

Frequency of congenital hearing loss in 43,503 healthy newborn infants in Konya, Turkey

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Abstract

Objective: To determine the frequency of congenital hearing loss (CHL) in healthy newborn infants in Konya, Turkey.

Methods: A total of 43,503 healthy neonates born at Doctor Faruk Sükan Obstetrics and Children's Hospital between the years of 2006 and 2011 were evaluated, prospectively. Hearing screening test was carried out using Transient Evoked Otoacoustic Emission (TEOAE) method. Hearing test was also repeated three times in neonates with suspected hearing loss in first month of life. Infants with abnormal hearing test were referred to Department of Ear, Nose and Throat Selçuk University, Meram Faculty of Medicine, Konya, Turkey. Evoked auditory brainstem responses (E-ABR) were performed in these cases. Infants with abnormal E-ABR were referred to further centers for cochlear implantation.

Results: Hearing test was found to be abnormal in 226 (5.19/1,000) infants based on the results of TEOAE, repeated three times. CHL was diagnosed in 216 (4.97/1,000) of 226 infants at the end of E-ABR. These 216 infants were referred for cochlear implantation.

Conclusion: Our findings showed that TEOAE method is highly effective in neonatal hearing screening and frequency of CHL was 4.97/1,000 in our region.

Keywords: Congenital hearing loss, Newborn, Hearing screening, Turkey (JPMA 61:727; 2011).

Introduction

Speaking and language ability of babies rapidly progress in the first months of life. The incidence of congenital hearing loss (CHL) has been found to be about 1-6/1,000 in healthy infants worldwide. CHL causes significant problems by blockage of learning of speech, language skills, emotional and behavioural development in babies.¹⁻⁸ Hence, hearing screening is important in the early diagnosis of CHL. Transient Evoked Otoacoustic Emissions test, one of the most widely used methods in hearing screening, is preferred because the test is simple, fast, economic and highly sensitive.^{1,6,9,10}

In this study, we aimed to determine the frequency of CHL in healthy newborn infants in Konya, Turkey over a period of 5 years.

Subjects and Methods

A total of 43,503 healthy neonates including healthy prematures who were born in Doctor Faruk Sükan Obstetrics and Children's Hospital between the years of 2006 and 2011 were evaluated, prospectively. All neonates were younger than 30 days. Prematures less than 1500 g, infants hospitalized in a neonatal intensive care unit, infants with sepsis and/or meningitis, severely jaundiced infants, infants with severe birth trauma and hypoxic ischaemic encephalopathy were not included in this study.

Hearing screening test was performed on the first day of life in all infants. Hearing screening test was carried out by

using Transient Evoked Otoacoustic Emission (TEOAE) method. It was performed by Madsen Capella Mark device (Accu-Screen PRO, Germany).

Hearing test was also repeated twice in neonates with suspected hearing loss in first month of life. If the first test was abnormal, it was repeated on the 15th day of life. The third test was repeated again 15 days after the second test.

In TEOAE method, a microphone was placed to a baby's outer ear paths during measurement. Infants with bilateral positive response were thought to be normal and passed the screening. Infants without unilateral (very infrequent, it was noted in 3 infants) or bilateral positive response were accepted as abnormal. Infants with TEOAE were referred to Department of Ear, Nose and Throat Selçuk University, Meram Faculty of Medicine, Konya, Turkey for further evaluation. These neonates were further evaluated by evoked auditory brainstem responses (E-ABR).

Infants showing no response on E-ABR were accepted as deaf and they were referred to a cochlear implantation center for further investigation. Treatment and follow-up of these infants with congenital hearing loss were performed in these centers because cochlear implantation is not performed in our center.

Results

Hearing test was found to be abnormal in 226

(5.19/1,000) infants based on the results of Transient Evoked Otoacoustic Emission, repeated three times. These infants were evaluated by using of evoked auditory brainstem responses in the Department of Ear, Nose and Throat. Congenital hearing loss was diagnosed in 216 (4.97/1,000) of 226 infants at the end of further investigations. These 216 infants were referred for cochlear implantation.

Discussion

Speaking and language ability of babies rapidly progresses in the first months of life. The incidence of congenital hearing loss (CHL) has been found to be about 1-6/1,000 in healthy infants worldwide. CHL causes significant problems by the blockage of learning of speech and language skills, emotional and behavioural development in babies.¹⁻⁸ So, hearing screening is very important in early diagnosis of CHL. Transient Evoked Otoacoustic Emissions (TEOAE) test, one of the most widely used methods in hearing screening, is preferred because of simple, fast, economic and highly sensitive.^{1,6,9,10}

We found that 226 infants had abnormal response by using TEOAE test. Of 226 infants, 216 had CHL at the end of evoked auditory brainstem responses. A reliable result was obtained with a 4.4% error margin. This finding showed that TEOAE test is highly effective when it is made correctly.

The incidence of CHL has been found to be about 1-6/1,000 in healthy infants worldwide.^{1,2,6,11-14} The incidence of CHL varies in different countries. It is around 1/1,500 in United States of America, 1/2,000 in Sweden and 1/800 in Israel.¹⁵ The frequency of CHL in Turkey has been reported as 1-2/1,000 by Belgin et al,¹⁶ 2/1,000 by Genç et al¹⁷ in Ankara, 1.5/1,000 by Hilal Bolat¹⁸ in Aydın. In our study, the frequency of CHL was found as 4.97/1,000, which is higher than those of results of Turkey, and other countries. In our study, the number of screened infants was higher than other studies; therefore, we found that the rate of CHL in our region was higher than other studies.

A successful neonate hearing screening programme will provide early diagnosis of hearing loss in babies. American Academy of Pediatrics suggests that hearing screening test should be made before 3 months and treatment should be made before 6 months.¹⁹ Hence, it was stressed that the hearing screening test is very important because of earlier diagnosis and treatment of CHL in all neonates.

Conclusion

Our findings showed that Transient Evoked Otoacoustic Emissions (TEOAE) method is highly effective in neonatal hearing screening and we found that the frequency of congenital hearing loss was 4.97/1,000 in our region. Hence, TEOAE screening programme must be performed in all neonates. In our

hospital, about 12-13 thousand babies are born are year and TEOAE screening tests are routinely performed.

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