Awareness of Microbial Contamination in Face Shields Used in Dentistry

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Abstract

Background: The basic know-hows of handling face shields and its related contamination is invaluable given the current escalation of today's scenario. We firmly believe that educating the still-growing students is a huge step forward in battling this situation. Thus, in our present study we have aimed to assess the awareness levels of dental undergraduates and postgraduates regarding the contamination of face shields when used in dentistry.

Materials and Methods: This was a survey based study conducted in the month of March 2021, using the online survey platform SurveyPlanet®. This survey was taken up by 100 dental students (both undergraduates and postgraduates) studying at a private dental university in Chennai, India. The questionnaire consisted of 10 questions. The questions were framed to evaluate the knowledge and awareness of dental students about the contamination associated with face shields when used in dentistry. The data was collected, tabulated in Microsoft Excel® and coded for analysis. The Statistical Package for the Social Sciences for Windows (Version 20.0, SPSS, Inc., Chicago, U.S.A.) was used to analyze the data obtained.

Results: 63% of the students used Only Mask, 12% used Only Face Shield while 25% used both. 38% of the students wore gloves while removing face shields to dispose of them after use. 50% of them were aware that if not tight fitting, aerosols may still enter and exit around the outside of a face shield.

Conclusion: Within the limits of the current study we conclude by reporting that the existing levels of knowledge and aptitude regarding face shields in dentistry is not satisfactory with respect to the current situation in today's pandemic.

Keywords: Microbial Contamination; Face Shields; Survey; Undergraduate; Postgraduate; Innovative.

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Introduction

Infectious diseases pose a threat to healthcare workers, particularly dentists and other dental professionals[1]. Dental practitioners did not utilise any eye, nose or mouth protectors throughout the majority of the last century. However, the rise of infectious conditions like Hepatitis B, Hepatitis C and AIDS has highlighted the importance of infection control measures[2-4]. Dentists carry the risk of cross-contamination and splattering everyday, because of routine work involving blood, saliva and aerosols[5].

The Center for Disease Control and Prevention (CDC) has stated that masks, eyewear and face shields are needed for protecting the critical areas of the face against dangerous organisms[6]. The Occupational Safety and Health Administration (OSHA) also mandates that face protection should be considered in its eye and face protection standards[7].

It also says that healthcare professionals and workers exposed to eye or face hazards must wear eye and face protectives. In a clinical setting this translates into employing masks, eye goggles and face shields while working on patients. The guidelines for primary PPE used in dentistry (CDC, 2003) includes gloves, surgical masks, eyewear, face shields and gowns[8]. But yet how many of us have thought about utilizing face shields in dentistry before this pandemic?

Face shields cannot protect us against traumatic impact hazards and thus must always be worn in conjugation with eye goggles[9]. Literature has also shown that face shields are best used as a supplement to masks and head caps, and so using only face shields as it covers the front of the face is not ideal[10]. OSHA suggests that training is required before a dental personal can successfully employ the use of a face shield. This training includes teaching students and professionals the necessity of face protection, the importance of knowing how to maintain, store, sterilize and properly fit the equipment and how failing to do so reduces the efficiency of protection. They also need to be understanding of the limitations and capabilities of face wear and how to inspect, wear and remove them.

When using face shields, one must consider the following: It must snugly fit around the head without any voids between the forehead and the shield[11]. The default plastic bands are generally not tight enough and may fall off with repeated use. Placing a sponge between the forehead and the face shield provides better comfort levels, but such face shields should be considered as disposable commodities as the sponge can never be fully sterilized. When removing and disposing single use face shields, it must be done with utmost care. Sterilization is mandatory for reusable face shields. These shields must be free of sponges, stapler pins or adhesive materials to achieve complete sterilization[12]. At least 5 shields must be kept in reserve to cycle between them alternatively. The ideal thickness for OHP sheets is 150–200 micron to withstand repeated sterilisation cycles and to avoid crimping. While handling, one must never touch the front side of the face shield. Remove used face shields with gloved hands and dispose both. Sterilization may be done with 1% sodium hypochlorite solution or 2% glutaraldehyde for a minimum of 10 minutes[13]. The best method is by EtO sterilisation[14].

This basic knowledge is invaluable given the current escalation of today's scenario. We firmly believe that educating the still-growing students is a huge step forward in battling this situation. Our team has extensive knowledge and research experience that has translated into high quality publications[15-23],[24-29],[30-35]. Thus, in our present study we have aimed to assess the awareness levels of dental undergraduates and postgraduates regarding the contamination of face shields when used in dentistry[36-38].

Materials And Method

This was a survey based study conducted in the month of March 2021, using the online survey platform SurveyPlanet®. This survey was taken up by 100 dental students (both undergraduates and postgraduates) of both genders studying at a private dental university in Chennai, India. The questionnaire consisted of 10 questions. The questions were framed to evaluate the knowledge and awareness of dental students about the contamination associated with face shields when used in dentistry. The data was collected, tabulated in Microsoft Excel® and coded for analysis. The Statistical Package for the Social Sciences for Windows (Version 20.0, SPSS, Inc., Chicago, U.S.A.) was used to analyze the data obtained.

Results

The total sample consisted of 100 undergraduate and postgraduate dental students of predominantly South Indian origin studying at a private dental hospital in Chennai, India. A total of 10 questions were asked to assess their knowledge, awareness and aptitude towards dental contamination in face shields. Both genders were included in the study.

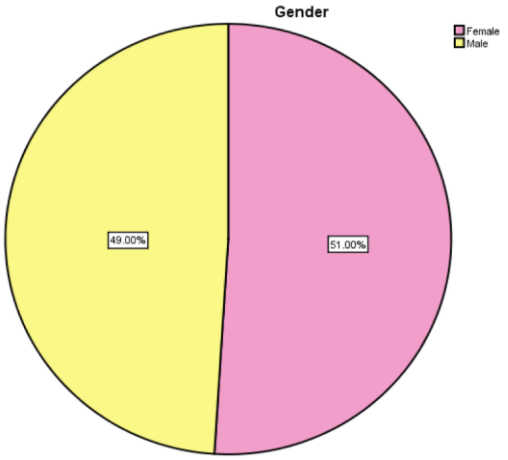

Fig.1: Pie chart showing the gender distribution of the study participants. The slice in pink represents the 'Female' population with 51% and the slice in yellow represents the 'Male' population with 49%

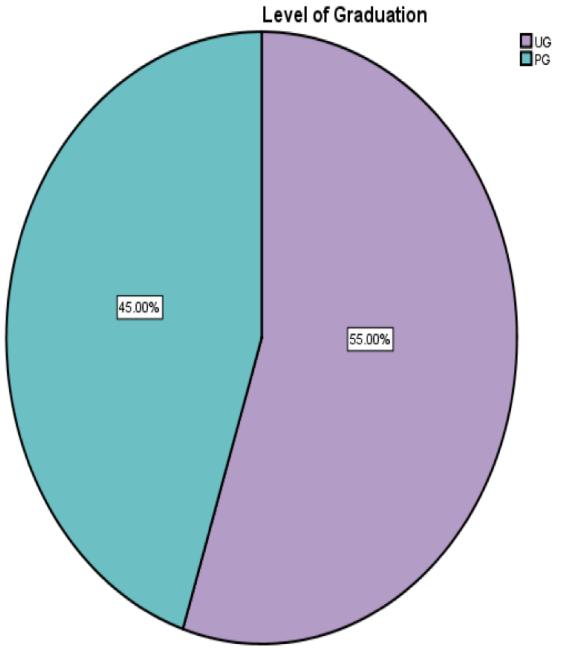

Fig.2: Pie chart showing the distribution of the level of graduation of the study participants. The slice in purple represents the 'Undergraduate' students with 55% and the slice in blue represents the 'Postgraduate' students who took up this survey with 45%

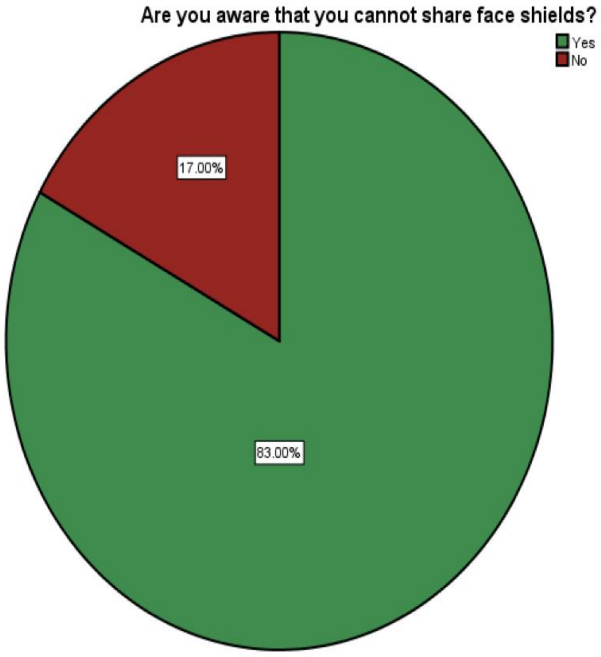

Fig.3: Pie chart showing the response distribution of the students when asked, "Are you aware that you can not share face shields?". 83% of the students answered 'Yes' (Green) while 17% answered 'No' (Red).

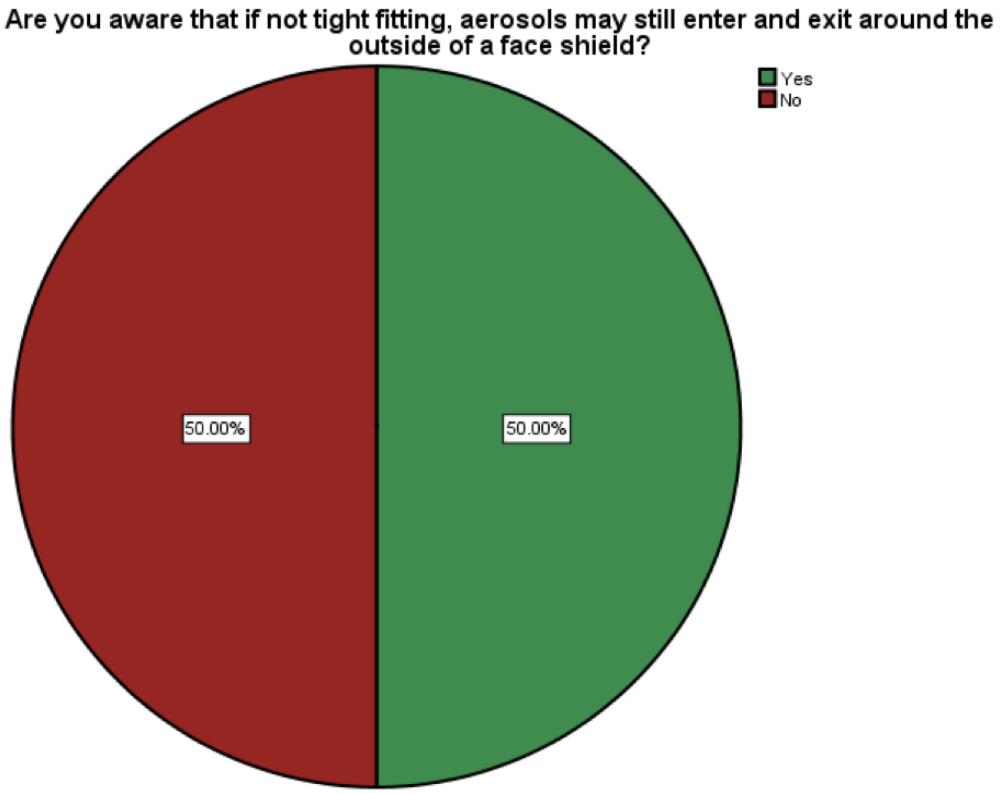

Fig.4: Pie chart showing the response distribution of the students when asked, "Are you aware that if not tight fitting, aerosols may still enter and exit around the outside of a face shield?". 50% of the students answered 'Yes' (Green) while 50% answered 'No' (Red).

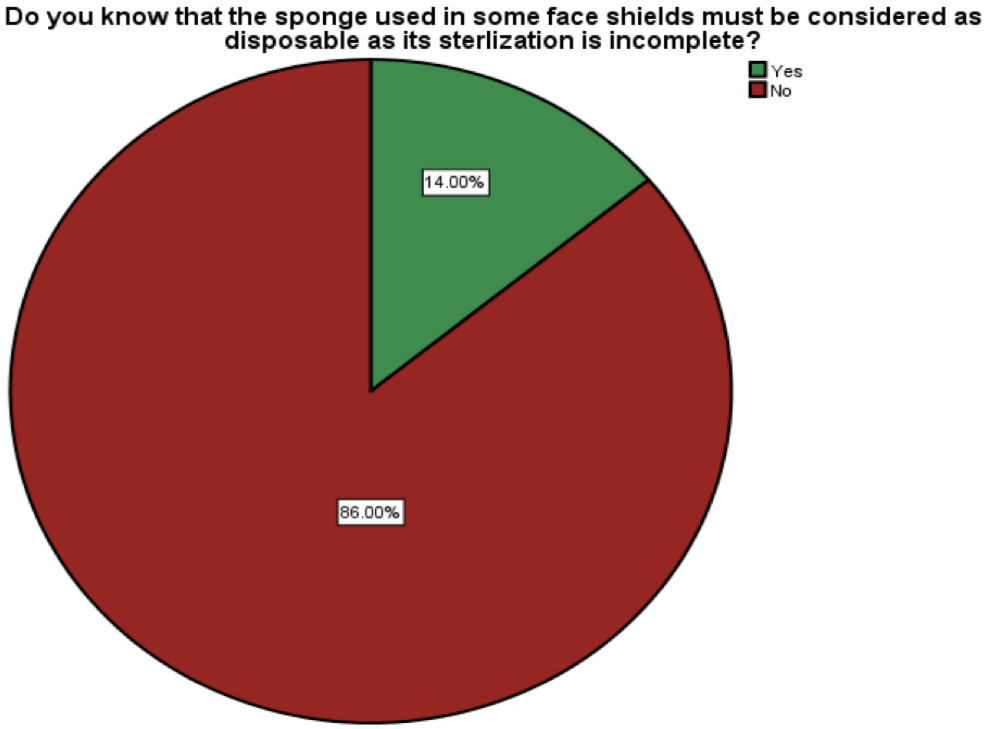

Fig.5: Pie chart showing the response distribution of the students when asked, "Do you know that the sponge used in some face shields must be

considered as disposable as its sterilization is incomplete?". 14% of the students answered 'Yes' (Green) while 86% answered 'No' (Red).

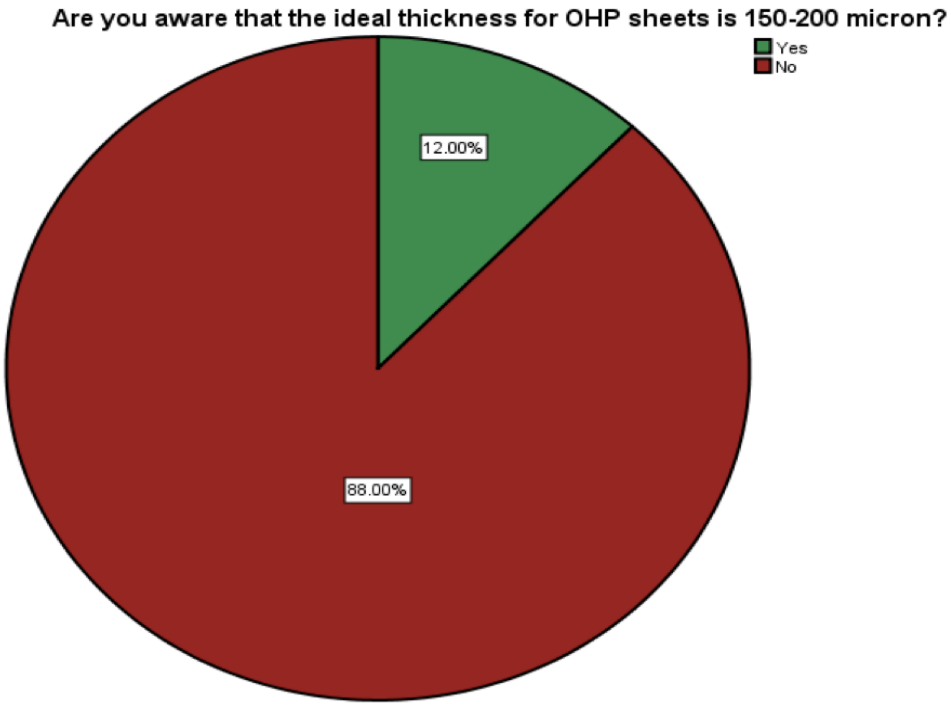

Fig.6: Pie chart showing the response distribution of the students when asked, "Are you aware that the ideal thickness for OHP sheets is 150-200 micron?". 12% of the students answered 'Yes' (Green) while 88% answered 'No' (Red).

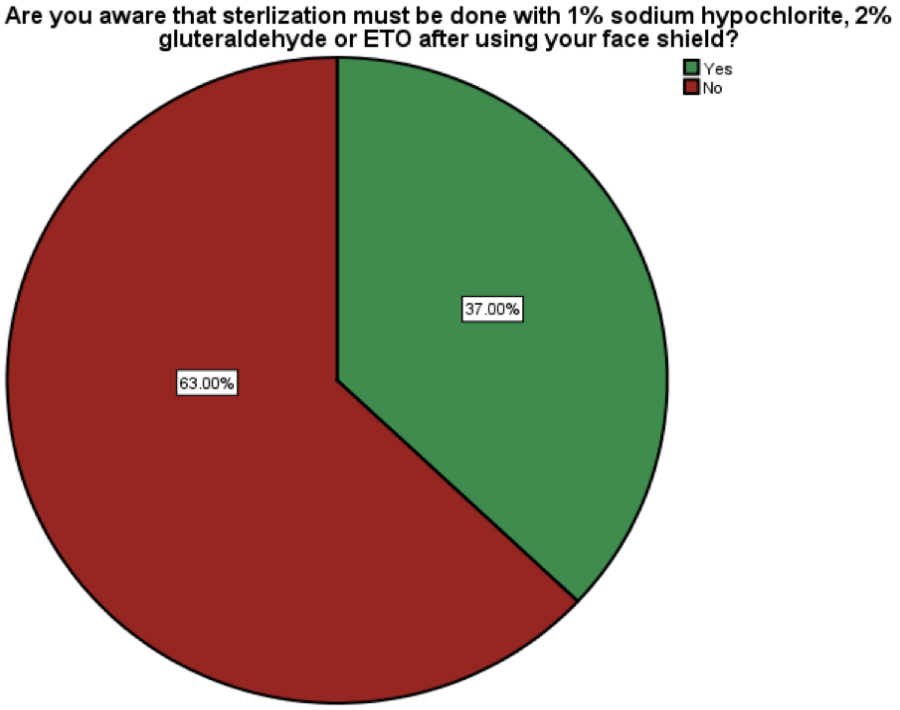

Fig.7: Pie chart showing the response distribution of the students when asked, "Are you aware that sterilization must be done with 1% sodium hypochlorite, 2% glutaraldehyde or EtO after using your face shield?". 37% of the students answered 'Yes' (Green) while 63% answered 'No' (Red).

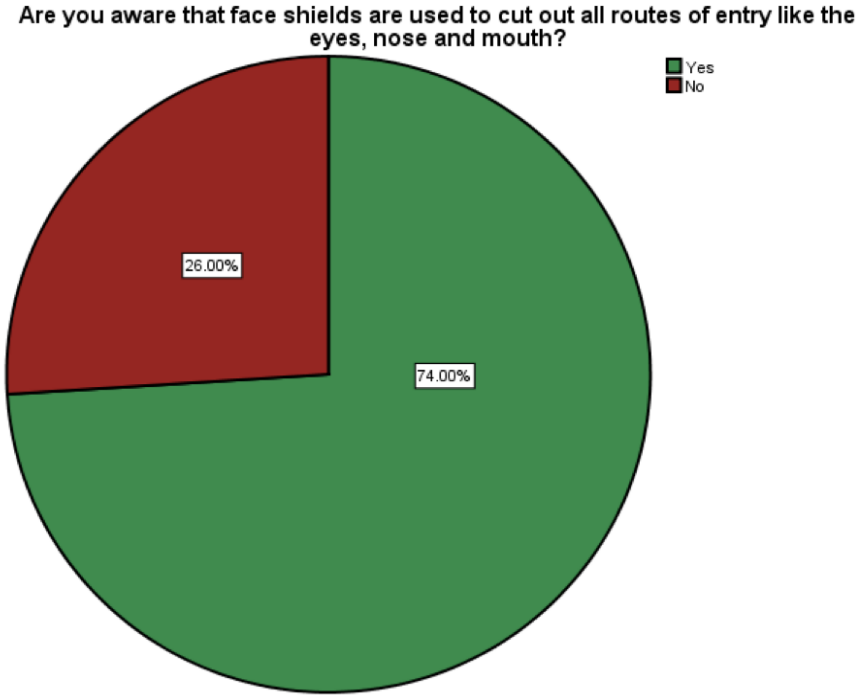

Fig.8: Pie chart showing the response distribution of the students when asked, "Are you aware that face shields are used to cut out all routes of entry like the eyes, nose and mouth?". 74% of the students answered 'Yes' (Green) while 26% answered 'No' (Red).

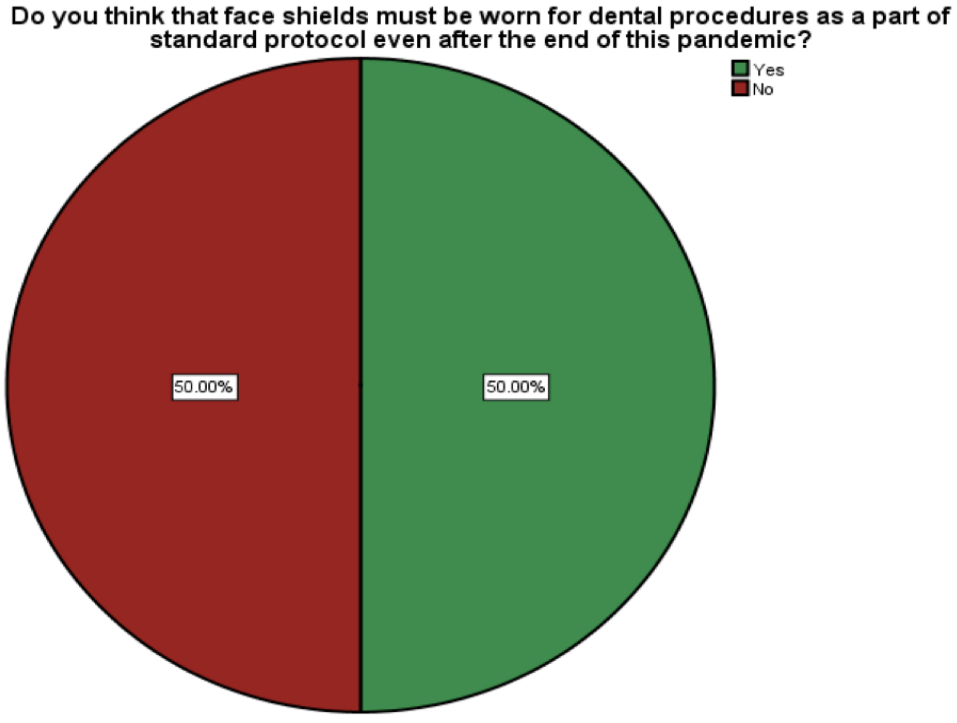

Fig.9: Pie chart showing the response distribution of the students when asked, "Do you think that face shields must be worn for dental procedures as a part of standard protocol even after the end of this pandemic?". 50% of the students answered 'Yes' (Green) while 50% answered 'No' (Red).

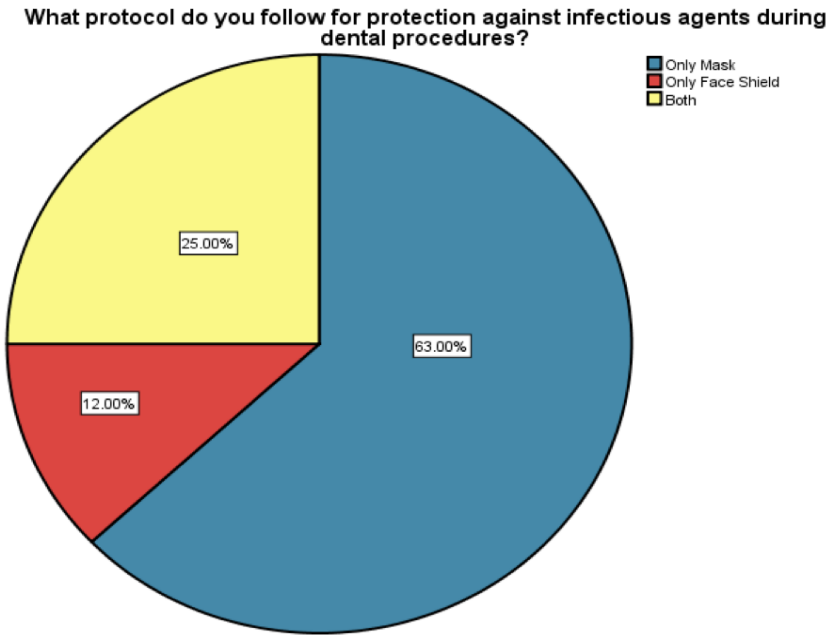

Fig.10: Pie chart showing the response distribution of the students when asked, "What protocol do you follow for protection against infectious agents during dental procedures?". 63% of the students answered 'Only Mask' (Blue), 12% answered 'Only Face Shield' (Red) while 25% answered 'Both' (Yellow).

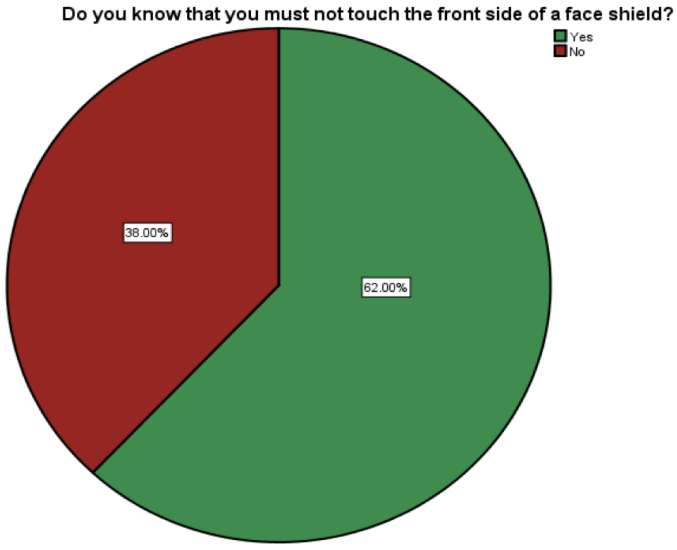

Fig.11: Pie chart showing the response distribution of the students when asked, "Do you know that you must not touch the front side of a face shield?". 62% of the students answered 'Yes' (Green) while 38% answered 'No' (Red).

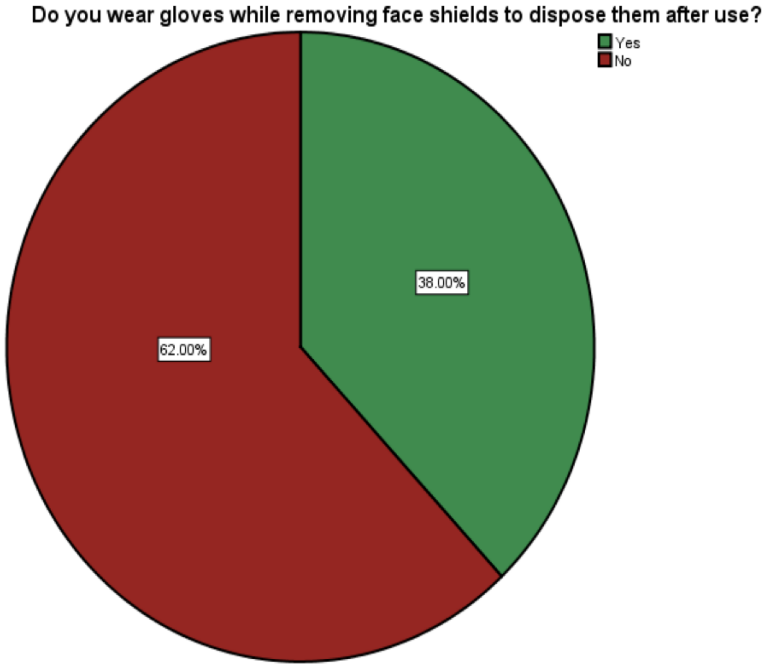

Fig.12: Pie chart showing the response distribution of the students when asked, "Do you wear gloves while removing face shields to dispose of them after use?". 38% of the students answered 'Yes' (Green) while 62% answered 'No' (Red).

Discussion

The results obtained from Figure 1 show the gender distribution of the students who participated in our current study with the 'Female' population being 51% and the 'Male' population being 49%. Figure 2 shows the distribution of the level of graduation of the study participants. 55% were 'Undergraduate' students and 45% were 'Postgraduate' students.

When asked "Are you aware that you can not share face shields?", 83% of the students answered 'Yes' while 17% answered 'No' as seen in Figure 3. When asked "Are you aware that if not tight fitting, aerosols may still enter and exit around the outside of a face shield?", 50% of the students answered 'Yes' while 50% answered 'No' as showcased in Figure 4. Figure 5 asks "Do you know that the sponge used in some face shields must be considered as disposable as its sterilization is incomplete?", to which 14% of the students answered 'Yes' and 86% answered 'No'. Figure 6 asks "Are you aware that the ideal thickness for OHP sheets is 150-200 micron?" to which only 12% of the students answered 'Yes' but 88% answered 'No'. This reveals that students are especially unfamiliar with more technical facts regarding the use of a face shield.

Figure 7 asks "Are you aware that sterilization must be done with 1% sodium hypochlorite, 2% glutaraldehyde or EtO after using your face shield?" to which 37% of the students answered 'Yes' while 63% answered 'No'. When asked "Are you aware that face shields are used to cut out all routes of entry like the eyes, nose and mouth?", 74% of the students answered 'Yes' while 26% answered 'No' as observed from Figure 8. This reveals that students are aware of the basic functions of a face shield when being used in dental procedures.

"Do you think that face shields must be worn for dental procedures as a part of standard protocol even after the end of this pandemic?" was asked in Figure 9 where 50% of the students answered 'Yes' while 50% answered 'No'. This was in fact not an option seeking question but rather it hoped to find out how many students assumed that face shields were just a requisite during the timeframe of the pandemic. According to several guidelines, face shields are to be used during routine dental procedures to minimize contamination risk to critical face areas even outside the pandemic as explained in a study by Kanjirath et al. in 2009 (36) and one by Tunon-Molina et al. in 2021 (37).

Figure 10 asks "What protocol do you follow for protection against infectious agents during dental procedures?" to which 63% of the students answered 'Only Mask', 12% answered 'Only Face Shield' while 25% answered 'Both'. These numbers highlight the necessity to explain to students that face shields are not used alone, but are used in conjunction with other protective equipment like caps, surgical masks and goggles and are therefore considered adjunctive personal protective equipment as stated by Khan et al. in 2020 (38). When asked "Do you know that you must not touch the front side of a face shield?", 62% of the students answered 'Yes' while 38% answered 'No' as seen in Figure 11. "Do you wear

gloves while removing face shields to dispose of them after use?" was asked in Figure 12 to which 38% of the students answered 'Yes' and 62% answered 'No'. This calls for strict protocols that mandate and reinforce the proper way to remove and dispose of face shields so that students can learn and replicate.

Overall, the results of our study show an unfortunate paucity in the awareness of dental undergraduates and postgraduates regarding the contamination of face shields when used in dentistry. It is imperative that students and professionals learn the correct way to employ, dispose, store and sterilize face shields to better existing standards of safety for both themselves and their patients.

Conclusion

Within the limits of the current study we conclude by reporting that the existing levels of knowledge and aptitude regarding face shields in dentistry is not satisfactory with respect to the current situation in today's pandemic. It is essential that institutions teach and guide students before allowing them to professionally battle infectious diseases.

Limitations of the Study

Our small sample size where most of the participants are from South Indian cities lowers the reliability and generalizability of our results with respect to other populations.

Future Scope of the Study

The study can be further bettered by involving a higher number of participants from other ethnicities and populations as well, thus overcoming our geographical barriers and small sample size and increasing the reliability of our findings.

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