

# Sero-Prevalence of COVID-19 Antibody among Employees of a STEEL Industry: A Cross Sectional Study

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**Abstract:** ***Introduction:** Corona virus was declared as a global pandemic by WHO on 11<sup>th</sup> March 2020. There has been substantial evidence that a large proportion of people infected with SARS-CoV-2 are asymptomatic but can infect others. Likewise Rapid Ag test and RT-PCR had their own limitations in detecting COVID-19 infection. Sero-prevalence of IgG antibodies against COVID-19 is an important tool to estimate the true extent of infection in a cohort and to implement control measures according to it. **Objective:** To estimate the prevalence of COVID-19 antibody in serum of employees of a STEEL INDUSTRY in Odisha. **Methodology:** This is a Cross Sectional Study conducted among the employees of a steel industry in Odisha. The employees of the steel industry were the study population. The study period was from December 2020 to February 2021. All the employees were informed about the antibody test going to be conducted at the hospital one week before the test and were asked to remain present on the day of serum COVID-19 antibody test. Total 972 samples were collected from 23<sup>rd</sup> Jan 2021 onwards till 31<sup>st</sup> January and were sent for antibody level estimation to Tertiary Care Centre (NABH accredited and authorized for COVID testing and COVID patient treatment) on daily basis. Proper COLD CHAIN as per the Govt. guidelines was brought maintained during transfer of the sample for antibody testing. A pretested questionnaire was administered to all of them. After one week the results were obtained, compiled and analyzed with SPSS software. Those who remained absent during the sample collection, those who are seriously ill or suffering from COVID-19 infection were excluded from the study. **Results:** A total of 972 people were included in the study with mean age of 37+2.43 years and 99.6% male employees. Positive serology i.e. COVID-19 antibody level 1 or >1 was found among 240 (25%) employees. Among those 240 employees only 51 (21.2%) were symptomatic and tested positive for COVID-19 infection. **Conclusion:** The current sero-prevalence study rightly provides information on proportion of the population exposed to COVID-19 infection. Hence, the golden rule of Social distancing, sanitization, personal protective equipment and public health measures have to be continued in the workplace to control spread of virus and maintain good health among employees. **Study Population:** Employees of a Steel Industry, Odisha*

**Keywords:** Sero Prevalence, IgG antibody, COVID-19 infection

## 1. Introduction

The first case of novel Corona Virus infection has been reported on December 31, 2019, in Wuhan, China. The virus has spread across the globe rapidly and has caused severe catastrophe<sup>(1)</sup>. The coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2) has affected all the countries worldwide<sup>(2, 3)</sup>. Infections with SARS-CoV-2 may have clinical manifestations which can be symptomatic (mild to severe) or asymptomatic. However, only a proportion of all COVID-19 cases are identified by contact tracing. A population-based sero-epidemiological study can measure the extent of the population that has antibodies against SARS-CoV-2 and can estimate the proportion of the population exposed to the virus and the proportion of the population that remains susceptible to the virus<sup>(4)</sup>. COVID-19 poses a high occupational risk to the factory workers also to their family members residing with them. Several serological studies, estimating anti-SARS-CoV-2 antibodies have shown that the actual number of infected individuals are higher than the reported cases due to various factors (Host, Agent and Environmental). Estimating the sero prevalence status of the community regularly is an important indicator to address the gap in data<sup>(5)</sup>, thereby informing public health authorities and aiding governance policies oriented towards COVID-19.

## Objective

To estimate the prevalence of COVID-19 antibody in serum of employees of a steel industry in Odisha.

## 2. Materials and Methods

### Study design and participants:

This study is a prospective, single centre observational study conducted at steel industry between December 2020 to February 2021. A total of 972 samples of employees from steel industry, whether they had symptoms or not were recruited in this study after due consent from all employees. COVID-19 RT-PCR positive employees were excluded from the study. All participants were categorized based on age and gender.

### Data Collection:

All the employees were informed about the antibody test going to be conducted at the hospital one week before the test and were asked to remain present on the day of serum COVID-19 antibody test. Total 972 samples were collected on 23<sup>rd</sup> Jan 2021 onwards till 31<sup>st</sup> January. The participants were informed that sero positivity would indicate past infection. A blood sample (3 mL) was collected in a serum separator tube under aseptic conditions and transported to the testing facility for antibody level estimation to a Tertiary Care centre (NABH accredited & authorized for COVID testing) upright in a transport box within 3 hours after

Volume 12 Issue 4, April 2023

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collection. A pretested questionnaire was administered to all of them. The serum samples were tested for qualitative detection of IgG antibodies to SARS-CoV-2

**Data compilation and statistical analysis:**

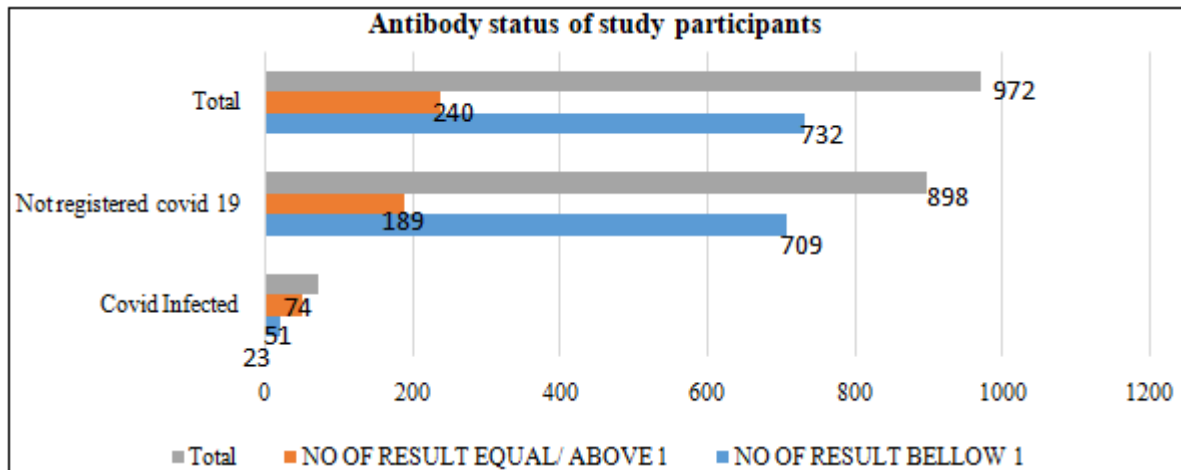
After one week the results of antibody tests were obtained. Participants were categorized as seropositive if SARS-CoV-2 antibodies were detected at threshold of  $\geq 1.0$  index value or sero negative if SARS-CoV-2 antibodies were below the threshold. Statistical Analysis Data were analyzed with IBM SPSS ver.25.0. The results were expressed as frequency and proportions for categorical variables and mean and standard deviation for continuous variables. Associations between

categorical variables were assessed using the chi-square test. A  $p < 0.05$  was considered too statistically significant.

**3. Results**

**Table 1:** Antibody status of study participants

Antibody Result	COVID Infected	Not registered COVID 19	Total
No. of Result Bellow 1	23	709	732
No. of Result Equal/ Above 1	51	189	240
Total	74	898	972



Out of total 972 employees, 240 participants tested positive for COVID-19 antibody. Among those 240 employees, 51 was documented cases of COVID-19, whereas 189 were never registered as COVID-19 positive. This implies either they were asymptomatic or sub-clinical infection or did not opt for COVID test while symptomatic. Likewise, out of 732 participants who were negative for COVID-19 antibody, 24 employees had a previous history of COVID 19 infection. This may be due to weaning of antibody level with due course of time.

COVID-19 infection associated with Co-morbidity possess a significant risk of longer hospital stay and loss of quality of life. Out of the total 239 sero positive participants 46.4% had associated co morbid conditions.

**Table 2:** Demographic data of Employees with percentage positivity

Variabales	Total	Antibody positive
Age		
≤40 yrs	584 (60.1%)	150 (25.6%)
>40 yrs	388 (39.9%)	89 (22.9%)
Gender		
Female	4 (.4%)	1 (25%)
Male	968 (99.6%)	238 (24.6%)
Co-morbidity		
Yes	279 (28.8%)	111 (39.7%)
no	693 (71.2%)	128 (18.4%)
Occupation		
Skilled	195 (20%)	55 (28.2%)
Semiskilled	233 (24%)	83 (35.6%)
Unskilled	544 (56%)	101 (42.2%)

Among the study participants, 544 (56%) were unskilled employees. Sero conversion was found to be highest among them (42.2%). This can be attributed to lack of awareness on their part, not following COVID appropriate behavior, overcrowding at workplace and residence.

**4. Discussion**

The present study conducted among employees of a steel industry in Odisha observed that the IgG antibody to SARSCoV-2 was present in 24.6% of participants, indicating past infection with the virus. A study conducted at a teaching hospital of New Delhi by **Pragya Sharma et al**<sup>(6)</sup> found a sero prevalence of 12.1%. A large community-based repeated sero-survey conducted in Delhi during the same period reported detectable IgG antibodies in 24.08% to 28.39% of the population<sup>(7)</sup>.

Mean age of study participants was 38.77 yrs  $\pm 7.95$ . Majority of the employees (60.1%) were aged below 40 years. Among them sero prevalence was found to be 25.6%. Most of the employees were Male (99.6%) with sero positivity of 24.6%.

In the study by **Kshatri JS et al**<sup>(5)</sup> IgG antibodies against SARS-CoV-2 were detected in more than 90% of all individuals who participated in the sero survey.

In a study by Ray **Animesh et al**<sup>(8)</sup> Sero prevalence of COVID-19 was highest between 40 to 59 years and was calculated to be 22% and 26% for 40-49 and 50-59-year age group respectively which is contrast to this study as sero

positivity was found to be more among employees of, 40 year of age group.

Sero-positivity rate was 34.5% in female and 33.6% in male subjects in a study by **Majumder T et al** <sup>(9)</sup>. Among the employees of present study was found to be approximately same among both gender at 25%.

According to a study by **Inbaraj LR et al** <sup>(102)</sup> Co morbidity like hypertension and diabetes was present among 16% and 10% sero positive participants while in our study out of all co morbid employees 39.7% had sero positivity for COVID-19.

**5. Conclusion**

Unskilled workers in this study were at high risk of SARS-CoV-2 infection as compared with others. This sero prevalence study highlights the importance of SARS-CoV-2 antibody in sero prevalence and epidemiology studies which may subsequently guide the policy-making in implementing an effective infection control strategy to curb SARS-CoV-2 transmission. The golden rule of Social distancing, sanitization, personal protective equipment and public health measures have to be continued in the workplace to control spread of virus and maintain good health among employees.

**Funding**

All the administrative logistics bear by the parent steel industry and all medical logistics bear by the Pathology Dept. and Microbiology Dept., of empanelled Tertiary Care Centre (NABH accredited) with the steel industry.

**Conflict of Interest**

The author (s) declare (s) that there is no conflict of interest.

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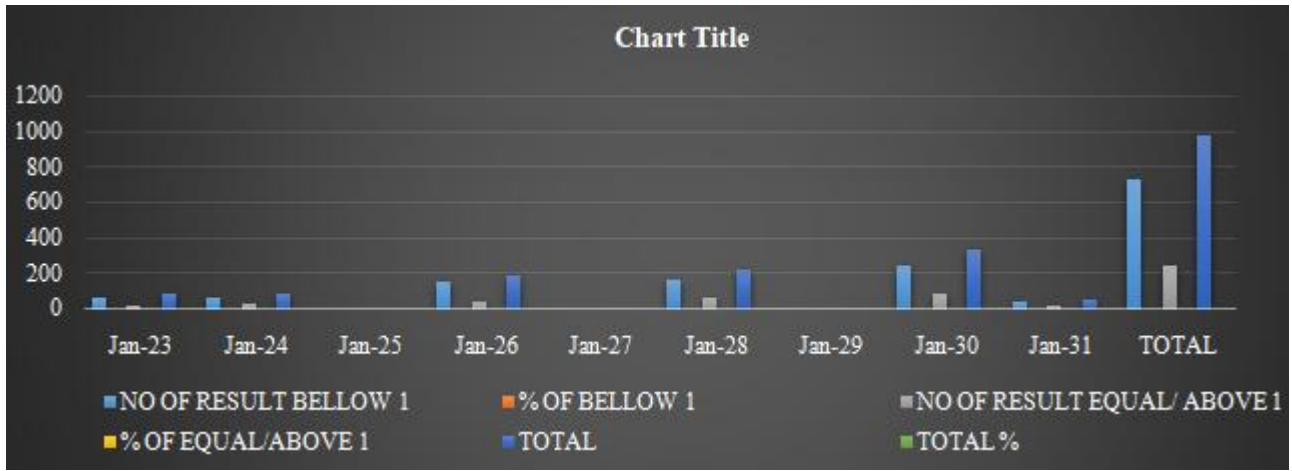
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**Summary of Antibody result 1st Feb 21**

DATE	Jan-23	Jan-24	Jan-25	Jan-26	Jan-27	Jan-28	Jan-29	Jan-30	Jan-31	TOTAL
NO OF BELLOW 1	66	66		149		163		249	39	732
% OF BELLOW 1	78.57%	71.74%	0.00%	80.54%	0.00%	73.42%	#DIV/0!	74.11%	73.58%	75.31%
NO OF RESULT EQUAL/ ABOVE 1	18	26		36		59		87	14	240
% OF EQUAL/ABOVE 1	21.43%	28.26%	0.00%	19.46%	0.00%	26.58%	#DIV/0!	25.89%	26.42%	24.69%
TOTAL	84	92	0	185	0	222	0	336	53	972
TOTAL %	100.00%	100.00%	0.00%	100.00%	0.00%	100.00%	#DIV/0!	100.00%	100.00%	100.00%



Antibody Result	COVID Infected	Not registered COVID 19	Total
NO OF RESULT BELLOW 1	23	709	732
NO OF RESULT EQUAL/ ABOVE 1	51	189	240
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