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COVID-19 vaccination acceptability among type 2 diabetes mellitus patients in a tertiary hospital in Southwest Nigeria: a cross-sectional study

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Abstract

Background: The mortality from COVID-19 is higher in diabetes mellitus (DM) patients compared to the general population, hence it is highly desirable that DM patients are vaccinated against COVID-19 infection. The aim was to determine the willingness of type 2 DM patients to accept COVID-19 vaccine and associated factors.

Methods: This was a cross-sectional descriptive study that involved DM patients. A structured questionnaire was used for data collection. Multivariable logistic regression was used to assess factors associated with willingness to be vaccinated.

Results: A total of 302 DM patients participated in the study. About 90% of the respondents perceived COVID-19 to be a serious disease; however, 33.5% of the patients considered themselves to be at risk of contracting COVID-19 despite having DM. About 70.0% of the DM patients were willing to receive the vaccine. Factors associated with willingness to be vaccinated were perception of COVID-19 as a severe disease (Adjusted odds ratio (AOR), 6.09; 95% CI, 4.96- 12.27), previous vaccination (AOR, 1.58; 95% CI, 1.04- 2.98), and higher education (AOR, 2.36; 95% CI, 1.04- 6.86).

Conclusion: About a third of the study participants were not willing to receive COVID-19 vaccination. There is need to educate the at-risk population about the importance of COVID-19 vaccination.

Keywords: COVID-19, Vaccine, acceptance, type 2 diabetes, Nigeria

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Article Original

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COVID-19 acceptabilité de la vaccination chez les patients atteints de diabète sucré de type 2 dans un hôpital tertiaire du sud-ouest du Nigéria : une étude transversale

Enikuomehin, A.C.[1], Junaid, O.A.[1], *Adejumo, O.A.[1], Ogundele, O.A.[2], Lawal, O.M.[1], Akinbodewa, A.A.[1], Fakhraddeen, Y.M.[3]

Résumé

Objectif de l'étude: La mortalité par COVID19 est plus élevée chez les patients diabétiques par rapport à la population générale, il est donc hautement souhaitable que les patients DM soient vaccinés contre l'infection par COVID-19. L'objectif est de déterminer la volonté des patients atteints de diabète de type 2 d'accepter le vaccin COVID-19 et les facteurs associés.

Méthodes: Il s'agissait d'une étude descriptive transversale qui impliquait des patients DM. Un questionnaire structuré a été utilisé pour la collecte des données. Une régression logistique multi variée a été utilisée pour évaluer les facteurs associés à la volonté de se faire vacciner.

Résultat de l'étude: Au total, 302 patients atteints de diabète ont participé à l'étude. Environ 90 % des répondants percevaient le COVID-19 comme une maladie grave ; cependant, 33,5% des patients se considéraient comme à risque de contracter le COVID-19 malgré le diabète. Environ 70,0 % des patients atteints de diabète étaient disposés à recevoir le vaccin. Les facteurs associés à la volonté de se faire vacciner étaient la perception du COVID-19 comme une maladie grave (rapport de cotes ajusté (RCA), 6,09 ; IC à 95 %, 4,96 à 12,27), une vaccination antérieure (RCA, 1,58 ; IC à 95 %, 1,04 à 2,98) et l'enseignement supérieur (RCA, 2,36 ; IC à 95 %, 1,04-6,86).

Conclusion : Environ un tiers des participants à l'étude n'étaient pas disposés à recevoir le vaccin COVID-19. Il est nécessaire d'éduquer la population à risque sur l'importance de la vaccination contre la COVID-19.

Mots-clés : COVID-19, vaccin, acceptation, diabète de type 2, Nigéria

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INTRODUCTION

The coronavirus disease (COVID-19) outbreak started in Wuhan, China in December 2019 (1). The virus was declared a pandemic by the World Health Organization (WHO) in March 2020 (2). Since its onset, 632 million cases and 6.5 million deaths recorded globally as at 13th November, 2022 (1). Protective measures along with efficacious vaccines form the best strategy to combat COVID-19 infection as definitive treatment is still being investigated (3) . Vaccination has been shown to decrease the spread and severity of COVID-19 infection, as well as reduced the need for hospital and intensive care admission (4,5). There are different vaccines currently in use against COVID-19 globally. In fact, as at March, 2022, 11,056,690, 967 doses of vaccines have been administered globally (1). Therefore, sufficient vaccine coverage and a high acceptance rate will be needed for successful COVID-19 immunization. However, the biggest challenge faced by most governments is vaccine acceptability. COVID-19 acceptance by the public is affected by citizens' mistrust towards health authorities, governments, health professionals, and the misinformation about COVID-19 on social media (6). WHO listed vaccine hesitancy as one of the ten major threats to health globally (7).

Generally, patients with diabetes mellitus are more prone to infectious diseases (8). Also, these infections are more likely to be serious and are associated with fatal outcome in them (8). Reports have shown that COVID-19 infection is more severe in diabetic patients compared to the general population (9-12). Diabetic patients with COVID-19 are more likely to have respiratory failure, require intensive care admission, have long ventilator dependence and spend longer time on admission. The mortality from COVID-19 is higher in Diabetes mellitus (DM) patients compared to the general population (11,12). Hence, it is highly desirable that diabetic patients are vaccinated against COVID-19 infection in order to reduce their risk of contracting the disease and having devasting consequences from the infection. The aim of this study is to determine the willingness of type 2 DM patients to accept COVID-19 vaccine and the factors that influence their decision. The findings from this study will provide useful information to address their concerns about COVID-19 vaccines and this may eventually improve the vaccine uptake.

MATERIALS AND METHODS

This was a cross-sectional descriptive study carried out between April and June 2022 at the University of Medical Sciences Teaching Hospital Complex, Ondo State located in Southwest Nigeria.

The minimum sample size for this study was calculated by using Leslie Kish formula for sample calculation in cross-sectional study (13). This was determined by using a prevalence of willingness of diabetic patients to accept COVID-19 vaccine from a previous study carried out in Saudi Arabia (14) reported to be 36.2%; 95% confidence interval and a sample error of 5%. The minimum sample size following inclusion of an attrition rate of 10% is 390.

Inclusion criteria for this study were DM patient, willingness to give informed consent and age above 18 years. Study participants that fulfilled inclusion criteria were consecutively recruited into the study from the medical out-patient clinic in the Ondo and Akure complexes of the hospital.

Data were collected through an interviewer-administered questionnaire which had 3 sections. The first section on socio-demographic characteristics of the participants such as age, gender, level of education, occupation, marital status, religion, ethnicity and monthly income. The second section assessed the risk of contracting COVID-19 while the third section assessed the perception about COVID 19 vaccine and willingness to accept the vaccine. Perception about COVID-19 was assessed using 5-point Likert scale to capture the full range of opinions.

Ethical Consideration

Ethical clearance was obtained from the Ethics and Research Committee of the University of Medical Sciences, Ondo. Informed consents were obtained from participants. All questionnaires were coded (without names) and confidentiality was ensured throughout the study

Data Analysis

Data entry and analysis were made, using Statistical Package for the Social Sciences (SPSS) version 20.0 (SPSS Inc., Chicago, IL, USA). Socio-demographic variables were presented as frequency and percentages. The willingness to receive COVID-19 vaccine was presented as bar graph. Bivariate association between socio-demographic variables, other variables, and willingness to receive the COVID-19 vaccine were assessed using the chi-square test. Multivariate logistic regression analysis was

done to identify the predictors of respondents' willingness to accept COVID-19 vaccine. Using adjusted odds ratios (AORs) and 95% confidence intervals (CIs). The outcome variable for both the bivariate and multivariate analyses was willingness to accept COVID-19 vaccine dichotomize into 'yes' or 'no' responses. The level of significance was set at $p < 0.05$.

RESULTS

A total of 302 Diabetic Mellitus (DM) patients participated in the study. The majority (65.9%) were 60 years and above, mostly male (68.9%) and married (67.9%). Nearly half of the respondents had tertiary education (48.7), while more than half (5.3%) were self-employed and of Yoruba extraction in southwest Nigeria. [Table1]. More than half (n=165; 54.6%) has systemic hypertension, while (n=80; 26.5%) had been vaccinated 2 years earlier.

In all (n=270; 89.4%) of the respondents perceived COVID-19 to be a serious disease; however, only 33.5% of the patients considered themselves to be at risk of contracting COVID-19 despite being diabetic, while 25.3% agreed that visiting the hospital increases their risk of contracting the disease. Regarding participants' acceptance of the COVID-19 vaccine, 70.2% of the DM patients were willing to receive the vaccine. On bivariate analysis, to assess the factors associated with the willingness to be vaccinated, 76.3% of those who perceived COVID-19 as a serious disease were willing to receive the vaccine compared to those that did not perceived it as a serious ($p< 0.001$). Equally, 61.2% of those who had previous vaccination two years earlier were also willing to receive the vaccine ($p< 0.041$). [Table 2]. The level of education, was also significantly associated with the willingness to receive the vaccine, 60% of those with secondary education and above showed willingness to receive the vaccine ($p<0.006$). However, age ($p=0.367$), marital status ($p=0.292$), religion ($p=0.3570$ and participants occupation ($p=0.468$) were not significantly associated with the willingness to receive COVID-19 vaccine. [Table 2].

On multivariate analysis for predictors of willingness to receive the vaccine, perceived seriousness of COVID-19 infection, previous vaccination 2 years earlier and level of education were found to be predictors of willingness to receive vaccination. Participants who perceived COVID-19 to be a serious disease were six times more likely to receive the vaccination (Adjusted odds ratio (AOR), 6.09; 95% CI, 4.96- 12.27), in addition, those who had vaccination 2 years earlier were one and half times more likely to accept the vaccination (AOR, 1.58; 95% CI, 1.04- 2.98), and also, those having secondary education and above were also more likely to same. (AOR, 2.36; 95% CI, 1.04- 6.86). [Table 3]

DISCUSSION

Our study assessed the willingness to receive COVID-19 vaccine among DM patients, a group of individuals at risk of developing severe COVID-19 infection because of their underlying comorbid condition. In the study, majority (65.9%) of the 302 participants were older than 60 years with the least group being those between the ages of 20 and 39, a finding that reflects the increased prevalence of diabetes mellitus with age (15). The higher male prevalence reported in this study has been supported by a higher male preponderance of DM especially in previous studies and this has been attributed to a larger amount of visceral fat found in men compared to women(16,17) and the distinctiveness in lifestyle and behavioral pattern in both genders (18). Higher male prevalence in the hospital may also be indicative of males more empowered to be in the hospital and participate in the study than female (19). Level of education has had variable impact on the willingness to receive the COVID 19 vaccination according to previous studies. This study found that 6 out of every 10 participants with secondary education and higher showed willingness to receive the vaccine. This finding is similar to report from a study conducted in Ontario which found that those with less than tertiary education were more likely to be unwilling to receive COVID-19 vaccine (20). In contrary, low level of education was reported has having a favorable effect on the willingness to receive COVID-19 vaccine in a cross-sectional study among the Southwestern Ethiopian residents (21).

Majority (89.4%) of our respondents perceive COVID-19 to be a serious infection; however, only about a third of the study population considered themselves at risk despite being diabetic. Our study found that participants who perceived COVID 19 to be a serious disease were six times more likely to receive the vaccinations. In addition, those who had ~~been~~ received other types of vaccine in the past were found to be one and a half times more likely to receive COVID-19 vaccination. Studies have shown increased susceptibility to severe COVID 19 illness among diabetic patient (patients) (9-12,22). They have been found to be at a higher

risk of hospitalization and death(11,12). Optimal glycemic control alone has not consistently shown favorable outcomes in hospitalized COVID-19 infected diabetic patients (23), and COVID-19 vaccines remain the most effective way to alleviate COVID-19 related potential disaster in DM patients (24). Previous report (24) has established that a perception of higher susceptibility to the infection and more dire consequences tend to favor higher COVID 19 vaccine uptake among diabetic patients and also showed that concerns about safety and side effects portend a negative attitude towards the vaccine uptake (25). This is in keeping with our finding in which 76.3% of those who perceived COVID-19 infection to be a serious disease were willing to take the vaccine compared to those who had no such viewpoint. Perceived seriousness of the infection, previous vaccination 2 years earlier and level of education predicted the willingness to receive the COVID 19 vaccination on multivariate analysis in this study. Previous vaccination as a factor predicting willingness to vaccination in this study is similar to a study finding in which previous pneumonia vaccinated subjects were more willing to be vaccinated (26). Although this study did not record any significant association between religion and COVID 19 vaccine uptake, religious affiliations have been found to influence people's attitude towards the vaccine (27,28).

CONCLUSION

Individuals with underlying conditions like diabetes are likely to develop severe COVID 19 infection. Vaccination remains a potent weapon to fight the infection. Perceived seriousness of the infection, level of education and previous vaccination predict the willingness to receive the COVID 19 vaccine. There is need to educate diabetic patients on the safety and efficacy of COVID 19 vaccine to improve vaccination rates in this group of patients.

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Conflict of Interest: no conflict of interest

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Table 1. Socio-demographic characteristic of the study participants.

Variable	Frequency N=**302**	Percent (%)
Age (years)		
20-39	8	2.6
40-59	95	31.5
60 and above	199	65.9
Sex		
Male	208	68.9
Female	94	31.1
Marital Status		
Single	12	4.0
Married	205	67.9
Divorced	5	1.7
Widowed	80	26.5
Education		
No formal education	27	8.9
Primary	73	24.2
Secondary	55	18.2
Tertiary	147	48.7
Religion		
Christianity	288	95.4
Islam	11	3.6
Traditional religion	3	1.0
Occupation		
Government employed	70	23.2
Self employed	167	55.3
Unemployed	65	21.5
Ethnicity		
Yoruba	282	93.4
Igbo	18	5.9
Hausa	2	0.7

able 2. Factors associated with willingness to accept vaccination among DM patients
/illingness to accept vaccine N=302

ariable	**Yes** **n (%)**	**No** **n (%)**	**P-value**
erceived seriousness of COVID- **)**			
es	206(76.3)	64(23.7)	**P<0.001**
o	6(18.8)	26(81.2)	
revious vaccination in the past			
Yes	49(61.2)	31(38.8)	**P<0.041**
No	163(73.4)	59(26.6)	
ge			
)-49	27(64.3)	15(35.7)	P=0.367
50	185(71.2)	75(28.8)	
ex			
[ale	148(71.2)	60(28.8)	P=0.301
emale	64(68.1)	30(31.9)	
[arital status			
ot married	72(74.2)	25(25.8)	
[arried	140(68.3)	65(31.7)	P=0.292
evel of education			
econdary education and below	60(60.0)	40(40.0)	
ertiary	152(75.2)	503(24.8)	**P=0.006**
eligion			
hristianity	200(69.4)	88(30.6)	
lam	9(81.8)	2(18.2)	P=0.357
raditional religion	3(100)	0(0.0)	
ccupation			
mployed	164(69.2)	73(30.8)	
nemployed	48(73.8)	17(26.2)	P=0.468

e 3: Predictors of willingness to accept COVID -19 vaccination among DM patients

	Category of Variables	AOR(95%CI)	P-Value
eived seriousness of COVID-19	No (Ref)	1	
	Yes	6.09(4.96-12.27)	**<0.001**
ious vaccination in the past	= No (Ref)	1	
	=Yes	1.58(1.04– 2.98)	**0.002**
tal Status	Not married (Ref)	1	
	Married	1.05(0.55 – 2.02)	0.866
	Female (Ref)	1	
	Male	0.66(0.34 – 1.27)	0.213
ational	Secondary and below (Ref)	1	
l	Tertiary	2.36(1.40- 6.86)	**0.018**
pation	Employed (Ref)	1	
	Unemployed	0.84(0.41-1.74)	0.636
(years)	20-49 (Ref)	1	
	=50	0.89 (0.35-1.80)	0.584