Oral Cavity: A Potential Repository for Early Detection of SARS-CoV-2 Infection in Asymptomatic Carriers

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ABSTRACT

The present outbreak of the Corona Virus Disease 2019 (COVID-19) has become a global health emergency. The major reason of concern amongst the health authorities is the early detection and effective isolation of the patients as the present disease is quite similar in initial clinical presentation to the old common flu. Presently, Real Time reverse transcription Polymerase Chain Reaction (rRT-PCR) is considered to be the gold standard to detect the causative virus, SARS-Cov-2, but its time consuming and poses the risk of further spread meanwhile, to the exposed people especially healthcare workers. Therefore globally, social distancing is the only mode identified to prevent the spread of the disease and keep isolating people who present with clinical symptoms, screen them and act accordingly. However asymptomatic carriers are the next point of worry and demands mass screening which is not possible with rRT-PCR per se. Researchers are trying to establish a way out for detecting the SARS-Cov-2 virus in the asymptomatic carriers or in patients who are under incubation period, thereby eradicating the spread of disease and flatten the curve of virus multiplication.

As reported in the literature salivary analysis was found promising in early detection of a similar virus during SARS outbreak. This article is an attempt to emphasize on the fact that oral cavity can be a potential reservoir of SARS-CoV-2 both in the incubation phase and or convalescence period due to its anatomical relation with the salivary glands, naso-oro-pharynx, and the mucosa which are ultimately flooded with saliva. Saliva samples are simple to collect and probably makes it an ideal tool for mass screening, thereby facilitating early detection and prevention of further spread of the deadly pandemic.

Keywords: Oral cavity; Salivary glands; Nasooro pharynx; Saliva; Oral mucosa; COVID 19; SARS-CoV-2

INTRODUCTION

The present outbreak of the 2019 coronavirus (COVID-19) constitutes a public health emergency of global concern [1]. It was on 31st December 2019 when health officials from China submitted a report to World Health Organization (WHO) stating about 41 patients suffering from a mysterious pneumonia in the city of Wuhan and Chinese province of Hubei [2]. One week later a new Coronavirus, SARS-CoV-2, was identified as the etiologic agent for the same [3]. Since then, the infection has rapidly spread worldwide due the highly increased contagiousness of SARS-CoV-2 as compared to the virus with 80% similar sequence homology which was responsible for SARS epidemic in 2003 [4,5]. On 11th March 2020, World Health Organisation (WHO) declared Corona Virus Disease 2019 (COVID-19), a global pandemic [6].

At present, Real Time reverse transcription Polymerase Chain Reaction (rRT-PCR) on respiratory specimens (nasopharyngeal) represents the gold standard test for detection of SARS-CoV-2 infection [7]. However, it is not considered as an ideal screening modality for mass screening as it implies the patient's stay in

hospital until diagnosis is made which further leads to close contact between healthcare workers and the patients and poses a high risk of transmission of infection to nurses and physicians [8]. To overcome this problem, recently, rapid serologic tests have been a point of discussion but the scientific community still does not agree that they can be used in a mass screening program to detect the asymptomatic carriers [9].

This article is an attempt to attract the attention of the researchers towards oral cavity which could be a potential reservoir for SARS-CoV2 as was proven by salivary analysis during SARS pandemic in 2003.

DISCUSSION

The expected mode of transmission of COVID-19 is when a person comes in contact with droplets while talking, coughing, sneezing by a previously infected person, as it would be for other respiratory infections. The origin of droplets can be nasopharyngeal or oro-pharyngeal and normally associated with saliva [10]. Larger droplets could contribute to viral transmission to subjects nearby, and, on the other side, the long-distance transmission is possible with smaller droplets infected with air-suspended viral particles/aerosols, produced during clinical procedure like in dentistry [11].

As majority of the infected droplets are somehow related to saliva it should be first understood how the virus reaches the oral cavity and eventually saliva. Possibly, it may appear in the mouth after migrating from the naso-oro-pharynx or secondarily the expression of ACE2, which is an important receptor for COVID-19 explains the presence of SARS-CoV-2 in the oral cavity [12]. The expression of ACE2 was found higher in minor salivary glands than that in lungs in a recent study [13], which suggests salivary glands could be potential target for COVID-19 also due to its expression which was reported higher on the epithelial cells of the oral mucosa [14].

It is important to note that new positive cases being reported continuously amongst the rescuing team and healthcare workers who were under strict professional protection, which indicates that there could be affection of COVID-19 caused by non-occupational exposure through direct or indirect contact with the oral, nasal and the eye mucous membranes of the affected individuals [15].

This may explain the presence of asymptomatic infections and silent transmission before the disease symptoms are found clinically [16]. It is analysed that positive rate of COVID-19 in patients' saliva can reach 91.7%, and saliva samples can also cultivate the live virus [17]. Therefore, it is fundamental that the salivary load in asymptomatic carriers be analysed to establish a sensitivity threshold for a future test.

The use of saliva as a diagnostic sample has several advantages: Since saliva can be easily provided by the patient [18], it does not require specialized personnel for its collection. In addition, the comfort of the procedure is significantly higher if compared with the nasopharyngeal swab or sputum procedure. Azzi et al. also suggested that saliva represents a promising tool in COVID-19 diagnosis [19].

Considering this, the COVID-19 outbreak is a reminder that dental/oral and other health professionals must always be diligent in protecting against the spread of infectious disease. As in bronchoscopy [20], inhalation of airborne particles and aerosols produced during dental procedures on patients with COVID-19 can be a high-risk procedure in which dentists are directly and closely exposed to this virus. Therefore, it is crucial for dentists to refine preventive strategies to avoid the COVID-19 infection by focusing on patient placement, hand hygiene, all personal protective equipment (PPE), and caution in performing aerosol-generating procedures [21].

Some virus strains have been detected in saliva as long as 29 days after infection, indicating that a non-invasive platform to rapidly differentiate the biomarkers using saliva could enhance disease detection [22-24]. But on the other hand it we should not forget that even if diagnosis by saliva is non-invasive and less hazardous compared with throat swabs, comprehensive diagnosis should be supported by complete information of symptoms, epidemiological history, and analysis of multiple clinical examinations [15].

CONCLUSION

The need of the era is, quick identification and isolation of both symptomatic patients as well as asymptomatic patients/carriers suffering from COVID-19 which is possible only by rapid mass screening. Unfortunately, there is no such technique available presently. Considering the role of saliva in the spread of the disease, it is wise to investigate the potential of the oral cavity as a reservoir of COVID-19 and its impact on transmission of this virus. Saliva, the major secretion in the oral cavity may provide a convenient, cost effective and rapid way of mass screening for asymptomatic COVID-19 carriers both in the incubation phase as well as convalescence period. This can help the experts in framing effective strategies for prevention and eradicate future spread of the deadly pandemic.

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