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Review Article

PREVENTIVE MEASURES IMPLEMENTATION AMONG LIBYAN GENERAL DENTISTS AND PROSTHODONTISTS DURING COVID-19 OUTBREAK IN TRIPOLI: A CROSS-SECTIONAL STUDY.

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Abstract

Introduction: The available knowledge about Covid-19 mandate applying set of strict preventive measures for medical and dental professions. Dental health personnel are considered among high risk occupation group during the pandemic.

Objective: This study aimed to assess the level of adherence to the preventive measures against the coronavirus disease and infection control among prosthodontists and general dentists in Tripoli, Libya.

Methods: A questionnaire consisting of 8 questions was distributed among dentists who are working in private clinics or public health centers during Covid-19 pandemic, in Tripoli. Dentists were selected randomly to participate in this survey.

Results: This study included a total of 70 dentists forming a response rate of about 87,5% (70 dentists participated out of 80 dentists), a total of 19 were prosthodontists and 51 were general dentists. The results showed that only 32% had attended lectures regarding COVID-19. The percentage of dentists who wear PPE during fixing post insertion complete denture complains and during fixing high spots before final cown/ bridge cementation were (60%, and 61.4%) respectively. During dental treatment, all dentists reported they do keep frequent hand hygiene by using ABHR or water and soap, (72.8%) ask their patients for pre procedural mouth rinse before starting the treatment, (62.8%) stated that they use rubber dam during aerosol generating procedures..

Conclusions: Libyan dentists in this study showed practicing of moderate infection control procedures to minimize transmission of Covid-19, limited comprehension of what constitutes as emergency dental procedures was recognized. Dentists are required for attending awareness days and workshops in this respect.

Keywords: COVID-19, Dentists, Preventive measures, Infection control.

Introduction

Coronavirus disease is an infectious disease caused by a newly discovered corona virus called SARS-CoV-2. This virus comes from a large family of viruses that are common in people and many different species of animals, including camels, cattle, cats, and bats. Rarely, animal coronaviruses can infect people and then spread between people.[1] However, Covid19 virus where first reported infections were linked to a live animal market, then the virus became sustainable and transmitted from person to person.[2]

The mode of transmission is strongly thought via saliva, respiratory droplets and nose excretions when infected person cough or sneeze or talks.[3] The Covid 19 is sustainable in the community and spread easily causing community spread.[4]

The easily spread of the virus led to challenges in disease prevention and control, the awareness and emphasizing on the basic measures to prevent the transmission of the disease is widely adopted. This makes the personal protective equipment and Hand hygiene an obligation to the most of people during this pandemic crisis. Hand hygiene, washing with soap and water, disinfection using Alcohol based hand rub are essential and basic measures that have been proved to control transmission of the disease and strongly recommended, also wearing of protective face mask is significantly advised especially when people get out of their houses and may cannot keep the required social distance.[3]

Practicing a good respiratory etiquettes, covering cough or coughing in elbow, sneezing in tissue, and avoid touching your face, and wash or disinfect your hands after coughing and sneezing is significantly recommended to prevent transmission of the disease, as well as extra regular cleaning and disinfection of the surfaces.[3, 4]

COVID-19 and dental treatment:

One of the problems that might concern the dentist and the dental staff is whether the patient who seeks the dental treatment is infected with Covid-19 or not. The asymptomatic cases or cases with mild symptoms were reported for being source of infection during the incubation period.[5]

During dental procedures, huge amount of saliva, saliva droplets and blood are produced when using headpiece and ultrasonic instruments, these secretions may form the Bio-aerosol.[6] Bio-aerosol, is aerosol consisting of particles of any kind of organisms, this carry small particles called droplet nuclei (1–5μm) and droplet (>5μm). Droplet Nuclei can stay long time suspended in the air or travel long distance or falling on the surfaces and transmit airborn infectious diseases.[7] Dental procedures that generates aerosol which contains droplets that might be inhaled or

directly contact oral mucosa, nasal and ocular membranes is the main source of SARS-Cov-2 transmission.[8]

Infection control measures in the dental setting:

Due to the nature of dental profession, recommendations were formulated in Guidelines for Corona virus prevention and control in dental settings [9,10]. In general, these guidelines covered all the areas that concern with protection of the dentist, dental staff, dental healthcare personnel and the patient to prevent the transmission of Covid-19 in the dental office.

These recommendations include personal protective equipment, hand hygiene, detailed patient evaluation, rubber dam isolation, mouth rinsing before dental procedures, using high volume suction instead of saliva ejector, and disinfection of the clinic [10,11]. In addition to useful information about the signs and symptoms of the disease, ways of transmission and referral mechanisms to increase dentist's knowledge and prevention practices.

Some health bodies in different countries preferred the dentist to attend awareness days, training workshops, and lectures before staring their work in dental clinics during this pandemic. These efforts meant to expand the knowledge of the dentists towards Covid-19 nature, methods of transmission, measures of protection and control which are updated and falls under the umbrella of the world health organization and the center of disease control and local health organizations. [8]

In the beginning of the pandemic emerging, the guidelines for dental profession regarding prevention of transmission of Covid19 priorities the emergency treatment and postpone the elective procedures[11], this plan aimed to protect the staff and preserve the personal protective equipment and patient supplies. However, the extended time since the eruption of the Covid-19 made the dental clinics oblige to do more than the emergency treatment. The clinical decision with the information provided in the guidelines help the dentist to decide whether the case is urgent or necessary for intervention and treatment.[12]

Methods:

This research based on sampling according to the following inclusion criteria which are dentists who are working in private clinics or public health centers during Covid-19 pandemic, in Tripoli. Dentists who are not working during this pandemic and dentists out of Tripoli district are excluded. Questionnaires were distributed and delivered personally to each dentist in form of hard copies. This survey conducted in July 2020 and all questionnaires were received to be analyzed in August 2020.

Regarding the structure of the questionnaire, the questions were developed in English language and comprises of eight questions, all of these questions are close questions and followed by either Yes or No answers, to make the questionnaire easy and rapid. All questions ask about the infection control practices applied and followed in the dental clinic. These questions were formulated based on pertinent literature and reviewing of the international guidelines and the national guidelines in this regard.

The questions covered the following areas; the training workshops about Covid-19 in dentistry that were attended by practicing dentists, the infection control measures were taken in the waiting room, infection control measures in the dental clinic, type of dental procedures that are carried out in the dental clinic, infection control measures during the treatment, infection control measures between the patients or after completion the dental treatment, the using of personal protection equipment during peripheral procedures. In addition, Demographic details were obtained about educational qualifications and specialization regardless of age, gender and experience.

Dentists were selected randomly to participate in this survey, 70 dentists responded to take a part to fill the questionnaire. Taking in consideration that, only limited numbers of private dental clinics were permitted to reopen during this pandemic according to the decisions made by Tripoli dental syndicate.

Privacy and confidentiality of the collected data were maintained in this survey and the purpose of the survey was explained, the ethical consent was approved and the questionnaires also kept anonymous regarding the identity of the dentist and the name or the place of the private dental clinic. This may induce more reliable responses according to the researcher opinion.

The data was sorted, checked for completes and consistency, summarized, and statistically analyzed.

Questionnaire of dentists adherence to protective measures against COVID-19:

- Qualification: General dentist ☐ Specialist ☐

Q1: Do you attend any training or lectures regarding COVID-19? Yes ☐ No ☐

Q2: What are the proective measure you apply in the waiting room

a. Asking patients to sit far from each other (social distancing) Yes ☐ No ☐
b. Patints should wear a face mask, while waiting Yes ☐ No ☐
c. Part time schedule between patients Yes ☐ No ☐
d. Provide alcohol hand based rub (ABHR) and tissues for patients Yes ☐ No ☐

e. Provide posters encourging hand hygiene and cough ettiquette Yes ☐ No ☐

Q3: Do you ask patients to wash their hands before getting in dental chair? Yes ☐ No ☐

Q4: Which of the following protective measures for minimizing risk of Coronavirus disease transmission you practice in your dental clinic?

a. Routinely clean and disinfect surfaces in contact with patient Yes ☐ No ☐
b. Avoid moving patients out of their area unless necessary Yes ☐ No ☐
c. All health and staff members wear personal protective equipment Yes ☐ No ☐
d. Only denists wear personal protective equipment Yes ☐ No ☐
e. Place suspected patients in adequately ventilated single rooms Yes ☐ No ☐
f. All patients walk through disinfection tunnel anti COVID-19 Yes ☐ No ☐

Q5: Which of the following emergengy procedure you carry out in your clinics?

a. Emergency examination ☐
b. Sever pain connected to pulpal infection ☐
c. Swelling due to dental infection ☐
d. Traumatic injuries ☐
e. Denture treatment ☐
f. Final crown/ bridge cementation ☐
g. If the temporary restoration is lost, broken, or causing gingival irritation. ☐

Q6: What are the protective measures against Coronavirus infection you follow during treatment?

a. Frequently clean hands by using alcohol-based hand rub or soap and water Yes ☐ No ☐
b. Preprocedural mouth rinse for patients before treatment Yes ☐ No ☐
c. Using rubber dam for isolation in aerosol- producing procedures Yes ☐ No ☐
d. Using of high volume suction instead of saiva ejector Yes ☐ No ☐

Q7: What are the measures you take after completion of treatment (in between patients)?

a. Disinfect reusable PPE (e.g protective eyewear and face shield) Yes ☐ No ☐
b. Changing disposable PPE (face mask,surgical gown) in between patients Yes ☐ No ☐
c. Flush the dental unit water tubes in between patients Yes ☐ No ☐

Q8: Do you use PPE when you

a. fix post insertion complete denture complains
e.g (over extention, broken denture,painful spots) Yes ☐ No ☐
b. fix high spots before final cown/ bridge cementation Yes ☐ No ☐

Results:

Descriptive statistical analysis was used to analyze data in this survey; percentages were used to describe categorical data and were analyzed using (SPSS) software, version 22.

The survey results show the following:

This study included a total of 70 dentists forming a response rate of about 87.5% (70 dentists participated out of 80 dentists), a total of 19 were specialists (prosthodontists) and 51 were general dentists.

Survey results showed that only 32% (12 specialists and 20 general dentists) had attended lectures or training in infection control in dentistry for prevention of Covid 19 in dentistry

When asking about the preventive measures in the waiting room, 64 dentists (91%) were requiring the social distance between the patients in the waiting room, 60 dentists (85.7%) asked patients to wear facemasks during waiting, while 59 dentists (84.2%) part time scheduled between patients, and 67 (95.7%) provided alcohol based hand rub and tissues for patients in the waiting room, and only 40 (57%) Provided visual alerts in form of posters that encourages patients towards hand hygiene and cough etiquette.

43 (61.4%) of the dentists asked the patients to wash their hands when getting in dental chair.

Regarding to the protective measures for minimizing risk of Coronavirus disease transmission inside the dental clinic all the participated dentists were doing the routine cleaning and disinfection of the surfaces in contact with patients, 45 (61.4%) avoided unnecessary moving of the patient out of their area, majority of the dentists 68 (97.1%) indicate that all health and staff members wear personal protective equipment, while only 2 dentists answered that only the dentist wear the PPE, 46 (65.7%) put the suspected Covid 19 patients in well ventilated single rooms, and 27 (38.6%) use the disinfection tunnel in the dental clinic

As regards to the type of the dental procedure that carried out in the dental clinic during this pandemic, the results showed 66 (94.2%) Carry out emergency examination, while 64 (91.2%) do management of severe pain related to pulpal infection, and they do management of swellings due to dental infections, and manage traumatic injuries. Surprisingly, only 21 dentists (30%) do denture treatment, 29 dentists (41%) do crown/bridge cementation, 47 (67%) mange the temporary filling (falling, broken or causing gingival irritation). *Figure (1)*

During dental treatment, dentists were asked about certain infection prevention control measures, all dentists reported they do keep frequent hand hygiene by using ABHR or water and soap, 51 of dentists (72.8%) ask their patients for pre procedural mouth rinse before starting the treatment, 44 dentists (62.8%) stated they use rubber dam during aerosol generating procedures, and 47 (67%) used high volume suction instead of saliva ejector. *Figure (2)*

After completion of the treatment there were 67 dentists (95.7%) who disinfect reusable PPE, and 59 dentists (84.2%) change the PPE between patients, while 63 (90%) flush water tubes in the dental chair between patients. *Figure (3)*

When asking about peripheral dental procedures related to the fixed and removable prosthodontics, for instance, management of post insertion denture complains such as overextension, broken denture, painful spots there was 42 (60%) who used PPE when doing these procedure while, in the same context with nearly similar result, there was 43 of dentists (61.4%) in this study who wear PPE when fixing high spots before final cementation of the crown and bridge work.

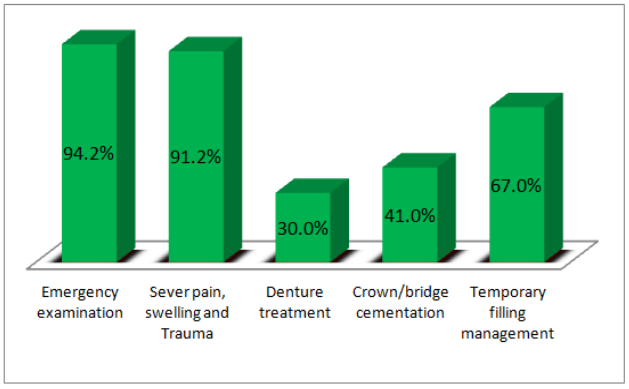

Figure 1: Showing the type of the dental procedures that are carried out in dental clinics during this pandemic in %

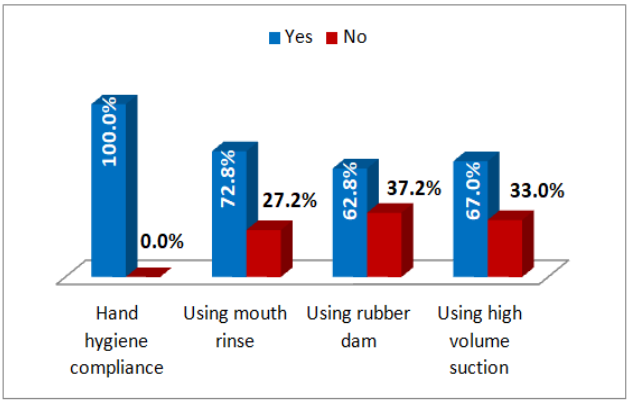

Figure 2: Showing the protectve measures against COVID-19 during treatment in %

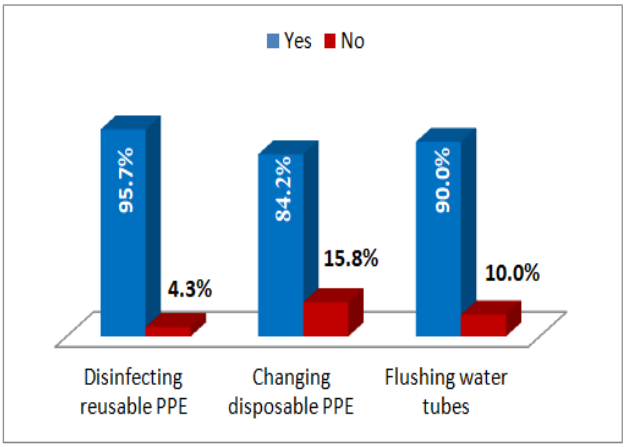

Figure 3: Showing the protective measures against COVID-19 after completion of treatment in %

Discussion:

This survey was aimed to explore dentists adherence and dental health personnel to the standard procedures that have been stipulated by the CDC (Center of Disease Control) and WHO (World Health Organization) to prevent transmission of Covid19 in the dental settings.

The current survey was created to be easy to interpret and quick to answer, this simplicity aimed to reduce misunderstanding of the provided questions and reduce incorrect answers.

The limitations of the current research represented mainly in the size of the sample, which was limited because dental treatment was suspended in all private clinics and with cautions in the public centers, after that, Tripoli Dental Syndicate and the National Center of Disease Control released recommendations and rules to reopen the dental clinics and pursue routine dental treatment in limited number of dental clinics.

The response rate for this study was 87.5% to include 19 specialists (prosthodontists) and 51 general dentists, 70 dentists in total, the dentists work in different private clinics within the boundaries of Tripoli district.

To face the current crisis, it was essential to enhance awareness and knowledge among the dentists society and the dental health personnel, to guarantee that all the working dentists during this time have the required knowledge to face Covid-19, it is necessary to keep the professionals updated and well formed, this may be done though scientific days, training workshops [8,13]. However, in this study, there were only 32% of the dentists who attended training days about Covid-19 and its relation to dentistry profession. Attendance of such training days and workshops should expand knowledge of the dentists and keep them alert to the present situation of the Covid-19 diffusion.

One of the recommended protective measures in the waiting room of the dental clinic is to keep social distance between patients by 1.5-2 meters,[10,11] this is particularly important as it is strongly believed that SARS-Cov2 has the characteristics of viruses transmitted by the droplet airborne route,[2,3,14] focusing on social distance should minimize exposure of not infected individuals to the respiratory droplets expressed by others through sneezing, coughing and speaking.in this study 91% dentists were requiring the adequate social distance between the patients in the waiting room.

It is advisable that all individuals in a crowed wear a face mask and this applies also for patients who are gathered in a small area like the waiting room[15], this also can be augmented with considerable patients flux and good air ventilation in the waiting room, the results of this study showed that (85.7 %) of the dentists asked the patients to wear face masks during waiting.

In the same context, most international guidelines emphasized on minimizing of patients number in the waiting room, patient flux and part time scheduled patients is very important and aimed to have not more than one patient is waiting, occasionally if more than patient are waiting, them it is advisable to wait out of the dental clinic.[11,16] Accordingly, 84.2% of the dentists in this study were able to part time scheduled between patients.

Hand hygiene is widely adopted as a universal precaution to minimize the spread of Covid-19, due to the fact that SARS-CoV can remain on the surfaces for long time as well as suspended in the air, those virus particles can be transmitted from contaminated surface to mouth, nose, eyes via contaminated hands.[17,18] However, inadequate hand washing protocol for the patients in the dental clinic was documented in other studies.[19] In this study, Alcohol based hand rub was provided for patients in the waiting room by 95.7% of the dentist and 61.4% were strict about hand washing when the patient enters the dental unit.

To encourage patients to follow the correct cough, sneezing etiquette and hand hygiene it is useful to put visual alerts in the waiting room and in non-clinic areas to promote good hygiene behavior [16]. This fact was reflected in this survey by 57% of the dentists provide the visual alerts in the clinics.

When asking the dentists about the followed preventive measures to decrease the risk of Covid-19 transmission ,all the dentists answered they apply routine cleaning and disinfection of surfaces which are regularly come in contact with the patient. This has a particular importance as the cleaning of surfaces in dental clinic proved to minimize risk of disease transmission.[18,20]

Avoiding of unnecessary moving of patients should decrease their contact with other working staff and decrease the probability either producing bioaerosole or catching it [8,17], more than half of the dentists in this study follow this as a preventive measure for Covid-19.

Majority of dentists in this study, and dental health personnel used personal protective equipment, this results conform with results from other studies, [13,19] however the type of face mask is not shown in these studies.

As the diagnosis of suspected patients may be done after asking about history of travel, occupation contact and cluster, those patients should be separate and moved in well ventilated room [8,16], 65.7% of the dentists in this study do apply this rule and they deal with the suspected patients accordingly.

Eventhough the validity of disinfection tunnel is questionable,[16] 38.6% of dentists answered they used them to disinfect patients and personnel in the dental clinic.

The ADA (American Dental Association) categorized some dental procedures as emergency and urgent procedures which require immediate intervention and may lead to significant harm if delayed or not provided [12]. Emergency examination and management of dental pain due to pulpal infection, treatment of swellings of dental origin and management of traumatic injuries were performed by 94.2% and 91.2% dentists respectively. Only 30% of the dentists were doing denture treatment as they may perceive denture treatment not indicated as urgent treatment. Similar to these findings, 41% provided cementation of crown bridge work, 67 % did manage temporary fillings.

As regard to apply of certain infection control measures in the dental setting during treatment of patients, all dentists performed good hand hygiene practice with soap and water and using of ABHR this result is close to other researches were majority of the dentists followed hand hygiene protocol. [13,19]

Pre procedural mouth rinsing with antiseptic mouth wash is indicted as it is believed to decrease the microbial load in the saliva, especially with 1% oxygenated mouth rinses, [10,11,21] in this study 72.8% of the dentists advice their patients to use mouth rinse before starting the treatment.

Using of rubber dam and high volume suction is essential when doing aerosol generating procedures, this aimed to prevent formation of saliva pool inside patient's mouth in order to minimize bio aerosol transmission [22,23] However only 62.8% answered they use rubber dam during work, While 67% used high volume suction instead of saliva ejector.

After completion of patient treatment some precautions must be taken to ensure that infection control procedures was achieved adequately, 95.7% in this survey disinfect the reusable PPE, while 84.2% change the PPE between patients, and 97% flush the water lines between patients.

The researchers in this study wanted to ask about peripheral dental procedures, which may be incorrectly performed and not conformed with best infection control practice and usually done beside the patient or sometimes in separate room where other laboratory procedures carried out. These procedures involve using of micro motors which splatter parts from the prosthesis or the frame work, in this instance, if they are not sterilized, the parts that splatter are contaminated either by saliva and blood occasionally and may cause transmission of a pathogen. About 61% of the dentist were using of PPE during fixing of post insertion denture problems or reducing of high spots during cementation of fixed prosthesis. However, this result may be positevely improved if the dentists know more about aierolized transmission of Covid-19.

Conclusions:

1. Libyan dentists in this study showed practicing of moderate infection control procedures to minimize transmission of Covid-19.
2. Limited comprehension of what constitutes as emergency dental procedures was recognized.
3. Dentists are required for attending awareness days and workshops in this respect.
4. International Guidelines released to target dental professionals should be distributed to all registered dentists to keep them well informed and updated to ensure they are doing best practice.
5. The epidemic situation of Covid-19 is under continues change, and number of victims increased. This mandates close follow up of what is occurred globally. Dental profession is at high risk compared to some other professions; which obligates dental professionals to do the best preventive infection control practice to face the risk of Covid-19 transmission.

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Abbreviations:

- **ABHR:** Alcohol Based Hand Rub.
- **ADA:** American dental association.
- **CDC:** Center of Disease Control.
- **COVID-19:** Coronavirus disease.
- **PPE:** Personal Protective Equipment.
- **SPSS:** Statistical Package for the Social Sciences.

WHO: World Health Organization.