

A SURVEY ON THE PROBLEMS FACED BY PATIENTS UNDERGOING DENTAL IMPLANTS DURING CORONAVIRUS PANDEMIC

Running title: To assess the problems faced by the patients who got a dental implant during the COVID pandemic.

ABSTRACT

Aim

To analyse the problems faced by patients with dental implants during the pandemic.

Introduction

Dental implants have been used for a long time in the dental field and continue to dominate the field. Due to this reason, a huge amount of people go for dental implants. However, they have their own drawbacks and this is worsened by the coronavirus pandemic. Patients are unable to reach their dentist in person which sometimes leads to complications. This study hopes to shed more light on the different types of problems faced by patients with dental implants, especially during this pandemic.

Materials and methods

This study had a sample size of 100 and data was collected using an online questionnaire with a total of 11 questions. The statistical method used to analyse data is SPSS software version 23.

Result

Some of the responses had significant p- values (of 0.001 and 0.101) whereas the others did not.

Conclusion

By the end of the study, it was concluded that most patients with dental implants underwent a lot of problems during the covid pandemic.

KEYWORDS

Complications, Coronavirus, Dental implants, Implants, Pandemic.

INTRODUCTION

Dental implants, also known as an endosseous implant or fixture, is a surgical component that interfaces with the bone of the jaw or skull to support a dental prosthesis such as a crown, bridge, denture, facial prosthesis or to act as an orthodontic anchor [1,2] Implants are used to replace missing individual teeth (single tooth restorations), multiple teeth, or to restore edentulous dental arches [3][4]. The majority of dental implants are often made of commercially pure titanium, which is available in four grades depending upon the amount of carbon, nitrogen, oxygen and iron contained [5] [6] There is a vast ocean of dental materials and they are successfully used in dentistry. But among them, dental implants are a good example of a fusion of science and technology involved in various disciplines including surface chemistry, physics, biomechanics, and surface engineering. There are different approaches to placement of dental implants after tooth extraction [7] [8]

The approaches are:

1. Immediate post-extraction implant placement.
2. Delayed immediate post-extraction implant placement (two weeks to three months after extraction).
3. Late implantation (three months or more after tooth extraction).

The common goal of modern dentistry is to restore normal function, speech, health and aesthetics [9]. The number of dental implants used in the United States increased approximately four fold from 1983 to 1987 [10] [11]. It has also seen increasing use of dental implants, with usage skyrocketing from 0.7% of patients missing at least one tooth in 1999 - 2000, to 5.7% in 2015 - 2016 and was projected to potentially reach 26% in 2026 [12].

Implant dentistry is a field that avoids usage of high speed handpieces, leading to non generation of aerosols [13][14] Thus, treatments can be performed in a sterile environment which is a necessity during the pandemic [15][16] Water coolant is not necessary too [17]. On the contrary,

general dentistry was affected because the majority of the treatments use high speed and ultrasonic devices that generate aerosols which increases the risk of respiratory transmission ([17,18][19]

This research is specifically necessary to see the effects of COVID in the dental field. It also helps us to analyse the problems faced by patients, if any and all this ultimately leads to improvement of efficiency of dental implants [20] [21]It will keep the patients more prepared in case a crisis occurs similar to this in the near future. It will further lead to improvement of dental technique to minimise errors [22,23].

The aim of this study is to therefore analyse the problems faced by patients with dental implants during the pandemic. The null hypothesis is that there are no problems faced by patients with dental implants during the pandemic and the assumed hypothesis is that there are problems faced by patients with dental implants during the pandemic.

MATERIALS AND METHODS

100 patients with dental implants were chosen for this study from Saveetha Dental College and Hospitals, Poonamallee, Chennai. The Institutional human ethical committee has given ethical clearance for the present study as it does not involve invasive procedures. The number of subjects involved were 100. The pros of this study included quick collection of data due to the limited number of participants available and the interest of the participants themselves and the only con being the inability to reach a larger number of people for this study due to current pandemic and consecutive lockdowns. After explaining the experimental procedure and making them aware of their role in the project, informed consent was obtained from them [24]. Patients who had their implants fixed before the lockdown were not included in the study.

The data was collected from the patients from the following questionnaire.

1. How long has it been since you placed your implant?
 - A) 2-3 months
 - B) 5 months
 - C) 6-8 months

D) 1 year

2. What type of implant do you have?

A) Endosteal (placed in jaw bone)

B) Subperiosteal (under the gum or above jaw bone)

3. Have you tried online appointments?

A) Yes

B) No

4. Did you try any home remedy to relieve pain?

A) Yes

B) No

5. Did you experience extreme pain or bleeding in your gums due to implants?

A) Yes

B) No

6. Did your implants become loose during the lockdown?

A) Yes

B) No

7. How much did your food habits change because of your implant?

A) Changed a lot

B) Less change

C) No change

8. Did you face any complications because of not going to checkup?

A) Yes

B) No

9. Did you have to get additional dental procedures done to correct the complications?

- A) Yes
- B) No

10. How much did your sleep pattern change due to the implant?

- A) Changed a lot
- B) Less change
- C) No change

11. Have you by yourself cancelled an appointment due to the fear of the pandemic?

- A) Yes
- B) No

STATISTICAL ANALYSIS

Data were entered in excel spreadsheet and were analysed using descriptive statistics and Chi test. The software used was SPSS version 23.

RESULTS

FIGURE 1

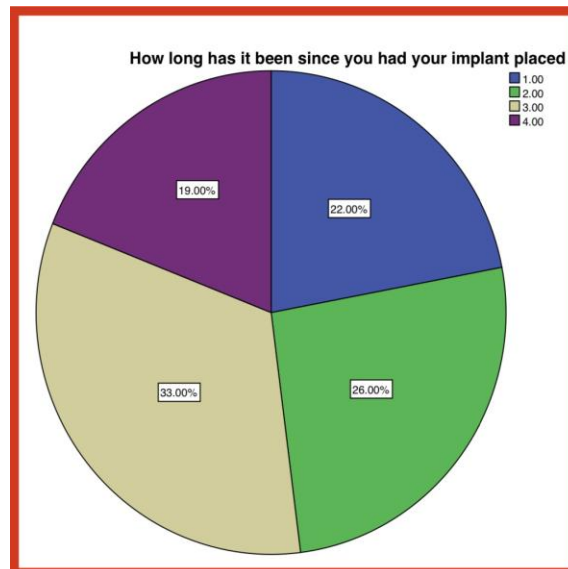


Figure 1 represents the responses for the question of how long it has been since you had your implant placed. The present observation shows statistical significance (0.001) between the different subjects by using Pearson Chi square test with a confidence level of 95%. Green color denotes “2-3 months”, mustard color denotes “5 months”, purple color represents “6-8 months ago” and blue color represents “1 year”. 22% of the subjects had their implants placed 2-3 months ago, 26% of them had it placed 5 months ago, 33% of the subjects had it placed 6-8 months ago and the rest of them had it placed a year ago. Patients who had their implants placed less than 6 months ago will be affected the most because they still might have to go for regular follow ups which is not possible during the pandemic.

FIGURE 2

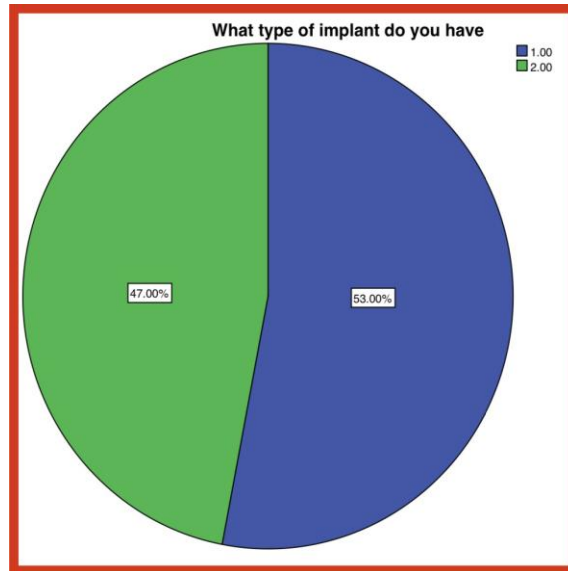


Figure 2 shows the responses recorded for the question, “What type of implant do you have?”. The present observation shows statistical significance (0.001) between the different subjects by using Pearson Chi square test with a confidence level of 95%. Green color denotes “endosteal implants” and blue color denotes “subperiosteal implants”. 47% of the patients had endosteal implants which means the implants are placed in the jawbone whereas the rest of them had subperiosteal implants, where they are placed under the gum or above the jaw bone.

FIGURE 3

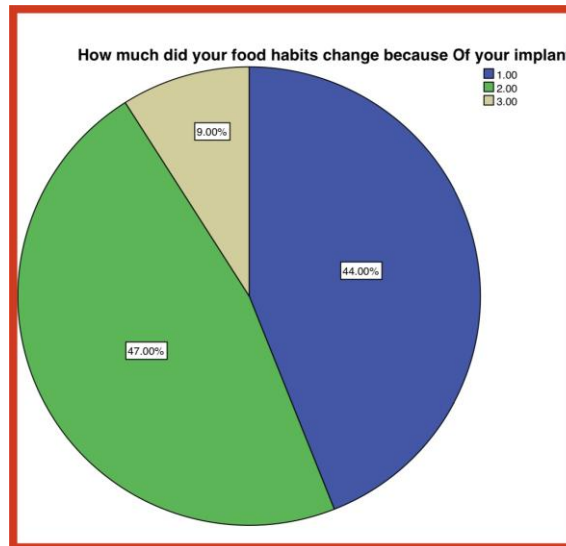


Figure 3 shows the responses observed for the question of, “How much did your food habits change because of your implant?”. The present observation shows statistical significance (0.000) between the participants of the study by using Pearson Chi square test with a confidence level of 95%. Green represents “less change”, blue represents “ changed alot” and mustard represents “ no change”. 44% of the subjects had a lot of changes in their food habits post implant, 47% of the habits underwent less change, and 9% of them did not undergo any change.

FIGURE 4

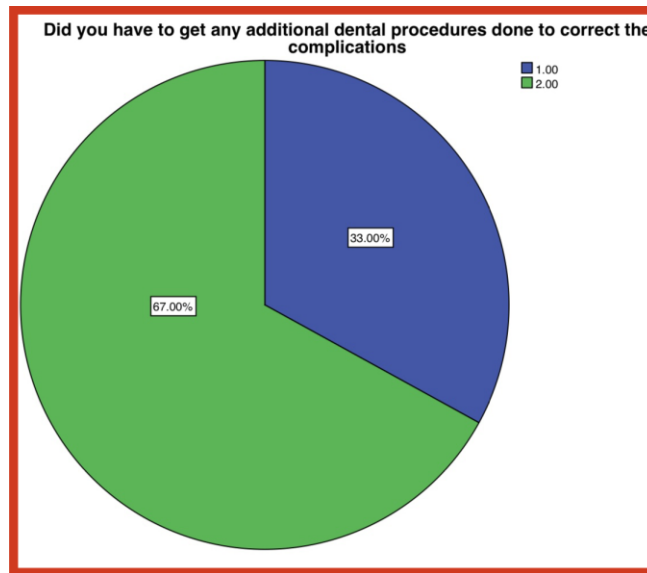


Figure 4 shows the responses recorded for the question, “Did you have to get any additional dental procedures done to correct the complications?”. The present observation shows statistical significance (0.096) between the participants of the study using Pearson Chi square test with a confidence level of 95%. Green represents “no” and blue represents “yes”. 33% of the subjects had to get additional dental procedures done to correct the complications whereas 67% of them did not have to go through this long process.

FIGURE 5

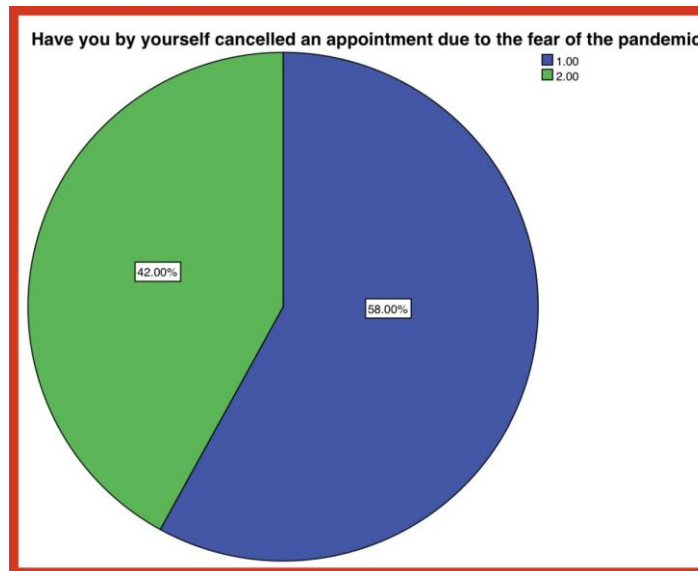


Figure 5 shows the responses recorded for the question, “ Have you by yourself cancelled an appointment due to the fea of the pandemic?”. The present observation shows statistical significance (0.096) between the participants of the study using a bar chart with a confidence level of 95%. Blue denotes “yes” and green denotes “no”. 58% of the subjects cancelled their appointments due to the fear of the pandemic, while 42% of them did not.

DISCUSSION

From the above results it is very clear that a large number of people with dental implants are affected due to the pandemic. Around 54% of the study population reported extreme pain or bleeding in their gums due to their implants. This is very concerning because these may be symptoms of dental failure. Some signs of infection including hyperplastic soft tissues, suppuration, which means when the gums are under pressure, swelling, fistulation, color changes of the marginal peri-implant tissues, should be noted very earlier on because if not, it might lead to several complications [25] [26]. Around 33% of the subjects had to get additional dental procedures done to correct the complications. In a similar study conducted in Ontario, most

complications were preventable and the two main causes were poor planning and permanent paraesthesia [27] [28].

However in this study, the complications may be attributed to the fact that the patients could not make it to the appointments due to the lockdown. So even if they had symptoms of infection, these couldn't be corrected on time. About 58% of the subjects cancelled their dental appointment due to fear of the pandemic. However during traumatic or emergency situations, treatment cannot be avoided (Figure 1-5). During urgent times like this, patients should be divided into 3 groups - apparently healthy, suspected of COVID 19, confirmed of COVID 19. Waiting rooms must be separated for each group with protective measures with regard to PPE for the dental clinicians and staff [29] [30].

Apart from this, other studies found that patients are financially insecure. This leads to postponement of treatments which again will lead to complications or dental implant failures [31],[32] What is important to note here is that, not only the patients, but the dentists are also confronted with additional expenses [33]Lack of sufficient follow ups underestimated the effects of prosthetic loading, additional implant failures and biological and biomechanical complications might be expected over the long term [34] [35].

Limitations to this study include the inability to increase the number of sample size which would have ultimately given more credibility due to limited resources because of the pandemic. Since more research has not been done in this exact topic, there were not a lot of references available to compare the results of this study with. One possible alternative for this, is a follow up of this study after a few months.

It is necessary to conduct studies like this as it helps us to gain a better perspective of the relation between the pandemic and the field of dentistry. More studies need to be done similar to this so that it will help us to be better equipped in case this situation presents itself again after a specific period of time. Now that such a type of study has been conducted, it gives more awareness and knowledge for dentists on how to treat patients better and will keep them prepared. This helps in improved patient care.

CONCLUSION

The corona pandemic is unexpected all over the world. This pandemic situation affected most people and affects day to day life of individuals including patients also, especially the persons who underwent dental treatments using dental implants. The present study thus concluded that the patients with dental implants were affected by the corona pandemic.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

REFERENCES

1. Pujari GRS, Subramanian V, Rao SR. Effects of *Celastrus paniculatus* Willd. and *Sida cordifolia* Linn. in Kainic Acid Induced Hippocampus Damage in Rats [Internet]. Vol. 53, Indian Journal of Pharmaceutical Education and Research. 2019. p. 537–44. Available from: <http://dx.doi.org/10.5530/ijper.53.3.86>
2. Rajkumar KV, Lakshmanan G, Sekar D. Identification of miR-802-5p and its involvement in type 2 diabetes mellitus. *World J Diabetes*. 2020 Dec 15;11(12):567–71.
3. Palmer R. *A Clinical Guide to Implants in Dentistry*. Palgrave Macmillan; 2000. 86 p.
4. Uma Maheswari TN, Nivedhitha MS, Ramani P. Expression profile of salivary micro RNA-21 and 31 in oral potentially malignant disorders. *Braz Oral Res*. 2020 Feb 10;34:e002.
5. Madhavan G. Book Review: *Dental Biomechanics*. By A. N. Natali (Ed.), Taylor & Francis, London, 2003, 304 pp., ISBN 041-530-6633, UK £75, US \$120 [Internet]. Vol. 32, *Annals of Biomedical Engineering*. 2004. p. 1598. Available from: <http://dx.doi.org/10.1114/b:abme.0000049248.69528.ef>
6. Ravisankar R, Jayaprakash P, Eswaran P, Mohanraj K, Vinitha G, Pichumani M. Synthesis, growth, optical and third-order nonlinear optical properties of glycine sodium nitrate single crystal for photonic device applications [Internet]. Vol. 31, *Journal of Materials Science: Materials in Electronics*. 2020. p. 17320–31. Available from:

<http://dx.doi.org/10.1007/s10854-020-04288-5>

7. Esposito M, Grusovin MG, Polyzos IP, Felice P, Worthington HV. Timing of implant placement after tooth extraction: immediate, immediate-delayed or delayed implants? A Cochrane systematic review. *Eur J Oral Implantol*. 2010 Autumn;3(3):189–205.
8. Paramasivam A, Priyadharsini JV, Raghunandhakumar S, Elumalai P. A novel COVID-19 and its effects on cardiovascular disease. *Hypertens Res*. 2020 Jul;43(7):729–30.
9. Oshida Y, Tuna EB, Aktören O, Gençay K. Dental Implant Systems [Internet]. Vol. 11, *International Journal of Molecular Sciences*. 2010. p. 1580–678. Available from: <http://dx.doi.org/10.3390/ijms11041580>
10. Quayle AA. A watershed in dental implantology: the second NIH consensus development conference on dental implants [Internet]. Vol. 16, *Journal of Dentistry*. 1988. p. 239–41. Available from: [http://dx.doi.org/10.1016/0300-5712\(88\)90081-4](http://dx.doi.org/10.1016/0300-5712(88)90081-4)
11. Johnson J, Lakshmanan G, Biruntha M, Vidhyavathi RM, Kalimuthu K, Sekar D. Computational identification of MiRNA-7110 from pulmonary arterial hypertension (PAH) ESTs: a new microRNA that links diabetes and PAH [Internet]. Vol. 43, *Hypertension Research*. 2020. p. 360–2. Available from: <http://dx.doi.org/10.1038/s41440-019-0369-5>
12. Elani HW, Starr JR, Da Silva JD, Gallucci GO. Trends in Dental Implant Use in the U.S., 1999-2016, and Projections to 2026. *J Dent Res*. 2018 Dec;97(13):1424–30.
13. Princeton B, Santhakumar P, Prathap L. Awareness on Preventive Measures taken by Health Care Professionals Attending COVID-19 Patients among Dental Students. *Eur J Dent*. 2020 Dec;14(S 01):S105–9.
14. Chaturvedula BB, Muthukrishnan A, Bhuvanaraghan A, Sandler J, Thiruvengkatachari B. Dens invaginatus: a review and orthodontic implications. *Br Dent J*. 2021 Mar;230(6):345–50.
15. Wanis C, Aulakh G, Wilson G, Moore R. Impact of COVID-19 on dental specialty training in the UK: the trainee perspective [Internet]. Vol. 12, *Faculty Dental Journal*. 2021. p. 23–9. Available from: <http://dx.doi.org/10.1308/rcsfdj.2020.124>
16. Gudipaneni RK, Alam MK, Patil SR, Karobari MI. Measurement of the Maximum Occlusal Bite Force and its Relation to the Caries Spectrum of First Permanent Molars in Early Permanent Dentition. *J Clin Pediatr Dent*. 2020 Dec 1;44(6):423–8.
17. Flanagan D. Osteotomy Irrigation: Is it Necessary? [Internet]. Vol. 19, *Implant Dentistry*. 2010. p. 241–9. Available from: <http://dx.doi.org/10.1097/id.0b013e3181dc9852>
18. Amato A, Caggiano M, Amato M, Moccia G, Capunzo M, De Caro F. Infection Control in Dental Practice During the COVID-19 Pandemic. *Int J Environ Res Public Health* [Internet]. 2020 Jul 2;17(13). Available from: <http://dx.doi.org/10.3390/ijerph17134769>
19. Logeshwari R, Rama Parvathy L. Generating logistic chaotic sequence using geometric

- pattern to decompose and recombine the pixel values [Internet]. Vol. 79, Multimedia Tools and Applications. 2020. p. 22375–88. Available from: <http://dx.doi.org/10.1007/s11042-020-08957-9>
20. Sekar D, Lakshmanan G, Mani P, Biruntha M. Methylation-dependent circulating microRNA 510 in preeclampsia patients [Internet]. Vol. 42, Hypertension Research. 2019. p. 1647–8. Available from: <http://dx.doi.org/10.1038/s41440-019-0269-8>
 21. Alharbi KS, Fuloria NK, Fuloria S, Rahman SB, Al-Malki WH, Javed Shaikh MA, et al. Nuclear factor-kappa B and its role in inflammatory lung disease. *Chem Biol Interact.* 2021 Aug 25;345:109568.
 22. Wu S, Rajeshkumar S, Madasamy M, Mahendran V. Green synthesis of copper nanoparticles using *Cissus vitiginea* and its antioxidant and antibacterial activity against urinary tract infection pathogens [Internet]. Vol. 48, Artificial Cells, Nanomedicine, and Biotechnology. 2020. p. 1153–8. Available from: <http://dx.doi.org/10.1080/21691401.2020.1817053>
 23. Vikneshan M, Saravanakumar R, Mangaiyarkarasi R, Rajeshkumar S, Samuel SR, Suganya M, et al. Algal biomass as a source for novel oral nano-antimicrobial agent. *Saudi J Biol Sci.* 2020 Dec;27(12):3753–8.
 24. Jacob ME, Abraham S, Surya S, Minz S, Singh D, Abraham VJ, et al. A Community Health Programme in Rural Tamil Nadu, India: The Need for Gender Justice for Women [Internet]. Vol. 14, Reproductive Health Matters. 2006. p. 101–8. Available from: [http://dx.doi.org/10.1016/s0968-8080\(06\)27227-6](http://dx.doi.org/10.1016/s0968-8080(06)27227-6)
 25. Prashanti E, Reddy J, Sajjan S. Failures in implants [Internet]. Vol. 22, Indian Journal of Dental Research. 2011. p. 446. Available from: <http://dx.doi.org/10.4103/0970-9290.87069>
 26. Rao SK, Kalai Priya A, Manjunath Kamath S, Karthick P, Renganathan B, Anuraj S, et al. Unequivocal evidence of enhanced room temperature sensing properties of clad modified Nd doped mullite $\text{Bi}_2\text{Fe}_4\text{O}_9$ in fiber optic gas sensor [Internet]. Vol. 838, Journal of Alloys and Compounds. 2020. p. 155603. Available from: <http://dx.doi.org/10.1016/j.jallcom.2020.155603>
 27. Shuman M. Patient's Risk Factors for Dental Implant Success and Failure (A Retrospective Study) [Internet]. Vol. 67, Egyptian Dental Journal. 2021. p. 219–23. Available from: <http://dx.doi.org/10.21608/edj.2020.47496.1310>
 28. Bhavikatti SK, Karobari MI, Zainuddin SLA, Marya A, Nadaf SJ, Sawant VJ, et al. Investigating the Antioxidant and Cytocompatibility of Linn Extract over Human Gingival Fibroblast Cells. *Int J Environ Res Public Health* [Internet]. 2021 Jul 4;18(13). Available from: <http://dx.doi.org/10.3390/ijerph18137162>
 29. Falahchai M, Babae Hemmati Y, Hasanzade M. Dental care management during the COVID-19 outbreak. *Spec Care Dentist.* 2020 Nov;40(6):539–48.

30. Marya A, Karobari MI, Selvaraj S, Adil AH, Assiry AA, Rabaan AA, et al. Risk Perception of SARS-CoV-2 Infection and Implementation of Various Protective Measures by Dentists Across Various Countries. *Int J Environ Res Public Health* [Internet]. 2021 May 29;18(11). Available from: <http://dx.doi.org/10.3390/ijerph18115848>
31. Dahab M, van Zandvoort K, Flasche S, Warsame A, Ratnayake R, Favas C, et al. COVID-19 control in low-income settings and displaced populations: what can realistically be done? *Confl Health*. 2020 Jul 31;14:54.
32. Barma MD, Muthupandiyam I, Samuel SR, Amaechi BT. Inhibition of Streptococcus mutans, antioxidant property and cytotoxicity of novel nano-zinc oxide varnish. *Arch Oral Biol*. 2021 Jun;126:105132.
33. Levy GA, Talbot PJ. Corona- and Related Viruses: Current Concepts in Molecular Biology and Pathogenesis. Springer Science & Business Media; 2012. 615 p.
34. Annibali S, Cristalli MP, Dell'Aquila D, Bignozzi I, La Monaca G, Piloni A. Short Dental Implants [Internet]. Vol. 91, *Journal of Dental Research*. 2012. p. 25–32. Available from: <http://dx.doi.org/10.1177/0022034511425675>
35. Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol*. 2019 Dec;90(12):1441–8.