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RESEARCH ARTICLE

COVID-19 Vaccination Readiness and Hesitancy among the Patients with Chronic Diseases in a Teaching Hospital in Ekiti State, Nigeria

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Abstract:

Background:

Vaccination has been a great strategy used by public health experts to control the spread of deadly diseases such as COVID-19, although this effort is usually threatened by vaccine hesitancy.

Aim:

The study assessed vaccine hesitancy among people with chronic diseases in Ekiti State University Teaching Hospital, Ado-Ekiti.

Methods:

The research design was descriptive and cross-sectional. One hundred and ninety-three (193) participants who were purposively selected from four different chronic clinics in the hospital participated in the study. Socio-demographic data and vaccine knowledge were determined using a standardized questionnaire, while the readiness and hesitancy levels with responsible factors were determined using an adapted questionnaire. Data analysis was done using descriptive and inferential statistics.

Results:

Findings showed that the majority of the participants were female and between the ages of 21-40 years. About half (43.8%) of the participants had poor knowledge of the COVID-19 vaccine. Age (X^2= 17.255, p=0.028) and length of disease (X^2= 13.917, p=0.031) were observed to be significantly associated with the participants' knowledge level of the COVID-19 vaccine and vaccination. Participants were hesitant about the COVID-19 vaccine due to historical influence (35.6%), politics (43.1%) and roles of health professionals (50.8%).

Conclusion:

High-level advocacy about vaccines (especially new ones, such as COVID-19 vaccine) and its benefits should be encouraged at all levels so as to improve acceptance and minimize vaccination hesitancy among the populace thereby promoting public health.

Keywords: COVID-19, Knowledge, Vaccination, Hesitancy, Chronic diseases, Intense respiratory syndrome.

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1. INTRODUCTION

Coronavirus disease 2019 (COVID-19), which belongs to the family of viruses that can cause extremely intense respiratory syndrome coronavirus 2 (SARS-CoV-2) in humans, has continued to be a global concern [1]. The emergence of SARS-CoV-2 was first reported in late 2019 in the Wuhan province of Hubei, China, and, after that, quickly became a viral threat afflicting over 220 countries [2, 3]. The devastating consequences of the virus have prompted the call for policies and strategies to mitigate and contain the effect of the pandemic [4].

The initial response instigated by most countries so as to minimize or prevent COVID-19 transmission includes the use of non-pharmaceutical interventions, such as mandatory use of masks, hands sanitization, social distancing, travel bans, closure of schools, and other public places [5]. However, it was

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noted that these non-pharmaceutical interventions could only reduce the disease progression, but the most affordable public health interventions to limit the pandemic and diminish related mortality and morbidity rates is through the use of effective, safe, and affordable antiviral agents and vaccines [6 - 8]. COVID-19 ravaged the world from late 2019 to date, disrupting the global health system and its economy, however, the COVID-19 vaccine was quickly developed to control the deadly disease globally, but people from different regions of the world developed apathy to the acceptance of the vaccine. Hesitancy to vaccine uptake is not only for COVID-19 vaccination but is a usual occurrence. Almost twenty years ago, before the approval of the COVID-19 vaccine, the WHO identified hesitancy to the vaccine as part of the ten essential dangers to worldwide well-being [9].

Despite its imminent accessibility, public opinion on the new COVID-19 vaccine is still uncertain. The survey conducted by Lin *et al*. [10] reviewed the declining rate of vaccine acceptance, The study observed that the vaccine acceptance rate dropped from 70% in March 2020 to below 50% in October 2020, citing the following factors: demographic, socioeconomic, and partisan for the divides. A review carried out in January 2021 among 15 countries revealed that France is one of the nations with the lowest vaccine intention rate [11]. Moreover, the denial of COVID-19 by various sections may have influenced COVID-19 vaccine hesitancy (VH), considering the information on the accessibility of COVID-19 vaccines in certain countries. Aside from the conviction that the COVID-19 vaccine may be apolitical in the absence of confidence in the pharmaceutical industry or its non-mandatory administration, the vaccine also has religious reservations, as some referred to it as the “mark of the beast” [12].

Also, ongoing global outbreaks of generally wiped-out vaccine-preventable illnesses, such as the recurrent measles epidemics in Europe and the United States of America (USA), have been, to a great extent, credited to vaccine hesitancy among the populace [13]. The low open acknowledgment of immunization against the 2009 H1N1 pandemic flu was revealed in the USA and the United Kingdom [14], contentions around the human papillomavirus (HPV) vaccine in India and Japan [15] and the 2003-2004 polio vaccine blacklisted in Nigeria [16] are some of the reasons for vaccine hesitancy, doubt and opposition on a global scale.

The series collection of research tends to suggest that vaccine indecision is becoming a problem in Nigeria. For instance, vaccine hesitancy among guardians was observed as one of the fundamental difficulties confronting vaccination programmes as shown in a study conducted in 2009 among State and National Managers of Expanded Programme on Immunization (EPI) managers [17]. Vaccine hesitancy was likewise featured as a critical part of the different measles outbreaks that occurred in South Africa from 2003 and 2011. However, notwithstanding the growing proof of evidence, vaccine hesitation is still a major problem with an uncertain solution [17]. Currently, many COVID-19 vaccines have been approved and endorsed to prevent COVID-19, such as the Pfizer-BioNTech vaccine, Moderna’s and Janssen's vaccines and many others. Phase 3 of COVID-19 large-scale clinical trials was on as of February 2021 in the United States with vaccines like AstraZeneca and Novavax [18]. Almost 63 million dosages of these vaccines have been dispersed in the U.S., as stated by the Centre for Disease Control, while more than 43.2 million doses have been given [18, 19]. In the UK, a complete number of 12,844,193 individuals have been vaccinated since the commencement of COVID-19 vaccination. There is a global increase in the rollout of COVAX vaccines. The main COVID-19 vaccination crusades in Africa utilizing COVAX started in Ghana and Côte d'Ivoire. Whereas Africa's most populous country, Nigeria, has received its first consignments of COVID-19 vaccines, becoming the third African country to have access to COVAX [20].

The explanations behind COVID-19 vaccine acknowledgment and reluctance remain complex and can be credited to the intersection of a few variables: questions about the genuine requirement for vaccines, worries about the safety of the vaccine, side effects, past pessimistic encounters with vaccines, doubt if the vaccine will be effective, experimental reasoning, and other issues might be involved [21]. Wang *et al*. [22] asserted that independent risk factors such as; diabetes, hypertension, pulmonary disease, and cardiovascular disease were responsible for severe COVID-19 disease and complicated conditions.

As of 19th October 2021, COVID-19-related deaths of about 4,903,911 people have been recorded globally, while there are 242,460,000 reported cases of COVID -19, and the condition most of the time resulted in deaths, especially when there is an underlying chronic diseases such as diabetes, asthma, hypertension, HIV/acquired immune deficiency syndrome, and others [2]. According to Nigeria's Centre for Disease Control, as of 22 April 2022, there are 255,670 confirmed cases of COVID-19 in Nigeria, 2,653 active cases, 249,874 discharged cases, 3,143 deaths and the disease is spreading very fast day by day. Therefore, there is a need for the study to assess the COVID-19 vaccination hesitancy among patients with chronic diseases in a teaching hospital.

2. MATERIAL AND METHODS

2.1. Research Design, Setting and Target Population

The research design was descriptive and cross-sectional, using a quantitative strategy. Purposive, stratified and convenient sampling methods were used to select participants for the study.

The study was conducted in a Teaching Hospital in Ekiti State, Nigeria. The target population for this study were patients with chronic diseases in four clinics (Outpatients unit, endocrinology/diabetics, hypertensive/cardiology, and HIV/antiretroviral therapy) within the hospital. According to consistent clients' records of October 2021 from the four clinics, an average of 104 hypertensive patients, 70 diabetes, 34 asthmatics, and 106 HIV patients visited the hospital. Hence, the total target population was 314.

The sample size was determined using Taro Yamane’s formula [23] of sample size determination. A sample size of

176 was obtained, factoring in a 10% anticipated non-response rate. A total of 193 respondents were included in the study. The samples for each clinic were calculated based on the proportion of the patients' monthly records. A total of 64, 43, 21, and 65 patients with hypertension, diabetes, asthma and HIV/RVD were used for the study, respectively.

2.2. Instrument and Data Collection

The questionnaire for this study was adapted from previous studies by Elhadi *et al*. [24], King *et al*. [25] and Rzymski *et al*. [26], which consisted of three sections in accordance with the objectives of the study. Section A contained 8 questions on the socio-demographical characteristics of the respondents, termed the bio-data section.

Section B consisted of 10 questions that assessed the knowledge of patients on COVID-19 and its vaccination with yes or no responses. Respondents were divided into three categories based on their normalized knowledge scores: those scoring 0-40% were classified as having poor knowledge, those scoring 50- 60% were classified as having moderate knowledge, and a score of 70% and above were classified as good knowledge. Section C investigated COVID-19 vaccination readiness with 15 questions. Participants were scored 1 to 5 marks; a score of 15-29 was rated ready, 30-55 indifferent and perception while a score of 56-75 was rated not ready.

Section D comprised three parts: (A-C) on factors that determine and influence COVID-19 Vaccination hesitancy; part A is for hesitancy based on contextual influences, B is for hesitancy based on individual and group influence, C is for hesitancy based on vaccine and vaccination issues with a total of 75 questions using five-point like scale responses of 'strongly agree, agree, neutral, disagree, and strongly disagree with the scoring from 1 to 5 marks. Participants who scored 25-61 had low hesitancy, 62-93 mild hesitancy, while a score of 94-125 was high hesitancy.

After ethical approval, the researchers visited the four selected clinics in order to familiarize themselves with the staff and patients. Data were collected twice weekly (during patients' clinics) from January to March 2022. Participants who met the inclusion criteria were invited to participate in the study. The researcher gave the questionnaire to the participants on their clinic days after their clinic activities and allowed them to settle down comfortably for around 30-45 minutes to fill the questionnaire without any interference. The questionnaires, which were simple, clear, and unambiguous, were used and the respondents selected were informed of the benefits of the study in English and translated to Yoruba language, and the reasons for carrying out the research were explicitly made known to them. A total of 193 questionnaires were completed and collated.

The samples were registered outpatients who have been diagnosed with hypertension, diabetes, asthma and human immune-deficient patients attending selected clinics. The inclusion criteria for the study include: being a registered patient diagnosed with hypertension, diabetes, asthma and HIV/RVD of the facility, being diagnosed for at least one year and willingness to participate in the study.

2.3. Data Analysis

All data were analysed using the Statistical Package for Social Scientists (SPSS). Data were presented as descriptive and inferential statistics. Descriptive data were presented as frequencies and percentages. The chi-square analysis was used to test for association. All analyses were carried out at a probability level of 0.05.

2.4. Ethical Considerations

Approval to conduct the study was obtained from the Ethics and Research Committee of EKSUTH with approval number EKSUTH/A67/2021/012/004. Detailed explanations about the purpose of the study, data collection process and rights of participants were provided to all consented patients before their participation. Anonymity was assured by ensuring that the names of the respondents do not appear anywhere in the study tools and strict confidentiality was maintained.

3. RESULTS

3.1. Socio-demographic Profile of the Study Participants

The socio-demographic profile of the study participants revealed most of them were between the ages of 21-40 years: with hypertension (40.8%), diabetes (55.9%), asthma (57.1%), and HIV/RVD (43.1%). Most of the participants with hypertension were males (59.4%), while the majority were female participants with diabetes (60.5%), asthma (57.1%) and HIV/RVD (63.1%). With respect to religion, the majority of the participants (54.7% for hypertension, 62.8% for diabetes, 61.9% for asthma and 66.2% for HIV/RVD) were Christians. Most of the participants with hypertension (48.4%), diabetes (34.9%) and asthma (42.9%) have had their ailment less than one year, while the majority of participants with HIV/RVD (32.3%) have had their ailment between 2-3 years (Table **1**).

3.2. Participants' Knowledge Level of COVID-19 Vaccination/vaccine

Among participants with hypertension, 35.9%, 43.8% and 20.3% had poor, moderate and good knowledge of COVID-19 vaccine/vaccination, respectively. For those with diabetes, 51.1%, 21% and 27.9% had poor, moderate and good knowledge, while for those with asthma, 47.6%, 47.6% and 4.7% had poor, moderate and good knowledge, respectively. In the case of the participants with HIV/RVD, 12.3% had poor knowledge, 23.1% had moderate knowledge, and 64.6% had good knowledge. Apart from age (X^2= 17.255, p= 0.028) for patients with hypertension and disease duration (X^2= 13.917, p= 0.031) for patients with asthma, none of the demographic characteristics of the participants showed significant association with knowledge of COVID 19 vaccine/vaccination (Table **2**).

Table 1. Socio-demographic characteristics of the study participants (N=193).

Characteristics	Participants' Category			
-	Hypertensive (n=64)	Diabetics (n=43)	Asthmatics (n=21)	HIV/RVD (n=65)
Age (years)	-	-	-	-
21 – 30	15 (23.4)	10 (23.3)	8 (38.1)	8 (12.3)
31 – 40	11 (17.4)	14 (32.6)	4 (19.0)	20 (30.8)
41 – 50	15 (23.4)	6 (14.0)	3 (14.3)	23 (35.4)
51 – 60	14 (21.9)	3 (7.0)	1 (4.8)	9 (13.8)
Above 60	9 (14.1)	10 (23.3)	5 (23.8)	5(7.7)
Gender	-	-	-	-
Male	38 (59.4)	17(39.5)	9(42.9)	24(36.9)
Female	26 (40.6)	26(60.5)	12(57.1)	41(63.1)
Education	-	-	-	-
No formal	6(9.4)	2(4.7)	2(9.5)	6(9.2)
Primary	17(26.6)	6(14.0)	1(4.8)	16(24.6)
Secondary	28(43.8)	26(60.5)	15(71.4)	20(30.8)
Tertiary	13(20.3)	9(20.9)	3(14.3)	23(35.4)
Religion	-	-	-	-
Islam	21(32.8)	10(23.3)	7(33.3)	15(23.1)
Christianity	35(54.7)	27(62.8)	13(61.9)	43(66.2)
Traditional	7(10.9)	6(14.0)	1(4.8)	7(10.8)
Others	1(1.6)	0	0	0
Marital status	-	-	-	-
Single	14(21.9)	10(23.3)	8(38.1)	13(20.0)
Married	36(56.3)	20(46.5)	7(33.3)	32(49.2)
Separated	8(12.5)	4(9.3)	0	11(16.9)
Widowed	5(7.8)	8(18.6)	5(23.8)	4(6.2)
Divorced	1(1.6)	1(2.3)	1(4.8)	5(7.7)
Occupation	-	-	-	-
Artisan	1(1.6)	1(2.3)	0	13(20.0)
Civil Servant	23(35.9)	15(34.9)	5(23.8)	20(30.8)
Trading	28(43.8)	9(20.9)	4(19.0)	22(33.8)
Retired	4(6.3)	10(23.3)	3(14.3)	5(7.7)
Unemployed	4(6.3)	0	0	3(4.6)
Student	4(6.3)	8(18.6)	9(42.9)	2(3.1)
Length of disease	-	-	-	-
< 1 year	31(48.4)	15(34.9)	9(42.9)	6(9.2)
1 – 2 years	6(9.4)	4(9.3)	7(33.3)	13(20.0)
2 – 3 years	4(6.3)	9(20.9)	2(9.5)	21(32.3)
3 – 5 years	3(4.7)	3(7.0)	0	13(20.0)
> 5 years	20(31.3)	12(27.9)	3(14.3)	12(18.5)

Table 2. Knowledge level of COVID 19 vaccination/vaccine among the study participants.

-	Category of Patients																			
-	Patients with Hypertension					Patients with Diabetes					Patients with Asthma					Patients with HIV/RVD				
-	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p
Age (years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21 – 30	10	4	1	17.255	0.028	6	2	2	13.284	0.102	4	4	0	7.560	0.478	0	1	7	5.221	0.734
31 – 30	3	7	1	-	-	7	3	4	-	-	2	2	0	-	-	4	5	11	-	-
41 – 50	1	8	6	-	-	1	4	1	-	-	1	1	1	-	-	2	7	14	-	-
51 – 60	4	7	3	-	-	1	0	2	-	-	1	0	0	-	-	1	1	7	-	-
Above 60	5	2	2	-	-	7	0	3	-	-	2	3	0	-	-	1	1	3	-	-

(Table 2) contd.....

-	Category of Patients																			
-	Patients with Hypertension					Patients with Diabetes					Patients with Asthma					Patients with HIV/RVD				
-	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p
Gender	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Male	15	16	7	5.378	0.251	5	5	6	4.683	0.321	4	5	0	0.992	0.609	3	6	15	0.088	0.957
Female	17	12	4	-	-	16	4	6	-	-	6	5	1	-	-	5	9	17	-	-
Education	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
No formal	2	4	0	5.404	0.493	2	0	0	10.883	0.092	0	2	0	4.200	0.650	0	0	6	7.812	0.252
Primary	6	7	4	-	-	3	1	2	-	-	0	1	0	-	-	2	4	10	-	-
Secondary	11	13	4	-	-	15	7	4	-	-	8	6	1	-	-	1	4	15	-	-
Tertiary	4	4	5	-	-	2	1	6	-	-	2	1	0	-	-	5	7	11	-	-
Religion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Islam	6	12	3	9.998	0.125	4	3	3	1.979	0.740	2	4	1	3.831	0.429	1	3	11	3.554	0.470
Christianity	16	11	8	-	-	15	4	8	-	-	7	6	0	-	-	6	12	25	-	-
Traditional	1	5	1	-	-	3	2	1	-	-	1	0	0	-	-	1	0	6	-	-
Others	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-
Marital status	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Single	8	4	2	8.332	0.402	5	2	3	4.914	0.767	4	4	0	3.360	0.762	1	1	11	7.202	0.515
Married	9	19	8	-	-	8	6	6	-	-	3	3	1	-	-	4	9	19	-	-
Separated	4	3	1	-	-	2	1	1	-	-	0	0	0	-	-	1	3	7	-	-
Widowed	2	1	2	-	-	6	0	2	-	-	3	2	0	-	-	0	1	3	-	-
Divorced	0	1	0	-	-	1	0	0	-	-	0	1	0	-	-	2	1	2	-	-
Occupation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Artisan	1	0	0	7.705	0.658	1	0	0	6.892	0.548	0	0	0	-	-	1	2	10	6.231	0.795
Civil Servant	6	12	5	-	-	7	4	4	-	-	2	2	1	4.877	0.560	2	5	13	-	-
Trading	9	12	7	-	-	4	3	2	-	-	1	3	0	-	-	4	6	12	-	-
Retired	2	1	1	-	-	5	0	5	-	-	2	1	0	-	-	0	2	3	-	-
Unemployed	3	1	0	-	-	0	0	0	-	-	0	0	0	-	-	1	0	2	-	-
Student	2	2	0	-	-	5	2	1	-	-	5	4	0	-	-	0	0	2	-	-
Disease duration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
< 1 year	13	12	6	12.100	0.147	7	5	3	10.052	0.261	4	5	0	13.917	0.031	0	1	5	10.677	0.221
1 – 2 years	3	3	0	-	-	3	1	0	-	-	3	4	0	-	-	1	1	11	-	-
2 – 3 years	1	0	3	-	-	5	2	2	-	-	0	1	1	-	-	2	6	13	-	-
3 – 5 years	1	2	0	-	-	0	1	2	-	-	0	0	0	-	-	1	5	7	-	-
> 5 years	5	11	4	-	-	7	0	5	-	-	3	0	0	-	-	4	2	6	-	-
Knowledge level (%)	**35.9**	**43.8**	**20.3**	-	-	**51.1**	**20.9**	**27.9**	-	-	**47.6**	**47.6**	**4.7**	-	-	**12.3**	**23.1**	**64.6**	-	-

Note: A, B and C indicate 'poor', 'moderate' and 'good' knowledge, respectively. X^2 and p represent chi-square and probability values, respectively.

3.3. Vaccination Readiness and Hesitancy Levels of the Participants

COVID-19 vaccination readiness level of the participants showed that among the participants, 4.7%, 93.8%, and 1.5% (participants with hypertension), 0%, 100%, and 0% (participants with diabetes), 4.8%, 95.2%, and 0% (participants with asthma) and 3.1%, 90.8%, and 6.2% (Participants with HIV/RVD) were observed to be ready, indifferent and not ready for vaccination, respectively., Generally, apart from the duration of disease (X^2= 19.976, p= 0.010 for participants with hypertension; X^2= 18.931, p= 0.015, for participants with HIV/RVD) and occupation (X^2= 23.146, p= 0.010, for participants with HIV/RVD), none of the other socio-demographic characteristics of the participants showed significant association with COVID 19 vaccination readiness (Table **3**).

Table 3. COVID-19 vaccination readiness level of the study participants.

-	Category of Patients																			
-	Patients with Hypertension					Patients with Diabetes					Patients with Asthma					Patients with HIV/RVD				
-	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p
Age (years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21 – 30	2	13	0	7.644	0.469	0	10	0	-	-	1	7	0	1.706	0.790	1	7	0	7.382	0.496
31 – 30	0	11	0	-	-	0	14	0	-	-	0	4	0	-	-	0	19	1	-	-
41 – 50	0	14	1	-	-	0	6	0	-	-	0	3	0	-	-	0	21	2	-	-

(Table 3) contd.....

-	Category of Patients																			
-	Patients with Hypertension					Patients with Diabetes					Patients with Asthma					Patients with HIV/RVD				
-	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p
51 – 60	1	13	0	-	-	0	3	0	-	-	0	1	0	-	-	1	7	1	-	-
Above 60	0	9	0	-	-	0	10	0	-	-	0	5	0	-	-	0	5	0	-	-
Gender	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Male	3	34	1	2.919	0.571	0	16	0	-	-	0	9	0	0.787	0.375	0	22	2	1.468	0.480
Female	0	23	0	-	-	0	27	0	-	-	1	11	0	-	-	2	37	2	-	-
Education	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
No formal	0	6	0	4.743	0.577	0	2	0	-	-	0	2	0	0.420	0.936	0	6	0	8.278	0.218
Primary	1	16	0	-	-	0	6	0	-	-	0	1	0	-	-	2	14	0	-	-
Secondary	1	27	0	-	-	0	26	0	-	-	1	14	0	-	-	0	18	2	-	-
Tertiary	1	11	1	-	-	0	9	0	-	-	0	3	0	-	-	0	21	2	-	-
Religion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Islam	1	20	0	1.341	0.969	0	10	0	-	-	0	7	0	0.646	0.724	1	13	1	1.501	0.827
Christianity	2	32	1	-	-	0	27	0	-	-	1	12	0	-	-	1	39	3	-	-
Traditional	0	7	0	-	-	0	6	0	-	-	0	1	0	-	-	0	7	0	-	-
Others	-	-	-	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-
Marital status	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Single	1	13	0	1.748	0.988	0	10	0	-	-	1	7	0	1.706	0.636	1	11	1	3.616	0.890
Married	2	33	1	-	-	0	20	0	-	-	0	7	0	-	-	1	28	3	-	-
Separated	0	8	0	-	-	0	4	0	-	-	0	5	0	-	-	0	11	0	-	-
Widowed	0	5	0	-	-	0	8	0	-	-	0	1	0	-	-	0	4	0	-	-
Divorced	0	1	0	-	-	0	1	0	-	-	0	0	0	-	-	0	5	0	-	-
Occupation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Artisan	0	1	0	2.383	0.992	0	1	0	-	-	0	5	0	1.400	0.706	0	9	4	23.146	0.010
Civil Servant	1	22	0	-	-	0	15	0	-	-	0	4	0	-	-	1	19	0	-	-
Trading	2	25	1	-	-	0	9	0	-	-	0	3	0	-	-	0	22	0	-	-
Retired	0	4	0	-	-	0	10	0	-	-	-	-	0	-	-	1	4	0	-	-
Unemployed	0	4	0	-	-	0	0	0	-	-	1	8	0	-	-	0	3	0	-	-
Student	0	4	0	-	-	0	8	0	-	-	0	0	0	-	-	0	2	0	-	-
Disease duration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
< 1 year	1	30	0	19.976	0.010	0	15	0	-	-	0	9	0	2.100	0.552	0	6	0	18.931	0.015
1 – 2 years	0	6	0	-	-	0	4	0	-	-	1	6	0	-	-	0	9	4	-	-
2 – 3 years	1	2	1	-	-	0	9	0	-	-	0	2	0	-	-	1	20	0	-	-
3 – 5 years	0	3	0	-	-	0	3	0	-	-	0	0	0	-	-	1	12	0	-	-
> 5 years	1	19	0	-	-	0	12	0	-	-	0	3	0	-	-	0	12	0	-	-
Readiness level (%)	**4.7**	**93.8**	**1.5**	-	-	**0**	**100**	**0**	-	-	**4.8**	**95.2**	**0**	-	-	**3.1**	**90.8**	**6.2**	-	-

Note: A, B and C indicate 'ready,' 'indifferent' and 'not ready,' respectively. X^2 and p represent chi-square and probability values, respectively.

In the case of factors influencing vaccination hesitancy by the participants' contextual influences, low, mild, and high in 56,4%, 35.6%, and 5.9% (participants with hypertension), 68.4%, 29.3%, and 2.3% (participants with diabetes), 61.9%, 24.8%, and 13.3% (participants with asthma), and 33.5%, 43.7% and 22.8% (participants with HIV/RVD), respectively. For hesitancy related to group/individual influences, 64.7%, 31.6%, 3.2% (participants with hypertension), 71.2%, 27.0% and 1.8% (participants with diabetes), 69.5%, 11.4% and 19.0% (participants with asthma) and 31.7%, 44.3% and 24.0% (participants with HIV/RVD) of participants were observed to show low, mild, and high hesitancy, respectively. A total of 7.5%, 2.3%, 23.8%, and 30.5% of participants had high hesitancy due to factors that were related to vaccine-specific issues (Table **4**).

Among participants with asthma, none of the demographic characteristics showed a significant association with vaccination hesitancy. For participants with diabetes, age (X^2= 11.77, p= 0.019), marital status (X^2= 9.754, p= 0.045), and occupation (X^2= 12.39, p= 0.015) showed significant association with vaccination hesitancy. In the case of patients with hypertension, only age (X^2= 13.680, p= 0.008) was observed to be significantly associated with vaccination hesitancy, while age (X^2= 19.273, p= 0.013), marital status (X^2= 12.775, p= 0.047) and disease duration (X^2= 21.230, p= 0.002) showed significant association with vaccination hesitancy for participants with asthma (Table **5**).

Table 4. Factors influencing COVID-19 vaccination hesitancy levels of the study participants.

Hesitancy Category	Patients with Hypertension			Patients with Diabetes			Patients with Asthma			Patients with HIV/RVD		
-	Low	Mild	High	Low	Mild	High	Low	Mild	High	Low	Mild	High
Contextual influences	-	-	-	-	-	-	-	-	-	-	-	-
Communication rating	75	20.3	4.7	74.4	23.3	2.3	61.9	28.6	9.5	32.3	52.3	15.4
Influential leaders	54.7	42.2	3.1	72.1	25.6	2.3	61.9	19.0	19.0	41.5	43.1	15.4
Historical Influence	45.3	45.3	9.4	60.5	34.9	4.7	57.1	23.8	19.0	27.7	43.1	29.2
Religion/Social	54.7	42.2	3.1	62.8	37.2	0	52.4	38.1	9.5	30.8	44.6	24.6
Politics rating	62.5	28.1	9.4	72.1	25.6	2.3	76.2	14.3	9.5	35.4	35.4	29.2
Total contextual influences	**58.4**	**35.6**	**5.9**	**68.4**	**29.3**	**2.3**	**61.9**	**24.8**	**13.3**	**33.5**	**43.7**	**22.8**
Hesitancy based on individual and group influences	-	-	-	-	-	-	-	-	-	-	-	-
Past vaccination	65.6	29.7	4.7	74.4	23.3	2.3	71.4	14.3	14.3	40.0	32.3	27.7
Belief/Attitude rating	60.9	37.5	1.6	65.1	32.6	2.3	71.4	14.3	14.3	32.3	43.1	24.6
Health system experience	68.8	29.7	0	65.1	32.6	2.3	66.7	9.5	23.8	26.2	40.0	33.8
Risk/Benefit	59.4	32.8	7.8	72.1	27.9	0	66.7	14.3	19.0	26.2	55.4	18.5
Immunization is not needed	68.8	28.1	3.1	79.1	18.6	2.3	71.4	4.8	23.8	33.8	50.8	15.4
Total individual /group influences	**64.7**	**31.6**	**3.4**	**71.2**	**27.0**	**1.8**	**69.5**	**11.4**	**19.0**	**31.7**	**44.3**	**24.0**
Vaccine/vaccination specific issues	-	-	-	-	-	-	-	-	-	-	-	-
New vaccine formulation	50.0	42.2	7.8	62.8	34.9	2.3	61.9	19.0	19.0	32.3	35.4	32.3
Mode of administration	70.3	26.6	3.1	86.0	14.0	-	71.4	14.3	14.3	27.7	38.5	33.8
Design of vaccine	45.3	42.2	12.5	60.5	37.2	2.3	47.6	23.8	28.6	35.4	33.8	30.8
Rehabilitation/source of vaccine	64.1	28.1	7.8	58.1	39.5	2.3	57.1	14.3	28.6	24.6	46.2	27.7
Role of health professional	53.1	40.6	6.3	86.0	11.6	2.3	57.1	14.3	28.6	20.0	52.3	27.7
Total vaccination specific influences	**56.6**	**35.9**	**7.5**	**70.7**	**27.4**	**2.3**	**59.0**	**17.1**	**23.8**	**28**	**41.2**	**30.5**

Table 5. COVID 19 vaccination hesitancy level of the study participants.

-	Category of Patients																			
-	Patients with Hypertension					Patients with Diabetes					Patients with Asthma					Patients with HIV/RVD				
-	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p
Age (years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21 – 30	14	1	0	13.68	0.008	10	0	0	11.77	0.019	8	0	0	19.273	0.013	1	5	2	5.584	0.694
31 – 30	5	6	0	-	-	11	3	0	-	-	1	3	0	-	-	4	8	8	-	-
41 – 50	5	10	0	-	-	2	4	0	-	-	0	1	2	-	-	5	12	6	-	-
51 – 60	8	6	0	-	-	1	2	0	-	-	1	0	0	-	-	2	6	1	-	-
Above 60	7	2	0	-	-	5	5	0	-	-	3	1	1	-	-	1	4	0	-	-
Gender	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Male	27	11	0	4.620	0.099	10	6	0	0.699	0.705	6	2	1	0.185	0.911	4	15	5	1.152	0.560
Female	10	13	0	-	-	18	8	0	-	-	7	3	2	-	-	9	20	12	-	-
Education	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
No formal	4	2	0	1.377	0.711	2	0	0	1.584	0.663	2	0	0	7.854	0.249	1	4	1	5.521	0.479
Primary	9	8	0	-	-	4	2	0	-	-	0	0	1	-	-	6	7	3	-	-
Secondary	19	9	0	-	-	18	8	0	-	-	9	4	2	-	-	4	10	6	-	-
Tertiary	7	6	0	-	-	5	14	0	-	-	2	1	0	-	-	2	14	7	-	-
Religion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Islam	10	11	0	4.786	0.188	8	2	0	1.557	0.459	4	1	2	2.568	0.632	5	7	3	5.645	0.227
Christianity	25	10	0	-	-	18	9	0	-	-	8	4	1	-	-	6	23	14	-	-
Traditional	4	3	0	-	-	3	3	0	-	-	1	0	0	-	-	2	5	0	-	-
Others	0	1	0	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
Marital status	-	-	-	-	-	10	0	-	-	-	7	1	0	-	-	3	6	4	-	-
Single	12	2	0	6.071	0.194	13	7	0	9.754	0.045	2	3	2	12.752	0.047	6	17	9	2.187	0.975
Married	18	18	0	-	-	1	3	0	-	-	0	0	0	-	-	3	6	2	-	-
Separated	5	3	0	-	-	4	4	0	-	-	4	1	0	-	-	0	3	1	-	-

(Table 5) contd.....

-	Category of Patients																			
-	Patients with Hypertension					Patients with Diabetes					Patients with Asthma					Patients with HIV/RVD				
-	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p	A	B	C	X^2	p
Widowed	3	2	0	-	-	1	0	0	-	-	0	0	1	-	-	1	3	1	-	-
Divorced	1	0	0	-	-	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Occupation	-	-	-	-	-	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-
Artisan	1	0	0	7.377	0.194	12	3	0	12.39	0.015	0	0	0	8.206	0.223	1	7	5	8.153	0.614
Civil Servant	14	9	0	-	-	5	4	0	-	-	1	2	2	-	-	6	8	6	-	-
Trading	14	14	0	-	-	3	7	0	-	-	2	1	1	-	-	5	12	5	-	-
Retired	2	2	0	-	-	-	-	0	-	-	2	1	0	-	-	1	4	0	-	-
Unemployed	4	0	0	-	-	8	0	0	-	-	8	1	0	-	-	0	2	1	-	-
Student	4	0	0	-	-	-	-	0	-	-	-	-	-	-	-	0	2	0	-	-
Disease duration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
< 1 year	17	14	0	2.830	0.587	11	4	0	0.798	0.939	8	1	0	21.230	0.002	2	2	2	7.008	0.536
1 – 2 years	4	2	0	-	-	3	1	0	-	-	2	4	1	-	-	3	6	4	-	-
2 – 3 years	3	1	0	-	-	6	3	0	-	-	0	0	2	-	-	5	9	7	-	-
3 – 5 years	3	0	0	-	-	2	1	0	-	-	0	0	0	-	-	2	8	3	-	-
> 5 years	12	8	0	-	-	7	5	0	-	-	3	0	0	-	-	1	10	1	-	-
Hesitancy level (%)	**61**	**39**	**0**	-	-	**67**	**33**	**0**	-	-	**62**	**24**	**14**	-	-	**20**	**54**	**26**	-	-

Note: A, B and C indicate 'low', 'mild' and 'high', respectively. X^2 and p represent chi-square and probability values, respectively.

4. DISCUSSION

Findings showed that the majority of the study participants were within the age group of 20-40 years, which is consistent with a similar study conducted by Elhadi *et al*. [24] in Libya, where 56.4% of the participants were within the age 20-40 years. Also, another similar study conducted in the United States by Fridman *et al*. [25 - 27] had 62.3% of participants between the ages of 20-40 years. As revealed in the current study, most of the participants were females and had secondary education and above. These findings are consistent with the results of an earlier study by Rzymski *et al*. [26] on the perception and attitudes of patients in Poland towards COVID-19 vaccines.

The majority of participants with the exception of participants with HIV/RVD, had poor knowledge of the COVID-19 vaccine and vaccination. This result supported earlier studies by Rzymski *et al*. [26] and Islam *et al*. [28], but was in contrast with another Nigerian study conducted to determine the factors influencing COVID-19 vaccine uptake among adults where 69.5% had satisfactory awareness of COVID-19 and vaccination exercise. Socio-demographic characteristics of participants showed significant relationships between knowledge of the COVID-19 vaccine and age (hypertensive patients), while disease duration was significant among patients with asthma. Conversely, these findings are in contrast to a study conducted by Adedeji-Adenola *et al*. [29] in which socio-demographic factors, such as occupation, prior diagnosis of COVID-19, education and religion were statistically significant to respondents' awareness of COVID-19 vaccination exercise.

The study further revealed that most of the participants were indifferent in their readiness to accept the COVID-19 vaccine due to reasons such as individuals and groups and mode of vaccine administration. This outcome is supported by the findings of El-Elimat *et al*. [6], which examined the acceptance and attitudes towards the COVID-19 vaccine in Jordan, where most of the participants were not ready to take the COVID-19 vaccine. Likewise, another study by Solis *et al*. [30] on COVID-19 vaccine acceptance and hesitancy discovered that only 30.1% of people in Low and Medium-income countries were ready to take the COVID-19 vaccine. The study outcome is also in contrast to another similar study by Elhadi *et al*. [24] on knowledge, attitude, and acceptance of the COVID-19 vaccine by health workers and the public, which showed 60.6% of the study population were willing to receive the vaccine.

Moreover, the study further discovered that participants with HIV/RVD have the highest hesitancy among the patients' categories in this order (HIV/RVD >asthmatic > hypertensive > diabetic), which conforms with a study by King *et al*. [25] in the USA on the time trends, factors associated with and reasons for COVID-19 vaccine hesitancy, a survey of US adults where findings showed that participants with weakened or compromised immune system have the highest hesitancy while participants with cancer, diabetes (type 1 and 2) and obesity have less hesitancy for COVID-19 vaccine. This may probably be due to fear of becoming sicker or contracting the virus since their immune system is already weakened. Furthermore, the majority of the participants were hesitant to take the COVID-19 vaccine, and this was due to several factors, including poor communication, religion, political and social factors, health system experience, the role of healthcare professionals and design of the vaccines as it is usually given through injection. This is consistent with the findings of a similar study conducted by King *et al*. [25], where participants were hesitant due to vaccine safety and lack of trust on the COVID-19 vaccine and the government.

Furthermore, Fridman *et al*. [27] found that vaccine attitudes and hesitancy are influenced by a variety of demographic and ideological factors, such as the perceptions of vaccine risk, which differ among individuals. This lends credence to the findings of the current study, where some of the

participants' socio-demographic characteristics (age, marital status, occupation and disease duration) were significantly associated with vaccine hesitancy. Political ideology is another well-documented determinant of vaccine-related attitudes and behaviors. Fridman *et al*. [27] concluded that political aspects play a significant role in vaccination hesitancy, and these conform with the findings of this study.

CONCLUSION

The study sought to assess the COVID-19 vaccination hesitancy among patients with chronic diseases in a teaching hospital. Findings revealed poor knowledge of the COVID-19 vaccine and vaccination among the participants, with poor readiness and high hesitancy. The majority of the study participants were indifferent and reluctant to take the COVID-19 vaccine. Several factors, such as vaccine risks, its safety, historical background, political influence, past vaccination attitudes, beliefs, and attitudes, were highlighted as the reasons for their hesitancy. Poor knowledge of COVID-19 vaccination influences acceptance, which in turn promotes hesitancy. The implication is that if patients are well educated and counseled, it would improve patient acceptance and reduce hesitancy against vaccines, hence curtailing the spread of COVID-19 infections.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved from the Ethics and Research Committee of EKSUTH with approval number EKSUTH/A67/2021/012/004.

HUMAN AND ANIMAL RIGHTS

No animal was used in this study. This research was conducted on humans in accordance with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent was obtained from the participants.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of the article are available within the article.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflicts of interest, financial or otherwise.

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