2023, 20 (4 Special Issue): 1498-1506
https://dx.doi.org/10.21123/bsj.2023.8694
P-ISSN: 2078-8665 - E-ISSN: 2411-7986

Baghdad Science Journal

Impact of COVID-19 Vaccine on Hearing Status of Young Ages (Medical College Students as a Sample)

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Received 05/03/2023, Revised 28/07/2023, Accepted 30/07/2023, Published 30/08/2023

Abstract

Many studies dealt with the consequences of SARS CoV-2 (which cause COVID-19 infection) on the nervous system especially sensory nerves where the virus causes loss of taste and smell as it's known, and may affect auditory nerves and be the expected cause of some hearing problems. A case-control analytic study was performed on a connivance sample of society of university students from a medical faculty. Each participant filled out a questionnaire contains demographic data and general, auditory and respiratory health condition, in addition to vaccination status. In the other side, the audio- examinations were performed on the study sample including Pure Tone Audiometry (PTA) and tympanometry. Two statistical methods; chi-square and t-test were used to interpret the correlation. It is noticeable that there is no clear link between the thresholds and the vaccination status. This is contrary to some studies that found that the vaccine may have a very slight influence on hearing thresholds. This can be explained by the fact that is the small (significant) *p* values in both methods was spread in a various and random manner, and it can be said that there is a possible effect, but it is not clear nor regular. A more comprehensive studies are required to establish this relationship between the hearing threshold and the COVID-19 vaccine.

Keywords: College Students, COVID-19 Vaccine, Decible, Hearing Loss, Hearing Impairment.

Introduction

During the COVID-19 pandemic, there have been several case reports in which sudden sensorineural hearing loss (SSNHL) has been associated with COVID-19 vaccination.[1,2].There have been reports of hearing loss and other auditory issues following COVID-19 vaccinations, according to the World Health Organization (WHO) [3]. However, the hearing problems seem to be extremely rare, given that more than 11 billion doses of COVID-19 vaccine have been given worldwide. Research into the matter has been limited, and there is no known cause for tinnitus. So far, there is no proof that the vaccines may cause any hearing problems, according to the WHO, the Centers for Disease Control and Prevention (CDC), and companies that manufactured the vaccines. However, some studies have shown a potential link between COVID-19 vaccinations and sudden sensorineural hearing loss (SSNHL)[4]. A population-based cohort study conducted in Israel showed an increase in the incidence of SSNHL following vaccination with messenger RNA COVID-19 vaccine BNT162b2 (Pfizer-BioNTech). However, the results of another cohort study showed no evidence of an increased risk of SSNHL following COVID-19 vaccination5. Further research is needed to determine whether there is a causal relationship between COVID-19 vaccinations and hearing loss. Many researches proved that different viruses affect hearing efficiency[6]. For the relation of SSNHL and COVID-

19 vaccination, Formeister et al. reported that there were no associations between two Messenger RNA (mRNA) COVID-19 vaccinations with Pfizer-BioNTech or Moderna and SSNHL (Formeister et al)[7]. In previously reported SSNHL cases after vaccinations other than the COVID-19 vaccine, the etiologies were unclear. Viral antigens after vaccination could induce immunologic response resulting in release of antibodies and cytokines. Immunocomplex mediation could cause autoimmune response directing antibodies to the cochlea (Okhovat et al)[8]. Immunologic and inflammatory responses might result in vasculitis and vascular ischemia of the cochlea. However, these etiologies including viral infection, vascular ischemia, and autoimmune response are known suspicious causes of SSNHL regardless of vaccination. Vaccination may be the significant cause of sudden sensorineural hearing loss (SNHL) within three days of receiving the COVID-19 vaccination, despite the fact that no conclusive evidence linking vaccination to SNHL has been provided., the unpleasant incidence of sudden sensorineural hearing loss following COVID-19 vaccinations should be considered since viral infection may be the reason[9].Viral injury to the auditory pathway has a wide range of pathologies. The organ of Corti (the site of hearing sensations) and its hair cells are the components in the inner ear that can be damaged by viruses[10]. Multiple viral infections have been shown to disrupt the auditory system, resulting in hearing loss, according to research[6, 11]**.** Viral infections can cause hearing loss that is congenital or acquired, unilateral or bilateral, and moderate, severe, or profound in severity[12]. Sensorineural hearing loss is caused by a variety of viral diseases, such as the Cytomegalovirus (CMV), herpes simplex, rubella, hepatitis, mumps, and varicella zoster[6]. These viral infections can cause significant harm to inner ear tissues such hair cells, the organ of Corti, and the cochlear nerve[13]. As most viral infections, the SARS-CoV-2 virus is reported to induce hearing loss. Individuals with COVID-19 have been reported to have hearing impairment concurrently with or after the illness, according to many case studies[14, 15]. Virus-induced hearing loss is a kind of SNHL that occurs when the structures within the cochlea are damaged (some viruses can also affect the auditory part of the brainstem). However, infections caused by some viruses can induce conductive or mixed hearing impairment[6,11]**.** Acute respiratory syndrome is caused by primary coronaviruses like SARS-COV-1, while (MERSCOV) the agent of Middle East Respiratory Syndrome, does not affect the auditory system, at least no instances have been recorded[16]. It is unclear if COVID-19 caused by a novel coronavirus affects the auditory system. In this field, several investigations have been completed, and more are in the works[17]. Furthermore, it has been reported that COVID-19 may cause damage to the inner ear organs, although it is uncertain if tinnitus is induced directly by SARS-CoV-2 or whether it is caused by stress and sadness linked with quarantine circumstances and illness dread[18]. On autopsy of numerous COVID-19 patients, it was found that 2/3 of the individuals carried SARS-CoV-2 genetic material in the middle ear and mastoid, the material was also detected in the brainstems of the deceased. The neurological consequences of SARS-CoV-2, according to the investigators, may impair the brain's auditory regions, such as the temporal lobe or brainstem[19]. In moderate or asymptomatic COVID-19 instances, hearing loss might develop. COVID-19 individuals had nerve damage in the temporal lobe and brainstem, according to brain imaging tests. Hypoxia (abnormally low oxygen levels in the circulatory system) has been identified as a probable cause of hearing impairment in COVID-19 patients in several studies[19, 20]. This idea is likely to be correct since cochlear hair cells have a high metabolic rate and are especially susceptible to hypoxic or ischemic damage. Previous research on the link between COVID-19 and abrupt hearing loss has yielded limited results. COVID-19's method of action is unknown. COVID-19, like SARS-CoV-2, is thought to interact with the angiotensin-converting enzyme (ACE2) and assault the cochleovestibular nerve and cochlear soft tissues, according to recent findings[19]. Due to a lack of research, it is unknown if hearing loss is transitory or remains following therapy. If the novel virus in this case follows the path of other viruses, the hearing loss produced by COVID-19 should not be permanent. The majority of occurrences of acute hearing loss are viral, and the majority of patients are treated with steroids. Patients with mild levels

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https://dx.doi.org/10.21123/bsj.2023.8694
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of hearing impairment frequently recover without needing any specific therapy[11,12]. Hearing impairment is a term often used instead of hearing Loss. Hearing deficit is a loss of hearing ability produced by either neurological or auditory system dysfunction. As a result of such loss, one's capacity to interpret languages may deteriorate, as well as one's sensitivity to different frequency noises[21]. The quantity of energy delivered per second across a 1 m^2 area is referred to as sound intensity. For audiometry purposes, the pure tone's intensity is referred to as the tone's loudness. The dB hearing level (HL) scale, the dB sound pressure level (SPL) scale, and the dB sensation level (SL) scale are all used in audiometry for distinct purposes. On the other side, the dB HL scale is the most generally used dB scale in audiology[22]. The *decibel* is a smaller version of the *bel*, which is a bigger unit. The *bel* originally describes a ten-to-one intensity ratio (or power ratio) between the strength of two sounds. One *bel* equals 10:1, two *bels* equal 100:1, and three *bels* equal 1000:1. *Bels* is defined as a logarithmic relationship whose formula is:

$$bel = \log_{10} (I_2 / I_1)$$

Where I_2 / I_1 denotes the intensity or power ratio, I_1 is the reference sound intensity $I_1 = 10^{-12}$ W/m^2 (threshold of audibility), and I_2 is the sound intensity. Thus the equation can be rewrite as:

$$\text{decibels (dB)} = 10 \log_{10} (I_2 / I_1)$$

The assessment of a person's hearing response to single tones is known as pure tone audiometry. The term "absolute tone" refers to a tone that has only one pitch. The rate or speed with which the sound source vibrates determines the frequency of a tone. To measure hearing loss, pure tone audiometry uses both air and bone conduction methods. An air-conducted signal flows through the air and is received by the ear in the same manner that we hear on a daily basis. As a result, air conduction audiometric threshold measures reflect a person's hearing for air-conducted sounds in the same way that humans hear most sounds[23]. In the current study, the severity categories of hearing loss were adopted according to the classifications shown in Table 1.

Table 1. Popular Categorization of Hearing Loss[24]

Degree of hearing loss	Hearing threshold range (dB)
Normal	–10 to 15
Slight	16 to 25
Mild	26 to 40
Moderate	41 to 55
Moderately severe	56 to 11
Severe	12 to 90
Profound	91+

Finally, using methods such as otoscopy and tympanometry, as well as masking and bone conduction audiometry, it is possible to assess whether the hearing damage is conductive or sensorineural. Tympanometry is a test that determines how the middle ear structure reacts to sound and how air pressure changes with time, it's one of the most prevalent and important aspects of an audiologic evaluation[25]. Measures of middle ear function can be based on the amount of energy rejected (impedance) or the amount of energy accepted (admittance) by the middle ear. Impedance and admittance are opposite sides of the same phenomenon and yield the same information. The term “immittance” was coined to encompass both approaches, although nowadays most measurements are in admittance. Tympanometry is an objective test that measures the mobility (loosely termed “compliance”) of the middle ear at the tympanic membrane as a function of applied air pressure in the external ear canal. Compliance is typically expressed as acoustic admittance in milliohm (mohm) (or as the admittance of an equivalent volume of air in cm^3 or mL), and pressure is expressed in dekapascals (daPa). As the pressure changes, the point of maximum compliance of the middle ear is identified as a peak on the tympanogram. The point of maximum compliance indicates the pressure at which the eardrum is most mobile and occurs when the pressure in the external ear canal equals the pressure in the middle ear[26,7].

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Materials and Methods

A case-control analytic study was performed on a connivance samples of college students from a medical faculty. The participants filled out a questionnaire containing demographic data, general and auditory and respiratory health condition, in addition to vaccination status. In the other side, the audio- examinations were performed on the study sample including Pure Tone Audiometry (PTA) and tympanometry. The taken sample consisted of 100 participants segregated into two groups according to vaccinated as a case group and unvaccinated as a control group. Data was collected from healthy, young volunteers aged of 18 to 28 years old in period between January to May 2022. It is possible to compare the seventy vaccinated participants (with the various vaccine types used in the Iraqi protocol), and the thirty who did not receive any dose of the any type of vaccine. Two statistical methods (chi square ($\chi 2$) and t-test) are used to interpret the correlation between the variables. Version 26 of the Statistical Package for the Social Sciences (SPSS) is used to execute statistical analyses (Chi square and t-test).

Results and Discussion

The young and close ages were chosen in order to reduce the age factor, as well the mean age was 21. 91± 2.42 years, with range 18-28 years. The ratio between the genders was chosen read aproximatly equals for each group ,gender composition of the sample was 48 (48%) male, 52(52%) females, with male to female ratio of 1: 1.08. With this ratio, the effect of gender is mostly cancelled. The BMI The body mass index (BMI) ranged as 16.3 - 35.34 kg/cm^2 with mean 23.99±3.8 kg/cm^2 which is within the normal range. Vaccination status ditributed as in Table 2.

Table 2. Vaccination Status of Study Samples

COVID-19 vaccination status	**No vaccine**	**30%**
	The first dose only	**10%**
	1^{st} and 2^{nd} doses	**58%**
	1^{st} and 2^{nd} doses and booster dose	**2%**
	Total	**100%**
Type of vaccine	**No vaccine**	**30%**
	Pfizer	**58%**
	AstraZeneca	**6%**
	Sinopharm	**6%**
	Total	**100%**

Association between vaccine status and the pure tone frequencies by using ($\chi 2$) (is illustrated in Table 3), comparison of pure tone thresholds between the vaccinated and unvaccinated for air – conduction study (is shown in Table 4) and comparison of pure tone thresholds between the vaccinated and unvaccinated for bone – conduction study (is shown in table 5). The pure-tone audiometry is a "gold" standard test of audiology examination. Its role is to assess whether hearing acuity is normal or impaired. Pure tone testing is the cornerstone of most auditory examinations. Pure tones at selected frequencies are presented through either earphones (air conduction) or a vibrator pressed against the mastoid portion of the temporal bone (bone conduction), and the minimal level that the subject can hear (threshold) is determined for each frequency[27].

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Table 3. Association between Vaccine Status and the Pure Tone Frequencies by using x^2(p-values ; significant difference at a level less than 0.05)

Frequencies / Variables	Right ear 250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	Left ear 250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz
COVID-19 vaccination status	.020	.005	.001	.014	.011	.004	.104	.179	.010	.134	.102	.001
variation in the types of vaccine	.979	.108	.98	.032	.029	.003	.810	.647	.547	.310	.049	.009
	Right bone						**Left bone**					
COVID-19 vaccination status	.911	.058	.076	.017	.288	.008	.151	.09	.05	.011	.040	.022
variation in the types of vaccine	.784	.822	.800	.404	.079	.010	.213	.792	.752	.011	.037	.05

Table 4. Comparison of Pure Tone Thresholds between the Vaccinated and Unvaccinated for Air – Conduction Study (p-values ; significant difference at a level less than 0.05)

Frequency (Hz)	Vaccine status	Right ear **Hearing intensity(dB)**	**t-test**	***p* – value**	Left ear **Hearing intensity(dB)**	**t-test**	***p* – value**
250	**Vaccinated**	9.83±5.80	-2.00	0.048	9.8±7.86	-1.81	0.073
	Unvaccinated	12.86±7.35			12.50±7.84		
500	**Vaccinated**	10.17±6.50	-1.34	0.184	10.00±6.16	-1.98	0.051
	Unvaccinated	12.35±1188			13.14±7.13		
1000	**Vaccinated**	10.8±5.20	-0.1	0.922	9.33±3.88	-1.9	0.095
	Unvaccinated	10.79±5.10			11.00±4.79		
2000	**Vaccinated**	14.8±10.08	2.59	0.011	13.00±10.05	1.34	0.182
	Unvaccinated	10.07±7.15			10.64±7.02		
4000	**Vaccinated**	16.17±10.40	3.22	0.002	15.8±10.15	2.53	0.013
	Unvaccinated	10.50±6.87			10.86±8.03		
8000	**Vaccinated**	17.17±11.42	3.80	0.000	16.17±10.14	2.80	0.006
	Unvaccinated	9.64±7.86			10.29±9.44		

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https://dx.doi.org/10.21123/bsj.2023.8694
P-ISSN: 2078-8665 - E-ISSN: 2411-7986
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Table 5. Comparison of Pure Tone Thresholds between the Vaccinated and Unvaccinated for Bone – Conduction Study (p-values ; significant difference at a level less than 0.05)

Frequency (Hz)	Vaccine status	Right bone			Left bone		
		Hearing intensity(dB)	**t-test**	***p* – value**	**Hearing intensity(dB)**	**t-test**	***p* – value**
250	**Vaccinated**	8.8±5.07	-1.25	0.216	8.17±4.25	-2.20	0.031
	Unvaccinated	10.07±5.21			10.64±5.51		
500	**Vaccinated**	9.50±4.4	-0.44	0.64	8.50±4.76	-2.40	0.018
	Unvaccinated	10.00±5.45			11.43±5.90		
1000	**Vaccinated**	8.00±4.84	-0.99	0.323	7.8±3.6	-2.4	0.011
	Unvaccinated	9.07±4.98			10.29±4.96		
2000	**Vaccinated**	11.33±9.09	1.16	0.248	13.83±11.35	2.19	0.031
	Unvaccinated	9.43±6.73			9.86±6.6		
4000	**Vaccinated**	13.17±9.51	2.58	0.011	15.83±10.83	3.05	0.003
	Unvaccinated	8.92±6.53			9.86±8.07		
8000	**Vaccinated**	15.8±10.14	3.9	0.000	15.5±11.40	3.04	0.003
	Unvaccinated	9.00±7.40			9.29±8.35		

From Tables 3,4 and 5 , it is noticeable that there is no clear link of the thresholds to the vaccination status. This can be explained by the fact that is contrary to some studies that found that the vaccine may have a very slight influence on hearing thresholds, similar to the infection itself [7,28] . Form the statistically side, the t-test of the two groups that consist of vaccinated and unvaccinated people was used here to find *p* values for different frequencies. The probability of presence correlation in the topic of the vaccine and hearing thresholds were previously treated in a prior item in the current study using chi-square, considering the sample consists of one group. It is noticeable that the small (significant) *p* values in both methods were spread in a various and random manner, and it can be said that there is a possible effect, but is not clear nor regular. This is also matching approximately with what is mentioned in the researchs in that section. The research work may be perform on other societal categories. Using other methods or measurements to assess the hearing condition of the subjects.

Conclusion

Though there are few anecdotal and extremely limited reports of SSNHL during the COVID-19 pandemic[29,14] , no studies have documented a strong connection, it is noted in this analytic study that there is a somewhat statistically small significant effect of the COVID-19 vaccine on hearing thresholds for different and dispersed frequencies (irregular distribution). It requires broader and more comprehensive studies in this regard. The study recommended that using a larger study samples, different design or work on a broader age group to confirm the results.

Acknowledgment

Many thanks to a hearing and speech consultant, at Alimamein Alkadhimein Medical City Hospital, with his team for their cooperation and facilitating the practical aspect of the research and to the student Dhurgham Yousif Jawad For his efforts in following up administrative matters and reviewing the Ministry of Health in obtaining the original approvals to accept the research project, as it meets the standards approved by the Ministry of Health ,I do not forget to thank all the volunteer students in the research sample in their various stages.

Authors' Declaration

- Conflicts of Interest: None.
- I hereby confirm that all the Tables in the manuscript are mine.
- Authors sign on ethical consideration's approval.
- Ethical Clearance: The project was approved by the local ethical committee in Ministry of Health, Baghdad Health Department / Karkh/ Baghdad/ Iraq, the approval number is 48 on31/01/2022.

References

1. Zhao H, Li Y, Wang Z. Adverse event of Sinovac coronavirus vaccine: deafness. Vaccine. 2022; 40(3): 521-523. https://doi.org/10.1016/j.vaccine.2021.11.091
2. Canales Medina M, Ramirez Gómez M. Tinnitus, sudden sensorineural hearing loss, and vestibular neuritis as complications of the AstraZeneca COVID-19 vaccine. Cureus. 2022; 14(1): e20906. https://doi.org/10.7759/cureus.20906
3. Christian Rausch MD, Qun-Ying Yue. Covid-19 vaccines and hearing loss and tinnitus, Uppsala Monitoring Centre WHO Pharmaceuticals Newsletter. 2022; 18(1). https://apps.who.int/iris/bitstream/handle/10665/351326/9789240042452-eng.pdf?sequence=1&isAllowed=y
4. Formeister EJ, Chien W, Agrawal Y, Carey JP, Stewart CM, Sun DQ. Preliminary analysis of association between COVID-19 vaccination and sudden hearing loss using US Centers for Disease Control and Prevention Vaccine Adverse Events Reporting System data.JAMA Otolaryngol Head Neck Surg. 2021; 147(7): 674-676. https://doi.org/10.1001/jamaoto.2021.0869
5. Nieminen TA, Kivekäs I, Artama M, Nohynek H, Kujansivu J, Hovi P. Sudden Hearing Loss Following Vaccination Against COVID-19. JAMA Otolaryngol Head Neck Surg. 2023 Feb 1, 149(2): 133-140. https://doi.org/10.1001/jamaoto.2022.4154. PMID: 36520464; PMCID: PMC9857204.
6. Cohen BE, Durstenfeld A, Roehm PC. Viral causes of hearing loss: a review for hearing health professionals. Trends Hear 2014 Jul 22. 18: 1–17 https://doi.org/10.1177/2331216514541361.
7. Formeister, E. J., Wu, M. J., Chari, D. A, et al. Assessment of Sudden Sensorineural Hearing Loss after COVID-19 Vaccination. JAMA Otolaryngol Head Neck Surg. 2022 Apr 148(4): 307-315. https://doi.org/10.1001/jamaoto.2021.4414.
8. Okhovat S, Fox R, Magill J, Narula A. Sudden onset unilateral sensorineural hearing loss after rabies vaccination. BMJ Case Rep. 2015 Dec 15; 2015: bcr2015211977. https://doi.org/10.1136/bcr-2015-211977. PMID: 26670892; PMCID: PMC4680576.
9. Jeong J, Choi HS. Sudden sensorineural hearing loss after COVID-19 vaccination. Int J Infect Dis. 2021 Dec; 113: 341343. https://doi.org/10.1016/j.ijid.2021.10.025.
10. Wong AC, Ryan AF. Mechanisms of sensorineural cell damage, death and survival in the cochlea. Front Aging Neurosci. 2015 Apr 21. 7(58). https://doi.org/10.3389/fnagi.2015.00058.
11. Wilson WR, Veltri RW, Laird N, Sprinkle PM. Viral and epidemiologic studies of idiopathic sudden hearing loss. Otolaryngol Head Neck Surg. 1983 Dec; 91(6): 653-658. https://doi.org/10.1177/019459988309100612.
12. Merchant SN, Adams JC, Nadol JB Jr. Pathology and pathophysiology of idiopathic sudden sensorineural hearing loss. Otol Neurotol. 2005 Mar; 26(2): 151-60. https://doi.org/10.1097/00129492-200503000-00004.
13. Chen X, Fu YY, Zhang TY. Role of viral infection in sudden hearing loss. J Int Med Res. May27. 47: 286–13. Published online2019.https://doi.org/10.1177/0300060519847860
14. Sriwijitalai W, Wiwanitkit V. Hearing loss and COVID-19: A note. Am J Otolaryngol. 2020 May-

Jun; 41(3): 102473. https://doi.org/10.1016/j.amjoto.2020.102473.

15. Chern A, Famuyide AO, Moonis G, et al. Bilateral Sudden Sensorineural Hearing Loss and Intralabyrinthine Hemorrhage in a Patient With COVID-19. Otol Neurotol. 2021 Jan; 42(1): e10-e14. https://doi.org/10.1097/MAO.0000000000002860.
16. Almufarrij I, Uus K, Munro KJ. Does coronavirus affect the audio-vestibular system? Arapid systematic review. Int J Audiol. 2020 Jul; 59(7): 487-491. https://doi.org/10.1080/14992027.2020.1776406
17. Freni F, Meduri A, Gazia F, Nicastro V, Galletti C, Aragona P, et al. Symptomatology in head and neck district in coronavirus disease (COVID-19): A possible neuroinvasive action of SARS-CoV-2. Am J Otolaryngol. 2020 Sep-Oct; 41(5): 102612. https://doi.org/10.1016/j.amjoto.2020.102612.
18. Fidan V. New type of corona virus induced acute otitis media in adult. Am J Otolaryngol. 2020 May-Jun; 41(3): 102487. https://doi.org/10.1016/j.amjoto.2020.102487.
19. Osman Kilic, Mahmut Tayyar Kalcioglu, Yasemin Cag, Ozan Tuysuz, Emel Pektas, Hulya Caskurlu, et al. 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; June 11, (97)06: 208-11. https://doi.org/10.1016/j.ijid.2020.06.023,
20. Nayak N, Ghosh A, Bhatta DR, Gharti Magar D. COVID-19: a brief review. J Pathol Nep 2020. 10(1): 1659-62. https://doi.org/10.3126/jpn.v10i1.28946.
21. Swanepoel de W, Hall JW 3rd. A systematic review of telehealth applications in audiology. Telemed J E Health. 2010 Mar; 16(2): 181-200. https://doi.org/10.1089/tmj.2009.0111. PMID: 20187743.
22. Moazzam M, Atique S. Review of Handbook of Biomedical Instrumentation. 3th ed. Adv Medical Dent Heal Sci. 2020; 3(2): 18–18. https://doi.org/10.5530/amdhs.2020.2.4, www.amdhs.org,
23. Khandpur R S. Compendium of Biomedical Instrumentation, 3 Volume. Hoboken, New Jersey. Set John Wiley & Sons; 2020 Feb 25.
24. Clark JG. Uses and abuses of hearing loss classification. ASHA. 1981 Jul; 23(7): 493-500. PMID: 7052898.
25. Katz J, Chasin M, English K, Hood LJ, Tillery KL, eds. Handbook of clinical audiology. 7th ed. Philadelpia: Wolters Kluwer Health; 2015. p. 29-47.
26. Yvonne Chan, John C, Goddard K J, Lee's Essential otolaryngology: head & neck surgery, 11th ed .MeGraw-hill Education, NewYork 2016 .
27. Robert W Baloh, Joanna Jen, Hearing and Equilibrium, Goldman's Cecil Medicine. 24th ed. 2012 part 26: eye, ear, nose, and throat diseases p.436
28. Davide Pisani, Federico Maria Gioacchini, Pasquale Viola, Alfonso Scarpa, Alessia Astorina, Massimo Re.et al. Audiovestibular Disorders after COVID-19 Vaccine: Is There an Association? Audiol Res. 2022 Apr 21; 12(3): 212-223. https://doi.org/10.3390/audiolres12030024.
29. Mustafa MWM. Audiological profile of asymptomatic Covid-19 PCR-positive cases. Am J Otolaryngol. 2020 May-Jun; 41(3): 102483. https://doi.org/10.1016/j.amjoto.2020.102483.

2023, 20 (4 Special Issue): 1498-1506
https://dx.doi.org/10.21123/bsj.2023.8694
P-ISSN: 2078-8665 - E-ISSN: 2411-7986

Baghdad Science Journal

تأثير لقاح COVID-19 على حالة السمع لدى الشباب (طلاب كلية الطب كعينة)

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الخلاصة

تناولت العديد من الدراسات عواقب السارس CoV-2 (الذي يسبب عدوى COVID-19) على الجهاز العصبي وخاصة الأعصاب الحسية حيث يسبب الفيروس فقدان حاسة التذوق والشم كما هو معروف ، وقد يؤثر على الأعصاب السمعية، ويتوقع ان يسبب بعض المشاكل في السمع. في هذه الدراسة هناك استكشاف حول الارتباط بين لقاح هذا الفيروس وكفاءة السمع. و معرفة ما إذا كان هنالك تأثير للقاح COVID-19 على كفاءة السمع لدى الأفراد الذين تم تطعيمهم (الملقحين).

تم إجراء دراسة تحليلية لحالة وضبط على عينة من طلاب الكلية من كلية الطب بمعرفتهم. قام المشاركون بملء استبيان يحتوي على البيانات الديموغرافية والحالة الصحية العامة والسمعية والجهاز التنفسي ، بالإضافة إلى حالة التطعيم. وفي جانب آخر ، تم إجراء الفحوصات الصوتية على عينة الدراسة بما في ذلك قياس السمع النقي (PTA) وقياس الطبلة. لتفسير الارتباط تم إكمال طريقتان إحصائيتان chi-square و t-test. من الملاحظ أنه لا يوجد ارتباط واضح بين العتبات وحالة التطعيم. يمكن تفسير ذلك من خلال حقيقة أنه يتعارض مع بعض الدراسات التي وجدت أن اللقاح قد يكون له تأثير طفيف جدًا على عتبات السمع. إن قيم p الصغيرة (المهمة) في كلتا الطريقتين منتشرة بطريقة مختلفة وعشوائية ، ويمكن القول أن هناك تأثيرًا محتملًا ، لكنه ليس واضحًا ولا منتظمًا. يُلاحظ في هذه الدراسة التحليلية أن هناك تأثيرًا مهمًا من الناحية الإحصائية إلى حد ما للقاح COVID-19 على عتبات السمع للترددات المختلفة والمشتتة (التوزيع غير المنتظم). وانه يتطلب دراسات أوسع وأكثر شمولاً في هذا الصدد.

الكلمات المفتاحية: طلاب كلية، لقاح كوفيد-19، ديسيبل ، فقدان السمع، ضعف السمع.