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Insights of covid-19 in 2023 and dental practice - A mini review

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Abstract

The outburst and transmission of severe acute respiratory syndrome-Related Corona virus 2(SARS-CoV-2), accountable for the Corona virus Disease 2019 (COVID-19), has caused anurgent situation in the health care system globally. The World Health Organization affirmed the pandemic diffusion of COVID-19, and preventive measures to limit contagion have been takenin several countries including India. The virus has a primarily respiratory transmission throughaerosol and droplets. The significance of infection control is thus vital in limiting the effects ofvirus diffusion. Dental care settings invariably carry the risk of SARS-Cov-2 infection due to thespecificity of its procedures, which involves face – to-face communication with patients, andfrequent exposure to saliva, blood, and other body fluids, and the handling of sharp instruments. COVID-19 is a major emergency worldwide, which should not be underestimated. Due to therapidly evolving situation again, further assessment of the implications of the COVID-19 outbreak in dental practice is needed.

Keywords: COVID-19, Aerosol, Virology, Transmission, Dentistry, SARS-Cov-2, SocialDistancing, Quaratine, Dental Professionals

Introduction

The novel COVID-19 virus has posed momentous challenges intended for Dental and Medical Organizations, altogether affected countries world-wide. The onset of SARS-Cov-2 was astonishing to have originated in Wuhan, China, in late 2019[1]. It has been shown that COVID-19, like SARS-CoV, binds to human angiotensin-converting enzyme 2 (ACE-2) via its spike glycoprotein (Fig.1) expressed on its envelope for entering the target cell [2,3,4]. ACE-2, which was

discovered in 2000, virtually presents in all tissues with relatively higher expression in respiratory epithelial cells, alveolar cells type I and II, oral cavity, kidney, testis, and intestines [5,6,7]. Meanwhile, using a cross-species receptor confirms a wide host transmissibility of COVID-19, with the exclusion of chickens [8]. SARS-CoV reduces the expression of ACE2 and contributes to lung injury (Fig.1) [9].

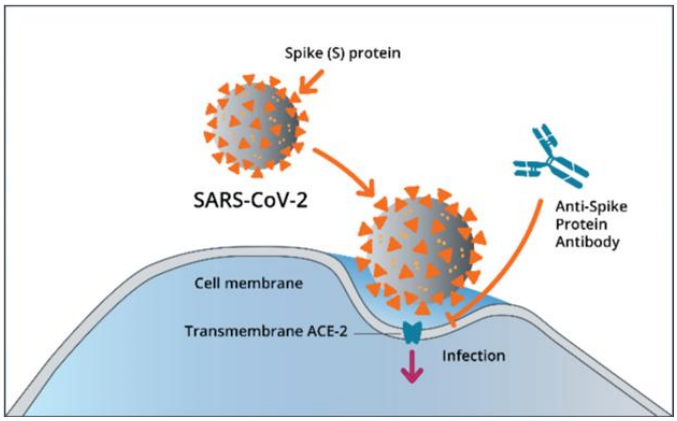

Figure 1:

The length of action and kind of reaction to the current disease worldwide including India wereunusually inconsistent[10]. The preventive standards include lockdowns and enforced quarantinesunder an astonishing extent. The degree of tracking of each and every individual is not possible,however, the ministry of electronics and IT of India has developed a mobile application, Arogya Setu, to help the citizens identify their risk of contracting SARS-Cov-2 virus [11].

The Indian government speedily embarked measures to:

(1) Condense the influx of fresh cases by ensuring travel limitations.

(2) Through quarantines for controlling the spread of the infectious virus.

(3) Proper hygiene measures, self-isolation, and social distancing to reduce contact between people's [12].

Although, by applying the above-mentioned thesaurus we can only detain the spread of disease.

Dental emergencies are provided by way of recommendation on stringent personal protectiveequipment (PPE) with all the possible procedures to decrease plus circumvent production ofdroplets and aerosols by employing high vacuum suctions, along with others [13]. The health care professionals immediately caught up in this national urgent situation, working day and night, many of them have become infected, and unfortunately died. Dental professionals, often add close contact with patients and hence major actions aligned with this dangerous infection should be taken [14]. The Indian Dental Association recently released an article on the recommendation of preventative measures for dental professionals to minimize transmission through contact and dental procedures, as methodical information leads en route for improvements in contagion control, risk appraisal, and virus management equipment and patient communications.

Related research

Following literature review will evaluate various credible literatures published from different academic world.

Chen et alhave done a Structural analysis of the receptor binding of 2019-nCoV. In this study, the researcher had concluded that ACE2 is widely expressed with conserved primary structures throughout the animal kingdom. Since ACE2 is predominantly expressed in intestines, testis, and kidney, fecal-oral and other routes of transmission are also possible.

Wang et aldetected SARS-CoV-2 in different types of clinical specimens.In this study 1070 specimens collected from 205 patients and the positivity was checked by using RT-PCR. The result obtained shows that the sputum sample consists of 72% positivity after

bronchoalveolar lavage fluid which consists of 93% of positivity.

Han et al oncompared SARS-CoV-2 RNA in induced sputum and throat swabs of convalescent COVID-19. In this study they stated that in order to reduce the risk of disease spread, viral RNA tests of induced sputum, not throat swabs, should be assessed as a criterion for releasing COVID-19 patients.

Doremalen et alhave compared the aerosol and surface stability of SARS-CoV-1 and SARS CoV-2. In this study researchers found that stability of both is similar under the tested experimental circumstances. Detectable in aerosols for up to three hours, up to four hours on copper, up to 24 hours on cardboard and up to two to three days on plastic and stainless steel. However, aerosol and fomite transmission of SARS-CoV-2 is plausible.

Now it has been mentioned in many articles that dental aerosol spread is also a potential route oftransmission whenever there will be an exposure to the elevated congregation of aerosols in asomewhat blocked atmosphere. Generally dental treatments produce aerosols, which create possible risks toward the clinicians and patients. Four articles were found in total, all were fromChina and fortunately, there are no registered cases of COVID-19 transmission were found indental surroundings to date. Although, understanding the relation between corona virus and dental aerosol transmission in dentistry is essential [15].

Research methodology

In the present study, an array of sources together with Scopus, Medline, Embase journals, PubMed, and Web of Science has been analysed.

This investigation was done by means of the subsequent keywords and or their equivalents; COVID 19, SARS-CoV, oral cavity, dental, dentistry, aerosols, ACE2, Coronavirus, and acute respiratory distress syndrome[16].

Discussion

The dental aerosol is generated from dental equipment e.g., power-driven scalers, dentallaboratory handpieces, burs, air-water syringes, and other rotary equipment. In the clinics thedental aerosols are suspended in air and can pose danger to the clinicians, present teammembers, and patients as well [17]. More is the particle size (>50 μm) of these droplets suspended in the atmosphere, shorter they lived and therefore fly down rapidly. On one hand, smaller droplets have a tendency to stay over a prolonged period and are able to penetrate and get deposited in the alveolus (Fig. 2) [18].

Figure 2:

Aerosols-a possible mode of sars-cov-2 virus transmission

Broad conformity exists within the communicable diseases in the society about a promisingmethod of respiratory infections that can spread very quickly between human beings [19]. Transmission may take place as a result of two different methods and need no bodily contiguityamong contaminated as well as vulnerable persons. At some point within a sneeze or a cough,“Droplet sprays” of virus burdened respiratory zone fluid, classically larger than 5 mm in diameter, impact straight Ly on a susceptible person. Instead, a vulnerable individual can breathein minute aerosol particles consisting of solid evaporated respiratory

droplets, which are tinyenough (<5 mm) to remain airborne for hours[20].

In dental settings these aerosols are contaminated by micro-organisms like bacteria, fungi, andviruses present in the oral mucosa and that's why called bio-aerosols. Beside from microbes, theaerosols also consist of particles from a salivary fluid, blood, food debris, oronasal discharge,gingival fluids, plaque, and calculus [21]. Coarse particles are also expelled throughout oral prophylaxis procedures [5]. Depending upon the procedure performed the composition of thesedental aerosols changes from patient to patient [22].

The New York Times published an article entitled "The Workers Who Face the GreatestCoronavirus Risk", where a striking graphic figure described that dental practitioners are thepersonnel most open to the risk of being affected by a SARS-CoV-2 than any other healthcareprofessionals because of close proximity to the patients [23]. Hence, dentistry that producesaerosol is not desirable in patients who tested positive for this novel coronavirus [9].

Paramount importance of virology and aerosol science

SARS-CoV-2 is the virus that causes the disease called COVID-19 pandemic is named severeacute respiratory syndrome coronavirus 2 by the International Committee on Taxonomy of Viruses (ICTV) on 11 February 2020. SARS-CoV-2 remains steady into dental bio-aerosols forquite a few moments [23]. They are viable for hours up till one or two daytimes resting on surfaces, thus the spread of COVID-19 is viable among aerosols along with fomented communication [24]. Roughly the substantial chance of transmission is by two customarilyextraordinary authority i.e.virology and aerosol science. As far as cognition is concerned, data ismandatory about the standard viral titter of the released aerosol particles, in addition to theminimal infective dosage for SARS-CoV-2 into vulnerable persons. Unfortunately, not either theaerosol exhibited viremia nor the minimal infective dosage for coronavirus have been incontestably established to date [25]. Presently it is up to airborne researchers to give theinnovation and hard information to either support or reject this speculation.

Perfectly, the vaporized spread of COVID-19 is the utmost significant worries in dentistry andmedical health care. At the point when dental instruments work into the patient's mouth, a lot ofaerosol and droplets mixed with the patient'ssalivary fluid and even blood will be produced.

Particles of droplets and aerosols are small enough to stay airborne for an all-encompassingperiod before they choose natural surfaces or enters the respiratory tract [26]. Hence, the COVID-19 has the prospective to spread through dental aerosols from contaminated individuals in dentalsettings and hospitals.

However, following procedures should be taken in dental practice so as to minimize chance for exposures-

- Post a sign at the entrance to the dental practice which instructs patients having symptoms of a respiratory infection (e.g., cough, sore throat, fever, sneezing, or shortness of breath) to please reschedule their dental appointment and call their physician. The same thing applies if they have had any of these symptoms in the last 48 hours.
- Reschedule appointments if your patients have travelled outside India in the last two weeks to an area affected by the coronavirus disease. This includes China, Hong Kong, Iran, Italy, France, Spain, Germany, Japan, Singapore, South Korea, Taiwan, Thailand, Vietnam or any other COVID19 affected country.
- Take a detailed travel and health history when confirming and scheduling patients. Do not provide non-

emergent or cosmetic treatment to the above patients and report them to the health department immediately. Screen patients for travel and signs and symptoms of infection when they update their medical histories.

- Incorporate questions about new onset of respiratory symptoms into daily assessments of all patients.
- Take temperature readings as part of the routine assessment of patients before performingdental procedures.
- Take the contact details and address of all patients treated.
- Install physical barriers (e.g., glass or plastic windows) at reception areas to limit close contact with potentially infectious patients.
- Make sure the personal protective equipment being used is appropriate for the proceduresbeing performed.
- Use a rubber dam when appropriate to decrease possible exposure to infectious agents.
- Use high-speed evacuation for dental procedures producing an aerosol.
- Autoclave hand-pieces after each patient.
- Have patients rinse with a 1% hydrogen peroxide solution before each appointment.
- Clean and disinfect public areas frequently, including door handles, chairs and bathrooms.

Conclusion

Dental clinics perpetually bear the threat of contagion because of the specificness belonging toits treatment, that requires facing contact or through the direct spread. Furthermore, reviews haveproved that coronavirus probably be spread directly or indirectly by means of saliva and dentalaerosols. However, staves in favour of humankind are massive. The bio-aerosol scientificassociation needs to escalate and undertake the existing challenge introduced by a coronavirus, and furthermore, assist healthier with setting us up for predictable futurity outbreaks.

Limitations

Numerous earnest inquiries concerning dental bio-aerosol spread and COVID-19 disease are still to be addressed like-

- What are the ideal conventions containing SARS-CoV-2 and would we able to be survey theirharmfulness?
- How do encompassing natural circumstances, for example, degrees and moisture, influenceairborne disease practicability?

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