Covid 19 and dental practice: A review of literature

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Table of Contents

Original Manuscript **4**
Supplementary Files **25**

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Abstract

Background: Covid 19 (coronavirus) is a global concern since it is spreading fast as a droplet infection leading to fever, cough, and acute respiratory disease

Objective: This paper aimed to provide an ample literature review of Covid 19 and its implications on dental practice.

Methods: A systematic literature review was made through Pubmed, Medline database and Google scholar search engine using key words; coronavirus, covid-19, oral health, dental aerosol, dental implicational, management.

Results: A total of 210 articles were reviewed and in this only 59 relevant article pertaining to covid-19 and dentistry were used for this study.

Conclusions: The current outburst of the coronavirus strain 2019 (COVID-19) represents a public health emergency of global distress. Dentistry is the field of medicine which has suffered a lot. The present article highlighted various challenges and effect of coronavirus on oral health and its implication. Clinical Trial: not applicable

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Key words

Oral health, coronavirus, covid-19, dentistry

Introduction

Covid 19 (coronavirus) is a global concern since it is spreading fast as a droplet infection leading to fever, cough, and acute respiratory disease, in severe cases leading to pneumonia, kidney failure, and even death.[1]This epidemic disease has involved more than 212 countries in a span of 3-

4 months. The outburst of corona virus disease 2019 (COVID-19) started from Wuhan, China in December 2019. It has emerged as one of the swiftly health emergency and has extended significantly affecting more than 90% of countries all over the world. Chinese center for disease control and prevention declared a novel corona virus as a causative agent of COVID-19 on 8th January 2020. World Health Organization (WHO) declared this outbreak as a public health crisis of international concern on January 30, 2020. The overall mortality rate found to be 3.4%. [2-5] This paper aimed to provide an ample literature review of Covid 19 and its implications on dental practice.

Method

A search was made through Pubmed, Medline database and Google scholar search engine using key words; coronavirus, covid-19, oral health, dental aerosol, dentistry. The inclusion criteria includes; coronoavirus (covid-19), its mode of transmission, laboratory investigations, clinical features, dental aerosol, dental implicational, management. References of chosen articles were also evaluated for probable inclusion in the study. Upon verifying the matching title, abstract; full text was referred and cross matching was done based on inclusion criteria.

Result

A total of 210 articles were reviewed and in this only 59 relevant articles pertaining to covid-19 and dentistry were used for this study. In these article 47 articles were related to dentistry. Most of the dental articles mentioned about prevention of disease, atraumatic management, telemeidicine and postponement of non urgent treatments.

Discussion

The term novel is used as this virus is new to already existing corona virus family Corona viridae. This is a single stranded RNA virus which is highly infectious. It has found to be zoonotic in origin ie. transmission occurs from animals to humans.[5,6] There is strong confirmation that this novel corona virus has resemblance to corona virus species seen in bats and potentially pangolins

thus favoring the zoonotic nature of this virus infection. [1,7] There are 7 types of corona virus which can infect human beings so far. Among all, 229E (α corona virus), NL63 (α corona virus), OC43 (beta corona virus) and HKU1 (beta corona virus) are common. In 2002, severe acute respiratory syndrome corona virus (SARS-CoV) was first recognized and in 2012, the middle- east respiratory syndrome corona virus (MERS-CoV) was first acknowledged. There are 41,00,788 confirmed cases of the coronavirus and 2,80,432 death worldwide, as on dated 10th May 2020. [8-12]

Mode of transmission

Mode of transmission found to be single animal-to-human transmission, followed by sustained human-to-human, it also spread through respiratory droplets (Sneezing and coughing by infected symptomatic or asymptomatic patient) and contact transmission (shaking hands with the infected person). Contact with a surface or object that has the virus and then touching the nose, eyes, or mouth is the potential mode of transmission. [1,3,4,13-15] Sometimes transmission may happen earlier than the disease symptoms emerge.

Holshue et al [16] reported first ever case of 2019 novel corona virus in USA and found SARS-CoV-2 in the stool of patients from China and the United States suggesting that there is high risk of fecal-oral transmission. However, its aerosols or vertical transmission is still a question of doubt.

Source of Transmission

Symptomatic patients are potential source of transmission. However, recent studies advocate that asymptomatic patients are also carriers of SARS-CoV-2. This has been matter of concern as it is very difficult to diagnose and isolate such patients in order to prevent community transmission. [17] Earlier it was thought that there are 5- 6 days of incubation period of COVID-19 but now there is proof that it could be as long as 14 days.

Risk groups

It has been found that health care worker, doctors, nurses, ward persons, sweepers, dentists, ENT specialist are at higher risk. Those who are in close contact to the patients such as family

members of any age are also at risk. It is found that older person with underlying co-morbidities such as diabetes, cardiovascular diseases, immune compromised patients, pregnant women, hypertension, subjects with organ transplant, lung diseases etc. are potential risk individuals. [18]

Clinical symptoms

Most patients with COVID-19 present with mild symptoms. Patients experience cold- or flu-like symptoms mostly starts 2–4 days after a corona virus infection. However, symptoms vary from person-to-person. [3, 4] Guan et al [19] found that there are 15%- 25% severe cases. The most common symptoms are high grade fever, dry cough, shortness of breath or dyspnea and fatigue or tiredness. Some patients may experience myalgia or muscle pain, headache, sore throat, vomiting and diarrhea. There can be hyposmia (diminished sense of smell) and dysguesia (abnormal taste sensation). Computed tomography (CT) scan shows ground-glass opacities, bilateral patchy shadows and bilateral pneumonia in the chest. In severe cases, patients may develop arrhythmia and shock which need ventilator support. [20] Changes in olfactory and gustatory sensations and frequent formation of oral ulcerations has been reported. [21,22] Some patients may be asymptomatic without any signs or symptoms, can be diagnosed with blood examination.

Highest cases of covid 19 mortality and morbidity affected in the several developed and developing countries such as; United States, Spain, Italy, France, United Kingdom, Iran, and India with; 1347318, 264663, 218268, 176658, 215260, 106220, 62939 cases with 80040, 26621, 30395, 26310, 31587, 6589, 2109 deaths respectively.[8]

Sample collection and diagnosis

Preferred sample is throat and nasal swab in viral transport media (VTM) and transported on ice. Alternate sample is nasopharyngeal swab, Bronchoalveolar lavage (BAL) or endotracheal aspirate which has to be mixed with the viral transport medium and transported on ice. [23]

Real-time reverse transcription polymerase chain reaction (rRT-PCR) test is used for the qualitative detection of nucleic acid. [24] Saliva can have an essential function in the human-to-human

transmission, and non-invasive salivary diagnostics may offer a suitable and cost-effective point-of-care stage for the quick and initial identification of COVID-19 infection. It is suggested that trained health care professionals has to wear appropriate personal protective equipment (PPE), latex free purple nitrile gloves during collecting patient sample. [1, 25, 26]

Covid- 19 and Dentistry

As we are aware that oral cavity is reservoir of plenty of microorganisms, hence dentists are at high risk of getting infected as they deal with the oral cavity. Dentists are directly and closely exposed to inhalation of aerosols, patient saliva contamination and airborne particles formed during dental procedures from COVID-19 infected or asymptomatic patients, making dental procedure as a high-risk procedure and risk to dentist and dental staff. [1, 27-32] The viral load contained in the human saliva as well in blood is very high. [30]

It has been observed form studies that smoking is most likely connected with the pessimistic succession and undesirable upshot of COVID-19. [33] Khader et al, and KAmate et al evaluated the Awareness, Perception, and Attitude of dentist about COVID-19 and its control and they concluded that Jordanian dentists aware of covid and they need to aware about the guidelines and precautionary measure. [34, 35] Awareness and education of dentist should be made to prevent from spread of covid. [36]

Management of patients in dental clinics

Initial screening is advisable via telephone to recognize patients with suspected or possible COVID19 infection. Government of India Ministry of Health & Family Welfare Directorate General of Health Services has recommended guidelines in this era of covid- 19 pandemics. [23] A case of covid19 is suspected when he/she had undertaken international flight in the last 14 days or all symptomatic contacts of laboratory confirmed cases or all symptomatic healthcare personnel or all hospitalized patients with severe acute respiratory illness or asymptomatic straight and high risk

associates of a confirmed case. [37-39]

There is no common practice or guideline for dental care condition to active or suspected COVID-19 belongings. Hence because of deficiency of standard guidelines and instructions, dental care provision has completely stopped or significantly decreased in several affected countries including India. In adding to emergent affected populations suffering, this will also enrage the trouble on hospitals emergency departments previously struggle with the pandemic. Indian dental association (IDA) has recommendations on covid-19. [38,40]

All patients visiting dental clinics should be given a medical form to fill it such as history of recent travel, contact with COVID- 19 patients or presence of symptoms. Infrared thermal sensors are to be used to assess patient's temperature without touching him at a desired distance. Symptomatic patients should be referred to Covid care centre. Appointments should be rearranged if the patient has traveled outside India in the last two weeks to an area such as China, Italy, Iran, Hong Kong, France, Germany, Japan, Spain, South Korea, Singapore, Thailand, Taiwan, Vietnam or any other COVID19 exaggerated country.

Upon patients arrival, before entering the reception, they should be fumigated, hand sanitized and given mask and gloves to wear. [41] All routine patients should be subjected to rinse with a 1% hydrogen peroxide or 1% Betadine solution before each appointment. Eggers et al [42] recommended use of 0.23% povidone-iodine mouthwash for at least 15 seconds before the dental procedure. This is to reduce viral load in the saliva. Autoclave used instruments after each patient are necessary along with disinfection and cleaning of public places repeatedly, including chairs, bathrooms and door handles. [32,41, 43] Disposable and single-use instruments and devices should be used whenever possible to reduce the cross-infection risks. [1] Patient appointment cards should be avoided. All payments should be done digitally. Strict waste disposal protocol is necessary with training & education for assistants.

All procedure should be done under rubber dame, caries excavation using spoon excavator or

chemo mechanical method. All unwanted posters, consumable and non consumable materials should be kept away. [10, 43, 44] Dental treatment should be based on patient category (table-1).

It is advisable to categorized dental treatment into emergency, urgent, non urgent and elective. Guo et al concluded from their study that there is a strong influence of COVID-19 on the consumption of emergency dental services. [45] Under emergency, cases such as fractures, Ludwig's angina and postoperative bleeding should be considered. Under urgent, cases such as acute pulpitis, pain of fractured vital tooth, avulsed or luxated tooth, dry socket and pericoronitis, extra oral swelling, should be included. Under non- urgent, cases such as asymptomatic fractured or defective restoration, removable partial denture, correction of complete denture, fixed partial denture, esthetic dentistry, scaling, esthetic, and orthodontic treatment should come. [38,42, 46, 47] Extra oral radiographs such as panoramic radiographs should be made compulsory to reduce the excessive salivation and gag reflex with IOPAR. Home oral hygiene instruction should be given to each dental patient. [4, 48, 49]

List of the accessories to be bought to restart dentistry are mentioned in Table-2. [50] Once the consultation/ procedure is over, then the whole treatment chamber should be fumigated (Patient, dentist, assistants with PPE and the instruments used for the procedure) as it is. After the fumigation, the patient, dentist and assistants with PPE should leave the treatment chamber. Then the treatment chamber, including the instruments used for the procedure should be UV irradiated for 15 minutes. Treatment area should be a negative pressure chamber so A/c should be off. [13, 51] Frequent hand washing and use hand sanitizer should be followed. After every patient, the whole chamber, including walls, roofs, knobs etc., everything should be wiped with 1% sodium hypochlorite (NaoCl) solution. [20]

One dentist should do once in 3 days consultation/ procedures. This is to prevent viral loading. Doctors who are 50 years and above having, hypertension, diabetes, lung disease and any other systemic diseases should avoid seeing the patients. In between patients a minimum of 30 minutes to 60 minutes gap should be given. Call up all the cases seen/ treated every 7 days for 4 weeks to know

about their health condition.

Dentist and dental assistants should use personal protective equipment (PPE) to prevent spread of infection and it should be changed for each patient. Single piece PPE should be preferable, so that there won't be any gaps. Before wearing the PPE, regular dress should be removed and wear only PPE in a Separate designated room for wearing them (Donning Room). After the procedures, PPE should be discarded very carefully in separate designated room (Doffing Room). Everyone should take bath and go home.[4,48,49,52,53] There are certain challenges for the dentists. The use of PPE in each patient is not possible. The high cost of the PPE kit and the heavy burden of dress make it quite hectic.

There should be separate entry/exit for the patients and a separate entry/exit for the doctors and assistants. N95/ FFP3 masks can be treated in plasma sterilizer (hydrogen peroxide gas) and can be reused for 5 times. Housekeeping & group D employees should also be provided protective gear. [20]

Dental aerosol

During many dental procedures, aerosols and droplets are produced, this causes spread of droplet spread of diseases such as; Covid-19, tuberculosis, and severe acute respiratory syndrome, or SARS. Hence it is advised for regular use of standard barriers such as masks and gloves, PPE kit, the universal use of pre-procedural rinses and high-volume evacuation. [54]

Dental drill (airotor hand piece) creates the formation of splatter, droplets, and aerosol generally contaminated with viruses, bacteria, fungi and blood. Oral surgery drills also cause aerosol in addition to splatter. Periodontal procedures such as ultrasonic scaling have to be avoided. Endodontics cannot use 3 way syringes and airotor as there is high production of aerosols. The usual protective procedures in daily clinical work are not effective adequate to prevent the COVID-19

spread. [2,5,15,48,55,56] All dental treatments which required drills or ultrasonic devices cause aerosol release, oral surgery procedures and routine dentistry (orthodontic, radiograph, esthetic corrections etc), should be postponed until the recession of covid-19 outbreak. [12, 52, 55, 57]

Prevention

Prevention can be done through, personel protection kit¸mouth mask, social distancing. following don't touch MEN (M-mouthm E-eye, N-nose), follow WOMEN (W-wash hand frequently, O-operate from distance, M-maintain cough tiquette, E-east fresh fruits and vegetables, N--no handshake). Sanitize the working area after each patient. Create awareness about covid-19. One has to maintain proper infection control. Proper disposal of all waste generated.[1,25,26]

Pharmacological management

Professional authoritarian bodies advised in opposition to prerequisite of dental treatment except for emergency cases, since the recognition of the pandemic COVID-19, but supportive therapy for the control of dental symptoms of pain, such as analgesics, and non-steroidal anti-inflammatory drugs (NSAIDs) can be recommended. [27]

There is no definite treatment method for COVID yet and Vaccine development is under process. Plasma therapy and Hydroxychloroquine (Dose 400 mg BD – for 1 day followed by 200 mg BD for 4 days) in combination with Azithromycin (500 mg OD for 5 days) drug has been suggested. Topical and systemic steroids are usually not advised. [13, 23] Carrouel et al suggested using βCD-Citrox therapeutic oral mouth rinses to reduce the viral load of ovid-19. [58]

In suspected or confirmed cases of COVID19 infections requiring urgent dental care for conditions such as tooth pain and/or swelling, antibiotics and/or analgesics is an alternative. This approach may offer symptomatic relief and will provide dentists sufficient time to either refer the patient to a specialist or deliver dental care with all. In case of symptomatic irreversible pulpitis or apical periodontitis, first line of management is ibuprofen 600 mg plus acetaminophen 500 mg and

second line of management is dexamethasone 0.07- 0.09 mg /Kg. Secondary management includes full pulpotomy. [59]

In case of acute apical abscess primary management includes incision and drainage along with antibiotic augmentin 500 mg twice for 5 days or clindamycin 300 mg thrice for 5 days. Local anesthetic 0.5% bupivacaine may be useful as an immediate pain reliever. Patients with tooth fracture, vital pulp therapy is recommended. Patients with cellulitis or fractures should be managed surgically. [20, 59]

Social distancing with use of personal protection measures and frequent hand sanitization helps to prevent exposure to the COVID droplet infection. Further studies are required to prevent and manage the spread of Covid 19. [27]

Conclusion

To start dentistry again after this pandemic is over needs assessment of all above said points. Failure of adherence to all these may land up the dental surgeon into trouble. Covid-19awareness should be created among dentist and preventive strategies should be developed, urgent dental treatment should be postponed.

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Legends for illustrations

Tables

Table 1: Patient category and treatment option

Category	History	Treatment option
Category 1	Covid -19 positive patients	Referral to Covid health centre
Category-2	Patient who has positive recent travel history or contact with anyone come from abroad	Should be deferred for treatment for 14 days. Prescribe emergency medication.
Category 3	Patient recovered from covid-19 or quarantine	Ask to submit medical records and make sure they have completed their 14 days isolation
Category-4	Patient answered negative to relevant questions and shows related respiratory symptoms	Should be given appointment after 14 days. Emergency medication should be prescribed with N95 masks.
Category-5	No related respiratory symptoms and patient answered negative to questionnaire	Can be taken for treatment

Table-2: Consumable and non consumables for dental practice

A. Non Consumables:-	***B. Consumables:-***
1) Ultrasonic Fumigator	1) PPE kits (gown, goggle, gloves, face mask/respirator, face shield, Shoe covers)
2) Extra Oral Suction	2) Face Shields
3) UV Light Trolley	3) N5 Masks only for consultations
4) HEPA Air purifiers	4) FFP3 Masks for procedures
5) Electric Hand dryers.	5) Sodium Hypochlorite
6) IR Thermometer	6) 0.2%Povidine iodine / 1% hydrogen peroxide mouth wash
7) NMD Aerosol protection doom.	7) 3-5% sodium hypochlorite as surface disinfectant
8) Pulse Oximeter	8) Sanitizers
9) Electric Hand pieces	9) Prophylactic HCQ
10) Negative pressure chambers.	10) Liquid soap/ Soap bar
	11) HCQ tablets for the fumigator.
	12) Iodine solution to wipe patients face
	13) Gloves
	14) Shields for the hand piece
	15) COVID-19 consent forms
	16) Rubber dam

Author and year	Study type	aim	outcome
Shacham et al (2020)	Online constructed questionnaire Survey	COVID-19 factors and psychological Factors among dentist	Risk of elevated psychological distress was found in 11.5%
Fiorillo et al (2020)	Systematic meta analysis	Persistence of the different coronaviruses, SARS-CoV-2 in the environment	persistence was longer with higher inocula, persistence found on metal and non-metal samples, human coronavirus could be influenced by temperature, persistence greater at 4ºC
Ahmed et al (2020)	Online constructed questionnaire Survey (response form 30 countries dentists)	To assess anxiety and fear, knowledge about coronovirus among dentist	87% of participants were afraid of getting infected, most of them were aware about covid and guidelines, and they follow the preventive protocol
Izzetti et al (2020)	Systematic review	literature and the clinical management of dental patients	1 reported data on clinical activities, Three articles described the risks related to dental practice
Vardavas and Nikitara (2020)	Systematic review	Prospective and restrospective studies on smoking and coronovirus	smoking is most likely associated with the negative progression and adverse outcomes of COVID-19.
Yu et al (2020)	survey	Assessed	Out of 90 patients 50.26% required

		endodontic Emergencies during Coronavirus Disease 2019	endodontic treatment. symptomatic irreversible pulpitis, symptomatic irreversible pulpitis, symptomatic apical periodontitis, and acute apical abscess was the diagnosis for endodontic treatment.

Supplementary Files