



**Research Article**

**FUTURE OF IMPLANTS IN DENTISTRY POST COVID-19 PANDEMIC**

**Abhimanyu Sharma<sup>1</sup>, Dharendra Srivastava<sup>2</sup>, Lokesh Chandra<sup>3</sup> and Sonal Mishra<sup>4</sup>**

<sup>1</sup>Research Associate, Oral Surgery, ESICDC, New Delhi

<sup>2</sup>Professor, Oral Surgery, ESICDC, New Delhi

<sup>3</sup>Associate Professor, Oral Surgery, ESICDC, New Delhi

<sup>4</sup>Associate Professor, Oral Surgery, ESICDC, New Delhi

**ARTICLE INFO**

**Article History:**

Received 13<sup>th</sup> March, 2020

Received in revised form 11<sup>th</sup>

April, 2020

Accepted 8<sup>th</sup> May, 2020

Published online 28<sup>th</sup> June, 2020

**Key words:**

COVID-19, Implantology, Dental, Implants, Dentist, Dental cross-infection, Infection control

**ABSTRACT**

The corona virus has presented a global crisis for health care workers and has evoked variable response from different parts of the planet. It is of extreme importance to evaluate the role of dental health care professionals in curbing the spread of SARS-CoV-2 virus. Currently elective dental services have been put on hold in fear of increased risk of cross infection in a dental setting. However there is still a need for delivering organised emergency dental care to a section of population presenting with severe dental ailments. Dental Implants are among the prime mode of dental services offered worldwide by majority of dentists in recent past. Therefore it is but obvious, that the whole dental fraternity, apart from being concerned about the need for additional protection and safety measures that need to be put in place to avoid transmission of COVID-19 in a dental office, will also be equally worried about the financial consequences amidst the economic instability worldwide.

*Copyright©2020 Abhimanyu Sharma et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

**INTRODUCTION**

A novel human coronavirus, also called as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified as the etiologic microorganism of COVID-19 outbreak by the Chinese Center for Disease and Prevention in January 2020.<sup>1</sup> The COVID-19 pandemic has rapidly become an international health crisis. As a consequence of the extensive spread of SARS-CoV-2 and the unique characteristics of dental office (including proximity of oropharyngeal region, generation of aerosol during dental procedures), both the Dental healthcare professionals as well as the patients have a considerably higher risk of cross infection.<sup>2,3</sup>

The etiological agent of COVID-19 is the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Transmission of virus has been shown to occur through droplet infection and by contact.<sup>4</sup> Airborne spread of the virus occurs when an infected person coughs or sneezes, with a possibility of spreading the infection to persons in close proximity. Therefore various public health guidelines have recommended

Social distancing as an crucial step to avoid spread of the disease. Additionally the surfaces of objects contaminated with virus laden droplets also may result in transmission of the virus if touched by another individual. Other potential routes of transmission can be via aerosols or fecal-oral spread.<sup>5</sup> Average time period for Incubation of the disease is approximately 5-6 days but could also touch 14 days.<sup>1</sup>

The COVID-19 virus was recently identified in saliva of infected patients. Saliva can have a major role in the human-to-human transmission. Dental healthcare professionals may be unknowingly providing treatment for infected but not yet diagnosed COVID-19 patients, or those considered to be suspected cases for surveillance it is of utmost importance for dentists to put in place preventive strategies in order to limit the COVID-19 infection by focusing on patient scheduling, hand hygiene and all personal protective equipment (PPE) .

The New York Times published a piece entitled “The Workers Who Face the Greatest Coronavirus Risk”, wherein they described that dentists are the workers most exposed to the danger of being stricken by COVID-19.<sup>6</sup> As stated before, it is essential to grant clear and straightforward guidelines to manage dental patients and to ensure safety of working dentists from any risk. The transmission of the virus is primarily through inhalation/ingestion/direct mucous contact with saliva droplets; it is also important to know that the virus

\*Corresponding author: **Abhimanyu Sharma**  
Research Associate, Oral Surgery, ESICDC, New Delhi

can survive on hands, objects or surface which were exposed to infected saliva.

As the entire world is coping with the pandemic in two major fronts one being health care and second economy, dentistry and its sub stream of implantology isn't spared from the same, the speculations and certainty are going hand in hand about impact of COVID19 outbreak on Implantology. In the current paper we will be discussing two aspects of impact of COVID19 outbreak on Implantology; first includes its clinical implications on Implant dentistry and second being its impact on the economy and market of Implants

### **Clinical implications of COVID 19 on Implant Dentistry**

Patients commonly present with symptoms of fever, dry cough, shortness of breath, fatigue and muscle pain. Less commonly, nausea, diarrhoea, Headache may also be reported.<sup>7</sup> Radiologic investigations show ground glass opacities in chest on Computed tomography. Wu et al reported that 80% of the patients show only mild symptoms similar to seasonal flu which could contribute to undiagnosed cases.<sup>8</sup>

Dental professionals are at high risk for transmission of COVID-19 due to the high concentration of viral load present in oropharyngeal secretion and its primary source of spread a droplet infection. Various dental interventions involve aerosol generation (via use of high speed handpiece or ultrasonic devices) which could also contribute to increased risk of cross-infection especially in asymptomatic patients who are carriers for virus. Therefore the universal protective protocols followed routinely in dental practice may not suffice to prevent nosocomial spread.<sup>9</sup>

### **Recommended Measures**

During the current COVID-19 pandemic the advisory for Dental clinics is to establish precheck triages to measure and record the temperature and medical health status of every staff and patients. Dentists should aim to focus only on emergency dental care and postpone any elective procedure. Dental office and the waiting area should be well ventilated at all times along with spaced out seating of patients.

Ather *et al* have suggested Initial telescreening of dental patients to identify suspected COVID carriers before scheduling dental appointments. Questions should be asked pertaining to recent travel history to COVID-19 prone areas; possibility of exposure to known-suspected COVID-19 infected individuals; appearance of respiratory symptoms/fever in recent history. Since the incubation period of SARS-CoV-2 may extend over 2 weeks, a positive response any of the above queries mandates deferring the appointment for at least 2 weeks. Additionally the patients should be encouraged to self quarantine at home and contact their primary care physician for tele-consultation.<sup>3,10</sup>

Those patients who seem fit for appointment scheduling should be advised to wear surgical facemask and preferably come alone or with a single attendant at the time of their dental visit.

At the appointment visit, patients should be requested to fill out detailed questionnaire regarding their medical history, Covid-19 screening as well as a true emergency questionnaire. Patients should be tested for their body temperature via non contact thermometer or cameras having infrared sensors in waiting area itself.<sup>5</sup> Those who show fever (> 100.4 degree F =

38 degree C) or respiratory illness symptoms should be prescribed symptomatic medications for dental ailment and deferred for another 2 weeks.<sup>3</sup> Alternatively it has been suggested to perform dental treatment of suspected cases in negatively pressured rooms if available.<sup>9</sup>

First of all it will be essential to get COVID19 test done along with routine tests prior to implant surgery, depending upon active infection or recovered infection, following which a decision is to be made.

A preprocedural mouthrinse with 0.2% povidone iodine is recommended for reducing the viral load in saliva since SARS-CoV and MERS-CoV appears to be highly susceptible to povidone mouth rinse.<sup>11</sup> Another alternative is rinsing with 0.5-1% hydrogen peroxide mouthrinse preoperatively as it demonstrates non specific virucidal activity.<sup>12</sup> Imaging procedures should use extraoral techniques including panoramic radiography or computed tomography to avoid contact with oral secretions and minimise gag/cough reflex. However if intraoral sensors are to be used, they should have double barriers to avoid cross contamination. Ather et al suggest the use of disposable (single use) instrument where possible.<sup>3</sup> It is emphasized to minimize the use of aerosol generating devices like high speed handpiece, ultrasonic instruments and 3-way syringes along with use of saliva ejectors to further reduce the production of droplets and aerosols.<sup>13</sup>

### **Modulation of host immune response post alveolar bone surgery in patients with and after COVID infection**

The post operative sequelae of implant surgery involves the metabolic response of soft tissue and alveolar bone surrounding the implant site. Viruses pose significantly higher health risk and put an extra strain on host immune system, which in turn has an adverse effect on the bone marrow. The metabolic component of host immune response consists of cells of innate immunity, which are known to change their activity depending on conditions within the human body, including an active viral infection. Viruses can similarly alter the metabolic state of the cells, because of their synthetic genome, especially those with significantly small and reduced ones.<sup>14</sup>

Hematopoietic stem cells within the bone marrow have long term self-renewing capacity and have the capability to differentiate into any type of cell.<sup>15</sup> The ability of bone marrow to form copious amount of blood cells required on a routine basis depends on the proliferation and differentiation of hematopoietic stem and progenitor cells (HSPCs). This process may be modulated under stressful conditions, like infections to satisfy the specific cell requirement of the host immune response and resulting physiological changes. Viral infections can lead to direct and indirect damage to HSPCs as well as the surrounding tissue, ultimately resulting in altered bone marrow output. Acute viral infections usually cause transient aplasia, partly associated with the action of type I IFNs, and to direct viral infection, during which both HSPCs and stromal cells are exhausted. This successively may cause bone marrow pathology, eventually resulting in compromised healing from implant surgery.<sup>16</sup>

Literature reveals contradicting data regarding the pathogenesis of alveolar necrosis in presence of active viral infections like varicella zoster virus. Couple of hypotheses

have been put forward to account for the same. One possible elucidation might be the presence of ischemia. The vasculitis induced by the viral infection may cause necrosis of the periodontal tissue and alveolar bone. Another possible explanation is that the inflammatory edema of the alveolar nerve might compress the alveolar arterial blood vessel within the narrow maxillary or mandibular canal. This process could end in ischemia and consequent necrosis of the periodontal tissue and alveolar bone whilst pre-existing pulpal and periodontal infection can also contribute to this mechanism.<sup>17</sup>

Substantial controversy remains regarding the association of HIV infection and the development of bone infections. May et al observed the long term clinical outcome of implant placement in patients identified with acquired immunodeficiency syndrome (AIDS) because of human immunodeficiency virus (HIV). Their study found a rather higher failure rate of 10% in patients with AIDS, compared to widely accepted failure rates in healthy patients at 5-7%.<sup>18</sup>

In light of available literature, the prognosis on dental implant associated procedures remains guarded in patients infected with SARS-CoV-2 virus.

### **Financial aspect of dental implants amidst COVID 19 Pandemic**

The spread of the novel coronavirus has led to a considerable disruption of worldwide economic activity via decrease in international production, travel, and trade. However, so as to alleviate the medium- to long-term economic fallout from this existing crisis, a timely understanding of the consequences of the pandemic over buyer demand side of the economy is key to initiate the appropriate tools and stabilize the economy. In this regard, a serious worry is that an increase in consumers' income and employment risk weakens their economic stability and economic sentiment. Canonical theories of economic demand and the psychology of markets highlight the detrimental effect of dampened economic sentiment in depressing aggregate demand and worsening economic downturns.<sup>19-24</sup>

Factors affecting implantology practice globally include : Functioning of production units of Dental implant fixtures, all its accessories ; availability of Protection gear ; Patient's apprehension to opt for high cost surgical procedure partially because of paused economy and partially because of risk of cross infection involved at dental clinics

As international stocks, markets and trading is dull the uncertainty about revision of cost both at manufacturer, seller and purchaser (implantologist) and consumer (patient) presents uncertainty for future . Considering the sudden increase in consumption and thus need for production of PPE related stuff many companies may shift or invest in this industry rather than moving ahead in a stagnant market of implantology from last 2 months globally. There are varied reviews in the market most of which indicates fall in global economy. This in turn has a direct impact on spending habits of general population keeping an elective thing at the tail of it. Few reports definitely suggest rise in over all health care market but there's no concrete base for hike in implantology market in near future.

### **DISCUSSION**

Even after a never ending debate it is ample clear that those who would wish to manufacture implants will do , those who

wish procure implant fixtures will still do, and people who would want to go ahead with implant treatment procedures will still do. Now the million dollar question arises is pertaining to the precautions that are deemed necessary by the implantologist for a bilaterally safe procedure and just in case there is any patient who have had a history of covid19, will there be any direct clinical impact of the same on the surgery ?

It is of extreme importance presently to consider every patient as a potential carrier of the virus and thus treat accordingly. It has become almost mandatory in current scenario to use WHO recommended guidelines, recommended PPE kits. Due to the unprecedented increase in demand for protective gear, hoarding, blackmarketing and duplicating of PPE kits have already begun in most part of the country. Whereas at one end the safety is not guaranteed the other end added cost of PPE of entire clinical staff engaged in implant procedure may have an added cost to the patient or will reduce the profit to implantologist leading to its effect over further expenditure capability of surgeon. At the end it can be safely concluded that the covid-19 outbreak is going to cause a drastic paradigm shift in business and health care for sure. In such a scenario it is no surprise that Dental Implantology being an amalgamation of both the abovementioned sectors will definitely not remain untouched.

### **References**

1. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, Ren R, Leung KSM, Lau EHY, Wong JY, et al 2020. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* [epub ahead of print 29 Jan 2020] in press. Doi:10.1056/NEJMoa2001316
2. The Lancet (2020): Emerging understanding of COVID-19. *Lancet*. 395(10221):311
3. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. coronavirus Disease 19 (COVID-19): Implications for Clinical Dental Care . *J Endod* 2020; 1-11
4. Centers for Disease Control and Prevention. Transmission of coronavirus disease 2019 (COVID-19). Available from: <https://www.cdc.gov/coronavirus/2019-ncov/about/transmission.html>.
5. Peng X, Xu, X, Li Y, et al. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci* 2020;12:9
6. Lazaro Gamio. The Workers Who Face the Greatest Coronavirus Risk. *The New York Times*. March 15, 2020
7. Giacomelli A, Laura Pezzati L, Conti F, et al. Self reported olfactory and taste disorders in SARS CoV-2 patients: a cross-sectional study. *Clinical Infectious Diseases*, ciaa330. Available from: <https://doi.org/10.1093/cid/ciaa330>
8. Wu Z, McGoogan, JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report 72314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020.
9. L.Meng, F. Hua, Z.Bian. Coronavirus Disease 2019 (COVID-19): Emerging and Future Challenges for Dental and Oral Medicine. *J Dent Res* 2020, Vol.99 (5) 481-487.

10. Wang Y, Wang Y, Chen Y, Qin Q. Unique epidemiological and clinical features of the emerging 2019 novel coronavirus pneumonia (COVID-19) implicate special control measures. *J Med Virol* 2020. Available from: <https://doi.org/10.1002/jmv.25748>
11. Kriwa H, Fujii NN, Takishima I. Inactivation of SARS coronavirus by means of povidone-iodine, physical conditions, and chemical reagents. *Jpn J Vet Res* 2004;52:105-12.
12. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and its inactivation with biocidal agents. *J Hosp Infect* 2020;104:246-51
13. Kohn WG, Collins AS, Cleveland JL, Harte JA, Eklund KJ, Malvitz DM; Centers for Disease Control and Prevention. 2003. Guidelines for infection control in dental health-care settings- 2003. Available from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a1.htm>
14. González Plaza JJ, Hulak N, Kausova G, Zhumadilov Z, Akilzhanova A. Role of metabolism during viral infections, and crosstalk with the innate immune system. *Intractable Rare Dis Res*. 2016;5 (2):90–96. doi:10.5582/irdr.2016.01008)
15. Rieger, M.A., and Schroeder, T. (2012). Hematopoiesis. *Cold Spring Harb. Perspect. Biol.*4:a008250.doi: 10.1101/cshperspect.a008250)
16. Pascutti MF, Erkelens MN, Nolte MA. Impact of Viral Infections on Hematopoiesis: From Beneficial to Detrimental Effects on Bone Marrow Output. *Front Immunol*. 2016;7:364. Published 2016 Sep 16. doi:10.3389/fimmu.2016.00364
17. Tabrizi R, Dehghani Nazhvani A, Vahedi A, Gholami M, Zare R, Etemadi Parsa R. Herpes Zoster Induced Osteomyelitis in the Immunocompromised Patients: A 10-year Multicenter Study. *J Dent (Shiraz)*. 2014;15 (3):112–116.
18. May, M.C., Andrews, P.N., Daher, S. Et al. Prospective cohort study of dental implant success rate in patients with AIDS. *Int J Implant Dent* 2, 20 (2016)
19. John Maynard Keynes. *The general theory of employment, interest, and money*. Springer, 2018
20. George A Akerlof and Robert J Shiller. *Animal spirits: How human psychology drives the economy, and why it matters for global capitalism*. Princeton university press, 2010.
21. Robert J Shiller. *Irrational exuberance: Revised and expanded third edition*. Princeton university press, 2015.
22. Ulrike Malmendier and Stefan Nagel. Depression babies: do macroeconomic experiences affect risk taking? *The Quarterly Journal of Economics*, 126(1):373–416, 2011.
23. Olivier Coibion, Yuriy Gorodnichenko, and Rupal Kamdar. The formation of expectations, inflation, and the phillips curve. *Journal of Economic Literature*, 56(4):1447–91, 2018.
24. Christopher D Carroll. Macroeconomic expectations of households and professional forecasters. *The Quarterly Journal of Economics*, 118(1):269–298, 2003.

**How to cite this article:**

Abhimanyu Sharma, Dharendra Srivastava, Lokesh Chandra and Sonal Mishra (2020) 'Future of Implants in Dentistry Post Covid-19 Pandemic', *International Journal of Current Advanced Research*, 09(06), pp. 22504-22507. DOI: <http://dx.doi.org/10.24327/ijcar.2020.22507.4442>

\*\*\*\*\*