RESEARCH ARTICLE

Abdullah Belada[1]
Ahmet Koder[2]
Mehmet Ali Sungur[3]

[1] Duzce University Medical Faculty, Department of ENT, Duzce, Türkiye
[2] Trakya University Medical Faculty, Department of ENT, Edirnel, Türkiye
[3] Duzce University Medical Faculty, Department of Biostatistic, Duzce, Türkiye

Corresponding Author:
Abdullah Belada
mail: abdullahbelada@yahoo.com

Received: 31.10.2024
Acceptance: 14.02.2025
DOI:10.18521/ktd.1576850

Konuralp Medical Journal
e-ISSN1309–3878
konuralptipdergi@duzce.edu.tr
konuralptipdergisi@gmail.com
www.konuralptipdergi.duzce.edu.tr

Did Increase of Rates of Sudden Hearing Loss During COVID-19?

ABSTRACT

Objective: This study aims to assess the impact of the COVID-19 pandemic on cases of sudden hearing loss (SHL).

Method: We examined two patient groups diagnosed with SHL at Düzce University Medical Faculty Hospital and Düzce Atatürk State Hospital in Turkey. The first group, diagnosed between March 2019 and March 2020, represents pre-Covid-19. The second group includes patients diagnosed from March 2020 to March 2021, corresponding to the initial year of the Covid-19 pandemic in this region. We evaluated patient numbers, age, and gender across these groups to identify any increase in SHL cases potentially associated with the pandemic.

Results: The ratio of SHL cases per population in Group 1 was 51 out of 450,000, or approximately 0.011333. In Group 2, this ratio was 32 out of 450,000, or roughly 0.007111. Statistical analysis (p=0.037) revealed a notably higher SHL rate in the pre-Covid-19 period than during the pandemic.

Conclusions: The suggested etiological explanations for SHL remain hypothetical. Although COVID-19 has been widely considered a possible factor, our findings do not support increased SHL cases due to the virus.

Keywords: COVID-19 Pandemic, Sudden Hearing Loss, Infection.

Covid-19 Sürecinde Ani İşitme Kaybi Oranlari Artiş Gösterdi Mi?

ÖZET

Amaç: Bu çalışmanın amacı, Covid-19 salgının ani işitme kaybı üzerindeki etkisini araştırmaktır.

Yöntem: Çalışmamızı oluşturan 1. grup, Covid-19 öncesi Türkiye-Düzce Mart 2019 den Mart 2020 tarihine kadar Düzce Üniversitesi Tıp Fakültesi Hastanesi ile Düzce Atatürk Devlet Hastanesi' nde Ani İşitme Kaybı tanısı almış hastaları içerir. İkinci grup ise yine aynı popülasyonda Covid-19 enfeksiyonun görülmeye başladığı Mart 2020 ile Mart 2021 ile tarihleri arasında AİK tanısı almış hastaları içermektedir. Bu hastaların sayısı, cinsiyeti ve yaşı incelenip, iki grubun sayısı arasında AİK tanısı alan hastalarında Covid-19 salgını nedenli bir artış olup olmadığının değerlendirilmesi amaçlanmaktadır.

Bulgular: Grup 1 deki hastaların nüfusa oranı 51/450000 = 0,011333 dir. Grup 2 deki hastaların nüfusa oranı 32/450000 = 0,007111 dir. Bu iki oran 51/450000 = 0,011333 ile 32/450000 = 0,007111 karşılaştırıldığında p=0,037 olup istatistiksel olarak Covid-19 öncesinde AİK oranı, Covid-19 esnasındaki AİK oranından anlamlı olarak yüksek bulunmuştur.

Sonuç: Etyoloji de ortaya konan fikirler hipotez düzeyindedir. Tüm dünyayı etkisi altına alan Covid-19 da AİK nın olağan şüphelileri arasındadır. Bizim bulgularımız Covid-19 un AİK nı artırmadığı yönündedir.

Anahtar Kelimeler: Covid-19 Salgını, Ani İşitme Kaybı, Enfeksiyon.

INTRODUCTION

Sudden hearing loss (SHL) is considered an otorhinolaryngology emergency, characterized by a rapid sensorineural hearing decrease of 30 dB or more across three sequential frequencies within 72 hours. Each year in the United States, about 5 to 27 out of every 100,000 individuals are diagnosed with SHL (1). Given the condition's relatively rare occurrence, its causes and treatments are not fully understood (2). Studies indicate that 32-65% of SHL cases may resolve on their own (3,4). Possible causes include viral infections (5), vascular blockages (6), cochlear stress responses (7), and immune-related processes (8). Viral agents such as herpes simplex (HSV), HIV, hepatitis, measles, rubella, mumps, lassa virus, and enterovirus have been associated with SHL (2,9,10).

Covid-19, identified in December 2019 as a zoonotic virus from a seafood market (11), typically shows symptoms within 2 to 14 days of exposure. Common symptoms are fever, cough, sore throat, headache, muscle aches, and changes in taste or smell, though severe cases can lead to respiratory distress, multi-organ failure, or death, especially in immunocompromised individuals (12,13).

While various viruses are known to trigger SHL, it is uncertain whether Covid-19 is one of them. This study investigates whether there was an increase in SHL cases within one year following the onset of the Covid-19 pandemic.

MATERIAL AND METHODS

A total of 83 patients with SHL were included in this study. To meet the study's objective, participants were divided into two groups, each spanning the same one-year timeframe: the pre-pandemic group and the pandemic-period group. The pre-pandemic group consists of patients diagnosed with SHL at Duzce University Medical Faculty Hospital and Duzce Atatürk State Hospital between March 2019 and March 2020 in Duzce, Turkey, before Covid-19 emerged. The pandemic group includes those diagnosed with SHL between March 2020 and March 2021, marking the period when Covid-19 began affecting this area. The study was conducted retrospectively based on sudden hearing loss diagnoses entered into the system. By comparing the number of SHL cases, along with patient age and gender, this study aims to determine if there was an increase in SHL cases during the pandemic. The Clinical Research Ethics Committee of Duzce University approved the study protocol (2020/160)

Statistical Analysis: Statistical analyses were performed using IBM SPSS version 22 (IBM Corp., 2013, Armonk, NY). The Shapiro-Wilk test was applied to check data distribution, and the Levene test was used to assess homogeneity of variance. For comparisons between groups, an independent samples t-test was conducted, while categorical data were evaluated using a chi-square test. Results were presented as mean, standard deviation, frequency, and percentage, with a statistical significance threshold set at 0.05.

RESULTS

In this study, 83 patients in total were assessed. The pre-pandemic group included 51 patients, with 26 males (50.98%) and 25 females (49.02%), and an average age of 44.71±16.27 years. In the pandemic group, there were 32 patients, comprising 22 males (68.75%) and 10 females (31.25%), with a mean age of 44.03±14.98 years (Table 1). No statistically significant differences in age (p=0.850) or gender distribution (p=0.111) were observed between the pre-pandemic and pandemic groups. SHL incidence rates per 100,000 people were calculated for each one-year period, with the population of Düzce considered as 450,000. The pre-pandemic rate was 11.33 per 100,000, while the pandemic rate was 7.11 per 100,000. A significant difference was found between these rates (p=0.037), with the SHL rate being notably higher before Covid-19 compared to during the pandemic. (Figure 1).

Table 1. Comparison of before and pandemic-period groups

	Before Pandemic (n=51)	**Pandemic Period (n=32)**	**p**
Sex, n (%)			
Male	26 (50.98)	22 (68.75)	0.111
Female	25 (49.02)	10 (31.25)	
Age (year)	44.71±16.27	44.03±14.98	0.850

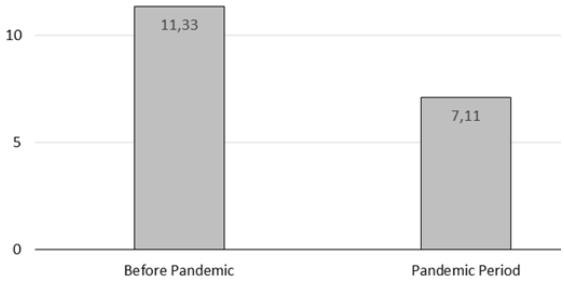

Figure 1. The ratio of sudden hearing loss in the before and pandemic period

DISCUSSION

Coronaviruses (CoVs) have led to three significant outbreaks in the past 25 years: Severe Acute Respiratory Syndrome (SARS), Middle Eastern Respiratory Syndrome (MERS), and currently COVID-19. The COVID-19 outbreak began in Wuhan, Hubei province, China, and was identified as a zoonotic disease associated with a novel betacoronavirus, SARS-CoV (14). Key symptoms of COVID-19 include fever, cough, sore

throat, muscle pain, respiratory failure, and disorders of smell and taste (15).

Viral infections can lead to peripheral facial paralysis and sensory disorders related to cranial nerve involvement (16,17). Various viruses, such as herpes simplex, HIV, hepatitis, measles, rubella, mumps, Lassa, and enterovirus, have been implicated in sudden hearing loss (SHL) (17,18). Several theories suggest that viral infections might cause SHL through mechanisms such as direct invasion of the cochlear nerve, reactivation of latent viruses in the inner ear, or systemic cross-reactions between antigens and antibodies triggered by the virus (2,17,18).

Numerous studies have explored the relationship between COVID-19 and SHL, primarily in the form of case reports. In one study by Osman Kılıç et al (19), out of five SHL patients tested for COVID-19, one tested positive, exhibiting SHL as the sole symptom. The authors cautioned that SHL could be a unique manifestation of COVID-19. Lamaunier et al (20) documented a case of SHL in the right ear of a 67-year-old female patient following COVID-19. Similarly, Lang et al (21) described a nurse diagnosed with COVID-19 who later experienced sudden hearing loss in her right ear despite treatment.

Drouet et al (22) found elevated plasma serotonin levels in SHL patients in a study involving 133 participants. Building on this, Harenberg et al (23) proposed that increased serotonin may lead to coagulation disorders and microthrombosis, suggesting a potential link between COVID-19 and SHL via ACE2 receptors. Fidan and colleagues (24) evaluated the incidence of sudden hearing loss during the COVID-19 pandemic, revealing an increase in SHL diagnoses compared to pre-COVID-19 rates. In a cohort study conducted by Kim et al. (25), it was found that Covid-19 infection increased sudden hearing loss.

In our research conducted from March 2020 to March 2021, during the onset of COVID-19 in Turkey, 39 patients were admitted to hospitals in Düzce province with SHL, compared to 54 in the pre-COVID-19 period. Interestingly, this comparison indicates a decline in SHL cases during the pandemic. Although viral infections are known to cause SHL, specific virus types have been associated with this condition. A review of the literature shows no documented increase in SHL related to SARS or MERS, indicating that the connection between COVID-19 and SHL remains largely anecdotal.

During this unprecedented period, factors that cannot be analyzed with current data may have contributed to the decrease in SHL cases. These could include reduced exposure to acoustic trauma due to restrictions on gatherings such as hunting, sports events, and nightlife. The widespread use of masks may have led to a decline in other upper respiratory tract infections, potentially reducing SHL cases from non-COVID-19 viruses. Additionally, some patients may have avoided seeking treatment for SHL in hospitals due to concerns about disease transmission. These factors warrant further investigation. The study includes patients from a specific region, and a much larger sample size and longer follow-up period would be needed to assess the effects of COVID-19 more accurately

CONCLUSION

The low incidence of SHL and the inability to perform pathological examinations leave its etiology unclear. Current theories are largely hypothetical, with COVID-19 being considered a potential contributor to SHL. Our findings suggest that COVID-19 does not increase the risk of SHL, and further studies are needed to clarify this issue.

REFERENCES

1. Chandrasekhar SS, Tsai Do BS, Schwartz SR, Bontempo LJ, Faucett EA, Finestone SA, et al. Clinical Practice Guideline: Sudden Hearing Loss (Update). Otolaryngol Head Neck Surg. 2019;161 (8):1-45.
2. Chen X, Fu YY, Zhang TY. Role of viral infection in sudden hearing loss. J Int Med Res. 2019;47(7):2865-72.
3. Dishoeck H and Bierman T. Sudden perceptive deafness and viral infection (report of the first one hundred patients). Ann Otol Rhinol Laryngol. 1957; 66(4): 963–80
4. Rasmussen H. Sudden deafness. Acta Otolaryngol. 1949; 37: 65–70.
5. Ovet G, Alatas N and Kocacan FN. Sudden sensorineural hearing loss: is antiviral treatment really necessary? Am J Otolaryngol. 2015; 36(4):542–6.
6. Veldman JE. Cochlear and retrocochlear immune-mediated inner ear disorders. Pathogenetic mechanisms and diagnostic tools. Ann Otol Rhinol Laryngol. 1986; 95(1):535-40.
7. Mattox DE, Simmons FB. Natural history of sudden sensorineural hearing loss. Ann Otol Rhinol Laryngol. 1977;86(8):463-80.
8. Stachler RJ, Chandrasekhar SS, Archer SM, Bontempo LJ, Faucett EA, Finestone SA, et al. Clinical practice guideline: sudden hearing loss. Otolaryngol Head Neck Surg. 2012;146(3):1-35
9. Mateer EJ, Huang C, Shehu NY, Paessler S. Lassa fever-induced sensorineural hearing loss: a neglected public health and social burden. PLoS Negl Trop Dis. 2018; 12(2):1-11
10. Chen HC, Chung CH and Wang CH. Increased risk of sudden sensorineural hearing loss in patients with hepatitis virus infection. PLoS One. 2017; 12(4):1-11

11. Mackenzie J, Smith D. COVID-19: a novel zoonotic disease caused by a coronavirus from China: what we know and what we don't. Microbiol Aust. 2020;17(3):41:45
12. Baj J, Karakuła-Juchnowicz H, Teresiński G, Buszewicz G, Ciesielka M, Sitarz E et al. COVID-19: specific and non-specific clinical manifestations and symptoms: the current state of knowledge. J Clin Med. 2020; 9(6):1753
13. Abdel Rhman S, Abdel Wahid A. COVID-19 and sudden sensorineural hearing loss, a case report. Otolaryngology Case Reports. 2020;16:1-3
14. Harrison AG, Lin T, Wang P. Mechanisms of SARS-CoV-2 Transmission and Pathogenesis. Trends Immunol. 2020;41(12):1100-15.
15. Vaira LA, Salzano G, Deiana G, De Riu G. Anosmia and Ageusia: Common Findings in COVID-19 Patients. Laryngoscope. 2020;130(7):1787.
16. Kennedy PG. Herpes simplex virus type 1 and Bell's palsy-a current assessment of the controversy. J Neurovirol. 2010;16(1):1-5.
17. Mateer EJ, Huang C, Shehu NY, Paessler S. Lassa fever-induced sensorineural hearing loss: A neglected public health and social burden. PLoS Negl Trop Dis. 2018; 12(2):1-11
18. Cohen BE, Durstenfeld A, Roehm PC. Viral causes of hearing loss: a review for hearing health professionals. Trends Hear. 2014;29(18)
19. Kilic O, Kalcioglu MT, Cag Y, Tuysuz O, Pektas E, Caskurlu H, Cetın F. Could sudden sensorineural hearing loss be the sole manifestation of COVID-19? An investigation into SARS-COV-2 in the etiology of sudden sensorineural hearing loss. Int J Infect Dis. 2020;97(8):208-11.
20. Lamounier P, Franco Gonçalves V, Ramos HVL, Gobbo DA, Teixeira RP, Dos Reis PC, Bahmad F Jr, Cândido Costa C. A 67-Year-Old Woman with Sudden Hearing Loss Associated with SARS-CoV-2 Infection. Am J Case Rep. 2020; 3(21):1-6
21. Lang B, Hintze J, Conlon B. Coronavirus disease 2019 and sudden sensorineural hearing loss. J Laryngol Otol. 2020; 1(10):1-3.
22. Drouet L, Hautefort C, Vitaux H, Kania R, Callebert J, Stepanian A, Siguret V, Eliezer M, Vodovar N, Launay JM. Plasma Serotonin is Elevated in Adult Patients with Sudden Sensorineural Hearing Loss. Thromb Haemost. 2020;120(9):1291-9.
23. Harenberg J, Marchetti M, Falanga A. Acquired Autoimmune Hemophilia Following SARS-CoV-2 Vaccines: Dual-Drug Effects on Blood Coagulation and the Scylla and Charybdis Phenomenon. Thromb Haemost. 2021;121(12):1555-7.
24. Fidan V, Akin O, Koyuncu H. Rised sudden sensorineural hearing loss during COVID-19 widespread. Am J Otolaryngol. 2021;42(5):102996.
25. Kim HJ, Jeong S, Kim K, Lee JD, Oh YH, Suh MJ. Incidence of hearing loss following COVID-19 among young adults in South Korea: a nationwide cohort study. EClinicalMedicine. 2024;29 (6);75:102759.