Acta Scientific Otolaryngology (ISSN: 2582-5550)

Volume 3 Issue 9 September 2021

Review Article

Etiopathogenesis and Prognosis of Altered Taste and Smell Sensation in Covid 19 Patients

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Received: July 19, 2021

Published: August 09, 2021

Abstract

Altered taste and smell sensation is being reported commonly in Covid patients. Human strains of corona virus have been demonstrated to invade the central nervous system through the olfactory neuroepithelium and propagate from within the olfactory bulb. Nasal epithelial cells display the highest expression of the SARS-CoV-2 receptor, angiotensin converting enzyme 2, in the respiratory tree. The condition is more commonly associated in patients with mild disease. Initially there were concerns that the virus can reach the brain through olfactory bulb but post-mortem studies of people who had had COVID-19 have shown that the virus rarely reaches the brain. According to the OLFACAT survey, loss of smell, either hyposmia or anosmia was seen in virtually 2 hundredth of the European general population. Loss of smell is taken into account to possess a major impact on quality of life. The article is aimed to summaries the Incidence; causes and recovery pattern of the Covid associated altered taste and smell sensation.

WE concluded that Anosmia may be thought to be an unknown neurologic symptom in COVID-19. Within the early stage of the disease anosmia and ageusia appear to be a part of vital symptoms and clues for diagnosing COVID-19. The acute onset of loss smell and loss of taste appear to be the vital symptom of SARS Cov-2 which may improve at an interval of 3 weeks.

Keywords: Altered Taste; Altered Smell; Covid 19 Patients

Introduction

In China (Wuhan) the primary case of Covid nineteen eruption was seen in December 2019 [1]. The virus responsible for this disease is a new corona virus which is known to have a possible bat origin [2,3]. Angiotensin-converting enzyme (ACE2) was found to be the functional receptor for SARS-CoV-2, in multiple human organs together with the central nervous system in January 2020.

The disease progressively unfold worldwide during a short span. By early August 2020 this has affected 188 countries, infected over eighteen million individuals (probably a bigger range, several unknown because of non testing) and caused quite 700,000 deaths everywhere the globe. It had been declared as a worldwide pandemic on March eleven, 2020 by World Health Organization.

The common symptoms of it are weakness, fever, cough, and breathing difficulty. Alternative symptoms embrace muscle and joint pain, throat irritation, headache, nausea or diarrhea, and a few nasal symptoms, particularly smell and taste dysfunction. In patients infected with corona virus, anosmia is a frequent symptom. However, certain patients are observed to develop sudden severe loss of smell and taste without any other respiratory symptoms.

Physiology of smell

The olfactory neuro-epithelium covers an extent of 8 - 10 cm^2 of olfactory cleft placed in upper part of nasal cavity. The nasal airflow

odorants reach this site and bind/activate the olfactory receptor (OR) proteins. There are 350 totally different OR expressed by 5 - 30 million receptor neutrons present within the sensory system epithelial tissue [4]. Whereas for taste the sensation is carried only by five receptor which are present in tongue and palate.

According to the OLFACAT survey, loss of smell, either hyposmia or anosmia was seen in virtually 2 hundredth of the European general population [5]. In US a epidemiological study showed prevalence of 13.5% for smell impairment, 17.3% for taste impairment, and 2.2% for each taste and smell impairment [6]. Loss of smell is taken into account to possess a major impact on quality of life and conjointly it decreases the power to sense the harmful environmental parts like fires, rotten food, gas leak resulting in reduction in appetite and eventually deficiency diseases, immunity reduction, and worsening of medical health problem. Thus anosmia is expounded to increased mortality.

Etiology of loss of smell

The major cause for anosmia includes respiratory tract infection by adenovirus, corona virus, influenza, rhinovirus, brain injury due to trauma, rhinitis, chronic rhinosinusitis, disease like Parkinsonism and Alzheimer while certain nasal or paranasal sinus tumors, intracranial tumours, exposure to- drugs, harmful substances and radiation are the minor causes.

In cases of acute rhinosinusitis and common cold, loss of smell may be a common (> 60%) and typically transient (3 - 7 days) symptom [7], whereas permanent loss of smell is often seen in post viral etiologic cases. But in URTI the loss of taste has not been, totally investigated. The causative agent for smell loss in URTI is taken into account to be due to combination of multiple factors like mechanical obstruction of transmission of odorant within the olfactory cleft because of inflammation of mucous membrane (cytokine storm) and shedding (neurodegeneration) of the sensory system neuro-epithelium thereby hindering the binding of odorant to OR [8]. The two macromolecule receptors which are responsible for host cell entry, division and binding of corona virus (ACE2 and TMPRSS2) that are expressed within the support cells and olfactory receptor neuron , have a possible role for the loss of smell in COVID-19 patients [9].

The anosmia discovered within the early stage of COVID-19 is because of injury to the nervii olfactorii during invasion and multiplication of SARS-CoV-2. Therefore loss of smell and taste may be seen frequently in patients infected with SARS-CoV-2.

Loss of taste is also considered secondary to smell dysfunction. The SARS-CoV-2 binds and penetrates the host cell via ACE2 receptor and these receptors are widely present on the oral epithelial cells [10].

The loss of taste discovered in early stage of COVID-19 is believed to be due to damage to these cells of oral cavity. This proof might explain the pathogenetic mechanism underlying anosmia and ageusia in COVID-19.

According to a recent epidemic study, the spread of COVID 19 is seen highest prior and post the symptom onset [11].

Early identification is very important for the management of COVID-19. Reporting the first signs like anosmia or ageusia can be highly useful for diagnosing and isolating the patients of COVID-19.

Review of Literature

Out of fifty six initial studies revealed to this point on COVID-19, the Oxford COVID-19 evidence Service published a document stating that "the current proof (grade D) to recommend changes in odor to be a feature of COVID-19 is restricted and inconclusive." Since then, a number studies were initiated to establish the association of COVID 19 and anosmia/ageusia. In Wuhan, a study by Mao., *et al*. [12] on the basis clinical data revealed a 5% occurrence of loss of smell or taste in around 200 hospitalized patients.

In South Korea a study of n = 3191 reported an incidence of 12% of anosmia and ageusia.

In Milan, 33% cases of anosmia or ageusia was recorded in 59 hospitalized patients by Giacomelli., *et al* [13].

Lechien., *et al*. [14] reported 86% cases of anosmia or 89% of ageusia in less severe patients of COVID 19, effecting patient's well-being, from four European countries.

According to most of the studies approximately all COVID-19 patients get relieved from loss of smell and taste at an interval of 2 weeks after onset. In most studies, similar incidence was seen for both anosmia and ageusia, which necessitates differentiating between loss of flavor (smell plus taste) and loss of real taste sensa-

tion. A study by Song., *et al*. [15] found that loss of taste was more common than loss of smell in COVID 19 patients, of which ageusia was associated with severe COVID-19.

In Spain a study conducted by using VAS (0-10) for analysis of loss of smell and taste revealed that loss of smell and taste was the first symptom in many patients and it also shows that it was more frequent in below 60 age group and mild disease [16]. Out of all only one study conducted in Iran used smell test and reported highest incidence of loss of smell [17], although because of lack of validation of the test used their results may be doubtful.

In Iraq, Haider Majid Haider Al-Zaidi., *et al*. [18] Studied 65 quarantined patients of which Smell dysfunction appeared in majority of patients with or without other symptoms of COVID-19 and half of them of them were recovered. Loss of taste was found associated with other COVID-19 symptoms. The recovery from the symptoms was achieved within 1 week. 15 - 18% of patient had loss of smell and taste, as the only symptom before the patient tested positive for COVID 19. Most of the patients affected with anosmia and ageusia were in age group 40 - 50 in this study.

In France, Timothée Klopfenstein., *et al*. [19] did an observational study on 70 patients. MCC index was 1.70 (2.5). Thirty nine percent patients had respiratory illness. Generalized malaise, cough, and fever were the three main symptoms. More than half of the patients had neurological symptoms: smell and taste dysfunction. The average duration of loss of smell was 7 days, and half of the patients recovered before a month of evolution. Only one patient with loss of smell was not recovered. Patients with anosmia having had pneumonia, requiring hospitalization, and oxygen therapy were less than patients without anosmia. No significant difference was found in the viral load of patients with and without anosmia.

Lukas Horvath., *et al*. [20] conducted a descriptive study, in Melbourne Australia on COVID positive patients. The foremost frequent symptoms observed were taste and smell loss. Post-recovery, smell disturbance was seen in more number of patients than taste disturbance.

Yonghyun Lee., *et al*. [21] conducted a study in Korea which revealed approximately 15% patients had loss of smell and taste in the initial stage of disease. Females and younger individuals were more commonly affected by anosmia or ageusia. For both loss of smell and taste the average time to recover was 1 week and maximum upto a period of 3 weeks. Loss of smell was seen persisting for an extended period in younger age group patients.

Conclusion

Corona virus disease is seen to be related to chemo sensitive pathology and may be the sole symptom that presents the disease.

Anosmia may be thought to be an unknown neurologic symptom in COVID-19. Within the early stage of the disease anosmia and ageusia appear to be a part of vital symptoms and clues for diagnosing COVID-19. The acute onset of loss smell and loss of taste appear to be the vital symptom of SARS Cov-2 which may improve at an interval of 3 weeks.

The treating physician or the patient should commence olfactory retraining if there is absence of early improvement. In cases of post viral anosmia, as per current evidence, olfactory training is the only treatment option available [22]. It is indicated strongly if the anosmia has not recovered within 1 month, although can be started earlier. Olfactory training provides valuable prognosis to those individuals affected by symptoms.

Further research in future may be required for assessing the objective smell test and their recovery.

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