World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(REVIEW ARTICLE)

Check for updates

Sudden deafness post vaccination against Covid 19

Ferney Alonso Méndez Pinto [1,*], Orlys Patricia Rojas Daza [2], Sonia Elizabeth Escaleras Aguilar [3], Zaira Maria Sanchez Silvera [4], Chiara Theresa Norato Ortíz [5], Adriana María Echeverría de Benegas [6], Marly Andrea Riobó Galvis [7] and Ana Madeleine Quiñones Gonzalez [8]

[1] *Otorhinolaryngologist, Universidad de Ciencias Médicas de la Habana.*
[2] *Epidemiologist, Universidad del Magdalena y Universidad Autónoma de Bucaramanga.*
[3] *General Physician, Universidad Nacional Experimental de los Llanos Centrales "Rómulo Gallegos".*
[4] *General Physician, Universidad Simón Bolívar, Barranquilla.*
[5] *General Physician, Fundación Universitaria Sanitas.*
[6] *General Physician, Universidad Católica Nuestra Señora de Asunción.*
[7] *General Physician, Fundación Universitaria Sanitas.*
[8] *General Physician, Corporación Universitaria Uniremington.*

World Journal of Advanced Research and Reviews, 2022, 14(01), 151–156

Publication history: Received on 05 March 2022; revised on 06 April 2022; accepted on 08 April 2022

Article DOI: https://doi.org/10.30574/wjarr.2022.14.1.0309

Abstract

Sudden sensorineural hearing loss or sudden deafness of unknown cause is one of the adverse effects that occur after vaccination against covid 19 in adults. In the case of children, the pediatric population has been subject to vaccination in recent months with favorable results, since the adverse events presented are very mild, however, the possibility of a relationship between vaccination for covid 19 and the development of sudden post-vaccination deafness in these.

Keywords: Deafness; Vaccination; COVID-19; Pediatrics

1. Introduction

COVID-19 is the disease caused by the new coronavirus known as SARS-CoV-2 [1]. Currently, COVID-19 patients are the main source of infection, and severely ill patients are considered more contagious than mildly ill patients. Asymptomatic infected people, patients in the incubation period, do not show signs or symptoms of respiratory infection that have been shown to excrete the virus, but they are not exempt as they are potential sources of infection [2].

COVID-19 has been considered as a kind of self-limiting infectious disease, and most cases with mild symptoms can recover within 1-2 weeks. Infection caused by SARS-CoV-2 can cause 5 different outcomes: asymptomatic infected people (1.2%); mild to medium cases (80.9%); severe cases (13.8); critical case (4.7%); and death 2.3% in all reported cases) [3].

In many patients, the most common symptoms are fever (98%), cough (76%), and myalgia or fatigue (44%) (Figure 1). Less common symptoms were sputum production (28%), headache (8%), hemoptysis (5%), and diarrhea (3%) [4].

* Corresponding author: Ferney Alonso Méndez Pinto
Otorhinolaryngologist, Universidad de Ciencias Médicas de la Habana

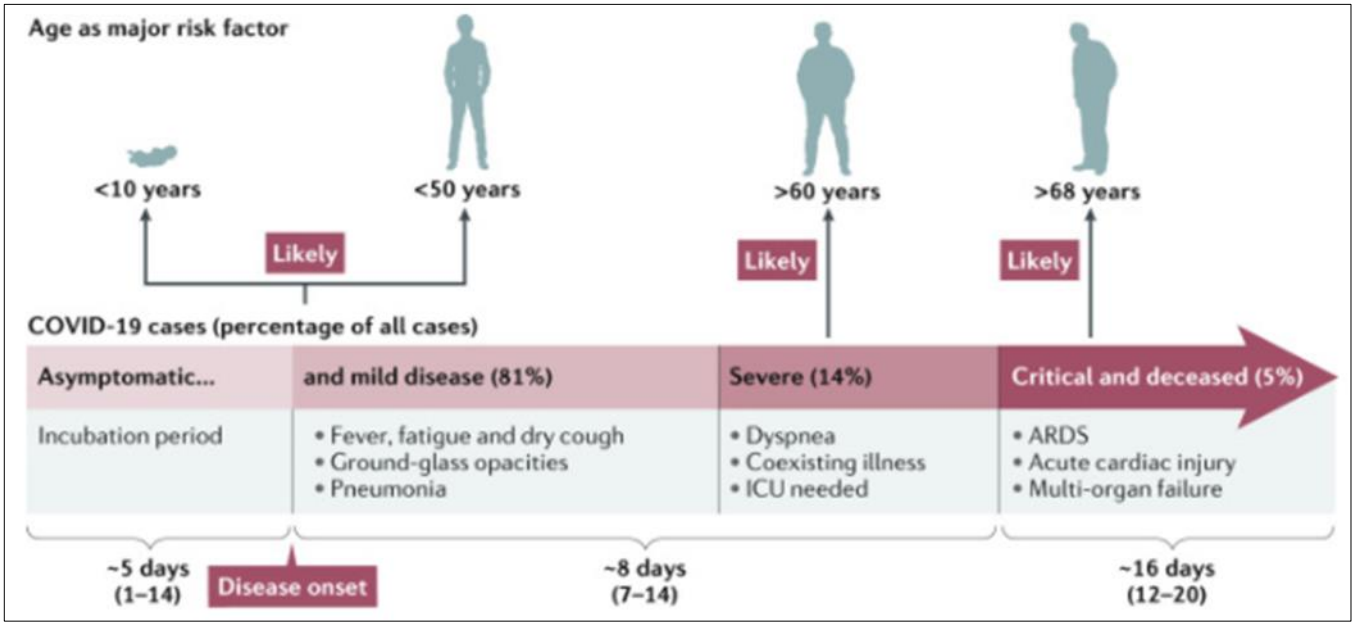
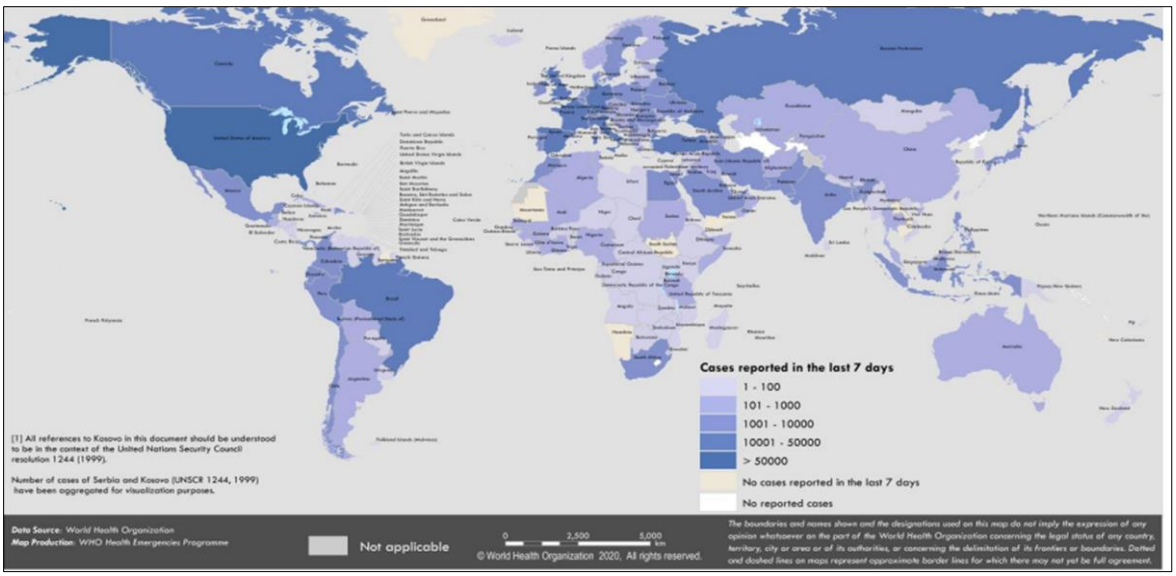


Figure 1 Clinical features of COVID-19

By 2020, COVID-19 spread from Wuhan to all of China, spreading to different countries around the world (Figure 2). At the end of March, the highest rate of infected per million inhabitants was led by Spain with 1,549 cases/million inhabitants with a total number of 72,248 cases, followed by Italy with 1,529 cases/million inhabitants and France with 493 cases/ million inhabitants with a total of 39,964 [5].

The percentage of mortality varies depending on the region. At the end of March, Italy had the highest number of deaths, with more than 10,000 deaths, and reported a lethality close to 10%. On the other hand, South Korea had a fatality rate of 1.5 and 2.3 in China [6]. On the contrary, mortality changes according to age, being 0% in children under 9 years of age and reaching up to 14% in those over 80 years of age [7].



Taken from: For children, COVID-19 appears to be generally mild. A minority of children with COVID-19 require hospitalization. In the month of March 2020, among 2,572 confirmed cases of COVID-19 in children in the United States, the estimated hospitalization rate ranged from 6% to 20%, and between 0.58% and 2.0% they were admitted to an ICU. In that report, children younger than 1 year had the highest percentage of hospitalization (15%-62%) among pediatric patients with COVID-19 [8].

Figure 2 Countries, territories or areas with reported confirmed cases of COVID-19.

Now, most children seem to get the infection from COVID-19-positive adults, especially from family contacts. Like adults, the virus to children is transmitted primarily by respiratory droplets, direct contact, and aerosol transmission [9].

Due to the rates of contagion by covid 19 presented in the pediatric population, it is necessary to immunize these children from the age of 5, and Pfizer-BioNTech vaccines are available for children between 5 and 11 years old, between 12 and 17 years old and for young people 18 years of age and older, in addition to the modern vaccine, which are monitored with the most comprehensive and exhaustive safety monitoring program in US history, which certifies that they are suitable for application [10].

In turn, the adverse effects that occur after vaccination against COVID 19 in children include fatigue, headache, fever and pain at the injection site [11], and it is estimated that this is not necessary in this population, however, there have been cases in which children have died due to the severity of the course of the disease caused by this virus, since, as in adults, there are comorbidities and risk factors that exacerbate and complicate the child's health condition, which means that it is important to take into account these factors, which include chronic respiratory disease: asthma that is difficult to control, cystic fibrosis, ciliary dyskinesia, congenital or acquired heart disease, chronic diseases renal, hepatic or digestive, obesity, chronic neurological diseases: cerebral palsy; neuromuscular diseases, muscular dystrophy, neurodisability, ASD, neurodegenerative diseases, endocrine disorders: diabetes mellitus, adrenal insufficiency, metabolic and mitochondrial diseases, Down syndrome, other chromosomal abnormalities, dependent older children, sickle cell anemia, asplenia or liver dysfunction, cystic fibrosis and immunocompromised patients [12].

Adverse events are usually more severe after the application of the second dose of the vaccine and in recent studies, the development of Myocarditis or Pericarditis has been associated with the application of messenger RNA vaccines in a few cases so it is desired to know the risk of developing sudden deafness after vaccination in the pediatric population, since it is an adverse effect present in vaccination in adults.

2. Methodology

A detailed bibliographic search was carried out since 2011 of the most relevant published information in the PubMed, Scielo, and Medline databases, national and international libraries specialized in the topics discussed in this review article. The following keywords were used: Deafness, vaccination, COVID-19, pediatrics, SARS-COV-2. The data obtained ranges from 5 to 20 records after the use of the keywords described above. The bibliographic search was carried out in English and Spanish, it was limited by year of publication and studies published from 2011 to the present were used.

3. Results

In their surveillance study of adverse events after covid mRNA vaccination, Klein et al included ischemic stroke, appendicitis, acute myocardial infarction, venous thromboembolism, Bell's palsy, and myocarditis, which was more common in the group of 12 to 39 years, although in very low proportions compared to the group studied, however, sudden deafness or hearing loss were not reported as an adverse event.

Table 1 Demographic and Clinical Characteristics of Hearing Loss Incidents for 40 individuals

Characteristic	No. (%)
Mean age (range), y	56 (25-88)
Sex	
Women	25 (63)
Men	15 (37)
Manufacturer	
Pfizer	28 (70)
Moderna	12 (30)
Mean SSNHL onset after vaccine dose (range), d	4 (0-21)
Steroid treatment	30 (75)

Taken from: Formeister, E. Chien, W. Agrawal, Y. Carey, J. Stewart, M. Sun, D. 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 Jul 1; 147(7): 674-676

For his part, Formeister, in his research letter, carries out a preliminary analysis of the association between vaccination against COVID-19 and sudden hearing loss, motivated by patients who attended the Johns Hopkins University Hospital with unilateral SSNHL confirmed audiometrically within the 24 hours after vaccination against COVID-19, for which the reports of vaccinated patients with association with sudden deafness in the database were investigated and it was determined that of 86,553,330 doses administered, only 40 individuals probably developed sudden deafness due to of this, as shown in Table 1. However, there was no record of the pediatric population within these cases [13].

In turn, Jeong et al. present in their case report, 3 patients who developed sudden deafness after vaccination by covid 19. The first case corresponds to a 64-year-old female patient who attended the outpatient service referring hearing loss in the right ear 2 days after the covid 19 vaccine, the initial hearing threshold with a weighted average of four frequencies was 86 dB in the right ear and 17 dB in the left ear in pure tone audiometry , for this treatment of oral steroids was indicated to which the dose was lowered 5 days after the start of the same, and intratympanic injection was applied, which caused the patient to fully recover her hearing threshold [14].

The second case corresponded to a 42-year-old male patient who came to the outpatient clinic due to a picture of hearing loss in the left ear, with 2 weeks of evolution and which had started from the day he received the dose of the vaccine against the covid 19. Initial four-frequency weighted average hearing threshold was 13 dB in the right ear and 9 dB in the left ear on pure-tone audiometry, but there was acute low-frequency hearing loss in the left ear, as this patient was given the same treatment as patient number 1, so he was able to fully recover his hearing threshold [15].

Finally, the third case corresponds to an 18-year-old male patient, who attended the outpatient service due to sudden hearing loss in the right ear with 2 weeks of evolution, and which began after the second dose of the vaccine was applied. Against covid 19. This patient received the same treatment as the first 2 patients, however, his hearing threshold worsened.

It is estimated that the etiology of this sudden hearing loss is due to the fact that the viral antigens in the vaccine provoke an immunological reaction through which the antibodies are directed to the cochlea, causing vasculitis and inflammation of the same, which is manifested in the patient as sudden hearing loss. However, due to the little information regarding this adverse effect of the vaccine, it cannot be certain that its etiology is due to this, although there is a strong association [16].

Although the third case presented corresponds to an 18-year-old patient, who is part of the pediatric population (0 to 18 years), the incidence of these cases is very low, so it is not stated that this is a frequent adverse event in this population after vaccination by covid 19 [17].

4. Discussion

Sudden deafness is an ENT emergency that affects the well-being and quality of life of patients, and although it is of unknown etiology, since there is no established mechanism as the main cause, in recent years it has been associated with the application of vaccine against covid 19 in the adult population and it is desired to know its possible association in children [18].

Despite the wide availability of vaccines against covid 19 worldwide, the WHO recommends the administration of BNT162b2 Pfizer/BioNTech for the pediatric population due to its safety indices and few reports of cases of severe adverse effects.

Regarding the adverse effects that occur, Myocarditis is associated with this vaccine, however, its proportion is 1 case per 20,000 vaccinated, so it is not a subject of great impact.

In their case report, Pisani et al present a 57-year-old male patient who developed sudden deafness and tinnitus in his right ear 2 days after receiving the first dose of the covid-19 vaccine, who was treated for 12 days. With methylprednisolone therapy, however, the patient was diagnosed with mild right-sided SSNHL, for which long-term follow-up was indicated [19].

Tsetsos et al., in their case report, present a 61-year-old female patient who was admitted to the emergency department reporting complete hearing loss in her right ear 2 days after the application of the second dose of the vaccine against the covid. When performing the corresponding tests, the pure tone audiometry showed deep SSHL on the right side of at least 85 dB in all frequencies, for which anticoagulant treatment was started and 7 days after admission he was

discharged with a treatment based on in oral glucocorticoids and acetylsalicylic acid for 9 days, 11 days after starting treatment the patient reported a significant improvement [20].

Finally, after the review of articles developed, the lack of records and cases to determine a relationship between sudden deafness after vaccination by covid 19 and the pediatric population is evident, since it has been determined that this adverse effect is more frequent in adults. And geriatric population. However, authors such as Briggs recommend expanding this type of study in order to guarantee the complete safety of this type of vaccine in children since, although there are antecedents such as the one exposed by Garcia in his article, in which he reports that In 2007, the Nigerian government filed a lawsuit against Pfizer, not only for the death of 11 children, but also for the serious damage caused to another 200, including deafness, blindness, cerebral palsy and other deformities after the application of a vaccine from this laboratory the existing bibliography is not sufficient to determine this relationship.

5. Conclusion

Vaccination against covid 19 constitutes the protection barrier against the SARS COV 2 virus and the severity of symptoms in the course of the disease caused by it. Since the beginning of the pandemic, vaccination of the pediatric population has been a topic of global controversy due to little knowledge of the adverse effects that it can cause on the health of children, however, their safety has been recognized and its application in these, with the slight development of certain unfavorable events. In turn, in adults, post-vaccination deafness is presented as a moderately common adverse effect, although, in children, there has been no evidence of a case index that certifies the relationship of this hearing loss with vaccination against covid 19, so it is not a reason for concern in this regard, however, it is necessary to expand the studies related to this, in order to provide alternatives that can counteract this type of situation, so it continues to be studied.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflicts of interest.

References

[1] Zhao, H., Li, Y., & Wang, Z. Adverse event of Sinovac Coronavirus vaccine: Deafness. *Vaccine*, 2022; *40*(3), 521-523.

[2] Evidence of SARS-CoV-2 infection in travelers returning from Wuhan, China. Hoehl S, Rabenau H, Berger A, Kortenbusch M, Cinatl J, Bojkova D, Behrens P, Böddinghaus B, Götsch U, Naujoks F, Neumann P, Schork J, Tiarks-Jungk P, Walczok A, Eickmann M, Vehreschild MJGT, Kann G, Wolf T, Gottschalk R, Ciesek S N Engl J Med. Mar 26. 2020; 382(13): 1278-1280.

[3] The epidemiological characteristics of an outbreak of novel coronavirus disease (COVID-19) in China. Epidemiology Working Group for Epidemic Response of NCIP, Chinese Center for Disease Control and Prevention. Zhonghua Liu Xing Bing Xue Za Zhi. 2020 February 10. 2019; 41(2): 145-151.

[4] Clinical characteristics of patients infected with the new coronavirus in Wuhan, China. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, Cheng Z, Yu T, Xia J, Wei Y, Wu W, Xie X, Yin W , Li H, Liu M, Xiao Y, Gao H, Guo L, Xie J, Wang G, Jiang R, Gao Z, Jin Q, Wang J, Cao B Lancet. 2020 February 15. 2019; 395(10223): 497-506.

[5] Grote, H., & Izagaren, F. Covid-19: the communication needs of D/deaf healthcare workers and patients are being forgotten. *bmj*, 2020; *369*.

[6] Adigun, O. T., Vivekanantharasa, R., & Obosu, G. K. The Deaf or Hard of Hearing Population's Attitude and Information Seeking Behaviour Towards COVID-19 in South Africa. *J Hum Ecol*, 2021; *75*(1-3), 16-26.

[7] Wu Z, Mcgoogan JM. Characteristics of and Important Lessons from the Coronavirus Disease (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases from the Chinese Center for Disease Control and Prevention. JAMA. 2020; 323(13).

[8] ChenZ, et al. Diagnostic and treatment recommendations for pediatric respiratory infection caused by the 2019 novel coronavirus. World journal of pediatrics. 2020; 16(3).

[9] Xu Y, Li X, Zhu B, et al. Characteristics of pediatric SARS-CoV-2 infection and potential evidence of persistent fecal viral shedding. NatMed. 2020; 26(4): 502-505.

[10] McKee, M., Moran, C., & Zazove, P. Overcoming additional barriers to care for deaf and hard of hearing patients during COVID-19. *JAMA Otolaryngology–Head & Neck Surgery*, 2020; *146*(9), 781-782.

[11] Martinon F. Pediatric vaccination against COVID-19 and despite COVID-19. Annals of Pediatrics. 2022; 96: 4-7.

[12] Moraga F. Vaccination against COVID-19 in adolescents. A reality. Vaccines. 2021; 22(3): 135–137

[13] Risso A. Chiaborelli, M. Ciapponi, A. Evidence on vaccines for COVID-19 in children and adolescents. Vid Actual Pract Ambul. 2022; 25(1): e0069977

[14] Klein et al. Surveillance for Adverse Events after COVID-19 mRNA Vaccination. JAMA. 2021; 326(14): 1390–1399.

[15] Formeister E, Chien W, Agrawal Y, Carey J, Stewart M, Sun D. 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. 1 Jul 2021; 147(7): 674-676.

[16] Jeong J, Seung H. Sudden sensorineural hearing loss after COVID-19 vaccination. Int J Infect Dis. Dec 2021; 113: 341-343.

[17] Alcas O, Mamani D. SUDDEN HEARING LOSS AFTER VACCINATION AGAINST COVID-19. Rev Peru Med Exp Public Health. 2021; 38(4): 664-5.

[18] Aragón R, Miranda M. Vaccination against COVID-19 in children. Rev Mex Pediatr. 2021; 88(3): 89-92

[19] Pisani D, Leopardi G, Viola P, Scarpa A, Riciardello F, Cerchiai N, Astorina A, Chiarella G. Sudden sensorineural hearing loss after covid-19 vaccine; A possible adverse reaction? Otolaryngol Case Rep 2021 Nov; 21: 100384

[20] Tsetsos N, Poutoglidis A, Vlachtsis K, Kilmpasanis A. Gougousis, S. Sudden Sensorineural Hearing Loss Following the Second Dose of COVID-19 Vaccine. Cureus. 25 Aug 2021; 13(8): e17435.