Original Research Article

Vaccine Hesitancy and Acceptability of COVID-19 Vaccines among Students in Medical Specialties. The University of Aden, Yemen.

Abstract :
Background: The World Health Organization (WHO) considered the COVID-19 vaccine as a new critical tool against SARS-CoV-2 which has successfully reduced the global burden of illness and death. This study aims to assess the acceptability of the COVID-19 vaccine among students in Medical Specialties at the University of Aden, Yemen, and the factors affecting their intention to accept the vaccine.
Methods: A cross-sectional study design was used to target medically related students in the University of Aden with a proportional sample stratified by specialty and educational level during the first semester of 2021-2022. A self-reported questionnaire consisted of five primary sections: sociodemographic characteristics, information on beliefs and attitudes about COVID-19, the attitudes and beliefs about a COVID-19 vaccination, level of willingness and support for COVID-19 vaccine, and finally about the sources of knowledge about the COVID-19 vaccine was used.
Results: The total number of students enrolled in this study was 422 from the different medical specialties at the University of Aden. The knowledge level was low among the participants (55.2%). However, the rest of the findings related to other domains were found to be poor and showed higher barriers to reduce the level of infection (70.9%), acceptability of the COVID-19 vaccine (47.4%), low level of attitude toward the COVID-19 vaccine (48.3%), and high negative perception on the vaccine (67.8%), respectively. Findings showed a significant statistical difference in gender between males and females (p=0.003), age group as younger compared to older age (p=0.048), and the area of residency by governorates (p=0.044).
Conclusion: Overall, medical students in the University of Aden demonstrated low knowledge, high false perceptions, and barriers to the COVID-19 vaccine. Male students showed a likely higher level of vaccine uptake willingness and demonstrated a more positive attitude to accept the vaccine than females. This strengthens the need to take measures and address the rumors and conspiracy theories to avoid distrust in the efficacy and safety of the vaccine.

Keywords: COVID-19, Vaccine, knowledge, acceptance, medical students, Yemen

Introduction

Preventative efforts on Coronavirus disease 2019 (COVID-19) and its variants as contagious diseases have been of supreme importance to the tremendous infections that result in global chaos in health, economic, and social fields (Nicola, Alsafi et al. 2020). The global efforts to reduce the effects of the pandemic to the previous one before the pandemic era, and to depress its health and socio-economic impact, crucially depend on the preventive efforts including the administration of vaccines by the people (Viner, Russell et al. 2020).

Based on the Strategic Advisory Group of Experts on Immunization (SAGE), vaccine hesitancy is the term used to describe: “delay in acceptance or refusal of vaccination despite the availability of vaccination services.” (MacDonald 2015). Acceptance of new vaccines anywhere is considered as one of the main challenges for achieving immunization coverage (Chen and Zhang 2021). Although immunization has successfully reduced the global burden of illness and death, public confidence in vaccines can be affected by various concerns. The WHO considered the COVID-19 vaccine as a new critical tool against SARS-CoV-2 that has successfully reduced the global burden of illness and death (WHO 2021). Many people are delayed in accepting the COVID-19 vaccine despite its availability and the free services provided to encourage people to accept it (Almalki, Alotaibi et al. 2021). Therefore, vaccine acceptance described since the last decade as influenced by many factors including among others the low perception of the disease risk, hence, vaccination was deemed unnecessary complacency; the trust in vaccination safety, effectiveness, besides the competence of the healthcare systems; and the availability, affordability, and delivery of vaccines in a comfortable context (Larson, Jarrett et al. 2015, Domek, O'Leary et al. 2018, Bhopal and Nielsen 2021).

Public confidence in vaccine uptake can be affected by various concerns. As such, vaccine hesitancy can lead to delays, refusal and sometimes contribute to disease outbreaks in the target community (Larson, Smith et al. 2013, Karafillakis, Dinca et al. 2016, Arce, Warren et al. 2021). However, investigating the attitude and vaccine literacy of the people may indicate the main factors affecting vaccine uptake. Moreover, defining vaccine literacy is likely connected to the definition of health literacy and could be applied in this context, as a "personal, cognitive and social skill that determines the capability of an individual to access, understand, and use the information to improve and maintain personal health," (Nutbeam 2000, Biasio 2019). The basic assumption of this definition is that people with a satisfactory level of health literacy manage their health more efficiently (Gusar, Konjevoda et al. 2021). Therefore, it is assumed that level of vaccine literacy would be high among our university students particularly if we consider that our graduates from the college of medicine and relevant specialty soon will become physicians and qualified healthcare workers with close contact with their patients and expected to be a role model in their community.

Personal perception of the vaccine, beliefs, or attitudes toward vaccination, such as perceived efficacy or benefits of vaccines, safety concerns or side effects, and social/peer environment may also influence vaccine uptake (WHO 2020). Many low-income countries, including Yemen, have low socioeconomic status with low levels of education, income, and high unemployment as factors that may directly affect the vaccine distribution and acceptance among their people (Arce, Warren et al. 2021, Moore, Purvis et al. 2021). Besides, people in communities under conflict or migrants have denied being susceptible to COVID-19 infection and then show inaccessibility of the vaccine (WHO 2021). This feeling was not exclusive to members of the public only, but it was also demonstrated among health professionals and university students. For example, Mahdi (2021), has reported that vaccine hesitancy among Iraqi medical students was up to 65.21%.(Mahdi 2021) Similarly, other studies conducted among

professional groups and university students showed a high rate of hesitancy towards accepting the COVID-19 vaccine (Al Kazzaz 2021, Bin-Ghouth and Al-Kaldy 2021, Sallam, Dababseh et al. 2021). In Yemen, according to our knowledge, there was no available study related to the level of acceptance of the COVID-19 vaccine among medically related university students. Therefore, this study aims to assess the acceptability of the COVID-19 vaccine among medically related university students in Aden, Yemen, and the factors associated with their intention to accept the vaccine.

Material and Method

Study design, Population, and Sample

A cross-sectional study design was used targeting medically related students in the University of Aden**,** Yemen**,** and registered in one of the following medically related specialties: Medicine, Dentistry, Pharmacy, Medical Laboratory Sciences, and Nursing during their first semester of the academic year 2021-2022 (September and October). The ideal sample size was estimated based on the population size, a 50% response rate, a 5% margin of error, and a 95% confidence interval, which was calculated to be 384 participants. However, to strengthen the sample size, 10% of the sample was added to achieve a total of 422 students. A proportional sample stratified by specialty and educational level was used based on the total number of students registered in each of the five medically related specialties. A random selection of the students from each of the above-mentioned specialties was carried out. Therefore, recruitment of participants was based on the randomly identified student from the registration list in the same classroom regardless of sex differentiation (as male and female students were found in the same classroom); however, it was ensured that there were no penalties for refusing to participate, and at the same time there were no incentives for those who participated in the study, therefore, all students who selected were agreed to participate in the study without excluding anyone.

Instrument and data collection

The self-reported questionnaire was designed and adapted by the authors based on similar studies on assessing the level of vaccine hesitancy and acceptance for COVID-19 (MacDonald 2015, Harapan, Wagner et al. 2020, Nzaji, Ngombe et al. 2020, Sherman 2020, Sherman, Smith et al. 2020, Zhong, Luo et al. 2020). The close-structured questionnaire was initially developed in English, translated into Arabic, and then translated back into English to confirm the validity of the translation and the integrity of the content. The survey then used the Arabic text to administer the study. Similarly, the scientific credibility and validity of the tool were evaluated by three independent public health preventive medicine experts, who provided feedback on the accuracy, relevance, and simplicity of the included questions and statements. The questionnaire was administered (off-line) to the students in their classroom in each college under the supervision of the authors only and after taking permission from the class instructor to take about 5 minutes to be completed.

The questionnaire was pretested, and the final version was reviewed and approved by the research team. A calculated Cronbach alpha of more than 0.72, was obtained from the overall domains, however, each domain was tested to assess the internal consistency of the questions. Items were grouped in the following sections: (A) demographic information included age, gender, marital status, the discipline of their study, education level, the governorate in which they were residing (administrative regions in Yemen), whether the participant had contracted COVID-19, whether any of the participant's relatives or friends had acquired COVID-19, whether any of the participant's relatives or friends died from COVID-19, (B) knowledge of novel coronavirus (COVID-19) with a total of 20 items of structured questions required possible responses of "Yes", "No" and "Don't know". (C) vaccine literacy (VL) to assess the knowledge of COVID-19 vaccine and vaccination intention which is composed of 20 items of "Yes", "No" and "Don't know". (D) acceptance of COVID-19 vaccination:

The survey's primary outcome was the acceptance of the COVID19 vaccination where participants were asked about their willingness to be vaccinated. Acceptability of the COVID-19 vaccine consisted of five main questions on the factors influencing participants' trust toward COVID-19 vaccines that have been available in the country and factors for their acceptability or hesitancy toward the COVID-19 vaccine. All questions in part D used a five-point Likert scale ranging from strongly agree to strongly disagree and coded from 5 to 1, respectively. The last part was (E) related to the sources of knowledge about the COVID-19 vaccine with some possible answers (e.g., mass media [radio/television], newspaper, internet, social media [Facebook, Twitter], family and relatives, friends, and neighbours.

Data Analysis

For the statistical analysis, coded data were entered and analyzed using IBM SPSS statistics 25.

A normality test was applied, and the examined scored data of most variables showed significant skewness and kurtosis. Therefore, the median score was used as a determinant of the cut-off point for all the summative scores from each domain. A sum-up percentage of item scores for each domain was done, and then the median score was calculated to determine the level of goodness as good or not. Hence, a higher value over the median for each domain was considered as a positive value such as adequate knowledge, perceived less barrier in controlling COVID-19 infection, positive willingness to receive the vaccine from those who did not, positive attitude toward the vaccination, and finally, perception toward COVID-19 vaccine. All the answers were included in the analysis, however, a few questions showed a small number of missing and were treated accordingly.

The demographic data were evaluated and summarized using the descriptive presentation. Quantitative data were presented as mean, standard deviation (SD), and interquartile ranges. Chi-square testing was used in identifying associations between variables and outcomes.

A multivariable logistic regression analysis was performed using a backward stepwise approach to examine and identify factors associated with the vaccine demand group, intention to have the COVID-19 vaccine, acceptance, and hesitancy with Adjusted Odds Ratio (AOR), and a 95% confidence interval (CI) were calculated. The level of significance (α) was set at 0.05.

Results

The total number of students enrolled in this study was 422 from the different medical colleges in the University of Aden as follows: 194 from Medicine, 68 from Pharmacy, 119 from Dentistry, 27 from Medical Laboratory Sciences, and finally 14 students from Nursing. As the process of administering the questionnaire was in the same classroom, in this way we ensured a 100% response rate. The highest percentage of the participants were males (60%), in the age group of 20-23 years (46.0%), and a mean age of 22.7 (SD±2.0) years, from medical specialty (46.0%), and Aden Governorate (64.7%). The findings showed that knowledge level was low among the participants (55.2%). Also, few participants expressed a low level of barrier to reducing the COVID-19 infection (29.1%), which means they feel that the capacity and ability to reduce and control the COVID-19 infection is low. Minor variations were noted among gender, age, specialty, and governorates. Moreover, the chi-square association test was used to analyze the level of knowledge and the level of barriers. The test showed a statistically non-significant difference with the demographic variables, as seen in table 1.

Table 1. Demographic characteristics, level of knowledge on COVID-19 and barriers to controlling the infection among medically related students, University of Aden (n=422)

	Total	Adequate knowledge	Less barrier

Variables	Categories	No. (%) *	No. (%) **	*p*-value	No. (%) **	*p*-value
Sex	Male	253 (60.0)	134 (53.0)	.256	72 (28.5)	.703
	Female	169 (40.0)	99 (58.6)		51 (30.2)	
Age (years)	18-21	110 (26.1)	54 (49.1)	.176	41 (37.3)	.090
	22-23	194 (46.0)	116 (59.8)		52 (26.8)	
	≥ 24	118 (28.0)	63 (53.4)		30 (25.4)	
Specialty	Medicine	194 (46.0)	109 (56.2)	.129	48 (24.7)	.476
	Pharmacy	68 (16.1)	29 (42.6)		23 (33.8)	
	Dentistry	119 (28.2)	68 (57.1)		38 (31.9)	
	Medical lab sciences	27 (6.4)	19 (70.4)		9 (33.3)	
	Nursing	14 (3.3)	8 (57.1)		5 (35.7)	
Governorates	Aden	273 (64.7)	154 (56.4)	.735	77 (28.2)	.853
	Lake	49 (11.6)	25 (51.0)		15 (30.6)	
	Al-Dhale'e	63 (14.9)	32 (50.8)		21 (33.3)	
	All others	37 (8.8)	22 (59.5)		10 (27.0)	
Overall		-	**233 (55.2)**		**121(29.1)**	

* Percentages were taken from the total sample size (422)
****** Percentages were taken from the rows total

Findings in Table 2 illustrated a generally poor level of acceptability and willingness of COVID-19 vaccine (47.4%), high negative perceptions toward the vaccine (67.8%), and low levels of attitude toward vaccination against COVID-19 (48.3%), as seen in table 2.

Male participants (53.4%), younger age groups (57.3%), and those residing in Al-Dhale'e governorate (55.6%) were found to be more accepting of the COVID-19 vaccine than their counterparts with statistically significant differences (p=0.003, p=0.048, and p=0.044, respectively). However, no statistically significant difference was found between different medical specialties.

Likewise, on the analysis of the level of attitude toward COVID-19 vaccine and vaccination intention, statistically, significant differences were found between gender (p <0.001) where males showed a more positive attitude in comparison to females (56.9%). The rest of the variables showed no statistically

significant differences between the level of attitude toward the COVID-19 vaccine and other demographic variables such as age groups, specialty, and residency.

Regarding the association between the perception toward the vaccination process against COVID-19 and the different demographic variables including gender, age groups, specialty, and residency by governorates, no association was found ($p > 0.05$). However, the general level of perception was found positive.

Table 2. Acceptability, positive attitude, and perception toward vaccination against COVID-19 among medically related students (n=422)

Variables	Categories	Willing to be vaccinated		Positive attitude		Positive perception	
		No. (%) **	***p*-value**	**No. (%) ****	***p*-value**	**No. (%) ****	***p*-value**
Sex	Male (253)	135 (53.4)	**0.003**	144 (56.9)	**<0.0001**	175 (69.2)	.452
	Female (169)	65 (38.5)		60 (35.5)		111 (65.7)	
Age (years)	18-21 (110)	63 (57.3)	**0.048**	59 (53.6)	.210	73 (66.4)	.256
	22-23 (194)	83 (42.8)		85 (43.8)		126 (64.9)	
	≥ 24 (118)	54 (45.8)		60 (50.8)		87 (73.7)	
Specialty	Medicine (194)	102 (52.6)	0.267	99 (51.0)	.088	125 (64.4)	.697
	Pharmacy (68)	31 (45.6)		39 (57.4)		49 (72.1)	
	Dentistry (119)	47 (39.5)		49 (41.2)		82 (68.9)	
	Medical Lab Sciences (27)	13 (48.1)		9 (33.3)		20 (74.1)	
	Nursing (14)	7 (50.0)		8 (57.1)		10 (71.4)	
Governorates	Aden (273)	121 (44.3)	**0.044**	123 (45.1)	.088	179 (65.6)	.169
	Lahej (49)	20 (40.8)		22 (44.9)		31 (63.3)	
	Al-Dhale'e (63)	35 (55.6)		39 (61.9)		50 (79.4)	
	All others (37)	24 (64.9)		20 (54.1)		26 (70.3)	
Overall		**200 (47.4%)**		**204 (48.3%)**		**286 (67.8%)**	

***** Percentages were taken from the column total
****** Percentages were taken from the rows total

Table 3. shows the results of logistic regression analysis. Reading the adjusted odds ratio (AOR), none of the demographic covariates including gender, age, type of specialty, and the governorate that the student came from was a predictor for the level of knowledge on COVID-10. Similar findings were found concerning the level of perceived barrier to control the COVID-19 infection, except the younger age group were found less likely to show perceived barrier to control the COVID-19 infection than their counterpart (OR:0.556; 95% CI: 0.313-0.987; *p*:0.045).

The regression model in table 4 showed that being a male was the only predictor attributed to having had 1.68 (95%CI: 1.06-2.67; *p*:0.028) times the odds of willingness to receive the COVID-19 vaccine and more likely 2.06 times of having a positive attitude for receiving the COVID-19 vaccine (95%CI: 1.30-3.26; *p*: 0.002, respectively) in comparison to female students. However, the rest of the variables such as age groups, specialty, and governorate of residency, were found with no association with the dependent outcomes. In addition, the analysis of the positive perception to receive the COVID-19 vaccine showed no likelihood association with all independent variables in the study.

Figure 1 presents the difference in sources of information regarding the COVID-19 vaccine. When students were asked about the trusted source of information related to the COVID-19 vaccine, around 89% of the respondents have reported that doctors and professors at the colleges were the main sources of information. Other sources were found such as social media (87.5%), local and international satellite channels (82.0%), and oral sources of information from family and friends (71%). However, the role of doctors and teaching professors, governmental websites, and local radio programs as a source of information were found with statistically significant differences between those willing to receive the vaccines and those not willing (p-value <0.001, 0.036, and 0.012, respectively).

Table 3. Modeling regression analysis between the level of knowledge on COVID-19 and the perceived barriers to control the diseases with the sociodemographic characteristics of the participants (n=422)

Variables	Categories	Knowledge			Perceived barriers		
		AOR	**95% CI**	***p-value***	**AOR**	**95% CI**	***p-value***
Sex	Male	0.962	0.610-1.516	.866	1.155	.699-1.908	.574
	Female	R	-	-	R	-	-
Age (years)	18-21	.783	.461-1.328	.363	.556	.313-.987	**.045**
	22-23	1.254	.782-2.011	.347	.962	.565-1.639	.888
	≥ 24	R	-	-	R	-	-
Specialty	Medicine	.844.	.272-2.613	.768-	1.408	.432-4.592-	.570-
	Pharmacy	472	.143-1.562	.219	.865	.250-2.995	.819
	Dentistry	.860	.269-2.744	.798	.964	.288-3.229	.952
	Medical Lab sciences	1.489	.368-6.026	.576	.953	.230-3.953	.947
	Nursing	R	-	-	R	-	-
Governorates	Aden	.768	.369-1.596	.479	1.028	.458-2.303	.947
	Lahej	.577	.237-1.405	.226	.858	.324-2.269	.757
	Al-Dhale'e	.691	.297-1.608	.391	.740	.295-1.854	.520
	All others	R	-	-	R	-	-

AOR: Adjusted Odds ratio
R: reference

Table 4. Modelling regression analysis between willingness to receive the COVID-19 vaccine, attitude to receive the vaccine, and the negative perception of the vaccine with the sociodemographic characteristics of the participant (n=422)

Variables	Categories	Willingness			Positive Attitude			Positive perception		
		AOR	**95% CI**	***p-value***	**AOR**	**95% CI**	***p-value***	**AOR**	**95% CI**	***p-value***
Sex	Male	1.680	1.058-2.666	**.028**	2.059	1.300-3.262	**.002**	.943	.586-1.517	.810
	Female	R	-	-	R	-	-	R	-	-
Age (years)	18-21	1.589	.928-2.720	.091	1.170	.685-1.999	.566	1.408	.791-2.507	.245
	22-23	.934	.580-1.503	.778	.828	.515-1.333	.438	1.553	.928-2.601	.094
	≥ 24	R	-	-	R	-	-	R	-	-
Specialty	Medicine	1.123	.356-3.542	.843	.822	.257-2.623	.740	1.160	.331-4.064	.816
	Pharmacy	.775	.231-2.603	.680	.952	.279-3.240	.937	.920	.243-3.485	.903
	Dentistry	.749	.230-2.437	.631	.633	.192-2.081	.451	.887	.246-3.202	.855
	Medical Lab sciences	1.490	.376-5.903	.570	.670	.164-2.736	.577	.582	.129-2.637	.483
	Nursing	R	-	-	R	-	-	R	-	-
Governorates	Aden	.527	.249-1.114	.094	1.006	.488-2.075	.987	1.276	.587-2.774	.538
	Lahej	.409	.164-1.019	.055	.886	.364-2.157	.790	1.348	.530-3.429	.531
	Al-Dhale'e	.685	.289-1.624	.390	1.304	.560-3.038	.538	.612	.236-1.583	.311
	All others	R	-	-	R	-	-	R	-	-

R: reference

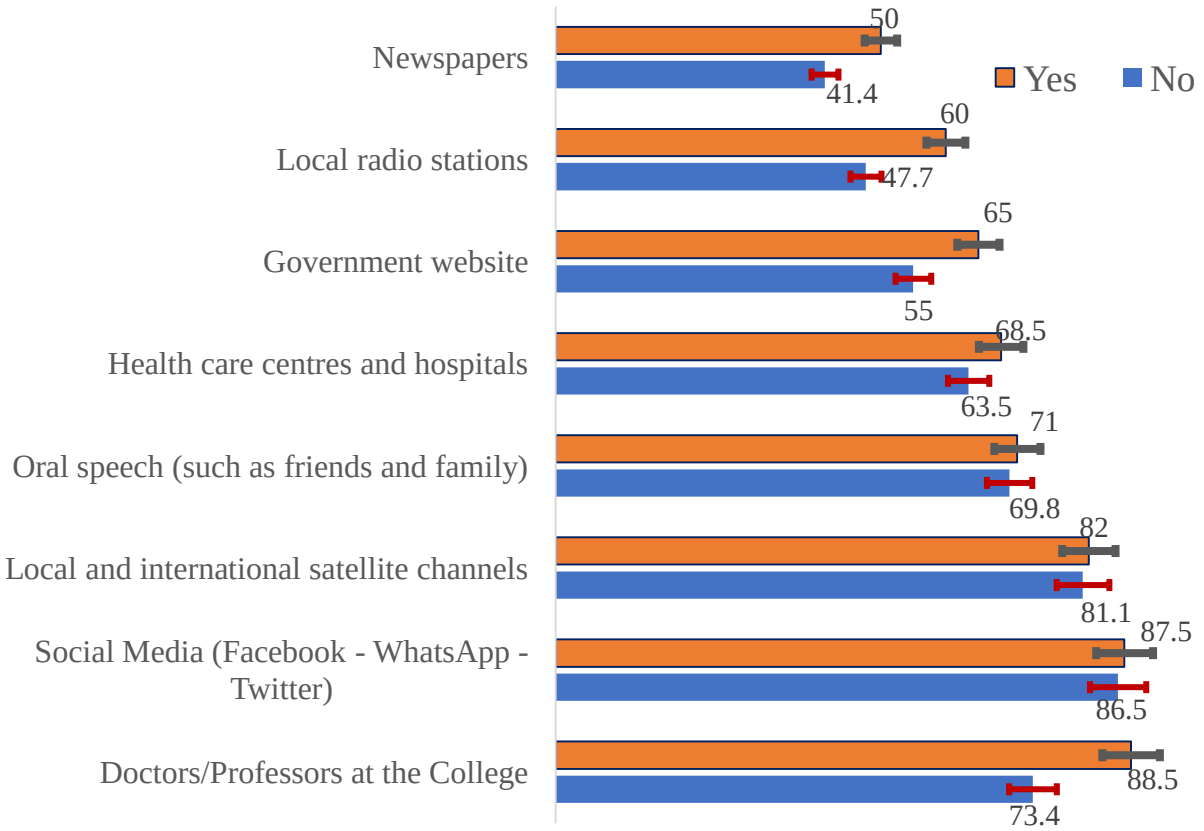

Figure 1. Source of information as factors related to vaccine-hesitancy

Discussion

The results of the survey provide information on knowledge, perceived barriers to control the COVID-19 diseases, willingness to receive the vaccine, attitude to receive the vaccine, and the negative perception of the vaccine among university students at medically related colleges.

Knowledge on the infection and the vaccine

Several predictive factors and barriers, as well as the level of knowledge about the nature of the COVID-19 diseases and the used preventable vaccine, could be linked strongly to the level of willingness to receive a vaccine (Alqahtani, Althobaity et al. 2017, Kreps, Prasad et al. 2020, Neumann-Böhme, Varghese et al. 2020). It is likely to link the low level of knowledge on the nature of COVID-19 infection (55.2%) with the low level of willingness to accept the COVID-19 vaccine (47.4%) as found throughout the responses of the students in this study. Besides that, no significant differences between the components of the demographic variables such as gender, age groups, medical specialty, area of residency, and either the level of knowledge or willingness for getting the vaccine. Moreover, it was unexpected to find this low level of knowledge or willingness to accept the vaccine among the medical university students who will be graduate soon as physicians from the college of medicine and were prepared to play a role-model for their patients as well as acting as a trusted health information source in their community.

Factors related to COVID-19 vaccine acceptance

Our finding of low COVID-19 vaccine acceptance was inconsistent with what was reported from other university students in other countries like Saudi Arabia, (Almalki, Alotaibi et al. 2021); Lebanon, (Hamdan, Singh et al. 2021); Italy, (Baccolini, Renzi et al. 2021); Japan, (Harada and Watanabe 2022); the United Kingdome,(Sherman, Sim et al. 2021); Australia, (Faasse and Newby 2020) and France, (Tavolacci, Dechelotte et al. 2021) (90.4%, 87%, 86.1%, 85.5%, 73.5%, 60.5%,

and 58.0%, respectively). Moreover, some studies were in line with our findings showed a low rate of COVID-19 vaccine acceptance like Turkey with 36.6% acceptance, (Soysal, Durukan et al. 2021); Egyptian students 35%,(Saied, Saied et al. 2021); Jordan with 34.9%,(Sallam, Dababseh et al. 2021) and 33 % of the Iraqi university students (Tahir, Ramadhan et al. 2022).

This variation in acceptancy rates could be explained as due to many factors including among others the differences in local culture, the severity of the pandemic in each country, the role of the government in encouraging the people to receive the vaccine, and the availability and accessibility of the vaccine in the country (SAGE 2020, Saied, Saied et al. 2021, Harada and Watanabe 2022). In Yemen, this is the first study conducted among university students, however, a study conducted in Mukalla city, Yemen among healthcare workers has reported a high percentage of COVID-19 vaccine hesitancy (74%),(Bin-Ghouth and Al-Kaldy 2021) which was much higher in comparison to our findings among students in the University of Aden (48.3%).

The main reported factors of low vaccine acceptance in our study could be explained by different reasons including among others: fear of potential side effects, lack of reliable data regarding the vaccine, lack of trust for those creating and distributing the vaccine, misinformation in the COVID context, disbelief in the vaccine effectiveness, and poor sources of information on the infection. In addition, the poor role of the government in disseminating proper information on the SARS-2 CoV to all the population, limited accessibility, and affordability to all the people as the cost of the vaccine to the country is mainly donation-based, the weak role of the medical curricula in the university to intensify the relevant knowledge of the students as well as to encourage them to use the preventive measures, including the vaccine. Our findings were in line with findings from other studies elsewhere reported on COVID-19 vaccine hesitancy (Harris, Maurer et al. 2010, Brown, Young et al. 2021, Lazarus, Ratzan et al. 2021). Moreover, the perceived risk of becoming infected was considered in some studies as a predictor towards intention for accepting the vaccine (Larson,

Clarke et al. 2018, Fu, Wei et al. 2020). In our study, male students showed one and half more times the higher perceived risk for being infected than females, and two times more likely to have a positive attitude for receiving the vaccine (OR: 2.06; 95%CI: 1.30-3.26; *p*: 0.002, and OR: 1.68; 95%CI: 1.06-2.67; *p*:0.028, respectively).

As the country is under protracted political conflict, such elements if not taken seriously, erode the level of trust and thus reduce the uptake of the COVID-19 vaccine in our communities. Hence, vaccine hesitancy remains a major public health problem and is becoming a barrier to the prevention and containment of the COVID-19 pandemic. In the year 2019, the WHO listed the main reasons for vaccine hesitancy including complacency, inconvenient access to vaccines, and lack of confidence in vaccination; health workers remain the mainstay for overcoming these factors.(WHO 2019) Likewise, ensuring a safe and effective vaccine against SARS-Cov-2 will influence positively the containment of COVID-19 in the public as well as will achieve a high rate of vaccine uptake (Lawes-Wickwar, Ghio et al. 2021).

Source of information

In the meantime, some respondents to the present survey reported that they did not know where accurate/reliable information can be obtained from as the information provided by the health organizations was not sufficient. This part is reflected in their high level of perceived barriers to control the COVID-19 infection. The most influential factors to accept or not accept the COVID-19 vaccine in our study were different pieces of information from different social media platforms (87.5%). Repalust et al. stated that high vaccine hesitancy rates in younger ages might result from the possibility of higher acceptance of inaccurate information circulating among online or offline peer groups (Repalust, Šević et al. 2017). Thus, the present study also found that the vaccine hesitancy/ refusal possibility increased when negative information was received. Many studies have referred that lack of effective information communication strategies could be damaging and could

expose people to false and misleading information (Puri, Coomes et al. 2020, Allington, Duffy et al. 2021, Muric, Wu et al. 2021). The spread of misinformation by the anti-vaccine movement through social media platforms intensified doubts about the vaccine among the public and, in turn, decreased vaccine acceptability as stated in some studies (Almalki, Alotaibi et al. 2021). It is suggested that investigating this stratum of medical specialty in the community have to indicate the importance to work hard in developing the medical curriculum to involve more some educational elements related to the current pandemics and health-related measures to prevent and control it.

Limitations

The present study a has few limitations that warrant consideration. Firstly, it is cross-sectional which depicts a picture of the community response at the point of the study. As participants were asked to report their intention to receive the COVID-19 vaccine if it is available in the future, answers in this regard could include "not sure" if they would take or not take it in the future when the vaccine is abundant and easily accessible. It is interesting to study how the intention varies over time and the context in the study population. Secondly, the current study did not explore the motivation behind the acceptance or barriers behind the hesitancy of the COVID-19 vaccine. Despite the above limitations, the present study is the first of its kind with a representative sample size across the different medically related students at the University of Aden and demonstrated the student intention to uptake the COVID-19 vaccine.

Conclusion

COVID-19 vaccine hesitancy remains high among medically related students at the University of Aden, Yemen, and mainly among females. Additional findings showed that students perceived low risk and trust in the health system were found to be significant predictors towards the low intention

towards taking the COVID-19 vaccine in Yemen. Identifying the barriers to vaccination and related characteristics among those who expressed unwillingness to take the vaccine is essential. Accordingly, interventions targeted towards increasing acceptance rates among university students are urgently needed. Future studies should use a composite measure based on a theoretical framework such as the theory of planned behavior among other non-medical students as well as the public in Yemen and other countries for comparison.

Ethical Approval And Consent

On the first page of the questionnaire, respondents were informed about the background and objectives of the study, and they were free to withdraw at any time, without giving a reason, and all information and opinions provided would be anonymous and confidential. Respondents showed an understanding of the content of the questionnaire and were agreed to participate in the study as marked in the corresponding box and signed a consent form before proceeding to answer the questionnaire and declaring that no personal identification is required. The study protocol was also approved by the Research Ethics Committee at the Faculty of Medicine and Health Sciences, University of Aden (REC-101 -2021).

Competing interest disclaimer:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly used products in our area of research and country. There is no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but the advancement of knowledge. Also, the

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