The attitudes and perceptions towards the Covid-19 vaccine among dental staff at the University of the Western Cape, South Africa

ABSTRACT

Introduction

Despite the well-known increased risk of exposure to the Covid-19 virus in a dental setting, vaccination rates among staff members are low. This information, as well as the possible associations to demographic profiles, may be useful for authorities to adequately address specific concerns and uncertainties.

Aims and Objectives

To determine the attitudes and perceptions towards the COVID-19 vaccine among dental staff at the UWC Oral Health Centers.

Design

A cross-sectional design was used.

Methods

An anonymous, online, validated questionnaire was used to collect the data.

Results

Majority (91.4%) of the participants had received the Covid-19 vaccine while just over 12% stated that they would not take the booster vaccination. Significant associations between the level of education and the attitudes and perceptions of staff were found.

Conclusions

While the majority had a positive attitude towards the Covid-19 vaccine, specific concerns and uncertainties were identified and will need to be addressed in order to improve vaccination rates among staff members.

Keywords: "Covid-19 vaccine"; "vaccine hesitancy"; "cross-sectional study"; "South Africa"; "Dental Staff"

INTRODUCTION

COVID-19 is a communicable disease that is also known as severe acute respiratory syndrome coronavirus 2 (SARS-COV 2) and was announced a pandemic on the 11th of March 2020\textsuperscript{1,2}. The Covid-19 virus’s most common route of spread is through tiny droplets propelled during coughing or speech from individuals infected with the virus, within a space of 6 feet\textsuperscript{1}.

According to the National Institute for Communicable Diseases, the first COVID-19 case in South Africa was identified and recorded on the 5th of March 2020 in KwaZulu-Natal\textsuperscript{3}. The first confirmed case of COVID-19 reported in the Western Cape was on the 11th of March 2020 in the City of Cape Town\textsuperscript{4}. There are 9 provinces in South Africa, and the Western Cape Province is the 3rd largest province with a population of nearly 7 million people, according to the Western Cape Government official website. The total number of positive COVID-19 cases for the Western Cape, up to the 05 of January 2022, was 3 494 696 infections, with a total of 91 561 deaths\textsuperscript{5}.

Global efforts were made to develop an effective and safe vaccine against this COVID-19 virus. The following vaccines were developed with different approaches: Oxford Univ-AstraZeneca, Gamaleya Sputnik V...
and Johnson & Johnson (viral vector, genetically modified virus); Pfizer-BioNTech, Moderna, Curevac and Curevac (RNA, nucleic acid, incorporating part of the virus genetic code); Sinopharm and Sinovac (inactivated or attenuated virus); Inovio (DNA, synethetic DNA fragments) and EpiVacCorona and Novavax (Protein subunit) 6. According to a recent systematic review, the effectiveness of COVID-19 vaccines against a range of SARS-CoV-2 outcomes showed an 89.1% vaccine effectiveness for the prevention of infection, 97.2% prevention in hospitalizations, 97.4% vaccine effectiveness for the prevention of ICU admission or severe disease and 99.0% effectiveness for the prevention of COVID-19 related deaths 7. The Johnson & Johnson, PfizerBioNTech vaccine is currently implemented, specifically for health care workers through the Sisonke Programme in South Africa 8.

Although the Johnson & Johnson vaccine program may not eliminate COVID-19, it provides the best protection against severe COVID-19 cases that result in hospitalization and death 9, but it is not as effective as Moderna and Pfizer-BioNTech, or compared to single dose Johnson & Johnson vaccines 10. To date, more than 9.37 billion vaccine doses have been administered globally 11. As of the 7th January 2022, 28.3 million doses have been administered against the COVID-19 across South Africa 12. According to the Centre for Disease Control and Prevention, the side effects of the Johnson & Johnson vaccine and Pfizer vaccine are similar which include pain, redness, localized swelling at injection site, fatigue, headaches, flu-like fever, headache, nausea, vomiting, chills, joint pain, and exhaustion 13. There appears to be a general lack of understanding regarding the mechanism of action and possible complications of the Covid-19 vaccine, specifically causing an allergic reaction especially seen with Pfizer-BioNTech 14.

Dentists and dental staff face daily risks of cross infection due to exposure to high levels of microorganisms found not only in the patient’s oral cavity, but also in the aerosols generated by dental instrumentation in 14,15. Ultrasonic generated aerosols and the use of high-speed rotary instruments create a large amount of infectious aerosol droplets that can remain suspended in the air for extended periods of time after a dental procedure 16,17. The University of the Western Cape (UWC) in Cape Town, South-Africa, has two oral health centres that serve the Tygerberg and Mitchell’s Plain communities. The University of the Western Cape was designated a World Health Organization (WHO) Collaborating Centre for Oral Health and is at the forefront of oral health developments while serving underprivileged communities. The oral health centres consist of a combination of academic, administrative and support staff for both teaching and clinical care. All staff members working in the oral health centres, regardless of their role, are in one way or another, exposed to the high-risk dental environment.

Despite the availability of the Covid-19 vaccine free of charge to all staff members, many opted not to accept the vaccine. The ideal would be for all staff members to be vaccinated against the Covid-19 virus, thereby limiting cross-infection and contributing to the safety of staff, students and the patients at the two oral health centres. It is therefore important to identify and address specific concerns and uncertainties and thus improve vaccination rates.

The aim of the present study was to determine the attitudes and perceptions towards the COVID-19 vaccine among dental staff at the UWC Oral Health Centers. A secondary aim was to determine if there were any associations between the demographics (age, sex, staff type and level of education) and the staff’s attitudes and perceptions.

MATERIALS AND METHODS

A cross-sectional study was conducted by means of an anonymized online survey. The study was approved by and ethical clearance obtained from the UWC Biomedical Research Ethics Committee (ref no. BM21/5/3). A human resources representative shared the link to the online survey with all the staff members. Participation was also voluntary and no incentive was set for participants, other than the new UWC specific data that would be gained. The included population consisted of the staff compliment included all professions actively working in the oral health centers (clinical, administrative, academic and support staff) for the Dental Faculty at the University of the Western Cape. Participation in the study was voluntary and participants could withdraw from the study at any stage. Using a 50% prevalence for attitudes, a sample size of 184 participants was necessary for a 5% precision and a 95% confidence interval for a limited sample of 368 staff members at the Dental Faculty.

The questionnaire was based on a validated questionnaire16 and included 16 questions. The first four questions recorded demographic details (age group, gender, staff type and level of education) followed by two questions regarding individual vaccine records (previous vaccinations and vaccination against Covid-19). Four questions on the attitudes and four on the perceptions of dental staff towards the Covid-19 vaccine were also recorded. The responses to “yes/ no” and Likert scale questions were coded as “1” for “yes/ agree” and “0” for “no/ don’t know/ undecided/ disagree.” Total scores were respectively calculated by summing the raw scores of each category of questions ranging from 0–4 for attitudes and perceptions. A score of zero was indicative of poor attitudes and perceptions, whereas a score of 4 was indicative of excellent attitudes and perceptions. REDCAP® was used for data capturing.

Microsoft Excel was used for data cleaning, editing, sorting, and coding. The excel file was then imported into STATA software (StataCorp. 2019. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC.). Confounders such as age, sex, level of education and staff type were also recorded. Descriptive statistics (i.e., frequencies, percentages, means, standard deviations) and first-order analysis (i.e., chi-square tests, Fisher’s exact test) were performed. Likewise, t-tests or one-way ANOVA or Kruskal Wallis tests were performed to determine significant relations of the mean attitudes scores with sociodemographic information. A Pearson’s correlation was used to determine
correlations between attitudes and perceptions. Finally, factors that significantly differed in terms of perception scores, were included into multivariate linear regression analysis with perceptions, as the dependent variables. All tests were deemed statistically significant at \( p < 0.05 \).

**RESULTS**

There was a 28.5\% (\( n = 105 \)) response rate out of 368 potential participants. This response rate is close to the expected response rate for internal surveys and above the expected response rate of external surveys. Only 6 participants indicated that they have never received a vaccine in their lifetime.

The majority (\( n = 96 \)) of the participants had already received either the Johnson & Johnson (90.63\%) or Pfizer (9.38\%) Covid-19 vaccine. Table 1 indicates the demographics of the participants in this study, with a majority being female (61.9\%), clinical staff (64.76\%) with postgraduate qualifications (52.38\%).

More than 80\% felt that the vaccine was safe and 96\% felt that they would take the vaccine without hesitation (Table II). The distribution of attitude and perception scores by demographic profiles are reported in Table III. Higher scores are indicative of positive attitudes and perceptions with regards to the COVID-19 vaccine. None of the adjusted models using forward or backward elimination had an impact on attitudes or perceptions. Therefore, only simple (unadjusted) regression models were presented for attitudes and perception scores. Although not statistically significant, males had a better attitude towards the COVID-19 vaccine compared to females, but this was not the case for the perception scores.

There was a statistically significant, moderately positive correlation between attitude and perception, \( p = 0.0043 \). In other words, participants with a better attitude also had a better perception towards the COVID-19 vaccine.

In Table IV, it is evident that older individuals were more likely to have higher (positive) perception scores compared to the younger participants. In fact, older participants had an increased perception score of 1.99 units greater than their younger counterparts. However, attitude scores did not differ by age group. Attitudes and perception scores did not differ between administrative or clinical staff. There was no statistically significant difference in attitude or perception scores for different levels of education.

| Table I. Baseline demographics (\( n=105 \)) |
|---------------------------------------------|
| **Sex**                                   | \( n(\%) \) |
| Female                                    | 65 (61.9) |
| Male                                      | 40 (38.1) |
| **Age category**                          |           |
| < 41 years                                 | 52 (49.52) |
| \( \geq 41 \) years                      | 53 (50.48) |
| **Staff Type**                            |           |
| Admin                                     | 37 (35.24) |
| Clinical                                  | 68 (64.76) |
| **Level of Education**                    |           |
| High school or below                      | 17 (16.19) |
| University                                | 33 (31.43) |
| Post-graduate                             | 55 (52.38) |

| Table II. Responses to close questions related to attitudes and perceptions towards the Covid-19 vaccine (\( n=105 \)) |
|----------------------------------------------------------------------------------------------------------------|
| **Attitudes**                                                                                     | \( n(\%) \) |
| Do you think that the Covid-19 vaccine is safe?                                                     | 87 (82.86) |
| No/Don't know                                                                                      | 18 (17.14) |
| Will you take the Covid-19 vaccine without hesitation?                                             |           |
| Yes                                                                                           | 96 (91.43) |
| No                                                                                            | 9 (8.57)  |
| I will encourage my family/friends/relatives to get vaccinated                                    |           |
| Agree                                                                                        | 97 (92.38) |
| Disagree/Undecided                                                                            | 8 (7.62)  |
| Would you consider taking the booster vaccination?                                              |           |
| No                                                                                           | 13 (12.38) |
| Yes                                                                                           | 92 (87.62) |

**Perceptions**

| Do you think the Covid-19 vaccine may have side effects? | \( n(\%) \) |
|--------------------------------------------------------|-------------|
| Yes                                                    | 97 (92.38) |
| No                                                     | 8 (7.62)   |

The Covid-19 vaccine is necessary to combat the global Coronavirus pandemic.

| Agree                                                                 | 94 (89.52) |
| Disagree/Undecided                                           | 11 (10.47) |

In your opinion, who do you think should be vaccinated?

| Everyone                                                               | 100 (95.24) |
| HCW/HCW/Individuals with comorbidities                             | 5 (4.76)    |

Do you think that if everyone in the society maintains the preventive measures, Covid-19 will be eradicated?

| Yes                                                                 | 25 (23.81) |
| No                                                                  | 80 (76.19) |
DISCUSSION

The aim of the present study was to determine the attitudes and perception towards the COVID-19 vaccine among dental staff at the UWC Oral Health Centers.

The results of the present study show that overall, age did not impact the attitudes (p = 0.4961) of participants, but that perception scores were statistically significantly higher (more positive) in older participants (p = 0.0489) towards the Covid-19 vaccine. Al-Zalfawi et al.20 and Islam et al.18 found that neither attitudes or perception scores differed between different age groups. Participants that attended university and post-graduate studies did not appear to have more favourable attitudes (p = 0.2109), or perceptions (p = 0.1770).

Al-Zalfawi et al.20 found that attitudes scores differed between sexes, but perception scores did not differ. Similarly, Islam et al.18 found that sex had a statistically significant impact on attitude scores. In the current study it was found that sex did not have statistically significant (p > 0.05) impact on attitudes or perceptions scores (Table I), however, the present study did not have an equal number of male and female participants which may have skewed this comparison.

Nearly all the participants (95.24 %) reported that everyone should be vaccinated against COVID-19 and this finding was higher than the findings in a study by Haque et al.21 According to Alam et al.,22 less than 50% of healthcare workers in Bangladesh, and 46% of Bangladeshi citizens were interested in receiving the COVID-19 vaccination if it became available is much lower than the present study population (91.43%). Older individuals also had a statistically significantly higher perceptions score compared to younger individuals (Table IV). This finding agrees with Rzymski et al.,23 who found that 71% of Polish adults, and 55.3% of Saudi adults were willing to receive the COVID-19 Vaccination compared to the 12.38% of dental staff in the present study13.

CONCLUSIONS

The present study revealed that majority of the staff at the UWC oral health centres, have positive attitudes and perceptions towards the COVID-19 vaccine. Attitudes and perception scores were statistically significantly lower for participants without post-graduate training.

The findings suggest that policy makers should provide specific information regarding the mechanism of action, possible side effects and the necessity of booster shots, to improve the and strengthen the attitudes and perceptions among dental staff towards the Covid-19 vaccine, especially among staff with lower levels of education. Focused informative interventions will help alleviate uncertainties, reduce vaccine hesitancy and improve the success rate of the vaccine roll out.

Limitations

There was a very low response rate, as only 28.5% of the staff population responded to the survey, however, a response rate of 33% is generally accepted 22. The low response rate of staff could possibly be attributed to survey fatigue, as staff were overwhelmed by many online research projects conducted in the Covid-19 pandemic.

Table III. Distribution of Attitude and Perception scores by demographics (n=105)

| Demographics       | Attitudes | | Perceptions | |
|--------------------|-----------|-----------------|-------------|-----------------|
|                    | Total mean (SD) | p-value | Total mean (SD) | p-value |
| Gender             |           |           |              |           |
| Females            | 2.969 (0.56) | 0.3374 | 3.564 (0.90) | 0.8769 |
| Males              | 3.075 (0.53) |           | 3.525 (0.96) |           |
| Age category       |           |           |              |           |
| < 41 years         | 3.481 (0.99) | 0.4961 | 2.903 (0.57) | 0.0489 *  |
| ≥ 41 years         | 3.604 (0.84) |           | 3.113 (0.51) |           |
| Staff Type         |           |           |              |           |
| Admin              | 3.622 (0.72) | 0.5202 | 3.108 (0.52) | 0.1734 |
| Clinical           | 3.500 (0.92) |           | 2.956 (0.56) |           |
| High school/ below | 3.25 (0.97) |           | 3.235 (0.56) |           |
| Level of Education |           |           |              |           |
| University         | 3.485 (1.03) | 0.2109 | 2.969 (0.59) | 0.1770 |
| Post-graduate      | 3.673 (0.82) |           | 2.964 (0.51) |           |

*statistically significant.

Table IV. Unadjusted and Attitudes and Perceptions regression with demographic variables.

| Demographics       | Attitudes | | Perceptions | |
|--------------------|-----------|-----------------|-------------|-----------------|
|                    | Unadjusted Coefficients | | Unadjusted Coefficients | |
|                    | Estimate (95% Confidence Interval) | p-value | Estimate (95% Confidence Interval) | p-value |
| Clinical Staff     | Clinical | −0.65 (−0.495 to 0.252) | 0.52 | −1.37 (−0.372 to 0.068) | 0.173 |
| Age category       | > 41 years | 0.68 (−0.234 to 0.48) | 0.496 | 1.99 (0.001 to 0.418) | 0.049 * |
| Sex                | Male | −0.16 (−0.397 to 0.34) | 0.877 | 0.96 (−0.112 to 0.323) | 0.337 |
| Education level    | University | 0.00 (−0.292 to 0.791) | 0.363 | −1.64 (−0.587 to 0.055) | 0.104 |
|                    | Post-graduate | −0.16 (−0.066 to 0.941) | 0.088 | −1.81 (−0.57 to 0.027) | 0.074 |

*statistically significant.
Author Contributions
The following statements should be used: “Conceptualization, F.K.D. and N.P.; methodology, F.K.D.; software, F.K.D.; validation, F.K.D. and L.R.; formal analysis, F.K.D.; investigation, F.K.D. and N.P.; resources, F.K.D.; data curation, L.R., D.P., I.P., C.P., S.L.R., S.R. C.R.; writing—original draft preparation, L.R., D.P., I.P., C.P., S.L.R., S.R. C.R.; writing—review and editing, F.K.D., N.P., S.N.; visualization, F.K.D.; supervision, S.N.; project administration, F.K.D. and N.P.; funding acquisition, S.N. All authors have read and agreed to the published version of the manuscript.”

Declaration of Funding: This research received no external funding

Ethics: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (BMREC) of University of the Western Cape (protocol code BM21/5/3 and date of approval: 29 June 2021). Participation in this study was voluntary and informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data can be found at this link, https://zenodo.org/record/5776161

Acknowledgments: The authors would like to thank the participants for partaking in this study

Conflicts of Interest: The authors declare no conflict of interest.

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