



## Research Article

# Evaluation of 1808 Newborns Hearing Screening Outcome

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### Abstract

**Objectives:** We evaluated the results of hearing screening tests performed at our center during the study.

**Methods:** In this descriptive study, 1808 newborns at our center between October 2015 and November 2017 were examined. Hearing screening tests were done according to the National Hearing Screening Protocol without discharge from the baby hospital.

**Results:** In this study totally 1808 babies were designated for hearing screening test. According to the hearing screening tests, the percentage of babies who are suspected of hearing loss and referred to the reference center is 0.11%.

**Conclusion:** Early detection of hearing the loss in newborns is important for early treatment. All newborns should be assessed in terms of their risk factors and all those involved in the risk group should be screened. In this respect, treatment of hearing loss children can be started for language and speech development can be achieved.

**Keywords:** Hearing loss, hearing screening, newborn

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Auditory stimulation within the first year of life is very important for the baby's language development and cognitive functions. Early diagnosis and treatment of hearing loss should be done as soon as possible. Hearing loss is one of the most common occasions in congenital anomalies. Those anomalies can occur every 1-4 of 1000 live births.<sup>[1]</sup> The hearing loss of the most common congenital anomalies in the newborns is also emphasizing the importance of hearing screenings.<sup>[2, 3]</sup> Projections made by the World Health Organization foresee that hearing loss is among the causes of global disease burden and that it will move to higher levels with prolonged population growth and the life expectancy in the future.<sup>[4]</sup> In 1999, the American Academy of Pediatrics accepted the recommendation of the Joint Committee on Baby Hearing about screening in the first 3 months and starting rehabilitation in the first 6 months.<sup>[5]</sup> Children with hearing loss have been found to have normal hearing abilities if they receive hearing aid during the first 6 months of life. Otherwise, language, social

and cognitive abilities will decline. Babies having hearing loss who has not passed a hearing scanning program can be diagnosed averagely between 12 and 36 months. This delay in diagnosing is a significant loss of time in terms of language and speech development, cognitive, mental and social development. It has been shown that infants who were diagnosed early in the researches and started rehabilitation before the 6th months need for rehabilitation in schools are significantly reduced. The World Health Organization and Joint Hearing Loss Committee recommend that children are hearing impaired in the first three months and rehabilitation should begin within the first six months of hearing loss.<sup>[6]</sup> For these reasons, newborn hearing screening programs are being implemented in increasing numbers in the country since 1993.<sup>[10]</sup> Nowadays, neonatal hearing screenings are based on electrophysiological based evoked otoacoustic emissions (EOAEs) and auditory brainstem responses (ABR) measurements were used either singly or with the combination. These tests are non-invasive,

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cheap and objective tests.<sup>[7,8]</sup> The world's situation parallels to Turkey the babies born with hearing impairment detected at an early stage, the implementation of these babies to hearing aids and to ensure the performance of the required rehabilitation work Newborn Hearing Screening Program has been initiated and implemented a national program since 2004.<sup>[9]</sup> In our work, we were made from infants born between June 2014 and October 2015. The results of hearing screening tests were evaluated.

### Methods

1808 healthy newborns born at Meltem Hospital between 09.10.2015-30.11.2017 were taken into this study. The baby was made in a private room reserved for the hearing test, while the baby was sleeping or in a still calm state, at a time when the baby could be fluid and serum in the external auditory canal and the test was a discharge to test the baby in order not to adversely affect the test results. Hearing screening tests were carried out by two certified nurses who had been trained in this matter before. Hearing screening was done while the baby was in her mother's lap or on a flat surface in a quiet environment. Appropriate probes were selected according to the size of the baby's outer ear canal.

Two-sided measurements were made on the baby's hearing screenings with the TEOAE test, and it was assumed that the babies receiving the bilateral emission response passed the screening. The families of infants who were unable to obtain one or two-sided emission response were informed and called for a test withdrawal 7 days later. Otosopic examination and tympanometric evaluation of infants who did not pass the single or double-sided TEOAE test was conducted. At the end of the examination, required treatment was performed in the presence of a problem such as debris or otitis related to the external auditory canal and/or middle ear that may affect the TEOAE response. After the existence of the external ear canal and middle ear problem that could affect the TEOAE response, the babies were retested. Babies who did not pass the TEOAE test in the second control were called for control for the third time to perform ABR and ABR was performed. The ABR result was given "automatically passed" or "not passed" through the test. Infants' hearing screening was done using the Otometrics (Madsen AccuScreen, Denmark) brand auto-acoustic emitter. This device can also make ABR (test). The results of hearing screening tests were given to the families in writing matter. Infant screening test findings were written to "Hearing Screening test form". At this stage, babies with single or bilateral hearing loss were referred to centers of advanced hearing testing.

### Results

1808 babies were included in the study (Fig. 1). 1694 (93.7%) Of babies passed the first TEOAE test. 114 newborns were failed in the first test. 104 of the babies passed the through the second test who failed on the first test and those who failed on the second test 10 of babies performed ABR test. The remaining 5 babies were tested for ABR, the fourth test. In the fourth test, 3 babies passed and 2 babies did not pass the test. Two (0.11%) Babies who could not pass the test were found to have one-sided and one-sided bilateral hearing loss.

### Discussion

The screening protocol to be used in newborn hearing screenings is of great importance.

Most of the permanent hearing losses in newborns are due to cochlear dysfunction. Ototoxic drugs are caused by hairy cell loss in the hypoxic-ischemic cochlea, hyperbilirubinemia by accumulating bilirubin in the cochlea, and meningitis by hearing loss caused by labyrinthine.<sup>[10-12]</sup> Early diagnosis and treatment of congenital hearing loss is essential for the success of the baby in all developmental areas.<sup>[13, 14]</sup> The purpose of the hearing loss diagnosis is to determine the baby before 3 months of age and to start the treatment at six months.<sup>[13-15]</sup>

The TEOAE test is more commonly used because of the short duration of hearing screening test, which can be done in noisy environments up to 50 decibels. The disadvantage is that it is adversely affected by debris in the external auditory canal, from fluids and middle ear disorders. In TEOAE, the stimulus intensity is 26-36 dB HL.<sup>[16]</sup> If there is more than 20-40 dB of hearing loss, the test cannot be answered. According to Kemp and his friends,<sup>[17]</sup> TEOAE application is 95% successful on the third and fourth days after birth. Yilmaz



Figure 1. Newborn hearing screening test results.

and his friends were taken OAE testing in a total of 2284 babies' hearing screenings tests and 1922 babies (84.15%) passed the test, and 49 of 362 infants who could not pass the first test were found to have failed in the ABR tests.<sup>[18]</sup> Aricigil and his friend performed the hearing screening test on 12232 babies, 1211 babies (99.8%) found normal hearing test results, 13 babies (0.1%) unilaterally and 9 babies (0.07%) had the bilateral hearing loss. Susaman and his friends performed the TEOAE hearing screening tests on 1664 newborns. 248 of the (14.9%) neonates were found to be unable to pass the first screening test.<sup>[19]</sup> In our center, a total of 1808 newborn have performed the TEOAE hearing screening tests and 114 (6.3%) newborns were found to be unable to pass the first screening test. One of these babies was found to have unilateral and the other had the bilateral hearing loss. The findings of our center were found to be consistent with the literature. The American Academy of Pediatrics recommends that at least 95% of all newborn hearing screening patients have advanced auditory the screening program is considered efficient if it is done.<sup>[20]</sup>

## Conclusion

As in many centers in our country, the neonatal hearing screening program is regularly performed in our hospital. Early detection of hearing the loss in newborns is important for early treatment. In this respect, treatment of hearing loss children can be started and language and speech development can be achieved. For this reason, it is important to apply the newborn hearing screening protocols sensitively.

## Disclosures

**Ethics Committee Approval:** The study was approved by the Local Ethics Committee.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

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