DOI: 10.7860/JCDR/2021/50212.15182

Letter to Editor

Public Health Section

Xerostomia in Coronavirus Disease-19 Pandemic: Causes and Prevention

KAVEH NASIRI[1], ALEKSANDRA DIMITROVA[2]

Keywords: Dry mouth, Hyposalivation, Saliva

Dear Editor,

Saliva is a complex fluid produced in major and minor salivary glands. Around 90% of salivary secretion occurs in major salivary glands; submandibular, sublingual, and the paired parotid glands. Moreover, there are hundreds of minor salivary glands, located in the cheeks, lips, palate, tongue and oropharynx, that produce 10% of the total saliva. The range of saliva secretion is estimated to be 500 to 1000 mL per day. The total salivary flow rate is around 0.3 mL/min; however, it can increase to more than 3 mL when salivation is stimulated [1,2]. This brief letter focused on xerostomia as a potential risk factor for COVID-19 and the protective role of saliva.

Xerostomia or dry mouth is dryness of the oral cavity caused by hyposalivation or complete lack of salivation. Xerostomia is described as a symptom usually developing in aging population; nonetheless, it can develop at any age. If xerostomia is not treated well in time, it can cause serious oral consequences. There are many causes for dry mouth, the most common of which are atrophy or fibrosis of salivary glands, aplasia, high dosage of radiation, auto-immune diseases (Sjögren's syndrome, AIDS), medications (hypotensive agents, diuretics, bronchodilators, antidepressants, antihistaminic agents, neuroleptics, anxiolytics, cytostatic, opioids, and others), dehydration (renal failure and uncontrolled diabetes) and anxiety [2-4].

A review on COVID-19 symptoms by Struyf T et al., included 16 studies with 7,706 participants. The six main COVID-19 symptoms in the review studies were coughing, sore throat, high temperature, muscle or joint pain, fatigue and headache. Since coughing and sore throat were common even in patients without COVID-19, these symptoms are less helpful for diagnosis [5]. Huang N et al., reported that in almost half of the COVID-19 cases oral manifestations including taste loss, dry mouth and oral lesions were observed [6]. The study by Fathi Y et al., reported that in 60% of patients, COVID-19 led to hyposalivation [7]; nevertheless, there were several limitations in the study including a small number of people participating (10 patients) and the lack of a control group [7]. Moreover, the study by Liu L et al., showed that Angiotensin-Converting-Enzyme-2 (ACE2) epithelial cells lining the salivary gland ducts are the first target of Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and the dysfunction of the salivary gland via virus may lead to hyposalivation [8]. In other words, attachment protein, i.e., spike of SARS-CoV-2 uses the same ACE2 and the cellular protease Transmembrane Serine Protease 2 (TMPRSS2) for the activation of the virus [9,10]. However, more investigation is required to prove that the virus targets salivary gland ducts and hyposalivation is a main symptom of COVID-19.

Saliva contains various proteins and peptides which play an essential role in neutralising various viruses and respiratory infections. In particular, cathelcidin (LL-37), lactoferrin, lysozyme, mucins, peroxidase, salivary agglutinin, secretory immunoglobulin A (sIgA), α,β defensins and Secretory Leucocyte Peptidase Inhibitor (SLPI) have antiviral function. Moreover, salivary gp340 shows antiviral activity against Human Deficiency Virus-1 (HIV-1) and influenza A. Mucins also have antiviral potential against HIV-1 [11].

Other saliva components, such as IgA and IgG show a protective function against influenza viruses [11]. IgG antibody is also reported to be a critical component of defence against COVID-19. IgG antibodies neutralises the virus; their direct antiviral activity was shown in 33,000 COVID-19 patients who were treated with convalescent plasma in the United States [12]. Furthermore, two more recent studies reported that IgG has high potential against SARS-CoV-2 spike antigens [6,13]. The spike protein of SARS-CoV-2 facilitates the route transmission of COVID-19 by latching onto cellular attachment factor (ACE2). COVID-19 can easily be transmitted by inhaling virus-infected droplets or directly transferred from infected droplets to the mucous membranes in the nasal or oral cavities [9,10]. Therefore, saliva components, particularly IgG, are the body's first line of defence against COVID-19 and the lack of sufficient saliva weakens its defensive feature against SARS-CoV infection. The lack of sufficient saliva may lead to more severe consequences if the virus infects individuals with pre-existing hyposalivation.

Older patients infected with COVID-19 have higher mortality and morbidity rate, particularly with a history of certain co-morbidities [14]. Salivary IgG antibodies have defence mechanism against SARS-CoV-2. Hyposalivation decreases the antiviral components of saliva which contribute to neutralising or annihilating various viruses and respiratory infections, particularly SARS-CoV-2 [6,11-13].

The signs of xerostomia can be attenuated with salivary drug stimulants (e.g., pilocarpine, malic acid, yohimbe and anethole trithione), chewing sugar-free gum, mouthwash (Biotène), acupressure, transcutaneous electrical stimulation and reducing or not taking drugs having hyposalivation effect [2,3]. Thus, the treatment of pre-existing hyposalivation in high-risk patients is of great significance in this disastrous pandemic. Nevertheless, it is suggested that more studies should be conducted on the antiviral effect of IgG and other antiviral saliva components against SARS-CoV-2 and xerostomia as a medical condition affecting the antiviral function of saliva, thereby being a risk factor for COVID-19 infection.

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PARTICULARS OF CONTRIBUTORS:
1. Independent Researcher, Essen, Germany.
2. Department of Haematology, Internal Oncology and Stem Cell Transplant, Evang. Hospital Essen-Werden, Essen, Germany.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Kaveh Nasiri,
Independent Researcher, Essen 45138, Germany.
E-mail: dds.nasiri@web.de

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: May 05, 2021
- Manual Googling: May 29, 2021
- iThenticate Software: Jul 09, 2021 (17%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? NA
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **May 04, 2021**
Date of Peer Review: **May 15, 2021**
Date of Acceptance: **Jun 12, 2021**
Date of Publishing: **Aug 01, 2021**