

# Seropositivity in PCR positive COVID-19 healthcare workers and its correlation with age, gender, anosmia and smoking

ZOHAIB ASHRAF<sup>1</sup>, UZMA SHAHEEN<sup>2</sup>, MUHAMMAD ANJUM IQBAL<sup>3</sup>, MUHAMMAD ASIF QURESHI<sup>4</sup>, ABDUL REHMAN QAISRANI<sup>5</sup>, MUNA MALIK<sup>6</sup>

<sup>1,3</sup>Demonstrator Pathology, Dera Ghazi Khan Medical College

<sup>2,5</sup>Assistant Professor, Dera Ghazi Khan Medical College

<sup>4</sup>Principal, Dera Ghazi Khan Medical College

<sup>6</sup>Assistant Professor, Post Graduate Medical Institute, Lahore

Correspondence to Dr. Zohaib Ashraf, Email: zohaibashrafa@yahoo.com

## ABSTRACT

Coronavirus started from China and became a pandemic that impacted all aspects of life. The present study was conducted at teaching hospital Dera Ghazi Khan between April and August 2020. A total of 48 doctors were included in this study. All of the subjects reported positive for COVID-19 on PCR. Antibodies were non reactive in 33% of subjects, anosmia was present in 47%. We found a positive correlation between anosmia and antibody titer.

**Keywords:** COVID-19, Coronavirus, Anosmia, Antibodies, PCR

## INTRODUCTION

A new coronavirus (SARS-CoV-2) emerged from Wuhan China in December 2019, causing epidemic of acute respiratory syndrome in humans. This virus spread rapidly and engulfed the globe within a matter of months and was declared as public health emergency of international concern by World Health Organization on January 30<sup>th</sup>, 2020 (Iqbal MR., 2020). This virus caused 4291 deaths in 114 different countries in just three months. (Van Bavel et al., 2020). SARS-CoV-2 belongs to Coronaviridae family. This virus is enveloped with single stranded, positive sense ribonucleic acid (RNA) genome (Driggin et al., 2020). Previously two highly pathogenic coronaviruses identified as SARS (Severe Acute Respiratory Syndrome) and MERS (Middle Eastern respiratory Syndrome) caused epidemics in China and Middle East respectively (Aliet al., 2020). Corona Virus can be transmitted through many modes including contact, respiratory droplets, fomites and feco-oral route. This virus is more contagious when the patient is symptomatic but has also been transmitted by asymptomatic patients (Wong et al., 2020). COVID-19 presents with variable clinical pictures varying from asymptomatic to severe respiratory symptoms, mild to moderate symptoms and severe disease in older age group with higher death rates (Sikemma et al., 2020). Among Coronavirus patients having spectrum of clinical presentations, 80% of infected people don't require any hospital care and have only mild disease, while 15% of patients who show moderate symptoms, may require oxygen therapy. Only 5% require hospitalization that may need mechanical ventilation, endotracheal intubation and ICU care (Lockhart et al., 2020). Covid-19 outbreak has put an extreme burden on resources at health care centres and rapid depletion of personal protective gears used in the care of patients have raised a significant concern for safety of health care providers (Schwartz et al., 2020).

Health care providers are at constant risk of acquiring and transmitting the infection because of their constant

exposure to infected people and contaminated surfaces in health care facilities. Front-line warriors of COVID-19 pandemic are health care workers (Lotfinejad et al., 2020). Health system needs a coordinated global to meet this unprecedented challenge (Remuzzi et al., 2020).

This study determines the seropositivity in doctors who were positive for Covid-19 on PCR. Also it highlights the distribution of corona among male and female health care providers, the correlation between smoking and corona and symptom of anosmia in Covid affected professionals. This study was conducted in far south teaching hospital of Punjab. More studies are required to be done to determine the prevalence, course, infectivity ratio, seropositivity, morbidity and mortality of patients affected by Corona-19 in Pakistan.

## MATERIALS AND METHODOLOGY

This study was conducted in BSL III (Biosafety Level-3) Laboratory of Teaching Hospital Dera Ghazi Khan, a district in far flung south of Punjab, Pakistan between April and August 2020. In this study, 48 doctors were reported Covid Positive whose Polymerase chain reaction (PCR) of naso/oro-pharyngeal swabs for Covid-19 was done by Quant Studio™ 5 Real Time PCR. The doctors were then tested for antibody production after recovery from Corona. The novel coronavirus (2019 nCoV) antibody in serum was detected by capture chromatography, using the principle of immunochromatography. Two redlines on card indicated positive or reactive for antibody production.

## RESULTS

In this study, 48 doctors were included who were reported positive for Covid-19 on real time PCR. PCR of naso/oro-pharyngeal swabs was done by Quant Studio Real Time PCR.

Table1: Distribution of Covid +ve by PCR in accordance to gender.

Male	Female	Total
37	11	48
77.08%	22.91%	100%

Age: Mean (N=48) 32.29 ± 9.374 years

Range 23 years – 60 years

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Fig.1: Seropositivity percentage in PCR positive Covid recovered doctors.

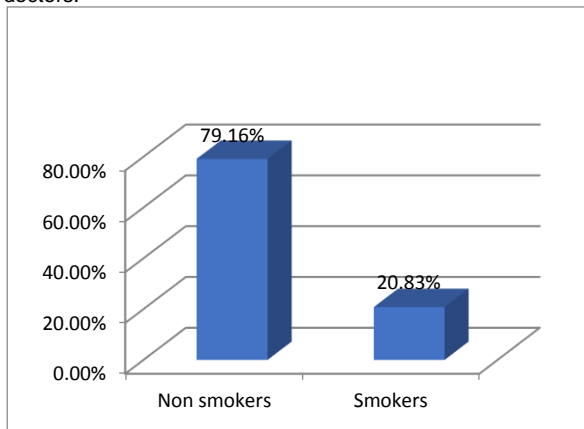


Table 2: Percentage of anosmia in Covid positive doctors.

Anosmia	
Yes	No
23 (47.91 %)	25 (52.08%)

Fig. 2: Percentage of Covid positive ratio among smokers' vs non smokers.

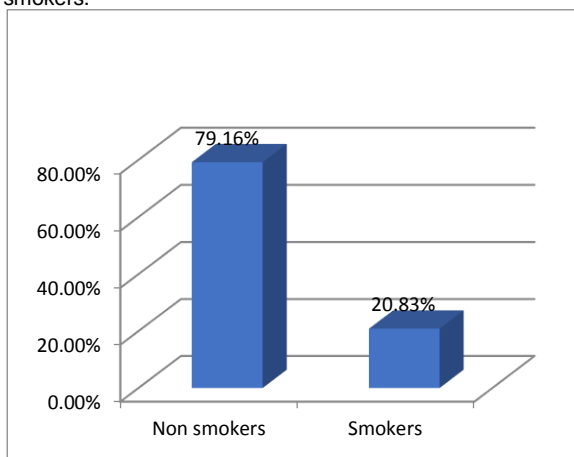


Table 3:

Antibodies		ODDs Ratio	95% Confidence Interval	
			Lower	Upper
Gender	Male	1.970	0.495	7.832
	Female	1.000		
Age	≤ 30 years	1.000	1.033	18.181
	> 30 years	4.329		
Loss of Smell	Yes	1.889	0.554	6.445
	No	1.000		
Smoking	Yes	1.000	0.495	7.813
	No	1.969		
Symptoms	Asymptomatic	1.000	0.861	9.642
	Mild	2.882		
	Moderate	*		
	Severe	4.201		

\*Value < 1

Males are 1.97 times more positive to Antibodies titer than female.  
 Loss of smell is positively related while smoking is negatively related to Antibodies titer.  
 Increasing severity of symptoms increases the positivity of antibodies titer.

## DISCUSSION

This study was conducted in Teaching hospital Dera Ghazi Khan which is located in far south of Punjab Province in Pakistan. This is the district which received over 2 thousand pilgrims from Iran who were then quarantined some 20 kilometers from main city, at a quarantine centre established by Government of Pakistan. Also this city is hub of labour class who work in Middle Eastern countries which heightened the threat to spread of pandemic in this district. First Covid positive doctor from Punjab was reported from this district that was deployed as team leader to collect naso/oropharyngeal swabs of pilgrims isolated at quarantine centre. This study includes 48 doctors who were Covid positive on real time PCR.

Table 1 shows that out of 48 doctors, 11 were females and 37 were males. This shows that more male doctors were exposed and became Covid Positive than females. This finding coincides with the cultural background of this southern district where males are expected to do outdoor jobs while more females are restricted to do household work at home.

Increased incidence in males has also been observed from Descriptive and observational data from Wuhan, China where majority (51%–66.7%) of affected patients have been male (Walter et al.2020). Similarly in Italy 58% of infected patients were males (Remuzzi et al., 2020).

Currently, men represent 58% of COVID-19 infected patients in Italy and 70% of COVID-related deaths .However, this result doesn't relate to many other studies where gender disparity isn't found and equal percentage of males and females are affected. The Global health 50/50 research initiative presented a worldwide overview of sex disaggregated data and clearly demonstrated that similar number of males and females were affected (Gebhard et al.,2020).

Regarding sero-positivity our study shows that 32 out of 48 (66.66%) doctors developed IgG antibodies while 16 (33.33%) who were PCR positive for Covid-19 didn't develop IgG antibody This study is contrary to study conducted by Long et al in china where 100% patients developed antibody (Long et al.,2020).

Another study conducted in China showed that some patients didn't develop any antibody even after negative PCR which indicates that without adaptive immunity, innate immunity may still be strong enough to eliminate SARS CoV 2 (Wang et al.,2020)

Anosmia is one of the classical symptoms of Covid-19 and in our study 23(47.91%) doctors developed anosmia during their course of Covid-19.Our study relates to study conducted in united Kingdom where the majority of respondents (61%) reported onset of anosmia (Hopkins et al.,2020)

Smoking is injurious to health and is key cause of many medical problems. In our study a very interesting finding was observed where 79.16% doctors who developed Covid -19 were non smokers while only 20.83% were smokers. Our study doesn't coincide with many other studies where smoking is a risk factor for progression of COVID-19 (Patanavanich et al 2020). Observational study conducted by Simons et al, there was uncertainty about the

associations between smoking and COVID-19 outcomes arising from the recording of smoking status (Simons et al., 2020).

Our study relates to a study conducted in France by Fontanet et al where infectivity ratio was lower in smokers than non smokers (7.2% vs 28%) (Fontanet et al., 2020).

When this study was conducted, personal protective equipment (PPE) were not widely available in Pakistan and all the study participants reported use of only face masks (Sarraz et al., 2020)

**Limitations:** It was conducted at a small teaching hospital located in far south of Punjab, Pakistan. More such studies should be conducted.

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