

ORIGINAL RESEARCH

Evaluation of the Knowledge regarding Infection Control in Prosthetic setup during Covid Pandemic among the Dental Students – A Cross Sectional Survey

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ABSTRACT

Background: Infection control is the important aspect of clinical dentistry because of the cross contamination of diseases via oral cavity is frequent between the dental team and the patients. So it is prerequisite to create awareness regarding infection control protocols among the dental students during their undergraduate/postgraduate training period.

Aim: The aim of this cross sectional study is to describe the state of knowledge and create awareness among the dental students about infection control in prosthetic clinic during this COVID 19 pervasive circumstance.

Materials and methods: An online questionnaire based survey was conducted among the dental students in July 2021. Totally 300 third, fourth, fifth year undergraduate students and postgraduates who are studying prosthodontics as their speciality were participated. The survey consisted of 7 closed ended and 17 open ended questions related to the knowledge towards infection control protocol in prosthodontic clinic and their self satisfaction about their knowledge. After proper validation from the experts, reliability was evaluated. The google form was prepared and distributed among the dental students across various dental colleges.

Results: A total of 300 participants were involved in this study. Their knowledge towards infection control was varied between 24.33% and 78%. Some of the participants responded “good” or “fair” to the questions related to the evaluation of their knowledge towards infection control in prosthodontic clinic ($P < 0.001$). About 50% of students rated their knowledge as average and 7% of students rated their knowledge as poor towards infection control in prosthetic clinic.

Conclusion: The results of this study show that the students have enough awareness, average knowledge and self satisfaction level about infection control protocol in prosthetic clinic during this COVID 19 pandemic.

Keywords: COVID 19; Infection control; Sterilization and disinfection.

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INTRODUCTION

The novel corona virus becomes the part and parcel of our lives in recent days. The disease affected the large number of population across the world. Since 1918 there have been number of pandemic diseases affected the globe. The last one in the order is COVID 19. Pandemic is nothing but a disease occurring over a wide geographic area and affects a significant amount of population^{1,2}. The COVID 19 pandemic caused serious disease outcomes and widespread infections. The disease not only affected the physique, but also affected the mental health and well being of the people.

SARS COV-2 is a causative agent of COVID 19 disease. The source of origin of the virus is bat and

the transmission of the disease is from human to human. The transmission of the virus can occur through close contact with the symptomatic people. Since the virus is having the ability to survive outside the living organisms like aerosols, this COVID 19 era presents a challenge for the dentists. The fertile environment for the growth and transmission of various inimical disease causing microorganisms is the human oral cavity. The dentists are exposed to saliva, blood and other body fluids during various operative procedures³. In the dental operatory, the spread of infection is more often between the dental team and the patients. Especially during this pandemic situation, the prosthodontic clinic requires a high degree of concern. Because the prosthodontic treatment

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consists of various stages of construction of the prosthesis and the occurrence of cross contamination is more via dental impressions, bite registrations and through various procedures³. This leads to the strict implementation of certain infection control protocols in the clinic to prevent cross contamination. Unfortunately, in many dental colleges the future dentists are not aware of the infection control measures in prosthodontics. So it is important to teach the dental students about the infection control protocol in the prosthodontic clinic during their undergraduate and postgraduate training period. Various dental programs should be conducted by the institution to create awareness among the students. They should strictly include infection control protocol as a part of their academic curriculum. This study was conducted to evaluate the knowledge of the dental students regarding infection control protocol in prosthetic clinic during this COVID 19 pandemic.

MATERIALS AND METHOD

A cross-sectional survey was conducted among the South Indian population across the dental colleges in Tamilnadu. Ethical approval was obtained from the Institutional Ethical Committee at Karpaga Vinayaga Institute of Dental Sciences (IEC NO:KIDS/001/2021/III).

INCLUSION CRITERIA:

1. Both the undergraduate and postgraduate students of various dental colleges were included in the study.
2. Undergraduates who are studying third, fourth and fifth year and postgraduates who have taken prosthodontics as their specialities were included in the study.
3. Students who show willingness to participate were included.

EXCLUSION CRITERIA:

1. Students don't want to participate in this study were excluded.
2. Undergraduate students who are studying first and second year and other speciality postgraduates were excluded from this study.

The sample size was calculated using Morgan's table with confidence interval 0.80%, alpha error at 0.01 % and it resulted in a minimum sample size of 300 students. Out of 300 students, 64 were third year, 125 were fourth year, 62 were fifth year undergraduates and 51 were postgraduates respectively.

A google form was prepared and distributed through WhatsApp groups on June 30, 2021 and discontinued on July 5, 2021. The information about

the students was kept confidential and they were participated voluntarily in the study.

COMPONENTS OF THE QUESTIONNAIRE AND METHOD OF ASSESMENT:

The questionnaire was prepared based on infection control protocol in prosthetic clinic. It consisted of 7 closed ended questions related to their awareness about the infection control and 17 open ended questions related to their knowledge about sterilizing and disinfecting various prosthodontic equipments. The validity assessment was done for the questionnaire by five experts. A questionnaire was assessed for content validity index for simplicity, clarity, ambiguity and objectivity. CVI index was checked and the score was 0.8. To assess the reliability, the questionnaire was pretested among 10 participants (n =10) who were not included in the sample. The responses were collected twice from the participants in a one hour interval. A test-retest reliability assessment was done and giving a value of 0.8, which indicated significant reliability.

The questionnaire was prepared in a google form format and distributed across various dental colleges (Karpaga vinayaga institute of dental sciences, Adhiparasakthi dental college, Tagore dental college, Ragas dental college, Tamilnadu Government dental college and Chettinad dental college). The first part of the questionnaire was comprised of the student's demographic details, second part was comprised of questions related to the knowledge about infection control protocols in prosthetic clinic. All the participants were instructed to respond to the questions by choosing the most appropriate answer. The data thus collected were entered in Microsoft excel sheet format and a P value of < 0.001 was considered significant. (QUESTIONNAIRE: in Appendix 1)

RESULTS

A total of 300 dental students were participated in this study. Out of which 245 were undergraduates (81.7%) and 55 were postgraduates (18.3%). In the undergraduate category, 64 were third year (21.3%), 125 were fourth year (41.0%) and 62 (20.7%) were fifth year students. In the postgraduate category, 22 were first year (7.3%), 15 were second year (5.0%) and 14 (4.7%) were third year students as shown in figure 1. The total number of males were 77 (25.7%) and females were 223 (74.3%).

Table 1 represents the distribution of responses regarding student's awareness and attitudes toward infection control protocols in the prosthetic clinic. Almost 100% of students agreed that the infection control is important during this COVID 19 pandemic. About 73.0% students agreed that they were aware of infection control in prosthetic clinic.

88.3% of students were following strict sterilization protocol after diagnosing each patient. 98.3% of students were sanitizing their hands after attending each patient. And about 98.3% of students sterilize and disinfect the prosthodontic instruments after every use in patients.

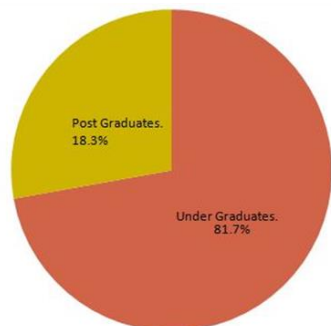
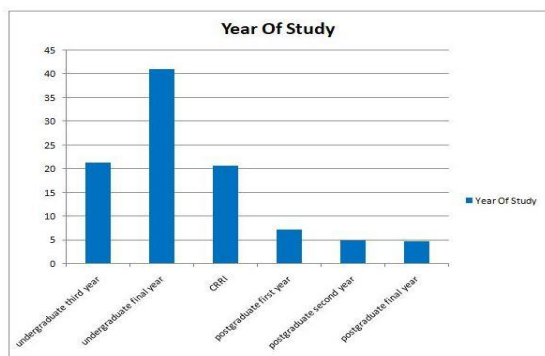


Figure 1: Distribution of the designation of the students



Graph 1: Distribution of participants based on their academic year of education

Questions	Yes	No	Sometimes
Do you think infection control is important during this COVID 19 pandemic?	300(100.)	0	0
Do you know about infection control protocol in prosthetic clinic?	219(73.0)	21(7.0)	60(20.0)
Do you follow strict sterilization protocol after diagnosing each patient?	265(88.3)	1(0.3)	34(11.3)
Do you sanitize your hands after attending each patient?	295(98.3)	1(0.3)	4(1.3)
Do you sterilize and disinfect the prosthodontic instruments after every use in patients?	295(98.3)	1(0.3)	4(1.3)

Table 1: Awareness of dental students regarding infection control

Table 2 demonstrates the distribution of responses of student's knowledge towards infection control. It varied from 24.33% (students who had the knowledge about disinfecting the lathe) and 78% (students who had the knowledge about sterilizing the impression material dispensing guns). 62% had the knowledge about sterilizing and disinfecting the alginate impression and metal trays, 60.6% had the knowledge about disinfecting the face bows, 57.3% had the knowledge about sterilizing the alginate impression and plastic trays.

About 51.6% of students had the knowledge about disinfecting the temporary dental prosthesis, 48.6% had the knowledge about sterilizing Steel-tungsten-carbide burs, 47.3% had knowledge about disinfecting wax bite block. 42.3% students had the knowledge about disinfecting the articulators and tooth shade guide. 41.6% had the knowledge about sterilizing handpieces. 40.3% knew about sterilizing diamond burs and 39% had the knowledge about disinfecting stone casts. 34-30% of students had the knowledge about sterilizing and disinfecting fixed prosthesis and polishing stones. Least knowledge

Questions	Undergraduate students			Postgraduate students			P value
	Third year	Fourth year	Fifth year	First year	Second year	Third year	
How do you sterilize and disinfect the following instruments? Diagnostic instruments	53 (82%)	86 (68%)	50 (80%)	20 (90%)	15 (100%)	10 (71%)	0.017
Alginate impression and plastic trays	36 (56%)	63 (50%)	27 (43%)	21 (95%)	14 (93%)	11 (78%)	0.000
Alginate impression and metal trays	43 (67%)	66 (52%)	37 (59%)	14 (63%)	14 (93%)	12 (85%)	0.086
Impression material dispensing guns	35 (54%)	71 (56%)	37 (59%)	20 (90%)	14 (93%)	11 (78%)	0.003
Hand pieces	25 (39%)	42 (33%)	17 (27%)	18 (81%)	13 (86%)	10 (71%)	0.000
Diamond burs	17 (26%)	43 (34%)	17 (27%)	21 (95%)	13 (86%)	10 (71%)	0.000
Steel-tungsten-carbide burs	26 (40%)	43 (34%)	35 (56%)	17 (77%)	13 (86%)	12 (85%)	0.000
Stone casts	27 (42%)	29 (23%)	20 (32%)	17 (77%)	13 (86%)	11 (78%)	0.000
Wax bite block	26 (40%)	50 (40%)	20 (32%)	21 (95%)	13 (86%)	12 (85%)	0.000
Articulators	19 (29%)	37 (29%)	27 (43%)	18 (81%)	14 (93%)	12 (85%)	0.000
Face bows	36 (56%)	61 (48%)	39 (62%)	20 (90%)	13 (86%)	13 (92%)	0.003
Temporary dental prosthesis	36 (56%)	51 (40%)	22 (35%)	21 (95%)	14 (93%)	11 (78%)	0.000
Removable prosthesis with metal base.	21 (32%)	35 (28%)	13 (20%)	3 (13%)	4 (26%)	2 (14%)	0.001
Fixed prosthesis (metal, porcelain)	20 (31%)	30 (24%)	14 (22%)	15 (68%)	14 (93%)	11 (78%)	0.000
Lathe	11 (17%)	18 (14%)	5 (8%)	15 (68%)	12 (80%)	12 (85%)	0.000
Polishing stones	17 (26%)	28 (22%)	8 (12%)	17 (77%)	12 (80%)	10 (71%)	0.000
Tooth shade guide	28 (43%)	54 (43%)	37 (59%)	5 (22%)	2 (13%)	1 (7%)	0.000

Table 2: Distribution of correct responses of student's knowledge towards infection control

was recorded on the questions regarding sterilizing the removable prosthesis with metal bases and lathe. It was varied between 22.6% and 24.33%. About 38% of participants acquired the information about infection control through the internet, 24% from college staffs and 17% through the lectures.

Question related to the satisfaction of students	Distribution of responses			
	Excellent	Very good	Average	Poor
Rate your knowledge about infection control in prosthetic clinic during this pandemic?	9(3%)	120 (40%)	150 (50%)	21 (7%)

Table 3: Distribution of responses to questions related to satisfaction of students with their knowledge towards infection control

Table 3 demonstrates the student's self evaluation about their knowledge. Almost 50% students rated their knowledge as average. 40% rated as good and 7% rated as poor and 3% rated their knowledge as excellent.

DISCUSSION

The results of this study reveal that the student's knowledge about infection control protocols in prosthetic setup during this pandemic situation. In our study, the participation of undergraduate students was more when compared to postgraduate students. Since some of the similar studies only rely on closed ended questions, our study used an open ended questions to evaluate the knowledge of the students for more accurate results. The study reveals that the students have average knowledge and self satisfaction about infection control protocols. Knowledge varied from 73% to 100%. Almost 100% of students think that the infection control is important during this pandemic situation. And 73% were aware of disinfecting the prosthodontic equipments. Most of the students acquired their knowledge through internet (38%). About 78% students had the knowledge about sterilizing the impression material dispensing guns and had the least knowledge on the questions regarding sterilizing the removable prosthesis with metal bases and lathe.

Deogade et al conducted a similar study in a private dental school. Most of the subjects responded "good" or "fair" to the questions related to the evaluation of their knowledge and policy implementation of infection control in prosthodontic clinic. The results of the study showed that there was an inadequate attitude and awareness of subjects toward infection control in prosthetic practice.⁴

Mustafa et al assessed the knowledge, attitude, and infection control measures and their social behavior and stress measures related to the COVID-19 pandemic among Jordanian health care students. An online questionnaire was distributed to medical,

dental, pharmacy, nursing, applied health science students during the COVID-19 pandemic quarantine. Majority of students had good knowledge scores, few of them have a serious lack of knowledge⁵.

Alharbi et al evaluated the knowledge, attitude and compliance of infection control guidelines among dental faculty members and students at KSU. A comparison was made between students and dental faculty members. It resulted in almost equal percentages of knowledge (49.6, 49.0%). There was no statistically significant difference in the knowledge and attitude of dental faculty members. The results of this study showed that undergraduate dental students and faculty members at KSU had a good adherence to infection control guidelines⁶.

Dr. Devendra Chopra conducted a similar survey before and after taking remedial classes among the dental students and stated that there was an improvement in knowledge towards infection control in prosthodontic clinic after remedial classes⁷. Gupta et al assessed the knowledge of dental lab technicians regarding infection control and they found that most of the technicians were not aware of basic infection control protocols⁸.

Correlating the previous studies, in the present study, some students have a serious lack of knowledge and others have average knowledge regarding infection control. In this study, clinical students were included because they are at high risk than the preclinical students. Therefore, proper education about infection control during the preclinical year of the students is necessary.

Self satisfaction was assessed by the self evaluation of the students towards infection control protocol. Therefore, certain definite strategies during their undergraduation will be helpful for them to implement proper infection control measures during their clinical and laboratory work.

Deogade et al reported in his study that about 47.8% were satisfied and 28.9% were fairly satisfied with their knowledge and performance related to infection control in prosthodontics clinic⁴. In this study, about 50% of students rated their knowledge as average. Since infection control is important during this pandemic situation, the students require additional efforts to acquire knowledge towards infection control in prosthetic clinic. And also they were aware of the individual measures they should take during this pandemic situation.

LIMITATIONS AND RECOMMENDATIONS OF THE STUDY:

- Since it is a cross sectional survey, study can be done for long term to achieve better reliability.
- In future studies, dental practitioners can also be included to create more awareness.

CONCLUSION

The results of our study include the following:

- The student's knowledge towards infection control protocol in prosthodontic clinic is average.
- Some of the students have a serious lack of knowledge.

Therefore, proper education about infection control protocol in prosthetic clinic is necessary for the students to prevent cross contamination during this COVID 19 pandemic.

CONFLICT OF INTEREST

There is no conflict of interest

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APPENDIX 1-QUESTIONNAIRE

1. Do you think infection control is important during this COVID 19 pandemic?
Yes / no/sometimes.
2. Do you know about infection control protocol in prosthetic clinic?
Yes / no/sometimes.
3. Mention the source of information about infection control?
Lectures / College staffs / Friends / Internets / Posters / Books/others.
4. Do you follow strict sterilization protocol after diagnosing each patient?
Yes / no/sometimes.
5. Do you sanitize your hands after attending each patient?
Yes / no/sometimes.
6. Do you sterilize and disinfect the prosthodontic instruments after every use in patients?
Yes / no/sometimes.
7. If yes how do you sterilize and disinfect the following instruments?
Diagnostic instruments:
 - a) Wash with soap and water and autoclave.
 - b) Wash with soap and water, autoclave and keep it in sterilized green cloth.
 - c) Wipe with 70% ethyl alcohol.
 - d) None of the above.
8. Alginate impression and plastic trays:
 - a) Wash, remove the surplus water, sprinkle with 0.1% sodium hypochlorite, put it in sealed packet for 10 minutes and dispose the tray.
 - b) Wash, remove the surplus water, sprinkle with 0.1% sodium hypochlorite, put it in sealed packet for 10 minutes and autoclave.
 - c) Washed with soap, water and autoclave.
 - d) None of the above.
9. Alginate impression and metal trays:
 - a) Wash, remove the surplus water, sprinkle with 0.1% sodium hypochlorite, put it in sealed packet for 10 minutes and dispose the tray.
 - b) Wash, remove the surplus water, sprinkle with 2% glutaraldehyde, put it in sealed packet for 10 minutes and wash the tray with soap, water and autoclave.
 - c) Wash, remove the surplus water, sprinkle with 0.1% sodium hypochlorite, put it in sealed packet for 10 minutes and autoclave.
 - d) None of the above.
10. Impression material dispensing guns:
 - a) Rinse, pack and autoclave.
 - b) Wash with soap, water and autoclave.
 - c) Rub, sprinkle or submerge inside the appropriate disinfectant solution.
 - d) None of the above.
11. Handpieces:
 - a) Flush for 30 seconds in running water and autoclave.
 - b) Flush for 20 seconds in running water and wipe with 70% ethyl alcohol.
 - c) Flush for 60 seconds in running water and immerse in 2% glutaraldehyde solution.
 - d) None of the above.
12. Diamond burs:
 - a) Wash with metallic brush and soap; autoclave.
 - b) Wash with soap and water; autoclave.
 - c) Wash with metallic brush and soap; dried with dry heat.
 - d) None of the above.
13. Steel-tungsten-carbide burs:
 - a) Rinse, pack and autoclave.
 - b) Wash with metallic brush and soap; autoclave
 - c) Wash with metallic brush and soap, cleaned, dried & immerse in 2% glutaraldehyde for 10 hrs washout, dried with dry heat.
 - d) None of the above.
14. Stone casts:
 - a) Submerge in 0.5% or 1% sodium hypochlorite solution. Submerge in 0.5% or 1% sodium hypochlorite solution.
 - b) Immerse in glutaraldehyde solution.
 - c) Sprinkle with 5.25% sodium hypochlorite solution and let it sit for atleast 10 minutes.
 - d) None of the above.
15. Wax bite block:
 - a) Wash, submerge in 0.1% sodium hypochlorite for 10 min, washout.
 - b) Wash, submerge in 1% sodium hypochlorite for 5 min, washout.
 - c) Wash, submerge in 0.1% sodium hypochlorite for 20 min, washout.
 - d) None of the above.
16. Articulators:
 - a) Spray with 2% glutaraldehyde solution.
 - b) Wash with soap and water.
 - c) Wipe with 70% ethyl alcohol.
 - d) None of the above.
17. Facemasks:
 - a) Flush for 30 seconds.
 - b) Wipe, spray or immerse with appropriate disinfectant solution.
 - c) Wash with soap and water; autoclave.
 - d) None of the above.
18. Temporary dental prosthesis:
 - a) Submerge in 0.1% sodium hypochlorite for 10 minutes and cleanse.
 - b) Submerge in 0.5% or 1% sodium hypochlorite.
 - c) Spray with 2% glutaraldehyde solution.
 - d) None of the above.
19. Removable prosthesis with metal bases:
 - a) Submerge in 0.5% or 1% sodium hypochlorite solution.
 - b) Wipe with 70% ethyl alcohol.
 - c) Submerge in 0.1% sodium hypochlorite solution for 5 minutes and rinse.
 - d) None of the above.
20. Fixed prosthesis (metal, porcelain):
 - a) Spray with 2% glutaraldehyde solution.
 - b) Immerse in glutaraldehyde solution.
 - c) Immerse in 0.1% sodium hypochlorite.
 - d) None of the above.
21. Lathes:
 - a) Spray with 2% glutaraldehyde solution.
 - b) Wipe with 70% ethyl alcohol.
 - c) Rinse, pack and autoclave.
 - d) None of the above.
22. Polishing stones:
 - a) Wash with soap, water and autoclave.
 - b) Wipe with 70% ethyl alcohol.
 - c) Immerse in 0.1% sodium hypochlorite.
 - d) None of the above.
23. Teeth shade guide:
 - a) Wash with soap, water and autoclave.
 - b) Immerse in 0.1% sodium hypochlorite.
 - c) Wipe, spray or immerse with appropriate disinfectant solution.
 - d) None of the above.
24. Rate your knowledge about infection control in prosthetic clinic during this pandemic?
a)Excellent b)Good c)Average d)Poor.