ORIGINAL ARTICLE

CLINICAL PRESENTATION OF COVID-19 AND ITS ASSOCIATION WITH BLOOD GROUPS AND GENDER AMONG MEDICAL STUDENTS DURING DIFFERENT WAVES OF PANDEMIC

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ABSTRACT

Background: Covid-19 is a heterogenous viral disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-COV-2), surfaced in December 2019 and enveloped the whole world since then. It affects people of all ages with wide range of symptoms. Inconsistent relationship between Covid-19 with ABO/Rh blood groups and female gender has been reported so far.

Objectives: To determine clinical presentation of Covid-19 and its association with blood groups and gender among medical students during different waves of pandemic.

Methods: This retrospective observational study was conducted at Rashid Latif Medical Complex Lahore from May-2023 to August-2023. The study included volunteer students from the medical, dental, and physiotherapy departments, aged 16–26 years. Participants were divided into two groups: those previously diagnosed with Covid-19 who had successfully recovered (Covid-positive group) and those without a history of Covid-19 infection (Covid-negative group). Mean ± SD were given for quantitative variables and frequencies and percentages for non-quantitative variables. The association between susceptibility of Covid 19 infection with ABO/Rh blood groups and gender was determined by Chi square test and odds ratio which was reported with 95% confidence intervals. The p-value < 0.05 was considered as significant.

Results: Out of total 428 students, 99 (23%) experienced Covid-19-like symptoms and 56 confirmed positive by reverse transcription polymerase chain reaction test (RT-PCR) out of them were selected. Median age of the infected individuals was 21 years (20.00-21.25) and 61.4% were females and 38.6 % were males. Common symptoms were cough and fever, flu, headache, sore throat, and smell & taste. Symptoms of majority of Covid-19 infected individuals i.e. of 73% subjects lasted less than 10 days. Only 6.8% of the Covid-19 infected subjects were hospitalized. Higher frequencies of blood group A and AB were found in Covid-positive group in comparison to Covid-negative but Chi square test showed no significant association between Covid-19 disease susceptibility and ABO/Rh blood groups.

Conclusion: Young individuals were primarily affected in the second and third waves of the Covid-19 pandemic, experienced short duration of infection and rapid recovery. Blood groups and gender are not found related with the risk of getting Covid-19 infection.

Key words: Covid-19, Coronavirus, SARS-COV-2, RT-PCR

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INTRODUCTION

Covid-19 stands for Coronavirus Disease-2019. It is a highly contagious respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1,2] It surfaced as unusual pneumonia in Wuhan, China in early December of 2019.[3] Then it quickly spread across the globe & was announced as a pandemic by the World Health Organization on 11th March 2020.[4,5]

Since February 2020, Pakistan has faced five distinct waves of Covid-19. First covid case in Pakistan was

reported on 26th February 2020.[6] The first wave of Covid-19 was witnessed between March and July 2020. Most of the patients had travel history from Iran. It hit its peak in mid-June and declined in mid -July. Second wave occurred from October 2020 until January 2021. It peaked in mid-December 2020.[7] The third wave occurred from March to May 2021 and soon after in July a fourth wave started which remained till October 2021.[8,9] Fifth wave of Covid 19 hit the country in January 2022. It remained till the end of April.[10] Since then, sporadic cases are being reported in Pakistan. In 2025, Pakistan has seen a rise in Covid-19 cases again, mainly due to new sub-variants of the Omicron strain.[11] Covid-19 presentation varied in different waves from asymptomatic to mild upper respiratory infection to severe interstitial pneumonia with respiratory failure. The common symptoms are fever or chills, cough, shortness of breath, fatigue, muscle aches, headache, loss of taste or smell, sore throat, runny nose, nausea vomiting, and diarrhea.[6,12]

Different factors such as age, gender, blood groups and co-morbidities influence the risk of getting covid infection. ABO blood groups have been linked with various infectious and non-infectious diseases including Covid-19.[13,14] However, different blood groups have been with increased risk of Covid infection and varied results have been reported in the existing literature.[15,16] Most of the available data about Covid infection is of hospitalized patients and of middle-aged subjects. Therefore, present study was planned to identify the initial presenting symptoms of Covid-19 in young individuals i.e. medical students and to find out the association of gender and blood groups with Covid susceptibility in them. This study would prove helpful in curtailing the future transmission of the Covid virus.

METHODS

This retrospective observational study included male and female students aged 16–26 years from various disciplines at Rashid Latif Medical Complex including the medical, dental, and physiotherapy departments after obtaining permission from Institutional Review Board and ethical committee of Rashid Latif Medical Complex.

The questionnaire and consent form were disseminated through official WhatsApp groups. Participants who were tested positive for Covid-19 infection through real-time polymerase chain reaction (RT-PCR) of either nasal or pharyngeal swabs during the duration of March 2020 and August 2023 were considered as Covid-positive. The distribution of ABO blood groups and gender among Covid-positive participants was compared with that of 329 age-matched Covid-negative students.

The questionnaire form collected basic personal details , age, body mass index, blood group and symptoms related to Covid-19 infection, immunization status, source of infection, contact history, duration of infection, hospital admission, treatment modalities and co-morbid conditions.

Statistical Analyses of the Data: The data was analyzed through SPSS 25. Quantitative variables were presented as Mean ± SD and non-quantitative variables as Frequencies and Percentages. The Chi-square test was used to analyze the distribution of ABO and Rh blood groups. Odds ratio (OR) analysis was performed to assess the association of ABO and Rh blood groups and gender with Covid-19 susceptibility by comparing Covid-positive and Covid-negative groups. Odds ratios were reported with 95% confidence intervals (CIs). All analyses were conducted using a one-versus-all comparison approach. The p-value < 0.05 was considered as significant.

RESULTS

A total of 428 students participated in the study. Out of which 99 (23.13%) experienced Covid-19-like symptoms during different waves of pandemic in Pakistan and successfully recovered from the infection. Among these 99 students, 32 (32.32%) were found positive using reverse transcription polymerase chain reaction (RT-PCR), 18 (18.18%) tested positive using rapid kit tests (nasal/saliva) and 24 (24.24%) subjects tested positive by both Rapid kit test and RT-PCR. However, 25 (25.25%) students with symptoms did not confirm their infection through any testing. Table-1 presents the demographic characteristics of the Covid-19 positive (RT-PCR +ve) subjects. The median age was 21 years, with 20 males and 36 females. The mean body mass index (BMI) was 25.56 ± 3.03 for males and 23.01 ± 3.90 for females. The majority of participants, 39 (69.64%), were day scholars, while 17 (30.36%) were hostel dwellers. Among the subjects, 25(44.64%) were vaccinated and 31 (55.36%) were unvaccinated at the time of Covid-19 infection. Regarding the source of Covid-19 infection, 27 subjects (48.21%) reported contracting it from household members, 16 (28.57%) from friends, 12 (21.43%) from the college campus, and 01 (1.79%) from the hostel. Direct contact with infected individuals was reported only by 19 subjects (33.93%), while 37 (66.07%) had no such history. Travel history to other cities was noted in 9 subjects (16.07%), with the remaining 47 (83.93%) having no travel history to other cities (Table 1).

The most common symptoms among PCR-positive COVID-19 infected individuals in this study were cough and fever, affecting 49 subjects (87.50%). Specifically, 36 experienced dry cough and 13 observed cough with sputum, while 25 had high-grade and 24 had low-grade fever. Following by cough and fever, other prevalent symptoms were flu and loss of taste and smell reported by 43 individuals (76.79%). Other common symptoms included headache (42 subjects, 75%), myalgia (41 subjects, 73.21%), sore throat (39 subjects, 69.64%), and backache (30 subjects, 53.57%). Difficulty in breathing was reported by 19 subjects (33.93%). Gastrointestinal symptoms were also observed, including abdominal cramps (12 subjects, 21.43%), diarrhea (11 subjects, 19.64%), and vomiting (7 subjects, 12.50%).

Furthermore, 5 subjects (8.93%) reported urinary symptoms, such as burning urine and increased frequency, while one subject (1.79%) presented with a body rash.

Table 1: Demographic, Epidemiological and Anthropometric profile of RT-PCR Positive Covid-19.

Variables		Covid -19 Subjects (RT-PCR Positive) n=56
Age (years)	Median (IQR)	21.00 (20.00-21.00)
Gender	Male	20 (35.71)
	Female	36 (64.29)
Body Mass Index	Male	25.56 ± 3.03
	Female	23.01 ± 3.90
Accommodation	Day Scholar	39 (69.64)
	Hostel dweller	17 (30.36)
Vaccination status at the time of infection	Yes	13 (23.21)
	No	43 (76.79)
Likely Source of Infection	Hostel	01 (1.79)
	College campus	12 (21.43)
	Friends	16 (28.57)
	Household members	27 (48.21)
History of direct contact	Yes	19 (33.93)
	No	37 (66.07)
Travel history to other cities	Yes	09 (16.07)
	No	47 (83.93)

The values of Covid-19 subjects, where no unit is mentioned, are represented in numbers along with percentages [n (%)]. The age is reported in years with median and interquartile range [Median (IQR)] whereas values of Body Mass Index are represented as Mean ±SD.

Maximum distribution of cases in this study occurred in the second and third phases of Covid-19 pandemic with 15 individuals (26.79%) each, followed by the first phase with 13 individuals (23.21%). Fewer cases were reported in the fourth phase (6 individuals, 10.71%), fifth phase (4 individuals, 7.14%), and 3 individuals (5.36%) in the last phase. The duration of illness varied, with 17 subjects (30.36%) experiencing symptoms for less than 10 days, 15 subjects (26.79%) for less than 14 days, 13 subjects (23.21%) for less than 5 days, and 11 subjects (19.64%) for less than 7 days. A total of 23% of the infected individuals had a reported allergy tendency. Notably, none of the individuals had hypertension, diabetes or any other systemic disease (Table 2).

Only 5 subjects (8.93%) were admitted in the hospital. Considering the treatment taken by the subjects, 3 of them (5.36%) used only the home remedies. 11 subjects (19.64%) took a combination of paracetamol, cough syrup, and home remedies. 34 subjects (60.71%) were given antibiotics along with other treatments. 7 subjects (12.5%) needed steroids and oxygen therapy. 1 subject (1.79%) didn't receive any treatment as shown in the table 2.

Table 2: Phases, duration of symptoms, hospital admission and treatment taken by Subjects with Covid-19 (n=56)

Variables		Frequency (percentage)
Phases of Covid-19	First phase	13 (23.21)
	Second phase	15 (26.79)
	Third phase	15 (26.79)
	Fourth phase	06 (10.71)
	Fifth Phase	04 (07.14)
	May 2022-June 2023	03 (05.36)
Duration of illness	< 14 days	15 (26.79)
	< 10 days	17 (30.36)
	< 7 days	11 (19.64)
	< 5 days	13 (23.21)
Admission to the hospital	Yes	05 (8.93)
	No	51 (91.07)
History of allergies	Yes	13 (23.21)
	No	43 (76.79)
Treatment	Home remedies alone	03 (05.36)
	Paracetamol, cough syrup & home remedies	11 (19.64)
	Paracetamol, Antibiotics cough syrup, Antibiotics home & steroids & remedies & oxygen	34 (60.71) 07 (12.5)
	No treatment taken	01 (1.79)

In terms of blood group distribution, 19 individuals (33.93%) belonged to blood group B, followed by 16 subjects (28.57%) with blood group O, 11 subjects (19.64%) with blood group A, and 10 subjects (17.86%) with AB blood group. The proportion of Rh-positive blood groups (46 subjects, 82.14%) significantly outnumbered Rh-negative blood groups (10 subjects, 17.86%) among the infected individuals. Blood group B was predominant among Covid-positive (33.93%) and Covid-negative subjects (43.79%) while blood group AB showed least presence in both groups. Covid-positive group had higher frequencies of blood type A (19.64% vs 18.24%) and blood type AB (17.86% vs 9.73%) as compared to Covid-negative group but the difference was not significant for both blood type A (p-value=0.802) and blood type AB (p-value=0.071) by Chi-square analysis. Frequencies of Rh-positive blood group were also found higher in Covid-positive group but again the difference was not significant by Chi-square (p-value = 0.271). Finally, gender also gave insignificant association with COVID-19 susceptibility (p-value = 0.637) documented in Table 3.

DISCUSSION

This retrospective observational study included volunteered medical students of Rashid Latif Medical Complex who contracted Covid-19 between March 2020 and August 2023.

The objectives of the study were to identify the symptoms of Covid-19 in students of Rashid Latif Medical complex during different waves of pandemic and to analyze (to assess the linkage between) the association of ABO/Rh blood groups and gender with

the susceptibility to Covid-19 infection in medical students. Data of 428 medical students was collected from questionnaire and 99 were having Covid-19 symptoms. While 56 out of these 99 were found positive through RT-PCR Testing. Majority of young people suspicious of having Covid-19 infection in this study didn't go for polymerase chain reaction test.

PCR-confirmed Covid-19 subjects was 21 years of age . Interestingly, despite existing literature suggesting a higher susceptibility among males.[17] our study group comprised more females than males. This discrepancy may be attributed to the higher participation rate of females in this questionnaire-based study and our selective inclusion of only RT-PCR-confirmed cases. To remove the bias, we checked the association of gender with susceptibility to coronavirus disease 2019 infection and we found no significant association. Other studies also support our finding that gender difference is not associated with susceptibility of Covid-19 infection.[18,19]

Table 3: Distribution of blood groups and gender among Covid-Negative and Covid-Positive Subjects

	Covid-negative n=329	Covid-positive n=56	*p*-value	Odds ratio (95% Cl)
Blood group				
A	60 (18.24%)	11 (19.64%)	0.802	1.10 (0.54-2.24)
B	144 (43.77%)	19 (33.93%)	0.168	0.66 (0.36-1.20)
O	93 (28.27%)	16 (28.57%)	0.916	0.99 (0.53-1.85)
AB	32 (09.73%)	10 (17.86%)	0.071	2.02 (0.93-4.38)
Rh-positive	288 (87.54%)	46 (82.14%)	0.271	1.53 (0.72-3.26)
Rh-negative	41 (12.46%)	10 (17.86%)		
Gender				
Male	107	20		1.153
Female	222	36	0.639	(0.637-2.086)

Our study found that 76.79% of Covid-19 cases occurred during the first three phases, with an equal number of cases (15) reported in phases two and three, and 13 cases in phase one. Fever & Cough surfaced as common symptoms affecting 87.50% of individuals. Flu-like symptoms with loss of taste and smell were reported by 76.79% of subjects, followed by headache, myalgia, sore throat, and backache (54-75%). 13-21% of the subjects experienced gut related symptoms including vomiting and diarrhea while 9% reported urinary symptoms like burning sensation and increased frequency. These findings are consistent with the clinical features of COVID-19 observed during the first three phases of Covid-19 in the literature.[8,20,21]

Shortness of breath is also included in clinical features of severe Covid infection.[22] and only 19 subjects (33.93%) in this study reported difficulty in breathing as a complaint. The symptoms of Covid-19 infection in majority of individuals (17, 30.36%) lasted less than 10 days. And in another 15 subjects (26.79%) it lasted less than 14 days. Only 8.93% of the Covid-19 infected subjects were hospitalized. Most subjects (85.71%) managed their symptoms with paracetamol, antibiotics, cough syrup and home therapies while a smaller proportion (12.50%) required steroids and oxygen. Notably, 23% of the infected individuals reported a history of allergies. None of the participants had underlying conditions like hypertension, diabetes or any other systemic disease. Our findings are aligned with available research which suggests that younger individuals tend to experience milder symptoms and have faster recovery from Covid-19 as compared to elderly individuals.[23] Only 13 subjects (23.21%) were vaccinated and 43 (76.79%) were unvaccinated at the time of infection. This supports previous findings that in comparison to unvaccinated ones, vaccinated individuals have a lower attack rate of Covid infection.[24]

The study found that 27 subjects (48.21%) contracted Covid-19 from household members, 16 subjects (28.57%) from friends, 12 subjects (21.43%) from college campus and 01 subject (1.79%) from hostel. Notably, 37 subjects (66.07%) had no direct contact history, and 83.93% had no significant travel history to other cities. During the partial lockdown in Pakistan's initial covid-19 phases, transmission primarily occurred through friends and family members, rather than colleges and hostels.[25] We found that blood group B was predominant in both Covid positive and Covid-negative individuals, followed by O, A, and AB mirroring the normal distribution of blood groups in Pakistani population.[26] Covid-19-positive individuals in our study showed slightly higher frequencies of blood group A (19.64% vs 18.24%) and AB (17.86% vs 9.73%) compared to Covid-19-negative individuals, but these differences were not statistically significant. This study found no significant link between ABO blood groups and Covid-19 susceptibility.

Additionally, higher frequency of Rh-positive blood group in Covid-19 positive group was found in comparison to Covid-19 negative individuals but again the association between Rh blood groups and covid-19 susceptibility was not significant as pointed out in the existing national and international literature presents contradictory results regarding relationship of different blood groups with risk of Covid-19 infection. Studies have found mixed results some linked blood group A with higher risk, some reported blood group B and still others implicating group AB with covid infection. On the other end, some identified blood group O to be at lower risk, others found blood group B and still others found Blood group AB to be protective against Covid infection.[27-31] Likewise, an Indian study reported blood groups A, B, and Rh-positive to be more prone to Covid-19, while blood groups O, AB, and Rh-negative had lower risk.[32] While a Pakistani study reported blood groups A, B, and AB to be more susceptible to Covid infection than blood group O.[33]

We did not find any significant association between ABO and Rh blood groups with susceptibility to Covid infection.[34,35] Pendu and his colleagues suggested that the presence of anti-ABO antibodies may offer protection against Covid-19, but this effect may be influenced by the distribution of ABO phenotypes in the population.[36] Notably, ethnic variations in blood type prevalence can lead to biased results if not accounted for in analysis. A study by Pasko et al. found no association between Covid-19 incidence and blood type after adjusting for ethnic differences in ABO blood group distribution.[37] Hence blood groups and Covid-19 infection shares complex interplay affected by multiple factors such as age, sex, comorbidities and the population's blood group distribution.

CONCLUSION

Participants of this study were young people who were mainly affected during first three phases of Covid-19 pandemic. Fever, cough, flu, loss of taste and smell are the usual symptoms. They had no major comorbidities, experienced a short duration of infection and had a quick recovery period. Notably, this study suggests that there is no significant association between ABO and Rh blood groups or gender and susceptibility to Covid-19 infection, highlighting the complexity of these relationships. Validation through large sample, collection of real time data and multi-centric studies is recommended to confirm these results.

Limitations: It was a retrospective study and conducted through an online questionnaire and lacked real-time or hospital data and included volunteered participation.

ETHICAL APPROVAL

Ethical approval of article was granted by the Ethics Committee of Rashid Latif Medical College, Lahore Ref No. IRB/2023/087, Dated: April 04, 2023.

AUTHOR'S CONTRIBUTIONS

TI: Conceived idea, design, manuscript writing
BA: Supervision, critical review
MSA: Data analysis, proof reading
AH: Manuscript writing, interpretation
SI, U: Manuscript writing,
All Authors: Approval of the final version of the manuscript to be published

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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