ASSESSMENT OF THE CHALLENGES TOWARDS COVID-19 TESTING AMONG FINAL YEAR MEDICAL STUDENTS IN ENUGU STATE, NIGERIA

ABSTRACT

***Background*:** Health infrastructure manned by trained personnel is very limited in sub-Saharan African countries, Nigeria inclusive due to various factors.Testing for SARS-COV-2 met with this limitation hence causing a sub-optimal level of testing for the infection. Efforts to procure reliable testing kits have been limited by various factors with medical students also being among those affected.

Objective:This study was aimed at assessing the knowledge level and challenges of the final year medical students towards COVID-19 testing in Enugu, a state in the Southeastern part of Nigeria.

Method: A descriptive and inferential cross-sectional study of 137 medical students in Enugu state, Nigeria, was done. Ethical approval was obtained from the Health, Research and Ethical committee of the University of Nigeria Teaching Hospital, UNTH, Ituku-Ozalla, Enugu state, Nigeria. Data was collected using validated self-administered virtual questionnaires and a descriptive and inferential analysis were done using statistical package for social sciences (SPSS).

Results: A total of one hundred and thirty-seven (137) responses were received; 86.8% who had symptoms suggestive of Covid-19 never got tested. As regards to reasons for not being tested, 36.9% affirmed to perceived discomfort of the testing method; 36 % said delay at testing centers; 33.5% inadequate testing centers; 31.4% lack of knowledge of available testing centers; 31.4% unavailability of PCR testing kits; 10% percent indicated fear of result as their reason for not been tested, 8.3% indicated some levels of religious basis for not being tested. In terms of knowledge, 61.8% were aware of PCR as a testing method, and 33.6% aware of the serology tests. Females were more likely not to get tested for COVID-19

when symptomatic. Unlike the males, most of the females also did not agree that there are sufficient numbers of COVID-19 testing centres in Enugu state; although analysis of both result was not statistically significant. (p-value- 0.49; p-value- 0.18 respectively).

Conclusion: COVID-19 diagnostic testing among medical students in Enugu state, Nigeria is sub-optimal and may result in an under-reporting of infections in Enugu state, Nigeria. Hence, the need for mass diagnostic testing and re-orientation cannot be overemphasized at both state and national level.

Recommendation: We recommend the provision of more affordable and reliable testing options by the Government. Increased sensitization on the availability of COVID-19 testing centers to medical students in Enugu state and the public in general would also be needed.

Keywords: COVID-19 testing, Challenges, Medical students, Southeastern Nigeria.

INTRODUCTION

COVID-19 is a highly contagious respiratory tract disease that has imposed a serious threat to the global health system since it was first originated in the city of Wuhan in China in December 2019.[1] It is caused by a viral organism known as Severe Acute Respiratory System Corona Virus Type 2 (SARS COV-2). [1, 2]It was, however, declared a public health emergency of international concern and pandemic by World Health Organization (WHO) on 30th January, and in March 2020 respectively. Since the inception of this deadly disease, according to WHO, about 256 million cases have been confirmed globally with at least 5 million deaths, 6.2 million confirmed cases and 151 thousand deaths in Africa, and about 213,589 confirmed cases in Nigeria with about 2,974 deaths.[2] In addition, since the COVID-19 pandemic, there has been a significant negative effect on medical education for medical students and surgical residents in Nigeria. [3, 4]

In the case of serious biohazards, such as viral outbreaks, diagnostic laboratories play an essential role in the rapid and accurate detection and isolation of new microorganisms using the cornerstone in diagnostic virology, which are the molecular diagnostic techniques.[5] The diagnosis of SARS-CoV-2 infection based on clinical features alone is often confused with that of influenza and seasonal upper respiratory tract viral infections as they present with similar signs and symptoms.[6] As with any other infection, the gold standard for diagnosis is the identification of the infectious agent. In the case of viral infections, this identification can be made by visualizing viral particles at electron microscopy or identifying intracellular viral inclusions at light microscopy.[7] Since the initial cases of pneumonia of unknown cause were first reported, viral culture and genetic sequencing of isolates obtained from these patients

identified a novel coronavirus as the etiology within 10 days in January 2020. This benefitted understanding of the disease occurrence and transmission, as well as diagnostic test development.[8] Although viral culture is relatively time-consuming and labor-intensive, it is much more useful in the initial phase of emerging epidemics before other diagnostic assays are clinically available.

The first test for COVID-19 diagnosis that Centre for Disease Control (CDC) distributed, released in February 2020, is the CDC 2019-Novel Coronavirus (2019-nCoV) Real-Time RT-PCR Diagnostic Panel, a test that accurately detects SARS-CoV-2 in respiratory specimens. Since CDC's first test was developed, many commercially available options for SARS-CoV-2 testing have been authorize.[9] Up till now, the gold standard method for identifying genetic material from SARS-CoV-2 remains real-time polymerase chain reaction (RT-PCR). Serological assays provide an alternative diagnostic approach for the current rapidly growing demand for rapid diagnosis of suspected patients and asymptomatic infections.

In South Korea, they dramatically hindered the COVID-19 outbreak by establishing an unprecedented national testing effort as they successfully managed to perform more than 300,000 tests in the first 9 weeks after identifying the first case of COVID-19.[10] This implies that the ability of any country to curtail an invading pandemic is highly dependent on the diagnostic capacities in terms of the highly equipped laboratories and the trained personnel. Generally, health infrastructure in particular, laboratory facilities with trained personnel is very limited in sub-Saharan African countries, Nigeria inclusive.[11]SARS-CoV-2 infection testing is problematic in this part of the world due to financial constraints[12] in both the aspects of the health care systems to procure trustworthy testing kits and the individuals to pay for testing. Many other factors in addition play key roles in hampering the effectiveness and progress of COVID-19 testing events. These countries have no domestic capacity to manufacture nasopharyngeal swabs, analytical reagents and COVID 19 kits for SARS-CoV-2 testing [13] and hence, depended on the provision from other highly equipped countries like China for the procurement of COVID-19 testing kits, and other reagents. When Nigeria

reported its first case of the virus on 27th February 2020, it had only five laboratories in four states able to test for COVID-19.[14]

Currently, almost all the major hospitals in Nigeria have testing kits but still very minimal to sub-serve the most populated country in Africa. This is a cause of concern especially since the acceptance rate of COVID-19 vaccines among healthcare workers is still less than optimal. [15]The focus of this study is on final year medical students being the future medical doctors. Ideally, final year medical students would have the expected level of knowledge about COVID-19. [16] The study aims to identify the major challenges towards COVID-19 testing among final year medical students in Enugu state, Nigeria.

METHODS

Study area and design

This study was a cross-sectional conducted among the final year medical students in Enugu State, Nigeria which is a low income country according to the World Health Organisation. There are a total of six universities in Enugu, of which four are private, one federal and one state. Among these six universities, only two offer medicine and surgery as a discipline and these include: theUniversity of Nigeria Enugu Campus, a subset of the University of Nigeria, Nsukka, Enugu, Nigeria, with about 180 final year medical students and the Enugu State University of Science and technology with about 80 final year medical students. Health service to students of the said institutions is sub-served by the medical centers located inside the campus but however, these hospitals don't have instruments for COVID-19 testing.

Study population and procedure

Final year medical student in Enugu state participated in the research. Questionnaires were distributed through the emails, social media, WhatsApp and Telegram. There was a lead representative in each of the institutions who helped with the distribution of tforms and sending regular reminders to limit non-response bias. Responses were collected from the respondents who agreed to the terms of the research and willingly gave their consents.

Data collection and methods

The data was collected with digitalized self-administered questionnaire created using Google form. The questionnaire design was made by the authors and guided by recommendations from the strategic advisory group of experts on immunizations (SAGE) vaccine hesitancy survey sample questions which were adapted to suit the Nigerian setting. [17]

A panel of experts was set up to help validate the questionnaire. Measures were put in place to limit all forms of survey bias using random question-answer ordering, regular contacts to limit non-response bias and social order bias in designing the questions.

The questionnaire has three sections:

Section 1 assessed socio-demographic characteristics of the respondents like age, sex, marital status, religion, and ethnicity.

Section 2 assessed knowledge of COVID-19 disease. The awareness of the symptoms, incubation period, mode of transmission and those at risk were assessed from the respondents.

Section 3 assessed the challenges of COVID-19 testing. In this section, respondents were assessed on the knowledge of the availability of COVID-19 testing categories, and their testing status.

However, using a Likert scale, the factors affecting the respondents' willingness to be tested were assessed; a range of score 1-5 was assigned with one as the lowest and five as the highest.

Statistical Analysis

Data analysis was carried out using Statistical package for Social Sciences (SPSS) by IBM. The data was reviewed and cleaned before analysis. Descriptive analyses were conducted to determine frequencies and proportions of categorical variables in the total study sample.

RESULTS

Social Demographics characteristics of Respondents

A total of 137 responses were received from the final year medical students. Response rate was 76% as 180 forms were sent to the medical students at both universities. Majority of the respondents were within the age range of 20-29 years (94.9%). Most were males (59.1%), 96% were Christians, 97% were single and 80.9% are of Igbo ethnicity.**(Table 1)**

Majority in our study believed that the incubation period ranges from 2-14 days (72.9%).

89.7% of the respondents answered that the disease could be transmitted via droplet, airborne transmission (63.2%), direct contact with infected people (61%), contact with infected surfaces (60.3%%), and feco-oral transmission (9.6%).

Table 1: Demographic study result of respondents

Variables	Frequency (n, %)
Age (years)	
15-19	3 (2.2)
20-24	78 (56.9)
25-29	52 (38)
>29	Nil
Gender	
Male	81 (59.1)
Female	56 (40.9)
Religion	
Christian	131 (96.3)
Muslim	1 (1.1)
African traditional religion	1 (1.1)
Others	2 (1.5)
Marital status	
Single	133 (97.1)
Married	4 (2.9)
Divorced/separated	Nil
Widowed	Nil
Ethnicity	
Igbo	110 (80.9)
Yoruba	4 (2.9)
Others	14 (16.2)

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204 **Table 2a- Relationship between gender and likelihood of being tested when**
205 **symptomatic**

	No	Yes	P-value	Chi-square
Fema	50	6	0.49	0.49
le	42.0%	33.3%		
Male	69	12		
	58.0%	66.7%		

Table 2b- COVID-19 testing centres in Enugu state Nigeria for symptomatic individuals

			Agreed	Disagree	Neutral	Strongly agree	Strongly disagreed	p-value	chi-square
		Female	15	25	8	2	6	0.18	6.25
			32.6%	52.1%	44.4%	18.2%	42.9%		
		Male	31	23	10	9	8		
			67.4%	47.9%	55.6%	81.8%	57.1%		

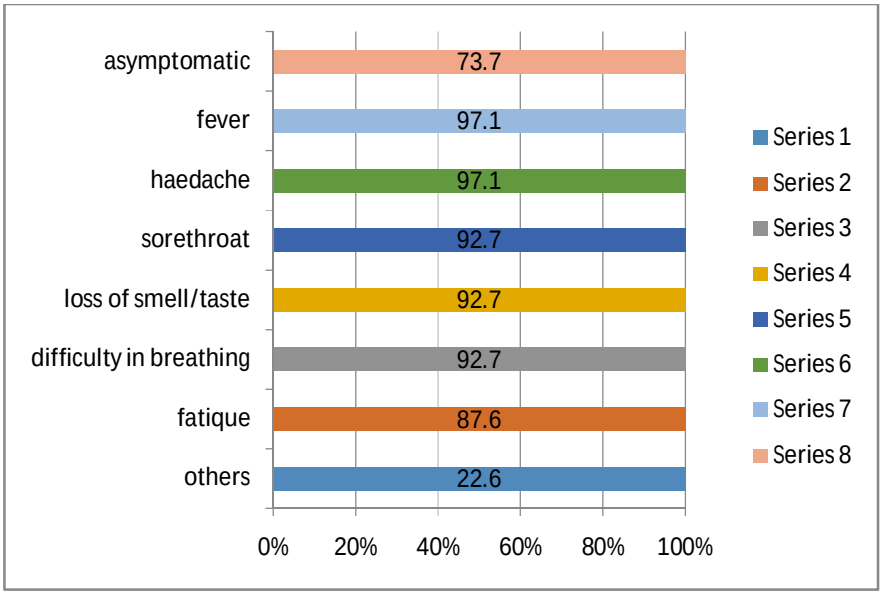

Figure 1- Knowledge of the medical students on the symptoms of COVID-19

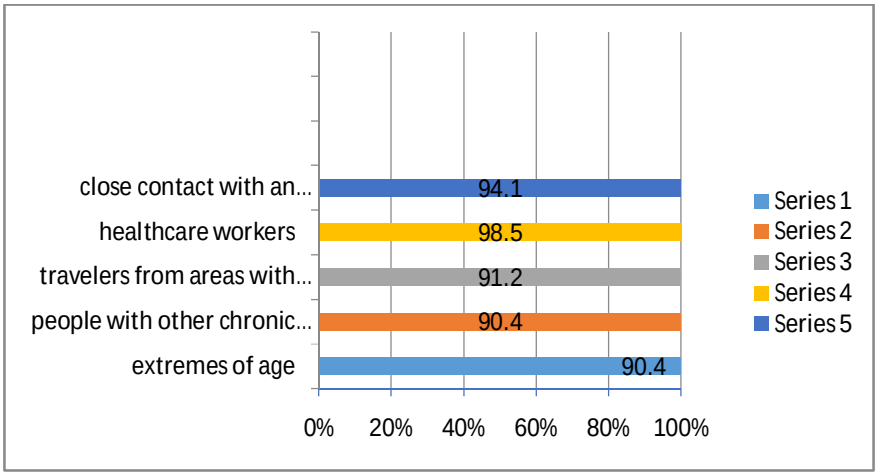

Figure 2- Knowledge of the medical students on the risk of contracting the disease

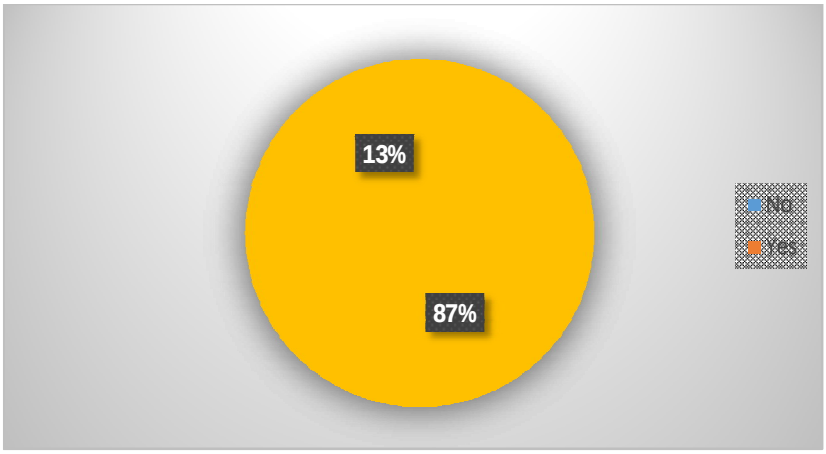

Figure 3- Have you being tested for COVID-19 during your symptomatic periods?

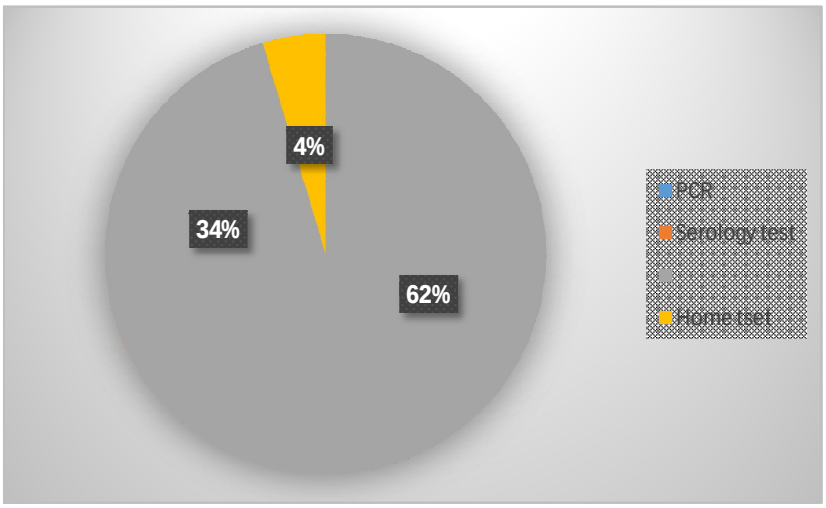

Figure 4- Information by the medical students on their awareness of Covid-19 testing methods

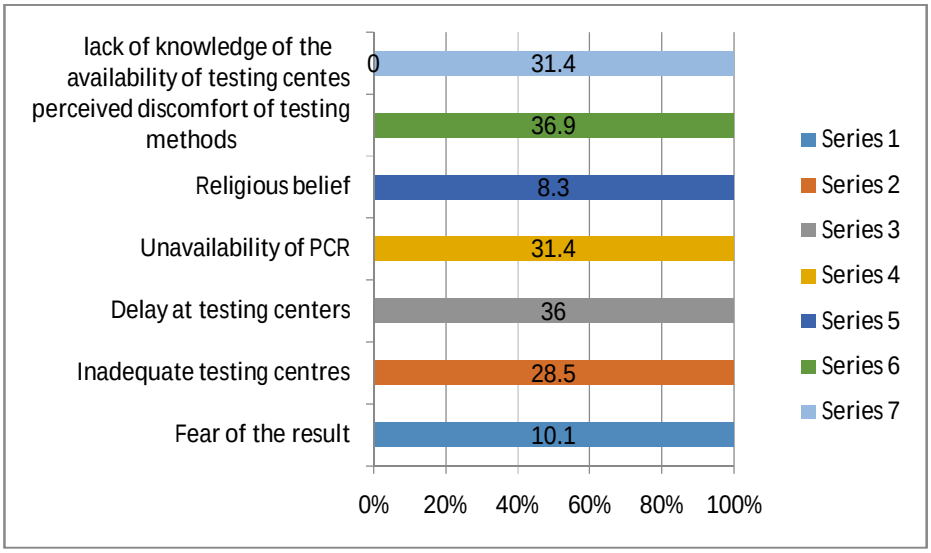

Figure 5- Major reason for not being tested for COVID-19 by the medical students from the survey

DISCUSSION

The result shows that 86.8% have not been tested which is in contrary to the intended and recommended mass testing by the World Health Organization. The two major reasons for

reduced COVID-19 testing as portrayed in the result is delay at the testing centers, unavailability of testing centers and the perceived discomfort of testing processes.

The fear is that this population is among the elites that is expected to have a positive health seeking attitudes and should have significant number of the individuals tested but unfortunately, the reverse has become the case. This shows that it could even be worst outside in the general population.

Knowledge of COVID-19

As shown in figure 1, most of the respondents believed the disease can be asymptomatic (73.7%), this is satisfactory, based on similar findings in a systematic review study by Zao G. et.al. which showed there is increasing evidence that many patients with COVID-19 are asymptomatic or have only mild symptoms, but they are able to transmit the virus to others.[18] Additionally, the percentage awareness of each symptom assessed showed an above 90% knowledge among the study participants for all symptoms assessed such as fever, headache, sore throat, loss of smell, cough, difficulty in breathing and fatigue. This gives more affirmation to the quality of the medical curriculum in giving adequate knowledge on prevention of transmissible diseases.

Respondents' view on those at high risk of contracting the disease is as follows can be seen from figure 2; it showed a very high level of belief of infectivity with above 90% for the various sources of infection risk assessed, with the healthcare workers believed to have the highest risk. This supports findings from a similar study by Naveed M. et.al were the rate of COVID-19 was high amongst healthcare workers. [19]

Awareness on the availability of COVID-19 testing categories (figure 3)

Among the respondents about 61.8% are aware that viral PCR test is available, and 33.6% believed antibody or serology test are also available. These commonly available testing

methods (PCR and serology) for COVID-19 are proven to provide vital information about the corona virus disease and help in diagnosis. [20]

Majority of the respondents indicated that they have not been tested for COVID-19 infection (86.8%) (figure 3). This is not encouraging and calls for a more intense sensitization and medical education to help develop an in-depth level of understanding of the pathology and need for testing when they have the symptoms. While Figure 4 shows the percentage of awareness of the testing methods; in figure 5, we found out that, in a decreasing order, the causes of not being tested for COVID-19 in our study amongst the participants include the a perceived discomfort in testing methods, delay at testing centres as topmost reasons; others were unavailability of enough testing centres, fear of the result outcome, religious belief, and others expressed lack of awareness of the available testing centres. This findings differ from a study by Amoo OS et.al were insufficient funds and a crowded testing centre were major reasons alluded to by the respondents as reasons for not getting tested. [21] The deficiency in the number of individual tested simply brings to light the limited supply of testing kits and the financial incapability of many individuals.

More importantly, from the correlative analysis done in this study, as shown in tables 2a and 2b, females were more likely not to get tested for COVID-19 when symptomatic. Unlike the males, most of the females also did not agree that there are sufficient numbers of covid-19 testing centres; although analysis of both result were not statistically significant. (P value- 0.49, Chi-square- 0.49; P value- 0.18, Chi-square value- 6.25 respectively).

The World health organization once said at the early phase of the pandemic that the absence of positive case in a country might not necessarily mean absence of the disease but the inability of the country to put up diagnostic testing measure to identify the ongoing cases. [22] This can as well be said in the case of COVID-19 pandemic in Nigeria, under reporting of cases does not mean the transmission has been reduced.

CONCLUSION

Majority of the respondents indicated that they were not tested for COVID-19 infection even when they had suggestive symptoms in the pandemic with most of the participants having a fair knowledge of available test options for COVID-19. The knowledge of symptoms, incubation period, and available testing methods was satisfactory among the final year medical students in Enugu state, Nigeria. Perceived discomfort with the testing methods and delay at the test centre were the leading reasons for not being tested.

RECOMMENDATION

Large-scale testing is not without challenges; however, the needs cannot be overemphasized. African context is unique and so must be its responses to the SARS-CoV-2 pandemic especially as the hospital response to COVID-19 pandemic and awareness creation amongst institutions in Nigeria have been reported to be relatively inadequate. [23]

Making testing more available and affordable and re-orientation of the citizens on the need for COVID-19 testing while working on expanding the healthcare capacity will contribute to effective responses to the pandemic.

Ethical Approval and consent

Ethical approval was obtained from the ethical committee of the University of Nigeria Enugu Teaching Hospital, Ituku-Ozalla, Enugu, Nigeria**.** The number assigned to the ethical clearance issue is NHREC/05/01/2008B-FWA0000245 8-1RB00002323.Theinformation obtained from the study was handled confidentially. Personal identifications of respondents were precluded from the study tool. Respondents were informed that their participation was voluntary and consent was implied by completion of the questionnaire.

DECLARATION OF CONFLICT OF INTEREST

The authors declare they have nothing to disclose

DATA: This would be released with permission of the corresponding author

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ARTIFICIAL INTELLIGENCE DISCLAIMER:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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