



Opinion Article

Is oral hygiene as important as hand hygiene during COVID-19 pandemic?

Vivek Kumar Bains¹, Rhythm Bains²

¹Department of Periodontology, Saraswati Dental College and Hospital, ²Department of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, King George's Medical University, Lucknow, Uttar Pradesh, India.

*Corresponding author:

Vivek Kumar Bains,
Department of Periodontology,
Saraswati Dental College
and Hospital, Lucknow,
Uttar Pradesh, India.

doc_vivek76@yahoo.co.in

Received : 09 June 2020

Accepted : 18 June 2020

Published : 30 June 2020

DOI

10.25259/AJOHAS_8_2020

Quick Response Code:



ABSTRACT

Oral hygiene is an integral part of personal hygiene practices and should not be neglected. Similar to hand hygiene, oral hygiene is essential in reducing infection from the oral cavity, and thus, its transfer to the upper and lower respiratory tract. Although there is no randomized clinical trial, oral hygiene may imply to reduce the morbidity and mortality related to coronavirus disease pandemic potentially. At present, standard oral hygiene measures consist of thorough cleaning of all surfaces of teeth, interdental areas, and tongue daily. Oral health-care providers should emphasize its importance. Thorough toothbrushing for “Two Times For Two Minutes” in a day is an easy key to remember.

Keywords: Disinfection, Oral hygiene, Coronavirus disease, Hand hygiene, Tooth brushing

INTRODUCTION

The recent global outbreak of the novel coronavirus disease (COVID-19) has once again brought to the forefront the importance of hand-hygiene and sanitization in preventing highly contagious viral infections.^[1,2] Although direct inhalation of infected respiratory or nasal droplets remains the primary mode of transmission of SARS-CoV-2, hand-hygiene is a very effective method of disease prevention by stopping the indirect transmission.^[3] The leading health organizations such as World Health Organization and Center for Disease Prevention have endorsed the role of correctly performed hand hygiene as a primary and easy to implement preventive measure for breaking the chain of transmission of the disease.^[4,5] It is advised to wash hands with soap and water for 40–60 s, and if it is not available, then with an alcohol-based hand rub (ABHR) for at least 20 s.^[6] Unlike the germicidal action of ABHR that involves protein denaturation and cell membrane disruption, surfactant in the soap reduces water tension, lifts soil and microbes, and thus clean them from the skin. Scrubbing with soap and water results in the mechanical removal of microflora.^[7,8] Popularly known in India as SUIMAN [*Seedha* (Rubbing palm to palm and between fingers), *Uta* (Back or dorsum of each hand), Interlacing fingers, *Muthi* (Back of fingers to opposing palm with interlacing fingers), *Angutha* (Rotation and rubbing of thumb clasped), *Nakhun* (Nails), and *Kalai* (Wrist)] method of hand hygiene practices are propagated among the healthcare workers and the general public. Government and non-government organizations have utilized various platforms such as social media, newspapers, and posters campaigns to promulgate and instill the practice of correct handwashing techniques among the public. In health-care settings, one can see the pictorial presentation of the five moments

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

©2020 Published by Scientific Scholar on behalf of Asian Journal of Oral Health and Allied Sciences

of hand hygiene and the steps of handwashing displayed in the patients' waiting area and the operatory. Handwashing is not a new thing. It has always been a part of culture and religious belief systems all over the world. But surprisingly, it was not an integral part of health-care settings until the late 1800s.^[9] Hands are a potential reservoir and vector for various pathological microorganisms. They come in contact with numerous already contaminated animate and inanimate surfaces.^[11] Studies have shown that people touch their face approximately 23 times in an hour, which poses a threat for virus transmission through oral, nasal, or conjunctival mucosa.^[10]

Since the oral cavity is portal for the virus's entry into the human body, it is sensible to state that, like hand hygiene, oral hygiene is essential in reducing infection from the oral cavity, and thus, its transfer to the upper and lower respiratory tract. Scientific evidence suggests maintaining optimal oral health status minimizes the incidence of hospital-acquired pneumonia.^[11,12] Self or professional-driven standard oral hygiene practices can reduce the rate of complications that may occur secondarily due to the aspiration of oropharyngeal microorganisms.^[12] Further, evidence supporting the enhancement of tooth-brushing-induced bacteremia due to diseased breached oral mucosa, gingival, and periodontal tissues in poor oro-dental health patients,^[13-16] further emphasizes maintaining optimum oral health in critically ill hospitalized patients. Thus, understanding the importance of oral health care is essential for patients who are hospitalized.^[17] Although there is no randomized clinical trial, yet oral hygiene maintenance may be a potentially effective method to reduce the morbidity and mortality related to COVID-19 pandemic.

CONTEXTUAL OPINION

In a letter to the editor to the British Dental Journal, Addy^[18] wrote that he was surprised that why dental community is not propagating tooth brushing on the same scale as handwashing to help in the prevention of COVID-19 and said that oral hygiene recommendations should be re-enforced by the governments, authorities, and the media. Authors opine that meticulous oral hygiene may reduce the probabilities of SARS-CoV-2 spread in quarantine and isolation centers, as well as in hospitalized COVID-19 patients. The reason for this opinion is based on the following shreds of evidence:

1. Scientific evidence suggests that due to a higher level of angiotensin-converting enzyme-2 expression in the salivary glands, the epithelial lining of salivary ducts, and oral mucosa, these are early target cells for coronavirus,^[19-22] thus SARS-CoV-2 virus colonizes in the oral cavity.
2. The most common portal for entrance and outlet of viral infectious disease transmission through droplets

and aerosol is the oral cavity.^[23,24] Oral cavity harbors numerous pathogens, including viruses, and in dysbiosis condition, the oral ecosystem becomes more conducive for the colonization of potential oral and respiratory pathogens. Viral infection colonizes in the oral and periodontal environment, lower and upper respiratory tract, gingival crevicular fluid, and major or minor salivary glands.^[22,24]

3. Saliva contains discharges from nasopharynx and lung (due to ciliary actions in airway lining);^[25,26] therefore, the potential of a microorganisms-spillover from the oral cavity to the respiratory system and vice-versa cannot be ruled out.

STANDARD ORAL HYGIENE PRACTICES

Similar to hand hygiene, ancient literature reports various preparations and methods of oral hygiene maintenance among the Sumerians, the Babylonians, and the Assyrians.^[27] At present, standard oral hygiene measures consist of thorough cleaning of all surfaces of teeth using a toothbrush with toothpaste, interdental areas, and tongue daily. An interesting article stated that a suitable time of brushing during COVID-19 pandemic maybe just before stepping out and coming home.^[28] Recommended timing for tooth brushing should not be less than 2 min, and more than 5 min revealed no additional benefit. Toothbrushes should be changed every 3 months or when visibly frayed. If toothbrush is fraying early than 3 months, it means a person is brushing too hard and forcefully. If toothbrush is not fraying even after 3 months, it means the person is not brushing correctly. The measures for healthy oral hygiene practices during and even after the COVID times are summarized in Table 1.

The toothbrush is the most common tool for cleaning teeth and comes in contact with microbial dental plaque and saliva. Thus, retaining microbes in the brush after cleaning the teeth may re-contaminate the mouth.^[29] Studies show that after a single use for a duration ranging from the 30 s to 4 min, toothbrushes may become contaminated by various

Table 1: Illustrates healthy toothbrush hygiene practices.

Brushing teeth with toothpaste twice daily, for at least 2 min
Never share your toothbrush with anyone
After each use clean and disinfect the toothbrush; It can be dipped in an antiseptic mouthwash
Avoid placing tooth brushes of a family in a common toothbrush holder
Change brushes regularly after 2–3 months
Put down the toilet-lid before flushing
Disinfect the floss containers and floss holders
Use disposable interdental cleaning aids

microorganisms such as bacteria, viruses, yeasts, and fungi.^[30] Often the toothbrushes are stored in bathrooms or combined toilet/bathrooms, which are warm and moist, and are an ideal place for the growth of microorganisms.^[31]

Disinfection of toothbrushes after use is often neglected practice. It is seen that the majority of people just rinse the brushes with plain water and then dry it to prevent contamination with potential disease-producing bacteria fungi and viruses.^[32,33] In a survey-based study conducted by Peker *et al.*^[34] to assess knowledge of toothbrush hygiene among dental students, 62.6% of the respondents reported that they did not know about toothbrush disinfection and did not disinfect their toothbrushes. It is advisable to dip the toothbrushes into an antiseptic mouthwash a few minutes after rinsing with water after each use. Studies have shown that toothbrush sanitization with UV rays for 2 h,^[35] and overnight immersion in 0.12% or 0.2% chlorhexidine is highly effective for toothbrush decontamination.^[36] Other studies have reported the use of microwave sterilization and herbal agents for toothbrush disinfection [Table 2].^[37,38] Furthermore, the disinfection of the brush handles with an alcohol-based sanitizer should be done after use. It is wise not to keep all toothbrushes of family members in a common holder. They should never be shared and can be color-coded to avoid confusion of mistakenly being used by anyone else in the family.

Toothpaste most often contain the same detergent-based cleaning agents (sodium lauryl sulfates [SLSs]), which have proven to be effective in handwashing methods.^[18] Besides having antimicrobial and plaque inhibitory properties, anionic surfactant SLS imparts foam, and dissolves and inactivates various nonenveloped as well as enveloped viruses including retrovirus, rotavirus, poliovirus, HSV2, and HIV infectivity.^[39,40] Mechanism of action through which SLS inactivates viruses is denaturing of the viral envelope and capsid protein. It has been shown to have moderate substantivity of 5–7 h.^[41] However, in patients allergic to SLS

or patients with diseased-sensitive oral and gingival tissue, SLS-free toothpaste is recommended.

The use of antiseptic mouthwashes as oral rinses and gargles is also a commonly performed oral health-care measure. In Japan, daily gargling was recommended by government officials as a protective hygiene practice to prevent upper respiratory tract infections in both healthy and diseased individuals after the H1N1 swine flu outbreak in 2009.^[42] The leading dental societies and associations like the American Dental Association and American Association of Endodontics advise the use of pre-procedural mouthwashes such as 0.2% Povidone-iodine and 1% hydrogen peroxide before performing any dental treatment to reduce the viral/microbial load of the aerosols.^[21,43] According to a meta-analysis by Marui *et al.*,^[44] pre-procedural mouth-rinse with 10 ml of chlorhexidine (0.1% or 0.2%), cetylpyridinium chloride, and essential oils led to a mean reduction of 68.4% colony-forming units in dental aerosols. Based on the previous studies on SARS and MERS, the SARS-CoV-2 is also considered to be vulnerable to oxidizing agents. Sodium bicarbonate normal saline relieves pain and promotes healing of oral wounds and after surgery, but does not inhibit microbes.^[45] Slots,^[46] while reviewing the low-cost periodontal treatment option, suggested that Povidone-iodine and dilute sodium hypochlorite may be the first choice antiseptics for treatment and periodontal disease prevention. Being a highly active cytotoxic oxidant, sodium hypochlorite (NaOCl) is an effective antiseptic and disinfectant agent against bacteria, fungi, and viruses. The recommended dosage is 8–10 ml (2 teaspoonfuls) of 6% household bleach, diluted in 250 ml of glass water, yielding 0.25% of sodium hypochlorite rinse to be used orally for 30 s for about 2–3 times a week.^[46,47] It reacts with proteins, nucleic acids, and lipids, and inactivates enzymes essential in the energy-yielding metabolism of microorganisms.^[47] Thus a routine use of the mouthwashes may help in reducing the viral load of saliva and oro-pharyngeal cavity.

ORAL HYGIENE AND COVID-19 PANDEMIC

Oral hygiene is an integral part of personal hygiene practices and should not be neglected. While it is necessary to follow rigorous oral hygiene procedures, it is also essential to keep our toothbrushes clean and free of infection, regularly. First and foremost, one should wash hands with soap and water, or sanitize with ABHR before touching the toothbrush. COVID-19 positive patients should have personal oral hygiene products that include a new soft toothbrush, toothpaste, and a mouthwash/gargle that should be discarded after the condition is improved. They should store their oral health products separately and disinfect their brush regularly. Powered toothbrushes and water-pik/oral irrigators may have the potential to produce more aerosols than manual

Table 2: Methods and agents used for the decontamination of the toothbrush.

UV toothbrush sterilizer
Antimicrobial solution spray on bristles
Microwave oven
Dishwasher
Disinfection by immersion in
• Chlorhexidine (0.12% or 0.2 %) for 10–20 min
• Hydrogen peroxide (3%) for 30 min
• 50% white vinegar 10 min
• 2% Sodium hypochlorite 10 min
• Essential oils and alcohol (Listerine) for 20 min before and after use
• 10% Povidone-iodine

toothbrushes and should be avoided. There is a need to develop professionally driven need-based standard oral hygiene programs (e.g., soft triple head toothbrushes, and associated suction toothbrushes) in critically ill patients with disability and limited manual dexterity.^[17,48]

Oral health-care providers should emphasize maintaining oral hygiene in the general public and hospitalized patients. Similar to the “Fit For School” public health program that includes tooth brushing, hand hygiene, and anti-helminthics in school children in the Philippines and Indonesia,^[49] general public oral health awareness campaigns can be adapted globally in the current COVID-19 pandemic. Thorough tooth brushing for “Two Times For Two Minutes” in a day is an easy key to remember, and is equally essential as 20 s of hand hygiene in the current COVID-19 pandemic scenario.

Declaration of patient consent

Patient’s consent not required as there are no patients in this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Alzyood M, Jackson D, Aveyard H, Brooke J. COVID-19 reinforces the importance of handwashing. *J Clin Nurs* 2020. Doi: 10.1111/jocn.15313.
- Bains VK. COVID-19 pandemic: Current scenario and our role. *Asian J Oral Health Allied Sci* 2020;10:1.
- Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci* 2020;12:9.
- Available from: https://www.who.int/gpsc/5may/hand_hygiene_why_how_and_when_brochure.pdf? [Last accessed on 2020 on Jun 07].
- Available from: <https://www.cdc.gov/handhygiene/index.html>. [Last accessed on 2020 Jun 07].
- Available from: <https://www.ncdc.gov.in/showfile.php?lid=532>. [Last accessed on 2020 Jun 07].
- Kampf G, Kramer A. Epidemiologic background of hand hygiene and evaluation of the most important agents for scrubs and rubs. *Clin Microbiol Rev* 2004;17:863-93.
- World Health Organization. WHO Guidelines on Hand Hygiene in Health Care. Geneva: WHO Press; 2009.
- Available from: <https://www.theguardian.com/world/2020/mar/18/keep-it-clean-the-surprising-130-year-history-of-handwashing>. [Last accessed on 2020 Jun 08].
- Kwok YL, Gralton J, McLaws ML. Face touching: A frequent habit that has implications for hand hygiene. *Am J Infect Control* 2015;43:112-4.
- Salamone K, Yacoub E, Mahoney AM, Edward KL. Oral care of hospitalised older patients in the acute medical setting. *Nurs Res Pract* 2013;2013:827670.
- Ames NJ. Evidence to support tooth brushing in critically ill patients. *Am J Crit Care* 2011;20:242-50.
- Ewan VC, Sails AD, Walls AW, Rushton S, Newton JL. Dental and microbiological risk factors for hospital-acquired pneumonia in non-ventilated older patients. *PLoS One* 2015;10:e0123622.
- Lockhart PB, Brennan MT, Sasser HC, Fox PC, Paster BJ, Bahrani-Mougeot FK. Bacteremia associated with toothbrushing and dental extraction. *Circulation* 2008;117:3118-25.
- Olsen I. Update on bacteraemia related to dental procedures. *Transfus Apher Sci* 2008;39:173-8.
- Lucas VS, Gafan G, Dewhurst S, Roberts GJ. Prevalence, intensity and nature of bacteraemia after toothbrushing. *J Dent* 2008;36:481-7.
- Otukoya R, Doshi M. Selecting the right tools for mouth care delivery in hospitals. *Nurs Times* 2018;114:11, 18-21.
- Addy M. Toothbrushing against coronavirus. *Br Dent J* 2020;228:487.
- Liu L, Wei Q, Alvarez X, Wang H, Du Y, Zhu H, et al. Epithelial cells lining salivary gland ducts are early target cells of severe acute respiratory syndrome coronavirus infection in the upper respiratory tracts of rhesus macaques. *J Virol* 2011;85:4025-30.
- Pasomsub E, Watcharananan SP, Boonyawat K, Janchompoo P, Wongtabtim G, Suksuwan W, et al. Saliva sample as a non-invasive specimen for the diagnosis of coronavirus disease 2019: A cross-sectional study. *Clin Microbiol Infect* 2020:S1198-743.
- Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): Emerging and future challenges for dental and oral medicine. *J Dent Res* 2020;99:481-7.
- Fini MB. Oral saliva and COVID-19. *Oral Oncol* 2020;108:104821.
- Xu R, Cui B, Duan X, Zhang P, Zhou X, Yuan Q. Saliva: Potential diagnostic value and transmission of 2019-nCoV. *Int J Oral Sci* 2020;12:11.
- Badran Z, Gaudin A, Struillou X, Amador G, Soueidan A. Periodontal pockets: A potential reservoir for SARS-CoV-2? *Med Hypotheses* 2020;143:109907.
- To KK, Tsang OT, Yip CC, Chan K, Wu T, Chan JM, et al. Consistent detection of 2019 novel coronavirus in saliva. *Clin Infect Dis* 2020:ciaa149. Doi:10.1093/cid/ciaa149.
- Kaufman E, Lamster IB. The diagnostic applications of saliva—a review. *Crit Rev Oral Biol Med* 2002;13:197-212.
- Shaklar G, Carranza FA. Introduction: The historical background of periodontology. In: Newman MG, Takei HH, Klokkevold PR, Carranza FA, editors. *Newman and Carranza’s Clinical Periodontology*. 13th ed. St. Louis, Missouri: Elsevier, Saunders; 2017. p. E1.
- Available from: <https://www.walesonline.co.uk/news/uk-news/brushing-teeth-right-time-helps-18167539>. [Last accessed on 2020 Jun 08].
- Naik R, Mujib BR, Telagi N, Anil BS, Spoorthi BR. Contaminated tooth brushes—potential threat to oral and general health. *J Family Med Prim Care* 2015;4:444-8.
- Tomar P, Hongal S, Saxena V, Jain M, Rana K, Ganavadiya R. Evaluating sanitization of toothbrushes using ultra violet rays and 0.2% chlorhexidine solution: A comparative clinical study. *J Basic Clin Pharm* 2014;6:12-8.
- Karibasappa GN, Nagesh L, Sujatha BK. Assessment of microbial contamination of toothbrush head: An *in vitro* study. *Indian J Dent Res* 2011;22:2-5.
- Konidala U, Nuvvula S, Mohapatra A, Nirmala SV. Efficacy of various disinfectants on microbially contaminated toothbrushes due to brushing. *Contemp Clin Dent* 2011;2:302-7.
- Frazelle MR, Munro CL. Toothbrush contamination: A review of the literature. *Nurs Res Pract* 2012;2012:420630.
- Peker I, Akarslan Z, Basman A, Haciosmanoglu N. Knowledge and behavior of dentists in a dental school regarding toothbrush disinfection. *Braz Oral Res* 2015;29:48.
- Aysegül O, Elgin IE, Gulcin A, Nedim S. The efficacy of chlorhexidine spray vs mouthwash in the microbial contamination of child toothbrushes. *J Dent Child (Chic)* 2007;74:177-81.

36. Mehta A, Sequeira PS, Bhat G. Bacterial contamination and decontamination of toothbrushes after use. *N Y State Dent J* 2007;73:20-2.
37. Gujjari SK, Gujjari AK, Patel PV, Shubhashini PV. Comparative evaluation of ultraviolet and microwave sanitization techniques for toothbrush decontamination. *J Int Soc Prev Community Dent* 2011;1:20-6.
38. Anand PJ, Athira S, Chandramohan S, Ranjith K, Raj VV, Manjula VD. Comparison of efficacy of herbal disinfectants with chlorhexidine mouthwash on decontamination of toothbrushes: An experimental trial. *J Int Soc Prev Community Dent* 2016;6:22-7.
39. Piret J, Désormeaux A, Bergeron MG. Sodium lauryl sulfate, a microbicide effective against enveloped and nonenveloped viruses. *Curr Drug Targets* 2002;3:17-30.
40. Bestman-Smith J, Piret J, Désormeaux A, Tremblay MJ, Omar RF, Bergeron MG. Sodium lauryl sulfate abrogates human immunodeficiency virus infectivity by affecting viral attachment. *Antimicrob Agents Chemother* 2001;45:2229-37.
41. Vannet BV, De Wever B, Adriaens E, Ramaeckers F, Bottenberg P. The evaluation of sodium lauryl sulphate in toothpaste on toxicity on human gingiva and mucosa: A 3D *in vitro* model. *Dentistry* 2015;5:1000325.
42. Eggers M, Koburger-Janssen T, Eickmann M, Zorn J. *In vitro* bactericidal and virucidal efficacy of povidone-iodine gargle/mouthwash against respiratory and oral tract pathogens. *Infect Dis Ther* 2018;7:249-59.
43. Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. Coronavirus disease 19 (COVID-19): Implications for clinical dental care. *J Endod* 2020;46:584-95.
44. Marui VC, Souto ML, Rovai ES, Romito GA, Chambrone L, Pannuti CM. Efficacy of preprocedural mouthrinses in the reduction of microorganisms in aerosol: A systematic review. *J Am Dent Assoc* 2019;150:1015-26.e1.
45. Shin AR, Nam SH. Antimicrobial effects of various methods for the disinfection of contaminated toothbrushes. *Biomed Res* 2018;29:2880-4.
46. Slots J. Low-cost periodontal therapy. *Periodontol* 2000 2012;60:110-37.
47. Galván M, Gonzalez S, Cohen CL, Alonaizan FA, Chen C T, Rich SK, *et al*. Periodontal effects of 0.25% sodium hypochlorite twice-weekly oral rinse. A pilot study. *J Periodontol Res* 2014;49:696-702.
48. Hua F, Xie H, Worthington HV, Furness S, Zhang Q, Li C. Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. *Cochrane Database Syst Rev* 2016;10:CD008367.
49. Duijster D, Monse B, Dimaisip-Nabuab J, Djuharnoko P, Heinrich-Weltzien R, Hobdell M, *et al*. Fit for school-a school-based water, sanitation and hygiene programme to improve child health: Results from a longitudinal study in Cambodia, Indonesia and Lao PDR. *BMC Public Health* 2017;17:302.

How to cite this article: Bains VK, Bains R. Is oral hygiene as important as hand hygiene during COVID-19 pandemic? *Asian J Oral Health Allied Sci* 2020;10:5