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Original Research Article

Knowledge, attitude, and perception of monkeypox among medical/health students across media space in Nigeria

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ABSTRACT

Background: Monkeypox is a rare disease caused by infection with the Monkeypox virus (MPXV). Although monkeypox existed and declined in the past, its re-emergence is simultaneous with the rise in cases recently.
Methods: This study utilized a non-interventional, anonymous, self-administered web-based survey through a descriptive cross-sectional design to collect data from medical/health students (undergraduate, graduate, and postgraduate students). The E-questionnaire was administered from 22nd July to 5th August through social media, and the data collected and extracted through an excel spreadsheet was analyzed using IBM SPSS Statistics 26.0.
Results: A total of 203 respondents were obtained from 22nd July to 5th August, out of which 109 (53.7%) were females, 92 (45.3%) were males with 18-25 years (63.5%), 25-30 years (26.6%), <30 years (7.4%) and <18 years (2.5%) age groups. Of the total respondents, 94.1% have heard about monkeypox before, 59.1% believed that monkeypox could be managed, 80.8% believed that monkeypox is zoonotic but can be transferred from human to human, and the majority (60.1%) are aware of the symptoms of monkeypox.
Conclusions: Medical/health students across social media show a relatively high knowledge of the Monkeypox virus with significant knowledge gap regarding the evolving epidemiologic and clinical manifestations, and the variety of components implicated in monkeypox transmission. Nonetheless, the knowledge is to be sustained and reinforced through continued awareness on social media and in rural areas with a high percentage of basic internet coverage and literacy. In order to direct proper surveillance, data collecting, readiness, and response operations, public health/surveillance capacities in Nigeria must be urgently developed.

Keywords: Monkeypox, Nigeria, Knowledge, Attitude, Perceptions, Social media

INTRODUCTION

Monkeypox is a disease caused by the Monkeypox virus (MPXV), which is a double-stranded DNA virus (≈197 kb) belonging to the genus Orthopoxviruses in the family Poxviridae and multiplies in the cytoplasm.[1,2] Monkeypox virus is known to have an oval structure when viewed with electron microscopy, with the size ranging from 200-400 nm[3]. Apart from the Monkeypox virus, there are three other species of the genus Orthopoxvirus: the Variola

virus, Cowpox virus, and Vaccina virus.[4] According to WHO, MPXV is the most important Orthopoxvirus infection in humans, making it the most viral zoonotic disease prevalent in central and West Africa.[1] MPXV was first reported in 1959 as an outbreak of a pox-like disease in monkeys kept at a research institute in Copenhagen, Denmark.[5] Several years after, there was the advent of the first human case of MPXV in medical history. The exact animal reservoir is still unknown, but in Africa, it is found among rodents, squirrels, reptiles, birds, and monkeys.[6] There are two possible modes of MPXV transmission: animal-human and human-human transmission. Human-human transmission could be by droplets and direct contact with infected skin lesions and/or contaminated materials.[2] The incubation period of MPXV is between 6-13 days, although some range from 5-21 days. The outbreak of human infection of monkeypox could be due to the discontinuation of the smallpox vaccination campaign.[7] Also, it could be to a close interaction between humans and the reservoir host of the virus because MPXV can infect a wide range of small animals.[7] The consumption of bush meat has also been a potential risk factor.[7] The unprecedented pathogen outbreak is due to its genetic sequences; scientists have investigated over a hundred infections. Several pieces of the literature confirm that the DNA virus has relatively large genomes and mutates easily.[8] As a result, examining the sequences might be less fruitful in tracking how the virus spreads from person to person. The increased number of human monkeypox cases demonstrates healthcare workers' importance of prevention, early detection, and quick response and management.[9] However, according to WHO, the lack of knowledge of monkeypox has been shown as one of the challenges faced in preventing the re-emergence of monkeypox.[10] Although the infection is still endemic in Nigeria, it is crucial for medical students, microbiology students, and healthcare workers to be knowledgeable and prepared for monkeypox since Nigeria is one of the countries that have numerous business establishments and few tourist destinations, which could increase its vulnerability to the importation of human Monkeypox virus.

The aim of the study was to assess the rise in cases of the Monkeypox virus in Nigeria. As a result, we sought to assess the background knowledge of monkeypox among medical/health students across media space in Nigeria.

METHODS

Study area

Figure 1 shows areas the study occurred across various social media spaces throughout Nigeria.

Data collection

This study used a non-interventional, anonymous, self-administered, web-based survey to investigate Nigerian medical and health students' knowledge, attitude and perception about the Monkeypox virus. This research used a descriptive cross-sectional study design to collect data from medical and health students (undergraduates, graduates, or postgraduates). The study utilized an online questionnaire delivered to participants between the periods of 22nd July to 5th August 2022. The online questionnaire was created on Google forms, posted on several social media platforms, and accessible by students across all 36 states of the country.

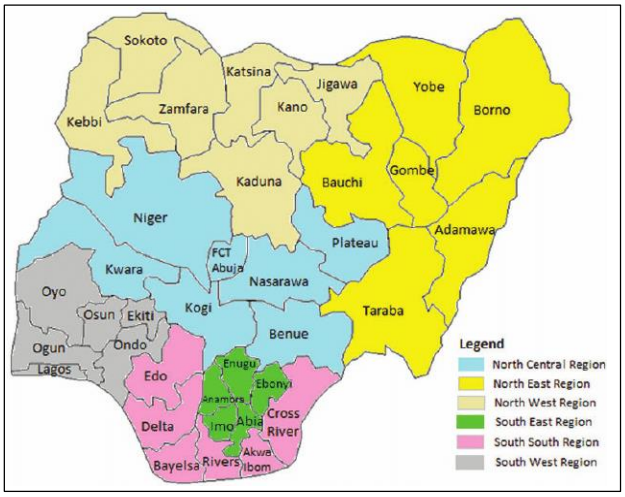

Figure 1: Map of Nigeria showing the study areas (36 states), extracted from Gayawan et al 2014.[16]

Questionnaire design

The authors designed the questionnaire based on the information and basic protective measures about Monkeypox virus acquired from the CDC, WHO, and NCDC. The online questionnaire consisted of four main divisions: demographics, knowledge assessments, symptoms, causes and consequences, transmission, clinical presentation and the diagnosis to extract attitude and perception component. Demographics included questions about sex, age, level of education, type of tertiary education, course of study, work and ethnicity. The knowledge assessment component tested respondents' understanding of the Monkeypox virus, including if they had heard of the disease previously, where they had heard about it, whether it could be treated, and whether it could spread from person to person.

Furthermore, we wanted to know if the participants knew about the symptoms, causes and consequences of monkeypox. Questions about the symptoms, causes and consequences of monkeypox included the symptoms of monkeypox, the year of the recent outbreak of monkeypox, the causative pathogen of monkeypox and the clinical presentations of monkeypox. Participants choose the right response from various options to answer the questions above. The participants' understanding of monkeypox transmission, clinical manifestation, and diagnosis was evaluated. The potential mode of transmission was close contact with an infected person or animal, close contact

with a skin lesion, body fluid and contaminated material, close contact with material contaminated with the virus, and close contact with a monkey. Participants had the option to choose strongly disagree, disagree, agree, and uncertain as their answers to the question above. On attitude and perception, we also questioned the participants' knowledge about the diagnosis of monkeypox and what health workers should do when they suspect monkeypox. After that, participants were asked about the preventive measures for monkeypox. Preventive measures include raising awareness of risk factors, educating people on the measures they can take to reduce exposure, more research and scientific study, and educating healthcare workers on handling specimens of suspected or confirmed Monkeypox virus infection. Participants responded to the above question with strongly agree, disagree, agree, and undecided. Finally, participants were prompted to rate their level of familiarity with the risk factors of monkeypox. The risk factors of monkeypox include animal bites, scratches from infected rodents, close association with rodents, and caring for a patient with monkeypox. Participants' responses included: strongly agree, disagree, agree, and undecided.

Before distributing the survey to participants, a pilot test was conducted too, and the necessary revisions were made. Personal identifiers were not collected, and participation in the study was entirely voluntary.

Statistical analysis

An excel sheet was automatically generated from the online questionnaire, allowing us with or to perform the statistical analyses. Statistical analyses were carried out utilizing IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. (Armonk, NY: IBM Corp). P value considered for the study was 0.05.

RESULTS

A total of 203 respondents were received for this study as of 5th August 2022, which was the data cutoff collection date for the online survey with a 100% completion rate.

Socio-demographic characteristics of participants

This study enrolled a total of 203 respondents. Of these, 109 (53.7%) were female, 92 (45.3%) were male, and those who did not disclose their gender were 2 (1.0%) as shown in Table 1. Most of the respondents were between the age group 18-25 years (63.5%), 26.6% were between the age group 25-30 years, 7.4% were between the age group >30 years, and 2.5% were between the age group <18 years. Respondents were students from different ethnic groups studying medical-related courses, and more than 50% of the respondents were undergraduates in different universities. Our research shows that above average of the correspondent (76.4%) has no medical-related job even though they studied/are studying medical and health-related courses, yet 70% of all the correspondent knows about monkeypox through social media/the internet; this informs us that social media is an ideal space for disseminating information and creating awareness. Considering the ethnicity of the correspondent from all the regions of Nigeria taken into consideration from North Central, North East, north-west, Southeast, South-South, and South West, each region has the percentage result of (10.3%, 9.4%, 10.8%, 5.4%, 17.2%, 46.8%) respectively.

The result from Table 1 above shows that the southwest of Nigeria is more informed about monkeypox and more sensitization needs to be done in other regions by the government and public health practitioners to curb the tendency of Nigeria to have a full-blown pandemic due to ignorance. Comparing the knowledge of monkeypox in Nigeria with the study in Indonesia on knowledge of monkeypox, the study shows a low level of knowledge of monkeypox (<10%) among general practitioners in Indonesia compared with Nigeria, which has about 78.75% of correspondents with a high level of knowledge about the infection as mentioned above.[8]

Social media are often seen as fast and effective platforms for searching, sharing, and distributing health information among the general population.[11] This goes with our findings, from the results a high percentage of respondents got information about monkey pox disease from social media/internet.

Source of information about monkeypox

The respondents of this study had information about monkeypox from varied sources, of which (70%) received information through social media/internet, 14.8% from family and friends, 6.4% at the hospital, 3.9% at school, 3.4% at a community health center, 0.5% at church/mosque, 0.5% of the respondents cannot really remember the source they had information about monkeypox from while 0.5% haven't heard about monkeypox before. Figure 2 shows different sources of information gotten from respondents

As much as 94.1% of the correspondent has heard about monkeypox, and the majority understands what it is about, following some of the responses received as regards the knowledge and transmission of monkeypox from Table 2 and 3 with above-average knowledge of the questions related to monkeypox. Nonetheless, there is a great need to contemplate more training, sensitization and awareness to the remaining population to enable transmission to the community. The risk factors of monkeypox are also an important aspect that needs to be looked into as the correspondent has no definite and clear understanding due to the diverse ranges of the result given. As seen in the study, it is essential that the government and public health practitioners officially adopt precise, systematic and explicit communication to build the gap in monkeypox knowledge. This communication comprises but is not restricted to the use of social media/internet, media, hospitals, health authorities and tertiary Institutions to help

design effective campaigns on various information about monkeypox, diagnostic method, risk factors and other aspects. For uniformity, dependable and convincing health information should be taken across all parts of Nigeria.

General knowledge of monkeypox, its transmission, biology, and risk factors

Of the total respondents, 94.1% have heard about monkeypox before, 59.1% believed that monkeypox could be managed, 80.8% believed that monkeypox is zoonotic but can be transferred from human to human, and the majority (60.1%) are aware of the symptoms of monkeypox.

When asked about the transmission of the Monkeypox virus, the majority (>50%) of the participants strongly agreed that monkeypox could be transmitted through close contact with an infected person or animal, through close contact with skin lesions, body fluid, and contaminated material, and through close contact with material contaminated with the virus, while the majority (>50%) disagreed that the Monkeypox virus can be transmitted through close contact with a monkey. The recent year of the monkeypox outbreak was asked; 64.5% of the participants chose 2022, while some others chose 2021, 2022, and 2019 respectively.

Among 203 respondents, 28.6% strongly agreed that an animal bite is a risk factor for monkeypox while 25.1% disagreed, 41.4% strongly agreed that scratches from an infected rodent are a risk factor while 13.8% disagreed, 36% strongly agreed that close association with rodents is a risk factor while 18.2% disagreed, 45.8% strongly agreed that caring for a patient who has monkeypox is also a risk factor while 12.8% disagreed.

Furthermore, the knowledge of participants about the risk factors of monkeypox and the knowledge of participants about the diagnosis of monkeypox shown in Tables 4 and 5 below is deficient at less than <50%. There is, therefore, a need for training on the diagnosis of monkeypox, whether PCR, biopsy serology or all methods, as the table shows that <50% understand the diagnostic methods for monkeypox, and the remaining population is unsure.

General knowledge about the biology, diagnosis, prevention, and responsibilities of health workers regarding monkeypox

Of the total respondents, 91.1% agreed that monkeypox is caused by a virus, 4.9% agreed that it is caused by bacteria while 3.9% agreed that monkeypox is caused by fungi. The majority of the participants believed that monkeypox could be diagnosed by PCR; 42.9% believed that monkeypox could be diagnosed through serology, while 40.4% agreed that monkeypox could be diagnosed through biopsy. Over 75% of the participants strongly agreed that monkeypox could be prevented by raising awareness of risk factors, educating people on the measures they can take to reduce exposure, more research and scientific study, and healthcare workers should be educated on handling specimens of suspected or confirmed Monkeypox virus infection. When asked what health workers should do if monkeypox is suspected, 71.9% of the total respondents strongly agreed that appropriate samples should be collected by the health workers, 78.3% strongly agreed that samples should be transported to the laboratory with appropriate capability, while 72.4% strongly agreed that health workers should scream for help.

According to Table 3, a high percentage of healthcare workers know the procedures on what to do when they encounter confirmed/suspected MPXV patients. However, Health professionals and those treating or coming in contact with patients who have monkeypox or their samples should be immunized against smallpox by national health authorities. According to estimates, receiving a smallpox vaccination offers 85% cross-protection against monkeypox.[12]

Table 1: Demographics of study participants.

Variables	Categories	N	%
Sex	Female	109	53.7
	Male	92	45.3
	Prefer not to say	2	1.0
	Total	203	100.0
Age (years)	18-25	129	63.5
	25-30	54	26.6
	30 and above	15	7.4
	Below 18	5	2.5
	Total	203	100.0
Course of study	Anatomy	1	0.5
	Animal and environmental biology	1	0.5
	Animal science	1	0.5
	Biochemistry	20	9.9
	Biology	2	1.0
	Biotechnology	1	0.5

Continued.

Variables	Categories	N	%
	Botany	4	2.0
	Chemistry	3	1.5
	Dental therapy	1	0.5
	Human anatomy	1	0.5
	Human anatomy and cell biology	1	0.5
	Mbbs	64	31.5
	Medical laboratory science	37	18.2
	Medical radiography	2	1.0
	Medical rehabilitation	1	0.5
	Microbiology	33	16.8
	Midwifery	1	0.5
	Nursing	10	4.9
	Optometry	1	0.5
	Pharm. D	1	0.5
	Pharmacology	2	1.0
	Pharmacy	4	2.0
	Public health	6	3.0
	Science lab technology	3	1.5
	Total	203	100.0
Level of education	Graduate	62	30.5
	Postgraduate	13	6.4
	Undergraduate	128	63.1
	Total	203	100.0
Type of tertiary education	College of Education	1	0.5
	College of Nursing and Midwifery	1	0.5
	Graduate	1	0.5
	Polytechnic	7	3.4
	University	193	95.1
	Total	203	100.0
Work (If you are working, do you have a medical-related job?)	No	155	76.4
	Yes	48	23.6
	Total	203	100.0
Ethnicity	North Central	21	10.3
	North East	19	9.4
	North West	22	10.8
	South East	11	5.4
	South South	35	17.2
	South West	95	46.8
	Total	203	100.0

Table 2: General knowledge of participants about monkeypox.

Variables	Categories	N	%
Have you heard about monkeypox diseases before?	Maybe	2	1.0
	No	10	4.9
	Yes	191	94.1
	Total	203	100.0
Can monkeypox be managed?	No	15	7.4
	Maybe	68	33.5
	Yes	120	59.1
	Total	203	100.0
Monkeypox is Zoonotic but can be transferred from human to human	No	4	2.0
	Not Sure/Maybe	35	17.2
	Yes	164	80.8

Continued.

Variables	Categories	N	%
	Total	203	100.0
Do you know the symptoms of monkeypox?	Yes	122	60.1
	No	55	27.1
	Maybe	26	12.8
	Total	203	100.0

Table 3: Knowledge and perception of participants about the responsibilities of health workers regarding monkeypox.

Variables	Categories	N	%
If monkeypox is suspected, health workers should?	Disagree	8	3.9
	Agree	49	24.1
	Strongly agree	146	71.9
Collect appropriate sample	Total	203	100.0
Transport sample to a laboratory with appropriate capability	Disagree	2	1.0
	Agree	42	20.7
	Strongly agree	159	78.3
	Total	203	100.0
Scream for help	Agree	24	11.8
	Strongly agree	32	15.8
	Disagree	147	72.4
	Total	203	100.0

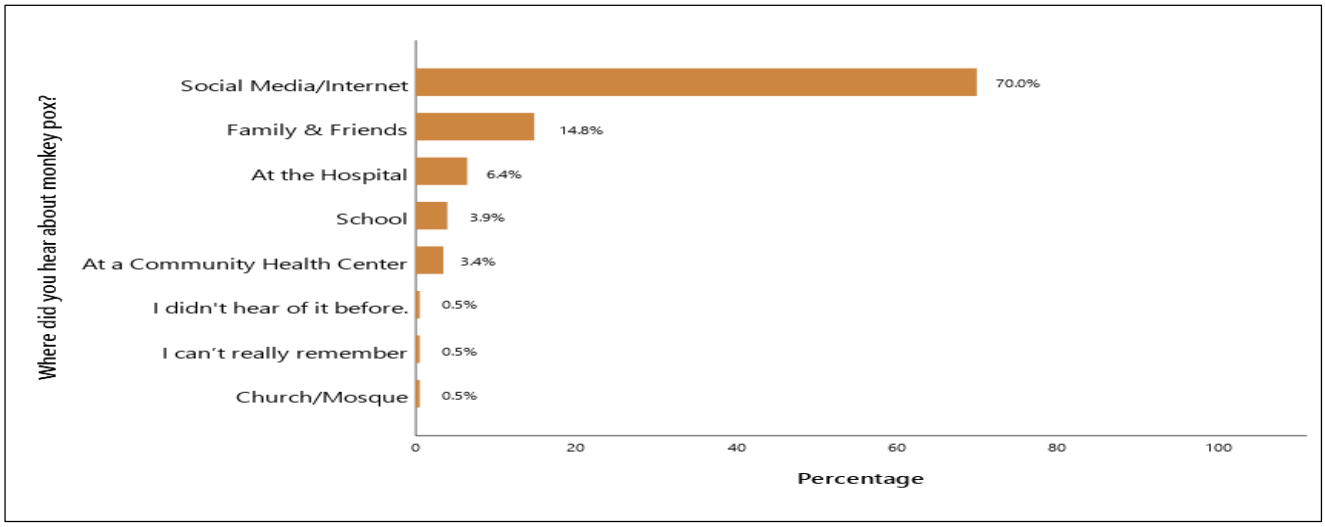

Figure 2: Bar chart showing the respondents source of information of monkeypox. From the data collected, social media had the highest percentage of route of information.

Table 4: Knowledge of participants about the risk factors of monkeypox.

Variables	Categories	Frequency	Percentage (%)
What are the risk factors of	Undecided	36	17.7
Monkeypox? Animal bite	Disagree	51	25.1
	Agree	58	28.6
	Strongly agree	58	28.6
	Total	203	100.0
Disagree		28	13.8
Scratches from an infected rodent	Undecided	32	15.8
	Agree	59	29.1
	Strongly agree	84	41.4
	Total	203	100.0

Continued.

Variables	Categories	Frequency	Percentage (%)
Undecided		31	15.3
Close association with rodents	Disagree	37	18.2
	Agree	62	30.5
	Strongly agree	73	36.0
	Total	203	100.0
Undecided		15	7.4
Caring for a patient who has Monkeypox	Disagree	26	12.8
	Agree	69	34.0
	Strongly agree	93	45.8
	Total	203	100.0

Table 5: Knowledge of participants about the diagnosis of monkeypox.

Variables	Categories	Frequency	Percentage (%)
Diagnosis of monkeypox	No	6	3.0
Can be done by?	Not sure	81	39.9
	Yes	116	57.1
PCR	Total	203	100.0
No		21	10.3
Biopsy	Yes	82	40.4
	Not sure	100	49.3
	Total	203	100.0
Not sure		104	51.2
Serology	Yes	87	42.9
	No	11	5.4
	Not sure	1	0.5
	Total	203	100.0

DISCUSSION

This study evaluated the knowledge of medical/health science related students across media space in Nigeria; it has shown that medical students on the media space are adequately informed about monkey pox virus by virtue of adequate infographic awareness by respective stakeholders. The effectiveness of online campaign as at the time of study can be linked to students increased media presence owing to industrial actions that lead to shutdown of public universities nationwide as students now engage actively on media platforms. In a field survey study conducted in Yenagoa, Bayelsa State of Nigeria, out of 384 respondents, only 92 show adequate knowledge of Monkeypox virus of which 52 percent credit their source of knowledge to TV/Radio, and 30.8 and 3.8 to health center and family members respectively.[13] The entire population have high percentage of those with merely primary school education which suggest that they may represent a fraction that credited knowledge source to health centers. Regardless of high awareness through TV/media in the study, and social media in this present study, there's need to deploy strong awareness program to grassroots level in communities through outreaches, and health to carter for information need of informally educated populations. Cross sectional face-to-face interview administered in a study of awareness of monkeypox among general public in Bangladesh shows that among 1,711 respondents, only 66.6 (1139) are aware of monkeypox. When compared with this study, it's evident that Nigerians are more aware of monkeypox than Bangladesh.[14] Out of the 66.6 awareness of monkeypox, 48.2 credited social media their information source. This also proves social media effective as in this study. Similar research conducted in Saudi Arabia also shows lack of adequate knowledge possibly attributed to relaxed state of the nation as no cases of monkeypox has been recorded yet.[15]

This research work is without limitation; the survey utilized online space for administration of the questionnaires due to lack of funding and dispersed student populations hence high tendency of in effectively extracting potential knowledge of monkeypox from intended subject as there might be prior consultations and research by participants before participation. Therefore, leading to bias in response. Subsequently, with adequate funding, its imperative to conduct a face-to-face interview into student populations in different campuses in the country to rule out this possibility of bias, and extension into student populations who aren't online. Our findings add to the existing knowledge of the Monkeypox virus by various healthcare professionals both in and out of school. From the data gotten, our results show that knowledge of

this disease is more in the southwest than in other geopolitical zones, which shows that they have more information about monkeypox. This finding will help health policymakers to make specific sensitization and awareness to those in the north and east. Our analysis further showed that a high percentage of respondents first heard about monkeypox on social media, this finding will also enable the government to put more effort into social media strategy to educate the public and create awareness/sensation of Monkeypox virus and other disease outbreaks within the country. The findings of this current study agree with the existing knowledge of the Monkeypox virus. Although future studies are needed to assess the reason behind the high knowledge of the southwestern region in Nigeria to monkeypox infection. A study on the relevance of social media in public health/disease outbreaks also needs to be done.

CONCLUSION

The majority of information about monkeypox is derived from an individual case or outbreak reports, passive intermittent surveillance, and other sources, none of which provide a reliable overall picture. Based on the e-questionnaire developed through Google forms distributed across social media, stronger outbreak preparedness activities are required; according to the response gotten, there is a significant knowledge gap regarding monkeypox, the evolving epidemiologic and clinical manifestations, and the variety of components implicated in monkeypox transmission. In order to direct proper surveillance, data collecting, preventive, readiness, and response operations to monkeypox, public health and surveillance capacities in Nigeria must be urgently developed. It will take coordinated, locally-led, interdisciplinary efforts closely adapted to capacity development and training to advance public health preparedness and match proactive surveillance programs to priority research.

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