ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE SCHOOL OF MEDICINE

DEPARTEMENT OF ANESTHESIOLOGY CRITICAL CARE AND PAIN MADICINE

REASERCH THESIS

Acceptability of COVID 19 vaccines among health care workers and its determinants in Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, 2021G.C.

Thesis to be submitted to the Department of Anesthesiology in Partial Fulfillment of the Requirement for Specialty Program in Anesthesiology.

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Addis Ababa, Ethiopia

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Abbreviations and Acronyms

TASH- Tikur Anbessa Specialized Hospital

WHO- World Health Organization

SAGE – strategic advisory group of experts on immunization

COVID-19- Corona Virus 2019

HCWs- Health Care Workers

USA- United States of America

KSA- Kingdom of Saudi Arabia

Abstract

Background: Healthcare workers who have negative attitudes, are averted, or are hesitant about vaccinations share these unfavorable attitudes and tend to recommend vaccination to their patients infrequently(1). Despite the huge efforts made to achieve successful COVID-19 vaccines, a major hindrance can be related to vaccine hesitancy towards the approved and prospective COVID-19 vaccination(2). The willingness to accept the vaccine among health care workers range from 28% lowest in Congo to 77% in France(3,4).

Objective: To assess the acceptability of a COVID-19 vaccine among healthcare workers in Tikur Anbessa specialized hospital, Addis Ababa 2020G.C.

Method: Institutional based descriptive cross sectional study was conducted among health care workers of Tikur Anbessa specialized hospital. Which is one of the tertiary hospital in the country. The source population was health care worker of Tikur Anbessa specialized hospital. Stratified random sampling was used with a final sample size of 384. The data was collected using an online questionnaire. Data was checked for completeness and imported to SPSS 20 software for analysis. Descriptive analysis was done for Socio-demographic and clinical characteristics of the participants. Bivariate logistic regression was done for each predictor variable and outcome variable. Multiple logistic regressions were done and statistical significance p-value less than 0.05 was taken as a determinant factor.

Result: Of the total 390 health care worker who started the online questionnaire 384 completed it a (98.4% completion rate). Among the 384 participants 256(66.7%) respondents were willing to have the COVID 19 vaccine, 50.8 % were willing to be vaccinated as soon as the vaccine becomes available while 49.2% would delay vaccination until the vaccine's safety is confirmed. Having a high risk of contracting COVID and believing that the COVID-19 vaccine should be compulsory for all increased probability of getting vaccinated

Conclusion and recommendation: Healthcare workers are at great risk of contracting and spreading the disease and, unless wide-acceptance of the vaccine is achieved. One of the crucial method is to alleviate fear of side effects.

1. Introduction

1.1. Background

The world is witnessing a major global humanitarian disaster due to the spread of the Coronavirus disease 2019 (COVID-19), which has affected all aspects of life across the planet. Countries around the world have implemented strict precautions and controls to contain the outbreak of COVID-19, which, among others, include social distancing and mandatory use of face coverings(5). The vaccine's development and deployment is one of the most promising health intervention strategies to mitigate the spread of COVID-19(6,7).

Ethiopia has received first round of 2.184 million doses of the Astra Zeneca COVID-19 vaccine(8). The success of any vaccination program depends on high vaccine acceptance and uptake, and the main challenge that now lies ahead is building public confidence in an emergency-released vaccine(6).

The WHO lists vaccine hesitancy as one of 10 threats to global health, the anti-vaccine movement uses Facebook to promote messages on the alleged dangers and consequences of vaccinating, leading to a reluctance to immunize against preventable communicable diseases(9). The SAGE Working Group on Vaccine Hesitancy concluded that vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services(10).

For acceptability of vaccination against COVID-19 among others education among HCWs is crucial because health professionals' attitudes about vaccines are an important determinant of their own vaccine uptake and their likelihood of recommending the vaccine to their patients(3). It has been reported that healthcare workers who have negative attitudes, are averted, or are hesitant about vaccinations share these unfavorable attitudes and tend to recommend vaccination to their patients infrequently(1)

The results of this study are expected to provide insight into projected vaccine uptake and underlying drivers of vaccine-related decision making among healthcare workers. By understanding this, effective strategies can be developed to enhance COVID-19 vaccine uptake in TASH.

1.2. Statement of the problem

Acceptance of COVID-19 vaccine is low, with the majority of healthcare workers choosing to wait to review more data before deciding. Only about one-third (1247, 36%) of respondents healthcare workers in the United States were willing to take COVID-19 vaccine as soon as it became available at the time of the survey(7).

Survey studies on COVID-19 vaccine acceptance rates were found from 33 different countries. In a majority of survey studies among the general public (62%), the acceptance of COVID-19 vaccination showed a level of ≥ 70%, Low rates of COVID-19 vaccine acceptance were reported in the Middle East, Russia, Africa and several European countries (11)

Despite the huge efforts made to achieve successful COVID-19 vaccines, a major hindrance can be related to vaccine hesitancy towards the approved and prospective COVID-19 vaccination(2). Studies in our country determining the acceptability of the COVID 19 vaccine is limited, so this study will be an input in filling this gap. This study aims to determine the acceptability of a COVID-19 vaccine among healthcare workers in Tikur Anbessa specialized hospital and factors affecting it. This will provide as an input as we proceed with the vaccination of healthcare workers.

1.3. Significance of the study

Healthcare workers play an important role in immunization program success and research has shown that their knowledge and attitudes in relation to vaccines determine their intentions for vaccine uptake and their recommendation of the vaccine (3). There is a wealth of literature showing that healthcare workers can themselves be vaccine hesitant and their hesitancy levels can thus impact hesitancy and aversion to receiving the vaccine among the general public(12). This study stressed to find factors that affects the acceptability of the COVID 19 vaccine among healthcare workers and brings down the barriers so that one of the prevention methods of COVID 19 can be implemented in Ethiopia.

2. Literature Review

Promoting the uptake of an emergency-released vaccine across a targeted population can pose significant challenges to public health authorities. Thus, identifying the factors that can be either a facilitator or a barrier in influencing intentions to uptake or decline the COVID-19 vaccine is important.

Cross-sectional survey that was conducted on the acceptability of a COVID-19 vaccine among the public and healthcare practitioners in the Saudi Arabia reveal that almost half of the 673 healthcare worker respondents in this study were unwilling to be vaccinated against COVID-19(6). In the United States among 3479 HCWs 8% of Respondents do not plan to get vaccine(7). Among the respondents who are willing to get vaccinated 50-56% would delay until the vaccine's safety is confirmed(6,7). In a study done in France 76.9% of Two-thousand and forty-seven HCWs, would accept a COVID-19 vaccine(4).

Surveys conducted in Africa showed very low acceptance rate compared to the westerns and European countries, in Congo the willingness of healthcare workers to be vaccinated against COVID-19 virus is very low (28%) when compared with a comparable study done in France which found that 77.6% (95% CI 76.2–79%) of participants agreed to get vaccinated against COVID-19, this low acceptance may be explained by the harm of social networks and spread of misinformation (3,4). Similarly study done in Ghana showed that 34.9% of 234 health care workers who responded had the intention of receiving the COVID-19 vaccine, concerns about the safety of vaccines and the adverse side effects of the vaccine were identified as the main reasons why health care workers would decline uptake of the COVID-19 vaccine (13).

Older age, male gender, fear about COVID-19, individual perceived risk and flu vaccination during previous season were associated with COVID-19 vaccine acceptance (3,4,6,7,13,14). Nurses (60.1%) and assistant nurses (70.3%) were less inclined to get vaccinated against COVID-19 than physicians (88.8%)(4). In a similar survey conducted in Beijing, china fear of seriousness of the infection (OR: 1.368, P=0.031), fear of repeated wave of epidemic (OR: 1.346, P<0.001), fear of longer epidemic (OR: 1.208, P=0.004), agreement with COVID-19 prevention by vaccination (OR: 1.747, P<0.001), belief in vaccine safety (OR: 1.915, P<0.001) showed significant positive association with intention to get vaccination(15)

Fear of adverse effects, effectiveness, and low/short period of clinical trial were noted as the most common concerns regarding COVID-19 vaccination(3,4,6,7). Fears of adverse side effects from the vaccine (26.73%), the short duration of the clinical trials was also cited as a cause for concern (20.72%), which was followed by fear about the vaccine's safety, and efficacy (16.82%) (6). Safety (69%), effectiveness (69%) and rapidity of development/approval (74%) were the most common concerns in survey done in the United states of America (7).

Delay to accept COVID 19 vaccine is also a pattern which is observed in different surveys like in the USA, majority of the HCW were not sure or would wait to review safety data before getting vaccinated (1953, 56%). Among the respondents who want to wait, 11% will like to wait for 3 months, 10% will like to wait for 6 months, and 20% will like to wait at least 1 year(7). From the study done in KSA 50.29% from half of the respondents who are willing to take the vaccine would delay until the vaccine's safety is confirmed(6).

There has been a monthly improvement in acceptance of the COVID 19 as seen from monthly surveys done in westerns, Far East and European countries. In the UK, the vaccine acceptance rate was 79.0% in April, 83.0% in May, 71.5% in June, 64.0% in July and 71.7% in September/October. In France, the vaccine acceptance rate ranged from 62.0% to 77.1% in March/April and was 58.9% in June. In Italy, the vaccine acceptance rate was 77.3% in April, 70.8% in June and it reached 53.7% in September. For the vaccine acceptance rates in the US, it was 56.9% in April, and ranged from 67.0% to 75.0% in May, and reached 75.4% in June(16).

Since the first COVID-19 cases, misinformation has spread across traditional media and social media, called by WHO an infodemic (i.e., excessive amounts misinformation and rumors that make it difficult identify reliable sources of information)(17). After hearing about poor vaccine quality and the false information conveyed by mass media which has included rumors on the extermination of the black race through vaccination, healthcare workers may have developed vaccine hesitancy, which can influence their decisions to get vaccinated and to promote the vaccine to their patients(3).

3. Objectives

3.1. General Objectives

- To assess the magnitude of acceptability of a COVID-19 vaccine among healthcare workers in Tikur Anbessa specialized hospital during the data collection time

3.2. Specific Objectives

- To assess vaccine hesitancy
- To assess the factors determining the acceptability of COVID-19 vaccine
- To assess factors determining delay for vaccination

4. Method

4.1. Study Design

Institutional based descriptive cross sectional study design

4.2. Study Place

The study was conducted at Tikur Anbessa Specialized Hospital which is found in Addis Ababa. Tikur Anbessa Specialized Hospital is one of the biggest hospitals in Ethiopia, which has been participating in management of COVID 19 suspected or confirmed patient in isolation center which was setup after the pandemic was declared. The isolation center has a ward with 7 beds and ICU with 3 beds, 5 mechanical ventilators and 6 monitors. Five nurses and 3 physicians were assigned per single rotation.

4.3. Study period

The study was conducted between April 5 and August 20 2021.

4.4. Population

4.4.1. Source population

Health care workers, working in Tikur Anbessa Specialized Hospital at the time of data collection.

4.4.2. Study Population

Selected health care workers, working in Tikur Anbessa Specialized Hospital at the time of data collection.

4.5. Inclusion and Exclusion criteria

Health care worker, (Doctors, Nurses, Pharmacists, anesthetists and Laboratory Technicians), who were available and gave their consent during the data collection in Tikur Anbessa Specialized Hospital.

4.6. Sample size determination

The actual sample size for the study determined by using single population proportion formula for single proportion population,

$$N = \frac{z^2_{1-\frac{\alpha}{2}} \times p \times (1-p)}{d^2}$$

Where ni = Initial estimated sample size

Z = Confidence level (alpha, α)

P = prevalence

d = marginal error

To determine the sample size the following assumption was used.

The proportion of health care workers who answered that they will have the COVID 19 vaccine taken from study done in Ghana, 'acceptability of a COVID-19 Vaccine Among Healthcare Workers in Ghana', taken from a previous related study 34.91%. A 95% confidence level, margin of error (0.05) used.

$$Ni\ (1) = \frac{(1.96)2 \quad x \quad 0.3491\ (1-0.3491)}{(0.05)2} = 349$$

When we add, 10% non-respondent percentage, final sample size was 384

4.7. Sampling Procedure

Stratified random sampling technique was used to stratify healthcare worker in TASH in to Nurses, Physicians (consultants, residents, GPs), Non-physician anesthesia providers, Laboratory technicians and pharmacists.

The number of study participants to be sampled from each discipline was determined using proportional to size allocation formula= $\frac{nf*ni}{N}$

Where: ni = Number of Health care worker in each discipline

nf = Final sample of the study

N = Total number of Health care workers.

Table 1: The proportion of sample size form each discipline

Health care workers (strata)	**Total number of HCWs**	**Sample size of strata**
Nurses	825	158
Physicians	1000	192
Non- physician anesthesia provider	39	8
Laboratory technicians	55	11
Pharmacists	74	15
Total	1993	384

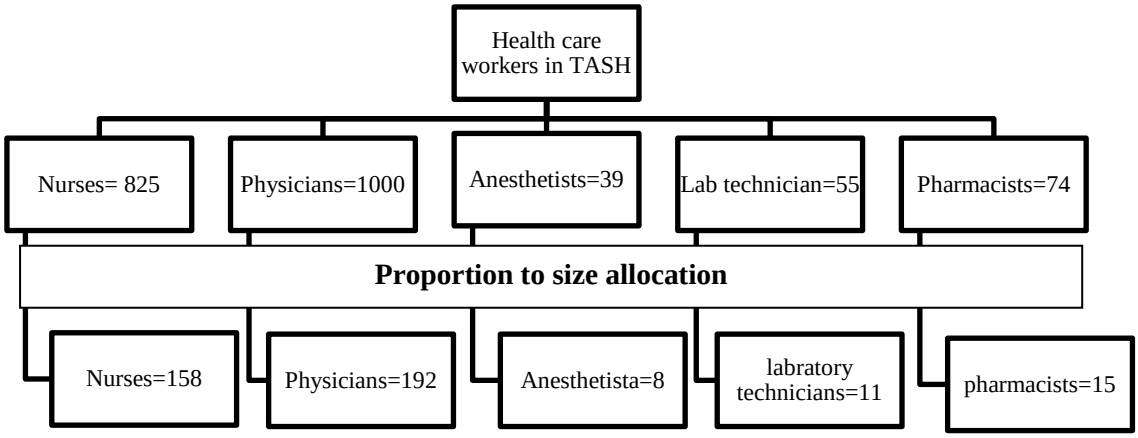


Figure-1: Schematic Presentation of Sampling Procedure in Health care workers TASH in Addis Ababa, Ethiopia 2020.

4.8. Data collection procedure

A self-administered semi structured questionnaire adopted from a research conducted in France and Ghana in 2020G.C. It was designed to include part I: Sociodemographic variables such as age, gender, marital status, occupation and their risk of COVID 19 infection. Part II: knowledge on COVID 19. Part III: attitude towards COVID 19 vaccine. Part IV: willingness to get vaccinated if yes when? If no why? The questionnaire was given online via telegram and collected by the principal investigator.

4.9. Data Analysis procedure

Data was checked for completeness and was entered in to SPSS 20(IBM Corporation, Armonk, NY, USA) software for analysis. Descriptive analysis was done for Socio-demographic and clinical characteristics of the participants. Bivariate logistic regression was done for each predictor variable and outcome variable. Multiple logistic regression was done and statistical significance p-value less than 0.05 was taken as a determinant factor. Then, the result was presented in frequency distribution tables and was summarized using graphs & pie-charts.

4.10. Data quality assurance

Pilot survey was carried out before the formal use of the questionnaire to ensure that the statement of each question was clear and understandable. Data was cleaned on daily basis. The questionnaire was checked for its completeness to assure the quality of data.

4.11. Study variables

4.11.1. Dependent variables

- Acceptability of COVID 19 vaccine
- Immediate or delayed acceptance of COVID 19 vaccine

4.11.2. Independent variables

- Demographic characteristics: Age, sex, Marital status, Occupation and Having chronic medical illness
- Having tested positive for COVID 19
- Risk of acquiring COVID 19

4.12. Operational definition

- **Health care worker**- Doctors, Nurses, Pharmacists, anesthetists and Laboratory Technicians(3)
- **Severe COVID 19**- is defined as dyspnea, a respiratory rate of 30 or more breaths per minute, a blood oxygen saturation of 93% or less, a ratio of the partial pressure of arterial oxygen to the fraction of inspired oxygen (Pa_{O_2}:F_{IO_2}) of less than 300 mm Hg, or infiltrates in more than 50% of the lung field(18)
- **Vaccine hesitancy**- delay in acceptance or refusal of vaccination despite availability of vaccination services.
- **Vaccine acceptability**- the individual or group decision to accept or refuse, when presented with an opportunity to vaccinate (6).
- **Chronic medical illness**- conditions that last 1 year or more and require ongoing medical attention or limit activities of daily living or both.

4.13. Ethical issue

- Ethical clearance and support letter was obtained from department of Anesthesiology and critical care, Addis Ababa University College of Health Science and submitted to Tikur Anbessa Comprehensive Specialized Hospital Chief Clinical and Academic Director Offices.
- Verbal informed consent was obtained from the participants after explanation is given on the objective, procedure, potential risks and benefits of participating in the study and the right to withdraw from the study at any time throughout their interview.
- This study will help policy makers, programmers and researchers to give appropriate attention on issues of interest. The participants were informed that there will be no direct benefit in participating in this study.
- Study participants were assured that their information confidentiality by removing personal identifications and instead using codes not sharing their information to anyone other than the study team. The data collection will be held with strict privacy and participants were reassured on the confidentiality whenever necessary.

4.14. Result dissemination plan

The study result will be submitted to Addis Ababa University School of medicine and be presented to the health science community and disseminated to the concerned and the result will be published on peer reviewed scientific journals.

6. Results

6.1. Socio demographic characteristics

Of the total 390 health care worker who started the online questionnaire 384 completed it a (98.4% completion rate). There were 199(51.8%) male and 185(48.2%) female participants. The mean age was 30.71 years (Range, 25-59) years (SD, ± 4.265). Fifty four percent (54.7%) were within the age group of 25-30 years. Hundred fifty three (39.8%) were married and 231(60.2%) were unmarried during the data collection time. Fifty percent of the sample were physicians, 41.1% were nurses, 3.9% pharmacists, 2.1% anesthesia providers and 2.9% lab technicians. Five percent of the respondents have chronic medical illness, 38.6% of the participants were previously sick with COVID 19.

Table-2: Distribution Socio-demographic characteristics of healthcare workers at TASH (n=384)

Variable	Response	Frequency (n=384)	Percent (%)
Age	**25-30**	210	54.7
	31-35	103	26.8
	36-40	56	14.6
	41-45	11	2.9
	>45	3	.8
Sex	**Male**	199	51.8
	Female	185	48.2
Marital Status	**Single**	166	43.2
	Married	153	39.8
	Separated/Divorced	1	.3
	Living Together	64	16.7
	Widowed	0	0
Occupation	**Physician**	192	50.0
	Nurse	158	41.1
	Pharmacist	15	3.9
	Anesthesia Provider	8	2.1
	Lab Technician	11	2.9

Chronic medical illness	**Yes**	20	5.2
	No	364	94.8
Sick with COVID 19	**Yes, PCR Confirmed**	69	18.0
	Yes, Clinical But Not PCR Confirmed	79	20.6
	No	166	43.2
	Don't Know	70	18.2

6.2. Acceptability of COVID 19 vaccine

Among the 384 participants 256(66.7%) respondents were willing to have the COVID 19 vaccine, while 128(33.3%) were not willing to be vaccinated.

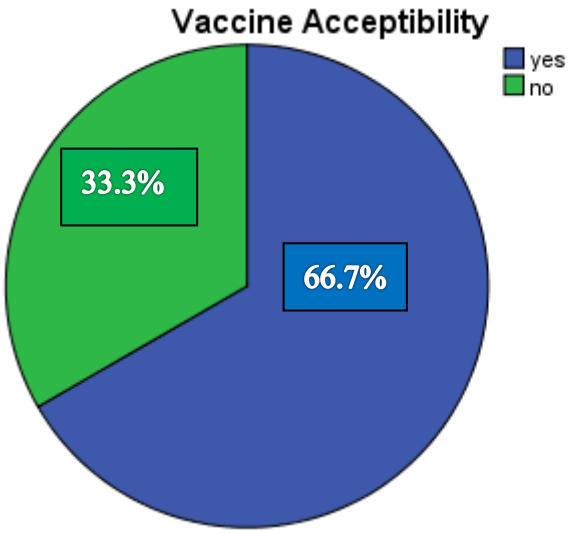


Figure-2: Vaccine acceptability TASH in Addis Ababa, Ethiopia 2020 (n=384)

6.2.1. Factors affecting the acceptability of COVID vaccine

Binary and Multivariable logistic regression was done regarding the factors that affect vaccine acceptability, and the strength of relationship were quantified using odds ratio (OR) and 95% confidence interval. Married participant were less likely to get vaccinated compared to single participants (AOR: 0.326; 95% CI: 0.129-0.829), (P value 0.019). Pharmacists were more likely to get vaccinated than physicians (AOR: 6.834 95% CI: 1.348-34.639), (P value 0.020).

In addition, participants who had fair concern about getting COVID 19 were less likely to get vaccinated than those with very high risk of getting COVID 19 (AOR: 0.170 95% CI: 0.047-0.617), (P value 0.007). Participants who think vaccination should not be mandatory were less likely to get vaccinated than those who think it should be mandatory (AOR: 0.011 95% CI: 0.004-0.033), (P value <0.01).

Table 3- Logistic regression estimates of factors associated with acceptance of a COVID 19 vaccine TASH in Addis Ababa, Ethiopia 2020 (n=384)

		COR 95% CI	P-value	AOR 95% CI
Age	**25-30 (reference)**			
	31-35	0.144(.013, 1.625)	0.380	0.160(0.003, 9.592)
	36-40	0.300(0.026, 3.418)	0.492	0.238(0.004, 14.347)
	41-45	0.717(0.061, 8.387)	0.735	0.491(0.008, 30.169)
	>45	0.875(0.059, 12.975)	0.664	0.376(0.005, 30.768)
Gender	**Female (reference)**			
	Male	0.645(0.421, 0.988)	0.551	0.825(0.438, 1.554)
Marital status	**Single (reference)**		0.001	
	Married	0.266(0.140, 0.507)	0.019	0.326(0.129, 0.829)

	Separated	1.284(0.712, 2.313)	0.462	1.409(0.565, 3.515)
	living together	0.000	1.000	0.000
Occupation	**Physician (reference)**			
	nurse	0.310(0.076, 1.264)	0.652	0.687(0.134, 3.522)
	pharmacist	4.598(1.173, 18.017)	0.020	6.834(1.348, 34.639)
	anesthesia provider	0.970(0.168, 5.593)	0.532	1.987(0.230, 17.143)
	lab technician	0.381(0.032, 4.550)	0.461	3.945(0.102, 152.010)
Chronic medical illness	**Yes**	0.850	0.650	0.687(0.136, 3.472)
	No (reference)			
Sick with COVID 19	**yes, PCR confirmed (reference)**			
	yes, clinical but not PCR confirmed	.554(.221, 1.389)	.002	0.137(0.039, 0.486)
	no	3.912(1.990, 7.690)	.318	1.645(0.620, 4.367)
	don't know	2.705(1.250, 5.852)	.384	1.663(0.529, 5.234)
Concern of getting COVID 19	**very high (reference)**			
	very low	0.000	1.000	0.000
	low	0.119(0.015, 0.944	0.238	0.206(0.015, 2.849)
	fair	0.142(0.053, 0.385)	0.007	0.170(0.047, 0.617)
	high	0.849(0.528, 1.364)	0.910	0.957(0.445, 2.056)
Mandatory vaccination	**Yes(reference)**			
	No	0.011(0.004, 0.030)	0.000	0.011(0.004, 0.033)

6.3. Factors associated with immediate or delayed acceptance of COVID 19 vaccine

Among the respondents who said yes to vaccination 50.8 % were willing to be vaccinated as soon as the vaccine becomes available while 49.2% would delay vaccination until the vaccine's safety is confirmed.

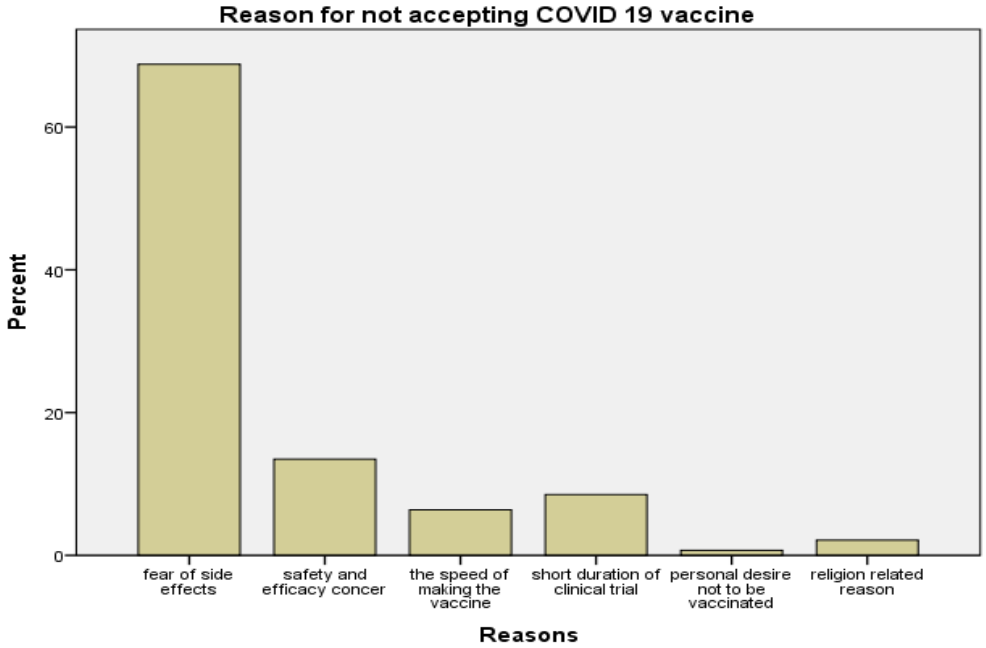
No significant association was seen between the independent variables and immediate or delayed acceptance of COVID 19 vaccine.

Table- 5: Logistic regression estimates of factors associated with immediate or delayed acceptance of COVID vaccine TASH in Addis Ababa, Ethiopia 2020 (n=384)

		COR 95% CI	P-value	AOR 95% CI
Age	**25-30 (reference)**		0.487	
	31-35	1.670(0.920, 3.033)	0.690	1.151(0.576, 2.300)
	36-40	0.967(0.395, 2.364)	0.114	0.374(0.111, 1.265)
	41-45	1.160(0.159, 8.436)	0.541	0.498(0.053, 4.643)
	>45	0.000	1.000	0.000
Gender	**Female**	1.330(0.807, 2.191)	0.914	1.031(0.593, 1.793)
	Male (reference)			
Marital status	**single**		0.304	
	Married	1.711(.976, 2.998)	0.099	1.744(0.901, 3.376)
	Separated/divorced	0.000	1.000	0.000
	living together	1.889(.881, 4.047)	0.171	1.787(0.779, 4.097)
Occupation	**Physician (reference)**		0.206	
	nurse	1.677(0.894, 3.146)	0.026	2.864(1.135, 7.224)
	pharmacist	1.136(0.317, 4.065)	0.748	1.277(0.287, 5.676)
	anesthesia provider	0.454(0.086, 2.406)	0.433	.500(0.088, 2.834)
	lab technician	1.136(0.275, 4.688)	0.728	1.317(0.279, 6.223)
Chronic medical illness	**Yes**	0.630(0.200, 1.983)	0.317	0.505(0.133, 1.923)
	No			

	(reference)			
Sick with COVID 19	yes, PCR confirmed (reference)		0.238	
	yes, clinical but not PCR confirmed	0.707(0.346, 1.445)	0.124	0.535(0.241, 1.188)
	no	0.570(0.286, 1.136)	0.115	0.554(0.266, 1.155)
	don't know	0.478(0.207, 1.105)	0.061	0.414(0.164, 1.043)
Concern of getting COVID 19	very low	.000	1.000	.000
	low	.567(0.155, 2.073)	0.513	0.628(0.156, 2.530)
	fair	1.133(0.540, 2.377)	0.442	1.405(0.591, 3.342)
	high	1.229(0.671, 2.252)	0.514	1.273(0.617, 2.626)
	very high (reference)		0.780	
Mandatory vaccination	Yes (reference)			
	No	1.044(0.592, 1.842)	0.558	1.201(0.650, 2.218)

Figure 3 - Reasons for not accepting the COVID 19 vaccine TASH in Addis Ababa, Ethiopia 2020 (n=384)



7. Discussion

Promoting the uptake of an emergency-released vaccine across a targeted population can pose significant challenges. Failure to address such challenges could impede the country's unprecedented efforts in managing the pandemic. Therefore identifying factors that impede the uptake of this vaccine is imperative for further action.

The result revealed that 66.7% of the respondents were willing to have the COVID 19 vaccine, while 33.3% were not willing to be vaccinated. Half of the participants were willing to take the vaccine as soon as possible. Compared to similar study done in France during the first pandemic wave 76.9% would accept a COVID-19 vaccine(1). This low acceptance may be explained by the harm of social networks and spread of misinformation. Since the first COVID-19 cases, misinformation has spread across traditional media and social media, After hearing about poor vaccine quality and the false information conveyed by mass media, healthcare workers may have developed vaccine hesitancy, which can influence their decisions to get vaccinated and to promote the vaccine to their patients. The other reason could be the daily confirmed new COVID-19 cases in the country had started to decline at that time of data collection and went up again.

In this study, 49.2% of those who were willing to be vaccinated intend to delay vaccination until the vaccine's safety is confirmed. Similar pattern is seen in other countries like 47% of Chinese people who showed an intention to accept the COVID-19 vaccination plan to delay immunization to see if there are associated side effects(2). This is one evidence that vaccination intention is likely to be higher than the actual vaccine uptake.

Perceptions of risk are an inherent part of the decision-making process; this study has found that vaccination intention was associated with a high-risk perception of COVID-19 to healthcare workers, which was similar to findings in kingdom of Saudi Arabia(3), France(1), USA(4).

Data collected from Chinese death rates reveal that there exists a gender gap in causality rate, men 4.7% mortality rate compared women 2.8% mortality rate(2), which is one of many studies which showed increased male susceptibility to the COVID 19 virus. This in contrary to this study has led to increased acceptance in male than female(2,5–7).

It was a surprise to see no association between older age, having chronic medical illness and vaccine acceptance because of the increased morbidity and mortality seen in the older age group and those with chronic medical illness. This makes this result different from what was seen in other studies(6)(8).

In addition participants who think vaccination should be compulsory were willing to get vaccinated, Due to the risk the pandemic has brought not only clinical but also economic, political and social, having a mandatory vaccination has become part of most western countries policy. This might increase vaccine acceptance.

8. Strength and limitations

8.1. Strength

This study tried get the picture of intentions to get a COVID vaccine and factors affecting the vaccine acceptability among healthcare workers of TASH using fairly large sample size. It used stratified sampling method. The sample included physicians, Nurses, Pharmacists, anesthetists and Laboratory technicians.

8.2. Limitation

The study was cross-sectional and couldn't identify causality. The study was conducted only in one institution. The association between the knowledge about COVID vaccine and vaccine hesitancy was not assessed.

9. Conclusion and Recommendation

9.1. Conclusion

In this study the intention to accept a COVID 19 vaccine is low, which makes this concerning as healthcare providers are the front liners and examples for the society. Healthcare workers are at great risk of contracting and spreading the disease and, unless wide-acceptance of the vaccine is achieved, the transmission of the virus would continue and recovery strategies would be hard to accomplish. Half of those who were willing to get vaccinated wanted to delay vaccination until safety of the vaccine is confirmed. There have been many studies conducted showing safety of the vaccine therefore it is imperative to have a compulsory vaccination policy.

9.2. Recommendation

To maintain the benefits of vaccination, understanding and addressing vaccine hesitancy will be crucial to their successful implementation.

The government can play a key role in implementing vaccination by making a compulsory vaccination policy.

Future researchers can include more institutions and assess the the knowledge and practice and attitude of healthcare workers towards COVID 19 vaccine.

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11. Annexes

a. Informed consent sheet

Hello dear, my name is Dr. Yisehak Abraham. In this difficult era of COVID 19 pandemic you have been an excellent frontline in the battle against COVID 19 pandemic and your country holds a great debt. It's been a couple of month since the announcement of the first COVID 19 vaccine discovery and most western and European countries have started to vaccinate its citizens starting from the health care workers despite some resistance from some health care workers.

Today I am here to collect data on the factors determining the acceptability of COVID 19 vaccines among health care workers in Tikur Anbessa Specialized Hospital, 2020. The information you give will be very useful in the realization of this study, and it will be kept confidential. The Name and Address of the participant will not be recorded. You have the right not to answer for any questions which might be inconvenient for you. However, your information is very important for the study. And we would like to confirm to you that all your data are confidential and used for research purpose only.

Are you willing to participate in this study?

Sign----------

Questionnaire Code----------

Thank you for spending your precious and valuable time.

Socio-demographic characteristics

1. **Gender**
   - ☐ Male
   - ☐ Female

2. **Age**

   ----

3. **Marital status**
   - ○ Single
   - ○ Married
   - ○ Separated/ divorced
   - ○ Living together
   - ○ Widowed

4. **Occupation**
   - ☐ Physician
   - ☐ Nurse
   - ☐ Pharmacist
   - ☐ Anesthesia provider
   - ☐ Lab technician
   - ☐ Other----------

5. **Do you have a chronic illness (diabetes mellitus, Hypertension, Asthma, Chronic kidney disease, Cardiac heart disease)?**
   - ☐ Yes
   - ☐ No

6. **Have you been sick with COVID-19?**
   - ☐ Yes, PCR confirmed
   - ☐ Yes, Clinical but not PCR confirmed
   - ☐ No
   - ☐ Don't know

7. How would you rate your concerns of getting COVID 19?

- ☐ Very low
- ☐ Low
- ☐ Fair
- ☐ High
- ☐ Very High

8. Do you think vaccination should be mandatory (must) for the citizens?

- ☐ Yes
- ☐ No

9. Who do you think should be prioritized for vaccination?

- ☐ Health care workers
- ☐ Elderlies
- ☐ Pediatrics

Knowledge on COVID-19 vaccine

Instructions: The following are questions that will ask about your knowledge level on COVID-19 vaccine . Please select the answer of your choice.

Do you agree in Vaccination is the best strategy to mitigate/control the pandemic?	☐ Yes ☐ No
After vaccination do you think you need to take all the precautions against COVID 19	☐ Yes ☐ No
Which of one of the following COVID-19 vaccine you heard about?	☐ Astrazenca ☐ Moderna ☐ Pfizer ☐ sputnik ☐ Johnson and Johnson/Janssen ☐ Sinovac ☐ others----------
If yes to the above question, which one of the	☐ Astrazenca

COVID vaccine is the most effective?

- ☐ Moderna
- ☐ Pfizer
- ☐ sputnik
- ☐ Johnson and Johnson/Janssen
- ☐ Sinovac
- ☐ others----------
- ☐

Which one of the following side effects of the vaccines you know about?

- ☐ Fever
- ☐ Fatigue
- ☐ Headache
- ☐ Muscle pain
- ☐ Chills
- ☐ Diarrhoea
- ☐ Pain at the injection site
- ☐ Other----------

Risk Perception on Novel Coronavirus/COVID-19

Instructions: Please select the answer depending on how much you agree with the statements below.

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	**Vaccination is a good idea because I feel less worried about catching COVID-19**					
2	**Vaccination decreases my**					

	chance of getting COVID-19 or its complications					
5	**I am concerned about faulty/fake COVID-19 vaccine**					

Willingness to be vaccinated

1. **If vaccine against COVID-19 infection is available, would you take it?**
   - ☐ Yes
   - ☐ No

2. **If yes to the above question, when would you like to take it?**

   - ☐ As soon as possible when it became available

   - ☐ Delay vaccination until the vaccine safety was confirmed

3. **If no to question NO 1, why are you not willing to get vaccinated?**

   - ☐ Fear of side effects
   - ☐ Safety and efficacy concern
   - ☐ The speed of making the vaccine
   - ☐ Short duration of clinical trial
   - ☐ Personal desire not to be vaccinated
   - ☐ I don't believe in the existence of COVID 19

- Religious related reason
- Other----------