



Taste And Smell Sensation Dysfunction In Covid-19 Patients

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Abstract

A significant proportion of people infected with SARS-CoV-2 report a new onset of smell or taste loss. The duration of the chemosensory impairment and predictive factors of recovery are still unclear. In this study, we aim to describe the prevalence and features of loss of smell (anosmia) and loss of taste (ageusia) in Covid-19 patients. This study was done during second wave of Covid -19 to assess the smell and taste sensations dysfunction in Covid-19 infected subjects. Subjects above age of 18 years who were infected with Covid -19 virus and recovered from Covid-19 infection were included in this study. 50.49 % subjects had loss of smell sensation. 36.76% subjects had loss of taste sensation, whereas

34.31 % subjects had loss of both smell and taste sensation. Chemosensitive dysfunction is associated with coronavirus disease and may be the only symptom that presents the disease. Smell and taste loss are highly prevalent in COVID-19.

Key words : Taste, smell, Dysfunction, Covid-19 .

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Introduction

There are three types of presentations in COVID-19: asymptomatic, mild upper respiratory tract infection (URTI), and severe systemic disease such as bilateral interstitial pneumonia [1]. Olfactory dysfunction (OD) is already recognized in clinical practice after many viral infections, which can cause OD by inflammation in the sinonasal mucosa and runny nose, with rhinovirus, parainfluenza Epstein-Barr virus, and some coronavirus being the most common viruses [2]. In 2018, Dubé et al. found that the previous form of human coronavirus (HCoV) OC43 reaches the central nervous system through the olfactory epithelium and starts neuropropagation at the olfactory bulbs [3]. Many other recent studies found that smell and taste dysfunctions are seen frequently in COVID19 patients [4]. Therefore, it is logical to consider the relationship between OD and the new coronavirus disease 2019. On the last day of the year 2019, 41 patients with pneumonia of unidentified cause were detected

in Wuhan City, Hubei province in China [5]. The identification of the causative microorganism was reached from the examination of the throat swab samples from the Chinese Centre for Disease Control and Prevention (CCDC) on 7th January, 2020. The causative agent was named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV- 2). The World Health Organization (WHO) in February 2020 named the disease as COVID- 19 [6]. During the outbreak of COVID-19 infection, there were millions of infected people and hundreds of thousands dead all over the world, and it remains a global threat [7].

An European multicenter study concluded that olfactory (85.6%) and gustatory (88%) abnormalities are prevalent symptoms in European confirmed COVID-19 cases, who may not have other nasal complaints [8]. However, these cases do not meet the criteria of self-isolation or testing [9]. Anosmia and/or ageusia might present alone or in mild confirmed cases of COVID-19. It is therefore necessary to test or

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quarantine those individuals with these complaints. Anosmia induced by COVID-19 infection was most probably linked to damage to the neuroepithelium rich in ACE2 receptor (especially stem cells).[10] In this regard, Gupta et al performed a bioinformatic analysis of single-cell expression profiles underscored selective expression of angiotensin-converting enzyme2 (ACE2) in a subset of horizontal basal cells and sustentacular cells of the olfactory mucosa in humans. They evaluated the expression of ACE2 transcript in 3906 olfactory mucosa originated single cells from the recent report by Durante et al and suggested that loss of smell in the infected patients is most unlikely due to the direct impairment of the olfactory sensory neurons; in particular the sustentacular cells and the horizontal basal cells are the potential cell types that are highly susceptible to viral entry.[11] Moreover, multiple non-neuronal cell types present in the olfactory epithelium express 2 host receptors, ACE2 and TMPRSS2 proteases, that facilitate SARS-CoV-2 binding, replication, and accumulation (Butowt and Bilinska).[12] In this study, we aim to describe the prevalence and features of loss of smell (anosmia) and loss of taste (ageusia) in COVID-19 patients.

Material and Methods

This study was done during second wave of Covid -19 to assess the smell and taste sensations dysfunction in Covid 19 infected subjects. Subjects above age of 18 years who were infected with covid 19 virus and recovered from Covid 19 infection were included in this study. Patients with proven COVID-19 infection by realtime polymerase chain reaction (RT-PCR) on nasopharyngeal and oropharyngeal swabs were enrolled in the current study. This was questionnaire based study. Questions regarding features of loss of smell and taste sensations in covid 19 patients were asked with help of Google forms. Informed consent was taken from subjects and participation in this study was voluntary. 204 subjects participated in this study. Both male and female adults were included in this study.

Results

204 subjects were included in this study. 102 were male and 102 female subjects.

Table 1: Number of Covid 19 subjects with smell and taste sensation dysfunction.

Dysfunction	Total subjects n=204	Percentage
Loss of smell	103	50.49 %
Loss of taste	75	36.76 %
Loss of both smell and taste	70	34.31 %

Table 1 shows number of covid 19 subjects with loss of smell and taste sensation. 50.49 % subjects had loss of smell sensation. 36.76% subjects had loss of taste sensation, whereas 34.31 % subjects had loss of both smell and taste sensation.

Table 2: Duration of loss of smell and taste sensation

Duration in days	Loss of Smell n=144	Loss of Taste n=106
< 7 days	48 (33.33%)	32 (30.18%)
8-14 days	74 (51.38%)	62 (58.49%)
> 14 days	22 (15.27%)	12 (11.32%)

Table 2 shows duration of loss of smell and taste sensations in days. 51.38% subjects had loss of smell for 8 to 14 days. 15.27 % subjects had loss of smell for more than 2 weeks. 33.33% subjects had loss of smell for less than 7 days. 58.49% subjects had loss of taste sensation for 8 to 14 days. 30.18 % subjects had loss of taste for less than 7 days. 11.32 % subjects had loss of taste for more than 2 weeks.

Discussion

Since the coronavirus disease-2019 (COVID-19) pandemic outbreak, many studies have demonstrated that a significant proportion of people who test positive for COVID-19 have a new onset of smell or taste loss [13]. The Centers for Disease Control and Prevention, the World Health Organization, and National Public Health Authorities added 'new loss of taste or smell' to the list of symptoms related to COVID-19. The pathogenesis of anosmia related to SARS-CoV-2 has not been defined and most studies have shown that COVID-19-related olfactory dysfunction demonstrates distinct characteristics differentiating it from post-viral olfactory loss related to other viral causes [14]. The olfactory loss is of sudden onset, usually profound, and comes early in the disease process [15]. The duration of the smell and taste disorders in COVID-19 disease is still unclear. Many studies reported a quick recovery in the majority of patients [16]. Smell and taste disorders are related to a wide range of viral



infections. Infection of the upper respiratory tract can cause acute-onset anosmia or ageusia because of viral damage to the olfactory epithelium. Moreover, viruses that can use the olfactory nerve as a route into the central nervous system include influenza A virus, herpesviruses, poliovirus, rabies virus, parainfluenza virus, adenoviruses, and Japanese encephalitis virus. In mouse models, SARS-CoV demonstrated transneuronal penetration through the olfactory bulb and its infection resulted in the rapid, transneuronal spread of the virus to connected areas of the brain. Damage to the olfactory nerve during invasion and multiplication of SARS-CoV-2 may explain anosmia observed in the early stage of COVID-19. Therefore, anosmia or ageusia may be more frequently observed in the COVID-19 patients than other respiratory viral infections. Ageusia may be a secondary result of olfactory dysfunction. However, the angiotensin-converting enzyme 2 receptor, which is the main host cell receptor of SARS-CoV-2 for binding and penetrating cells, is widely expressed on epithelial cells of the oral mucosa. Damage of mucosal epithelial cells of the oral cavity may explain ageusia observed in the early stage of COVID-19. This evidence may explain the pathogenetic mechanism underlying anosmia and ageusia in COVID-19. High transmissibility of COVID-19 before and immediately after symptom onset was reported with a recent epidemic study.[17] In our study 50.49 % subjects had loss of smell sensation. 36.76% subjects had loss of taste sensation, whereas 34.31 % subjects had loss of both smell and taste sensation. 51.38% subjects had loss of smell for 8 to 14 days.

15.27 % subjects had loss of smell for more than 2 weeks.33.33% subjects had loss of smell for less than 7 days. 58.49% subjects had loss of taste sensation for 8 to 14 days. 30.18 % subjects had loss of taste for less than 7 days. 11.32 5 subjects had loss of taste for more than 2 weeks. Early diagnosis is important for the control of COVID-19, recognition of early signs such as anosmia or ageusia might be very helpful for the diagnosis COVID-19 and isolation of the patients.

Conclusion

Smell and taste loss is highly prevalent in COVID-19 of all levels of severity. Most patients recover fast, but one out of ten have not

recovered in two months. Chemosensitive dysfunction is associated with coronavirus disease and may be the only symptom that presents the disease. Further objective studies with larger sample are required to cover chemosensitive dysfunctions, as the recognition of this dysfunction may help the COVID-19 diagnosis, and prevent the spread of this disease.

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