MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2024.6.560.564

COVID-19 and Tinnitus: Clinical Observations from an Indian Teaching Hospital

[1]Falguni Amin, [2]Borkhatariya Avi Sanjaykumar, [3]B.R. Sreedevi and [4]Devendra Manohar Patil

[1]Department of Otorhinolaryngology, GMERS Medical College, Panchmahal, Godhra, Gujarat, India

[2,4]Department of Physiology, Seth G S Medical College and KEM Hospital, Parel, Mumbai, Maharashtra, India

[3]Department of Physiology, GEMS Medical College Srikakulam, Andhra Pradesh, India

Abstract

Tinnitus is a common otologic symptom frequently observed in otolaryngology outpatient departments. Patients with COVID-19 infection have also reported tinnitus, but it has received little attention during the ongoing COVID-19 pandemic. The aim of this study was to determine the prevalence of tinnitus among COVID-19 patients in a tertiary care teaching hospital. This prospective study involved 67 COVID-19 patients who presented with tinnitus. All participants were confirmed to have COVID-19 through nasopharyngeal swab reverse transcription-polymerase chain reaction (RT-PCR). Detailed history-taking and clinical examination of the ear were performed to assess tinnitus and its outcomes. 67 patients infected with severe acute respiratory syndrome corona virus-2 (SARS-CoV-2) reported tinnitus. The cohort included 38 men (56.72%) and 29 women (43.28%), resulting in a male-to-female ratio of 1.31:1. Hearing loss was reported by 17 patients (25.37%), balance issues by 10 patients (14.93%)migraine symptoms by 12 patients (17.91%). This study indicates that COVID-19 patients can experience subjective otoneurological symptoms such as tinnitus. Tinnitus appears to be more prevalent in male COVID-19 patients compared to females. Associated symptoms, including hearing impairment and balance issues, should be anticipated alongside tinnitus. Further research is needed to elucidate the specific pathophysiological mechanisms underlying this subjective ringing sensation in COVID-19 patients.

OPEN ACCESS

Key Words
Tinnitus, COVID-19, Otoneurological symptoms, India

Corresponding Author
Devendra Manohar Patil,
Department of Physiology, Seth G S Medical College and KEM Hospital, Parel, Mumbai, Maharashtra, India.
drdevendrapatil@gmail.com

Author Designation
[1,3]Associate Professor
[2]Junior Resident
[4]Assistant Professor

Received: 18 May 2024
Accepted: 21 June 2024
Published: 28 June 2024

Citation: Falguni Amin, Borkhatariya Avi Sanjaykumar, B.R. Sreedevi and Devendra Manohar Patil, 2024. COVID-19 and Tinnitus: Clinical Observations from an Indian Teaching Hospital. Res. J. Med. Sci., 18: 560-564, doi: 10.36478/makrjms.2024.6.560.564

INTRODUCTION

COVID-19 is a highly transmissible disease caused by the severe acute respiratory syndrome corona virus-2 (SARS-CoV-2). The clinical manifestations in COVID-19 patients encompass fever, body aches, cough, anosmia dysgeusia, ranging from mild respiratory symptoms to severe acute respiratory distress syndrome. In addition to respiratory issues, COVID-19 patients may also exhibit neurological symptoms, which are observed in approximately 30% of cases[1,2].

The neurotropic properties of SARS-CoV-2 are still under investigation. Neurological manifestations such as headaches, altered consciousness and dizziness have been reported among COVID-19 patients. Olfactory and gustatory disturbances are notable neurological symptoms in these patients. Moreover, some COVID-19 patients experience neuro-otological symptoms, including dizziness, tinnitus and ear pain[3-5].

Although tinnitus is a frequent symptom in the outpatient otorhinolaryngology clinic, typically attributed to otological causes, it has also been noted in some COVID-19 patients. Persistent tinnitus can significantly affect the quality of life, disrupting an individual's daily activities[6-8]. Despite growing evidence of neurological symptoms in COVID-19, neuro-otological symptoms like tinnitus have been insufficiently explored during the current pandemic. This study aimed to assess tinnitus among COVID-19 patients in a tertiary care teaching hospital.

MATERIAL AND METHODS

This prospective study was conducted at an Indian tertiary care teaching hospital. Patients who had recovered from confirmed COVID-19 infection and were experiencing tinnitus were enrolled in this study. Inclusion criteria included a positive nasopharyngeal swab for SARS-CoV-2, regardless of the severity of the illness or the necessity for oxygen support during treatment. Recovery was defined by a negative RT-PCR result. Participants were required to be over the age of 18 years.

Exclusion criteria comprised patients with subjective hearing loss in at least one ear, those who had been hospitalized in an intensive care unit due to severe SARS-CoV-2 infection, individuals with a history of acoustic trauma or prolonged noise exposure, those with pre-existing audiological diseases, previous surgeries, psychiatric disorders, cardiovascular diseases, or circulatory comorbidities. All participants provided written informed consent for the study.

Participants underwent a comprehensive medical examination, during which demographic and clinical data, including age, sex, duration and severity of COVID-19 infection and the location of isolation/treatment, were recorded. Informed consent was obtained for both participation in the study and the use of anonymized data from their survey responses. Risk factors such as diabetes mellitus, hypertension and steroid use during the treatment period were documented. Participants were also queried about any loss of smell and taste during or following their COVID-19 treatment. Otoscopic examinations and tuning fork tests were performed for hearing assessment, adhering to appropriate protective measures. Magnetic resonance imaging (MRI) was conducted for all cases of unilateral tinnitus to exclude cerebellopontine angle lesions.

Statistical analysis was performed using the Epi Info and Graph Pad free software.

RESULTS AND DISCUSSIONS

(Table 1) is showcasing baseline clinicode mographic parameters among the study population. The study population consisted of 67 patients, with male to female ratio of 1.31:1. Among these patients, 22 (32.84%) had a history of diabetes mellitus. Additionally, 12 patients (17.91%) had a history of hypertension (H/O hypertension). The average age of the patients was around 49 years, with some variability in ages across the cohort. These baseline clinicodemographic parameters provide a snapshot of the characteristics of the study population, including gender distribution, prevalence of diabetes and hypertension the average age of the patients.

(Table 2) details the characteristics of tinnitus observed in COVID-19 patients. Among the patients with tinnitus, majority (89.55%) experienced bilateral tinnitus. Regarding the nature of tinnitus, 43 patients (64.18%) reported recurrent tinnitus. Additionally, 29 patients (43.28%) described their tinnitus as intermittent. In terms of persistence, 24 patients (35.82%) reported persistent tinnitus with changing intensity. A smaller proportion of patients experienced unilateral tinnitus. Pulsatile tinnitus, characterized by rhythmic pulsing or throbbing sounds, was reported by 5 patients (7.46%). These findings provide insight into the varied characteristics of tinnitus experienced by COVID-19 patients, including its bilateral nature, recurrence, intermittency, persistence with changing intensity pulsatile quality. Understanding these characteristics can aid in the diagnosis and management of tinnitus in individuals affected by COVID-19.

The association between tinnitus and other clinical findings in COVID-19 patients sheds light on potential comorbidities and shared symptomatology. Notably, smell and taste disorders were highly prevalent among tinnitus patients, with 46.27% reporting smell disorder and 43.28% reporting taste disorder. Hearing loss, anxiety, depression, migraine balance disorders were also notable clinical findings associated with tinnitus,

Table 1: Baseline clinicodemographic parameters among study population

Variables	n	percentage
Male patients	38	56.72
Female patients	29	43.28
H/O diabetes mellitus	22	32.84
H/O hypertension	12	17.91
Age, Mean±SD	49.21 ± 13.55	

Table 2: Characteristics of Tinnitus found in COVID-19 patients

Characteristic	n	percentage
Bilateral Tinnitus	60	89.55
Recurrent tinnitus	43	64.18
Intermittent Tinnitus	29	43.28
Persistent but with changing intensity	24	35.82
Persistent with the same intensity	10	14.93
Unilateral Tinnitus	7	10.45
Pulsatile tinnitus	5	7.46

Table 3: Associated clinical findings with Tinnitus observed in COVID-19 patients

Clinical Finding	n	percentage
Smell disorder	31	46.27
Taste disorder	29	43.28
Hearing loss	17	25.37
Anxiety	14	20.9
Depression	14	20.9
Migraine	12	17.91
Balance disorder	10	14.93

Table 4: Proportion of patients taking steroids during treatment

Variables	n	percentage
Patients taking steroids during treatment	26	38.81

highlighting the complex interplay between auditory, olfactory, gustatory and psychological aspects in COVID-19 patients experiencing tinnitus. These findings underscore the need for comprehensive assessment and management strategies addressing both the auditory symptoms and potential related comorbidities in COVID-19 patients with tinnitus (Table 3).

(Table 4) presents data on the proportion of patients taking steroids during treatment among the study population. Out of the total number of patients included in the study, 26 individuals, comprising 38.81% of the cohort, were reported to have received steroid treatment during their medical care. This finding suggests a significant proportion of patients in the study were prescribed steroids as part of their treatment regimen.

Tinnitus significantly affects patients' quality of life[9]. Viral infections often lead to sensorineural hearing loss and tinnitus, primarily affecting the inner ear hair cells, although some can involve the auditory brainstem[10]. COVID-19 infections have been associated with otoneurological manifestations such as tinnitus and balance issues[11]. The neurotropic and neuroinvasive properties are typical features of SARS-CoV-2[12]. A study indicated brain involvement due to corona virus infection, potentially leading to neuro-auditory impairment[13]. SARS-CoV-2 infection may directly affect the central nervous system or cause vascular damage leading to vasculitis, akin to mechanisms observed in varicella-zoster virus and HIV[14]. The vasculopathy seen in SARS-CoV-2 infection could directly result from hypercoagulability[13]. Studies have shown that COVID-19 infection damages cochlear outer hair cells[15,16]. Various mechanisms contribute to peripheral auditory system damage, including direct viral damage, immune system-mediated injury immunocompromised[17].

The involvement of the cochleove stibular system by SARS-CoV-2, coupled with pandemic stress, leads to cochlear symptoms such as tinnitus[18]. Given the anticipated duration of the COVID-19 pandemic, the health, social emotional impacts are likely to persist. Individuals with COVID-19 who are socially isolated, lonely experience poor sleep are at higher risk of developing tinnitus. Patients with tinnitus often feel neglected by healthcare providers who may not fully grasp the challenges associated with tinnitus and hearing loss[19]. Tinnitus appears to be more problematic for females and younger age groups during the pandemic[10]. In this study, 57.14% of males and 42.85% of females with COVID-19 infections experienced tinnitus, with an age range of 18-72 years and a mean age of 48.16[10].

Some COVID-19 patients with tinnitus also experienced olfactory and taste dysfunctions due to the neuroinvasive nature of SARS-CoV-2. In this study, 46.42% of COVID-19 patients with tinnitus had olfactory dysfunction42.85% had taste disorders[10]. Factors exacerbating tinnitus included self-isolation, loneliness, poor sleep, reduced physical activity, anxiety, depression, irritability financial concerns[20,21]. A portion of patients experienced anxiety, depression fluctuating tinnitus intensity during isolation[22].

Tinnitus diagnosis often relies on medical history, especially for COVID-19 survivors exposed to potentially ototoxic medications like chloroquine or

hydroxychloroquine[23]. Hearing difficulties, including tinnitus, should be monitored in COVID-19 patients detailed audiological assessments, including pure-tone audiometry and tympanometry, are recommended[24]. MRI scans can help rule out brain and inner ear lesions[25]. Treatment involves addressing comorbidities, pharmacological therapies like lidocaine and antide pressants nonpharma cological options such as tinnitus retraining therapy, masking environmental modifications[26].

CONCLUSION

There is increasing evidence that otologic symptoms, including tinnitus, are among the clinical manifestations of COVID-19 infection. The occurrence of tinnitus in COVID-19 has been linked to the neurotrophic and neuroinvasive properties of the SARS-CoV-2 virus. This study found a higher prevalence of recurrent tinnitus. Many COVID-19 patients with tinnitus also had comorbid conditions such as diabetes mellitus and hypertension. Further research is essential to fully understand the persistence of tinnitus in SARS-CoV-2-infected patients and to conduct high-quality studies with large sample sizes to evaluate the impact of COVID-19 on the audio vestibular system.

REFERENCES

1. Ahmad, I. and F.A. Rathore, 2020. Neurological manifestations and complications of COVID-19: A literature review. J. Clin. Neurosci., 77: 8-12.
2. Guan, W.J., Z.Y. Ni, Y. Hu, W.H. Liang and C.Q. Ou et al., 2020. Clinical characteristics of coronavirus disease 2019 in China. New Engl. J. Med., 382: 1708-1720.
3. Williams, J.G., 2005. Systematic review of prevalence studies of autism spectrum disorders. Arch. Dis. Childhood, 91: 8-15.
4. Moriguchi, T., N. Harii, J. Goto, D. Harada and H. Sugawara et al., 2020. A first case of meningitis/encephalitis associated with SARS-coronavirus-2. Int. J. Infect. Dis., 94: 55-58.
5. Meyer, M., M.S. Luethi, P. Neff, N. Langer and S. Büchi, 2014. Disentangling tinnitus distress and tinnitus presence by means of eeg power analysis. Neural Plast., 2014: 1-13.
6. Swain, S. and S. Das, 2022. Tinnitus in COVID-19 patients: Our experiences at an eastern Indian tertiary care teaching hospital. Mustansiriya Med. J., Vol. 21, No. 2 .10.4103/mj.mj_3_22.
7. Chan Y. 2009. Tinnitus: Etiology, classification, characteristics, and treatment. Discov. Med. 8: 133-136.
8. Swain, S.K., S. Nayak, J.R. Ravan and M.C. Sahu, 2016. Tinnitus and its current treatment–still an enigma in medicine. J. Formosan Med. Assoc., 115: 139-144.
9. Munro, K.J., K. Uus, I. Almufarrij, N. Chaudhuri and V. Yioe, 2020. Persistent self-reported changes in hearing and tinnitus in post-hospitalisation COVID-19 cases. Int. J. Audiology, 59: 889-890.
10. Swain, S.K. and S.R. Pani, 2021. Incidence of hearing loss in COVID-19 patients: A COVID hospital-based study in the eastern part of India. Int. J. Curr. Res. Rev., 13: 103-107.
11. Sriwijitalai, W. and V. Wiwanitkit, 2020. Hearing loss and COVID-19: A note. Am. J. Otolaryngology, Vol. 41, No. 3 .10.1016/j.amjoto.2020.102473.
12. CHETTY, R., S. BATITANG and R. NAIR, 2000. Large artery vasculopathy in HIV-positive patients: Another vasculitic enigma. Hum. Pathol., 31: 374-379.
13. Panigada, M., N. Bottino, P. Tagliabue, G. Grasselli and C. Novembrino et al., 2020. Hypercoagulability of COVID-19 patients in intensive care unit: A report of thromboelastography findings and other parameters of hemostasis. J. Thrombosis Haemostasis, 18: 1738-1742.
14. Luca, P.D., A. Scarpa, E.D. Bonis, M. Cavaliere and P. Viola et al., 2021. Chloroquine and hydroxychloroquine ototoxicity; potential implications for SARS-CoV-2 treatment. a brief review of the literature. Am. J. Otolaryngology, Vol. 42, No. 5 .10.1016/j.amjoto.2020.102640.
15. Swain, S. and S. Pani, 2020. Hearing loss: A neglected and morbid clinical entity in corona virus disease 2019 pandemic. Amrita J. Med., Vol. 16, No. 4 .10.4103/amjm.amjm_57_20.
16. Abramovich, S. and D.K. Prasher, 1986. Electrocochleography and brain-stem potentials in ramsay hunt syndrome. Arch. Otolaryngology Head Neck Surg., 112: 925-928.
17. Swain, S., S. Acharya and N. Sahajan, 2020. Otorhinolaryngological manifestations in COVID-19 infections: An early indicator for isolating the positive cases. J. Sci. Soc., 47: 63-68.
18. Beukes, E.W., J. Onozuka, T.P. Brazell and V. Manchaiah, 2021. Coping with tinnitus during the COVID-19 pandemic. Am. J. Audiology, 30: 385-393.
19. Swain, S.K., I.C. Behera and M.C. Sahu, 2017. Tinnitus among children – Our experiences in a tertiary care teaching hospital of eastern India. Pediatr. Pol. 92: 513-517.
20. Mazza, M.G., R.D. Lorenzo, C. Conte, S. Poletti and B. Vai et al., 2020. Anxiety and depression in COVID-19 survivors: Role of inflammatory and clinical predictors. Brain, Behav., Immun.., 89: 594-600.
21. Davis, H.E., G.S. Assaf, L. McCorkell, H. Wei and R.J. Low et al., 2021. Characterizing long COVID in an international cohort: 7 months of symptoms and their impact. eClinicalMedicine, Vol. 38 .10.1016/j.eclinm.2021.101019.

22. Prayuenyong, P., A.V. Kasbekar and D.M. Baguley, 2020. Clinical implications of chloroquine and hydroxychloroquine ototoxicity for COVID-19 treatment: A mini-review. Front. Public Health, Vol. 8 .10.3389/fpubh.2020.00252.
23. Swain, S.K., M.C. Sahu and J. Choudhury, 2018. Sudden sensorineural hearing loss in children: Our experiences in tertiary care teaching hospital of eastern India. Pediatria Polska, 93: 127-131.
24. Przybylski, A.K., 2019. Digital screen time and pediatric sleep: Evidence from a preregistered cohort study. J. Pediatrs., 205: 218-223.
25. Anderson, S.E., A. Sacker, R.C. Whitaker and Y. Kelly, 2017. Self-regulation and household routines at age three and obesity at age eleven: Longitudinal analysis of the uk millennium cohort study. Int. J. Obesity., 41: 1459-1466.