



## ENT MANIFESTATIONS IN POST COVID PATIENTS

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**KEYWORDS :****Introduction**

Coronavirus disease is a serious respiratory disorder that is caused due to infection of Coronavirus (SARS-COV-2). It was originally originated in Wuhan, China and resulted in death of millions around the world and is still counting.

Patients suffered from multiple symptoms while in active infection as well as post covid infection. Fever dry cough, fatigue was present almost in every patient. In severe cases disease may progress to acute respiratory distress syndrome and hence the need for Intensive care unit (ICU) was increased. The severity of symptoms was also dependent on the duration, for mild cases its 2 weeks while for severe cases it is 3-6 weeks.

As far as Otorhinolaryngology is concerned patients has symptoms like pharyngitis, dysphagia/odynophagia, nasal congestion, rhinorrhoea, ear pain and aural fullness were common. Initial publications also revealed as loss of taste and loss of smell being as cardinal sign for detection of early infection. There are patients who also suffered from multiple complications related to ENT like sudden SNHL, Anosmia and retro-orbital fungal infections. There are multiple studies published on symptomology of active Covid infection, but there is a lack of literature on post infective recovery of these symptoms. This study aims to fill the gap, also to examine the post recovery phase of covid for any temporary/permanent effects over body.

The most common ENT symptoms noted post Covid were anosmia, sudden SNHL, dysgeusia, cough and retro-orbital infections. Anosmia was one of the cardinal signs of covid-19 characterized by loss of sense of smell, affecting almost 87% of the patients worldwide. Anosmia and other chemosensory disorders cause consequences to quality of life and health problems. Hence patients who presents with loss of smell after ruling out other causes should be viewed as a potential SARS-CoV infected individuals. Another common and a cardinal sign of covid infection is dysgeusia or altered sense of taste, according to Yan et al.[3] altered or loss of taste affected almost 77% of the patients worldwide. A European multicentre epidemiological survey estimated that out of 417 confirmed cases of covid 88.8% of patients were affected by olfactory or gustatory dysfunction.

SSNHL is a concern and a topic of research in the field of ENT and its correlation with SARS-CoV has furthermore complicated it. However, hearing loss with COVID 19 has not been widely recognized. Currently, there is dearth of literature published on association of hearing loss and SARS-CoV infection. Critically ill patients especially who develop ARDS and require a prolong stay of more than 50 days in Intensive care units are much more likely to develop fungal infections. As the number of cases of Covid associated fungal infections increased, awareness about the complication also increased.

ENT clinical examination and invasive procedures even in Post-Covid patients imposes high risk to healthcare workers as the virus might be in latent phase in nasal or oral cavities. Endoscopy or biopsies causes large amount of aerosol generation, which should be avoided by wearing a mask or PPE kits. This study aims to help otolaryngologist for early detection and interventions of covid-19 related manifestations.

**Methods**

The study was conducted in a Designated COVID Tertiary Care Hospital with post Covid-19 patients. The selected patients are invited to participate after obtaining their consent in a form designed for these purposes. 70 patients were selected for this study as per the Inclusion and Exclusion criteria.

**Inclusion Criteria:**

- 1) Patients with Mild to Moderate severity.
- 2) Healthy Patients without any underlying co-morbidities
- 3) Patients who were COVID positive for 14 days or more and have a printed report for the same.
- 4) Patients completed 7 days of Quarantine.
- 5) Patients are undertaken for study only if they have RT-PCR printed report.

**Exclusion Criteria:**

- 1) Active COVID infection less than 14 days.
- 2) Patients already having Allergic Rhinitis, SNHL before COVID infection
- 3) Patients with Pulmonary fibrosis ,Myocardial infection or any underlying neurological manifestations.
- 4) Patients without Negative RT-PCR printed report

**Methodology**

Sample Size-70

Age Group-10-70 years

Duration of Study-6 months

Post Covid Follow up-1) After 7 days of infection

2) After 30 days of infection

3) After 60 days of infection

Study is focused on reporting the ENT manifestations in POST COVID-19 laboratory-confirmed positive patients. It included studies that demonstrate the incidence of ENT related manifestation among different patients' manifestations such as Anosmia, SNHL, Loss of taste, in laboratory-confirmed positive COVID-19 patients.

Pure tone audiometry represents the main instrument for the identification and classification of hearing impairment.

Anosmia in patients is been diagnosed by making patients smell Coffee Beans or Camphor.

Clinical assessment of Ageusia/Dysgeusia was done by

- Cotton dipped in glucose or saline was placed over anterior 1/3<sup>rd</sup> & posterior 2/3<sup>rd</sup> of the tongue. (Prior to this application 2% xylocaine was applied over tongue)

Patients are evaluated on the basis of-

- 1) General information based on Age, sex, religion, location
- 2) Clinical evaluation (comorbidities, ENT symptoms post covid infection)
- 3) Questionnaire based on hearing and olfaction

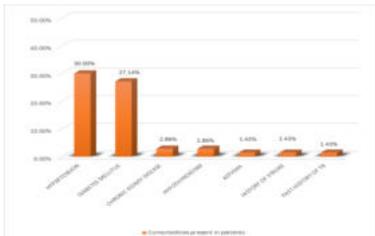
**Results**

In the present study, the mean age of the study population was 48.43 ± 15.82 years. It was also observed that the mean age was similar in females (46.67 ± 13.46 years) and males (49.75 ± 17.43 years); P value: 0.423. There was a male preponderance (57.14%) in the present study.

P/h/o oxygen requirement was present in 62.86% of the cases.

Comorbidities were present in 51.43% of the cases (Figure 2). Hypertension was present in 30% of the cases, DM in 27.14% cases, CKD and hypothyroidism in 2.86% of the cases each, while asthma, history of stroke and past history of TB were present in 1.43% of the cases each

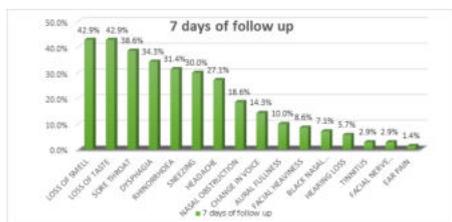
Gender Males Females	40 out of 70(57.14%) 30 out of 70(42.8%)
Age in years	48.43 ± 15.82 years
P/H/O Oxygen requirement	62.86%
Co-morbidities in patients	51.43% of the cases
Hypertension	30% of the cases
Diabetes Mellitus	27.14% cases
CKD and Hypothyroidism	2.86% of the cases



Distribution of the study population according to the type of comorbidities

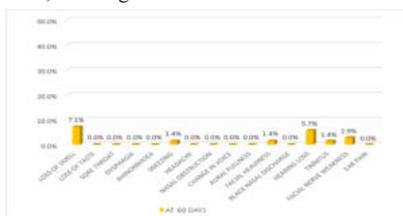
Patients after active covid infection were evaluated in ENT OPD on regular follow up on 7, 30 60 days. Patients were commonly found to have symptoms like Sore throat, dysphagia, odynophagia, change in voice, loss of smell and taste and Hearing loss. Patients were found to have sore throat including loss of taste and dysphagia as predominant symptom at the start of study (34.3% - 42.9%). Hearing loss was found to be present in (5.7%).

While tinnitus, facial nerve weakness and ear pain were the least common symptoms present in less than 5 % of the cases (Figure 4).Facial weakness and blackish nasal discharge was observed in 5 patients which were later diagnosed as mucormycosis and were further treated.

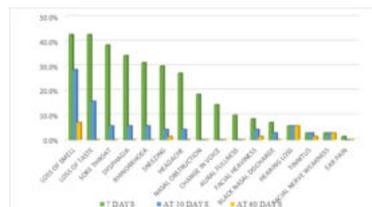


On 30 day follow up olfactory and gustatory symptoms were the most persistent symptoms accounting for 28.6% and 15.7%. About 14.3% patients recovered the ability to smell, whereas 27.2% patient regained taste sensations. Other ENT symptoms were on a resolving trend sore throat decreased from (38.6% to 5.7%). Nasal Obstruction, change in voice, aural fullness and ear pain were completely resolved by 30 days. The results were similar in all age groups.

On a 60 day follow up symptoms of most of the patients were resolved. Loss of smell (7.1%) and hearing loss (5.7%) were the most commonly persistent symptoms at 60 days. Dysgeusia completely resolved by 60 days. Other persistent symptoms included facial nerve weakness, facial heaviness, sneezing and tinnitus.



From 7 days to 60 days of follow up it was noticed that loss of smell and hearing loss were most persistent symptoms.



**Discussion**

In our study we have seen that patients infected with SARS CoV-2 may have from no symptom to multi organ dysfunction to septic shock. Despite its multiple presentation, symptoms are still vague. Most publications are focused on lower respiratory tract infections and multistage disorders. From ENT point of view virus, harbours in nasal, nasopharyngeal and oropharyngeal tissue and are a common site for taking samples. Patients also presented with various ENT symptoms which are important to evaluate and to detect patients infected with novel corona virus.

Pathophysiologically ,SARS CoV has a affinity towards ACE 2 receptors which are present in nasal as well as oral mucosa. These receptors are present diffusely all over the membrane and alteration in the structure due to virus causes inflammation in olfactory or gustatory pathway. But till date no exact pathogenesis is known. In 2008 Netland et al reported the effects of the SARS CoV infection on central nervous of mice, which was due to storm of cytokines ,in particular interleukin 6 IL-6,produced by neurons due to stimulation of the viral spike protein. SARS-Cov binds readily to ACE2 which are abundantly present in Nasal mucosa and oral cavity, hence forms the primary access route for the virus. Generally, patients recover within 2-3months since onset.

Loss of taste due to SARS CoV, according to published studies might be linked to bonding between SARS CoV2 and receptors of sialic acid, a component of saliva (responsible for taste perception) which gets degraded resulting in taste alterations. Reduced hearing and tinnitus are some presenting symptoms in patients with both COVID and Influenza infection. Histopathological evidence shows that there is loss of hair cells and supporting cells of organ of corti as SARS-CoV binds to ACE-2 receptor which are present on epithelial cells of the middle and inner ear. SARS-CoV causes release of cytokines and interleukin and tissue necrotizing factor that has a direct entry into the cochlear system and leads to inflammation that can cause SSNHL.

According to Sriwijitalai W, Wiwanitkit V hearing loss in COVID-19, the first case of covid related sensorineural hearing loss was reported in April 2020 and only four papers related to covid related hearing loss has been published. According to a study conducted by M.W.M. Mustafa ,it was seen that damage to auditory damage secondary to SARS-Cov was mostly intracochlear and irreversible.

Mucormycosis on the other hand is also a rapidly progressing and invasive complication, predominantly seen in immune compromised patients, patients with diabetes mellitus or hypertension. Treatment modalities like excessive use of steroids and antibiotics also predisposed to increase in mucormycosis cases. India was one of the worst affected countries with mucormycosis cases. A study conducted by W.F.Ismail et al. on the incidence of mucormycosis from 2017 to 2020 in Egypt, it was found that the frequency of patients almost tripled from 9 patients in 2017 to 29 patients in 2020. The French High Council for public health recommended to screen all patients for fungal pathogens in COVID 19 patients.In our study we evaluated 5 patients with mucormycosis, who had history of covid infection.3 males and 2 females with 3 patients having diabetes mellitus and hypertension as comorbidities. 1 patient expired due to complications in between the study. All patients belonged to age group of 40-64 years.4 out of 5 patients underwent surgical intervention and recovered with little or no residual complaints.

In this study we also compared multiple ENT symptoms from the day patients are out of the active infection window upto 60 days of follow up in ENT OPD. This data will help otolaryngologist worldwide to understand and assist them in building up a protocol for management of ENT related disorders in patients.

The most common symptom we found in patient after 7 days of active covid infection were related to olfactory and gustatory system. At the

start of the study most prevalent symptom was Loss of smell (42.9%), Sore throat (38.6%), Rhinorrhoea (31.4%), and sneezing (30%). Loss of taste accounted for (42.9%), dysphagia (34.3%), change in voice (14.3%). In Few cases patients also had hearing loss (5.7%). In a similar study, conducted by Goswami et al. in 2020 on 2000 patients, hyposmia and dysgeusia were seen in 44% and 32% of the patients. Sore throat was found to be present in 80% of the patient, whereas rhinorrhoea and nasal congestion was present in 28% patients respectively. Another study was conducted by Carvalho-Schneider C in 2021, to evaluate post covid symptoms after 30 days and 60 days of infection in 150 patients. The study concluded that after 30 days most persistent symptom was anosmia and ageusia that was about 40%, and it reduced to 29% after 60 days.

In our study patients followed up on 30 days for evaluation and it was found that many symptoms were on a resolving trend. Loss of smell reduced to (28.6%), sore throat reduced to (5.7%), rhinorrhoea (5.7%). Loss of taste resolved to (15.7%) and dysphagia to (5.7%). Patients were on regular medications since the time of discharge but most of complaints of smell and taste were resolving spontaneously. Recovery of symptoms was dependent upon the degree of initial loss, patient's age and duration. On 60 day follow most of the patients complaints were resolved and only persistent complaints were loss of smell (7.1%) and hearing loss (5.7%). Thus, we observed that even after recovery from active covid infection, patients had delirious effect on their health which required early intervention. This research aims to evaluate the possible impact on ear, nose and throat, after active covid infection in patients.

### CONCLUSION

Covid-19 pandemic has already spread all over the globe and world has seen its disastrous effects with millions of deaths. However there are very few studies done after Covid-19 infection. Post covid ENT manifestations should always be kept in mind as they can be easily overlooked, further research and publications will help otolaryngologist for early intervention and to improve the current treatment regime. Our results suggest that patients even after covid recovery had presented with high rates of olfactory, gustatory as well as hearing dysfunction. However, it also suggests a that recovery from these symptoms is possible with course duration of time.

There are limitations of this study as we excluded patient who had active covid infections, patients with need of high flow oxygen and intensive care unit admissions. We also observed several limitations in data collection as patients did not regularly follow up in OPD after 30 and 60 days.

Compliance with ethical standards-Declaration of competing interest. All authors declare no conflict of interest.

Funding-No funding source was used in this study.

Ethical approval was taken prior to commencement of study

Informed consent was obtained from all participants.