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Research Article

A Cross-Sectional Study on Prevalence of SARS-COV-2 among Sanitation Workers in a Teaching Hospital in South India

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Abstract: On 11 March 2020, WHO declared Covid 19 as a pandemic? RTPCR, the gold standard test for diagnosis of COVID 19 has false negatives due to low viral load and inappropriate sample collection. Therefore, antibody tests are the alternative. This study is conducted to identify sociodemographic patterns and to measure seroprevalence of IgM antibodies against SARS-COV-2 among sanitation workers. A cross - sectional study was conducted during August 2020 -September 2020 among sanitation workers employed in Government General Hospital, Kurnool. After obtaining IEC clearance, informed consent was obtained from 151 participants and study was conducted using a pre-tested, semi-structured questionnaire and Chemiluminescence Immunoassay (CLIA) test with cut off value for IgM antibodies of 10 AU/ml. The data was analysed using MS Excel 2016. Out of 151 participants, 59.6% were males. Majority (46.4%) were 31 to 40 yrs of age and 25.8% were illiterates. Hypertension was the most common comorbidity (12.6%) in the study population. Overall seroprevalence was found to be 6.6%, among females 8.2%, among study subjects aged more than 60 yrs it was found to be 33.3% and in those with Hypertension 15.8%. Out of those who turned out to be positive for antibodies, 100% were asymptomatic. After six months of emergence of first case, seroprevalence is only 6.62% indicating majority are still susceptible to Covid 19 infection. Among those positive for antibodies, 100% were asymptomatic, hence a need for periodic serological surveys among sanitation workers.
Keywords: COVID-19, SARS-COV-2, Seroprevalence, Chemiluminescence Immunoassay (CLIA), IgM antibodies, Sanitation Workers.

INTRODUCTION

At the end of 2019, the world witnessed the emergence of a new disease caused by novel beta corona virus (SARS-COV-2). On January 30, 2020, the WHO declared the situation as a public health emergency of international concern. On March 11, 2020 WHO declared COVID-19 disease as a pandemic [1]. Health care workers are among the first line of response and are at high risk for exposure and infection [2]. This type of workers faces unprecedented occupational risks of morbidity and mortality [3-5]. Hence, timely implementation of protective measures is imperative for this group [6-8]. Among them, sanitation workers work under inhumane conditions without proper protective equipment and safety measures. There are about 5 million sanitation workers in India who constitute backbone of waste management system. Sanitation workers reside mostly in informal settlements/slums with high population density. Hence high risk of transmission among them. RTPCR is the gold standard test for diagnosis of COVID-19 but it has a chance of false negatives due to low viral load [9, 10]. It is widely accepted that IgM provides the first line of defense during viral infections prior to generation of adaptive, high affinity IgG secondary response that are important for long-term immunity and immunological memory [11]. Hence, testing for IgM antibodies is the alternative method for rapid and highly sensitive laboratory diagnosis [12]. Serological detection of antibodies against SARS-COV-2 provides possibility for the early diagnosis of COVID-19. Hence, this study is conducted to measure seroprevalence of IgM antibodies among sanitation workers with the aim of identifying the socio-demographic patterns among sanitation workers and to measure seroprevalence of IgM antibodies among sanitation workers.

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MATERIALS AND METHODS

After obtaining IEC clearance (Letter / IEC No. 05/2020 – KMC, Dt. 14-09-2020), a cross sectional study was conducted in Government General Hospital, Kurnool during August 2020 – September 2020. Study population was 250 sanitation workers employed in our hospital. Of those 151 sanitation workers who responded to the invitation for COVID-19 testing drive in our tertiary health care set-up were taken as sample size by simple random sampling. Inclusion criteria were those who were working in our hospital for the past 1 year and gave consent for the study. Exclusion criteria were those who were not willing for the study. Study was conducted using a pre-tested, semi-structured questionnaire and Chemiluminescence Immunoassay (CLIA) test. CLIA is a technique that makes use of the emission of electromagnetic radiation caused by a chemical reaction to produce light. Chemiluminescence Immunoassays are quantitative serological antibody detection assays, which have high sensitivity and specificity [13]. After obtaining consent from study participants, their blood samples were collected and tested for antibodies using iFlash3000 automatic CLIA analyzer (Yhlo, China) [13]. It has a clinical sensitivity of 86.1% and clinical specificity of 99.2% with cut off value for IgM antibodies of 10 AU/ml. Data was analysed using MS Excel 2016 and SPSS version 21. Chi-square test is applied to test the significance. $P < 0.05$ is considered significant.

RESULTS

The following are the findings of the study collected through questionnaire and by CLIA test results.

Socio-demographic patterns among study population

Table-1: Gender distribution

Gender	Frequency, N (%)
Males	90 (59.6)
Females	61 (40.4)
Total	151 (100)

Seroprevalence among study population

Out of 151 participants, majority i.e. 90 members (59.6%) were males and 61 members (40.4%) were females.

Table-2: Age distribution

Age	Males	Females	Total, N (%)
< 30 yrs	17	10	27 (17.9)
31 to 40 yrs	36	34	70 (46.4)
41 to 50 yrs	22	14	36 (23.8)
51 to 60 yrs	13	2	15 (9.9)
>60 yrs	2	1	3 (2)
Total	90	61	151 (100)

Among the study participants, majority (46.4%) belonged to age group 31 to 40 yrs followed by age group 41 to 50 yrs (23.8%). Only 2% were elderly people with age >60 yrs.

Table-3: Distribution of study population according to education

Education	Frequency, N (%)
Illiterate	39 (25.8)
Primary school	37 (24.5)
Secondary school	38 (25.1)
Intermediate	37 (24.5)

About 25.8% were illiterates. 25.1% had secondary school education. 24.5% went to primary school and another 24.5% studied intermediate.

Table-4: Comorbidities among study population

Comorbidity	Frequency, N (%)
Nil	114 (75.5)
Hypertension	19 (12.6)
Diabetes mellitus	16 (10.6)
Others	2 (1.3)

Out of 151 study participants, 114 members (75.5%) had no comorbidities. Among those with comorbidities, Hypertension (12.6%) was the most common comorbidity followed by diabetes mellitus (10.6%).

Table-5: Percentage of asymptomatics among study population

Test result	Symptomatic, N (%)	Asymptomatic, N (%)	Total, N (%)
IgM Reactive	0	10 (6.6)	10 (6.6)
IgM Non-reactive	7 (4.6)	134 (88.8)	141 (93.4)
Total	7 (4.6)	144 (95.4)	151 (100)

Out of 151 participants, 10 members (6.6%) were positive for antibodies and all the 10 members i.e.

100% were asymptomatic. 141 members (93.4%) were negative for antibodies.

Table-6: Gender – Seroprevalence

Gender	IgM Reactive, N (%)	IgM Non-Reactive, N (%)	Total, N (%)
Males	5 (5.5)	85 (94.5)	90 (59.6)
Females	5 (8.2)	56 (91.8)	61 (40.4)
Total	10 (6.6)	141 (93.4)	151 (100)

94.5% of males and 91.8% of females were negative for antibodies. Seroprevalence was found comparatively more in females (8.2%) than in males (5.5%). Chi–square statistic is 0.41. P-value is 0.52; statistically not significant.

Table-7: Age – Seroprevalence

Age	IgM Reactive, N (%)	IgM Non-Reactive, N (%)	Total, N (%)
< 40 Yrs	5 (5.2)	92 (94.8)	97 (64.3)
41 to 50 yrs	3 (8.3)	33 (91.7)	36 (23.8)
51 to 60 yrs	1 (6.7)	14 (93.3)	15 (9.9)
>60 yrs	1 (33.3)	2 (66.6)	3 (2)
Total	10 (6.6)	141 (93.4)	151 (100)

Seroprevalence was found low (5.2%) in those with age <40 yrs. Seroprevalence was found high in age group >60 yrs (33.3%). Chi-square statistic is 3.96. P-value is 0.26. Statistically not significant.

Table-8: Education – Seroprevalence

Education	IgM Reactive, N (%)	IgM Non-Reactive, N (%)	Total, N (%)
Illiterates	3 (7.7)	36 (92.3)	39 (25.8)
Primary school	4 (10.8)	33 (89.2)	37 (24.5)
Secondary school	3 (7.9)	35 (92.1)	38 (25.2)
Intermediate	0	37 (100)	37 (24.5)
Total	10 (6.6)	141 (93.4)	151 (100)

There was no significant difference found in seroprevalence based on their education. Comparatively it was found more in those with primary school education (10.8%).

Table-9: Comorbidities – Seroprevalence

Comorbidity	IgM Reactive, N (%)	IgM Non-Reactive, N (%)	Total, N (%)
Nil	7 (6.14)	107 (93.85)	114 (75.5)
Hypertension	3 (15.8)	16 (84.2)	19 (12.6)
Diabetes mellitus	0	16 (100)	16 (10.6)
Others	0	2 (100)	2 (1.32)
Total	10 (6.6)	141 (93.4)	151 (100)

Among those with comorbidities, seroprevalence was found more in those with hypertension (15.8%). It was 6.14% in those with no comorbidities. Among those with diabetes mellitus, no one was positive for antibodies.

DISCUSSION

In various countries around the world, the results of seroprevalence studies carried out during the COVID-19 pandemic on health care workers were dissimilar and inconsistent depending on the sampling strategy applied. After six months of emergence of first case, seroprevalence was low (6.6%) in our study similar to study by Pollan. M *et al.* (5%) indicating majority are still susceptible to Covid 19 infection [14]. Among those positive for antibodies, there were asymptomatics similar to study by Wu X *et al.* and Steensels D *et al.* [15, 16]. Hence a need for periodic serological surveys among sanitation workers which may contribute to monitor the transmission dynamics and to evaluate infection control measures. In our study, no seroprevalence was found in those with symptomatic illness but in study conducted by Shields A et al, seroprevalence was found higher (37.5%) in those with symptomatic illness [17]. Compared with nucleic acid detection, antibody detection greatly shortens the sample detection time and it is less complicated to perform. The Chemiluminescence method is a quantitative serological antibody detection assay, which has high sensitivity and specificity. Testing for antibodies can reflect whether the patient is in a state of acute infection [13]. Convalescent plasma or hyper-immune immunoglobulin from patients that contains significant antibody titres can likely reduce the viral load and disease mortality [18, 19].

CONCLUSION

Over all Seroprevalence was found to be low, comparatively it was more in females, in age group > 60 yrs and in hypertensives. There is a need for regular and periodic health check-ups and serological surveys among sanitation workers. Sanitation workers should follow standard safety precautions and hygiene practices not only during the present pandemic but even after it wanes off.

LIMITATIONS OF THE STUDY

The study was conducted among sanitation workers who responded to the invitation for COVID-19 testing drive in our tertiary health care set-up. As it was conducted during a limited period among this randomly selected sample, the results of the study cannot be generalised to the entire population.

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