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ORIGINAL RESEARCH

Analysis of the Different Ear, Nose, and Throat (ENT) Manifestations in COVID-19-Positive Patients

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ABSTRACT
Background: The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has presented a wide range of clinical manifestations, extending beyond the well-documented respiratory symptoms. Among these, ENT (ear, nose, and throat) manifestations have emerged as significant clinical features, often serving as early indicators of infection.
Aim: To investigate the ear, nose, and throat symptoms in individuals in Covid-19 positive patients.
Material and methods: The study included patients of all genders and ages diagnosed with COVID-19 and admitted to the COVID hospital of the same centre, while patients who tested negative for COVID-19 were excluded. A total sample of 100 patients was included based on the inclusion criteria. Data collected for each patient encompassed demographic details (age, gender, and other relevant information), coexisting symptoms associated with chemosensory changes (anosmia and dysgeusia, including their grading and reversibility), nasal symptoms (nasal congestion, rhinorrhea, and other manifestations), ear manifestations (otalgia, hearing loss, and tinnitus), throat symptoms (sore throat, dysphagia, and other relevant issues), and the grading and description of taste loss (type and extent, including reversibility). Data was collected through chart reviews, aligned with the study's aims.
Results: A significant number of patients reported loss of smell, with 40% experiencing anosmia and 25% experiencing hyposmia. Similarly, loss of taste was prevalent, with 50% of the patients reporting dysgeusia and 20% reporting hypogeusia. Regarding the reversibility of these symptoms, 30% of the patients experienced full reversibility of chemosensory changes, 20% had partial reversibility, and 10% had irreversible symptoms. Nasal congestion was the most reported symptom, affecting 50% of the patients. Rhinorrhea was experienced by 30% of the patients, while nasal itching affected 20% and sneezing was reported by 15%. Otalgia (ear pain) was reported by 15% of the patients, hearing loss was noted in 10%, and tinnitus (ringing in the ears) was reported by 5%. Sore throat was the most common, affecting 60% of the participants. Dysphagia (difficulty swallowing) was reported by 25% of the patients, and throat irritation was noted in 30%.
Conclusion: We concluded that the ENT manifestations in COVID-19 positive patients, showcasing the prevalence and diversity of symptoms related to smell, taste, nasal, ear, and throat regions.
Keywords: Ear, Nose, Throat, Symptoms, Covid-19 positive

Introduction

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has presented a wide range of clinical manifestations, extending beyond the well-documented respiratory symptoms. Among these, ENT (ear, nose, and throat) manifestations have emerged as significant clinical features, often serving as early indicators of infection. Recognizing these symptoms is crucial for timely diagnosis and management of the disease, especially given the highly contagious nature of the virus.[1,2] One of the earliest reported ENT symptoms in COVID-19 patients is anosmia, or loss of smell, which can occur even in the absence of other respiratory symptoms. This phenomenon has been extensively documented and is now considered a hallmark of the disease. Other notable ENT manifestations

include dysgeusia (altered taste), sore throat, nasal congestion, and rhinorrhea. The pathophysiology behind these ENT symptoms is believed to involve the direct invasion of the olfactory epithelium and subsequent neural pathways by the SARS-CoV-2 virus.[3] The virus's affinity for the ACE2 receptor, abundantly present in the nasal and oral mucosa, facilitates this process. Moreover, inflammatory responses and local immune reactions contribute to the severity and persistence of these symptoms. Recent studies have also reported the occurrence of more severe ENT complications in COVID-19 patients, such as otitis media, hearing loss, and even sudden sensorineural hearing loss. These complications, though less common, highlight the virus's potential to affect multiple organ systems, including the auditory and vestibular systems. Furthermore, the impact of COVID-19 on pre-existing ENT conditions cannot be overlooked. Patients with chronic rhinosinusitis, allergic rhinitis, and other ENT disorders may experience exacerbations of their symptoms, complicating their overall disease management. This has been noted in clinical observations and reported in literature reviews discussing the intersection of COVID-19 with chronic ENT pathologies.[4,5]

Aim and objectives: To discuss different ENT manifestations in COVID-19-positive patients and their relation to other manifestations and to the severity of COVID-19.

Material and methods

The present cross-sectional, record-based study was conducted in the Department of Otorhinolaryngology (ENT), Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar, India, with institutional ethics committee approval obtained prior to commencing the research. The duration of the study was from February 2021 to July 2021.

Inclusion Criteria

- Patients who give written informed consent.
- Patient's age between 10-70 years.
- Patients of all genders and ages diagnosed with Confirmed COVID-19 patients after laboratory performed Reverse Transcription Polymerase Chain Reaction (RT-PCR). and admitted to the COVID hospital of the same centre
- Patient should be well oriented.
- Available for follow up.

Exclusion Criteria

- Patients who not give written informed consent.
- patients who tested negative for COVID-19 were excluded
- immunocompromised individuals
- Patients with neurodegenerative diseases or with dysfunctions concerning the CNS or the PNS
- Not available for follow-up.

A total sample of 100 patients of both genders was included based on the inclusion criteria. Data collected for each patient encompassed demographic details (age, gender, and other relevant information), coexisting symptoms associated with chemosensory changes (anosmia and dysgeusia, including their grading and reversibility), nasal symptoms (nasal congestion, rhinorrhea, and other manifestations), ear manifestations (otalgia, hearing loss, and tinnitus), throat symptoms (sore throat, dysphagia, and other relevant issues), and the grading and description of taste loss (type and extent, including reversibility). Data was collected through chart reviews, aligned with the study's aims.

Statistical Analysis

The recorded data were analysed using Microsoft Excel and IBM SPSS, version 22.0. Descriptive statistics summarized the data, and appropriate parametric and nonparametric tests were applied to assess associations between various variables, with results expressed as percentages. The Chi-square test was used to assess categorical data, whereas the '*t*' -test was used to determine. A P value < 0.05 was considered significant.

Results

Table 1: Relation between the demographic characteristics of the patients and COVID-19 severity

Characteristics	Variable	Severity of COVID-19	P value

		Mild	Moderate	Severe	
Gender	Male	29	15	13	0.002
	Female	33	7	3	
Mean age (years)		36.51±12.5	50.95±12.75	58.72±8.14	0.001
Smoking	Smoker	53	18	9	0.001
	Non smoker	10	2	8	
Comorbidity	Present	29	13	12	0.20
	Absent	33	8	5	
ENT manifestations	Present	20	9	13	0.81
	No	43	13	2	

Table 1 shows that 62 patients (62%), with a mean age of 36.51±12.5 years, suffered mild COVID-19; 22 patients (22%), with a mean age of 50.95±12.75 years, had moderate COVID-19; and 16 patients (16%), with a mean age of 58.72±8.14 years, had severe COVID-19. It was found that as the disease severity increased, the mean age increased significantly ($p < 0.001$). There was a significant difference ($p = 0.002$) in the severity of COVID-19 between male and female patients. The severity in male patients was mild in 29 patients, moderate in 15 patients, and severe in 13 patients. In female patients, the severity was mild in 33 patients, moderate in 7 patients, and severe in 3 patients.

Nine patients had severe COVID-19, compared to mild cases in 53, moderate cases in 18, and severe cases in 18. Ten non-smoking individuals had mild severity, two had moderate severity, and eight had severe severity. Nine smokers had severe cases. Smokers reported a higher percentage of severe COVID-19 cases ($p = 0.001$). Patients with comorbidities reported the highest number of severe COVID-19 cases—12, 13, and 29 patients were classified as severe, moderate, and mild cases, respectively. In comparison, patients without comorbidities reported five cases of severe, eight cases of moderate, and five cases of mild COVID-19. It was found that this difference was statistically non-significant ($p > 0.05$).

Table 2: Gender wise distribution of the Participants

Characteristic	**Number of Patients (n=100)**	**Percentage (%)**
Age		
< 20 years	5	5%
20-40 years	45	45%
41-60 years	35	35%
> 60 years	15	15%

Figure 1: Age wise distribution of the patients

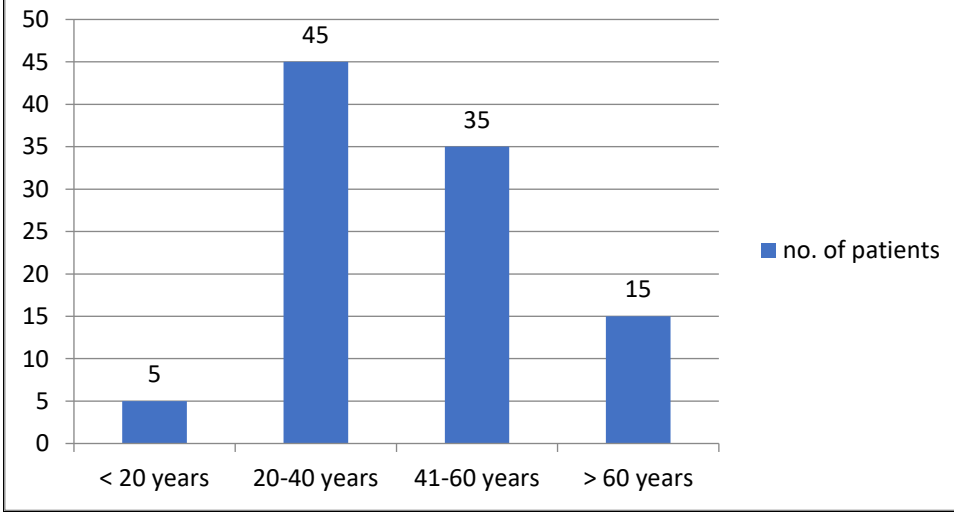

Table 2 shows that the age distribution shows that the majority of patients were between 20 and 40 years old, comprising 45% of the sample. This was followed by the 41–60-year-old age group, which made up 35% of the patients. Those over 60 years accounted for 15%, and the smallest group was those under 20 years, making up 5% of the sample. The gender distribution was relatively balanced, with 55% of the participants being male and 45% being female. This demographic spread provides a broad view of the impact of COVID-19 across different ages and genders in the studied population.

Table 3: Coexisting Symptoms Associated with Chemosensory Changes

Symptom	**Number of Patients (n=100)**	**Percentage (%)**
Loss of Smell		
Anosmia	40	40%
Hyposmia	25	25%
Loss of Taste		
Dysgeusia	50	50%
Hypogeusia	20	20%
Reversibility		
Fully Reversible	30	30%
Partially Reversible	20	20%
Irreversible	10	10%

Table 3 highlights the prevalence of chemosensory changes among the COVID-19 patients. A significant number of patients reported loss of smell, with 40% experiencing anosmia and 25% experiencing hyposmia. Similarly, loss of taste was prevalent, with 50% of the patients reporting dysgeusia and 20% reporting hypogeusia. Regarding the reversibility of these symptoms, 30% of the patients experienced full reversibility of chemosensory changes, 20% had partial reversibility, and 10% had irreversible symptoms. This data underscores the commonality of chemosensory disturbances in COVID-19 patients and their varied recovery outcomes.

Table 4: Nasal Symptoms in COVID-19 Positive Patients

Nasal Symptom	**Number of Patients (n=100)**	**Percentage (%)**
Nasal Congestion	50	50%
Rhinorrhea	30	30%
Nasal Itching	20	20%
Sneezing	15	15%

Nasal symptoms among the study participants are presented in Table 4. Nasal congestion was the most reported symptom, affecting 50% of the patients. Rhinorrhea was experienced by 30% of the patients, while nasal itching affected 20% and sneezing was reported by 15%. These findings indicate that nasal symptoms are a significant component of the ENT manifestations in COVID-19 patients.

Table 5: Ear Manifestations in COVID-19 Positive Patients

Ear Symptom	**Number of Patients (n=100)**	**Percentage (%)**
Otalgia	15	15%
Hearing Loss	10	10%
Tinnitus	5	5%

Ear-related symptoms were less common among the study population, as detailed in Table 5. Otalgia (ear pain) was reported by 15% of the patients, hearing loss was noted in 10%, and tinnitus (ringing in the ears) was reported by 5%. While not as prevalent as nasal or throat symptoms, these ear manifestations highlight the diverse ENT-related effects of COVID-19.

Table 6: Throat Symptoms in COVID-19 Positive Patients

Throat Symptoms	Number of Patients (n=100)	Percentage (%)
Sore Throat	60	60%
Dysphagia	25	25%
Throat Irritation	30	30%

Table 6 outlines the throat symptoms experienced by the patients. Sore throat was the most common, affecting 60% of the participants. Dysphagia (difficulty swallowing) was reported by 25% of the patients, and throat irritation was noted in 30%. These symptoms are indicative of the significant impact of COVID-19 on the upper respiratory tract.

Table 7: Grading and Description of Taste Loss

Parameters	Number of Patients (n=100)	Percentage (%)
Grading of Taste Loss		
Mild	20	20%
Moderate	30	30%
Severe	10	10%
Reversibility		
Fully Reversible	30	30%
Partially Reversible	20	20%
Irreversible	10	10%

The grading and description of taste loss among the patients are shown in Table 7. Mild taste loss was reported by 20% of the patients, moderate loss by 30%, and severe loss by 10%. Regarding reversibility, 30% of the patients experienced full reversibility of their taste loss, 20% had partial reversibility, and 10% had irreversible taste loss. These findings highlight the varying degrees of taste disturbances and their recovery in COVID-19 patients.

Discussion

The demographic characteristics observed in this study align with findings from other research on COVID-19 patients. Our study found that the majority of patients were aged between 20-40 years (45%), followed by those aged 41-60 years (35%). A study by Guan et al. (2020) reported similar age distributions, with a significant number of patients falling within the 30-59 age range.[6] The balanced gender distribution in our study (55% male and 45% female) is consistent with other studies, such as those by Huang et al.[7] and Chen et al.[8], which also reported a slight male predominance among COVID-19 patients.

Our study found that 40% of patients experienced anosmia and 25% experienced hyposmia, with 50% reporting dysgeusia and 20% hypogeusia. This prevalence of chemosensory changes is supported by other studies. Lechien et al.[9] reported that 85.6% of COVID-19 patients experienced olfactory dysfunction and 88.0% had gustatory dysfunction. Regarding the reversibility of these symptoms, we observed that 30% of patients had fully reversible symptoms, 20% partially reversible, and 10% irreversible. Studies by Vaira et al.[10] and Deiana G et al.[11] also noted varying degrees of recovery in chemosensory functions, with many patients recovering within a few weeks, but some experiencing longer-lasting effects. Nasal congestion was the most common nasal symptom, affecting 50% of our patients, followed by rhinorrhea (30%), nasal itching (20%), and sneezing (15%). These findings are consistent with a systematic review by Tong et al.[2], which reported nasal congestion in 4.1%,

rhinorrhea in 2.1%, and sneezing in 1.5% of COVID-19 patients. The prevalence of these symptoms underscores their importance in the clinical presentation of COVID-19.

Ear symptoms were less common, with otalgia reported in 15% of patients, hearing loss in 10%, and tinnitus in 5%. A study by Munro et al.[12] reported similar findings, noting that 7.6% of COVID-19 patients experienced hearing loss and 14.8% experienced tinnitus. These symptoms, though less common, highlight the diverse ENT manifestations of COVID-19 and the need for comprehensive otological evaluation in affected patients. Throat symptoms were prominent, with sore throat reported by 60% of patients, dysphagia by 25%, and throat irritation by 30%. These findings are in line with studies by Spinato et al.[13] and Mao et al.[14] which reported sore throat in 11.3% and dysphagia in a smaller percentage of patients. The high prevalence of throat symptoms in our study suggests that they are significant markers of COVID-19.[13,14] Taste loss was graded as mild in 20% of patients, moderate in 30%, and severe in 10%. The reversibility of taste loss was fully reversible in 30% of cases, partially reversible in 20%, and irreversible in 10%. Similar findings were reported by Eliezer et al.[15] who found varying degrees of taste loss in COVID-19 patients and noted that a significant proportion of patients experienced some degree of recovery over time. These variations in the severity and reversibility of taste loss highlight the need for further research to understand the underlying mechanisms and potential treatments.

Limitation(s) of the study

The shortcoming of the study is the small sample size and the short duration of the study.

Conclusion

In summary, the results from this study provide a comprehensive overview of the ENT manifestations in COVID-19 positive patients, showcasing the prevalence and diversity of symptoms related to smell, taste, nasal, ear, and throat regions. This data can be instrumental in better understanding the clinical presentation of COVID-19 and improving patient management and treatment strategies.

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