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ORIGINAL ARTICLE

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High prevalence of SARS-CoV-2 Antibodies in Unvaccinated Older Population and its Relationship with Hematological Parameters

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ABSTRACT

OBJECTIVES: To determine the prevalence of SARS CoV-2 (Immunoglobulin-G) antibodies in unvaccinated older populations and their relationship with hematological parameters.

METHODOLOGY: The study was conducted from March-August 2022. Two-hundred and forty six healthy unvaccinated individuals aged 60 and above were included by random sampling. Blood specimens were obtained to determine antibodies using the ECLIA technique. Data was analyzed with SPSS version 26.

RESULTS: The study showed that 170 (69.11%) participants were male, while 76 (30.89%) were female. Mean age of study sample was 67±6.9 (range:60-100) years. Participants were categorized into two age groups: Group I (60-69 years) had 163 (66.30%) participants, and Group II (70-100 years) had 83 (33.70%). IgG antibodies were positive in 225 (91.46%) participants and negative in 21 (8.54%). When considering gender, IgG was positive in 155/170 (91.17%) males and 70/76 (92.11%) females and negative in 15/170 (8.82%) males and 6/76 (7.89%) females. Regarding age groups, IgG was positive in 154/163 (94.48%) in Group I and 71/83 (85.54%) in Group II. No significant relationship was found between IgG and hematological parameters.

CONCLUSION: Our study showed a 91% prevalence of IgG antibodies in the older population. The sero prevalence of antibodies against SARS CoV-2 in the older population has increased. However, still they need vaccination so that the risk of getting an infection can be minimized.

KEYWORDS: Immunoglobulin-G, SARS CoV-2, Sero prevalence, Unvaccinated.

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INTRODUCTION

Coronaviruses, a group of respiratory viruses that lead to respiratory tract infections, affect individuals differently based on their overall health and immune system.[1] Typical symptoms include cough, fever, fatigue, loss of smell, and breathing difficulties. Some individuals may remain asymptomatic or experience mild symptoms that include subtle lung issues often unnoticed. However, others may face severe illness or even fatalities.[2] The spike protein of the coronavirus can harm the lungs, heart, central nervous system, and kidneys.[3] This results in long-term health issues and a condition known as long COVID. This spike protein also acts as a potent pro-coagulant, contributing to blood clotting and disseminated intravascular coagulation.[4] Older patients face a higher risk of complications and death from COVID-19.

Serological testing for immunoglobulin-G (IgG) and immunoglobulin-M (IgM) antibodies can detect recent or past infections, as the body produces a high number of antibodies during and after clearing the virus.[5] Therefore, both polymerase chain reaction (PCR) and serological testing are employed for detection, with PCR used to detect acute infections and serology for chronic and previous infections.

Disruption of normal blood clotting can lead to bleeding or thrombotic complications, with COVID-19 patients often experiencing hypercoagulable states and thrombotic events. These events affect both small and large blood vessels, and infected individuals produce pro-coagulants that contribute to thrombosis.6 Direct viral infection of endothelial cells (ECs) or

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damage caused by complement activation is responsible for EC dysfunction, contributing to thrombotic events.[7]

A distinctive response against SARS-CoV-2 is mounted by adaptive immune system and comprise of specific antibody production. However, inadequate data is available about its prevalence in older population, especially the unvaccinated ones. Therefore, the current study was conducted to determine the prevalence of SARS CoV-2 (Immunoglobulin-G) antibodies in unvaccinated older populations and to establish their relationship with hematological parameters.

METHODOLOGY

This descriptive cross-sectional study was conducted after approval from the institutional ethical review board (letter No:Dir/KMU/2022/02/1474). The study was conducted at the Institute of Pathology and Diagnostic Medicine at KMU Peshawar and Bacha Khan Medical College, Mardan, spanning from March 2022 to August 2022. The study included individuals aged 60 years and above of both genders who were not vaccinated against SARS-CoV-2. Cases who were unwilling to participate, individuals who had received the SARS-CoV-2 vaccine, and patients with chronic debilitating diseases were excluded from the study. Sample size of 246 was calculated using OpenEpi sample size calculator, taking population prevalence of 20%, a population size of 2.3 million in district Mardan, and a confidence level of 95%.

A random multistage clustered technique was employed for participant selection. Blood samples were collected in EDTA tubes for complete blood count. A Mindray BC-5000, a Five Parts Hematology Analyzer, was used for the complete blood count, and peripheral blood smears were prepared. Serum was collected in Gel tubes and tested for antibodies (IgG) using the Elecsys® Anti-SARS CoV-2 antibodies kit on the cobas e-411 analyzer. A cut off index less than 1.0 was considered negative, while Cut off index equal to or greater than 1.0 indicated a positive result for antibodies. Data was analyzed using SPSS v24 software. Mean and standard deviation were used to measure quantitative data. Frequency and percentages were used to calculate qualitative variables.

RESULTS

The demographic characteristics and hematological parameters of the study population are shown in table 1.

Out of a total of 245 study participants, 225 individuals (91.46%) tested positive for antibodies, while 21 individuals (representing 8.54%) tested negative. For males, the proportion of seropositive individuals was 91.18% (170/155), and the seronegative count was 8.82% (170/15). Among females, 92.11% (76/70) tested seropositive, and 7.89% (76/15) were seronegative. These findings are depicted in Table 2.

In the Group-I (60-69 years age group), the sero positivity rate was 94.48% (163/154), and the sero negativity rate was 5.52% (163/09). In the Group –II (70-100 years age group), the sero positivity rate was 85.54% (83/71), and the sero negativity rate was 8.54% (83/21), as demonstrated in Table 2

There was no significant correlation between IgG and hematological parameters. All the parameters showed statistically insignificant associations with IgG, including hemoglobin (p=0.896), red blood cells (p=0.260), white blood cells (p=0.635), platelets (p=0.588), neutrophils (p=0.816), lymphocytes (p=0.725), monocytes (p=0.230), and eosinophils (p=0.501) as shown in Table 3.

DISCUSSION

This study highlighted the high prevalence of IgG antibodies against SARS COV-2 in the older unvaccinated population of Mardan district. The rise in the prevalence of the antibodies in older population is protective. However, this population needs active vaccination as they are more susceptible to the complications of infection because of their age.

To our knowledge, there are no local studies conducted where sero prevalence is determined for the older population. However, studies in adults are consistent with our study. A local unpublished study shows 56% sero prevalence in older population.8 In a study conducted in Switzerland, no variation in prevalence was reported between the elderly and middle-aged adults.9A study from Africa shows 22% prevalence.10 Previous studies on SARS COV-2 antibodies in the elderly showed that those with more severe sickness produce antibodies than those with mild or asymptomatic infection.11 In our study, most of the participants were asymptomatic, but they still had high titer of antibodies. This evidence does not support the assumption that in the elderly, having mild disease and mild symptoms may fail to develop significant antibodies against the virus .12More currently, evolving adult data suggest that even asymptomatic patients can produce significant lasting and defensive antibodies against the SARS-CoV-2 infection.13

In acute infection, the effects on hematological parameters are prominent and drastic. These hematological parameter changes in the infected older SARS-CoV-2 individual cases show changes in the RBC, lower haemoglobin level, thrombocytopenia, incompatible leukocyte indices and eosinopenia.14,15 The haematological parameters of both male and female participants in our study are in the normal range. . In some participants the RBC counts were somewhat

Variable	Frequency (percentage)
Gender	
Male	170 (69.1%)
Female	76 (30.9%)
Age groups	
60-69 years	163 (66.30%)
70-100 years	83 (33.70%)
Variable	**Mean ±SD**
Age (years)	67±6.90
Age (Male)	68.27±6.59
Age (Female)	65.35±7.27
Hb (g/dL)	12.228±2.423
RBC counts (10e9/L)	4.433± 0.82
TLC (10e9/L)	9.496± 6.00
Platelets (10e9/L)	255.94±97.14
Neutrophils (109/L)	6.362± 7.497
Lymphocytes (109/L)	2.647± 1.662
Monocytes (109/L)	0.410±0.542
Esinophils (109/L)	0.415±0.513

Table 1: Characteristics of the participants (n=246)

Immunoglobulin-G			
	Seropositive	**Seronegative**	**Total**
Gender			
Male	155 (91.18%)	15 (8.82%)	170
Female	70(92.11%)	06 (7.89%)	76
Total	225 (91.46%)	21 (8.54%)	236
P-value	0 .463		
	Positive	**Negative**	
Age Group			
60-69 years	154(94.48%)	09 (5.52%)	163
70-100 years	71 (85.54%)	12 (14.46%)	83
Total	225 (91.46%)	21 (8.54%)	246
P-value	0 .0179		

Table 2: Gender-wise and age group distribution of serological test (n=246)

less when compared with the standard reference level. This occurrence has now been confirmed that hematopoiesis is suppressed in the bone marrow of SARS-CoV-2 infected patients.11,16 Recent studies show that SARS-COV -2 also suppresses thrombopoesis.17,18

The current study showed that the IgG antibodies response against SARS-CoV-2 has not affected the hematological parameters of the participants after six months. The hematological parameters, both of seropositive and seronegative participants, show minor differences which are not significant statistically. When IgG was correlated with hematological parameters, it was found that all of the parameters were statistically not significant, with a p-value

Haematological Parameters	Seropositive (Mean±SD)	Seronegative (Mean±SD)	P value
Hemoglobin **(g/dl)**	12.275±2.40	11.719±2.64	0.315
Red blood cell count **(millions)**	4.442±0.83	4.332±0.73	0.558
White blood Cell **(x109 cells/L)**	9.431±5.88	10.167±7.26	0.592
Neutrophils **(x109 cells/L)**	6.079±6.17	9.414±15.83	0.051
Lymphocytes **(x109 cells/L)**	2.681±1.69	2.276±1.27	0.286
Monocytes **(x109 cells/L)**	0.419±0.56	0.306±0.22	0.364
Eosinophils **(x109 cells/L)**	0.422±0.53	0.317±0.22	0.372
Platelet count **(x109 cells/L)**	258.25± 98.13	231.190± 83.90	0.223

Table 3: Comparison of Haematological Characteristics in both groups (n=246)

more than >0.05 in all parameters.

CONCLUSION

Although the SARS COV-2 antibodies prevalence in the older population is high compared to other studies, they still need vaccination so that the risk to get infection can be minimized. The hematological parameters have no relation with increased prevalence of IgG antibodies.

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CONFLICT OF INTEREST
Author declared no conflict of interest

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YMY: Conception, Design of the work, Data collection, and Drafting, Reviewed, Final approval, Agreement to be accountable
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MIK: Conception, Design of the work, Interpretation of data for the work, and Drafting, Reviewed, Final approval, Agreement to be accountable.
MA: Conception, Design of the work, Data collection, and Drafting, Reviewed, Final approval, Agreement to be accountable .

DATA SHARING POLICY
The data that support the findings of this study are available from the corresponding author upon reasonable request.

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