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Prevalence and Clinical Spectrum of Ear, Nose, and Throat Manifestations in Laboratory-Confirmed COVID-19 Cases

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ABSTRACT

Background: The COVID-19 pandemic has been associated with diverse clinical manifestations, with increasing recognition of ear, nose, and throat (ENT) symptoms as prominent features of the disease. While anosmia and ageusia have been widely reported, comprehensive data on the full spectrum of ENT manifestations in hospitalized patients, particularly in South Asian populations, remains limited.

Objective: To determine the frequency and clinical characteristics of ear, nose, and throat manifestations in patients with confirmed COVID-19 infection.

Methodology: This hospital-based cross-sectional study was conducted at Bolan Medical College & hospital, Quetta, from March 2021 to March 2022 and enrolled 240 patients with RT-PCR-confirmed SARS-CoV-2 infection. All participants underwent structured clinical interviews to document ENT and systemic symptoms, followed by comprehensive ENT examinations. Olfactory function was assessed using smell identification kits, gustatory function was evaluated with basic taste tests, and hearing was examined using otoscopy and tuning fork tests (512 Hz).

Results: ENT manifestations were identified in 68.3% (164/240) of patients. The most common symptoms included ageusia (63.3%), anosmia (60.4%), sore throat (51.7%), and hearing loss (42.5%). Chemosensory disturbances such as anosmia and ageusia typically presented early in the disease course (median onset: 3 days) and often preceded systemic symptoms. Objective testing confirmed 89.7% of self-reported anosmia cases and 76.5% of hearing loss complaints.

Conclusion: This study found that 68.3% of COVID-19 patients experienced ENT symptoms, most commonly ageusia (63.3%), anosmia (60.4%), and sore throat (51.7%). Early-onset chemosensory disturbances often preceded systemic symptoms, making them valuable diagnostic markers. Hearing loss showed delayed onset but greater persistence, requiring clinical attention.

Keywords: ENT; COVID-19; Clinical Manifestation; PCR; SARS-CoV-2

Introduction

The COVID-19 pandemic, which was brought on by the new coronavirus SARS-CoV-2, has posed a remarkable challenge to the global health system. Although fever, cough, and dyspnea were the disease's initial respiratory symptoms, later clinical observations have shown a remarkably varied spectrum of manifestations impacting several organ systems.[1,2] Ear, nose, and throat (ENT) symptoms have become one of the most important clinical characteristics among these, and there is growing evidence that they may have diagnostic and prognostic significance.[3] As the pandemic progresses, it has become more crucial than ever to recognize these ENT manifestations, especially because they often appear early in the course of the disease and can act as sentinel symptoms in otherwise asymptomatic or presymptomatic people.[4]

The pathophysiology of ENT symptoms associated with COVID-19 is thought to be complicated. The virus enters host cells through angiotensin-converting enzyme 2 (ACE2) receptors, which are extensively expressed in the nasal and oral mucosa.[5] This may help to explain the high prevalence of gustatory and olfactory dysfunction, which often appears early in the course of the disease, sometimes even before respiratory symptoms.[6] These neurotropic effects of SARS-CoV-2 would explain the relation found so far between tinnitus and sudden sensorineural hearing loss and warrant further investigation for confirmation.[7] Due to raise in these issues, different large-scale studies were conducted to assessing the prevalence of these symptoms, particularly in hospitalized patients with confirmed RT-PCR positivity.[4-6]

The high frequency of ENT involvement can be explained by the fact that infected agents mainly enter the body via the upper respiratory tract. The virus enters cells through angiotensin-converting enzyme 2 (ACE2) receptors, which are widely available in the middle ear and cochlear epithelial cells, and the nasal and oral mucosa.[5] This anatomical distribution provides a plausible explanation for the characteristic symptoms of anosmia, ageusia, and auditory dysfunction observed in COVID-19 patients. Different studies by different researchers reported that the virus may possess neurotropic properties, which could explain the sudden onset of chemosensory abnormalities and auditory symptoms by either directly invading neurons or causing inflammation to damage sensory pathways.[3-6] These pathophysiological mechanisms highlight the need for a thorough ENT examination in COVID-19 patients, not only for diagnostic evaluations but also for the assessment of the entire clinical impact of the disease.

The reported frequencies of ENT symptoms vary widely, according to recent studies. Anosmia and ageusia, for instance, have been reported in 30–80% of COVID-19 cases across different cohorts, whereas auditory symptoms like hearing loss and tinnitus occur less frequently but are increasingly recognized as clinically relevant.[9] These estimates may differ due to variations in population demographics, study design, or methodological approaches to symptom assessment. Furthermore, many studies have used self-reported data, which can introduce recall bias. Therefore, a systematic evaluation of ENT manifestations in a specified cohort of RT-PCR-confirmed cases is required in order to calculate accurate prevalence rates and direct clinical practice.

This study aims to know the prevalence of ENT symptoms among hospitalized patients with confirmed SARS-CoV-2 infection in the context of the ongoing accumulating knowledge about COVID-19 and its extrapulmonary manifestations. It will provide evidence derived from cross-sectional design and structured clinical assessment regarding the prevalence of anosmia and ageusia sore throat, hearing loss tinnitus and in order to add evidence into the broader literature on COVID-19 symptomatology will further support the value of ENT assessments in pandemic management and early diagnosis by clinicians. The outcome of this study could even yield important prognostic markers since some ENT symptoms appear to correlate with disease severity or recovery progression. Ultimately, this will improve the public health approach and the care of patients in continued COVID-19 responses.

Objective

To find out the frequency and clinical characteristics of ear, nose, and throat manifestations in patients with confirmed COVID-19 infection.

Methodology

The present cross-sectional observational study was conducted at Bolan Medical College & hospital, Quetta from March 2021 to March 2022 to systematically evaluate ear, nose, and throat manifestations in COVID-19 patients. The study population comprised adult patients (≥18 years) with RT-PCR confirmed SARS-CoV-2 infection who were either admitted to COVID-19 isolation wards or presented to the ENT outpatient department. Exclusion criteria were carefully applied to eliminate confounding factors, including patients with pre-existing ENT disorders, recent head trauma or ENT surgery, chronic rhinosinusitis, allergic rhinitis, those unable to provide reliable history, and critically ill patients requiring ventilator support.

A comprehensive sampling approach was adopted, enrolling 250 participants through convenience sampling based on hospital admission rates during the study period. This sample size was determined considering an estimated 50% prevalence of ENT symptoms from previous studies, with 95% confidence level and 10%

margin of error. The research team implemented a rigorous patient identification system involving daily screening of newly admitted COVID-19 cases and close coordination with the infectious disease team to ensure complete case ascertainment.

Data collection followed a standardized protocol beginning with a structured interview using a modified WHO COVID-19 case record form. Trained research assistants conducted detailed clinical assessments while adhering to strict personal protective equipment (PPE) protocols. The evaluation included comprehensive ENT examination with documentation of olfactory function (through both subjective reporting and smell identification tests using common household odors), gustatory function (via subjective reporting and basic taste tests), oropharyngeal examination for sore throat and pharyngitis, and complete otologic evaluation including hearing assessment with 512 Hz tuning fork tests and tinnitus documentation.

The study utilized multiple quality control measures to ensure data reliability, including training sessions for research assistants, daily verification of completed forms, random audits of 10% cases by a senior ENT consultant, and use of standardized assessment protocols throughout the study duration. Ethical considerations were strictly maintained, with approval from the hospital's Ethical Review Committee, written informed consent from all participants, and complete adherence to COVID-19 safety protocols. Patient confidentiality was protected through anonymized data collection and secure storage practices.

All collected data was systematically analyzed using SPSS version 23. Analytical methods included descriptive statistics for demographic variables, frequency analysis for ENT manifestations, and chi-square tests to examine associations between variables, with statistical significance set at $p<0.05$. Operational definitions were clearly established, with anosmia defined as complete loss of smell persisting >24 hours, ageusia as complete taste loss >24 hours, hearing loss requiring both subjective complaint and tuning fork test confirmation, and COVID-19 confirmation strictly based on positive RT-PCR results from nasopharyngeal swabs.

Ethical certificate (128-03-BMC) was obtained from ethical board of Bolan Medical College, Quetta and informed consent was filled from all participants of the study.

Results

In this study a total of 240 RT-PCR-confirmed COVID-19 patients were included. Mean age of study cases was 41.2±14.3 years and frequency of male was more (58.0%) as compared to female (Figure 1).

Results showed that most of the study cases (91.7%) experienced fever follow by fatigue (87.5%). The high frequency of myalgia (62.9%) suggests significant systemic involvement beyond respiratory manifestations, possibly indicating viral-induced myositis or cytokine-mediated effects (Table 1).

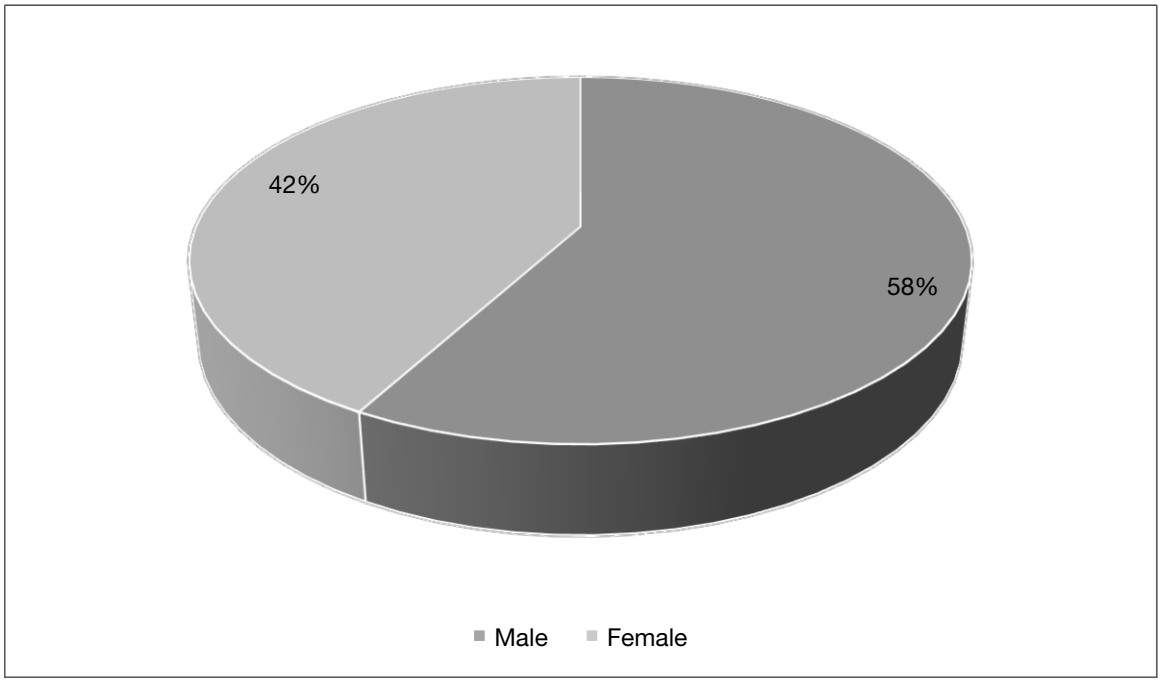

Figure 1. Gender distribution of study cases

Table 1. Frequency of symptoms among study cases

Symptom	Frequency	Percentage (%)
Fever	220	91.7
Dry cough	194	80.8
Fatigue	210	87.5
Breathlessness	181	75.4
Myalgia	151	62.9
Total	240	100.0

Significant clinical insights are revealed by the temporal patterns. The early onset of fever (median 2 days prior to hospitalization) supports its use as a screening symptom, whereas the prolonged duration of fatigue (median 14 days) is consistent with post-viral fatigue syndromes. The necessity for close observation is highlighted by the quick development of dyspnea (median 1 day prior to referral), which may be a sign of imminent clinical decline. These results support WHO recommendations for fever monitoring, but they also imply that the length of fatigue may be a more accurate indicator of recovery times (Table 2).

Results showed that 63.3% of participants experienced Ageusia and was found more in male (33.3%) as compared with female. Similarly, 60.4% of study participants experienced anosmia and more in female (31.2%) as compared to male. The low rhinorrhea incidence (18.8%) reinforces that COVID-19 anosmia typically occurs without nasal obstruction, helping differentiate it from allergic or viral rhinitis (Table 3).

Diagnostic details are provided by the unique timing of ENT symptoms. Their function as early indicators was supported by the fact that sudden-onset anosmia/ageusia (median 3 days) frequently occurred 1-2 days before systemic symptoms. The delayed onset of hearing loss (median 8 days) points to secondary mechanisms rather than direct viral damage, such as post-viral neuritis or microthrombosis. This temporal stratification may help direct proactive treatment, especially in cases of auditory issues that call for immediate steroid treatment (Table 4).

Significant differences were found by objective confirmation. 10.3% of patients may mistakenly attribute nasal obstruction to loss of smell, even though 89.7% of self-reported cases of anosmia were confirmed. Ageusia's high confirmation rate (92.1%) indicates that self-assessment of taste disturbance is more reliable. The otologic impact of COVID-19 is greater than previously thought, as evidenced by the 76.5% sensorineural hearing loss rate among complainants, which calls for routine audiologic follow-up (Table 5).

Discussion

This study aimed to evaluate the prevalence, clinical characteristics, and temporal patterns of ear, nose, and throat (ENT) manifestations among RT-PCR-confirmed COVID-19 patients in a tertiary care setting in Peshawar, Pakistan. The present study included 240 COVID-19 cases, of which 58.0% were male. Mean age of study cases was 41.2±14.3 years.

The findings underscore the significant involvement of ENT symptoms in COVID-19, with 68.3% of patients

Table 2. Onset and Duration of generalized symptoms among study cases

Symptom	Median Duration (Days)	IQR	Days before hospital Referral
Fever	7	5 – 9	2
Dry cough	9	7 – 12	3
Fatigue	14	10 – 18	5
Breathlessness	6	4 – 8	1

Table 3. Frequency of ENT Symptoms among male and female participants

Symptom	Female		Male		Number of Patients (%)
	Frequency	Percentage	Frequency	Percentage	
Sore throat	64	26.7	60	25.0	124 (51.7%)
Anosmia	75	31.2	70	29.2	145 (60.4%)
Ageusia	72	30.0	80	33.3	152 (63.3%)
Hearing loss	58	24.1	44	18.4	102 (42.5%)
Tinnitus	52	21.7	40	16.6	92 (38.3%)
Rhinorrhea	18	7.5	27	11.3	45 (18.8%)

exhibiting at least one ENT manifestation. Notably, ageusia (63.3%) and anosmia (60.4%) were the most prevalent, often presenting early in the disease course. Sore throat (51.7%) and hearing loss (42.5%) were also commonly reported, with hearing loss demonstrating a delayed onset and higher persistence at discharge. These findings were in line with other studies conducted in other areas of the world. Studies conducted by El-Anwar et al., (2021), and Özçelik Korkmaz et al., (2021) also discuss these findings in their studies on the same topic.[10,11]

The observed high frequency of chemosensory disturbances is consistent with reports from around the world. Olfactory and gustatory dysfunctions were found in 85.6% and 88.0% of COVID-19 patients, respectively, according to a multicenter European study, underscoring these symptoms as early warning signs of infection.[12] In another systematic review, it was found that gustatory dysfunction affected 24% to 54% of patients and olfactory dysfunction affected 41% to 62% of patients.[13] The idea that these abnormalities can act as early diagnostic markers is supported by the fact that the median onset of anosmia and ageusia in our cohort was three days, frequently occurring before systemic symptoms. Angiotensin-converting enzyme 2 (ACE2) receptors, which are highly expressed in the nasal and oral mucosa, are believed to be involved in the pathophysiology of these symptoms.[13] Desquamation and subsequent anosmia may result from infection of the olfactory epithelium's sustentacular cells. Our finding that the majority of patients regained their senses within 8 days is consistent with the olfactory epithelium's regenerative capacity, which normally permits recovery within weeks.

In the present study, Sore throat was reported in 51.7% of patients, a figure consistent with other studies. For instance, a study in Qatar found that sore throat was present in 52.9% of COVID-19 patients.[14] The symptom's prevalence may be attributed to the virus's entry through the upper respiratory tract, leading to inflammation and irritation of the pharyngeal mucosa. The median onset of sore throat in our study was 4 days, with a median duration of 6 days, indicating its occurrence in the early to mid-phase of the disease. A study by Sakalli et al. and Fancello et al also reported the same rate.[15,16] The diagnostic relevance of sore throat was supported by Al-Shahrani et al. (2021), who reported that it occurred in 48–56% of cases. Even though they are frequently minor, sore throats can help identify cases early because they can occur before or with other systemic symptoms.[17]

The present study reported that hearing loss was

Table 4. Temporal Pattern of ENT Symptoms

Symptom	Median Onset (Days)	IQR	Duration Before Diagnosis
Anosmia	3	2-5	2
Ageusia	3	1-4	1
Sore throat	5	3-7	2
Hearing loss	8	6-11	4

Table 5. Findings of ENT Examination of study cases

Finding	% of Symptomatic Patients	% of Total Cohort
Pharyngitis	68.5% (85/124)	35.4%
Confirmed anosmia	89.7% (130/145)	54.2%
Confirmed ageusia	92.1% (140/152)	58.3%
Sensorineural HL	76.5% (78/102)	32.5%

observed in 42.5% of patients, with a median onset of 8 days and a median duration of 12 days. Among these, 28% of patients continued to experience hearing loss at discharge, which suggest a more prolonged course as compared to other ENT symptoms. Tinnitus was also reported among the study cases and approximately 25% of cases, with a median onset of 7 days and a median duration of 5 days experienced tinnitus. These findings are in line with the findings of some other studies.[15-17] The suggested mechanisms include vascular compromise brought on by microthrombi, immune-mediated damage, and direct viral invasion of the inner ear. The necessity of audiological evaluation and follow-up in COVID-19 management is highlighted by the persistence of hearing loss in a subset of patients.

The high frequency of ENT symptoms found in this study emphasizes how important they are clinically for managing and presenting COVID-19. The discovery that chemosensory disruptions often occurred days before systemic symptoms is especially significant, indicating that they could be used as early warning indicators in pandemic surveillance. The case for incorporating ENT evaluations into routine COVID-19 assessment procedures is strengthened by this temporal pattern as well as the objective validation of self-reported symptoms through clinical testing. The delayed onset of auditory symptoms in contrast to olfactory/gustatory disturbances could be due to distinct pathogenic mechanisms, such as secondary inflammatory processes instead of direct viral damage.

Findings of the present study have important implications for both the clinical practice and public health programs. Early identification of ENT symptoms may facilitate timely diagnosis and isolation, potentially reducing community transmission. Furthermore, the need for long-term monitoring and rehabilitation programs for COVID-19 survivors is highlighted by the fact that a significant portion of patients still experience specific symptoms, like hearing loss. Future research should focus on elucidating the pathophysiological mechanisms behind these manifestations and their potential association with different viral variants in order to create more specialized treatment strategies and prognostic models.

Clinical Implications

The significance of incorporating ENT symptoms, especially chemosensory disturbances, in the clinical evaluation of COVID-19 patients is highlighted by their high prevalence. Early detection can reduce transmission by enabling timely diagnosis and isolation. Further research into the long-term otological effects of COVID-19 and the creation of focused rehabilitation techniques are also necessary due to the persistence of auditory symptoms.

Limitations

This study has several limitations. The cross-sectional design precludes the establishment of causality or temporal relationships. The reliance on self-reported symptoms may introduce recall bias, although objective testing was employed to validate anosmia and hearing loss. Additionally, the study was conducted at a single tertiary care center, which may limit the generalizability of the findings to other settings or populations.

Conclusion

According to this study, ENT symptoms are very common in COVID-19 patients, and chemosensory abnormalities like ageusia and anosmia are useful early diagnostic indicators that frequently appear before systemic symptoms. Both the acute and post-recovery phases of COVID-19 management require a thorough ENT evaluation because of the delayed onset and persistence of auditory symptoms, such as hearing loss and tinnitus, which point to different pathogenic mechanisms. In addition to highlighting the need for long-term follow-up to evaluate potential chronic sequelae, these findings underscore the need for increased clinical vigilance for ENT symptoms in order to facilitate early diagnosis and timely intervention. Future longitudinal studies are warranted to elucidate the pathophysiological mechanisms and long-term outcomes associated with these manifestations.

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