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Title: **Epidemiological and Clinical Manifestations of COVID-19 Variants in the Punjab Tertiary Care Hospitals**

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Epidemiological and Clinical Manifestations of COVID-19 Variants in the Punjab Tertiary Care Hospitals

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ABSTRACT

The first case of COVID-19 originated in China which then started spreading rapidly all over the world as a deadly pandemic. A huge number of people started to suffer due to the rapid attacks and virulent nature of the COVID-19 virus. This virus swiftly spreads from person to person. Initially considered as pneumonia due to similar signs and symptoms, with the passage of time its gravity was realized as compared to that of pneumonia. This virus attacks human respiratory system, damaging it to death. A survey was conducted during the pandemic to determine the prevalence and distribution of COVID-19 spread and its patient rate. Swabbed sticks were collected from different government and private hospitals following COVID-19 SOPs. A systematic data analysis was conducted by using different epidemiological tools to evaluate the prevalence and distribution rate of COVID across the country. Data was collected from all types of COVID-19 patients, including those on ventilator, admitted patients, patients with minor signs and symptoms, and patients having no symptoms but tested positive for COVID-19 by qRT-PCR. People who were already vaccinated were also included in this survey. A number of people showed positive vaccination effects, while most of them were not willing to receive vaccination. The study also illustrated that most of the patients who were admitted in hospitals showed severe symptoms, whereas some exhibited minor symptoms. It could be due to the fact that hospitals lack the facilities to accommodate every patient. Therefore, they only admit individuals with major symptoms and those having minor symptoms but with other complications. Whereas, patients with minor symptoms were referred to home isolation.

Keywords: COVID-19, epidemiological tools, pneumonia, qRt-PCR, SOPs

1. INTRODUCTION

COVID-19 is RNA infection with the appearance of over-the-counter signal one micro graphs of unmarked sequences. The nucleic corrosive is almost 30 kilo base and has a best sense along with a single poly-acetylated RNA. It has viral RNA with the largest poly-protein codes [1]. This poly-protein is broken down into proteases of viruses and forms RNA subordinate, RNA polymerase plus, ATPase helicase and a protein named surface agglutinin-esterase is present in OC43 plus further circles II

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COVID-19. It is a very high surface area of glycoprotein (S-protein) that forms E protein (small envelope protein). The encoding features of a few other ORFs (Open Reading Frame) are still not clear [2].

COVID-19 duplication method involves RNAs with polyadenylated 3 prime strand. Separated section of 5 edges is translated. Genetic mutations are common. Additionally, COVID-19 is equipped with the redistribution of heredity if 2 diseases contaminate a cell at same time [3]. Every virus of COVID forms within the cytoplasm of cells, turned by endoplasmic reticulum into cytoplasm vesicles. These are removed or delivered within the same period from the cell, plus after that the cell ends [4].

All COVID-19 compounds that have 229 E sites, utilize human amino-peptidase N as their cell receptor infection with mice. The combination II COVID-19 uses a person having the carcinogenic embryo (an embryo having cancer cells) with antigen family that act as receptors [5].The receptor is unknown however, may be a small number of cellular components including the "9-O-acetylatedneuraminic" corrosive and the "HLA-I molecule SARS COVID" utilize angiotensin mutations over compound II like its cell receptors [6].

The COVID-19 virus spreads mainly through saliva droplets or nasal discharge released by an infected individual, particularly when that person sneezes, coughs or breathes. Proofs from various studies and computational fluid dynamics templates provide insights into the particular process [7]. The particles are released through viral machinery that involves 'liquid-film explosion' in small airways, resulting in the release of particles ≤1μm in diameter during regular speech and breathing [8]. In contrast, the powerful "explosive atmosphere" accompanied by sneezing, coughing, shouting and loud singing lead to release of countless large particles [9].

2. MATERIAL AND METHOD

This section comprises research design, study framework, population, sampling, sample size, data collection and data analysis.

2.1. Research Design

A comparative design was used to explore the demographic relationship between various factors, such as age, sex, and city of residence of recovered and expired patient of COVID-19 in the Punjab province of Islamic Republic of Pakistan.

2.2. Collection and Transportation of Samples

The data was collected from the Mayo Hospital, Lahore, with the permission of the respected of hospital. By following the SOPs strictly, data was collected from the statistical branch of Mayo Hospital, Lahore.

2.3. Population

The population for the current study comprised patients from every division of Punjab, Islamic Republic of Pakistan.

2.4. Collected Data from Hospitals

Data representation is an important issue regarding the approval of findings (external legitimacy). Larger samples usually provide more accurate findings; however, there is a trade-off between a larger sample requirement and a smaller one. For better precision, random samples are often combined which is useful along with each. This method is known as two simple random sample segments for instance, a group is selected randomly and

after wards people are selected randomly from the chosen group [10]

2.5. Sample Size

In order to conduct the current study, multiple-stage random sampling technique was used. Almost250responseswerecollectedviaGoogleforms. Moreover, the data of 502COVID-19 patients was gathered from Mayo Hospital, Lahore, out of which 250 patients had expired due to COVID-19 and 250 patients recovered [11].

2.6. Data Collection

In order to provide more accurate estimates about the affected population, the above-mentioned method is helpful to use modern I.T facilities. Moreover, to follow the complete SOPs, the data from all over the Punjab was collected. Another sample of data was collected from Mayo hospital Lahore. Mayo Hospital situated in the heart of city Lahore and provides free medical facilities to every admitted patient for COVID-19 as part of the government policy. The data was collected from the hospital by the permission of respected MS of the Mayo hospital. The data was taken randomly from the statistical branch of the mayo hospital.

2.7. Data Analysis

The data was entered in to Microsoft excel sheet for analysis. The graphical representation of various variables including age, gender (sex), and city of residence, along with the variety of symptoms of COVID-19 was formulated by the Microsoft Excel. It showed the prevalence and epidemiology of the COVID-19 in the variables of the data. According to the available data of the current study, it was analyzed that COVID-19 prevailed in males more than that of females. The age groups 41-60 and 61-80 were more affected with the residents of Lahore who were the most affected residents in the Punjab province. Moreover, the data from hospital showed that the patients who were admitted in healthcare facility carried more severe symptoms, whereas the data from Google forms conveyed that patient who were home isolated showed minor symptoms in general.

2.8. Delta and Omicron

The 'Delta plus variant' was identified in Nepal with the K417N mutation. As compared to the alpha variant, delta variant is 40%-60% more transmissible. It also carries double risk of hospitalization. Initially, the vaccines that were developed were not effective against the delta variant [12]. Omicron (B.1.1.529) was identified by November 2021. The emergence of Omicron variant marked the beginning of 5th wave in Pakistan [13]. Initially, the influx was more but then since the vaccination phases started, the transmission of virus on a community level started reducing owing to the herd immunity [14]. The decrease in the number of Omicron positive patients was due to the mass-level immunization strategy of the government. Furthermore, travel restrictions and social gatherings were limited. SOPs were implemented and followed by people [15]. That is why Pakistan was able to cope up with the 5th wave better than most nations and the 5th wave disappeared as quickly as it originated [16].

3. RESULTS

3.1. Sample Size

The data collected by the 250 responses from Google forms suggests that almost 58% general public of Punjab was not totally affected by COVID-19 and 38.4% population was infected, however,

recovered. Moreover, 3.6%population was infected and was in the phase of recovery in gash own in Figure 1. The next important result via Google forms was that the incidence of COVID-19 was 67.6 % within the age group of 21-40 years, 23.2% within age group 0-20years, and 7.6% within the age group of 41-60 with 1.2% within the age group of 61-80 years old. Only 0.4% patients were found in 81+ age group as shown in Figure 2. This survey suggests that 53.2% males were infected and 45.6% females were infected, whereas 1.2% infected patients opted not to disclose their gender as shown Figure 3. Google form responses also show that out of all infected patients, there were 46.3% asymptomatic and 53.7% symptomatic patients as shown in Figure 4. There is also a possibility that out of those patients who consider themselves as not infected may got infected and was asymptomatic due to lack of testing trend in Pakistan. The data also suggests that out of all symptomatic patients, there were 47.9% patients with minor symptoms, 43.6 % patients with mild symptoms, and only 8.6% were severe symptomatic as shown in Figure 5. Moreover, the data also shows that the time of recovery in 30.5% patients was 10 days. Whereas, 26% patients recovered in 5 days, 22.1 % recovered in 15 days, 8.4% recovered in 20 days, and13% patients took 21 days or more as shown in Figure 6.

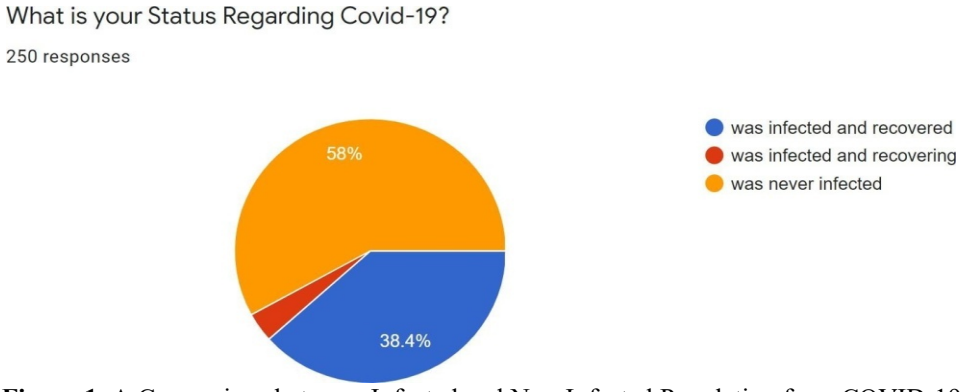

Figure 1. A Comparison between Infected and Non-Infected Population from COVID-19 Obtained through Google forms

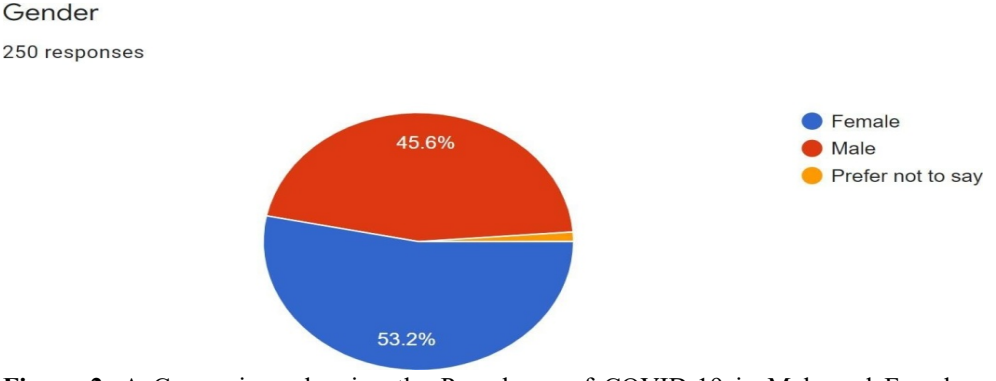

Figure 2. A Comparison showing the Prevalence of COVID-19 in Male and Female population

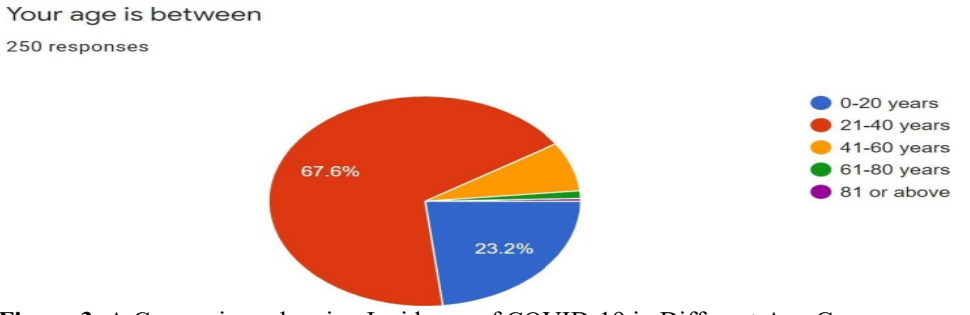

Figure 3. A Comparison showing Incidence of COVID-19 in Different Age Groups

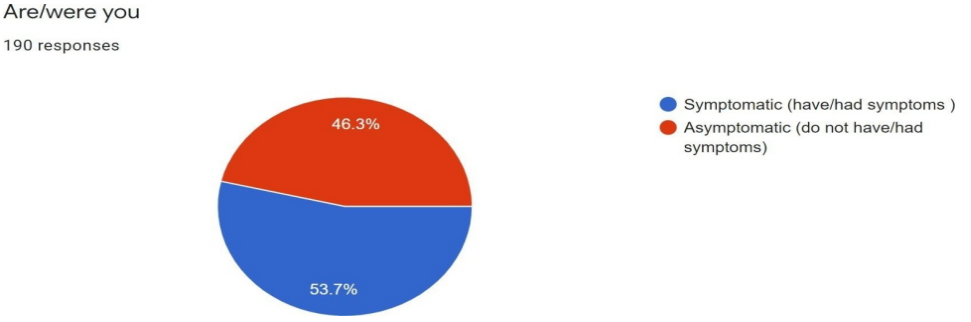

Figure 4. A Comparison between Symptomatic and Asymptomatic Patients of COVID-19

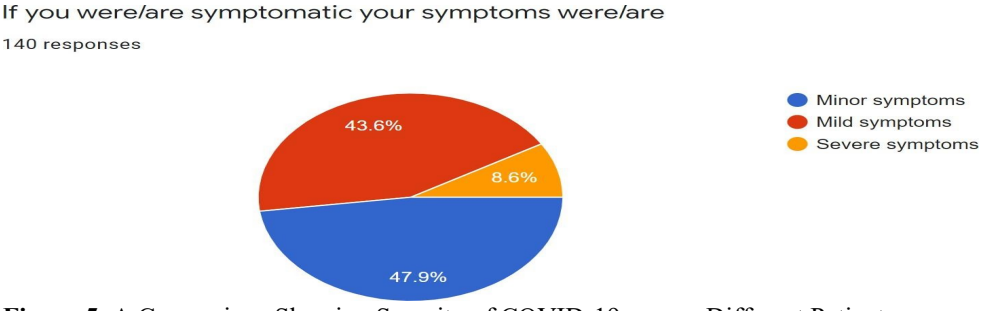

Figure 5. A Comparison Showing Severity of COVID-19 among Different Patients

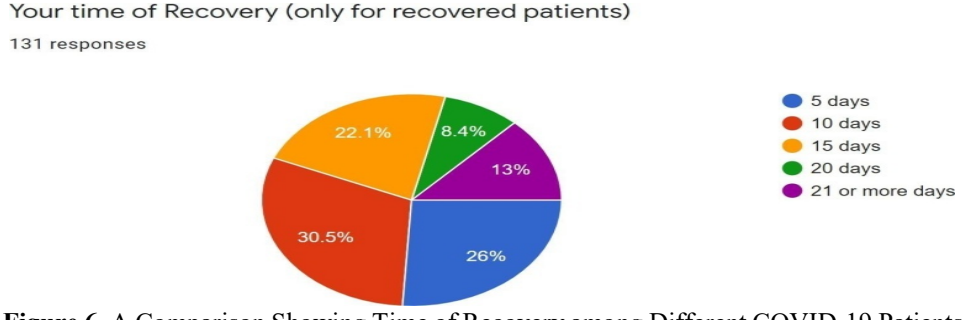

Figure 6. A Comparison Showing Time of Recovery among Different COVID-19 Patients

Hospitalization, ICU admission, and Case fatality percentages for reported COVID–19 Cases Age Group are comprehensively explained in Table 1. While in Table 2 the Size of Sample from different sources is divided in different groups. Another Table 3, justifying the Summary of Coronavirus Patients. In Table 4, age comparison of three waves of COVID-19 is being explained. The Table 5 and 6 giving an expression of. No. of Deaths in Different Age Groups and No. of Deaths in Different Divisions of Punjab respectively

Table 1. Hospitalization, ICU admission, and Case Fatality Percentages for Reported COVID–19 Cases Age Group

Age group(years)	(no. of cases)		
	Hospitalization%	ICU-Admitted%*	Case fatality%*
0–19(123)	1.6–2.5	0	0
20–44(705)	14.3–20.8	2.0–4.2	0.1–0.2
45–54(429)	21.2–28.3	5.4–10.4	0.5–0.8
55–64(429)	20.5–30.1	4.7–11.2	1.4–2.6
65–74(409)	28.6–43.5	8.1–18.8	2.7–4.9
75–84(210)	30.5–58.7	10.5–31.0	4.3–10.5

Age group define to differentiate between patient groups for disease analysis.

Table 2. Size of Sample from different sources

S #	Departments	Total Beds	Male	Female	Total Patients	Vacant Beds
1	ICUs (Total Vents)	84	40	36	76	8
	ICUs (Suspected)	31	16	13	29	2
	ICUs (Confirmed)	53	24	23	47	6
2	HDUs TOTAL Beds	204	88	56	144	60
	HDUs (Suspected)	102	33	23	56	46
	HDUs (Confirmed)	102	55	33	88	14
3	Isolation Wards Beds	97	2	14	16	81
4	AVH Single Bedded Rooms	27	12	9	21	6
Total		412	142	115	257	155

Table 3. Summary of Coronavirus Patients

Indicator	No. of Patients
Confirmed Patients (Admitted)	186
Suspected Patients	71
Total No. of Currently admitted patients	257

Indicator	No. of Patients
Total No. of Negative patients discharged	1380
Referred patients to Other Hospitals	131
Home Isolation Patients/LAMA	1908
Recovered/Discharged	923
Deaths/COVID (Confirmed)	1270
Deaths Suspected (Result awaited)	395
Deaths (Negative)	777
Total No. of reported patients	7041

Table 4. Age Comparison of Three Waves of COVID-19

Subject	1st Wave	2nd Wave	3rd Wave
Time-Frame	March2020	July2020	Dec/Jan2021
Symptoms	Sore throat, cough, fever, muscle as pain, headache, confusion, insomnia, dyspnea, chest pain	Fever, pneumonia, dyspnea, communal cold, Sudden death	Neurological effects along with fever, immediate death
Mortality Rate	Intermediate	Very High	Lower as compared to the1st and2nd
Effect on Economy	Complete Lockdowns	Greatly Affected	Less Affected
Development of Vaccination	Not-available, primary research carried out	Prototypes we recreated, work-in-progress	Phase1and2trailswereinitiated
Re-infection	Not present	Yes	More common
Mutations	Not present	Yes	New variants emerged steadily.

Table 5. No. of Deaths in Different Age Groups

Sr. no	Age group	No. of Deaths
1	0-20	13
2	21-40	42
3	41-60	101
4	61-80	73
5	81-100	20
6	100+	1

Table 6. No. of Deaths in Different Divisions of Punjab

Sr. No	Division name	No. of Deaths
1	Lahore	72

Sr. No	Division name	No. of Deaths
2	Faisalabad	24
3	Multan	28
4	Rawalpindi	17
5	Gujranwala	31
6	Sahiwal	29
7	Sargodha	13
8	Bahawalpur	26

The use of plasma for the treatment of COVID-19 has been an area of ongoing research and investigation. Plasma therapy, also known as convalescent plasma therapy, involves using blood plasma from individuals who have recovered from COVID-19 and transfusing it into patients who are currently infected. The plasma from recovered individuals contains antibodies that may help in fighting the virus and improving the patient's condition. Here's a comparison showing the use of plasma for the treatment of COVID-19 as shown in Figure 7.

The willingness of the general population for plasma donation during the COVID-19 pandemic can vary based on several factors. Here's a comparison outlining some key aspects that may influence the willingness of the general population for plasma donation in the context of COVID-19 as shown in Figure 8.

A Comparison showing Death Rate among Patients from all Divisions of Punjab and shown in Figure 9. While A Comparison showing Recovery Rate from COVID-19 between Male and Female Patients is shown in Figure 10.

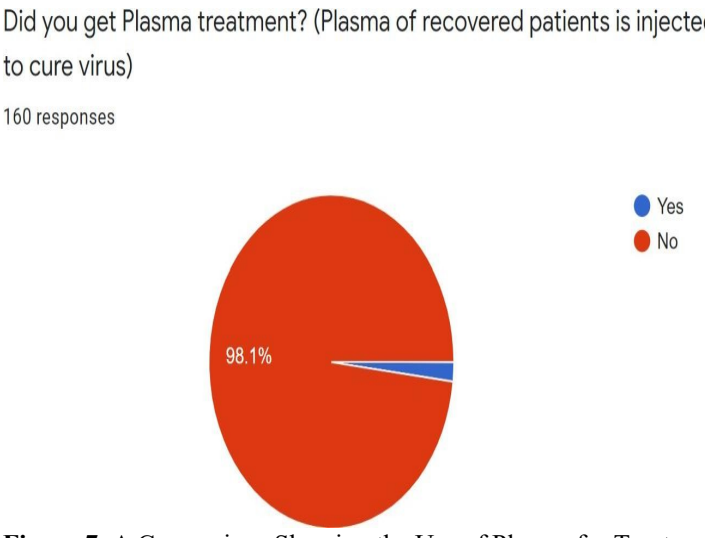

Figure 7. A Comparison Showing the Use of Plasma for Treatment of COVID-19

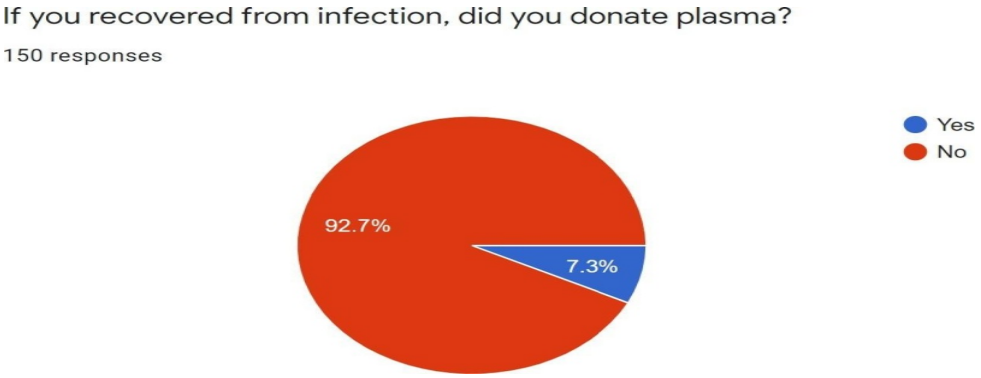

Figure 8. A Comparison showing the Willingness of General Population for Plasma Donation

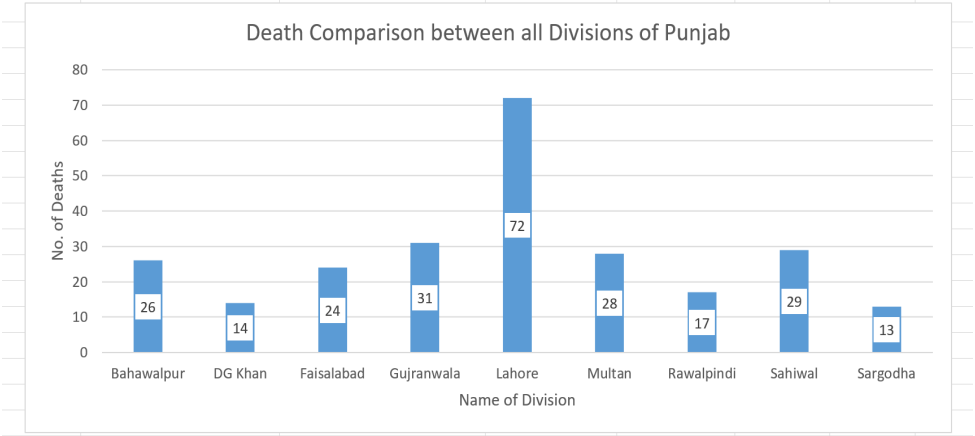

Figure 9. A Comparison showing Death Rate among Patients from all Divisions of Punjab

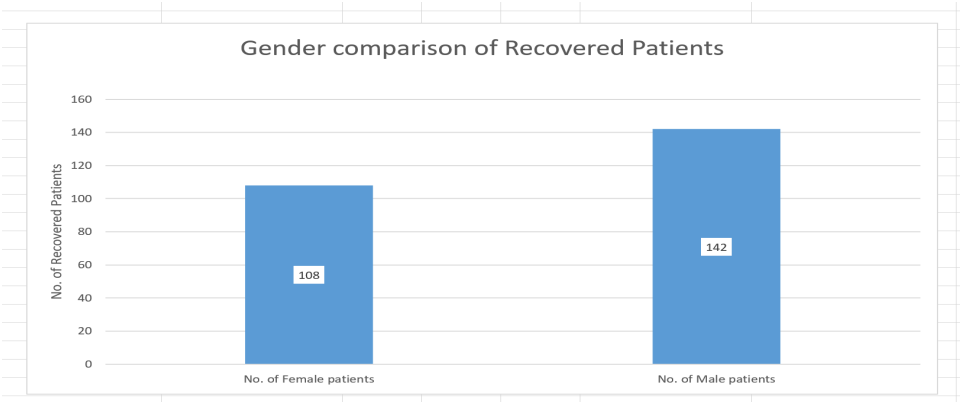

Figure 10. A Comparison showing Recovery Rate from COVID-19 between Male and Female Patients

The data of recovered patients collected from Mayo hospital Lahore showed that the recovery rate was also greater in male patients as compared to female patients. The recovery ratio between male and female patients according to the current study was 1.31:1and the percentage was 56.8% and 43.2% respectively and illustrated in Table 6. No. of Recovered Patients in Different Divisions of Punjab are shown in Table 7.

Table 8 showing no. of recovered Patients in Different Age Groups in the Punjab. This study showed that the recovery trend was observed to be the most in the age group 41-60 years. This might be due to the fact that this age group has the greatest number of active patients. The ratio of recovered patients was 27:43:100: 71:8: 1andthepercentage of recovered patients was 10.8%, 17.2%, 40%, 28.9%, 3.2%, and 0.4% for respected age groups 0-20, 21-40, 41-60, 61-80, 81-100, and100**.**

Table 7. No. of Recovered Patients in Different Divisions of Punjab

Sr. No	Division Name	No. of Recovered Patients
1	Lahore	90
2	Faisalabad	11
3	Multan	16
4	Rawalpindi	18
5	Gujranwala	19
6	Sahiwal	28
7	Sargodha	34
8	Bahawalpur	13

Table 8. No. of Recovered Patients in Different Age Groups

Sr. No	Age Groups	No. of recovered patients
1	0-20	27
2	21-40	43
3	41-60	100
4	61-80	71
5	81-100	8

The data of recovered patients collected from Mayo Hospital Lahore depicted that patient from one major city were reluctant to move to another major city for treatment. That is why, the ratio of recovered patients from major cities is low whereas, from smaller cities is high. However, Lahore still showed the highest ratio as it is the mega city of Pakistan. The ratio was 8.1: 1, 1.4: 1, 6.1: 7, 2.5:1, 3.0:1, 1.1:9, and the percentage was 36%, 4.4%, 6.4%, 7.2%, 7.6%, 11.2%, 13.6%, 5.2 %, and 8.4 % for respected divisions of Punjab province, Lahore, Faisalabad, Multan, Rawalpindi, Gujranwala, Sahiwal, Sargodha, Bahawalpur, and D.G Khan.

4. DISCUSSION

Corona viruses are infectious with RNA viruses. Four viruses, that is 229E, OC43, NL63, and HKU1 have been reported to cause cold symptoms common

in weakened people. However, the other two species are SARS-CoV and the infamous MERS-CoV which are linked to a deadly disease, cause plagues, and a high number of deaths [17]. The complete genome sequence for 2019-nCoV is shown to be identified as a beta corona virus of a novel sub-virus subgenus of the Corona viridae family, as genus similar to SARS-CoV[18].

Certain efficient schemes are required to avoid plus manage the epidemic. Balancing prevalence of disease occurrences is critical to the allotment of clinical assets, the management of productive events plus the development of the state economy [19].

A trend of saying no to plasma treatment was observed in the current study. This was owing to the claims of having a robust immune system due to their lifestyle and work routine, as shown in Figure 7. This may be due to the fact that most of the patients in this study showed minor symptoms; still 1.9% claimed to have received the plasma treatment [20]. Furthermore, upon asking whether or not the donation of plasma is needed, 92.7% patients said that they would not donate plasma and 7.3% agreed to donate plasma.

The data of various divisions showed that bigger cities, such as Lahore exhibited huge number of patients and the ratio of expired patients among different divisions of Punjab which was 5.5:1.8:2.1:1.3: 2.3 :2.2: 1:2 :1.1. The percentage of expired patients was 28.8%, 9.6%, 11.2%, 6.8%, 12.4%, 11.6%, 5.2%, 10.4%, and 5.6% for respected divisions Lahore, Faisalabad, Multan, Rawalpindi, Gujranwala, Sahiwal, Sargodha, Bahawalpur, and D.G Khan as shown in Table 5 and Table 6.

It's important to establish a dependable plus accurate predicting pattern which may be used as a reference to assist the governments for deciding economic crisis policies along with the allocation of clinical resources. Timeline analysis plays a key role to for malate assumptions in order to determine the incidence of many infections plus to predict the potential of perceived conditions with developing a quality control system [22].

In our research, the present status of the corona virus epidemic was checked at the Mayo Hospital in Lahore, Punjab province of the Islamic Republic of Pakistan and this study estimates the ongoing incidence and severity of the disease.

At the same time, number of positive cases is once again rising in Punjab, so it is predicted that more time is required to achieve the plan. The approach will result in more need of ICUs. So, in case, new mutations of virus do not develop then we are likely to see a smaller number of new positive patients. Else wise social and clinical problems will be uncontrollable, with some expected effect.

Moreover, 3.6% population was infected and was in the phase of recovery, as shown in Figure 6. Another important result of this study was that the incidence of COVID-19 was found to be 67.6% within the age group of 21-40 years and 23.2% within age group 0-20years. However, it was 7.6% within the age group of 41-60 and 1.2% within the age group of 61-80 years old and only 0.4% patients were found in 81+ age group. The incidence of COVID-19 in this survey suggests that 53.2% males were infected and 45.6% females were infected whereas, 1.2% infected patients opted not to disclose their gender as shown Figure 1.

Google form responses also show that out of all infected patients there were 46.3%

asymptomatic and 53.7% symptomatic as shown in Figure 4. Due to lack of testing trend in Pakistan. The data also suggests that out of all symptomatic patients there were 47.9% patients with minor symptoms, 43.6% patients with mild symptoms, and only 8.6% were severe symptomatic. Additionally, the data represents that 30.5% patients took 10 days to recover. Whereas, 26% patients were recovered in 5 days, 22.1 % were recovered in 15 days, 8.4% were recovered in 20 days, and 13% patients took 21 days or more as shown in Figure 6. This may be due to the fact that most of the patients in the current study were minor symptomatic till 1.9% claimed to have taken the plasma treatment. Furthermore, it was asked whether or not the donation of plasma would be carried out. Almost 92.7% patients said that they would not donate plasma and 7.3% people agreed for donations shown in Figure-8. Furthermore, it was asked from the patients of COVID-19 that whether or not they would donate plasma, to which 23% patients agreed and 23.3% expressed disagreement, whereas 53.3% were not sure.

The data also exhibited the general view of the public of Punjab over the vaccination of COVID-19. Almost 76% said that they would get vaccinated, whereas 24% public were reluctant to get vaccination. Nevertheless, almost 19.2% general public believed that vaccination is harmful which is alarming and 80.8% public showed their Rustin vaccination, as shown in Table 4.

The second phase of this study involved data collection from Mayo Hospital Lahore, in which data of 500 COVID-19 patients was collected.

4.1. Conclusion

The current research determined the present status of the corona virus epidemic at the Mayo Hospital in Lahore, Punjab province of the Islamic Republic of Pakistan. Moreover, this study estimated the ongoing incidence and severity of the disease.

At the same time, number of positive cases is once again surging in Punjab. Therefore, it is predicted that more time is required to achieve this plan. This approach would result in more need of ICUs. Therefore, new mutations of virus do not develop and there are likely a smaller number of new positive patients. Else wise social and clinical problems would remain uncontrollable, with some expected effect.

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