Evaluation of Specific IgG Antibody in Subjects Who Had Been Previously Infected with SARS-CoV-2

Dear Editor,

The current coronavirus disease pandemic, caused by the virus SARS-CoV-2, has been causing acute respiratory syndrome worldwide. Neutralizing immunity plays a major role in protecting oneself against the disease after vaccination or onset of infection.[1] Protective immunity provided by infectious diseases is predicated on the existence of immune memory. Investigation of immune memory to SARS-CoV-2 is necessary to understand protective immunity against COVID-19. However, few studies have investigated real-world antibody titers following infection that provide information for predicting long-time immunity.[2]

The sensitivity and specificity of the enzyme-linked immunosorbent assay (ELISA) test for the detection of IgG against SARS-CoV-2 have been acceptable; however, it is unclear how long after the onset of illness the specific test will have lasted and what factors affect the illness.[3,4] The limited studies demonstrated that antibody titers may be associated with older age, male sex, ethnicity, obesity, smoking, drinking alcohol, some underlying illnesses, and the use of immunosuppressive drugs. Also, the detectable date, peak, and duration of lasting of the antibodies have varied in the studies. Several studies reported rapid production of SARS-CoV-2-specific IgG within the first week and most subjects had seropositive antibodies in 3–4 weeks after illness onset.[5]

However, the long-lasting antibodies after the illness's onset and recovery are unclear. Also, diagnosis of factors that will affect the antibody response can increase risk perception and advocate policy to promote health during the COVID-19 pandemic.[6] Therefore, in our study, we reported the data on antibody titers against SARS-CoV-2 in response to infection onset in the Iranian population.

In this cross-sectional study, after completing the screening checklist, 5 ml of blood was taken from 893 personnel of Isfahan Mobarakeh Steel Company who had been previously infected with SARS-CoV-2. IgG antibody titer, against the SARS-CoV-2 virus, was determined using the ELISA method via a specific kit. The association between risk factors and the symptoms of COVID-19 with the results of IgG tests was analyzed by descriptive and analytic statistical methods and P value <0.05 was considered significant.

Out of 893 participants, 376 (42.1%) were positive for IgG antibody, 508 (56.88%) were negative, and 9 (1%) were borderline. The mean duration of the test after polymerase chain reaction (PCR) for coronavirus infection was 4.3 ± 1.4 months (IgG+ = 4.2 ± 1.5, IgG− = 4.5 ± 1.4, $P = 0.001$).

In the present study, the majority of COVID-19-positive individuals experienced mild-to-moderate symptoms; however, the production of COVID-19 antibodies was higher in those with more severe symptoms and those hospitalized due to the severity of the disease. The results of this study demonstrated that the presence of some symptoms including fever/chills/cough and shortness of breath were associated with the IgG antibody against COVID-19 [Table 1]. Antibody production

Table 1: The association between COVID-19 symptoms and IgG antibodies against SARS-CoV-2

Symptoms	IgG positive *n* (%)	IgG negative *n* (%)	*P*
The presence of symptoms			
Yes	359 (40%)	469 (52.5%)	0.01
No	17 (2%)	48 (5.5%)	
Fever or chills			
Yes	214 (25.5%)	224 (26.7%)	<0.001
No	152 (18.13%)	248 (29.59%)	
Body pain			
Yes	220 (25%)	288 (32.95%)	0.4
No	146 (16.7%)	220 (25%)	
Runny nose			
Yes	82 (9.38%)	110 (12.5%)	0.87
No	284 (32.49%)	398 (45.5%)	
Sore throat			
Yes	105 (12%)	131 (15%)	0.4
No	261 (30%)	377 (43%)	
Cough			
Yes	92 (10.53%)	64 (.33%)	<0.001
No	274 (31.38%)	443 (50.74%)	
Shortness of breath			
Yes	84 (9.62%)	63 (7.21%)	<0.001
No	282 (32.3%)	444 (50.85%)	
Headache			
Yes	152 (17.39%)	207 (23.68%)	0.33
No	214 (24.48%)	301 (34.43%)	
Nausea			
Yes	42 (4.8%)	48 (5.49%)	0.46
No	324 (37.07%)	460 (52.63%)	
Stomach ache			
Yes	40 (4.57%)	48 (5.49%)	0.55
No	326 (3.29%)	460 (52.63%)	
Diarrhea			
Yes	72 (8.23%)	80 (9.15%)	0.31
No	294 (33.63%)	428 (48.9%)	
Losing taste and smell			
Yes	175 (20.02%)	239 (27.34%)	0.64
No	191 (21.85%)	269 (30.77%)	

was not associated with underlying diseases; however, smoking, both in the past and recently, had significantly reduced the subject's the ability to produce antibodies.

A recent systematic review showed that active smoking had negatively impacted humoral response to vaccines against COVID-19, while the pathophysiology has not been completely clear.[7]

In summary, our study investigated the dynamic changes of serum IgG antibody of individuals infected with SARS-CoV-2 and provided deep insight into the immune response to the infection during months 4 to 7 after illness onset. This study revealed the decreasing immunity response over time which was affected by the severity of illness and smoking. These results advocate policies to promote health promotion initiatives that increase risk perception and ensure adequate protection against COVID-19.

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Ethics approval

This study was approved by the ethics committee of Isfahan University of Medical Sciences (Approval code: IR.MUI.MED.REC.1400.144).

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Conflicts of interest

There are no conflicts of interest.

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