

USE OF PERSONAL PROTECTIVE EQUIPMENT (PPES) BY DENTAL HEALTH CARE WORKERS DURING COVID-19 PANDEMIC IN KHYBER PAKHTUNKHWA

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ABSTRACT

The aim of this study is to find the use of Personal protective equipment (PPE) among dental health care workers during Covid-19 pandemic in Khyber-Pakhtunkhwa.

Data was collected via a well-structured online questionnaire (Google forms) which was sent to 500 dentists working in hospitals and private practices or both in Khyber Pakhtunkhwa by sending the link via WhatsApp, Email and other online applications. Out of 500, 151 participants responded. The participants included General Dental Surgeons, house officers, post graduate residents, faculty members of dental colleges / hospitals and private practicing dentists. All the participants had access to internet. Non-dental faculty members and dentists who were not practicing dentistry were excluded. The study was conducted in 2 months duration (February, 2022 – March, 2022).

Facemasks and gloves were more frequently in practice when compared to protective gowns and face-shields. Dental health care workers working in private hospitals observed more compliance with the use of face-shields as compared to those working in government hospitals. Male individuals used protective goggles more often than female ones.

Private hospitals showed maximum compliance with the use of PPEs as compared to government hospitals and private clinics. Although, both genders were equally compliant with the use of PPEs, however, the males were more compliant with the use of protective goggles.

Keywords: COVID-19, Personal Protective Equipment, Pandemics, Dentistry, Eye Protective Devices

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INTRODUCTION

COVID-19 is an acute (sometimes severe) respiratory disease caused by the SARS-COV-2 virus. It is significantly communicable and has affected the whole world, as a pandemic ¹. This virus is passed on through respiratory droplets and aerosols via coughing, sneezing, and saliva. The size of the particles, their speed, comparative humidity, and flow of air define the

range and duration that particles will stay in the air ². The “Ministry of Health, Government of Pakistan” announced the first COVID-19 case in Pakistan on February 26, 2020, in Karachi ³. On March 18, 2020 first death in the country, related to COVID-19 was reported in Khyber Pakhtunkhwa province ⁴. As of January 2022, a total of 194,887 cases have been reported in the province resulting in 6,002 deaths and 177,871 successful recoveries ⁵. Health care providers especially dentistry personnel are highly exposed to the prevalent SARS-CoV-2 due to the nature of dental treatment procedures i.e. aerosol-generating procedures and involvement of the upper respiratory tract area which hosts the virus ⁶. For this reason in territories affected by the pandemic, meticulous and efficient cross-infection control measures are the need of the time ⁷. Personal protective equipment (PPE) is used for the safety of the operator from harmful agents ^{8,9}. It includes a surgical mask, gown, face shield or goggles, gloves, and a cap ¹.

Lodhi et AL in his study reported that 47.9% of the dentists in Pakistan did not receive any training related

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to the correct use of Personal Protective Equipment. While 67.2% of the dentists were aware of the recent international guidelines about Personal Protective Equipment by WHO, CDC and others. Most of the participants (76.7%) did not have easy access to Personal Protective Equipment during this pandemic. A total of 60.8% of the dentists were reported to be aware of the recent WHO, CDC and other international guidelines to screen COVID-19 patients at their clinic. More than half of the participants (64.4%) were not aware of the differences between N95 and N99, N100 masks and 85% did not know how to store N95 respirator in-between patients¹⁰.

In another study by Muhammad Hakim et al the lack of PPE resulted in 71.74% of the healthcare workers in Pakistan in using alternative strategies, with the most common being the recycling of N95 masks (n = 137, 30.24%), recycling of surgical masks (n = 67, 14.79%), reuse of protective goggles (n = 56, 12.36%), and washing of disposable gowns (n = 45, 9.93%). When asked whether they had received adequate information regarding the use of PPE to protect themselves from contracting COVID-19, only 29.80% of the healthcare workers reported that they have always received adequate information. The remaining respondents either never or only rarely received such information. Half of the respondents (n = 229, 50.55%) agreed that the information received to date about the use of PPE was clear and complete (42.16%)¹¹. Qazi et al established 72% availability of PPE suits in dental practices. N95 respirators were available with 48% of the dentists although their use was only restricted to 35% of dental clinics¹².

A study conducted in Iraq reported that practice of PPE was considerably greater in dentists having post graduate degrees than general dental practitioners. Furthermore, dentist working in private hospitals displayed better practice than those employed in government setups¹³. According to a global survey in 36 nations, 53 percent of dental practitioners (n=27,818) stated that they utilize N95/FFP2, whereas 41.07 percent (n=21,558) asserted that they use eye protection. In the same survey, Pakistani dentists reported wearing eye protection 26.84 percent of the time and using N95/FFP2 16.54 percent of the time¹⁴.

Cross infection control measures are of utmost importance during this COVID-19 pandemic. Use of Standard personal protective equipment to prevent the spread of COVID-19 is essential in dentistry setup. This study was conducted to find out the use of personal protective equipment (PPE) among dental health care workers during Covid-19 pandemic in Khyber Pakhtunkhwa. Findings from this study will help us in assessing the need to aware and train dental practitioners in Khyber Pakhtunkhwa to use PPE and this data can be used to improve the cross-infection control situation in dental practices in the region.

MATERIAL AND METHODS

This study was conducted after an ethical approval

from the Institutional Review Board of Prime Foundation Pakistan (Prime/IRB/2022-410). Well-structured online questionnaire was developed in Google forms and sent to 500 dentists working in hospitals and private practices or both in Khyber Pakhtunkhwa by sending the link via WhatsApp, Email and other online applications. Out of 500, 151 participants responded. The participants included General Dental Surgeons, house officers, post graduate residents, faculty members of dental colleges/hospitals and private practicing dentists. All the participants had access to internet. Non-dental faculty members and dentists who were not practicing dentistry were excluded. The study was conducted in 2 months duration (February, 2022 – March, 2022).

The questionnaire comprised of 3 sections. Section 1 included questions regarding demographic data like age and gender. Section 2 recorded data regarding professional status/specialty and working setup (government hospital/private hospital/private clinic). Section 3 included questions addressing the use of personal protective equipment and cross infection control measures.

Data was entered in Statistical Package for the Social Sciences (SPSS) version 26. Quantitative variables were analyzed by using frequency and percentages. Pearson's Chi Square test and Cramer's V value was applied to see any significant relation between categorical variables on the use of PPEs. The level of significance was set at ≤ 0.05 .

RESULTS

The distribution of the entire sample across gender, working environment, speciality, and professional status is shown in Table 1. The sample size consists of 77 (51.3%) females and 74 (48.7%) males, ages 23 to 66, with a mean age of 31.54 years. The majority of participants 47 (32.9%) were from oral surgery, followed by orthodontics 36 (23.6%) and general dentistry 36 (23.6 percent). The prosthodontics department had the fewest participants 7 (4.6 percent). Participants from private clinics 21 (13.8%) and hospitals 70 (46.1%) responded more frequently. The postgraduate trainees were the study's most frequent participants 55 (36.2 percent) in terms of professional rank.

Table 2 illustrates the relationship between the use of PPEs and the working environment. Face shield usage and working setup have a statistically significant relationship (Chi Square = 24.589, df = 12, p = .017). Compared to government and private clinics, private hospitals saw higher levels of compliance with the usage of face shields. Gloves, gowns, and facemask usage did not significantly differ from the working environment (Chi square = 1.119, df = 3, p = .772), nor did the use of gloves, gowns, or facemask (Chi square = 7.943, df = 12, p = .790). Across all setups, the use of PPEs was more commonly observed. Facemasks and gloves were used more frequently than protective gowns and face shields.

TABLE 1: THE DISTRIBUTION OF THE SAMPLE AMONG GENDER, WORKING SETUP, SPECIALTY AND PROFESSIONAL SETUP

Variable	Sub groups	N	Percentage
Gender	Male	74	48.7%
	Female	77	51.3%
Working setup	Government hospital	59	38.8%
	Private hospital	70	46.1%
	Private Clinic	21	13.8%
Speciality	Orthodontics	36	23.6%
	Prosthodontics	7	4.6%
	Oral Surgery	47	32.9%
	Endodontics	12	7.9%
	Periodontics	10	6.6%
	General Dentistry	36	23.6%
	Professional status	Professors	8
	Associate professors	10	6.6%
	Assistant professors	11	7.2%
	Senior registrar/lecturer	12	7.9%
	Registrar/ lecturer	20	13.2%
	Post grad trainees	55	36.2%
	House officers	8	5.3%
	General dental practitioner	20	13.2%
	Dental assistants/technicians	7	4.6%

N = 151

TABLE 2: THE RELATION OF USE OF PPES WITH THE WORKING SETUP

Use of Gloves Chi square = 1.119, df = 3, p = .772									
Variables		Count	Expected	Always	Frequently	Sometimes	Rarely	Never	Total
Working Setup	Government hospital	56	56.7	56	3	-	-	-	59
	Private hospitals	67	67.2	67	3	-	-	-	70
	Private clinics	21	20.2	21	0	-	-	-	21
	Total	144		144	6	-	-	-	150
Use of Facemask Chi square = 3.828, df = 9, p = .922									
Variables		Count	Expected	Always	Frequently	Sometimes	Rarely	Never	Total
Working Setup	Government hospital	50	52.4	50	3	5	-	1	59
	Private hospitals	63	62.1	63	3	4	-	0.5	70
	Private clinics	20	18.6	20	1	0	-	0.1	21

		Total	133	7	9	1	150	
Use of Face Shield Chi Square = 24.589, df = 12, p = .017								
Variables		Always	Frequently	Sometimes	Rarely	Never	Total	
Working Setup	Government hospital	Count Expected	3 6.6	10 9.0	12 16.8	19 15.2	15 11.3	59 59
	Private hospitals	Count Expected	12 7.9	9 10.7	25 19.9	17 18.1	7 13.4	70 70
	Private clinics	Count Expected	1 2.4	4 .2	6 6	3 5.4	7 4	21 21
	Total		17	23	43	39	29	150
Use of Gown Chi Square = 7.943, df = 12, p = .790								
Variables		Always	Frequently	Sometimes	Rarely	Never	Total	
Working Setup	Government hospital	Count Expected	12 12.9	14 15.2	20 21.9	10 7	3 2	59 59
	Private hospitals	Count Expected	16 15.3	18 18.1	28 26	6 8.3	2 2.3	70 70
	Private clinics	Count Expected	4 4.6	7 5.4	8 7.8	2 2.5	0 .7	21 21
	Total		33.0	39.0	56.0	18.0	5	150

TABLE 3: THE RELATION OF USE OF PPES WITH GENDER OF SUBJECTS

Use of Gloves Chi square = 2.94, df = 1, p = .086								
Variables		Always	Frequently	Sometimes	Rarely	Never	Total	
Working Setup	Males	Count Expected	69 71.1	5 2.9	-	-	74	
	Females	Count Expected	76 73.9	1 3.1	-	-	77	
	Total		145	6	-	-	151	
Use of Facemask Chi square = 5.544, df = 3, p = .136								
Variables		Always	Frequently	Sometimes	Rarely	Never	Total	
Working Setup	Males	Count Expected	66 65.7	1 3.4	6 4.4	-	1 5	74
	Females	Count Expected	68 68.3	6 3.6	3 4.6	-	0 5	77
	Total		134	7	9	-	1	151
Use of Protective Goggles Chi Square = 11.124, df = 4, p = .025								
Variables		Always	Frequently	Sometimes	Rarely	Never	Total	
Working Setup	Males	Count Expected	16 9.3	9 10.3	30 32.3	13 14.2	6 7.8	74
	Females	Count Expected	3 9.7	12 10.7	36 3.7	16 14.8	10 8.2	77
	Total		19	21	66	29	16	151

		Use of Gown Chi Square = 2.999, df = 4, p = .558						
Variables		Always	Frequently	Some-times	Rarely	Never	Total	
Working Setup	Males	Count Expect- ed	18 16	15 19.1	30 27.4	8 8.8	3 2.5	74
	Females	Count Expect- ed	15 16.8	24 19.9	26 28.6	10 9.2	2 2.5	77
	Total		33	39	56	18	5	151

Table 3 illustrates the relationship between PPE use and gender. Gender and protective goggles use have a statistically significant relationship (Chi Square = 11.124, df=4, p=.025). Male individuals used protective goggles more frequently than female ones. The usage of additional PPEs such as facemasks, gowns, and gloves does not significantly correlate with the respondents' gender (Chi Square = 2.999, df = 4, p =.558, and Chi Square = 2.94, df = 1, p =.086, respectively). With the exception of the protective eyewear, which were utilized more frequently by the male subjects, both genders used PPEs equally. 4.6% of the subjects were not vaccinated, while 3.3% just received the first dosage. There were exclusively females in both percentiles.

DISCUSSION

Pandemic COVID-19, at the turn of the second decade in 21st century, has taken the world by storm by paralyzing every walk of life. The fear of acquiring the disease was very enormous as healthcare authorities have labeled the virus to be highly contagious ². Moreover, the cure for new disease was not known and prevention was the only mode of action that was to be implemented to halt the spread of the disease. Where everyone else was given the chance to stay at home to remain safe the healthcare workers stepped forward for the call of duty to face the biggest challenge of the century.

Since COVID-19 is an airborne infection, transmission through droplets or aerosols of infected patients make dental clinicians vulnerable to development of infection. A recently published newspaper article reported that dental clinicians/practitioners are the most vulnerable group of health care workers owing to their exposure and close proximity to the infected individuals ¹⁵. Among all the provinces of the country, Khyber Pakhtunkhwa recorded highest number of cases involving health care workers ¹⁶. It has been reported that conventional measures of protection are no longer efficient in preventing the spread of infection among dental practitioners ⁷. Our study provides an insight into the behavior and professional practices adopted by dental practitioners during the pandemic crisis.

PPE includes the gloves, facemask, gown, face shield and/or protective goggles. Face shields are considered personal protective equipment (PPE) because they offer barrier protection for the face and other nearby mucous membranes (eyes, nose, lips) ¹⁷. Lindsley et

al. ¹⁸ reported 96% and 92% reductions in the risk of inhalational exposure immediately following a cough for a face shield at distances of 18 in (46 cm) and 72 in (183 cm), respectively, using a cough aerosol simulator loaded with influenza virus (aerosol volume mean diameter of 8.5 m) and a breathing simulator. The face shield blocked 68% of the inhalational exposure at 18 in (46 cm) immediately after the cough and 23% over 1–30 minutes after the cough when the aerosol size was reduced to 3.4 m. (during which time the larger aerosol particles had settled out and droplet nuclei had formed and remained airborne so that flow occurred more easily around the edges of the face shield).

Our study indicated that the use of gloves and facemasks have been equally and adequately used by most of dental practitioners irrespective of their working setup. However, the use of face shields was found more among the practitioners in private hospitals. It also showed that most neglect regarding the use of face shields has been among practitioners among government hospitals. Use of gown, however, is slightly higher (though insignificant) in private hospitals. dentists working in private hospitals than those working in government hospitals. This highlights the need to employ strategies to better equip the government hospitals with PPEs and train the health care professionals working there about the cross-infection controls measures ¹⁹.

Another study reported poor availability of PPE to doctors of Pakistan with only 34.5% having access to gloves, 37.4% to masks/N95 respirator, 13.8% to face-shields/protective eyewear and 12.9% to gowns. On the contrary 79.6% of doctors from the United States were found to have access to gloves, 87.6% to masks/N95 respirator, 77.9% to face-shields/protective eyewear and 50.4% to gowns ²⁰. Regarding willingness of the dentists of Pakistan to undergo Covid-19 vaccination, a study published that only 49.3% agreed to get vaccinated upon availability in Pakistan ²¹. In this study it was established that 4.6% of the dentists did not get vaccinated, while 3.3% just received the first dosage.

Our study also depicted the relative use of PPE with respect to the gender of dental practitioners. The study showed that relative use of gloves, face masks and gown was the same between males and female practitioners. However, male practitioners used more protective goggles than the females

The use of PPE not only ensures the safety of prac-

tioners but also provides emotional strength to fight off the anxiety that arises from being near to infected individuals. Our study shows that the practice of using PPE in hospitals has been sufficiently implemented except for face shields and goggles. It also shows that most of the dental practitioners, whether male or female, feel equally responsible to protect themselves from getting infected or act as carriers of infection.

CONCLUSIONS

Private hospitals showed maximum compliance with the use of PPEs as compared to government hospitals and private clinics.

Although both genders were equally compliant with the use of PPEs, however, the males were more compliant with the use of protective goggles.

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