Original Research Article

Knowledge of COVID-19 Vaccine and Factors that Influence its Acceptance among Patients Living with Chronic Medical Conditions in Nigeria.

ABSTRACT

Aims: vaccines against COVID-19 have been developed but there are not enough vaccines for everyone. Special groups of people, such as those with chronic health conditions, must being prioritized. This study investigates the factors that promote disproval to COVID-19 vaccination for people living with chronic medical diseases in Nigeria.

Study design: Cross-sectional study.

Place and Duration of Study: University College Hospital between October, 2021 – December, 2021

Methodology: 387 adults with chronic medical conditions were sampled via an offline questionnaire using a cross-sectional design. Convenience sampling was used to recruit participants. The information was collected using a validated structured questionnaire adapted from the study carried out in Bangladesh by Saifu et al and entered into the Stata MP 14.0. To summarize the data, descriptive statistics such as mean, frequency, and percentages were used, and Chi-square analysis was used to test hypotheses with an Alpha level of 0.05

Results: The majority of responders (69.5 %) correctly identify the modes of transmission. . . While the knowledge of COVID-19 infection was found to be statistically correlated with the age, gender, education, income and ethnicity, the knowledge of the COVID-19 vaccine is significantly correlated with education and occupation. The respondents' income, occupation, and education were significantly correlated with their desire to receive the vaccine at p value of <0.01.

Conclusion: The results highlight the need to step up efforts to inform Nigerians adults about the COVID-19 infection and the available vaccines, especially those who have chronic medical conditions.

Keywords: COVID-19, Vaccine Acceptance, Patients, Chronic Diseases, Nigeria (Source: MeSH-NLM).

1. INTRODUCTION

The COVID-19 pandemic has continued to impose great morbidity, mortality, and economic burden on the global community. Its significant contribution to the rising incidence of psychosocial distress in places all around the world is something not to be taken lightly of.[1] Until March 2021, D'agostino et al reported that there were more than 121 million confirmed cases globally. This number alongside its confirmed deaths kept increasing daily, especially in areas where new variants had recently emerged from. [2,3] Nigeria was among the top five countries with the most reported cases in Africa.[4] Though until recently the world still hadn't found the cure for COVID-19, joint collaboration had successfully developed highly efficacious vaccine which helps prevent severe COVID-19 manifestations; and ultimately, death.[5] These vaccines are our current hope in ending the pandemic, therefore the government needed to ensure the rapid development, subsequent equitable access, and timely distribution of the COVID-19 vaccine .[6]

About 58 vaccines against the disease have been successfully developed,[7] and their administration since commenced worldwide.[2] The administration of the AstraZeneca COVID-19 vaccine started in Nigeria in March 2021.[8] However, the efficacy of this vaccination program in curbing the spread of the virus does not only depend on the efficacy and safety of the vaccine itself. It also depends on the willingness of members of society to get the vaccine, as this is necessary to promote herd immunity.[5] Countries like Ecuador, Malaysia, Indonesia, and China have been reported to have a high rate of acceptance of vaccine, but this is not the case in Africa.[9]

Several studies showed that people living with chronic diseases were highly concerned about the possible complications of COVID-19 as well as its management. [10,11]

At the moment, there are not enough COVID-19 vaccines for the general public.[12] Therefore, a multilevel system in vaccine distribution which prioritizes vaccine availability for certain elements of the population (i.e., people living with chronic conditions, medical workers) is essential for equity.[12] This population includes frontline healthcare workers, the elderly, and people living with chronic diseases.[13]

Studies had shown that factors which promotes disapproval against vaccination include, concerns about the vaccines safety and their perceived low effectiveness.[5,15] Factors which promotes approval towards vaccination include being elderly, high-income rate, and employer's recommendation.[6] Government-devised plans to heighten approval rate include making the vaccination process convenient, battling misinformation about the vaccine, providing correct information about the benefits and risks of vaccination.[14]

Only 24.6% of participants in research in South-South Nigeria said they intended to get the vaccine.[16] The global campaign for widespread COVID-19 vaccination is not currently leading in Africa. In his analysis of surveys conducted on the acceptance rate of COVID-19 in 33 countries, Sallam,[9] discovered that low rates of vaccine acceptance were reported in Russia, many European countries, and Africa. This would significantly hamper efforts being made around the world to contain the COVID-19 pandemic through vaccination.

Since the government and health care policymakers are working to ensure an equitable distribution of the vaccines despite their restricted supply, COVID-19 mortality and morbidity have been dramatically reduced.[12] Therefore, it is important to identify any potential and

real concerns of the target community regarding the adoption of the vaccination at an early stage.

There is also a need to strike a balance between educating the public about the importance of universal vaccine coverage and avoiding issues of coercion of vaccine recipients. In a developing country like Nigeria, where only about 62% of its population have some degree of education, coupled with the fact that only a total of about 0.13% of its two hundred million population size were affected by the COVID-19 infection, it was important to also assess the general level of knowledge of participants of the study. [22] The data collection process used in this study will also help to boost vaccine knowledge among the target demographic.

While there is a plethora of literature on the general public's willingness to accept the COVID-19 vaccine and the factors associated with this in other developed countries, [17-19] and an appreciable number of studies on the said topic in different parts of Nigeria. There are few studies at this time investigating the willingness of people living with chronic health conditions in Nigeria to be vaccinated against COVID-19. This study will therefore contribute to the body of knowledge about COVID-19 in Nigeria and serve as a basis for further research in this area of concern.

2. METHODOLOGY

2.1 Study design

This analytic cross-sectional study aims to assess the level of knowledge of COVID-19 infection, COVID-19 vaccine and factors that influence COVID-19 vaccine among patients living with chronic medical conditions in Nigeria. vaccine

2.2 Population and Sample

The study population comprises patients living with medical conditions for more than 6months that are receiving care at the University College Hospital. Respondents are adults 18 years old and above who are registered patients with the medical out-patient clinic, oncology clinic, hematology clinic, geriatric center, Surgical out-patient clinic, ophthalmology clinic, otorhinolaryngology clinic, and palliative center The sample size was calculated using the sample size formula for an unknown population19

2.3 Data Collection Instruments

A self and interviewer administered structured paper questionnaire written in the English spanned a duration of 8 weeks (mid-October, 2021 – early December, 2021). The questionnaire was adapted from the study carried out in Bangladesh by Saifu et al.20 The questionnaire contained three sections which collected information on respondents' socio-demographic details, knowledge of COVID-19 infection, knowledge of COVID-19 vaccine and willingness to obtain the vaccine.

2.4 Data Analysis

Analysis was done using the Stata MP 14.0. Descriptive analysis on the socio-demographic characteristics of the respondents was done. Test of association between socio-demographic characteristics and knowledge of COVID-19 infection and vaccine was done using Pearson's chi square test. Also, chi square test was used to determine factors associated with willingness to obtain the vaccine. Significance level of 0.05 was used for the analysis.

3. RESULTS AND DISCUSSION

3.1 RESULTS

[Table 1] The modal age group was 25-34years (43.9%). Women (60.5%) who responded were almost one and a half the number of male response (39.5%). More than half (53%) of the respondents were married. Respondents who had never attended any form of formal education and those with primary education made up 2.1% [n=8] of the population respectively; 31.5% [n=122] had secondary education while the majority had tertiary education 64.3% [n=249]. Slight above half (55.6%) of the respondents were from the South-West geo-political zone.

Table 1: Background Characteristics of the Respondents (n = 387) Among Patients with Chronic Medical Illness Attending the University College Hospital, Ibadan, Nigeria From Mid-October to Early December 2021

Variables	**Frequency**	**Percentage (%)**
Age, years		
18-24	67	17.3
25-34	170	43.9
35-44	94	24.3
45-54	24	6.2
55-64	16	4.1
>65	16	4.1
Gender		
Male	153	39.5
Female	234	60.5
Marital status	205	53.0
Married	160	41.3

Single	11	2.8
Divorced	11	2.8
Widowed		
Education		
No education	8	2.1
Primary	8	2.1
Secondary	122	31.5
Higher	249	64.3
Geopolitical zone		
North-Central	26	6.7
North-East	24	6.2
North-West	20	5.2
South-East	37	9.6
South-South	65	16.8
South-West	215	55.6
Occupation [a]		
Student	96	24.8
No current job	35	9.0
Unskilled job	91	23.5
Semi-skilled job	100	25.8
Skilled job	65	16.8
Income		
<₦11,000	22	5.7
₦11,000-₦20,000	15	3.9
₦21,000-₦30,999	12	3.1
₦31,000-₦40,999	59	15.3

₦41,000-₦50,000	141	36.4
>₦50,000	138	35.7
Religion		
Christian	279	72.1
Islam	104	26.9
Traditional	3	0.8
Others	1	0.3
Ethnicity		
Yoruba	291	75.2
Igbo	45	11.6
Hausa	44	11.4
Others	7	1.8
Ever willingly taken vaccine in the past		
Yes	136	35.1
No	197	50.9
Neutral	54	14.0
Obtained or willing to obtain COVID vaccine		
Yes	147	38.0
No	220	56.8
Neutral	20	5.2

[a:] Based on the level of training one needs to be in the occupation; Skilled Jobs: Jobs that require high expertise e.g lecturers, doctors, etc; Semi-skilled Jobs: Jobs that can by learn by apprenticeship, they require some level of training e.g tailoring, welding etc; Unskilled Jobs: Jobs that requires little or no training e.g trading etc

[Table 2] Statistically significant associations were found between knowledge of the COVID-19 infection and demographic characteristics age, gender, education, income, and ethnicity. Respondents of higher educational level have better knowledge of the virus.

Table 2: Chi-Square of Socio-demographic and Knowledge of COVID-19 Infection Among Patients with Chronic Medical Illness Attending the University College Hospital, Ibadan, Nigeria From Mid-October to Early December 2021

From the questions on knowledge of the infection, the maximum attainable score was 8. The scores have been categorized into poor knowledge (for scores 0 - 3), moderate (4 - 6) and high (7 - 8).

Variable (n=375)	**Poor** **Frequency (%)**	**Moderate** **Frequency (%)**	**High** **Frequency (%)**	***p*-value**
Age, years				0.01*
18-24	9 (13.4)	42 (62.7)	16 (23.9)	
25-34	22 (12.9)	112 (65.9)	36 (21.2)	
35-44	12 (12.8)	57 (60.6)	25 (26.6)	
45-54	1 (4.2)	16 (66.7)	7 (29.1)	
55-64	0 (0.0)	7 (43.8)	9 (56.2)	
>65	1 (6.3)	5 (31.2)	10 (62.5)	
Gender				0.02*
Male	19 (12.4)	82 (53.6)	52 (34.0)	
Female	26 (11.1)	157 (67.1)	51 (21.8)	
Marital Status				0.24
Married	22 (10.7)	124 (60.5)	59 (28.8)	
Single	19 (11.9)	104 (65.0)	37 (23.1)	
Divorced	1 (9.1)	8 (72.7)	2 (18.2)	
Widowed	3 (27.3)	3 (27.3)	5 (45.4)	
Education	1 (12.5)	6 (75.0)	1 (12.5)	<0.01*

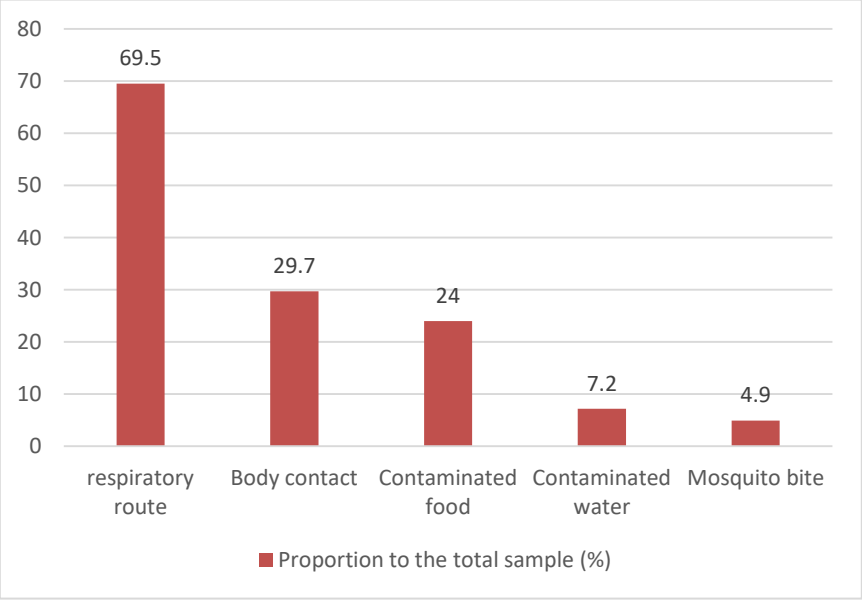
No education	1 (12.5)	4 (50.0)	3 (37.5)	
Primary	23 (18.9)	83 (68.0)	16 (13.1)	
Secondary	20 (8.0)	146 (58.6)	83 (33.3)	
Higher				
Geopolitical zone				0.42
North-Central	3 (11.6)	18 (69.2)	5 (19.2)	
North-East	3 (12.5)	12 (50.0)	9 (37.5)	
North-West	3 (15.0)	12 (60.0)	5 (25.0)	
South-East	9 (24.3)	18 (48.7)	10 (27.0)	
South-South	5 (7.6)	43 (66.2)	17 (26.2)	
South-West	22 (10.2)	136 (63.3)	57 (26.5)	
Occupation				0.11
Student	12 (12.5)	66 (68.7)	18 (18.8)	
No current job	2 (5.7)	21 (60.0)	12 (34.3)	
Unskilled job	12 (13.2)	53 (58.2)	26 (28.6)	
Semi-skilled job	16 (16.0)	61 (61.0)	23 (23.0)	
Skilled job	3 (4.6)	38 (58.5)	24 (36.9)	
Income				0.04*
<₦11,000	4 (18.2)	10 (45.4)	8 (36.4)	
₦11,000 - ₦20,999	3 (20.0)	7 (46.7)	5 (33.3)	
₦21,000 - ₦30,999	1 (8.3)	9 (75.0)	2 (16.7)	
₦31,000 - ₦40,999	6 (10.2)	48 (81.4)	5 (8.4)	
₦41,000 - ₦50,000	19 (13.5)	81 (57.5)	41 (29.0)	
>₦50,000	12 (8.7)	84 (60.9)	42 (30.4)	
Religion	35 (12.5)	167 (59.9)	77 (27.6)	0.08
Christian	9 (8.7)	69 (66.3)	26 (25.0)	

Islam	0 (0.0)	3 (100.0)	0 (0.0)	
Traditional	1 (100.0)	0 (0.0)	0 (0.0)	
Others				
Ethnicity				<0.01*
Yoruba	26 (8.9)	183 (62.9)	82 (28.2)	
Igbo	8 (17.8)	24 (53.3)	13 (28.9)	
Hausa	9 (20.5)	31 (70.5)	4 (9.0)	
Others	2 (28.6)	1 (14.3)	4 (57.1)	

*. Statistically significant associations

[Figure 1] The majority of respondents (69.5%) correctly identify the mechanism of transmission; only 19(4.9%) believe it is transmitted through mosquito bite.

Figure 1: Respondents Knowledge of the Routes of COVID-19 Virus Transmission Among Patients with Chronic Medical Illness Attending the University College Hospital, Ibadan, Nigeria From Mid-October to Early December 2021



[Table 3] The result of the test of association between respondents' knowledge of the vaccine and their demographic characteristics shows that education and occupation have significant association with knowledge of covid-19 vaccine.

Table 3: Chi Square of Socio-demographics and Knowledge of COVID-19 Vaccine Among Patients with Chronic Medical Illness Attending the University College Hospital, Ibadan, Nigeria From Mid-October to Early December 2021

From the questions on knowledge on COVID-19 vaccine, the maximum attainable score was 5. The scores have been categorized into poor knowledge (for scores 0 - 1), moderate (2 - 3) and high (4 - 5).

Variable (n=375)	**Poor Frequency (%)**	**Moderate Frequency (%)**	**High Frequency (%)**	***p*-value**
Age, years				0.05
18-24	41 (61.2)	18 (26.9)	8 (11.9)	
25-34	119 (70.0)	31 (18.2)	20 (11.8)	
35-44	59 (62.8)	21 (22.3)	14 (14.9)	
45-54	12 (50.0)	9 (37.5)	3 (12.5)	
55-64	6 (37.5)	7 (43.8)	3 (18.7)	
>65	5 (31.2)	7 (43.8)	4 (25.0)	
Gender				0.26
Male	88 (57.5)	42 (27.5)	23 (15.0)	
Female	154 (65.8)	51 (21.8)	29 (12.4)	
Marital	125 (61.0)	49 (23.9)	31 (15.1)	0.65
Married	105 (65.6)	36 (22.5)	19 (11.9)	
Single	7 (63.6)	3 (27.3)	1 (9.1)	

Divorced Widowed	5 (45.5)	5 (45.5)	1 (9.0)	
Education				0.02*
No education	6 (75.0)	2 (25.0)	0 (0.0)	
Primary	7 (87.5)	1 (12.5)	0 (0.0)	
Secondary	89 (72.9)	24 (19.7)	9 (7.4)	
Higher	140 (56.2)	66 (26.5)	43 (17.3)	
Geopolitical zone				0.73
North-Central	14 (53.8)	6 (23.1)	6 (23.1)	
North-East	14 (58.3)	7 (29.2)	3 (12.5)	
North-West	15 (75.0)	4 (20.0)	1 (5.0)	
South-East	26 (70.3)	7 (18.9)	4 (10.8)	
South-South	37 (56.9)	20 (30.8)	8 (12.3)	
South-West	136 (63.3)	49 (22.8)	30 (13.9)	
Occupation				<0.01*
Student	64 (66.7)	19 (19.8)	13 (13.5)	
No current job	20 (57.2)	11 (31.4)	4 (11.4)	
Unskilled job	61 (67.0)	23 (25.3)	7 (7.7)	
Semi-skilled job	70 (70.0)	21 (21.0)	9 (9.0)	
Skilled job	27 (41.5)	19 (29.2)	19 (29.2)	
Income	10 (45.5)	9 (40.9)	3 (13.6)	0.05
<₦11,000	11 (73.3)	2 (13.3)	2 (13.3)	
₦11,000 - ₦20,999	8 (66.7)	4 (33.3)	0 (0.0)	
₦21,000 - ₦30,999	46 (78.0)	7 (11.8)	6 (10.2)	
₦31,000 - ₦40,999	90 (63.8)	36 (25.5)	15 (10.6)	
₦41,000 - ₦50,000	77 (55.8)	35 (25.4)	26 (18.8)	

>₦50,000				
Religion				0.82
Christian	172 (61.7)	67 (24.0)	40 (14.3)	
Islam	66 (63.5)	26 (25.0)	12 (11.5)	
Traditional	3 (100.0)	0 (0.0)	0 (0.0)	
Others	1 (100.0)	0 (0.0)	0 (0.0)	
Ethnicity				0.27
Yoruba	181 (62.2)	74 (25.4)	36 (12.4)	
Igbo	27 (60.0)	11 (24.4)	7 (15.6)	
Hausa	31 (70.5)	7 (15.9)	6 (13.6)	
Others	3 (42.9)	1 (14.2)	3 (42.9)	

*. Statistically significant associations

Table 4 highlights that the respondents' education, occupation and income had a significant association with their acceptance or willingness to receive the vaccine.

Table 4: Chi-square of Socio-demographics and Willingness to Obtain the Vaccine Among Patients with Chronic Medical Illness Attending the University College Hospital, Ibadan, Nigeria From Mid-October to Early December 2021

Variable (n=367)	**Yes Frequency (%)**	**No Frequency (%)**	***p*-value**
Age, years	26 (40.6)	38 (59.4)	0.11
18-24	60 (37.0)	102 (63.0)	
25-34	32 (36.0)	57 (64.0)	
35-44	12 (50.0)	12 (50.0)	
45-54	8 (50.0)	8 (50.0)	

55-64 >65	9 (75.0)	3 (25.0)	
Gender			0.65
Male	61 (41.5)	86 (58.5)	
Female	86 (39.1)	134 (60.9)	
Marital			0.41
Married	83 (43.0)	110 (57.0)	
Single	55 (35.7)	99 (64.3)	
Divorced	4 (36.4)	7 (63.6)	
Widowed	5 (55.6)	4 (44.4)	
Education			<0.01*
No education	4 (50.0)	4 (50.0)	
Primary	3 (42.9)	4 (57.1)	
Secondary	30 (25.9)	86 (74.1)	
Higher	110 (46.6)	126 (53.4)	
Geopolitical zone			0.11
North-Central	15 (57.7)	11 (42.3)	
North-East	10 (43.5)	13 (56.5)	
North-West	6 (30.0)	14 (70.0)	
South-East	11 (33.3)	22 (66.7)	
South-South	31 (50.8)	30 (49.2)	
South-West	74 (36.3)	130 (63.7)	
Occupation	29 (31.9)	62 (68.1)	<0.01*
Student	12 (38.7)	19 (61.3)	
No current job	31 (37.4)	52 (62.6)	
Unskilled job	36 (37.1)	61 (62.9)	

Semi-skilled job	39 (60.0)	26 (40.0)	
Skilled job			
Income			0.02*
<₦11,000	9 (40.9)	13 (59.1)	
₦11,000-₦20,999	5 (38.5)	8 (61.5)	
₦21,000-₦30,999	2 (18.2)	9 (81.8)	
₦31,000-₦40,999	12 (21.4)	44 (78.6)	
₦41,000-₦50,000	56 (42.7)	75 (57.3)	
>₦50,000	63 (47.0)	71 (53.0)	
Religion			0.44
Christian	108 (40.7)	157 (59.3)	
Islam	39 (39.8)	59 (60.2)	
Traditional	0 (0.0)	3 (100.0)	
Others	0 (0.0)	1 (100.0)	
Ethnicity			0.67
Yoruba	112 (40.7)	163 (59.3)	
Igbo	16 (39.0)	25 (61.0)	
Hausa	15 (34.1)	29 (65.9)	
Others	4 (57.1)	3 (42.9)	

3.2 DISCUSSION

This study is a hospital-based study that was done to determine the knowledge about COVID-19 infection COVID-19 vaccine, and factors that influence vaccine acceptance among adults living with chronic disease in Ibadan, Nigeria. Most of our participants had an accurate knowledge of the mode of transmission of the COVID-19 infection (69.5%, respiratory route; 29.7%, body contact). This result is similar to other studies done in Ibadan and Nigeria. [21,22]

The increase in knowledge could be attributed to the widespread dissemination of information concerning the COVID-19 virus during the pandemic by federal and state governments, health institutions, and religious bodies. However, we believe there are misconceptions in the general Nigerian population on the disease as about one-third of our participants believe that the virus can be transmitted via body contact. We found also, that there was a significant association between the level of education and the knowledge of the COVID-19 infection. This is consistent with results from other studies done in China, and Egypt and a contradiction to an earlier study done in Ibadan to assess the level of knowledge on COVID-19.[22] Our study seems to be a more accurate representation of the current level of knowledge, as the previous study was done in mid-2020 at a time when the virus was relatively new and the level of rumors and misinformation surrounding the infection were significantly higher.

In our study, we found that a number of other socio-demographic factors such as age, gender, income, and ethnicity have significant associations with the knowledge of the COVID-19 infection among participants. Older male is shown to have a higher knowledge of COVID-19 compared to younger females, with a result similar to the previous study done in Nigeria.[23] Higher income is also associated with a higher knowledge level, but this is expected as high-income earners are likely to be more educated. The good knowledge of COVID-19 infection among the respondents could possibly be from the constant visitation or admission in the hospital environment which in itself is a source of health-related information to the patient. These patients and their family get to interact with healthcare professionals more frequently compared to other patients that are in the hospital for acute illness or other reasons.

Respondents who had higher level of education and people who worked at a skilled job had high level of knowledge about the vaccine, and this result was found to be similar to several other studies done in Ibadan and from other parts of Nigeria. [22]

As much as we recorded a significant level of knowledge about the COVID-19 vaccine among the participant, there was a high level of general misconception and misinformation concerning the vaccine. Similar finding was noted in a separate study in Ibadan. [24] Similarly, to the level of knowledge of the COVID-19 vaccine, we found a high level of acceptance among participant with higher level of education and those that have a skilled job compared to those with primary, secondary, no education and those not in skilled jobs respectively. This could imply that the high level of knowledge found among participants with

higher level of education has helped dispel some of the misconceptions and misinformation about the COVID-19 vaccine thereby increasing vaccine acceptance. This had a similar proportion to another study done in Ibadan. [24] However, it must be noted that even among these participants with high level of education only about 46% were willing to obtain the vaccine.

From our study, income was another factor that was associated with the willingness to obtain the vaccine which is in consonance with some other studies done in North America and Europe. [25-28] We found that the highest percentage of acceptance (47%) were found among the higher income participants. However, most participant across all income level will rather not take the vaccine. These findings show that even with prevailing general knowledge about the COVID-19 infection and vaccine, there is a need to promote awareness to help drive a positive attitude towards improving the willingness to obtain the COVID-19 vaccine.

4. LIMITATIONS

Convenience sampling was used in recruiting the respondents, this might affect the generalizability of the study as there is a risk of selection bias being introduced. The study does not investigate the reasons why respondents are willing or unwilling to take the Covid-19 vaccine and subsequent studies should explore this.

5. CONCLUSION

This study reveals that Nigerians have a good knowledge of the COVID-19 virus and vaccine, but there is still a lot of work needed to address Vaccine hesitancy, as good knowledge does not necessarily always translate to willingness to uptake vaccines. Misconceptions and misinformation must be addressed across the different socioeconomic strata in other to improve willingness to uptake the COVID-19 vaccine in the general population.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal

ETHICAL APPROVAL

All authors hereby declare that this study was approved by the ethical review boards of the University of Ibadan/University college hospital Ibadan with ethical approval number

NHREC/05/01/2008a and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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