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A cross-sectional study of the COVID-19 prevalence in Dir Lower, Pakistan

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Abstract

The article investigates the prevalence of COVID-19 in the district Dir Lower, Khyber Pakhtunkhwa, Pakistan. A cross-sectional epidemiological study was conducted in January-June 2020. Samples were taken from suspected patients who visited the District Headquarters Hospital, Timergara (DHQHT), Dir (Lower). All the experimental work was conducted at the DHQHT pathology laboratory. The Real-Time Polymerase Chain Reaction (RT-PCR) was used for testing. A P-value less than 0.05 was considered statistically significant. This study examines 2718 individuals. COVID-19 confirmed cases totalled 1125 (41.39 %), with 10 fatalities (0.5 %). Males (829) had a higher prevalence of illness than females (296), with a p-value of (0.76). Positive cases were most prevalent among those aged 31–40 years (26.84 %), followed by those aged 41–50 years (15.02 %), those aged 0–10 years (3.91%), those aged 11–20 years (9.51%) and those aged 21–30 years (21.24%). Most of the COVID-19 cases were found in the tehsils of Timergara (534) and Lal Qila (118). The study's findings indicate a high rate of positive cases and a low mortality rate. This study will aid researchers, doctors and policymakers in their efforts to contain or eliminate the spread of COVID-19 in the study area.

Keywords: SARS-CoV-2, Coronavirus, RT-PCR, Corona patients, seroprevalence, molecular analysis, epidemiology.

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1. Introduction

In the last month of 2019, Wuhan, China, became the first place in the world to discover (SARS CoV-2). SARS-CoV-2 is the primary source of Coronavirus (COVID-19) illness. China's COVID-19 outbreak reached epidemic proportions in February 2020 and the World Health Organization (WHO) acknowledged it as a worldwide pandemic in March 2020 (Hu *et al.*, 2021). The novel SARS-CoV-2 viral particle was structurally identical to the Coronavirus in many aspects (Andersen *et al.*, 2020). Furthermore, SARS-CoV-2 is a genetically related Beta Coronavirus subgenus Sarbecovirus to SARS-CoV (Ahmad *et al.*, 2020). For the last thirty years, there have been outbreaks of different viral endemics in China, i.e. in 1997, an outbreak of avian influenza occurred; in 2003, an outburst of "severe acute respiratory syndrome (SARS)" occurred; and in 2010, an outbreak of severe fever with thrombocytopenia syndrome (SFTS) occurred (Ahmad *et al.*, 2020).

COVID-19 is mainly transmitted via pulmonary system, as infected individuals release droplets and particles while breathing, speaking, laughing, coughing and sneezing. When infected individuals are physically close to one another, they are more likely to transfer COVID-19 virus (Wang *et al.*, 2021). Frequent symptoms include fever or chills, sore throat, cough, weariness, muscular or body aches, headache, exhaustion, breathing problems, Diarrhoea, and loss of taste and smell (CDCP, 2020). After virus exposure, symptoms can appear between one and fourteen days later. At least a third of afflicted persons exhibit no indications or symptoms (Zhiru *et al.*, 2020). Adults are more likely to experience severe symptoms. Following recovery, some individuals have a range of symptoms for months and confirmed organ damage has occurred (CDCP, 2020).

COVID-19 can potentially cause respiratory tract injury to the upper and lower respiratory tracts (sinus, nose and throat) (Harrison & Wang, 2020). It is thought that COVID-19 has the most significant impact on the lungs because it binds to the ACE2 receptor found on the surface of type II alveolar cells (Verdecchia *et al.*, 2020). The virus enters the host cell via a surface glycoprotein known as "spike" which attaches to the angiotensin-converting enzyme 2 (ACE2) receptor (Letko *et al.*, 2020). RT-PCR or other nucleic acid assays can be used to confirm the presence of COVID-19 in contaminated secretions. In persons with a strong clinical suspicion of infection, chest CT scans may help diagnose COVID-19. When an infection is detected using a serological test, antibodies produced by the body can be discovered and utilized to diagnose a previous infection (Li *et al.*, 2020).

In Pakistan's Karachi city of Sindh province, the first COVID-19 case was recorded on 26th February 2020. Pakistan's Federal Ministry of Health, Islamabad confirmed another case of COVID-19 on the same day. In 15 days, there were 20 confirmed COVID-19 positive cases out of 471 suspected cases, with Sindh reporting the most, followed by Gilgit-Baltistan (Waris *et al.*, 2020; Aslam et al., 2020; Jan et al., 2020). As of May 1, 2020, WHO reported 3,175,207 cases of COVID-19 worldwide, resulting in 224,172 deaths. Africa had 27,664 confirmed COVID-19 cases and 974 deaths, compared to America's 1,291,917 confirmed cases and 69,087 deaths. There were 188,585 confirmed cases and 7598 deaths in the Eastern Mediterranean. There were 1,461,404 confirmed cases in Europe, with 138,200 deaths because of COVID-19. Similarly, there were 57,088 confirmed cases in Southeast Asia, with 2174 deaths compared to 148,838 confirmed cases in the Western Pacific, with 6127 deaths (Rehman *et al.*, 2020; Ahmed et al., 2021).

This study provides the frequency distribution of COVID-19 and associated risk factors during the initial stage of the COVID-19 pandemic in District Dir Lower of Khyber Pakhtunkhwa, Pakistan. The effect of COVID-19 on individuals regarding their age is also investigated and their data is calculated. Similarly, the number of affected people in the different small regions of the District Dir Lower is analyzed and presented.

2. Research tools and methodology

2.1. Area of the study

The study was carried out on the basis of the data collected from District Headquarter (DHQ) Hospital, Timergara, District Dir (Lower), Khyber Pakhtunkhwa, Pakistan.

2.2. Data collection

All the biosafety instructions were followed when the samples were collected from suspected patients. Then, the collected samples were sent to the laboratories. The samples were tested within 24 hours and can be stored at 4°C.

2.3. Laboratory experimentations

A Polymerase Chain Reaction (PCR) machine was used to analyze the samples in the laboratory. Coronaviruses contain a single RNA genome that is extra ordinal in length. To detect the presence of viral RNA in the samples, the Real-Time Polymerase Chain Reaction (RT-PCR) method is utilized. To totally deplete patient samples of proteins, lipids and other components, chemicals such as Tris Hydroxy Methyl Aminomethane, potassium chloride and magnesium chloride were utilized. Using an enzyme, the single-stranded viral RNA recovered from the sample is transformed into complementary DNA (cDNA) (reverse transcriptase) (CDCP, 2020).

Target-specific DNA primers and an enzyme called Taq Polymerase are required to duplicate the target DNA after RNA is transformed into double-stranded DNA with the addition of a brief set of nucleotide subunits. Fluorescent markers are used to analyze viral RNA in a PCR device in order to detect the virus. The virus is proven to be present when the level of fluorescence exceeds a predefined threshold. The number of temperature cycles required for the machine to reach this threshold is recorded to ascertain the amount of virus present. The more viruses there are, the fewer cycles there are (CDCP, 2020).

2.4. Statistical analysis

The collected data were entered into Microsoft Excel 2019. The calculated values were presented in frequencies and percentages. The required graphs and pie charts were generated using Origin Pro 2018 for windows. The statistical analysis was performed using SPSS version 19. A P-value less than 0.05 was considered statistically significant.

3. Results

The results showed that a total of 2718 suspected patients were randomly tested for COVID-

19, of which 1125 (41.39%) were confirmed cases and 1593 (58.60%) were found to be negative. The mortality rate was 10 (0.36%). Among all individuals, 2011 were male and 707 were female.

Table-1: Distribution of COVID-19 cases

Suspected cases	2718
Positive cases	1125
Negative cases	1593
Mortality	10
Recovered	1115

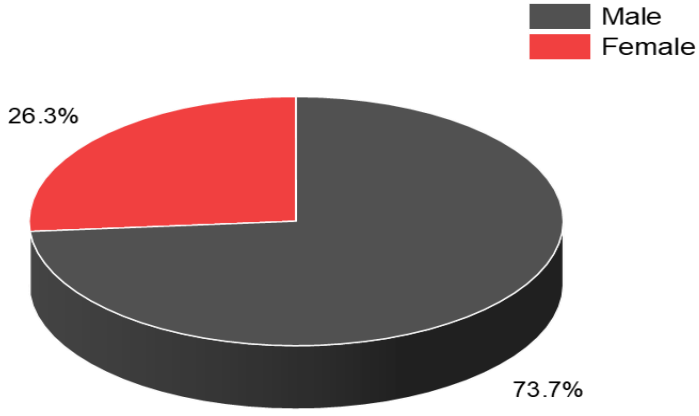
3.1. Gender-wise distribution of positive and negative COVID-19 cases

Table-2 shows that in District Dir Lower total of 1125(41.39%), positive cases were reported; out of 1125, the positive male rate was found to be 829 (73.69%), and the positive female rate was found (26.31%). The number of positive cases of COVID-19 was higher in males (n=829, 73.69%) than in females (n=296, 26.31%). The prevalence of COVID-19 cases among the male population was significantly higher ($P < 0.05$) than the female population of District Dir Lower, it may be because of more exposure to the outside environment and direct or indirect contact with positive cases.

Table-2: Gender-wise distribution of COVID-19 cases

Gender	Positive	Negative	P-value
Male	829 (73.69%)	1182 (74.20%)	0.764984
Female	296 (26.31%)	411 (25.80%)	
Total	1125 (100%)	1593 (100%)	

Figure 1: Gender-wise distribution of COVID-19 positive cases.



3.2. Age-wise distribution of COVID-19 positive cases

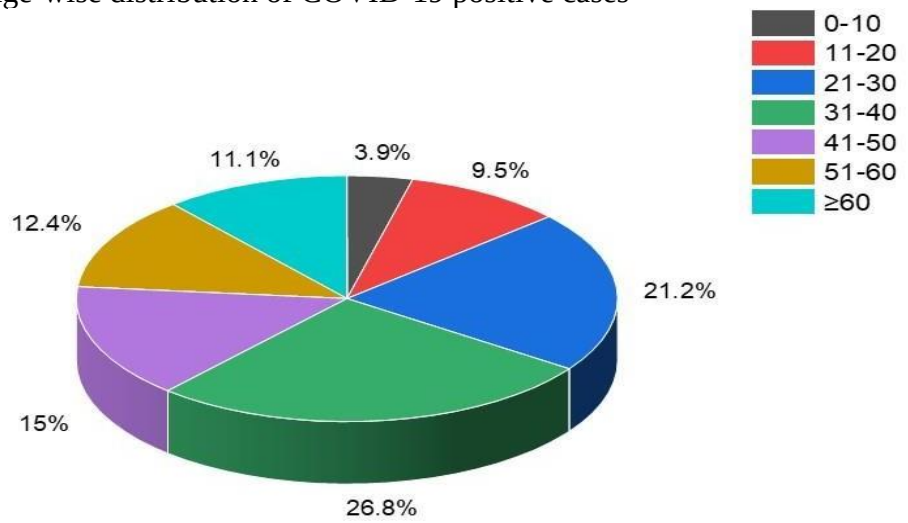
According to the age-wise distribution of COVID-19 cases between the age group 0-10 years old the number of positive cases of COVID-19 was 44 (3.91%); in between the age group 11-20 years old, the number of positive cases of COVID-19 was 107 (9.51%), in between the age

group 21-30 years old the number of positive cases of COVID-19 was 239 (21.24%), in between the age group 31-40 years old the number of positive cases of COVID-19 were 302 (26.84), in between the age group 41-50 years old the number of positive cases of COVID-19 were 169 (15.02%), in between the age group 51-60 years old the number of positive cases of COVID-19 were 139 (12.35%) and above 60 year old the number of positive cases of COVID-19 were 125 (11.11%). The highest number of positive cases were found between 31-40 years old, 302 (26.84%), as shown in table 3.

Table-3: Age-wise distribution of COVID-19 positive cases

Age (years)	Frequency	Percentage (%)
0-10	44	3.91
11-20	107	9.51
21-30	239	21.24
31-40	302	26.84
41-50	169	15.02
51-60	139	12.35
≥ 60	125	11.11
Total	1125	100

Figure 2: Age-wise distribution of COVID-19 positive cases



3.3. Area-wise distribution of COVID-19 cases

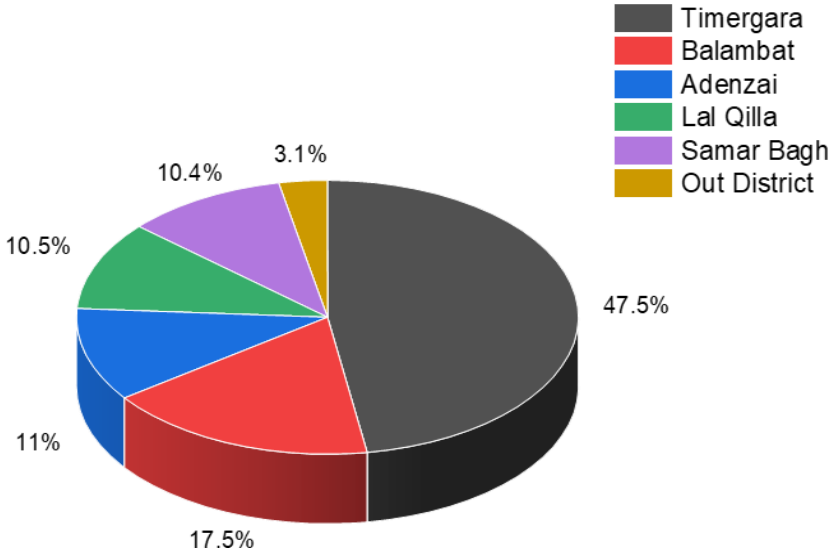
The tehsil wise COVID-19 cases in district Dir Lower show that the total positive cases in district Dir Lower was 1125(41.39%) and the number of negative cases was 1593 (58.60%) among them in tehsil Timergra the total positive cases were 534 (44.8%), and 657 (55.2%) cases were negative. In tehsil Samar Bagh, the total positive cases of COVID-19 were 117 (30.8%), and 263 (69.2%) cases were negative. In tehsil Adenzai, the total number of positive cases of COVID-19 was 124 (51%) and 119 (49%) cases were negative. In tehsil Lal Qila, the total positive cases of COVID-19 were 118 (31.3%) and 259 (68.7%) cases were negative. In tehsil Balambat, the total positive cases of COVID-19 were 197 (45.9%) and 232 (45.1%) cases

were negative. As shown in the table-4, there were 35 (35.7%) positive cases outside of the district Dir Lower and 63 (64.3%) cases were negative. The highest positive cases were found in tehsil Timergara 534 (44.8%) and the lowest positive cases were found in tehsil Samar Bagh 117 (30.8%).

Table-4: Area-wise distribution of COVID-19 cases

Tehsil	Positive	Negative	Total
Timergara	534(44.8%)	657(55.2%)	1191
Samar Bagh	117(30.8%)	263(69.2%)	380
Adenzai	124(51%)	119 (49%)	243
Lal Qilla	118(31.3%)	259(68.7%)	377
Balambat	197(45.9%)	232(54.1%)	429
Out of District	35 (35.7%)	63(64.3%)	98
Total	1125 (41.39%)	1593(58.60%)	2718

Figure 3: Area-wise distribution of COVID-19



4. Discussion

COVID-19 is a new Coronavirus infection discovered at the end 2019 in Wuhan, China. Until now it has infected tens of millions of people in 60 countries and territories and also spread outside of China. Symptoms vary from person to person: fever or chills, Sore throat, Cough, Fatigue, Muscles or body aches, Headache, Exhaustion, Breathing difficulty, Diarrhea, and loss of taste and smell. In accordance with the reports of WHO, COVID-19 has currently spread to 220 states/regions worldwide. Pakistan is also one of those affected areas. In Pakistan, Karachi Sindh province, the very first COVID-19 case was recorded on February 26, 2020. Pakistan's Federal Ministry of Health confirmed another case on the same day. In 15 days, the number of confirmed COVID-19 Positive cases was 20 among 471 suspected cases.

The virus initially spread to other countries because infected individuals travelled from China to other countries. If the individual tests positive, 14-days quarantine is required. Certain

countries have disregarded prevention measures, particularly those affecting immigration, resulting in the virus's global spread. As of May 1, 2020, the WHO reported 3,175,207 cases of COVID-19 worldwide, resulting in 224,172 deaths. Africa had 27,664 confirmed COVID-19 cases and 974 deaths, compared to America's 1,291,917 confirmed cases and 69,087 deaths. There were 188,585 confirmed cases and 7598 deaths in the Eastern Mediterranean. There were 1,461,404 confirmed cases in Europe, with 138,200 deaths because of COVID-19. There were 57,088 confirmed cases in Southeast Asia, with 2174 deaths, compared to 148,838 confirmed cases in the Western Pacific, with 6127 deaths.

The current study investigates the frequency distribution of "COVID-19" and conjoined risk factors during the initial stage of the COVID-19 pandemic in the Dir Lower district of Khyber Pakhtunkhwa, Pakistan. In the current study, a total of 2718 suspected individuals were tested for COVID-19 from January 2020 to June 2020. In the total 2718 samples, 1125 (41.39%) were confirmed COVID-19 cases, 1593 (58.60%) were found to be negative, and the mortality rate was 10 (0.36%). Ejaz *et al.* (2020) stated that in district Attock, the total number of positive cases of COVID-19 was 843. Anwar *et al.* (2021) stated that in district Mardan, the total number of positive cases of COVID-19 were 753. According to the study of Khan *et al.* (2021), in the district of Peshawar, a total of 845 samples were screened out of 845, and the number of confirmed COVID-19 positive cases was 121. According to the study by Saeed *et al.* (2021), in district Karak out of 435 suspected patients, the number of confirmed COVID-19 positive cases was 156.

The reason for the differences between the result of the current study and other relevant studies can be tracked to the difference between perspectives of the studies, time duration, facilitated and populated cities, and demographic area of these studies. The time duration of the study might also have affected the study as the time duration for the current study was varied than that of others. The climate and air or ventilation conditions might have caused the difference in the prevalence of coronavirus.

The present study also examines the patients of COVID-19 at various age levels. The uppermost number of positive cases was noticed between 31-40 years old (26.84%), followed by the age group 21-30 years old (21.24%), 41-50 years old (12.35%), 11-20 years old (21.24%), above 60-year-old (11.11%) and 0-10 years old (3.91%) including infants, the infection rate was low at the old age and children, it may be due to lower number of testing or less exposure to the outside environment. As we discussed, the morbidity rate was high in adult patients age between 31-40 years old (26.84%). Abid *et al.* (2020) noticed that among all age groups, the age group lying in between 20-39 is the most-affected age group with covid-19, while in Baluchistan the most covid-19 affected age group was 22-48 years, 22-52 years in Sindh and 22-44 years in Punjab. However, in Azad Jammu and Kashmir (AJK) and Gilgit Baltistan age varied from 31 to 60 years. Ali *et al.* (2021), stated that in district Swat the age groups of 40-49 had the highest number of confirmed COVID- 19 cases, while the age groups of 20-29 had the lowest number. The possible reasons for the difference in findings in the above-mentioned studies can be lack of awareness of people high exposure and close contact with covid-19 patients.

The present study shows that the frequency of COVID-19 in male individuals was much higher than in females, the number of males of covid-19 positive cases was 1125 (41.39%), and the number of female-positive cases was 296 (26.31%). The p-value i-e 0.76 is considered non-

significant because there were significant differences between male and female ratios. The ratio of male subjects was high. It may be due to the high number of COVID-19 tests or high exposure because the ratio between genders in other countries is almost the same. Ali *et al.* (2021) stated that in district Swat, the highest number of covid- 19 patients occurred in males. Ejaz *et al.* (2020) stated that in district Attock, the number of male-positive cases was 515(61.09%), and the number of female-positive cases was 328(38.90%), the result shows that in district Attock the frequency of male COVID- 19 cases was much higher as compared to female. Anwar *et al.* (2021) stated that the highest number of covid-19 patients in district Mardan occurred in males.

5. Conclusion

This is the first cross-sectional study that provides a detailed snapshot of COVID-19 in district Dir (Lower). The findings of the current study show a high positivity rate and a low mortality rate. This study will help researchers, clinicians and policymakers to curb or stop the further spread of COVID-19 in the study area. A total of 2718 patients were enrolled in this study. The overall prevalence was 41.39%, while the mortality rate was 0.36%. The frequency of disease was high in males (n = 829) as compared to females (n = 296). The highest number of positive cases was reported at the age of 31–40 years (26.84 %), followed by those aged 41–50 years (15.02 %), those aged 0–10 years (3.91%), those aged 11–20 years (9.51%) and those aged 21–30 years (21.24%). The most COVID-19 positive cases were found in the tehsils of Timergara (n = 534) and Lal Qila (n = 118).

Declaration of conflict of interest

The author(s) declared no potential conflicts of interest(s) with respect to the research, authorship, and/or publication of this article.

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