

Acceptability of COVID-19 vaccination among healthcare workers in Sudan

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Abstract

Introduction: Several studies have investigated COVID-19 vaccine acceptability and hesitancy, especially among healthcare workers (HCWs). However, acceptability of the vaccine by HCWs in Sudan remains unclear.

Aims: We investigated acceptability of the COVID-19 vaccine and its determinants among HCWs in Sudan.

Methods: Using a semi-structured questionnaire, we conducted a web-based cross-sectional study of COVID-19 vaccine hesitancy and its associated determinants among healthcare workers in Sudan during March–April 2021.

Results: A total of 576 HCWs responded to the survey. Mean age was 35 years. Females (53.3%), medical doctors (55.4%) and being located in Khartoum State (76.0%) each accounted for more than half of the participants. Absolute refusal of the COVID-19 vaccine was expressed by 16.0% of the respondents. Males were more than twice as likely to accept the vaccine as females. Lower acceptability was statistically significantly associated with the nurses (OR = 0.35, 95% CI: 0.15–0.82, $P < 0.001$), increased perceived harm from the vaccine (OR = 0.11, 95% CI: 0.05–0.23, $P < 0.001$), lack of confidence in the source of the vaccine (OR = 0.16, 95% CI: 0.08–0.31, $P < 0.001$) and lack of confidence in organizations or government sectors supervising the vaccination process (OR = 0.31, 95% CI: 0.17–0.58, $P < 0.001$).

Conclusion: This study highlights a moderate level of COVID-19 vaccine acceptability among HCWs in Sudan. Special consideration should be given to addressing vaccine hesitancy among female HCWs and nurses.

Keywords: vaccine, vaccination, immunization, acceptability, COVID-19, healthcare workers, Sudan

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Introduction

The novel coronavirus emerged in December 2019 and subsequently developed into the coronavirus disease 2019 pandemic (COVID-19) by March 2020 (C). Since then, the number of COVID-19 cases continued to increase, and by 27 June 2021 the number of cases globally had exceeded 179 million, with 4 million confirmed deaths (Ç). The rapid transmission of the disease and the high risk to global health made governments to implement harsh restrictions and regulations to control the pandemic, including physical distancing and massive use of face masks. Despite all the preventive measures, the pandemic is still progressing and claiming more lives, particularly among first responders, i.e. healthcare workers (HCWs) (Ç).

The first infections of COVID-19 in Sudan were detected among international travellers and returnees who arrived the country between February and March 2020 (4). Soon, Sudan experienced community spread of the pandemic due to poor adherence and the noncompliance of individuals to the preventive measures promoted by the Federal Ministry of Health (Ç).

In December 2020, the World Health Organization (WHO) validated the use of the first COVID-19 vaccine

for humans (6). By February 2021, 7 vaccines were available for use globally, with priority given to the most vulnerable groups, including HCWs (7). However, the success of vaccination efforts aimed at providing community-wide protection was challenged by vaccine hesitancy (8), rejection of vaccination, or delay in considering to take the vaccine despite its availability (9). Vaccine hesitancy has been documented worldwide, even among HCWs (9–CC). This hesitancy is a threat when it spreads among HCWs, mainly because this group of professionals is generally perceived by the community as the most trusted source of information, awareness and encouragement for vaccine uptake.

A recent study in Saudi Arabia showed that, despite the efforts of the Ministry of Health to publicize information on the safety and effectiveness of the COVID-19 vaccine, nearly 50% of HCWs were reluctant to take it (CÇ). Similarly, in the Congo 72% of the HCWs, and in the United States of America 56%, were hesitant to take the COVID-19 vaccine (CÇ, C4). However, a high acceptance rate was reported among HCWs in some countries, such as China, France and Greece, where the rates were 76.4%, 76.9% and 80.0% respectively (CÇ–C7).

The Expanded Programme on Immunization in Sudan faced a similar challenge in regard to vaccinating vulnerable groups, particularly HCWs, even though the number of COVID-19 cases has increased steadily : up to June 2021 it exceeded 36 000, with around 3000 related deaths (Ç). On 3 March 2021, Sudan received the AstraZeneca vaccine through the COVAX alliance (C8).

There is a huge information gap about hesitancy and acceptability around the COVID-19 vaccine among HCWs. Therefore, this study aimed to contribute to filling this gap by investigating the perception, awareness and attitude of HCWs towards the COVID-19 vaccine and determining the underlying beliefs and assumptions.

Methods

Study design and sampling

An online cross-sectional survey was conducted during March–April 2021. The inclusion criteria were HCWs who were practising in Sudan during the data collection period, including dentists, medical laboratory technologists, nurses, physicians, pharmacists, paramedic staff and public health workers, who agreed to participate in the study and who had internet connection to access and complete the online questionnaire. This survey was designed and implemented by the Federal Ministry of Health as part of the preparatory phase for launching the COVID-19 vaccination campaign in the country.

The sample size was calculated using *Epi Info*, version 7. The total number of HCWs targeted for the vaccinations as estimated by the Federal Ministry of Health was 400 000. Assuming that the expected extent of vaccine acceptance was 50%, using alpha error 0.05 and margin of error 5%, the minimum required sample size was 564. A convenience sampling technique was used to recruit the respondents and the questionnaire was distributed through professional social media platforms that were exclusive to Sudanese HCWs.

Survey tool

A semi-structured questionnaire was adapted from previous studies (C4–C9). The questionnaire was self-administered through a Google form. It had 3 major sections: background characteristics, including demographic and professional information related to knowledge and training about COVID-19 and the vaccine; COVID-19 vaccine acceptance, measured with 2 questions: “Would you take the COVID-19 vaccine when it is available?” and “Would you advise your family and friends to take the vaccine?”; and a health beliefs model, which was used to explore the determinants for COVID-19 vaccination acceptability.

The model explored the following items:

- Perceived susceptibility was measured by considering oneself at risk of contracting COVID-19 infection and the need to take the vaccine.
- Perceived severity was measured as the expected outcome if the person contracted COVID-19 infection.

- Perceived harm was measured by concerns related to the safety and side-effects of the vaccine.
- The perceived benefit was measured as belief in the efficacy and effectiveness of the vaccine.
- Cues to action were measured as who participants intend to protect by taking the vaccine.
- Perceived barriers were focused on potential lack of confidence in the vaccine producers, government bodies and organizations supervising the vaccination process.

Additionally, the open-ended broad question: “Do you have any comment regarding COVID-19 vaccination in Sudan?” was used to qualitatively explore the perspectives of HCWs on vaccine acceptability and hesitancy.

To ensure the completeness of the data, it was mandatory to complete all answer fields in the online questionnaire before submission.

Data analysis

Data from the Google sheet was cleaned and entered into SPSS, version 25.

Descriptive analysis was carried out using frequency tables for the categorical variables. Mean and standard deviation (SD) were estimated for the continuous variables such as age and years of working experience. For the open-ended broad question: “Do you have any comments regarding COVID-19 vaccination in Sudan?” answers were translated (if in Arabic) and coded and common themes were identified.

For the inferential analysis, bivariate analysis and multivariable logistic regression analysis were carried out to test for the determinants of acceptance of COVID-19 vaccination. Only definitive yes/no responses were included in this analysis, “maybe” answers were excluded. Cross tabulation and Pearson’s chi-squared test were used to investigate the associations between the outcome variables. Crude odds ratio (OR) was used as the estimate of the association. P value < 0.05 was considered statistically significant. The associations were further adjusted using multivariable logistic regression. Adjusted odds ratio (aOR), 95% confidence interval (CI), and a significance level of $P < 0.05$ were used.

Ethical considerations

The survey was part of a Federal Ministry of Health programme. Informed written consent to participate was obtained from each participant through the online form. All responses were conducted anonymously, and confidentiality of data was maintained throughout the survey.

Results

Sociodemographic characteristics

A total of 576 HCWs participated in this study and responded to the survey. Females represented 53.3% ($n = 307$). The mean age was 35 (SD = 10.6) years. The

majority of the participants (438, 76.0%) were working in Khartoum State (the capital state of Sudan), and most were physicians (319, 55.4%) (Table 1). Around 27% (n = 155) were diagnosed with a medical comorbidity, mainly asthma (69, 34.5%), hypertension (48, 24.0%) and diabetes mellitus (41, 20.5%). Around 45% (n = 259) of the participants had received training on COVID-19, yet only 24.5% (n = 123) described their level of knowledge about COVID-19 disease as “very good” or “excellent”; this was 8.7% (n = 50) for knowledge about the COVID-19 vaccination. Only 20.0% (n = 115) had contracted COVID-19 infection prior to the survey, and more than half (52.4%, n = 302) said they were directly or indirectly caring for COVID-19 cases (Table 1).

Vaccine acceptability, hesitancy and refusal

A total of 329 (57.0%) of our participants expressed their willingness to be vaccinated against COVID-19; 155 (27.0%) were hesitant; and only 92 (14.0%) refused to take the vaccine (Table 1). In response to the question about advising friends and family to get vaccinated against COVID-19, 438 (60.1%) responded yes, 52 (7.1%) maybe and 86 (11.8%) no (Table 1).

Parameters associated with acceptability of COVID-19 vaccine

The mean age of those who would accept the vaccine was 36.5 years, while for the refusers, this was 34.1 years ($P = 0.04$) (Table 2). The sex of the participant was strongly associated with acceptance, with 85.8% of men accepting the vaccine compared with 70.5% of the female participants. Vaccine acceptance was significantly higher with years of work experience (difference in means = 2.2, $P \leq 0.05$), receiving training related to COVID-19 vaccination, and taking care of COVID-19 patients directly or indirectly ($P \leq 0.05$). Those who rated their knowledge about the COVID-19 vaccination as excellent were the least willing to be vaccinated (59.4%, $P \leq 0.05$).

Bivariate analysis showed a statistically significant and positive association between vaccine acceptance among HCWs and perceived susceptibility to COVID-19 infection (OR = 2.72, 95% CI: 1.35–5.49, $P < 0.001$), perceived severity of the infection (OR = 2.48, 95% CI: 1.45–4.25, $P < 0.001$), and the perceived benefit of the vaccine (Table 3). Acceptance of the vaccine was significantly lower with increased perceived harm from the vaccine (OR = 0.11, 95%CI: 0.05–0.23, $P < 0.001$), lack of confidence in the vaccine producers (OR = 0.16, 95% CI: 0.08–0.31, $P < 0.001$), and lack of confidence in the organizations and the government supervising the vaccination process (OR = 0.31, 95% CI: 0.17–0.58, $P < 0.001$) (Table 3).

Determinants of COVID-19 vaccine acceptability

Following the bivariate analysis, the sociodemographic and professional characteristics and health belief model predictors were investigated using multiple logistic regression (Table 4). Only 3 sociodemographic and professional characteristics continued to be significant

Table 1 Sociodemographic and professional characteristics of healthcare workers (n = 576) in Sudan, 2021

Characteristic	Mean (SD)
Age (years)	35.3 (10.6)
Duration of practice/working experience (years)	10.4 (9.6)
	No. (%)
Sex	
Male	269 (46.7)
Female	307 (53.3)
Has comorbidities	
Yes	155 (26.9)
No	421 (73.1)
Comorbidity	
Diabetes mellitus	41 (20.5)
Hypertension	48 (24.0)
Asthma	69 (34.5)
Chronic kidney disease	5 (2.5)
Connective tissue disease	5 (2.5)
Cancer	6 (3.0)
Other	26 (13.0)
Immune suppressing medication	
Yes	15 (2.6)
No	556 (76.3)
Health profession	
Medical doctor	319 (55.4)
Nurse	17 (3.0)
Pharmacist	66 (11.5)
Medical laboratory scientist	26 (4.5)
Public health worker	86 (14.9)
Dentist	26 (4.5)
Other	36 (6.3)
Location of practice	
Khartoum State	438 (76.0)
Other than Khartoum State	134 (23.3)
Not working in Sudan	4 (0.7)
Any training on COVID-19	
Yes	259 (45.0)
No	317 (55.0)
Self-rated knowledge about COVID-19	
Excellent	141 (24.5)
Very good	221 (38.4)
Moderate	173 (30.0)
Good	29 (5.0)
Weak	12 (2.1)
Self-rated knowledge about COVID-19 vaccination	
Excellent	50 (8.7)
Very good	123 (21.4)
Moderate	177 (30.7)
Good	118 (20.5)
Weak	108 (18.8)
History of COVID-19 infection	
Yes	115 (20.0)

Table 1 Sociodemographic and professional characteristics of healthcare workers (n = 576) in Sudan, 2021 (continued)

Characteristic	Mean (SD)
No	461 (80.0)
Family member ever diagnosed with COVID-19	
Yes	216 (37.5)
No	360 (62.5)
Directly or indirectly been taking care of COVID-19 patients	
Yes	302 (52.4)
No	274 (47.6)
Would you take the COVID-19 vaccine?	
Yes	329 (57.0)
Maybe	155 (27.0)
No	92 (14.0)
Advise friends and family to get vaccinated for COVID-19	
Yes	438 (60.1)
Maybe	52 (7.1)
No	86 (11.8)

S Data available via t

predictors of vaccine acceptance: sex, the nursing profession and self-rated knowledge about the vaccine. Males were twice as likely to have the vaccine as females (OR = 2.4, 95% CI: 1.23–4.63), $P < 0.01$). Being a member of the nursing profession continued to be a negative predictor for acceptance (OR = 0.04, 95% CI: 0.01–0.24, $P < 0.001$). Self-rated knowledge about COVID-19 vaccination [having a good (OR = 0.45, 95% CI: 0.08–2.46, $P = 0.01$), a moderate (OR = 0.56, 95% CI: 0.27–1.16, $P = 0.02$) or a very good (OR = 0.36, 95% CI: 0.19–0.81, $P = 0.02$) knowledge about the vaccine] continued to be significantly and negatively associated with acceptance of the vaccine.

Among the determinants for health beliefs, only perceived harm, perceived lack of confidence in the vaccine producers, and all motivations to take the vaccine continued to be statistically significant. Acceptability was significantly lower for lack of confidence in the vaccine producers, OR = 0.19, 95% CI: 0.07–0.47, $P < 0.001$ (Table 4). This was even higher than the negative impact of perceived harms from the vaccine (OR = 0.35, 95% CI: 0.13–0.96, $P < 0.04$). The main motivation for accepting the vaccine among HCWs was to protect their families (OR = 85.09, 95% CI: 27.30–264.70, $P < 0.001$) (Table 4).

Concerns about COVID-19 vaccination

Besides the concerns about the safety and the possible side-effects of the vaccine among our participants, concerns about other aspects were expressed in the comments section of the questionnaire. A 37-year-old male doctor said, “I think there is a hidden agenda behind COVID-19 vaccine,” and a 35-year-old female doctor was concerned about the effect of storage conditions on vaccine safety and efficacy, “I am concerned about the storage of the vaccine.” Two participants were worried about potential corruption relating to vaccine distribution, which may lead to unequal distribution.

Many participants emphasized the importance of information dissemination and increasing awareness among the population to fight false information about the vaccine. A female doctor suggested that all HCWs be tested for COVID-19-explicit IgG before vaccination. One 39-year-old female doctor said, “For me, to be vaccinated or not is mainly dependent on the type of vaccine available. I do prefer the Oxford vaccine to the Pfizer vaccine.”

Discussion

In this cross-sectional study, we measured the extent of acceptability of COVID-19 vaccination among HCWs in Sudan. The vaccination acceptance rate was 57.0% and the refusal rate was 14.0%. Nurses had a lower acceptance rate than other professions, and females were less likely to have the vaccine than their male colleagues.

Irrespective of efforts to make vaccines available for this key target group in Sudan, vaccine acceptance among HCWs significantly affects uptake. COVID-19 vaccination hesitancy has been of increasing concern in many countries (C4, C4).

The majority of respondents were young and direct or indirect caretakers of COVID-19 patients and 20% of them had a history of COVID-19 infection. Females represented more than half of the respondents and this matches their representation in the health workforce in Sudan. About one-sixth expressed absolute refusal, which is twice as much as has been reported for HCWs in the United States of America (C4, C4). In contrast, 57% of the Sudanese HCWs said they would take the vaccine as soon as it became available. This relatively high acceptance rate is comparable to what has been reported by UNICEF in Ghana (C4), and double the acceptance rate reported among HCWs in the Congo (C4), which has the lowest reported rate for vaccine acceptance among HCWs globally (C4). The likelihood of acceptance of the vaccine among nurses was very low: nursing was the HCW profession with the lowest acceptance rate for the vaccine.

To increase COVID-19 vaccine acceptance, positive reinforcement of public perceptions through effective communication of the correct and up-to-date evidence on the safety and effectiveness of the vaccines is crucial. Exposure to misinformation about the vaccine can lower COVID-19 acceptance by up to 6% (C4). In our study, acceptance was inversely correlated with self-rated knowledge about COVID-19 vaccination. It was clear that HCWs had formed negative perceptions regarding the vaccine. This was translated into concerns regarding the development and safety of the vaccine as more than half of the participants were worried about the side-effects. More than a quarter were worried about how rapidly the vaccine was developed. Perceived mistrust towards vaccine manufacturers reduced vaccine acceptance by almost 80%, and the perception of greater harm from the vaccine itself reduced acceptance by 65%. This is a global challenge given the fact that the COVID-19 vaccine

Table 2 Bivariate analysis for sociodemographic and health characteristics as determinants of COVID-19 vaccine acceptance among healthcare workers (n = 576) in Sudan, 2021

Characteristic	Vaccine acceptance/ refusal (n = 421) ^a		Unadjusted OR (95% CI)	P
	Accept Mean (SD)	Refuse Mean (SD)		
Age (years)	36.5 (11.5)	34.1 (9.6)		0.04
Duration of practice (years)	11.6 (10.8)	9.4 (8.6)		0.04
	No. (%)	No. (%)		
Sex				
Male	181 (85.8)	30 (14.2)	2.52 (1.55–4.11)	< 0.01
Female ^b	148 (70.5)	62 (29.5)		
Has comorbidities				
Yes	93 (79.5)	24 (20.5)	1.11 (0.66–1.88)	0.68
No ^b	236 (77.6)	68 (22.4)		
Immune suppressing medication				
Yes	9 (69.2)	4 (30.8)	0.61 (0.18–2.06)	0.49
No ^b	316 (78.4)	87 (21.6)		
Health profession				
Medicine	190 (79.2)	50 (20.8)	1.03 (0.93–1.14)	0.50
Nursing	4 (28.6)	10 (71.4)	0.35 (0.15–0.82)	< 0.01
Pharmacy	31 (72.1)	12 (27.9)	0.91 (0.75–1.10)	0.31
Medical laboratory	13 (76.5)	4 (23.5)	0.97 (0.74–1.27)	0.86
Public health	55 (85.9)	9 (14.1)	1.12 (0.99–1.25)	0.10
Dentistry	14 (82.4)	3 (17.6)	1.05 (0.84–1.32)	0.66
Other	22 (84.6)	4 (15.4)	1.08 (0.91–1.29)	0.41
State where you are practising				
Khartoum	245 (76.3)	76 (23.7)	0.629 (0.34–1.14)	0.12
Other than Khartoum ^b	82 (83.7)	16 (16.3)		
Training on COVID-19				
Yes	167 (82.3)	36 (17.7)	1.60 (1.00–2.57)	0.04
No ²	162 (74.3)	56 (25.7)		
Weak	4 (57.1)	3 (42.9)	0.67 (0.12–3.83)	0.65
Self-rated knowledge about COVID-19				
Good	14 (66.7)	7 (33.3)	0.57 (0.12–2.70)	0.48
Moderate	79 (69.9)	34 (30.1)	0.26 (0.06–1.23)	0.09
Very good	138 (83.6)	27 (16.4)	0.30 (0.06–1.43)	0.13
Excellent ²	94 (81.7)	21 (18.3)		
Self-rated knowledge about COVID-19 vaccination				
Weak	38 (59.4)	26 (40.6)	0.50 (0.25–1.00)	0.05
Good	62 (74.7)	21 (25.3)	0.34 (0.17–0.66)	< 0.01
Moderate	103 (81.1)	24 (18.9)	0.28 (0.14–0.59)	< 0.01
Very good	83 (83.8)	16 (16.2)	0.17 (0.06–0.49)	< 0.01
Excellent ^b	43 (89.6)	5 (10.4)		
History of COVID-19 infection				
Yes	67 (77.0)	20 (23.0)	0.92 (0.52–1.61)	0.77
No ^b	262 (78.4)	72 (21.6)		
Family member ever diagnosed with COVID-19				
Yes	120 (78.4)	33 (21.6)	1.02 (0.63–1.66)	0.91
No ^b	209 (78.0)	59 (22.0)		
Directly or indirectly been taking care of COVID-19 patients				
Yes	183 (82.8)	38 (17.2)	1.78 (1.11–2.84)	0.01
No ^b	146 (73.0)	54(27.0)		

^aSD = Standard deviation

²Respondeents who did not answer were excluded from the analysis

^bReferenced category

Table 3 Bivariate analysis for health belief model as determinants of COVID-19 vaccine acceptance or refusal among the participants who responded positively to the tested perceptions among healthcare workers (n = 576) in Sudan, 2021

Determinant	Belief	Accept No. (%)	Refuse No. (%)	Unadjusted OR (95% CI)	P
Perceived susceptibility	I believe am at risk to get COVID-19 infection ¹	307 (79.9)	77 (20.1)	2.72 (1.35–5.49)	< 0.01
Perceived benefit	I don't believe the vaccine works	26 (51.0)	25 (49.0)	0.1 (0.05–0.20)	< 0.01
Perceived harm (overall) ²	High	13 (34.2)	25 (65.8)	0.11 (0.05–0.23)	< 0.01
	Low	316 (82.5)	67 (17.5)		< 0.01
Perceived barriers	I don't trust the pharmaceutical companies producing the vaccine ¹	37 (42.0)	51 (58.0)	0.16 (0.08–0.31)	< 0.01
	I don't trust the organizations/ government supervising the COVID-19 vaccination process	43 (48.3)	46 (51.7)	0.31 (0.17–0.58)	< 0.01
Perceived severity	Mild	165 (79.7)	42 (20.3)	0.51 (0.24–1.11)	0.09
	Moderate	69 (88.5)	9 (11.5)	0.52 (0.19–1.39)	0.19
	severe	38 (88.4)	5 (11.6)	2.48 (1.45–4.25)	< 0.01
	Not concerned ³	57 (61.3)	36 (38.7)		

¹Reference was assigned a grade of "Agree" (response 4)

²Perceived harm was measured as "High" (4) and "Low" (1, 2, 3) (reference was assigned a grade of "Disagree" (response 2))

³Reference was assigned a grade of "Disagree" (response 2)

Table 4 Multivariable logistic regression for determinants of COVID-19 vaccine acceptance among healthcare workers (n = 576) in Sudan, 2021

Determinant	Mean (SD)	P
Age (years)	1.01 (0.98–1.05)	0.32
Duration of practice (years)	0.99 (0.92–1.06)	0.66
Sex	aOR (95% CI)	
Male	2.39 (1.23–4.63)	0.01
Female ^a		
Health profession		
Medicine ^b	0.25 (0.08–0.74)	0.01
Nursing ^b	0.04 (0.01–0.24)	< 0.00
Pharmacy ^b	0.22 (0.05–0.83)	0.03
Medical laboratory ^b	0.78 (0.12–4.94)	0.80
Public Health ^b	0.90 (0.25–3.22)	0.10
Dentistry ^b	0.41 (0.06–2.80)	0.37
Other ^b	0.45 (0.08–2.46)	0.36
Training on COVID-19		
Yes	1.32 (0.58–3.00)	0.51
No ^a		
Self-rated knowledge about COVID-19		
Weak	1.02 (0.28–3.65)	0.98
Good	0.91 (0.27–3.03)	0.87
Moderate	0.68 (0.17–2.69)	0.58
Very good	0.63 (0.09–4.03)	0.62
Excellent ^a		
Self-rated knowledge about COVID-19 vaccination		
Weak	0.41 (0.06–2.80)	0.12
Good	0.45 (0.08–2.46)	0.01
Moderate	0.56 (0.27–1.16)	0.02
Very good	0.36 (0.19–0.81)	0.02
Excellent ^a		

Table 4 Multivariable logistic regression for determinants of COVID-19 vaccine acceptance among healthcare workers (n = 576) in Sudan, 2021 (continued)

Determinant	Mean (SD)	P
Directly or indirectly been taking care of COVID-19 patients		
Yes	1.03 (0.47–2.35)	0.93
No ^a		
Perceived susceptibility		
Yes	1.31 (0.47–3.63)	0.61
No ^a		
Perceived benefit		
Yes	1.51 (0.55–4.14)	0.42
No ^a		
Perceived barriers		
I don't trust pharmaceutical companies making the vaccine ^c	0.19 (0.07–0.47)	< 0.01
Perceived harm		
I don't trust the organizations/ government supervising the COVID-19 vaccination process ^c	0.59 (0.25–1.41)	0.24
I don't believe the vaccine is safe ^c	0.35 (0.13–0.96)	0.04
Perceived severity		
Mild (Yes) ^b	0.33 (0.13–0.86)	0.02
Moderate (Yes) ^b	0.50 (0.14–1.82)	0.29
High (yes) ^b	1.65 (0.76–3.61)	0.21
Cues to action (taking the vaccine)		
To prevent COVID-19 in myself ^b	52.50 (15.90–172.60)	< 0.01
To prevent COVID-19 in friends and family members ^b	85.09 (27.30–264.70)	< 0.01
To prevent COVID-19 in the community ^b	54.55 (20.89–142.43)	< 0.01

^aReference was assigned a grade of "Disagree" (response 2)

^bOR adjusted for the other variables in the model

^cCI 95% confidence interval

^aReference was assigned a grade of "Disagree" (response 2)

^bReference was assigned a grade of "Disagree" (response 2)

^cReference was assigned a grade of "Disagree" (response 2)

was developed within the shortest time in history. This calls for extra effort to build public trust in the vaccine. The advocacy phase should focus on providing up-to-date information about vaccine safety. Well-functioning tracking systems to cover adverse events and misinformation are vital during the implementation phase.

Female HCWs were much less likely to take the vaccine than their male colleagues. This may be explained by the disparities in perceived vaccine safety between the sexes. Adverse events from COVID-19 vaccines have been unduly reported among women compared with men, and have been excessively covered in the news (ÇÇ-ÇÇ). This could have resulted in a disproportionately negative perception of vaccine safety among females. It is crucial to take gender differences into account when addressing COVID-19 vaccine acceptability, as women represent

the major portion of the healthcare workforce in the country (ÇB). This hesitancy puts them at a higher risk of COVID-19 morbidity and mortality.

All reasons for HCWs to take the vaccine were statistically significant, however, care needs to be taken when interpreting the magnitude of the effect of each reason on how amenable they are to taking the vaccine as the confidence interval was relatively large.

This study had certain limitations. The use of an online survey to collect data from healthcare workers makes it difficult to generalize the study findings to all HCWs in Sudan. However, access restrictions resulting from the COVID-19 regulatory precautions in Sudan made it difficult to collect data through face-to-face methods.

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Acceptabilité de la vaccination contre la COVID-19 chez les agents de santé au Soudan

Résumé

Introduction : Plusieurs études ont examiné l'acceptation du vaccin contre la COVID-19 et la réticence face à cette vaccination, notamment chez les agents de santé. Toutefois, l'acceptabilité du vaccin par les agents de santé au Soudan reste peu claire.

Objectifs : Nous avons étudié l'acceptabilité du vaccin contre la COVID-19 et ses déterminants chez les agents de santé au Soudan.

Méthodes : À l'aide d'un questionnaire semi-structuré, nous avons réalisé une étude transversale en ligne sur la réticence face à la vaccination contre la COVID-19 et les déterminants qui y sont associés chez les agents de santé au Soudan entre mars et avril 2021.

Résultats : Au total, 576 agents de santé ont répondu à l'enquête. L'âge moyen était de 35 ans. Plus de la moitié des participants étaient des femmes (53,3 %), des médecins (55,4 %) et des personnes résidant dans l'État de Khartoum (76 %). Un refus absolu du vaccin contre la COVID-19 a été exprimé par 16 % des personnes interrogées. Les hommes étaient plus de deux fois plus susceptibles d'accepter le vaccin que les femmes. Une acceptabilité plus faible était associée de manière statistiquement significative aux personnels infirmiers (OR = 0,35, IC à 95 % : 0,15-0,82, $p < 0,001$), à une perception accrue des effets nocifs du vaccin (OR = 0,11, IC à 95 % : 0,05-0,23, $p < 0,001$), au manque de confiance dans la source du vaccin (OR = 0,16, IC à 95 % : 0,08-0,31, $p < 0,001$) et au manque de confiance à l'égard des organisations ou des secteurs gouvernementaux qui supervisent le processus de vaccination (OR = 0,31, IC à 95 % : 0,17-0,58, $p < 0,001$).

Conclusion : La présente étude met en évidence un niveau modéré d'acceptabilité du vaccin contre la COVID-19 chez les agents de santé au Soudan. Une attention particulière devrait être accordée à la réticence des agents de la santé des femmes et des personnels infirmiers à la vaccination.

تقبُّل التحصين ضد كوفيد-19 في أوساط العاملين في مجال الرعاية الصحية في السودان

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الخلاصة

المقدمة: تناولت دراسات عديدة مسألة تقبُّل لقاح كوفيد-19 والتردد في أخذه، لا سيما في أوساط العاملين في مجال الرعاية الصحية. ومع ذلك، فإن تقبُّل العاملين في مجال الرعاية الصحية للقاح في السودان لا يزال غير واضح.

الأهداف: هدفت هذه الدراسة إلى استقصاء تقبُّل لقاح كوفيد-19 ومحدداته في أوساط العاملين في مجال الرعاية الصحية في السودان.

طرق البحث: باستخدام استبيان شبه منظم، أجرينا دراسة مقطعية على الإنترنت للتردد في أخذ لقاح كوفيد-19 والمحددات المرتبطة بذلك في أوساط العاملين في مجال الرعاية الصحية في السودان، خلال المدة من مارس/ آذار إلى أبريل/ نيسان 2021.

النتائج: أجاب عن الاستبيان 576 عاملاً في مجال الرعاية الصحية. وكان متوسط أعمارهم 35 عامًا. وكانت نسبة الإناث (53.3%) والأطباء (55.4%) والموجودين في ولاية الخرطوم (76.0%)، أي أن كل فئة من هذه الفئات تجاوزت نصف المشاركين. وأعرب ما نسبته 16.0% من المجيبين عن رفضهم المطلق للقاح كوفيد-19. وكان احتمال تقبل الذكور للقاح أكثر من ضعف احتمال تقبل الإناث له. ومن الناحية الإحصائية، كان انخفاض تقبل اللقاح مرتبطاً ارتباطاً قوياً بكادر التمريض (نسبة الأرجحية = 0.35، فاصل الثقة 95%: 0.15–0.82، القيمة الاحتمالية > 0.001)، وزيادة تصور التعرض لأذى من اللقاح (نسبة الأرجحية = 0.11، فاصل الثقة 95%: 0.05–0.23، القيمة الاحتمالية > 0.001)، وانعدام الثقة في مصدر اللقاح (نسبة الأرجحية = 0.16، فاصل الثقة 95%: 0.08–0.31، القيمة الاحتمالية > 0.001) وانعدام الثقة في المنظمات أو القطاعات الحكومية التي تشرف على عملية التلقيح (نسبة الأرجحية = 0.31، فاصل الثقة 95%: 0.17–0.58، القيمة الاحتمالية > 0.001). الاستنتاج: تُبرز هذه الدراسة وجود مستوى متوسط من تقبل لقاح كوفيد-19 في أوساط العاملين في مجال الرعاية الصحية في السودان. وينبغي إيلاء اهتمام خاص لمعالجة التردد في أخذ اللقاح في أوساط العاملات في مجال الرعاية الصحية وكادر التمريض.

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