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Research Article

Otorhinolaryngological Manifestations Following COVID-19 Disease-A Cross-Sectional Observational Study

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I N F O

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A B S T R A C T

Introduction: COVID-19 infection is caused by SARS-CoV-2 virus. Clinical manifestations can range from patients being asymptomatic to flu-like symptoms like sore throat, runny or stuffy nose, and fatigue. The world continues to deal with successive attacks of coronavirus with the emergence of new variants.

Aim: To study the ENT manifestations in patients who have recovered from COVID-19 infection for a period of 6 months, from October 2021 to March 2022 (3 months after the recovery).

Materials and Methods: This is a cross-sectional observational study involving a total of 80 patients who attended the Department of ENT, at Chettinad Hospital and Research Institute, Tamil Nadu. All patients who fulfilled the inclusion criteria were assessed for any ENT manifestations based on history and clinical examination. Statistical analysis was done using Fischer's exact test/ Chi-square test to test the association between general characteristics of the study population and the persistence of ENT manifestations following COVID-19 disease for which Statistical Package for the Social Sciences (SPSS) version 25.0 and Microsoft Excel software were used.

Results: This study included 36 male and 44 female patients with a mean age of 39.11 ± 9.9 years. The common ENT manifestations were smell and taste disturbances, hearing loss, nasal obstruction, hoarseness of voice and headache. It was concluded from the study that the most commonly presenting symptom was hyposmia/ anosmia constituting about 30% followed by hard of hearing (10%).

Conclusion: A significantly large number of patients show residual symptoms beyond acute infection. The findings in this study are similar to the findings in other studies in the literature which showed that the most commonly involved is nose and paranasal sinuses. Further studies in collaboration with various specialities are recommended to study post-COVID manifestations in depth.

Keywords: Anosmia, Coronavirus, COVID-19, Hearing Loss

Introduction

SARS-CoV-2 (COVID-19), a new coronavirus that causes severe acute respiratory syndrome, was responsible for the outbreak that started in Wuhan, China which then spread to more than 200 countries of the world and resulted in many deaths all over the world.[1] World Health Organisation had declared it a pandemic on March 11, 2020. Even though the respiratory system is mainly affected, coronavirus can affect other organ systems also.[2] The main entry points for the virus are the nasal and oral cavities, and the nasal cavity and nasopharynx are thought to be the most frequent locations for virus reproduction.[3] In both humans and animals, coronaviruses are known to produce illnesses of varied severity that affect the gastrointestinal tract, the nervous system, the liver, and the respiratory system.[4] Pharyngitis, nasal congestion, dysgeusia, rhinitis, hyposmia, epistaxis, dizziness, otitis externa, and tinnitus are some of the otorhinolaryngological manifestations in COVID-19 patients.[5] The virus can spread from person to person by droplet transmission and direct contact with the oral, nasal, and eye mucous membranes.[6] Patients with typical COVID-19 symptoms can be identified with ease, but it might be challenging to identify those who lack these typical symptoms and constitute a transmission risk, prolonging and aggravating the illness.[7] Post-COVID period is defined as the continuation or development of new symptoms 3 months after the first COVID-19 infection.

Otorhinolaryngologists in particular play a crucial role as health care providers when treating patients with otorhinolaryngological symptoms. The most common manifestations of COVID-19 are fever, running or stuffy nose, fatigue, dry cough, and sore throat. Laryngitis, otitis externa, nasal congestion, rhinitis, epistaxis, hyposmia, dysgeusia, vertigo and tinnitus are some of the otorhinolaryngological manifestations.[8]

Coronaviruses causing COVID-19 infection are large, enveloped positive-strand RNA viruses which are classified as alpha, beta, delta, and gamma of which alpha and beta are the categories that can infect humans. The spikes on the virus's surface are formed of glycoprotein, which is essential for attaching to the receptors on host cells and plays a vital role in determining the severity of the infections of the host.[9] The COVID-19 incubation period is 1 to 14 days long, with a median of 5 to 6 days but new studies suggest the incubation period could go up to 24 days.[10] As the COVID-19 infection spreads beyond national boundaries, the appearance of the infection is diversifying more and more. At the same time, patients who are recovering from the infection have also been diagnosed with persisting and debilitating sequelae.

There is minimal literature on the pathognomonic signs and symptoms for the diagnosis of COVID-19 infection. The aim of this study was to study the ENT manifestations in patients who recovered from COVID-19 infection for a follow-up period of 6 months from October 2021 to March 2022 (3 months after the recovery).

Materials and Methods

This cross-sectional observational study involved a total of 80 patients for a period of 6 months (from October 2021 to March 2022) who attended the Department of Otorhinolaryngology, at Chettinad Hospital and Research Institute fulfilling the inclusion and exclusion criteria, after getting approval from the Human Ethical Committee.

Sample Size Estimation

The sample size was 80. It was calculated from the formula, $n = \{Z^2P(1-P)\}/d^2$, where Z = 1.96, P = 30%, d = 10%.[11]

Inclusion Criteria

Patients belonging to both genders, aged between 18 and 60 years, who were infected with COVID-19 and showed ENT manifestations post-recovery were included in the study.

Exclusion Criteria

Contraindications to the COVID-19 vaccine due to any cause, known history of sensory dysfunction, known history of head and neck tumours, atrophic rhinitis, congenital malformations involving head and neck regions, and known cases of respiratory diseases were excluded from the study.

Procedure

After obtaining informed and written consent from the participants, a detailed history and duration of the symptoms were recorded. Thorough general and systemic examinations along with ear, nose, and throat examinations were carried out.

All patients who recovered from COVID-19 infection were assessed for any signs of post-COVID ENT manifestations including disorders of sensory organs, post-intubation injury, hearing disorders etc. and data were recorded. Olfactory functions and taste disorders were assessed based on history and also clinically. Hearing was assessed using pure tone audiometry. The severity of post-COVID ENT symptoms was recorded and analysed.

Ethical Considerations

Institutional Human Ethics Committee approval was obtained before starting the study. Confidentiality of the study participants was maintained in all phases of the study.

Statistical Analysis

For numerical data mean and standard deviation were calculated. Nominal variables were expressed in frequency

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and percentages. Further, Fischer's exact test/ chi-square was done to test the association between general characteristics of the study population and the persistence of ENT manifestations following COVID-19 disease for which Statistical Package for the Social Sciences (SPSS) version 25.0 and Microsoft Excel software were used.

Results

The mean age of the study population is 39.11 ± 9.9 years. The majority of them were female (55%). Of the 80 participants, 45 (56.2%) of them had comorbidities and over 52% of them were vaccinated with at least one dose of COVID-19 vaccine, as shown in Table 1. Table 2 shows persistent symptoms reported by patients namely persistent sore throat (10%), hard of hearing (17.5%), anosmia or hyposmia (30%), ageusia or hypogeusia (8.75%), nasal obstruction (3.75%), shortness of breath (11.25%) and headache (10%). Only 2 patients (2.5%) developed post-intubation hoarseness of voice. Fisher's exact test/ chi-square was done to analyse the association between the general characteristics of the study population and the persistence of ENT manifestations following COVID-19 disease. Of these symptoms, hard of hearing was found to have an association with age by Fischer's exact test with p value being 0.019 (< 0.05) as evident from Table 3. Shortness of breath was found to have an association with age and vaccination status by Fischer's exact test with a p value being 0.013 and 0.02 respectively (Table 4). Manifestations like sore throat, anosmia or hyposmia, ageusia or hypogeusia, nasal obstruction and headache were not associated with age, gender, comorbidities or COVID-19 vaccination status.

Table 1.Characteristics of the Study Population

(N = 80)

Study Characteristics	N	%
Age (years)		
41–60	40	50.0
21–40	40	50.0
Gender		
Male	36	45.0
Female	44	55.0
Comorbidities		
Present	45	56.2
Absent	35	43.8
Vaccination status		
Unvaccinated	38	47.5
Vaccinated	42	52.5

Table 2.Persisting Complaints Following COVID-19 Disease

(N = 80)

Manifestations	N	%
Sore throat		
Present	8	10.00
Absent	72	90.00
Hard of hearing		
Present	14	17.50
Absent	66	82.50
Anosmia/ hyposmia		
Present	24	30.00
Absent	56	70.00
Ageusia/ hypogeusia		
Present	7	8.75
Absent	73	91.25
Nasal obstruction		
Present	3	3.75
Absent	77	96.25
Shortness of breath		
Present	9	11.25
Absent	71	88.75
Headache		
Present	8	10.00
Absent	72	90.00
Hoarseness of voice		
Present	2	2.50
Absent	78	97.50

Table 3.Association Between Characteristics of the Study Population and Hard of Hearing

(N = 80)

Study Characteristics	Hard of Hearing		Chi-square/ Fischer's Exact Test Value	p Value
	Present	Absent		
Age (years)				
41–60	11	29	5.541	0.019
21–40	3	37		
Gender				
Male	4	32	0.457	0.499
Female	3	41		

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Comorbidities				
Present	8	37	0.005	0.941
Absent	6	29		
Vaccination status				
Un-vaccinated	8	30	0.633	0.426
Vaccinated	6	36		

Table 4.Association Between Characteristics of the Study Population and Shortness of Breath

(N = 80)

Study Characteristics	Shortness of Breath		Fischer's Exact Test Value	p Value
	Present	Absent		
Age (years)				
41–60	8	32	6.135	0.013
21–40	1	39		
Gender				
Male	4	32	0.001	0.972
Female	5	39		
Comorbidities				
Present	7	38	1.910	0.167
Absent	2	33		
Vaccination status				
Un-vaccinated	1	37	5.385	0.020
Vaccinated	8	34		

Discussion

The symptoms of COVID-19 infection vary widely. Some patients can remain asymptomatic while in general most of the patients with exposure show common cold manifestations, pneumonia or bronchiolitis. Worst outcomes can be seen in patients with underlying disease or co-morbidities. A high mortality rate was seen in such patients as the disease can progress into Acute Respiratory Distress Syndrome. The disease can even involve other organs like the liver, heart, and kidney can cause various haematological and neurological diseases. SARS-COV2 can invade different organs by interacting with the ACE2 receptor in these organs. Also, multi-organ failure can also be caused when there is activation of the complement system, a cytokine storm, or due to dysregulated immune responses, or coagulation dysfunction.[12] Numerous investigations looking into the COVID-19-related otolaryngological symptoms have recently been carried out. As per previous studies, anosmia and cough were among the most often reported signs and symptoms which is consistent with our study, as anosmia was the most common symptom reported post-COVID infection. Additionally reported symptoms were ageusia, sore throat, congestion in the nose, runny nose, otalgia, postnasal drip, and hoarseness.[13] The present study aims at showing the diversity in the presentation of symptoms in patients following COVID-19 infection.

In one study conducted by Kumar et al. on 136 patients, ear manifestations included sensorineural hearing loss in 8%, 3% showed conductive hearing loss otitis media with effusion in 3% and 1% showed tinnitus. The nose & paranasal sinus manifestations include headache in 16%, dryness of the nose in 10%, olfactory dysfunction in 9% and epistaxis in 2%. The laryngeal and pharyngeal manifestations include dryness of mouth in 8%, sore throat in 4%, gustatory dysfunction in 4%, LPR in 3%, vocal cord palsy in 2%, aphthous ulcer in 2% and oral candidiasis in 1%. Also in the study headache was found to be the most common symptom following COVID infection seen in 22% of patients while the least common symptom was tinnitus found in just 1% of patients. In our study, we observed that persistent symptoms observed in patients were persistent sore throat (10%), hard of hearing (17.5%), anosmia or hyposmia (30%), ageusia or hypogeusia (8.75%), nasal obstruction (3.75%), shortness of breath (11.25%) and headache (10%). Only 2 patients (2.5%) developed post-intubation hoarseness of voice. The most common presenting symptom was hyposmia/ anosmia which was seen in 30% of patients while the least common symptom was hoarseness of voice seen in only 2.5%.[14]

In another study by Alrusayyis et al. which was conducted on 257 patients, 11 patients had persistent symptoms which included mainly sleep and psychological symptoms (73%), and most of them were females (63.6%) and all the 11 participants had at least one comorbidity. In our study, no patients reported any sleep or psychological disturbances.[15] Elibol reported that the most common post-COVID manifestations were anosmia in 35.4%, ageusia in 16.1%, sore throat in 27%, cough in 43.8%, nasal congestion in 12.9%, and postnasal discharge in 6%.[16] In our study anosmia was present in 30%, ageusia in 8.75%, sore throat in 10% and nasal congestion in only 3% of the study population. El-Anwar et al. reported that headache and sore throat were the most common symptoms following which anosmia was reported in 6%, 5.3% showed pharyngeal oedema, nasal congestion was seen in 4.1%, and nasal obstruction in 3.4%.[17] Our study also showed that the most common symptom was anosmia or hyposmia (30%). Nasal congestion was seen in only 3% of the study population.

The post-COVID period is defined as the continuation or development of any new symptoms 3 months after the initial COVID infection with these symptoms lasting for at

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least 2 months which cannot be explained otherwise. In the current study patients who were infected with COVID-19 and then recovered from the infection were followed up for a period of 6 months (3 months after they recovered from the infection). It was concluded from the current study that the nose and paranasal sinuses were most commonly affected followed by ear manifestation (hearing loss).

Conclusion

Various studies disclosed that the nose and paranasal sinuses were the most commonly involved in post-COVID infection. The results of our study were also similar to previous studies which concluded that the most affected are the nose and paranasal sinuses. Patients who are infected with COVID-19 can show a wide range of clinical manifestations ranging from being asymptomatic, having common manifestations like headache, fever, sore throat, and myalgia to having a multi-organ failure. A proper understanding of the pathophysiology of the disease helps in providing better ways to treat the infection and hence reduce morbidity and mortality.

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Conflict of Interest: None

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