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Original Research Article

Seroprevalence of COVID-19 antibody among patients visiting a large clinic in Uttar Pradesh

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ABSTRACT

Background: The study was conducted to determine the Coronavirus disease 2019 (COVID-19) antibody titre among patients who visited our clinic in Lucknow in order to find out the prevalence of sero positivity and to determine the association between COVID anti-body titre and positivity to different age groups, sex, and religions etc., if any.

Methods: Secondary data analysis was conducted at Lucknow's Sitara polyclinic from patients' data, who had attended the clinic between May 2021 and July 2021 and had universally undergone COVID antibody testing. COVID antibody (including IgG) levels in patients' blood were determined using Roche's commercial "Elecsys Anti-SARS-CoV2-cobas e411,601,602 system by Roche which measure by Eclia (electro chemiluminescence immunoassay) quantitatively antibodies (including IgG). Patients with titres less than 1 u/ml were deemed seronegative for anti –SARS COVID-2, while those with titres greater than or equal to 1 u/ml were declared seropositive.

Results: The overall rate of seropositivity was 84.8%. Around 84.5% males and 85.1% females were seropositive. Seropositivity was higher among 18 to 60 years of age. But there was no significant relation between mean age and seropositivity. Muslims had slightly higher seropositivity (86.0%) as compared to non-Muslims (84.5%). There was no significant difference between age and gender having positive COVID 19 antibody titres. Although the incidence of seropositivity was similar between Muslims and Non-Muslims, the antibody titres were significantly higher in Muslim patients.

Conclusions: In this part of central eastern UP, incidence of seropositivity could already be as high as 85%, which is a pointer toward adequate herd immunity. COVID-19 does not differentiate on the basis of age, gender or religious affiliations. However, Muslims were found to have more antibody titres compared to non-Muslims, possibly related to life style, degree of exposure to COVID-19 virus and presence of inherent immunity.

Keywords: SARS-CoV-2, COVID-19, Seroprevalence

INTRODUCTION

Numerous epidemics and pandemics have claimed the lives of tens of millions of people worldwide. A new virus

presents a threat to human life, economic security, and the healthcare system on a worldwide scale. Despite advances in health and science, we continue to confront this problem. The coronavirus causing the 2019-20 epidemic,

known as SARS-CoV-2, was identified in Wuhan, Hubei Province, central China.¹ Evidences suggest that a significant proportion of people infected with SARS CoV-2 remain asymptomatic, but are still capable of infecting others.² On the other hand, the prevalence of asymptomatic SARS-CoV-2 infection has remained unknown, but it has been predicted to vary between 5% and 20% in published research.^{3,4} To manage COVID-19, it is critical to identify and isolate an infected individual early, to disrupt the transmission pathway. However, they do not need or seek medical care, which contributes to the disease's fast spread. As a result, health authorities cannot depend entirely on verified cases of COVID-19 identified by RT-PCR for containment efforts, as they may overlook asymptomatic and pre-symptomatic infections.^{5,6} To address this issue, the WHO and CDC have suggested conducting population-based sero-epidemiological surveys in order to produce data and apply appropriate containment measures.^{7,8} In India, the ICMR has also undertaken community-based sero-surveillance for severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) in order to estimate and track infection rates in the general adult population. Serological testing and sero-epidemiology substantially contribute to our understanding of disease transmission, population susceptibility, and the appropriate public health treatments.⁹ Uttar Pradesh is India's most populated state, with a population density of 828 inhabitants per square kilometre. COVID 19's second wave was 3.5 times quicker than the first wave in Lucknow.¹⁰ The purpose of this study was to determine seropositivity by estimating the titre of COVID-19 antibody among patients who visited Sitara Polyclinic in Lucknow and to determine the association between COVID anti-body positivity and titres to different age groups, sex, and religions.

METHODS

Study setting, study period and study type

It was a secondary data analysis conducted at Lucknow's Sitara Polyclinic. For the study, data from patients who attended the relevant clinic between May 2021 and July 2021 were used. Every patient was tested for COVID-19 antibody titre regardless of their clinical state throughout that time period unless the patient refused the same.

Study participants, sample size and sampling technique

Participants who had undergone the COVID antibody testing were sorted purposefully from the chosen database. Data from 998 eligible research participants were included into the analysis after cleaning and validation.

Data collection

Data collection began after ethical clearance. From the data base, information on the patients' demographic characteristics such as age, sex, and religion were

gathered. COVID antibody titres of the selected patients were also collected.

Measurement of COVID-19 antibody

COVID antibody levels in patients' blood were determined using Roche's commercial "Elecsys Anti-SARS-CoV-2-cobas system." It quantifies antibodies (including IgG) against SARS COV-2 using the ECLIA (Electrochemiluminescence Immunoassay) to the severe acute respiratory syndrome coronavirus (SARS COV-2) spike(s) protein receptor binding domain (RBD) in human plasma and serum. This test is used as an aid to assess humoral immune response to the SARS-COV -2 protein. It is reported to have 99.9% specificity and 98% sensitivity (For details please refer to brochures available with manufactures M/S ROCHE-cobas e 411,601,602).

Interpretation of the COVID 19 antibody titre

Patients with titres less than 1 u/ml were deemed seronegative for anti-SARS COV 2 while those with titres greater than or equal to 1 u/ml were declared seropositive.

Data analysis

Epi info CDC version 7 was used to input and analyse data. Percentages were used to represent categorical data, whereas the mean and standard deviation were used to represent continuous variables. The chi square test was used to determine the relationship between categorical variables, whereas the independent sample t test was used to determine the relationship between continuous variables. Statistical significance was defined as a p value less than 0.05.

RESULTS

In present study as shown in Table 1, overall rate of seropositivity was 84.76%. As shown in table 2, overall mean age of the study participants was 50.24 years. Seropositivity among age group of 18 to 60 years was 85.66% while among 60 to 70 years and more than 70 years, it was 82.05% and 81.3% respectively (Table 1).

There was no significant age difference between seropositive and seronegative individuals (p 0.34). Age was also not significantly differed among lower and higher antibody titre levels (Table 3). Seropositivity among males and females were 84.5% and 85.1% respectively (Table 1).

As shown in Table 2 and Table 3, there was no significant gender wise difference among seropositivity for COVID-19 antibodies nor for titre levels. As shown in Table 1,

Hindu participants were having seropositivity of 84.5% while Muslims were having 86%. Seropositive status was not significantly differed across the religion in present study (Table 2, p=0.72) but according to Table 4, prevalence of significantly higher titres (>100) was more

common among Muslims (33.5%) as compared to Hindus (23.21%) (p 0.006) while lower titres between 10-50 were

more common (28.3%) in Hindus compared to Muslim population (18.9%).

Table 1: Seropositivity among study participants.

Seropositivity	Positive/out of (N)	Percentages (%)
Overall seropositivity	846/998	84.76
Gender		
Seropositivity in male	492/582	84.5
Seropositivity in female	354/416	85.1
Age groups		
Seropositivity in age group 18-60 years	657/767	85.66
Seropositivity in age group 60-70 years	128/156	82.05
Seropositivity in age group >70 years	61/75	81.33
Religion		
Seropositivity in Hindus	705/834	84.5
Seropositivity in Muslims	141/164	86.0

Table 2: Relation of presence of COVID antibody with variables (n=998).

	COVID Antibody present (n=846)	COVID Antibody absent (n=152)	Total	P value
Mean age (years)	50.26±21.07	50.09±15.72	50.24±20.34	0.92
Age groups				
18-60 years	658 (85.7%)	110 (14.3%)	768	0.34
60-70 years	128 (82.1%)	28 (17.9%)	156	
>70 years	60 (81.1%)	14 (18.9%)	74	
Gender				
Male	492 (84.5%)	90 (15.5%)	582	0.85
Female	354 (85.1%)	62 (14.9%)	416	
Religion				
Hindus	705 (84.5%)	129(15.5%)	846	0.72
Muslims	141 (86.0%)	23 (14.0 %)	169	

Table 3: Relation COVID antibody titres with variables (n=998).

	Titre <10 (n=317)	Titre 10-50 (n=267)	Titre 50-100 (n=164)	Titre >100 (n=250)	P value
Mean age (year)	49.01±15.61	51.89 ±30.87	50.37±14.97	49.94±13.34	0.4
Age groups					
18-60 years	248 (32.3%)	201 (26.2%)	126 (16.4%)	193 (25.1%)	0.37
60-70 years	41 (26.3%)	46 (29.5%)	24 (15.4%)	45 (28.8%)	
>70 years	28 (37.8%)	20 (27.0%)	14 (18.9%)	12 (16.2%)	
Gender					
Male	197 (33.8%)	155 (57.8%)	92 (15.8%)	138 (23.7%)	0.36
Female	120 (28.8%)	112 (26.9%)	72 (17.3%)	112 (26.9%)	

Table 4: Relation of religion and COVID-19 antibody titre (n=998).

Titre u/ml	Titre <10 (n=317)	Titre 10-50 (n=267)	Titre 50-100 (n=164)	Titre >100 (n=250)	P value
Hindu	260 31.2%	245 28.3%	143 17.1%	195 23.4%	0.006
Muslim	57 34.8%	31 18.9%	21 12.8%	55 33.5%	

DISCUSSION

The current study used clinic-based data analysis to ascertain seropositivity for COVID 19 in all patients attending to the Sitara Clinical, Lucknow, regardless of the nature, duration, or severity of their symptoms. Antibodies against COVID-19 are generated in the days to weeks after viral infection that a person was infected with the COVID-19 virus, regardless of severity of illness or even asymptomatic infection. Antibody seropositivity surveillance in a community may be used to estimate the extent of infection and the cumulative incidence of infection in the population.¹¹

The total seropositivity of COVID 19 was 84.76% in this Population. Seropositivity was detected in about 84.5% of males and 85.1% of females. Between July 2020 and December 2020, a study conducted in 12 cities in India by Velumany et al.¹² discovered that 31% of seropositivity tests were positive for SARS-CoV-2 antibodies. Total sero-prevalence of SARS-CoV-2 in Nashik Municipal corporation, Aurangabad district and Maharashtra were 39.53%, 5.9% and 40% respectively.¹³⁻¹⁵ The present study was done during the phase of second wave of COVID 19. The high seropositivity means that these people are already been infected with SARS COV-2 either naturally or through vaccination although most of vaccinated patients were negative for this antibody. It may be due to reluctance in the following COVID appropriate behaviour. The difference in seroprevalence may be because of the difference in the study design, demographic profile of study population, and the situation of COVID-19 pandemic in each site.

In present study, all age groups showed more than 80% seropositivity. Mean age was not significantly related with COVID antibody titre either qualitatively or quantitatively. In a study done by Saple et al highest proportion (45%) of anti-SARS-CoV-2 IgG antibody was in the age group 46–60 years followed by 44% in 36–45 years. Although age was also not significant with seroconversion in that study. It's a fact of life that natural ageing is linked to immune system decline, as shown by increasing susceptibility to respiratory diseases like influenza and new coronaviruses. Some of these alterations contribute to the immune system's decline. Inflammaging, or age-related immune-mediated inflammation, and associated inflammatory illnesses, on the other hand, become more common as people become old.¹⁶

According to research by Jin et al, older age is linked to a greater number of comorbidities and, as a result, increased severity and death in COVID-19 patients.¹⁷ SARS-CoV-2 has resulted in a high rate of death among the elderly. In Europe, 90% of fatalities occurred in Italy, Spain, and France, and 95% happened in seniors over the age of 60, the majority of whom had at least one underlying comorbidity.¹⁸

In present study, seropositivity among males and females were 84.5% and 85.1% respectively. In a study done by Saple et al, the proportion of seroconversion was 45% among females as compared to 35% in males.¹⁵ Although in either of the studies, the association was not statistically significant. Other studies like Dixit et al and Nagargoje et al also did not find any significant association with gender and COVID 19 antibody.^{13,14} It is interesting to note that most of adult females in our society remain confined to four walls of their house while males go out and work or help in procuring material for house hold requirements. Since COVID 19 positivity was equal, to be precise slightly higher in females. Why we can only surmise that virus come into the family equally through either male members or other means of spread defined by different authors, Males, however, are at a greater risk of adverse outcomes and mortality from COVID-19, regardless of their age. While COVID-19 is equally prevalent in males and females, male patients have a greater death rate. According to research conducted by Jin et al the number of males among dead patients is 2.4 times that of women.¹⁷ While males and women were equally susceptible, males were more likely to die. According to Bwire et al biological variations in males' and women's immune systems exist and may impair our capacity to fight infections such as SARS-2-CoV-2.¹⁹ Females are often more resistant to infection than males, which may be mediated by a variety of variables, including sex hormones and increased expression of coronavirus receptors (Angiotensin-converting enzyme 2) in males, but also by lifestyle factors such as greater rates of smoking and drinking among males.¹⁹

In the current study, significantly higher COVID 19 antibody titres were seen among Muslims. A similar study conducted recently in Malegaon also revealed that seropositivity was more among Muslims, and the association of religion with seropositivity was statistically highly significant.¹⁹ In a study conducted by Dixit et al in Aurangabad, Muslims had significantly higher (3.50 times) chance of developing sero-positivity, than others.¹⁴ A study conducted by Nagargoje et al in Nashik municipal corporation also showed significant relation with Muslim religion and seropositivity for COVID 19.¹³

High seropositivity is correlated with high virus circulation which means either public is violating lockdown and social distancing or may be due to taking of one or two doses of vaccinations. In either way, it means herd immunity has been established.

CONCLUSION

In this study central and eastern UP prevalence of seropositivity could already be as high as 85%, which is a pointer towards adequate herd immunity. COVID 19 does not differentiate on the basis of age, gender or religious affiliations. However, Muslims were found to have more antibody titres compared to non-Muslims, possibly related to lifestyle, degree of exposure and presence of inherent

immunity. Although high seroprevalence may give some kind of false sense of security but till date little is known about the protective titres of the antibodies and the duration for which they stay in blood. It is necessary to strictly follow COVID appropriate behaviour.

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