Have We Passed the Peak? Prevalence and Clinical Presentations of Covid-19 among Sudanese Health Workers

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Abstract
Until the 21st of June 2020, more than 1,773,084 worldwide were confirmed cases in the pandemic, among which 111,652 deaths as reported by international health authorities. Majority of patients show a mild presentation of the disease and have good prognosis. The current study was designed to investigate seropositivity of practicing healthcare workers and identify their related clinical symptoms if they found to be seropositive. Known previous positive healthcare workers as well as staff working in isolation wards were excluded. Thirty one healthcare workers were introduced in the study. All participants were firstly screened by Covid-19 ICT screening kits. Covid-19 IgM and IgG antibody levels were further detected using automated CLIA assay for all ICT reactive samples to IgM, IgG or both. Among the 4 participants who were found to be IgM seropositive after screening only 2 (50%) were found to be positive after conducting CLIA assay. Moreover, among the IgG seropositive specimens according to initial screening, 6 (85%) were found to be seropositive after conducting CLIA assay. Eventually, 7 (22%) practicing healthcare workers were found to be exposed to Covid-19 despite of the reactive antibody class as indicated by CLIA assay. Sudan is lacking organized Covid-19 screening programs due to the shortage of testing resources. The current result- although of the low sample size indicated a prevalence of 22% seropositivity among people who look healthy and practice their regular jobs. Taking that under considerations, Covid-19 viral infection prevalence peak might has been passed. Other large-scale studies are appreciated to be approached to better judge the current findings.

Keywords: Africa, Coronavirus, healthcare workers, Sudan


1. Introduction
Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), originating from Wuhan, China, has rapidly spread and became the world biggest concern. Until the 27th of May 2020, more than 5,488,825 worldwide were confirmed cases in the pandemic, among which 349,095 deaths were reported by international health authorities. In February, 2020, the WHO officially named the disease caused by this virus, COVID-19 [1,2,3].

When a person contract the virus, the immune system starts to construct antibodies in response, despite that these antibodies are critical for host defense, they are known for their diagnosis capabilities and identification usefulness [4].

At the beginning of the outbreak, most of the patients with COVID-19 had a history of contact with the Wuhan epidemic area. However, local transmission is currently striking in many countries. Most importantly, majority of patients show mild presentation of the disease and have good prognosis, while about 17% of patients may require medical care. However, patients over 50 years of age with a Neutrophil/ Lymphocyte Ratio (NLR) ≥ 3.13 are at high risk of severe COVID-19 [5,6].

The fact that the majority of infected individuals will have mild clinical presentation will directly influence the number of cases that are reported to be infected in a population if it is absolutely true, especially in low resource sitting countries where many infected individuals may only seek home remedy. The current study was designed to investigate seropositivity of practicing healthcare workers and retrospectively identify their related clinical symptoms if they found to be seropositive. Such study is proposed to help in understanding the true existing burden of the disease in...
2. Materials and Methods

2.1. Study Design

The study was conducted in Khartoum State targeting healthcare workers in Al-Amal hospital. Study was cross-sectional descriptive study. Testing was optional to hospital staff as part of the hospital Covid-19 containment plan. Known previous positive healthcare workers as well as staff working in isolation wards were excluded to avoid selection bias. Thirty one healthcare workers were introduced in the study, venous blood were drawn aseptically from each study participant, all specimens were transported to the laboratory where serum was separated from the blood by centrifugation at 4,000 rpm for 15 minutes. Serum samples were numbered and used for Covid-19 IgM and IgG antibodies detection using ICT screening initially followed by chemiluminescence immunoassay (CLIA) assay to the seropositive specimens. All seropositive participants were interviewed in private to promote confidentiality, full medical history was taken for each participant including current or previous Covid-19 infection-related symptoms, chronic illnesses as well as possible exposures. Participants as a result of low sample size were not found to be suitable to be categorized according to their age. All symptoms questioned were emphasized to only be reported if felt unusual or if believed to be abnormally severe.

2.2. Detection of Covid-19 IgM and IgG Antibodies

All participants were firstly screened by Covid-19 ICT screening kits where IgM-IgG combined antibody test was approached as illustrated by manufacturer, and the recombinant antigen is designed to be receptor binding domain of SARS-CoV-2 Spike Protein [7]. Covid-19 IgM and IgG antibody levels were further detected using automated CLIA assay for all reactive samples to IgM, IgG or both on MAGLUMI 800 CLIA analyzer as illustrated by the manufacture (Snibe - Shenzhen New Industries Biomedical Engineering Co., Ltd, Shenzhen, China) the Covid-19 IgM cut-off is 1.0 AU/mL, while the Covid-19 IgG cut-off is 1.1 AU/mL. Manufacturers claimed that the calculated clinical sensitivities of IgM and IgG were 78.65% and 91.21%, respectively, while specificities of IgM and IgG were 97.50% and 97.3%, respectively [8].

2.3. Data Analysis

The collected data were recorded and analyzed using Statistical Package of Social Sciences (SPSS, version 11) program and sensitivity as well as prevalence were calculated.

2.4. Ethical Considerations

An ethical clearance was delegated by the Laboratory administration to conduct the current study.

3. Results

3.1. Socio-demography

Thirty one participants were successfully introduced into the current study. Males were 15 while 16 were females. Majority of participants were laboratory technologists (26, 84%), 2 doctors, 2 nurses and one from administrative staff.

3.2. Initial Covid-19 Screening

After ICT screening; 10 participants were found to be reactive. Among which 4 were found to be positive to IgM antibodies, While 8 were found to be positive to IgG antibody class. Moreover, 2 participants were seropositive to both IgM as well as IgG antibody classes.

3.3. Covid-19 seropositivity Confirmation Using Automated CLIA Assay

Among the 4 participants who were found to be IgM seropositive after screening 2 (50%) were found to be positive after conducting CLIA assay. Among the IgG seropositive specimens according to initial screening, one sample were unable to be further processed and was excluded. Among the remaining; 6 (85%) out of 7 specimens were found to be seropositive after conducting CLIA assay. Among the two participants who showed seropositivity to both antibody classes according to initial screening; one was found seropositive for both classes while the other was found seronegative for both classes after conducting CLIA assay.

Eventually, 7 (22%) practicing healthcare workers were found to be exposed to Covid-19 despite of the reactive antibody class as indicated by CLIA assay. Among which 4 (57%) were females while 3 (43%) were males.

3.4. Clinical Presentations of Seropositive Healthcare Workers

Table 1. Clinical presentations of Covid-19 seropositive participants in the current study

<table>
<thead>
<tr>
<th>Symptom</th>
<th>N (%)</th>
</tr>
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<tbody>
<tr>
<td>Cough</td>
<td>1 (14)</td>
</tr>
<tr>
<td>SOB</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Fever</td>
<td>2 (28)</td>
</tr>
<tr>
<td>Headache</td>
<td>5 (72)</td>
</tr>
<tr>
<td>Chest pain</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Sore throat</td>
<td>2 (28)</td>
</tr>
<tr>
<td>Tiredness and fatigue</td>
<td>3 (43)</td>
</tr>
<tr>
<td>Loss of smelling or taste</td>
<td>2 (28)</td>
</tr>
<tr>
<td>Palpitations</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Nausea</td>
<td>2 (28)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>2 (28)</td>
</tr>
<tr>
<td>Back pain</td>
<td>2 (28)</td>
</tr>
<tr>
<td>Loin pain</td>
<td>1 (14)</td>
</tr>
<tr>
<td>Burning micturation</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Haematurea</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Lower limbs edema</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Loss of consciousness</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>
Clinical symptoms varied among participants; Headache was found to be predominating as 5 (72%) participants reported its experience followed by tiredness as 3 (43%). All clinical symptoms investigated are depicted in (Table 1). One participant indicated no history of any symptoms related to any kind of infection in the past two months while another participant was diabetic and hypertensive. Even among IgM seropositives, all participants needed no hospitalization and are recovered from symptoms when conducting the study.

4. Discussion

Although the humble sample size in the current study due to lack of testing resources, it is the first-to our knowledge to determine prevalence as well as clinical settings of Covid-19 infected individuals in the country.

While the recommended laboratory test for COVID-19 is based on qRT-PCR assay, serological assays have an important role to play in epidemiological studies of the COVID-19 pandemic. The qRT-PCR is known to have good performance characteristics [9,10]. Moreover, in controlled laboratory conditions the sensitivity and specificity were 100% and 100%, respectively [10]. However, Covid-19 ICT screening was found to lack specificity as (50%) for IgM seropositive samples after screening were found to be seronegative while (85%) for the IgG antibody class. ICT screening for Covid-19 IgM and IgG cut-off is designed to be 0.4 AU/mL according to manufacturer. However, all specimens that had showed false positive results in the initial screening were found to have antibody concentration less than 0.4 AU/mL after conducting the CLIA assay. ICT Screening sensitivity was not assessed as negative samples were not further processed to CLIA assay. These findings goes alongside other studies in the literature [11,12,13,14,15]. Moreover, Yang and colleagues in China reported a sensitivity as low as 52% [9].

All participants were well at the time of testing and were practicing their jobs, the testing would not be done if not optional as they did not feel seriously ill. Among which (22%) were found to be exposed to Covid-19. This result indicates and emphasizing previous studies as well as international official reports that the infection is mostly mild in healthy individuals or among people with no chronic illnesses [5,6].

The fact that laboratory technologists were the majority of participants 26 (84%) are not to be underestimated. This population according to current regulations in the study area practices almost no contact with patients excluding sample collection procedures only, as a result it is unlikely that they were exposed in duty, which may arbitrary point to similar prevalence estimates in the general population, or even higher among people at risk as arbitrary point to similar prevalence estimates in the general population, or even higher among people at risk as well as laboratory members for their ultimate cooperation.

Competing Interest

The authors declare that they have no competing interests.

Authors' Contributions

All authors contributed to the fieldwork and the writing, commented on and approved the article.

References


