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Research Article

Medical students' disease status of COVID-19: A multicenter study

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Background. Ever since its insurgence and wide-scale spread, COVID-19 has proved to be a challenge for healthcare workers throughout the world. Efforts have been made to scale its incidence and prevalence, find out cure for it as well as preventive measures like vaccines.
Methods. This is a cross-sectional study in which a predesigned proforma was disseminated amongst the medical students of Khyber Pakhtunkhwa. To gauge the status of COVID-19 amongst the medical students open-ended and close-ended questions were asked. These involved extracting demographics as well as information pertaining to signs and symptoms, hospital admission status and vaccination.
Results. A total of 605 medical students belonging to 16 different medical colleges responded. The frequency of COVID-19 was 31.4%, amongst the medical students. Students of clinical years were 1.31 times more likely to catch the infection than preclinical students. The self-isolation rate was 30.4%, hospital admission rate was 5%, and vaccination rate was 95%. The commonest presentation of COVID-19 was fever followed by fatigue and body aches.
Conclusions. The status of COVID-19 in KPK medical students is comparable to the rest of the world. Hence, we can deduce that the safety measures taken by the government and the private health sectors are proving at par with the developed world.

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Introduction

A novel coronavirus (SARS-CoV-2) started causing an acute respiratory disease at the end of the year 2019. [1] This disease first emerged in Wuhan, Hubei province of China, and quickly spread throughout the world. World Health Organization (WHO) officially declared the COVID-19 epidemic as a public health emergency of international concern on 30 January 2020. The disease was declared a pandemic on March 11, 2020, affecting 169 countries. [2] Human-to-human transmission of COVID-19 is through coughing, sneezing, and the spread of respiratory droplets or aerosols. This mode of transmission led to the vast-scale spread of this disease throughout the world. [3]

The various stages of the spread of this disease are the initial 'take-off stage', an 'exponential growing stage' followed by 'slowed growth', 'turning into a decline', and 'decline'. [4] This pattern along with transmission mode leads to the spread of Covid in

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bouts/waves. Presently Pakistan is facing the fifth wave of the COVID-19 epidemic. [5]

Punjab is the most populous province of Pakistan and has seen the highest number of confirmed cases and deaths so far in Pakistan. Khyber Pakhtunkhwa being Pakistan's third-most-populated province has seen an exceptionally high fatality rate of 3.03%. [6]

Young adults are usually carriers of this disease and play a role in its spread, they incur lesser severity of the disease. [7] A study conducted in Jordan showed that 237(13%) of students tested positive for COVID-19 infection by PCR, of which 15.2% were clinical students and 11.2% were pre-clinical students representing a relative risk of 1.36 of COVID-19 infection among clinical students compared to pre-clinical students. [8]

Until now 1,486,361 confirmed cases of COVID-19 have been identified up till now in Pakistan out of which 210,726 cases are from the KP province. The total number of deaths reported in Pakistan is 29,801 while that in KP is 6,130. [9] The total number of people who have received 1 dose of vaccine is 119,150,808, and the number of those who have received two doses is 92,565,125. [10] The projected hospital admissions in Pakistan will be 52,930 on 23rd Feb 2022 as reported on 8th Jan 2022. [11]

According to the Centers for Disease Control and Prevention, Covid symptoms appear 2-14 days after exposure to the virus and range from mild to severe. The top five symptoms of COVID-19 observed are fever, cough, dyspnea, fatigue, and body aches. [12] Wang et al reported that fever (98.6%) is the most common symptom of COVID-19 followed by fatigue (69.6%) and dry cough (59.4%). [13] The aim of this research was to find out the COVID-19 infection status amongst undergraduate medical students of the KP province of Pakistan and to determine the relative risk of COVID-19 between preclinical and clinical years.

Material & Methods

This study was conducted on medical students of various medical and dental colleges of Khyber Pakhtunkhwa (KP). This is a cross-sectional descriptive survey carried out over a period of six months. All undergraduate students of MBBS and BDS of various medical colleges of KP who filled the proforma and were ready to disclose their information were included. After attaining ethical approval from the institutional ethical board data (No.657/DME/KMC) was collected via census sampling. A self-developed questionnaire was administered to the students, which contained both open and closed-ended questions.

The questions included demographic features as well as basic information regarding the diagnosis of COVID-19, its symptoms, hospital admission status and vaccination. The proforma was disseminated via both google forms as well as by hand. Informed consent was taken with the proformas filled in person and implied consent on Google Forms. The data was then obtained from Google Forms as well as entered manually on an Excel sheet and was analyzed using SPSS v. 26.0. Relative risk for COVID-19 was determined between clinical and preclinical years based on the frequency of diagnosed COVID-19 cases.

Results

A total of 605 medical students enrolled in 16 different private and public medical colleges of Khyber Pakhtunkhwa, belonging to 39 different regions/districts participated in our survey.

The majority of students who participated in our survey were from Peshawar district (25%) and from Khyber Medical College (41%). The frequency of COVID-19 detected amongst medical students was 31.4%, while the frequency of vaccination was 95%.

The students in clinical years (3rd, 4th and final year) are 1.31 (relative risk) times more likely to get COVID-19 than preclinical years (1st and 2nd year).

S No.	Variable		N (%)
1.	Gender	Male	346 (57.2)
		Female	257 (42.5)
		Prefer not to say	2 (0.3)
2.	Age (years)	17-19	71 (11.7)
		20-23	468 (77.4)
		24-27	65 (10.7)
3.	Year of study	1^{st}	77 (12.7)
		2^{nd}	209 (34.5)
		3^{rd}	112 (18.5)
		4^{th}	136 (22.5)
		5^{th}	71 (11.7)
4.	Covid positive history	Present	190 (31.4)
		Absent	415 (68.6)
5.	Covid PCR done	No response	206 (34)
		Yes	171 (28.3)
		No	228 (37.7)
6.	Covid RAT done	No response	210 (34.7)
		Yes	84 (13.9)
		No	311 (51.4)
7.	Covid antibody	No response	207 (34.2)
		Yes	79 (13.1)
		No	319 (52.7)
8.	Presence of any symptoms	No response	209 (34.5)
		Yes	180 (29.8)
		No	216 (35.7)
9.	Self-isolation done	No response	212 (35)
		Yes	184 (30.4)
		No	209 (34.5)
10.	Hospital admission done	No response	206 (34)
		Yes	5 (0.8)
		No	394 (65.1)
11.	Consultation sought	No response	207 (34.2)
		Yes	143 (23.6)
		No	255 (42.1)
12.	Treatment plan followed	No response	209 (34.5)

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S No.	Variable		N (%)
		Yes	159 (26.3)
		No	237 (39.2)
13.	Vaccinated	No response	7 (1.2)
		Yes	575 (95)
		No	23 (3.8)
14.	Covid vaccine doses received	none	12 (2)
		1	46 (7.6)
		2	530 (87.6)
		3 (booster)	2 (0.3)
15.	Months passed after Covid	>1 or not diagnosed	436 (72.1)
		1-3	35 (5.8)
		4-10	68 (11.2)
		11-20	64 (10.6)
		21-27	2 (0.3)
16.	Second episode of Covid	No response	20 (3.3)
		Yes	19 (3.1)
		No	566 (93.6)

Table 1. Frequencies and Percentages of various parameters of medical students disease status

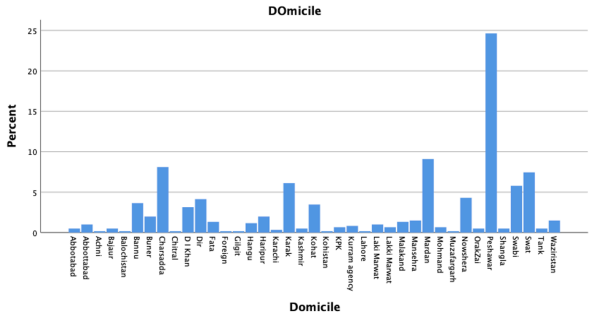

Figure 1. District-wise distribution of students of Khyber Pakhtunkhwa

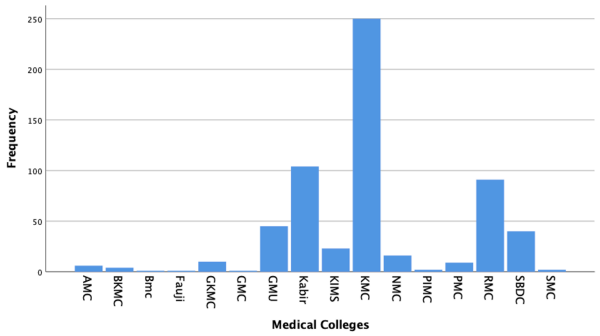

Figure 2. Medical College-wise distribution of students who responded.

Legend: AMC: Ayub Medical College, BKMC: Bacha Khan Medical College, Bmc: Bannu Medical College, Fauji: Fauji Foundation Medical College, GKMC: Gajju Khan Medical College, GMC: Gomal Medical College, Kabir: Kabir Medical College, KIMS: Khyber Institute of Medical Sciences (Kohat), KMC: Khyber Medical College, NMC: North West School of Medicine, PIMC: Pak International Medical College, PMC: Peshawar Medical College, RMC Rehman Medical College, SBDC: Sardar Begum Dental College, SMC: Saidu Medical College.

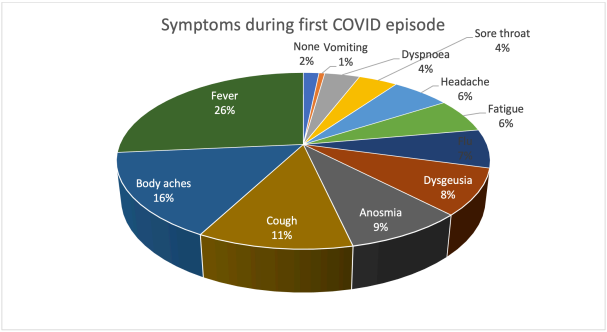

Figure 3. Percentages-wise distribution of symptom occurrence during the first episode of COVID-19 infection among participants

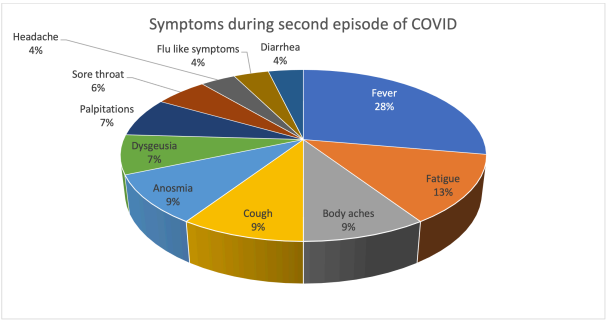

Figure 4. Percentages-wise distribution of symptom occurrence during the second episode of COVID-19 infection among participants

Discussion

There has been a profound effect on the healthcare and education system all over the world because of the COVID-19 pandemic. It has especially created hurdles for medical/healthcare students, as bedside learning is essential to medical education. During the pandemic, not only the curriculum was formatted to be delivered in a virtual manner but also the examinations were delayed. In Pakistan, most educational institutions including medical universities were reopened in September 2020. After the dissolution of the lockdown, students and healthcare staff were required to follow proper airborne precautions to prevent aerosol generation and propagation. [14]

We surveyed 605 medical students in 16 institutes of Khyber Pakhtunkhwa to gather information about their COVID-19 history, testing, and vaccination status. It showed that 190 students demonstrated

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evidence of previous COVID-19 infection. About 72.1% of all of the students reported symptom onset either within one month before the conduction of the survey or not at all. As this survey was conducted from June 2021 to March 2022, it showed that a large number of students were infected after the dissolution of the lockdown whereas only a few were infected during the lockdown. According to one study done in Jordan, 27.9% of infected students believed that their source of infection was from the hospital whereas 32.6% thought they contracted it from their homes. [8] Contrary to this, a study done in China showed that 84% to 89% of healthcare personnel who contracted COVID-19 infection believed they got it from the hospital. [15]

This deduction, however, would not apply to pre-clinical students who spend minimal amounts of time in the hospital. One source of the spread of infection can be attributed to the shared accommodation of clinical and pre-clinical students in hostels. A cross-sectional study of a COVID-19 outbreak in a medical College in India reported that 40 students mostly from the pre-clinical years tested positive for COVID-19 after contact with a student who had acquired the infection and attended several meetings and literary activities. The majority of these cases (67.5%) who had direct contact with the index case were residing in hostels. [16]

Multiple cases of coronavirus re-infection have been reported globally. A study done on 2625 participants employed in the healthcare setup showed that 5.94% of people had COVID-19 reinfection (two positive tests at least 90 days apart). Amongst these cases, 97.4% had either COVID clinical or non-COVID clinical roles. [17] An observational case series in Brazil reported a total of 33 healthcare professionals who had reinfection with coronavirus. Several risk factors have been implicated in potentially causing the infection including comorbidities, viral latency, environmental factors, and genetic background. [18] In our study, only 3.1% of the students reported a second episode of COVID-19 infection. Fever and body aches predominated the first episode of COVID-19 whereas fever and fatigue were the most common symptoms reported in a reinfection.

In underdeveloped countries like Pakistan, surveillance and diagnosis of COVID-19 infection can be economically challenging. The recommended gold standard diagnostic test for COVID-19 infection is reverse transcriptase polymerase chain reaction (RT-PCR). On the other hand, rapid diagnostic tests are economical and user-friendly but unsuitable for accurately diagnosing COVID-19 infection. [19] Although both tests are actively being used by healthcare centers in Pakistan, RT-PCR is the preferred test as 28.3% of students underwent RT-PCR and only 13.9% had the rapid antigen test in the present research.

Individuals who frequently visit healthcare setups are particularly prone to spreading the virus, especially if they are unvaccinated. A global assessment done by Mustapha et al. across 39 countries showed that vaccine hesitancy among 19,991 healthcare students and trainees was 18.9%. [20] Another study done in Paris showed that female healthcare students were more hesitant than males when it came to vaccination. Similarly, medical students and students who were doing internships were less hesitant compared to nursing students. [21] A multicenter study of medical students from Pakistan done from June 2021 to July 2021 reported that 91% of medical students were not only vaccinated but a large number of students urged their parents and families to get vaccinated as well. [22]

Although such statistics cannot be generalized to our study as the reasons for vaccine hesitancy have not been explored, we can see similar themes as coverage for full vaccination was 87.6%. This percentage may also not be attributed to vaccine hesitancy as vaccination was still being carried out in younger populations at the time of this survey.

In youngsters, the treatment of COVID-19 generally focuses on supportive care and monitoring of symptoms and vitals. Although over-the-counter medications such as acetaminophen and ibuprofen are usually used to alleviate fever, pain, and discomfort, it is still essential to follow guidelines provided by health organizations regarding the treatment of COVID-19 in youngsters. In our study, approximately 23.6% of students sought consultation, whereas only 26.3% followed a treatment plan. In addition to this, five students had severe infections and needed hospitalization.

Self-isolation is crucial to prevent the spread of infection, especially for people who have been diagnosed with COVID-19. These measures include staying at home, separating yourself from others, practicing hand hygiene, wearing a mask, and minimizing contact. According to our survey, only 30.4% of students practiced self-isolation. This may be attributed to the nonseriousness of the youth

towards standard operating procedures recommended by healthcare authorities. [23]

Hani et al did a cross-sectional study on healthcare students to determine a difference in infection rates between clinical and pre-clinical students. According to their survey, the incidence of COVID-19 seemed to be higher in clinical students as compared to pre-clinical students. In this study, they discussed that even though Personal protective equipment is necessary for effective prevention of infection, clinical students are sometimes considered nonessential members of healthcare facilities, hence, personal protective equipment might not be utilized with these students. [24] Similar trends can be seen in our study as clinical students are at higher risk (relative risk 1.31) of acquiring infection as compared to preclinical students.

The strength of this research is in its multicenter sampling and taking care of multiple aspects of COVID-19 status amongst medical students. The limitation is that it's a survey hence, we could only report frequencies and etiological processes or links between various aspects that weren't explored.

Conclusion

The medical students belonging to clinical years (3rd, 4th and final year) were at 1.31 times higher risk of contracting COVID-19 as compared to those belonging to preclinical years (1st and 2nd year). The most common symptoms reported during the first episode of COVID-19 were fever and body aches, while those during reinfection were fever and fatigue. The reinfection rate was 3.1% and 95% of the participants received the vaccine.

Conflict of Interest: The authors have no conflict of interest to declare.

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Declarations

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