Joint CBC-ICT Interpretation for the Pre-surgical Screening of COVID 19 Asymptomatic Cases: A Cross-Sectional Study

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ABSTRACT

Background: On the 26th,of February 2020, first cases of COVID-19 were confirmed in Pakistan. Since then, surgeries were halted in a bid to prevent transmission. However, since such a long halt is infeasible, a general protocol of screening the carriers, especially asymptomatic carries, is a dire need of time. The objective of our study is to propose an economically feasible protocol of COVID-19 screening. Simple but effective screening strategies can help to restore the workings of hospital surgical departments.

Methods: We analyzed the clinical data of patients turning up for elective surgeries at the Rawal General Hospital (RGH), Islamabad from the 24th of March to the 15th of May, 2020. Asymptomatic patients with negative COVID-19 contact and travel histories were screened with COVID-19 Immunochromatography (ICT) IgM/IgG antibody (Ab)Test. Complete Blood Count (CBC) was done and interpreted in conjunction with the ICT results.

Results: 39 patients with a mean age of 49 years were studied. The result of ICT for COVID-19 was positive in 9 cases (23%). The entire positive ICT patients population expressed significantly lower lymphocyte count (p<0.01); 8 patients had high monocyte count (p<0.05) whereas only 4 patients had a combined high neutrophil and monocyte count (P<0.05). All of these four patients with high neutrophil count were females. The combined interpretation of CBC and ICT IgM/IgG Ab Test had a high accuracy in diagnosing asymptomatic COVID-19 carriers that were later confirmed by real-time Reverse Transcriptase-Polymerase Chain Reaction (rRT-PCR).

Conclusion: We propose that joint CBC-ICT interpretation should be adopted on a large scale to help in the diagnoses of asymptomatic carriers as both tests are simple and inexpensive and thus suit the developing countries' limited health budget. Future research projects should be adopted in order to assess the accuracy of the proposed protocol on a large scale.

Keywords: COVID-19; Surgery; Asymptomatic carriers; ICT; CBC

INTRODUCTION

COVID 19 pandemic, starting from a wet market in Wuhan, ended up spreading globally [1].Characteristically, patients present with fever, body aches, diarrhea and shortness of breath that can lead, in severe cases, to pneumonia, shock and organ failure. However, a large number of patients are asymptomatic and never come under suspicion for diagnosis [2]. Complete Blood Count (CBC) is the most readily available and cost-effective laboratory test. If done and interpreted in conjunction with ICT antibody screening, it can help in the diagnosis of COVID-19. This being indicated, the accuracy of many antibody screening tests is being questioned by WHO [3,4]. So far, there is no effective treatment protocol and vaccination for COVID-19 pandemic. Comprehensive support and prevention is the only option, especially for developing world owing to their limited resources. Mortality figures, as reported across the globe, are about 2% [3,5]. Elderly patients are more susceptible to complications secondary to concurrent co-morbidities. In contrast to the initial figures, significant morbidity and mortality have been reported in young adults.[6] Routine CBC combined with the ICT IgM/IgG COVID Ab test can serve as a first-line screening test to identify asymptomatic carriers [6-8]. The provision of health services to non-COVID-19 patients can thus be restored [9,10]. Since the efficacy and accuracy of CBC combined with ICT IgM/IgG Ab Test interpretation to screen out COVID-19 carriers has not yet been definitely established [11-14]We, at RGH, aimed to evaluate the accuracy of these 2 tests in the diagnosis of asymptomatic COVID 19 cases, especially prior to elective before elective surgeries in order to protect paramedical staff,

order to protect paramedical staff, community and non-COVID 19 patients [1,5].

MATERIALS AND METHODS

All of the patients planned for elective surgeries were included and their presurgical blood samples, as a protocol for the COVID 19 diagnosis, were collected at the RGH Pathology department, Islamabad, Pakistan. All of the patients signed a consent form approved by the RGH Ethics committee for COVID 19 ICT IgM and IgG Ab Test in conjunction with CBC test. The CBC and serology testing were done with whole blood on all 39 patients.

All of the patients, at the time of being received at the Pathology desk,were asymptomatic; Only 2 patients experienced mild cough. The CBC and ICT IgM/IgG serology were done within 1 hour of the collection of blood. Anti-human IgG/IgM monoclonal antibo dies along with anti-goat IgG polyclonal antibodies were used in the ICT kit manufactured by Core Technology CO.LTD, China. Stat istical analysis was done by SPSS version 22. Frequencies were calcu lated for the demographics of the study population. Chi-square test was used to determine the statistical significance of CBC and ICT IgM/IgG Ab test (Figure 1).
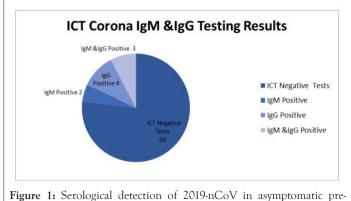

Figure 1: Serological detection of 2019-nCoV in asymptomatic pre-surgical screening protocol patient.

RESULTS

In our study, we tested 39 surgical OPD patients coming in for elective surgeries. Whole blood was collected for CBC and ICT IgM /IgG Ab testing, apart from the 3 respective routine pre-surgical investigations. A total of 9 patients were reactive on the ICT IgM/IgG Ab test out of which only 3 patients were double-positive for IgG and IgM. 4 patients had only-IgG reactivity. Moreover, 2 patients had only-IgM reactivity. The CBC indicated mild neutrophilia in all of the 4 female patients with count >7.99 × 10^3/μL (8-19 × 10^9/L) whereas low normal neutrophilic count was indicated in males at 1.9 (1.9-3.5 × 10^9/L). Lymphopenia was featured in 100% of the sample with absolute lymphocyte count 0.7 × 10^9/L (0.7-0.95 × 10^9/L) whereas no patient had lymphocyte account less than 0.5 × 10^9/L. While 8 patients had absolute monocyte count greater than 0.9 (1.2 -1.8 × 10^9/L), the eosinophilic count was found to be within the normal range in our study population. The CBC of only 1 female patient exhibited anemia that was attributed to menorrhagia that was confirmed by the allied test reflecting low ferritin. Thrombocytopenia was not noted in any of the COVID-19 positive asymptomatic carriers. All of the 9 COVID-19 positive patients surgeries were postponed and they were quarantined at home after taking samples for the COVID-19 Reverse Transcription Polymerase Chain Reaction (RT-PCR) test. The COVID-19 RT PCR was positive in only-IgM

reactive patients and combined IgG and IgM reactive patients but was negative in 1 patient (11%) out of 4 only-IgG reactive patients. The significance (p-value) for the ICT IgM/ IgG test was <0.01 whereas that of the combined interpretation of CBC and ICT IgM/IgG Ab Test parameters was <0.05. No patient was admitted and no mortality noted in the RGH study group.

DISCUSSION

The risk associated with COVID 19 pandemic for health care workers in hospital settings cannot be overstated.

The developed countries offering sequencing studies, RT-PCR and Enzyme-linked Immunosorbent Assay (ELISA) for the community screening and diagnosis,whereas middle and low developing countries, such as Pakistan,are only able to test sympto matic patients with RT-PCR secondary to limited resources at hand. Our findings from the RGH study group highlighted the high accu racy of collective CBC and ICT IgM/IgG Ab test interpretation in diagnosis of asymptomatic COVID 19 cases [6,7] .Variations were detected in the CBC parameters among both; ICT-reactive and ICT non-reactive asymptomatic patients. Contrary to Mardani et al. [6], Whole blood count (WBC) and absolute neutrophilic count(ANC) were found to be raised in ICT-reactive patients but the lymphocytic count was low findings in their study where they used RT-PCR for the COVID 19 diagnosis. After noting that the viral disease severity is gauged in terms of lymphocyte count, we did not find any patient with ALC <0.5 × 10/L as all were asymptomatic. similar findings of monocytosis(high absolute monocytic count:high patients in 2016. CBC testing showed no leucopenia with normal neutrophilic count; neutrophilia was observed in 4 patients only [5,15]. Consequently, it is suggested that the neutrophils are not affected in COVID 19's mild disease [3] and also that SARS-CoV-2 primarily act on lymphocytes [6-7]. ICT Antibody tests studies are reported scarcely but promising if done in conjunction with contact history, history of the symptoms of flu and diarrhea as well as CBC [7-10]. With this indicated, it is worthwhile to indicate that in the case of a SARS-COV-2 mutation, current antibody tests detection is rendered questionable [4]. In order to gauge the true prevalence of infections, large testing projects are required to predict true incidence. ICT is the only best solution in under-resourced, middle and low-income countries [8] (Table 1).

Table 1: Analyzing the CBC parameters in ICT reactive COVID-19 patients.

CBC Parameters	ICT Reactive (9)	ICT Non-reactive (30)
WBC	3.0-19	9.0-18
ANC	2.5-8.2	4.5-9.7
ALC	0.7-9	1-1.8
AMC	1.2-1.8	0.3-0.7

In the present study, simple laboratory data such as CBC with differential count when interpreted in conjunction with ICT is found to be useful in the diagnosis of asymptomatic patients in under-resourced, developing countries where limited affordability bars the large-scale usage of RT PCR for COVID 19 diagnosis.

CONCLUSION

We propose that combined CBC-ICT interpretation should be tested on a large scale to diagnose asymptomatic carriers as both tests are simple and inexpensive, thus suit the developing countries

that have limited health budget.

LIMITATIONS

Since the cohort's size is small, the findings cannot be amounted to be general. With the study only providing a snapshot of the present, the proposed protocol should be validated by retrospective as well as prospective studies.

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AUTHOR'S CONTRIBUTION

Tanzeel Imran: Conceptualization, Data curation, Investigation, Writing; Humera Altaf Naz: Methodology, Investigation; Hamza Khan: Reviewing; Ali Haider Bangash: Writing and Editing; Laraib Bakhtiar Khan: Methodology and Original draft preparation.

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