in Muzaffarabad. 39.2% of the cases were from this district. The high number of cases may be attributed to the fact that this district has highest number of doctors and it has more facilities that were dealing with corona virus pandemic. We cannot call it an association because in our study we have used consecutive sampling and we have taken only ten geographic locations. (4)

A study from past identified threats faced by doctors at hospital and suggested that following steps should be taken to protect hospital staff: Training healthcare workers to identify respiratory diseases • Providing increased access to personal protective equipment • Providing psychological support to health workers • Routinely conducting hospital surveillance • Recognizing that every healthcare system can have gaps. (5)

In Uganda the morbidity and mortality was found to be substantial. Vaccine rate was low and they required oxygen due to complications. While in our study the symptoms were mild and there were only nine deaths while in Uganda

study the death rate was high. In this study the age variable was not associated with case fatality, our study also showed the same results. (6)

In a study in Pakistan 689 tests were performed, 72 were positive. Males were more than females (72%), 14% had comorbid conditions. There was no mortality. Interviews were also done in this study and participants had an opinion that they got virus in the hospital. The HCWs tested positive for COVID were mostly frontline fighters (83%) while in our study 66.67% were doctors. There were 9 mortalities in our population with a case fatality rate of 0.94%. (7)

A letter to editor of journal of infection reported that 24 deaths occurred during pandemic, 13 of which were due to COVID-19. Symptoms were severe and the HCW died of sudden cardiac arrest and other complications of the infections. There was no association of age or gender. Our study also did not show association of age or gender on regression analysis. (8)

Another study identified the risk factors for HCWs and suggested that in the context of Covid-19, HWs face an unprecedented occupational risk of morbidity and mortality. There is need for rapid development of sustainable measures that protect HWs from the pandemic. (9)

In a study in Indonesia from March 2020 to 28 January 2021 a total of 647 deaths were reported. Out of 647 medical and health workers who died due to being infected with Covid-19, 289 doctors, 27 dentists, 221 nurses, 84 midwives, 11 pharmacists, 15 medical laboratory personnel. The death rate is on rise since the pandemic. In our study the deaths were 9 and recovery rate was good. (10)

CONCLUSION and RECOMENDATIONS

The case fatality was determined for healthcare workers and it was 0.94%. The development of sign and symptoms of the disease was associated with the type of profession and the case fatality ratio was different for doctors and nurses. The mortality rate in Muzaffarabad is not as high as in other studies in the world. The mortality between different groups of HCWs suggests there is need for exploring factors associated with mortality of each individual. Deaths can be avoided by avoiding exposure to the virus and by using disinfection protocols.

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