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REU dental students' knowledge about protection methods and the COVID-19 infected patients' treatment protocols in prosthodontics: A cross-sectional study

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Abstract--Introduction: Corona Virus Disease 2019 (COVID-19) became a global pandemic disaster in early 2020, and it is currently wreaking havoc in many parts of the planet. Prosthodontics units have been forced to halt their clinical operations due to the pandemic. As a result, in the aftermath of the pandemic, several clinics and private practices substantially reduced the number of non-deferrable urgent care prosthodontics patients they treated during the initial wave of the epidemic. Method: This is cross-sectional research that was done via an online survey among REU dentistry students. This research involved 500 students from clinical levels 8 through 12. An online questionnaire was created that included demographic information, as well as questions about knowledge, attitude, and practice regarding the management of COVID-19 suspected patients in prosthodontic clinics. Results: Revealed that a significant proportion of the study was based on females comprising 56.9% and 6th level of dentistry. The majority of them thought that corona patients could be asymptomatic, and according to them, airborne is the main route of transmission. Using the rubber increases the airborne particles. Packets should be disposed of with hygiene and medical waste protocols. Dentists agree that gypsum must be treated as infectious clinical waste. The method for disinfecting dental casts can be immersed in sodium chlorite for 20 mins. Elderly people having denture wearers should be disinfected with 3% hydrogen peroxide for 30 mins. For those who can with temperature less than 37C and the patient should be instructed to self-quarantine for those

with lesser temperature. Conclusion: In a prosthodontics clinic, over half of the dental students had a solid understanding of Covid-19 infection management. According to studies, students' practice experience with probable COVID-19 transmission channels in prosthodontics clinics is sufficient. During the COVID-19 epidemic, participants behaved well. We found non-significant differences across gender.

Keywords---COVID-19, patients' treatment protocols, Prosthodontics.

Introduction

In early 2020, Corona Virus Disease 2019 (COVID-19) became a worldwide pandemic crisis and is still affecting regions across the globe. Several countries have been affected by the COVID-19 outbreak, a public health crisis that has raised concerns about infection control among health care workers, particularly dentists. This pandemic has caused prosthodontics units to suspend their clinical activities. As a result, many clinics, and private practices in the wake of the pandemic drastically reduced the number of prosthodontics patients they treated to non-deferrable urgent care during the first wave of the pandemic (Lu, Stratton & Tang, 2020).

Dentists, as well as dental students, must maintain the safety of their staff and families when dealing with prosthodontics patients. In some affected countries, dental care facilities have been closed entirely or have only provided minimal treatment in emergencies (Li et al., 2020). Nonetheless, several facilities in some of the affected countries offer regular dental treatment. Moreover, this is partly due to the absence of universal protocols or guidelines governing dental care during a pandemic. COVID-19 outbreaks and limited knowledge about protective measures, together with the need for safe dental treatments, pose a challenging situation to dentists (Zheng et al., 2020).

According to a report from Dong, Du & Gardner (2020), in China, where the first cases of COVID-19 were detected, dental procedures carried out during the first wave of the pandemic mainly were emergencies. As a result of international recommendations and actions of other countries, several dental societies recommended suspending and delaying all non-emergency and non-urgent dental treatments. It may be helpful to refer to the American Dental Association's recommendations regarding dental emergencies, which refer to uncontrolled bleeding, soft-tissue bacterial infection, swelling in or around the mouth, and facial bone trauma. A tooth fracture, dental trauma, and pulpal inflammation are the most common causes of urgent dental care, which may require prompt treatment (Ather et al., 2020).

A study done in Austria included questions that provided further insights into general knowledge and attitudes about COVID-19 and dental care when a widespread pandemic. Dentistry students described their clinical courses as having direct patient contact, which puts them at a higher risk for COVID-19 infection due to work with rotating instruments and aerosol build-up. Their

confidence level in attending patients with symptoms related to COVID-19 was found to be low (Villani et al., 2020).

Another study among dental students reported that they maintain their clinics and ensure safety when providing treatment. In some cases, you may need to discard plastic covers on handles and the plastic tube to remove saliva from the patient's mouth. Between patients, clean and disinfect equipment that has not been discarded. Dental staff and dentists do require wearing personal protective equipment during treatment. Equipment like disposable gloves, unique masks, protective eyewear, or a face shield can be included. The use of specific tools is limited to one time. Clean and sterilise non-disposable devices in an area dedicated to the purpose (Zhu et al., 2020).

In Brazil, a study conducted among dental students during the COVID-19 outbreak period reported dental professionals using enhanced personal protection equipment (PPE) to provide dental care to patients in need of emergency treatment. However, other non-emergency treatments, including Prosthodontics treatment, were not performed (Estrich et al., 2020; Coulthard, 2020).

Benefits of the study

The findings of this study may be helpful in assisting the dentists willing to treat Prosthodontic patients during the pandemic of COVID-19 with attaining knowledge on how they can maintain infection control protocol when dealing with such patients.

Scope of the study

This study focused mainly on the infection control knowledge and attitudes of students working in Prosthodontic clinics, as it involves handling various materials being transported from dentist to technician.

Aims of the study

- To determine the knowledge and practice of dental students regarding the treatment of prosthodontic patients with COVID-19 related symptoms or history.
- To compare the responses based on gender.

Materials and Methods

Study Design: This is a cross-sectional study conducted among the dental students of REU using an online survey.

Study Sample: 500 students from clinical levels (8 to 12) were utilized in this study.

Study Instrument: Online questionnaire was constructed consisting of questions related to demographic data followed by questions including knowledge, attitude,

and practice towards the treatment of COVID-19 suspected patients in Prosthodontics clinics.

Instrument Validity and Reliability: A pilot study was conducted by sending the survey to 20 participants, and the data will be inserted in SPSS version 22 to determine the **reliability** by using Chronbach's coefficient alpha (value: 0.711). **The validity** of the questionnaire will be tested by sending it to experienced researchers in REU, but no changes were made.

Statistical Analysis

Collected data was analyzed using SPSS version 22, where descriptive as well as inferential statistics were conducted. Comparisons between groups were made with the value of significance kept under 0.05. Chi-square test was done to compare the responses among sub-groups.

Results

Power of sample

Table 1: Power of sample

Mean	3.23
Std Deviation	0.62
Sample size	500
Alpha	0.05
Sample mean	3.30
Standard Error of Mean	0.03
Critical Value	3.28
Beta	0.19
Power	0.81

Table 2: Frequencies

Variable	Frequency Percentage
Gender	
Male	43.1%
Female	56.9%
Dentistry level	
4 th year	20%
5 th year	30.8%
6 th year	49.2%
Can the COVI-19 patient be asymptomatic?	
Yes	86.2%
No	12.3%
I do not know	1.5%

What is the main route of transmission and spread of the infection?	
Airborne droplet	33.8%
Face to face communication	21.5%
Cough	30.8%
Handling of a sharp instrument	13.8%
How does COVID-19 spread in the prosthodontics department?	
Frequent direct or indirect contact of prosthodontics doctors with human fluids	18.5%
Face to face communication	6.2%
Dental instruments such as high speed that makes a large amount of aerosol and droplets	20%
All answers are correct.	55.4%
How can prosthodontists and students prevent the spread of COVID-19?	
Protection equipment and protective outwear	20%
Doctors and students should avoid touching their own eyes, nose, and mouth	9.2%
Washing hands with alcohol sanitiser	6.2%
All answers are correct	64.6%
Usage of rubber am could	
Increase airborne particles	80%
Reduce airborne particles	10.8%
I do not know	9.2%
The packets that contain the models, casts, dentures etc., need to be disposed of.	
With hygiene protocols	35.4%
With biomedical waste protocols	35.4%
With the hospital protocols	12.3%
I do not know	16.9%
In case when the cast/model becomes contaminated with blood from any patient or with saliva from an infectious patient.	
The gypsum must be treated as "infectious" clinical waste	41.5%
The gypsum must be disposed of in a sharps bin	32.3%
Dental casts/gypsum must be disposed of in a separate container, which is stored in the surgery.	21.5%
I do not know	4.6%
The lathe machine should be	
Cleaned and heat sterilised between each patient	41.5%
Cleaned and disinfected at the start and end of the day when contaminated	27.7%
Should be cleaned and disinfected daily	18.5%
I do not know	12.3%
Methods of disinfecting dental casts	
Can be immersed in Sodium Hypochlorite for 15 mins	21.5%

Can be immersed in Sodium Hypochlorite for 10 mins	18.5%
Can be immersed in Sodium Hypochlorite for 20 mins	33.8%
I do not know	26.2%
Methods of disinfecting Zinc-oxide eugenol impression paste	
0.5% Sodium Hypochlorite	29.2%
2% Gluteraldehyde	20%
Iodophors	35.4%
Cidex	10.8%
I do not know	4.6%
If an elderly patient who is a denture wearer, infected with COVID-19	
Should disinfect denture with 3% Hydrogen Peroxide for 30 mins	24.6%
Should disinfect denture with 100% Vinegar (acetic acid) for 6-8 hours	24.6%
Should immediately discard wearing the denture	23.1%
I do not know	36.9%
What should the dentist do if a patient who came to him was travelling or had contact with a corona patient in the previous 14 days and his/her body temperature is below 37.3c?	
The patient should be immediately quarantined, and the dental professionals should report to the infection control department of the hospital or the local health department.	15.4%
The patient should be instructed to self-quarantine at home for 14 days and defer the dental appointment.	33.8%
The dentist should defer the treatment until 14 days after the exposure event.	12.3%
The doctor should not do anything because there is no critical situation	21.5%
I do not know	16.9%
What should the dentist do if the patient who came to him was travelling or had contact with patients in the previous 14 days and his/her body temperature is not less than 37.3c?	
The patient should be immediately quarantined, and the dental professionals should report to the infection control department of the hospital or the local health department.	13.8%
The patient should be instructed to self-quarantine at home for 14 days and defer the dental appointment.	27.7%
The dentist should defer the treatment until 14 days after the exposure event.	7.7%
	40%

The doctor should not do anything because there is no critical situation I do not know	10.8%
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Gender Ratio of the present study

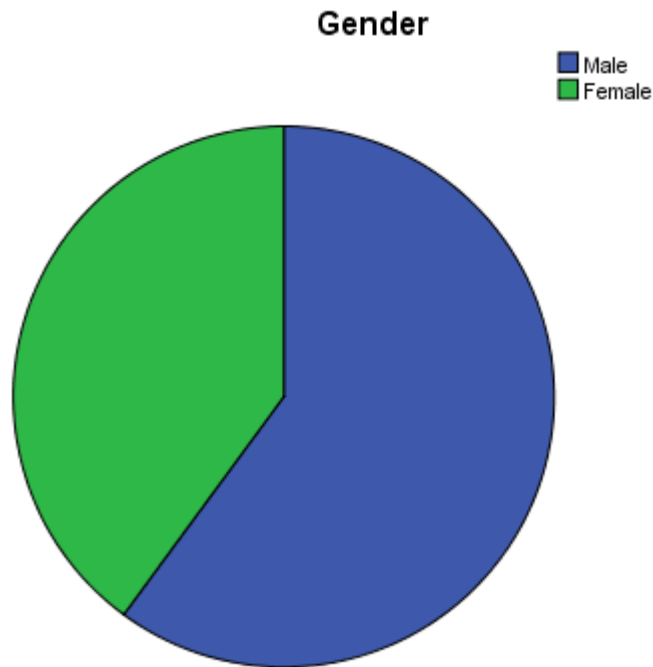


Table 3: Comparison across Gender

Variable	Male	Female	<i>p-value</i>
Can the COVID-19 patient be asymptomatic?			
Yes	85.7%	84.2%	.657
No	10.7%	15.8%	
I do not know	3.6%	00	
What is the main route of transmission and spread of the infection?			
Airborne droplet	21.4%	42.1%	.444
Face to face communication	32.1%	13.2%	
Cough	35.7%	26.3%	
Handling of a sharp instrument	10.7%	15.8%	
How does COVID-19 spread in the prosthodontics department?			
Frequent direct or indirect contact of a	10.7%	23.7%	

prosthodontics doctor with human fluids Face to face communication Dental instruments such as high speed that makes a large amount of aerosol and droplets All answers are correct.	3.6% 21.4% 64.2%	7.9% 18.4% 47.4%	.456
How can prosthodontists and students prevent the spread of COVID-19? Protection equipment and protective outwear Doctors and students should avoid touching their own eyes, nose and mouth Washing hands with alcohol sanitiser All answers are correct	7.1% 10.8% 7.1% 75%	28.9% 7.9% 5.3% 55.3%	.432
Usage of rubber am could Increase airborne particles Reduce airborne particles I do not know	78.5% 7.1% 14.3%	78.9% 13.2% 5.3%	.546
The packets that contain the models, casts, dentures etc., need to be disposed of. With hygiene protocols With biomedical waste protocols With the hospital protocols I do not know	35.7% 28.6% 21.4% 14.2%	34.2% 39.5% 5.3% 18.4%	.746
In case when the cast/model becomes contaminated with blood from any patient or with saliva from an infectious patient. The gypsum must be treated as “infectious” clinical waste The gypsum must be disposed of in a sharps bin Dental casts/gypsum must be disposed of in a separate container, which is stored in the surgery. I do not know	67.8% 21.4% 17.9% 3.6%	28.9% 39.5% 23.7% 5.3%	.125
The lathe machine should be Cleaned and heat sterilised between each patient Cleaned and disinfected at the start and end of the day when contaminated Should be cleaned and disinfected daily I do not know	25% 39.2% 21.4% 14.3%	52.6% 18.4% 15.8% 10.5%	.654
Methods of disinfecting dental casts Can be immersed in Sodium Hypochlorite for 15 mins Can be immersed in Sodium Hypochlorite for 10 mins Can be immersed in Sodium Hypochlorite for 20 mins I do not know	17.9% 10.7% 46.4% 25%	23.7% 23.7% 23.7% 26.3%	.879

<p>Methods of disinfecting Zinc-oxide eugenol impression paste</p> <p>0.5% Sodium Hypochlorite</p> <p>2% Gluteraldehyde</p> <p>Iodophors</p> <p>Cidex</p> <p>I do not know</p>	<p>28.6%</p> <p>21.4%</p> <p>35.7%</p> <p>7.1%</p> <p>7.1%</p>	<p>28.9%</p> <p>18.4%</p> <p>34.2%</p> <p>13.2%</p> <p>01</p>	<p>.506</p>
<p>If an elderly patient who is a denture wearer, infected with COVID-19</p> <p>Should disinfect denture with 3% Hydrogen Peroxide for 30 mins</p> <p>Should disinfect denture with 100% Vinegar (acetic acid) for 6-8 hours</p> <p>Should immediately discard wearing the denture</p> <p>I do not know</p>	<p>32.1%</p> <p>25%</p> <p>35.8%</p> <p>7.1%</p>	<p>18.4%</p> <p>21.1%</p> <p>36.8%</p> <p>21.1%</p>	<p>.457</p>
<p>What should the dentist do if a patient who came to him was travelling or had contact with a corona patient in the previous 14 days and his/her body temperature is below 37.3c?</p> <p>The patient should be immediately quarantined, and the dental professionals should report to the infection control department of the hospital or the local health department.</p> <p>The patient should be instructed to self-quarantine at home for 14 days and defer the dental appointment.</p> <p>The dentist should defer the treatment until 14 days after the exposure event.</p> <p>The doctor should not do anything because there is no critical situation</p> <p>I do not know</p>	<p>10.7%</p> <p>25%</p> <p>21.4%</p> <p>25%</p> <p>17.9%</p>	<p>18.4%</p> <p>39.5%</p> <p>5.3%</p> <p>18.4%</p> <p>15.8%</p>	<p>.234</p>
<p>What should the dentist do if the patient who came to him was travelling or had contact with patients in the previous 14 days and his/her body temperature is not less than 37.3c?</p> <p>The patient should be immediately quarantined, and the dental professionals should report to the infection control department of the hospital or the local health department.</p> <p>The patient should be instructed to self-quarantine at home for 14 days and defer the dental appointment.</p> <p>The dentist should defer the treatment until 14 days after the exposure event.</p> <p>The doctor should not do anything because there is no critical situation</p> <p>I do not know</p>	<p>21.4%</p> <p>21.4%</p> <p>10.7%</p> <p>35.7%</p> <p>10.7%</p>	<p>7.9%</p> <p>31.9%</p> <p>5.9%</p> <p>42.9%</p> <p>10.9%</p>	<p>.345</p>

Results

The present study about the knowledge and awareness about the COVID-19 in dental students revealed that a significant proportion of the study was based on females comprising 56.9% and 6th level of dentistry. Most of them thought that corona patients could be asymptomatic, and according to them, airborne is the main route of transmission. Packets should be disposed of with hygiene and medical waste protocols. Dentists agree that gypsum must be treated as infectious clinical waste, and the lathe machine should be cleaned and heat sterilized between each patient. Method for disinfecting dental casts can be immersed in sodium chlorite for 20 mins, and for Zinc-oxide Iodophors is used. Older people having denture wearer should be disinfected with 3% hydrogen peroxide for 30 mins.

Those who can with temperature less than 37C and the patient should be instructed to self-quarantine, for those with lesser temperature. In table 3, we examined the differences across gender, and the finding reported non-significant differences in both. Females think corona patients could be asymptomatic and the main route of transmission is airborne droplets for females while coughing for males. On how Covid-19 spreads in the prosthodontics department, mostly said they do not know about it. It can be prevented via protection equipment for females while males think all answers are correct. Usage of rubber can increase airborne drops for both groups and should be disposed of with hygiene protocols for a male while with bio-medical waste protocols. In case of contamination, gypsum must be treated as an infectious disease, while for females; this should be disposed of in a sharps bin. The lathe machine should be cleaned and heat sterilized for females, while for males, it should be disinfected at the start and the end of the year. Females did not know methods of disinfection, while males considered immersing Sodium hypochlorite as the best option. Iodophors is the method of disinfecting Zinc-oxide pastes for both male and female samples. For denture wearing elderly people, both groups agree on discarding wearer. People with higher temperatures should be self-quarantined.

Discussion

The present study was carried out in KSA on awareness and knowledge about corona prevention. Data was collected through cross-sectional research design, chi-square and descriptive analysis were also used through SPSS. In the first frequency table, findings revealed that a significant proportion of the study was based on females comprising 56.9% and 6th level of dentistry. Most of them thought that corona patients could be asymptomatic, and according to them, airborne is the main route of transmission. In prosthodontics, Covid-19 is caused by all the reasons mentioned in the table, also supported by literature that Covid-19 has been found in aerosols generated during medical operations, according to studies. The primary mode of transmission and dissemination of illness is currently regarded to be airborne droplets, according to respondents (Dadoue, 2021).

Again, in preventing Covid-19 in prosthodontics, most individuals agreed on all the options given to them, and literature also reported that dental staff and

dentists do require wearing personal protective equipment during treatment. Equipment like disposable gloves, unique masks, protective eyewear, or a face shield can be included. The use of specific tools is limited to one time. Clean and sterilise non-disposable devices in an area dedicated to the purpose (Zhu et al., 2020).

Using the rubber increases the airborne particles, but literature reported opposite to this and said that rubber dams might significantly limit the creation of saliva- and blood-defiled aerosol or spatter, according to studies. Rubber dams can also dramatically reduce particles in the air in a 3-foot circumference operating region. Packets should be disposed of with hygiene and medical waste protocols. Dentists agree that gypsum must be treated as infectious clinical waste, and the lathe machine should be cleaned, and heat sterilized between each patient. Method for disinfecting dental casts can be immersed in sodium chlorite for 20 mins, and for Zinc-oxide Iodophors is used. Elderly people having denture wearers should be disinfected with 3% hydrogen peroxide for 30 mins. Those who can with temperature less than 37C and the patient should be instructed to self-quarantine for those with lesser temperature (Dadoue, 2021).

In the subsequent analysis, we examine the differences across gender, and the finding reported non-significant differences in both. Female think corona patients could be asymptomatic and a previous study reported that in a German investigation, the covid-19 coronavirus can potentially be mainly transmitted with asymptomatic people. The main route of transmission is airborne droplets for females while cough for males, and literature also supports the notion of female participants. Using rubber can increase airborne drops for both groups and should be disposed of with hygiene protocols for a male while with bio-medical waste protocols (Dadoue, 2021).

In case of contamination, gypsum must be treated as an infectious disease, while for females; this should be disposed of in a sharps bin. The lathe machine should be cleaned, and heat sterilized for females, while for males, it should be disinfected at the start and the end of the year. Females did not know methods of disinfection while males considered immersion Sodium hypochlorite the best option while literature reported that there are techniques for washing and disinfecting dentures. To disinfect dentures, immerse them in 3 per cent hydrogen peroxide for 30 minutes. Iodophors is the method of disinfecting Zinc-oxide pastes for both male and female samples. For denture wearing elderly people, both groups agree on discarding wearer. People with higher temperatures should be self-quarantined (Dadoue, 2021).

Conclusion

In a prosthodontics clinic, over half of the dental students had a solid understanding of Covid-19 infection management. Students' practice experience with probable covid19 transmission channels in prosthodontics clinics is sufficient. During the Covid -19 epidemic, participants behaved well. We found non-significant differences across gender.

Limitations

The study was conducted on a small sample and only from one area. Corona conditions differ in every region around the globe, so there are some generalizability issues, internal consistency and social desirability as it was an online self-report survey.

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