International Journal of Otorhinolaryngology and Head and Neck Surgery
*Vernekar SM et al. Int J Otorhinolaryngol Head Neck Surg. 2026 Dec;12(6):996-1004*
https://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20264283

**Original Research Article**

# Spectrum of ENT manifestations in COVID-19

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**Received:** 20 October 2026
**Revised:** 17 November 2026
**Accepted:** 19 November 2026

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## ABSTRACT

**Background:** Coronavirus disease 2019 caused by SARS-CoV-2, presents with a wide spectrum of clinical manifestations, including ear, nose and throat (ENT). Early recognition and diagnosis and management can help prevent transmission. The aim is to evaluate various ENT related manifestations of COVID-19.
**Methods:** A descriptive cross- sectional study conducted over 100 laboratory confirmed COVID-19 patients. Detailed clinical history, examination performed. Patients with taste and smell disturbance followed up at one and three months to assess recovery.
**Results:** the mean age of study population was 47.73±15.5 years, with male preponderance. Most common nasal symptom was smelling loss (26%), cough (48%) followed by taste loss (21%) was the commonest throat complaint. ear related manifestations were uncommon. Mucormycosis was identified in 14% of patients.
**Conclusions:** ENT manifestations are common in COVID-19, with olfactory and gustatory disturbances being frequent. Most patients experience recovery of smell and taste disturbance over varied period of time. Awareness of these signs and symptoms can facilitate early diagnosis, management and improved patient outcome during future respiratory viral outbreaks.

**Keywords:** COVID-19, ENT manifestations, SARS-COV-2

## INTRODUCTION

Coronaviruses are important human and animal pathogens. In the end of 2019, a coronavirus was recognised as the causative agent in the cases of pneumonia in Wuhan, a city in the Hubei Province of China.[1] It drastically spread, resulting in an epidemic throughout China, followed by an increasing number of cases in other countries throughout the world. World Health Organization (WHO) confirmed it as a pandemic disease on March 11, 2020.[1] Compared to alternative viruses and former CoVs strains, novel CoV 19 seems to have decreased pathogenicity but increased transmission ability. To contain the spread, it is essential to identify the subtle or nonapparent symptoms of COVID 19 at the earliest. The entry point and the site for COVID-19 viral reproduction is considered to be through the nasal and oral cavity.[2] Thus COVID-19 presented with upper respiratory tract related symptoms including nasal congestion, sore throat and loss of sensation of smell and taste.[3] Patient coming with history of fever, cough, nasal blockade, foreign travel, or contact with COVID-19-positive patients should have a strong suspicion of COVID-19. Early identification of the affected individuals can be made possible by correct and complete knowledge of the manifestations of the disease.[4] It also

helps in the stratification of patients depending on the severity of the disease. And also, the infected patients could present with nonspecific symptoms which are different from the ones which are recognised in the literature, thus during pandemic it is essential to identify all possible signs and symptoms of the infection so as to identify all the infected cases and thus break the chain of transmission. Since the nasal cavity acts as first point of entry of the virus, the role of otorhinolaryngologists is an important one in the early detection of the disease. And at the same time this fact puts ENT doctors more prone for acquiring infection.[5]

According to the WHO, until Mid-October 2022, there were a total of 622,389,418 confirmed cases and of 6,548,492 deaths and 779,248,210 total cases up to June 2026 as given in the WHO current stats on COVID 19 infection.[6,7] This portrayed this pandemic as one of the worst pandemics ever faced by humankind. With the advent of COVID-19 vaccines and proper precautionary measures, this disease could be significantly controlled. Management of these patients is based on the severity and the clinical features of the disease.[8]

This COVID-19 pandemic was sudden and unexpected. World was unaware of the management of this catastrophic pandemic and it took a big toll on humanity both in terms of mortality and morbidity. Present study is planned to accumulate data on ENT manifestations in COVID-19 patients so as to see its implications and be prepared to meet the challenge in future for recurrence of COVID-19 or any other similar pandemic.

The aim of this study included to identify and describe the various ENT manifestations occurring in patients with COVID-19 and also to see effect of COVID-19 on smell, taste and hearing. We would also make an attempt to see the prognosis of hearing taste and smell loss.

## METHODS

### *Materials and methodology*

This is a descriptive type of cross-sectional study conducted on patients who are diagnosed as COVID positive using appropriate tests in the COVID isolation wards of Goa Medical College. It was conducted on a total of 100 patients who were tested COVID-19 positive by the laboratory testing.

Study was done over a period of 18 months, from January 2020 till June 2021. COVID-19 cases lab confirmed by rapid antigen test, TRUNAAT (nucleic acid amplification test) or RTPCR (Real time polymerase chain reaction).

### *Inclusion criteria*

Adults over 18 years of age, patients with ENT complaints of new onset will be included and patients giving consent for the study.

### *Exclusion criteria*

All severely ill patients admitted in COVID ICU were excluded from the study.

### *Ethical clearance*

Ethical clearance for the study was granted by the institutional ethics committee.

### *Methodology*

All patients were subjected to detailed clinical history regarding the symptoms of COVID and ear, nose, and throat examination done after obtaining informed consent. All patients also had to undergo smell test, taste test and tuning fork test.

Data was collected, after obtaining informed consent, via a preapproved proforma which was then entered into Excel spreadsheet to create a master chart. The master chart was then exported to SPSS statistical software for statistical analysis.

*Taste test*

A standardized and validated test, which investigates the ability to perceive four primary tastes (sweet, salty, sour and bitter) was used to evaluate the gustatory function in patients with confirmed diagnosis of SARS-CoV-2 infection. Four solutions, one for each primary taste, were prepared as follows: Salted solution: 30 g of table salt were added to 1 L of deionized water; Sweet solution: 30 g of refined sugar were dissolved in 1 L of deionized water; Sour solution: 90 ml of commercial 100% lemon juice added to 1 L of deionized water; and Bitter solution: unsweetened decaffeinated coffee.

*Smell test*

A standardised test for detection of ability of smell done by taking 4 samples which involve coffee extract, eucalyptus, cardamom powder and asafoetida.

### *Data analysis and interpretation*

Data was entered into Microsoft Excel (Windows 7; Version 2007) and analyses were done using the Statistical Package for Social Sciences (SPSS) for windows software (version 22.0; SPSS Inc, Chicago). Descriptive statistics such as mean and standard deviation (SD) for continuous variables, frequencies and percentages were calculated for categorical variables. Bar charts and pie charts were used for visual representation of the analysed data.

## RESULTS

The study was conducted in the department of Otorhinolaryngology, Goa Medical College during the

study period. The 100 COVID-19 positive subjects were studied to know the ENT manifestations of COVID-19 infection.

***Demographics***

*Distribution of gender*

Total 100 subjects were taken for the study out of which 73 were males and 27 females.

*Age distribution*

The age of the subjects ranged from 12-77 years. The median age of the subjects was 47.73 years. Majority of the patients belonged to the category of >60 years.

*Mucormycosis in COVID-19 patients*

Out of 100 subjects examined, 14 were suffering from mucormycosis.

*Nasal manifestations of COVID-19*

Amongst nasal symptoms smell loss (26%) was seen to be the most common symptom followed by nasal blockade (23%) as shown in Figure 1.

Amongst the nasal manifestations nasal mucosal congestion (28%) was the most common followed by presence of nasal discharge or eschar (21%) as shown in Figure 1.

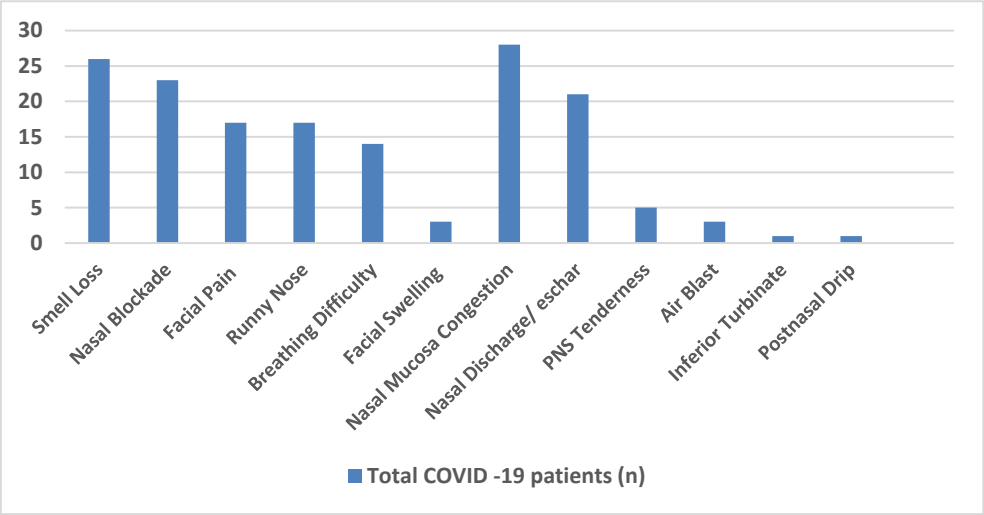


**Figure 1: Nasal symptoms and manifestations in COVID-19.**

*Smell testing in COVID-19 patients*

Around 33 patients were seen to have loss of smell that is 33 percent of the total subjects. Majority of patients with smell loss were seen to have at least loss of 2 smells. As shown in Table 1 and Figure 2.

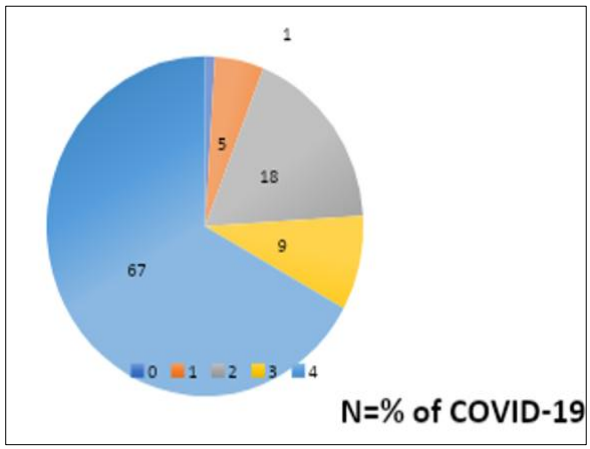


**Figure 2: Smell test in COVID-19 patients.**

**Table 1: Smell test in COVID-19 patients (n=100).**

| Smell test | | Total COVID -19 patients in percent (N) |
|---|---|---|
| **Severe** | (0 of 4 identified) | 1 |
| **Moderate** | (1 of 4) | 5 |
| | (2 of 4) | 18 |
| **Mild** | (3 of 4) | 9 |
| **Normal** | (4 of 4) | 67 |

Smell loss was graded as mild, moderate and severe based on the number of smells identified. Mild: unable to identify one sample out of 4; moderate: unable to identify 2-3 items out of 4; and severe: unable to identify any smell. Out of the 33 patients with hyposmia majority 23 patients were seen to have moderate smell loss.

*Nasal manifestations in mucormycosis patients*

As seen in Figure 3, nasal blockade (57%), facial pain (57%) and smell loss (50%) was seen to be the most common symptoms in patients of mucormycosis. Nasal

mucosal congestion (28%), was found to be the most common manifestation.

*Ear manifestations in COVID-19 patients*

Figure 4 show the ear manifestations in COVID-19 patients. Giddiness (4%) was seen to be one of the common findings. In this study no patient was identified as having new onset hearing loss based on tuning fork test. No ear manifestations were seen in the patients with mucormycosis.

*Throat manifestations in COVID-19*

Cough was the most common (48%) throat related symptom in COVID-19 patients followed by taste loss (21%) as seen in Figure 5. Posterior pharyngeal wall congestion was seen as most common manifestation in 22% of the patients as seen in Figure 5.

*Taste testing in COVID-19 patients*

Out of 100 patients 29 % patients were having loss of taste sensation as shown in Table 2 and Figure 6.

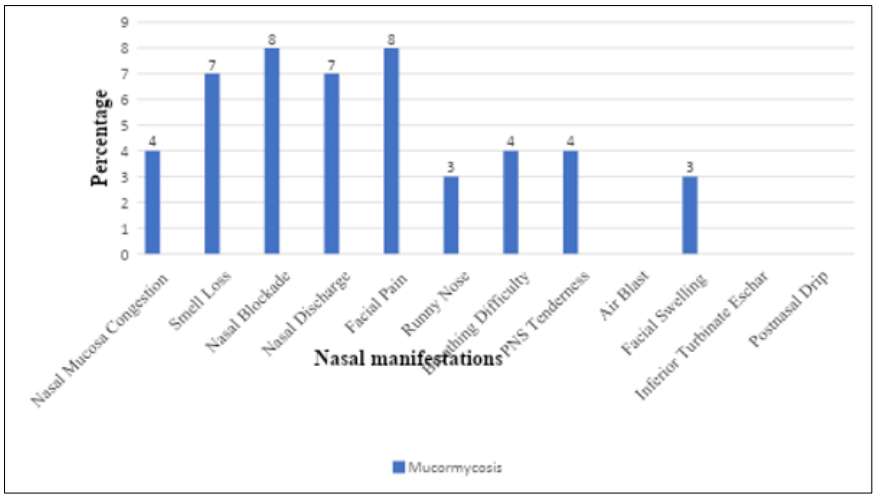


**Figure 3: Nasal manifestations in mucormycosis patients.**

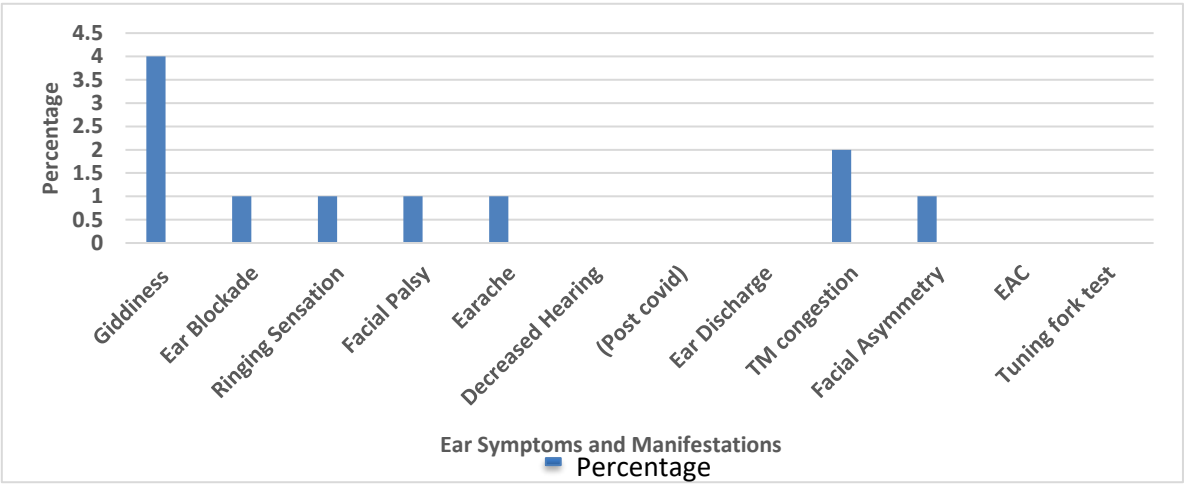


**Figure 4: Ear symptoms and manifestations in COVID-19.**

**Table 2: Taste test in COVID-19 patients (n=100).**

| Taste test | Total COVID-19 patients with taste loss (N) |
|---|---|
| **0 of 4** | 1 |
| **1 of 4** | 5 |
| **2 of 4** | 15 |
| **3 of 4** | 8 |
| **4 of 4** | 71 |

They were graded as mild who recognised 3 out of 4 tastes; moderate recognised 1-2 out of 4 tastes; and severe unable to recognise any taste.

Majority of the patients (20%) were having moderate grade of hypogeusia. In mucormycosis patients as shown in Figure 7 most common symptoms were cough and taste loss (28.6%) whereas, most common sign was palatal congestion or eschar (21.4%).

*Prognosis of functional loss in COVID-19 patients*

Patients with COVID-19 were also evaluated for loss of taste, hearing and smell sensation. Hearing loss was not seen in any of the patients in this study. Patients with taste and smell loss were followed up after one month and 3 months of first testing and asked regarding the improvement in above symptoms.

It was seen that out of the 33 patients with hyposmia 5 patients were symptomatic at the end of 1 month and 3 patients had persistent smell loss even after 3 months of COVID-19 infection as shown in Figure 8. Out of the 29 patients with hypogeusia, 1 patient remained symptomatic even after 3 months of infection.

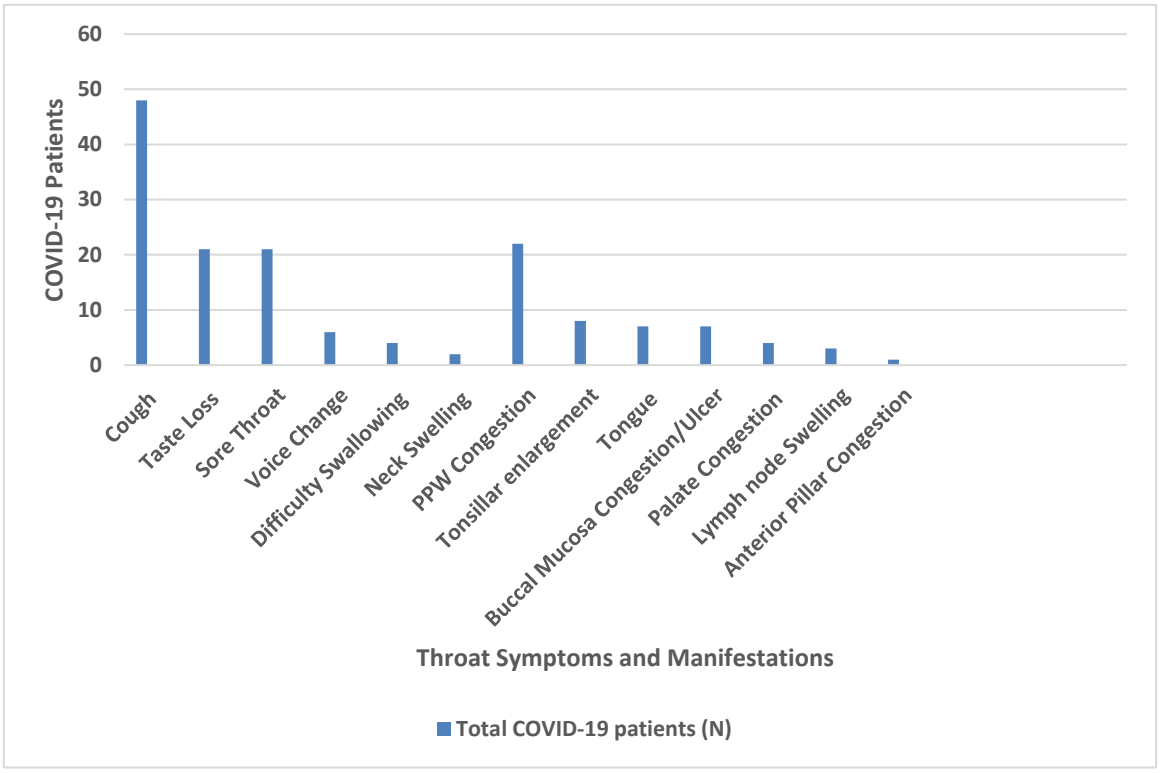


**Figure 5: Throat related symptoms and manifestations in COVID-19 patients.**

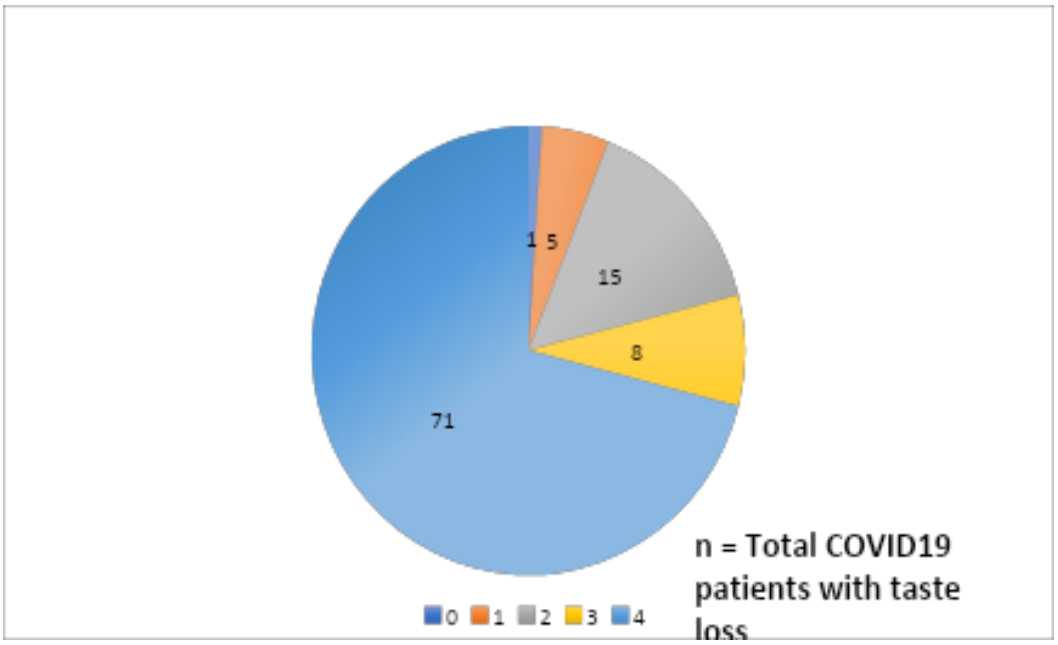


**Figure 6: Taste test in COVID-19.**

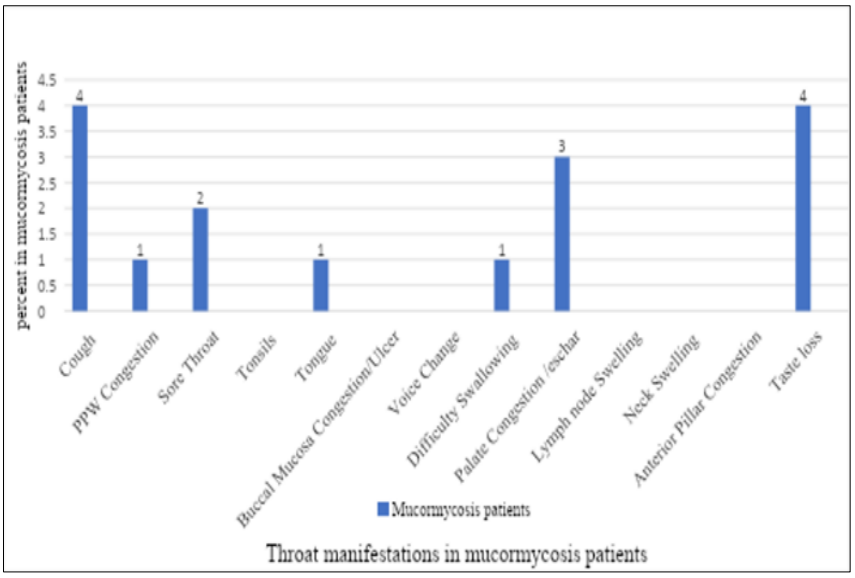


**Figure 7: Throat manifestations in mucormycosis.**

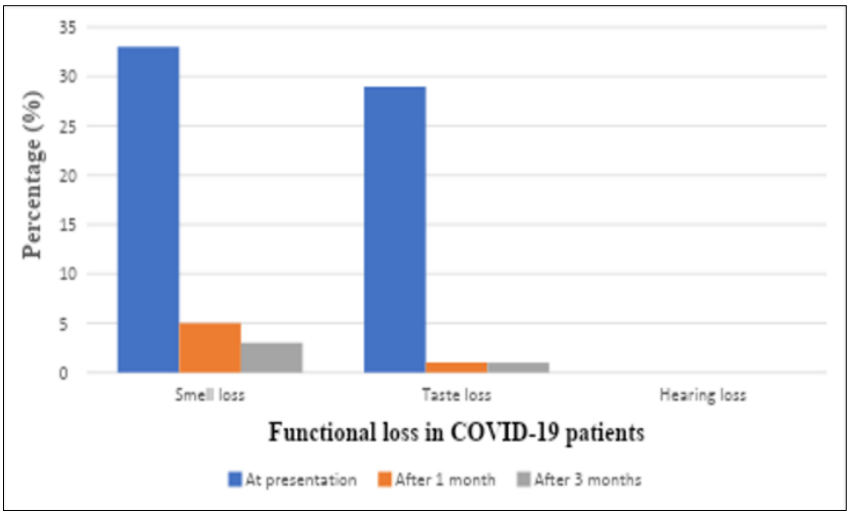


**Figure 8: Follow up of functional loss in COVID-19 patients.**

## DISCUSSION

At the end of 2019 a novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), was found to be causing respiratory tract infection which was officially termed as "COVID-19" by WHO. Due to the high potential of human-to-human transmission it eventually led to a global pandemic.

COVID-19 was initially most commonly described by characteristic symptoms of fever, cough and shortness of breath. However, now it is recognized to be highly heterogeneous in severity which covers a wide spectrum of clinical features from mild to severe cases of acute respiratory distress syndrome, and also extends to include otorhinolaryngological features. Although the common clinical features of COVID-19 include fever, fatigue and dry cough, ENT manifestations are also frequently seen in these patients.[9] As described earlier the mode of transmission is via nose and oral cavity and this information supports the presence of ENT related manifestations in COVID-19 patients.

In my study 73 % patients were males and 27 % were females which is similar to another study done by Francesca Fortunato et al in which infection was seen more in males as compared to females.[10] This could probably occur as males are socially more active and thus could have defied the precautions and restrictions given by the government.

In a study by Panda et al, COVID 19 infection was seen to affect older age group more frequently and more severely, these results were similar to our study.[11] These

results could be due to the fact that older age group patients have a higher likelihood of having various co morbidities as well as of having immunocompromised state which makes them more susceptible to infections like COVID-19.[12]

In a study by Panda et al 225 patients who had mild disease were studied to know the prevalence as well as presence and duration of symptoms. In this ENT manifestations accounted for 66.2% of all symptoms. Smell and taste disturbance also were common features in this study which is similar to our study. Here, smell and taste loss had an overall incidence of 20% and 45% of ENT manifestations.[11] Corona virus usually enters the body through nose or oral cavity and hence the patient presents with upper respiratory tract symptoms like nasal blockade, sneezing, nasal discharge, dry cough, sore throat or tonsillar enlargement.[2]

In the study by Savtale et al on prevalence of otorhinolaryngological symptoms of COVID-19 amongst the included 180 patients, 112 patients had one or more ENT related symptoms that included throat pain (47.2%), loss of smell (55.5%), loss of taste (58.8%) and hearing loss (54.44%) along with generalized COVID-19 symptoms.[13] Loss of smell and taste were found to be the most common symptoms in the above study. The upper respiratory tract infection also leads to inflammation of eustachian tube leading to ear related complaints such as otitis media and earache.[14,15]

COVID-19 infection causes inflammatory as well as immune mediated disease. This virus also gains access to neuroepithelium via olfactory nerve.[16] These mechanisms lead to the manifestations of COVID including loss of smell and hearing loss. Inner ear structures are susceptible to ischemia and vascular damage, which can lead to both hearing and balance dysfunction.[16] Hearing loss occurs due to virus triggered, immune mediated inflammation.[17] 223 patients studied by Egehan et al showed that the most common otorhinolaryngologic symptoms were taste loss, smell loss, and sore throat with respective frequencies of 34.5%, 31.8% and 26%.[18] The results of this study were similar to that of our study.

Hopkins et al studied 428 patients reporting new onset anosmia during the COVID-19 pandemic as one of the presenting symptoms.[19] 60 confirmed COVID patients were subjected to smell test by The University of Pennsylvania Smell Identification Test (UPSIT), as studied by Shima et al, 59 of the 60 patients (98%) were having anosmia.[20] A statistically significant rise in rates of hearing loss was noted before and after the pandemic in a study by Yukiko Wagatsuma et al.[21] However in my study we have not diagnosed any case of hearing loss post COVID infection. It could be due to the smaller number of subjects taken under our study.

Sedaghat et al found that isolated sudden-onset anosmia without nasal congestion or flu-like symptoms may identify up to 25% COVID-19 patients at the earliest clinical stages of the disease.[22] In the study by Hannum et al taste loss was seen to be present in almost 36.9 % results of which were seen to be similar to our study.[23] It has also shown that taste loss is also a unique symptom of COVID-19 infection.

In comparison to our study, prevalence of loss of taste and smell was found to be quite higher in study by Lechien et al.[24] Our study was limited to only mild and moderate cases of COVID-19 and hence the total number of patients were not studied.

Lee et al studied 3191 patients among whom 232 had anosmia and 143 had ageusia these were followed up to see for persistence of symptoms.[25] However this long term follow up couldn't be done in our study due to the limitation of time period in our study.

Hao et al studied 196 COVID-19 patients in whom cough and fever was seen to be the most prevalent symptoms which is comparable to our study.[26] Mohammad Waheed et al studied 1773 COVID positive patients to see the various manifestations of the disease. No hearing loss was noted in these patients which is similar to that in our study.[27]

Codeluppi et al compared the incidence of facial palsy in pre-COVID and during COVID pandemic. There was an increased rate of facial palsy noted.[28] In our study one patient presented with facial palsy during active COVID-19 infection. Facial palsy could occur secondary to the viral infection or immune mediated pathology.[28] In a case report by Ala et al, they documented lymphadenopathy in patients with COVID-19 patients which was also seen in our study.[29] As COVID infection has elevated inflammatory reactions and cytokine storm, local humoral immune response could result in enlargement of lymph nodes.

Implications of this current study included the knowledge about the varied ENT related signs and symptoms of COVID-19. The high proportion of patients with taste and smell loss found in this study have brought us to the conclusion that assessment of smell and taste should be included in the screening for COVID-19 infection, and also in case of patients coming with sudden onset smell loss should trigger COVID-19 precautions including quarantine and early consideration of testing for COVID-19 infection.

In this study we also learn that proportion of COVID-19 patients have otorhinolaryngological symptoms and hence the safety of otorhinolaryngologists is of prime importance.

***Limitations***

The number of patients enrolled in the study are comparatively less. And hence it could justify the

absence of some features like hearing loss in our study as compared to that of the others. In view of the lack of resources and restriction due to covid precautions, tests like Pure tone audiometry couldn't be done in this study. Due to the absence of adequate data regarding a standardised grading of anosmia and ageusia a self-made grading was used in this study. Since severe or ICU admitted COVID-19 patients were not included in this study hence some patients with mucormycosis was unable to be studied. COVID-19 can have long term sequelae which could not be included in my study due to shorter time duration of the study. This study could be further extended to study the long-term sequelae of COVID-19 infection.

## CONCLUSION

Based on the findings of my study it was seen that significant number of COVID-19 patients were symptomatic for various ENT Manifestations (89%). Thus, it shows that screening for these symptoms is necessary and also proving the fact that nose and oral cavity are the entrypoints for the virus. Majority of cases were seen to have nose and throat related features. Cough was seen to be the most common symptom (48%) and smell loss as most common sign (33%) in COVID positive patients. Along with these there were few non-specific symptoms seen like facial palsy (1%) and neck abscesses (2%) which remind to keep all non-specific symptoms and signs of COVID-19 infection in mind so as to identify all cases and break the chain of transmission of infection. Out of the 14 patients of mucormycosis nasal blockade and facial pain was the most common symptom (57%), and nasal discharge or presence of eschar was the most common sign (50%).

This study has helped in finding all the various signs and symptoms related to ear, nose and throat and the proportion of COVID-19 patients presenting with these clinical features. Patients with smell loss and taste loss were followed up for 3 months and majority of the patients were found to be improved. However, a few patients remained symptomatic after 3 months thus reflecting the need for prolonged follow up so as to identify the long-term sequelae of COVID-19 infection.

## ACKNOWLEDGEMENTS

Authors sincerely acknowledge the guidance and support of Dr. H. C. Goel, along with the faculty member, senior residents and staff of Department of Otorhinolaryngology, Goa Medical College. The authors would also like to extend their gratitude to all colleagues and patients who contribute to the successful completion of this study.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Vernekar SM, Varughese KM, Sa CD, Rodrigues RNV, Sirohi A. Spectrum of ENT manifestations in COVID-19. Int J Otorhinolaryngol Head Neck Surg 2026;12:996-1004.