

Original Research Article

Asymptomatic hearing loss-a missed symptom of COVID-19

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ABSTRACT

Background: COVID-19 pandemic is caused by SARS CoV2. The last reference of pandemic was Spanish flu in 1918 which caused hearing loss in many patients. The effect of COVID-19 is an interesting issue in audiology. Not much studies have been done; therefore, this kindled our interest to have a study on audiological profile of asymptomatic COVID-19 patients.

Methods: The 20 cases in the age group of 20 and 50 years who were confirmed positive for COVID-19 formed the study group. 20 subjects who had normal hearing (audiometric threshold at or better than 15 db HL) were used as control group. Pure-tone audiometry (PTA) was done for both the group on day 7 and 30. Air conduction and Bone conduction were measured. The audiometric thresholds were measured using the modified Hughson-Westlake method.

Results: High frequency hearing impairment was found in 9 out of 20 patients in the study group on day 7. Out of the 9 affected patients 7 patients showed improvement upon further testing done on day 30.

Conclusions: Like anosmia and ageusia, hearing loss can be considered as one of the clinical features in COVID-19 patients. This study was recorded to find a significant hearing loss in asymptomatic COVID-19 patients and thus sheds light on the auditory problem that people are experiencing during these difficult times and for future reference on pandemic research.

Keywords: Conductive hearing loss, Sensorineural hearing loss, COVID-19, Audiometric evaluation, PTA

INTRODUCTION

On 30 January 2020, world health organization (WHO) officially declared the COVID-19 epidemic as a public health emergency of international concern and on March 11 2020 WHO declared the novel corona virus (COVID-19) outbreak a global pandemic.¹ COVID-19 infection symptoms may appear 2-14 days after exposure (based on the incubation period of COVID-19) Most people will develop mild to moderate illness and recover without hospitalization. Anosmia and taste changes are common symptoms.^{2,3}

Various neurological symptoms such as loss of consciousness, headache and dizziness have been reported in COVID-19 patients.^{4,7} Viruses infections causing hearing loss can be congenital or acquired, unilateral or bilateral. They can directly damage inner ear structures, and can induce inflammatory responses which causes this damage, and they can also increase susceptibility or bacterial or fungal infection, thus leading to hearing loss. Often, virus-induced hearing loss is sensorineural, although conductive and mixed hearing losses can be seen with certain viral infections. Recovery of hearing after these infections can occur spontaneously.⁸⁻¹¹ Mechanisms of hearing loss by various

viruses differ greatly, ranging from direct damage to inner ear structures, including inner ear hair cells and organ of Corti (as seen in viral hearing loss caused by measles), induction of host immune-mediated damage.⁹⁻¹² Hearing loss in COVID-19 is an emerging area of concern and calls for further research in the field for better understanding. This study was done to assess the audiological profile among twenty COVID-19 positive cases and twenty control and thus sheds light on the auditory problem people are facing during these difficult times.

Aim

The aim of the study was to study audiological profile in COVID-19- PCR positive patients.

Objectives

The objectives of the study were to study the thresholds of PTA in COVID-19 PCR-positive cases.

METHODS

Twenty confirmed COVID-19 positive cases formed the test group and 20 healthy age and sex matched individuals forms the control group. Their age ranged between 20 and 50 years to avoid any age-related hearing affection. All the following procedures will be conducted for in patients admitted in RMMCH-Meticulous history taking and otological examination were carried out on all subjects before audiological testing and basic audiological evaluation, audiometric thresholds were measured using clinical audiometer.

Study design

The study design used was prospective study.

Source of data

Study to be conducted among the COVID-19 PCR positive patients at Rajah Muthiah medical college hospital, Chidambaram during the study period.

Study period

The study conducted during November 2020 to December 2020.

Study population

The 20 covid patients and 20 age and sex matched control groups were included in the study.

Inclusion criteria

The inclusion criteria for the study included- Asymptomatic and mild COVID-19 positive patients with

age in the range of 20-50 years and 20 healthy age and sex matched individuals forms the control groups, nasopharyngeal or oropharyngeal swab positive for SARS-Cov-2 infection by reverse transcriptase-polymerase chain reaction (RT-PCR) technique and COVID-19 patients without any previous hearing disorder.

Exclusion criteria

The exclusion criteria for the study excluded-Patient having age >50 years, diabetic and hypertension patients, patients using ototoxic drugs, patients with family history of deafness and patients with previous history of ear disease due to prolonged exposure to loud noise.

After obtaining the clearance from ethical committee, study was started in Rajah Muthiah medical college hospital. Total of 20 patients tested positive for COVID-19 infection and 20 healthy age and sex matched individuals formed the test and control group respectively. This study was done in ongoing pandemic situation so the study is considered as a pilot study and the sample size were decided based on number of cases the comes under inclusion and exclusion criteria. The patients were interviewed through telephone and data regarding the age, gender, presenting symptoms (fever, myalgia, cough, dyspnea, fatigability, sore throat, hearing loss, anosmia, ageusia and diarrhoea) and severity of the disease were taken. The patients are followed up at day 7 and day 30.

Basic audiological evaluation, the audiometric thresholds were measured using a clinical audiometer. Air conduction thresholds were measured using telephonic TDH39 from 250 to 8000 Hz. Bone conduction thresholds were measured using a radio ear B71 bone vibrator for frequencies from 250 to 4000 Hz. The audiometric thresholds were measured using the modified Hughson-Westlake method.

All testing was carried out in a double walled, sound treated booth within permissible noise limits an informed consent was obtained from all participants. Wilcoxon signed rank test used to analyse the statistical result.

RESULTS

In our study 9 out of 20 patients in the study group when compared to the control group on day 7 had significant hearing impairment at frequencies 4000 Hz (p=0.003), 6000 Hz (p=0.001), 8000 Hz (p=0.001). Wilcoxon signed rank test was used to compare the pure tone thresholds between the test and control group.

Seven out of the 9 affected patients showed improvement upon further testing done on day 30 4000 Hz (p value of 0.016), 6000 Hz (p value of 0.017), 8000 Hz (p value of 0.017).

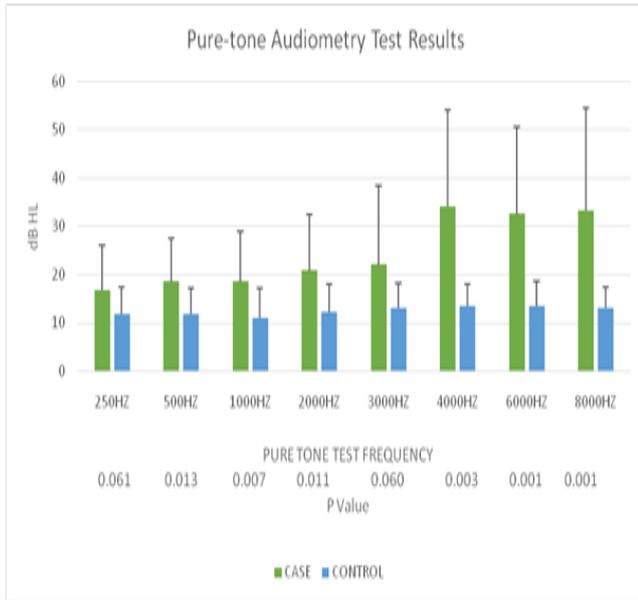


Figure 1: PTA test results of case and control.

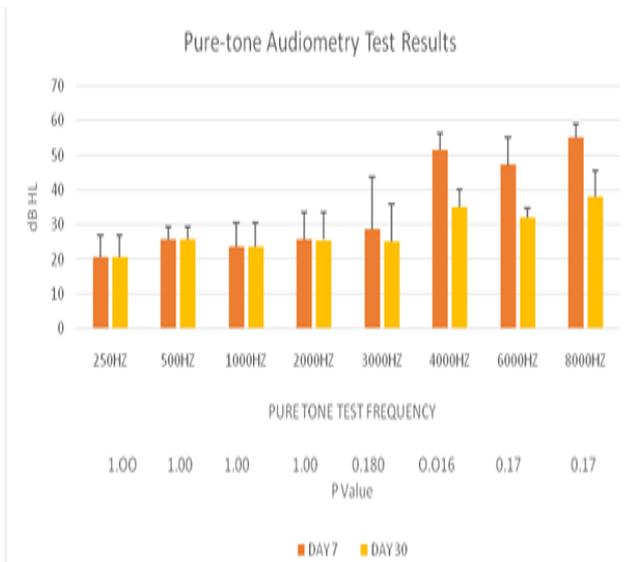


Figure 2: PTA test results on day 7 and day 30.

DISCUSSION

In our study we found that high frequency pure tone threshold was affected in the study group when compared to the control group. Cochlear hair cells are thought to be damaged in COVID-19 infection which may result in sensorineural hearing loss. ACE2 receptors are present in brain, medulla oblongata and temporal lobe which helps in entry of this virus into the brainstem and hearing centres and thus damaging them, this damage is thought to be due to cytokine mediated inflammatory response. This could lead to neurologic and otologic manifestations in COVID-19 affected patients.¹³ A comparative study of audiological evaluation between 20 asymptomatic COVID-19 positive patients and 20 normal hearing patients by Mustafa et al done using PTA and OAE

revealed significant high frequency hearing loss and referred transient evoked otoacoustic emissions (TEOAE) in asymptomatic COVID-19 patients.¹⁴

The first case of sensorineural hearing loss (SNHL) in a COVID-19 positive patient was recorded by Sriwijitalai et al.¹⁵ Later on there were other reports published relating SNHL in COVID-19 patients.^{14,16-18} Hearing loss, tinnitus, vertigo and otalgia have been described as common symptoms in COVID-19 patients in a study by Maharaj et al.¹⁹ Chantal et al there was a report on an elderly male with severe symptomatic COVID infection who had complained of hearing loss and tinnitus audiological evaluation was done which showed complete deafness on right side and profound sensorineural hearing loss on left side and magnetic resonance imaging (MRI) was done.¹⁷ This study showed the importance of audiological evaluation and radio-imaging as soon as possible for prompt management for better quality of life of the patient. From the various studies mentioned above even if the patient is asymptomatic; it does not guarantee a healthy hearing. In our study we found that High frequency pure tone threshold were affected in the study group when compared to the control group on the acute phase of illness (day 7) out of which few patients showed improvement on day 30. The mechanism of these effects requires further research on audiological evaluation on COVID-19 patients.

CONCLUSION

Like the anosmia and ageusia hearing loss can be considered as one of the clinical features in COVID-19 patients. Audiological screening of all COVID-19 patients will help in early identification of the audiological problems. This study was recorded to find a significant high frequency hearing loss in asymptomatic COVID-19 patients and thus shed light on the auditory problem that people are experiencing during these difficult times and for future reference on pandemic research.

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Conflict of interest: None declared

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