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Risk Perception and Hesitancy of Dental Health Professionals towards COVID-19 Vaccine in Riyadh Region, Saudi Arabia-A Web-based Survey

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Vaccine hesitancy is a common phenomenon due to its unknown long term side effects. Data regarding the sam is scanty in the Saudi Arabia region hence the purpose of this study was to assess the safety concerns and reasons for vaccine hesitancy and acceptance among dental health professionals in Saudi Arabia.
Materials and Methods: A total of 138 dental health professionals serving in a Riyadh region of Saudi Arabia were studied using an online-based structured, close-ended, and self-administered questionnaire developed by Paudel et al consisting of three sections: demographics, experiences, and willingness to get the vaccination, and perception of COVID-19, and COVID-19 vaccine safety. It was a cross sectional study where convienence sampling technique was employed. The total perception score was calculated by adding respondents' agreement with a set of eleven items using a Likert-type scale. Non-parametric tests (Mann– Whitney U and Kruskal–Wallis) were used for analysis ($p<0.05$).

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Results: A total of18.1% of respondents were diagnosed COVID-19 positive beforethe study. Many (71.7%) considered themselves at increased risk of contracting COVID-19. More than half (55.6%) of the participants believed the increased risk is due to their job type. Nevertheless, a considerable proportion of dental health professionals (89.9%) were willing to be vaccinated. The most common reason for hesitancy was the government approval of the safe and effective vaccine. The nationality, marital status, and type of dental professionals showed a statistically significant difference in vaccine safety perception and effectiveness concerns ($p<0.05$).
Conclusion: The COVID-19 vaccination is well accepted by dental professionals in the Riyadh region of Saudi Arabia. However, vaccine hesitancy is mainly related to the safety and effectiveness of the vaccine and government approval of the vaccine.

Keywords: Acceptance; COVID-19; dental health professional; risk perception; safety.

1. INTRODUCTION

Coronavirus disease 2019 (COVID-19) is continually taking a toll worldwide. As of June 04, 2021, there were 3,698,621deaths and 171,782,908 confirmed cases globally were reported by WHO. Many remedial measures have been tried with limited success since the pandemic's beginning [1,2]. Several vaccines have recently been developed to combat the virus. Currently, vaccines may be the best way to reduce disease transmission when more aggressive mutant strains are discovered regularly. Some vaccines are already on the emergency use list, while others are still being reviewed. However, a study conducted among dental and medical students has highlighted the need for profession-specific curricula to enhance knowledge about vaccines and vaccine counseling skills. In their research, Walker et al. (2021) reported that the international students demonstrated a low level of acceptance of the vaccine [3]. On the contrary, attitude towards getting vaccinated and consequences of infection, and doubts towards efficacy and vaccine potential side effects were found to depend on age and health care professional status [4]. Various studies conducted to assess the vaccination hesitancy and perception have demonstrated different outcomes [4–8].

Since dental health care professionals are directly involved in diagnosing, treating, and taking care of patients, they are at high risk of contracting COVID-19 infection [9]. Most countries, including Saudi Arabia, have started their vaccination programs. Vaccination has been demonstrated to help lower the severity of consequences to varying degrees. However, research has reported that 70% of the population needs to be vaccinated to obtain herd immunity to mitigate COVID-19 [1]. The vaccine skeptics for COVID-19 can deter vaccination drive by creating and spreading speculation. Acceptance of misguided information regarding the COVID-19 vaccine by the public is likely to develop hesitancy among the public to be vaccinated [10]. In Saudi Arabia, frontline health care workers have been given priority for COVID-19 vaccination. Since vaccination of health care practitioners including dental practitioners will ensure to deal effectively with infected patients.

The information gathered from this study aid in identifying potential concerns of the vaccine among dental health professionals that must be addressed to ensure adequate immunization of COVID-19. It also helps develop educational programs to teach dental professionals how to provide vaccine recommendations and counsel vaccine-hesitant patients. Hence this web-based survey aimed to assess the safety concerns and reasons for vaccine hesitancy among dental health professionals in Saudi Arabia.

2. MATERIALS AND METHODS

2.1 Study Design

A cross-sectional descriptive studywas conducted among dental health professionals, including dentists and dental auxiliaries in the Riyadh region of Saudi Arabia.

2.2 Study Questionnaire

This research used an English version of the questionnaire developed by Paudel et al. [11]. The questionnaire consisted of section 1, demographics; section 2, experiences, and perception of COVID-19; and section 3, vaccine safety perception and effectiveness concerns. A dental public health expert established the questionnaire's face validity. The questionnaire was pilot tested among 20 participants, and the reliability of the questionnaire was determined

using Cronbach's alpha (0.78%). Adults aged >18 years working as dental professionals (dentists, dental assistants, dental technicians, and dental hygienists) in the Riyadh region and having consented to participate included in the study.

2.3 Sample Size Calculation

The sample size was calculated as per Cochran's formula:N = Z^2pq/e2, WhereZ = value is obtained from the Z table at a given value of precision, 1.96. p = estimated proportion of the population which has the attribute in question; for our heterogeneous group of population, we assumed greater variability of 50%, so p = 0.5, q = 1 − p = 1 − 0.5 = 0.5, e = desired level of precision (i.e., the margin of error) = 5% = 0.05. Including these values in the formula resulted in a sample size of (N=384). However, only 138 dental health professionals responded to the online questionnaire.

2.4 Questionnaire Administration

An online English version of the questionnaire was prepared using google forms. In addition, the questionnaire links were shared with prominent dental professionals' social media platforms (WhatsApp, Twitter, and Snapchat). A convenience sampling design was employed for data collection.

2.5 Statistical Analysis

All the completed questionnaires were coded, entered, and analyzed using IBM SPSS version 25.0 (Armonk, NY, USA). Categorical variables were analyzed descriptively using frequency distribution and percentages. In addition, a multiple response analysis was carried out to identify the reasons for the increased risk of COVID-19 among study participants and the reason to become eligible for taking the vaccine. Finally, the total perception ranks of COVID-19 vaccines safety perception and effectiveness concern scores were calculated by noting the respondents' agreement (strongly agree and somewhat agree scored=1, and neutral, strongly disagree, and disagree =0 with a set of 11 statements. The data showed non-normal distribution; hence the mean ranks were compared using the Mann-Whitney U test and Kruskal-Wallis test across different demographic characteristics of the study participants. A p-value under 0.05 was considered significant for all the statistical tests.

3. RESULTS

A total of 138 dental professionals participated in this study. The demographic characteristics of the study participants are shown in (Table 1).The majority of the study participants were male (56.5%), Saudi nationals (68.1%) with a monthly income of upto 10000 SAR (48.6%). In addition, more than half of the study participants were single (55.8%) having a bachelor's level of education (63.8%). More dentists (84.1%) than dental auxiliaries (15.9%) participated in the study. Most dental health professionals worked in urban areas (64.5%) of the private sector (51.4%), and less than half of the participants took the influenza vaccine (48.6%).

When enquired about the COVID-19 infection (18.1%) of the study participants tested positive, 37.7% of the dental health professionals mentioned that their family members with whom they are staying tested positive for the COVID-19. Nearly half of the study participants were quite worried about themselves and their family members contracting COVID-19. Almost 71.7% of the participants identify themselves at the increased risk of COVID-19, and 59.4% perceive pandemic severity as moderate. Nearly 96.4% of the study participants were eligible to receive the vaccine, and 89.9% were willing to get vaccinated. However, 40.6% were highly concerned if the vaccine was not offered to them (Table 2).

A multiple response analysis indicated that (55.6%) of study participants viewed job types involving high contact with people as the reasons for increased risk of COVID-19, followed by other reasons, as shown in (Fig. 1).

When asked about acquiring vaccination, 41.6% said they were a health care professional, 26% said everyone should have access to vaccines, and 24 % said they work in a job with high contact with people (Fig. 2).

Table 1. Demographic characteristics of the study participants (N=138)

Characteristics		n	%
Gender	Female	60	43.5%
	Male	78	56.5%
Nationality	Saudi	94	68.1%
	Non-Saudi	44	31.9%
Monthlyincome (SAR)	Upto 10000	67	48.6%
	10000-20000	40	29.0%
	>20000	31	22.5%
Maritalstatus	Married	61	44.2%
	Single	77	55.8%
Education	Diploma	7	5.1%
	Bachelors	88	63.8%
	Masters	28	20.3%
	Ph.D/Saudi Board	15	10.9%
Profession	Dental Auxilary	22	15.9%
	Dentist	116	84.1%
Work Area	Rural	49	35.5%
	Urban	89	64.5%
Work Sector	Government	67	48.6%
	Private	71	51.4%
Influenza Vaccine	Yes	67	48.6%
	No	71	51.4%

Table 2. COVID-19 related information of the respondents

COVID-19 Related Information		n	%
Have you been diagnosed to be COVID-19 positive?	Yes	25	18.1%
	No	113	81.9%
Have any of your family members staying with you been diagnosed COVID-19 positive?	Yes	52	37.7%
	No	86	62.3%
How much worried you were about you or family member contracting COVID-19?	Extremely worried	40	29.0%
	Quiet worried	69	50.0%
	Little worry	19	13.8%
	No worry	10	7.2%
Do you identify yourself at increased risk of infection with COVID-19?	Yes	99	71.7%
	No	29	21.0%
	Dont know	10	7.2%
What is your perception of pandemic severity?	Mild	13	9.4%
	Moderate	82	59.4%
	Severe	43	31.2%
Do you think you are eligible to receive the vaccine?	Yes	133	96.4%
	No	5	3.6%
Are you willing to be vaccinated if a vaccine is offered to you?	Yes	124	89.9%
	Undecided	6	4.3%
	Will get Vaccinated	4	2.9%
	No	4	2.9%
Will you be concerned if the vaccine is not offered to you?	Extremely concerned.	56	40.6%
	Quite concerned.	45	32.6%
	Little concerned	16	11.6%
	Not concerned	12	8.7%
	Don't know.	9	6.5%

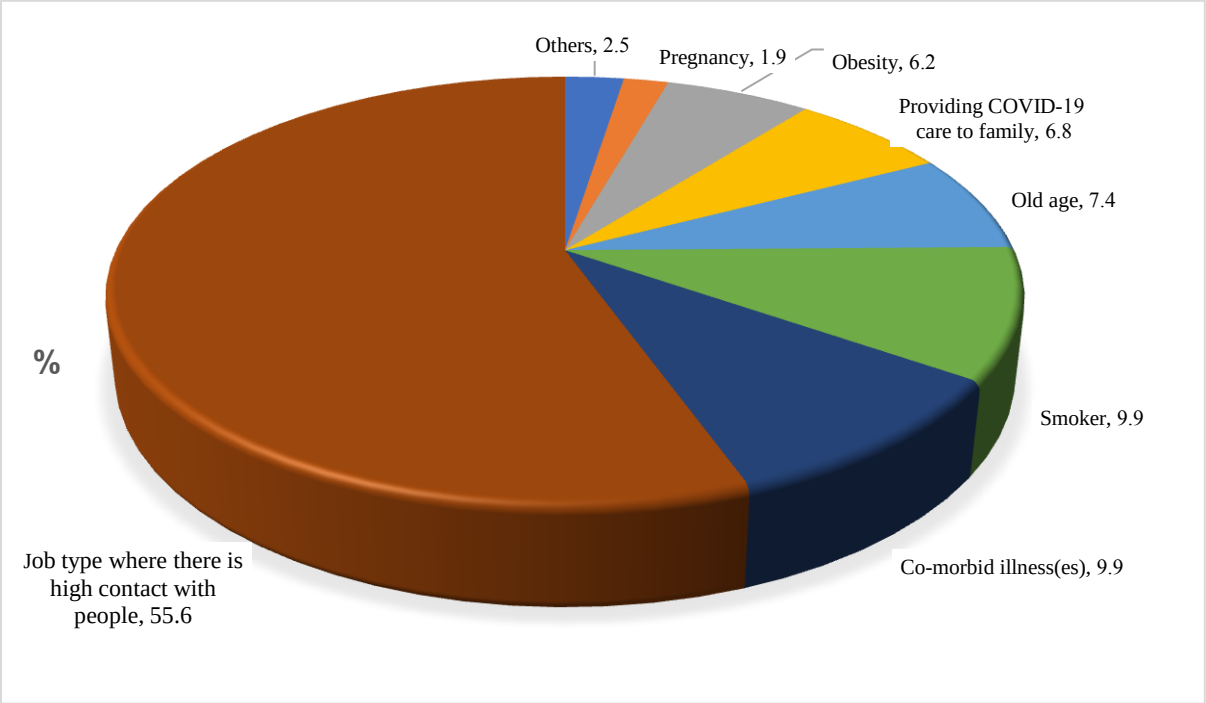

Fig. 1. Reasons for increased risk of COVID-19 among study participants (responses N=162)

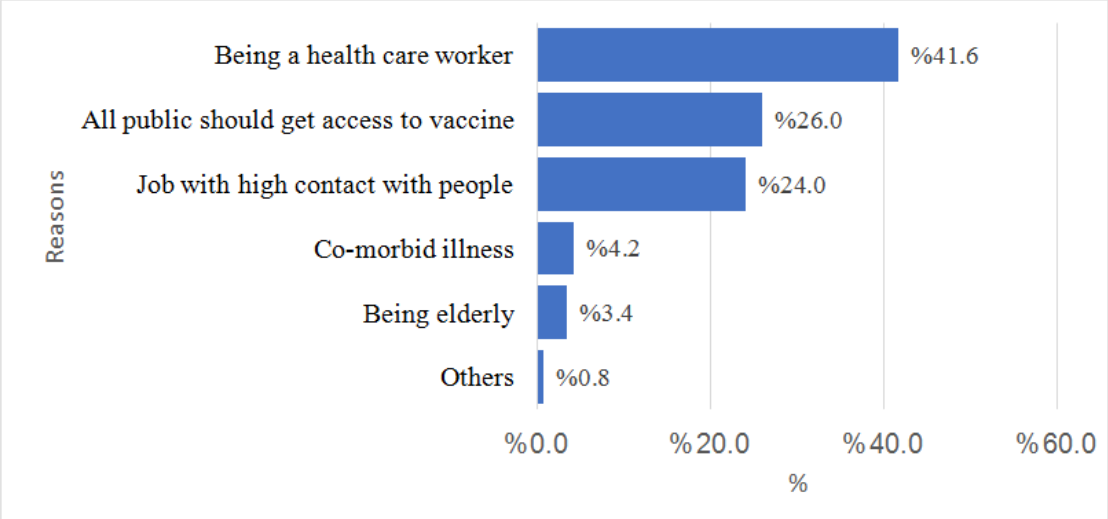

Fig. 2. Reason to become eligible for taking vaccine (responses=262)

Although nearly 73.20% agreed that the vaccine is safe, 22.50% reconsider getting vaccinated even after they had a bad reaction or know about someone having a bad reaction. While 80.40% agreed to receive if the vaccine is safe, effective, and offered free. Similarly, 89.80%were prepared to get the vaccine if approved by the government and comply with the employer's recommendation. Nearly half (50.8%) of the participants reconsider choosing vaccination after reading/hearing about the safety of vaccines through media or social media. Similarly, half (50.70%) of the participants were ready to share their vaccine safety information on their social media. Almost (66.60%) agreed that the health care workers provide sufficient information on side effects that follow vaccination, and (68.80%) mentioned that the pharmaceutical and biotech companies provide safe vaccines. Moreover, (29.7%) participants agreed that vaccines made in Europe or America are safer than those in our region, and (38.40%)

believed that vaccines overload theimmune system. However, (37.60%) dental health professionals agree that the excipients) used in vaccines can cause side effects (Table 3).

When mean ranks of vaccine safety perception and effectiveness concerns were compared across different demographic variables using Mann-Whitney U test and Kruskal-Wallis tests indicated statistically significant differences. A significantly higher mean rank was observed among Saudi dental professionals (74.70) compared to the non-Saudi professionals (58.40) (p=0.023). In addition, dental professionals who were single (76.95) showed a significantly higher mean rank than married (60.10) (p=0.012). Similarly, dentists (73.65) demonstrated a significantly higher mean rank of vaccine safety perception and effectiveness concerns than the dental auxiliaries (47.61) (p=0.004). However, other demographic variables did not show any significant differences in vaccine safety perception and effectiveness concerns, as shown in (Table 4).

Table 3. Vaccine safety perception and effectiveness concerns among study participants (N=138)

Vaccine safety perception	Strongly Agree	Somewhat agree	Neutral/no opinion	Somewhat disagree	Strongly disagree
COVID 19 vaccine is safe	34.8%	38.4%	22.5%	2.2%	2.2%
Myself or someone I know previously had a bad reaction to a vaccine which makes me reconsider getting vaccinated	8.7%	13.8%	30.4%	19.6%	27.5%
I will receive a COVID-19 vaccine if it is proven safe and effective and is offered to me free of charge	68.8%	11.6%	15.2%	2.9%	1.4%
If the government has approved a COVID-19 vaccine safe and effective, I am ready to comply with my employer's recommendation	71.7%	18.1%	8.0%	1.4%	0.7%
The information about safety I heard/read in the media/social media makes me reconsider the choice to be vaccinated	31.2%	19.6%	18.1%	11.6%	19.6%
I share information related to vaccination safety within my social media network	24.6%	26.1%	31.9%	6.5%	10.9%
Health care workers provide sufficient information on side effects that follow vaccination	36.2%	30.4%	20.3%	8.7%	4.3%
Pharmaceutical and biotech companies provide safe vaccines	30.4%	38.4%	27.5%	2.2%	1.4%
Vaccines made in Europe or America are safer than those made in our region	13.0%	16.7%	40.6%	8.0%	21.7%
I believe vaccines overload the immune system	10.9%	27.5%	35.5%	13.0%	13.0%
Excipients (medium for a vaccine) used in vaccines can cause side effects	10.1%	27.5%	50.7%	8.0%	3.6%

Table 4. Vaccine safety perception and effectiveness concerns and demographic variables

Variables		Mean rank	P
Gender	Female	68.95	0.885*
	Male	69.92	
Nationality	Saudi	74.70	**0.023***
	Non-Saudi	58.40	
Monthly income	Upto 10000	67.21	0.400¶
	10000-20000	76.48	
	>20000	65.45	
Marital status	Married	60.10	**0.012***
	Single	76.95	
Education	Diploma	60.29	0.437¶
	Bachelors	71.44	
	Masters	60.95	
	Ph.D./Saudi Board	78.40	
Professional	Dental Auxilary	47.61	**0.004***
	Dentist	73.65	
Work Area	Rural	61.65	0.081*
	Urban	73.82	
Work Sector	Government	67.48	0.555*
	Private	71.41	

**Mann-Whitney U test, ¶ Kruskal-Wallis test, Bold letter indicate p<0.05*

4. DISCUSSION

Because COVID-19-related illness and death are on the rise globally, immunization is gaining traction among health care professionals as a means of prevention and control. In addition, dental professionals areat significant risk of cross-infection while treating the patients within the clinical setup.Therefore, the vaccination remains the most often prescribed preventive intervention in dentistry, despite vaccine hesitancy, rumors, and misinformation driving a rising public concern that may even influence the dental health professionals [12–14].

Previous research has focused on the general population's acceptance of COVID-19 vaccination in Saudi Arabia [15–17], and considering the scarcity of similar studies among dental health professionals, and we decided to survey dental professionals risk perception and hesitancy of COVID-19 vaccination in Riyadh region. Due to the lack of similar studies among dental health professionals, our study findings are compared with general health professionals.

In this study, (89.5%) dental health professionals were willing to get vaccinated, indicating their acceptance of the COVID-19 vaccine. This finding is similar to that observed in a previous studies among dental professionals [18,14]. While Papagiannis reported that dentists' vaccine acceptance rate was 82.5% amongst healthcare workers [19]. However, vaccine acceptance among health care workers in Saudi Arabia ranged between 53-67% [20–23]. Another study conducted by Kelekar reported that 45% of dental students and 23% of medical students were hesitant about receiving the COVID-19 vaccine [24].

The study findings revealed a high percentage of acceptance, which might be attributed to several variables—first, being part of the high-risk health care group of getting COVID-19. The Ministry of Health in Saudi Arabia has now licensed three COVID-19 vaccines (Pfizer/BioNTech, Astra Zeneca, and Moderna) for distribution from over 100 immunization centers around the country [23]. This free availability of high efficacious and safe vaccines could have positively influenced dental professional's to have COVID-19 vaccination acceptance. Moreover, the death of the health care workers, including dental health professionals, during the peak of the COVID-19 pandemic may have resulted in anxiety and fear, which have favorably affected the acceptance of the vaccine [14]. Several personalized digital platforms were used to track the spread of COVID-19 and immunization. Tawakkalna, a GPS-enabled app, was launched by the Saudi Data and Artificial Intelligence Authority to monitor and limit persons' mobility during curfew hours, with the ability to give permits for

exceptions [25]. Moreover, it was updated with the individual's vaccination status.

Past studies found demographic differences in COVID-19 vaccine acceptance among healthcare workers [22,23]. Gender differences were evident with regards to vaccine acceptance. Male healthcare workers are more likely to accept vaccines than female healthcare workers. It could be due to the reported higher risks for COVID-19 hospitalization, infection, and death among males [26]. In the case of general health care workers with less education may be more receptive to a COVID-19 vaccination since they are less likely to deliver health care services through telecommuting than the physicians [23].

Moreover, younger health care workers were more receptive to the vaccine than the older age health care workers. On the contrary, our study found significant differences in vaccine safety perception and effectiveness concerns across nationalities, marital statuses, and types of dental professionals. Again, it could be attributed to the nature of the job and knowledge of the COVID-19 vaccine.

The present study found that adequate COVID-19 vaccination information and job contacting many people were related to vaccine acceptance among study participants. Additionally, dental professionals with higher safety perceptions and concerns might have less hesitancy to receive the vaccine, which could be a positive indicator of vaccine acceptance.

5. LIMITATIONS OF THE STUDY

The study sample was small, and only 36% of all the calculated subjects participated in the study. Moreover, the study sample was selected only from one region of Saudi Arabia. The use of non-probability sampling methodology may have created a selection bias. Therefore, study findings cannot be generalizable to all the dental professionals working in Saudi Arabia.

Moreover, the web-based surveying method, limited to computerized and internet users, had created a selection bias. Dental professionals having access to social media and the internet may be better knowledgeable regarding COVID-19 vaccination information and higher health literacy. In addition, the rate of vaccination acceptance may be overstated since dentists who were not interested in being vaccinated were unlikely to participate in this study. Furthermore, since our research was done at a time when Saudi dental professionals began to get vaccinated, encouragements among colleagues to receive vaccination may have had a favorable influence on improving acceptance rates.

6. CONCLUSION

The study results showed that COVID-19 vaccination is well accepted by the dental professionals in the Riyadh region of Saudi Arabia. Furthermore, the high acceptance of COVID-19 vaccination among dental professionals is predicted to significantly influence other healthcare workers and the public.

Therefore, we recommend that knowledge of the COVID-19 vaccine should be improved to address the vaccine hesitancy among dental health professionals. The implications of the study includes further nationwide research needed to assess the real vaccination rate among dental health professionals in Saudi Arabia.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely 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 for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

The purpose of the study was explained to the dental health professionals, and online consent to participate in the study was obtained. In addition, all the study participants were assured of confidentiality, as data was collected anonymously without personal identifiers. CHERRY's checklist was followed while conducting the study. The data collection was carried out in June and July 2021.

ETHICAL APPROVAL

A study proposal was submitted to the research center of Riyadh Elm University, Riyadh, Saudi Arabia and ethical approval was obtained ("SRP/2021/64/461/431").

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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