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Research Article

Anxiety Status in Parents of Infants Referred During National Newborn Hearing Screening

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Abstract

Aim: This study aims to investigate the anxiety status in parents of infants who received pass and refer results during newborn hearing screening (NHS).

Materials and Methods: The study was conducted on parents (mother and father) of a total of sixty infants who came to the NHS. All infants underwent automated (A)-ABR. Forty parents of 20 infants who were born healthy and received NHS-pass results were included in the study as group I. Forty parents of 20 infants who were born healthy and received NHS-refer results were included in the study as group II. Forty parents of 20 infants hospitalized in the neonatal intensive care unit (NICU) for at least five days and received NHS-refer results were included in the study as group III. Beck Anxiety Inventory was administered to all parents in the groups.

Results: When the anxiety levels were evaluated according to the groups, the anxiety scores of the parents in group III were higher than those in group I and group II ($p<0.05$). However, no difference was found between the parents' anxiety levels in group I and group II. When the anxiety scores were compared according to the genders, there was no difference in the anxiety scores of the fathers between the groups ($p>0.05$). However, mothers in Group III had higher anxiety scores than mothers in Group I ($p<0.05$).

Conclusion: Mothers of infants hospitalized in the NICU who received the NHS-refer result had higher anxiety levels than mothers who were born healthy and received the NHS-pass result. In order to keep the anxiety level of mothers of babies hospitalized in NICU under control, training can be organized for these mothers.

Keywords: Hearing, screening, ABR, audiology, newborn

INTRODUCTION

Hearing loss in healthy newborns is between 1-6 per thousand (1,2). In newborns who need intensive care, this rate rises to 2-4% (3-6). According to the World Health Organization, there are 7.5 million children with hearing loss (<5 years) worldwide (7), and hearing loss is one of the leading causes of the global non-fatal burden of disease (8). Most children with hearing loss live in low-income countries and can not access the necessary therapy (9). Childhood hearing loss affects language acquisition and children's social, motor and cognitive development and quality of life (10). For this reason, rapid diagnosis and intervention are essential in babies with hearing loss.

Newborn hearing screening (NHS) aims to identify infants with congenital or early-onset hearing loss. The result of NHS, usually implemented using Automated-Auditory Brainstem Responses (A-ABR) (and/or otoacoustic emission), can be a 'pass' or a 'refer'. Babies who fail the NHS (at least one ear) receive a refer result, and a refer result is a potential alarm for hearing loss. It was reported that parents who received the NHS- refer felt sad, angry, depressed, shocked, and had higher anxiety levels (11,12). On the other hand, some studies (13,14) stated that the anxiety status of the parents of babies with refer and pass results was similar. These emotional states can be affected by social differences, educational level, financial opportunities or cultural differences. To the best of our knowledge, no study in Turkey investigates the anxiety status of parents of infants with pass and refer results during newborn hearing screening.

This study aims to investigate the anxiety status in parents

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of infants who received the pass and refer results during newborn hearing screening.

MATERIAL AND METHOD

This study was planned prospectively. Verbal and written consent was obtained from all parents participating in the study. In addition, permission was obtained from the ethics committee of the University for the study (ethics committee project no: 2022/782).

The study was carried out on the parents (mother and father) of 60 babies, 40 of whom were born healthy and 20 of whom were hospitalized in the neonatal intensive care unit (NICU). Parents who applied to the NHS were grouped according to the test results of their babies. Forty parents of 20 infants who were born healthy and received NHS-pass results were included in the study as group I. Forty parents of 20 infants who were born healthy and received NHS-refer results were included in the study as group II. Forty parents of 20 infants who had been hospitalized in the NICU for at least five days and received NHS-refer results were included in the study as group III. The NHS protocol and groups applied in Turkey are shown in (Figure 1). The study did not include parents with psychiatric, neurological, orthopedic diseases or divorced parents. One week after the Automated (A)-ABR test was applied to the infants and the test result was reported to the parents, the Beck Anxiety Inventory was administered to the parents.

Automated-Auditory Brainstem Responces (A- ABR)

A-ABR test was applied to infants with Otometrics (Madsen Accuscreen) device. Electrode locations were cleaned with cleansing gel. Electrodes were placed on the forehead, cheek and neck of neck. If the impedance is <8 kOhm, the test is started. The click stimulus was automatically presented at an intensity of 35 dB nHL and applied to both ears. The noise-weighted pattern matching method was used as the test method.

Beck Anxiety Inventory

The Turkish validity and reliability study of the Beck Anxiety Inventory was conducted by Ulusoy et al. (14) and consists of 21 questions. Each question can be answered none (0 scores), mild (1 score), moderate (2 scores), and severe (3 scores). The total score is calculated as over 63.

Statistical analysis

SPSS 21 program was used for statistical analysis. The normal distribution of the data was checked with the Shapiro Wilk test. The One Way ANOVA test was used to compare the three groups if the data were normally distributed, and the Tukey test was used to compare the subgroups from the post hoc tests to compare the paired groups. If the data were not normally distributed, the Kruskal Wallis test was used. $p<0.05$ was considered statistically significant.

RESULTS

The mean age of parents in group I was 31.95±4.99 (22-43), the mean age of parents in group II was 30.20±5.73 (23-48), and the mean age of parents in group III was 31.98±3.71 (25-39). There was no significant difference between the groups in terms of the age variable ($p>0.05$). Age distributions by groups are shown in Table 1.

Table 1. Age distribution by groups

	Group I Mean±ss (min-max) n:40	Group II Mean±ss (min-max) n:40	Group III Mean±ss (min-max) n:40	p* value
Age	31.95±4.99 (22-43)	30.20±5.73 (23-48)	31.98±3.71 (25-39)	0.063
Mother	31.25±5.79 (22-43)	28.50±4.78 (23-38)	31.20±3.45 (25-36)	0.114
Father	32.65±4.06 (24-38)	31.90±6.14 (25-48)	32.75±3.89 (26-39)	0.439

* Kruskal Wallis test

Considering the results of NHS-refer babies, 14 (70%) babies in Group II failed unilaterally, and 6 (30%) failed bilaterally. Fifteen (25%) babies in Group III failed unilaterally, and 5 (75%) failed bilaterally. The mean duration of hospitalization in the NICU of the babies in Group III was 14.66±7.39 (6-36) days. There was no relationship between the length of stay of the babies in the NICU and the anxiety level of the parents ($p=0.664$). When the anxiety levels were evaluated according to the groups, the anxiety scores of the parents in group III were higher than those in group I and group II ($p<0.05$, Table 2). However, no difference was found between the parents' anxiety levels in group I and group II. When the anxiety scores were compared according to the genders, there was no difference in the anxiety scores of the fathers between the groups ($p>0.05$). However, mothers in Group III had higher anxiety scores than mothers in Group I ($p<0.05$, Table 2). 38 (31.6%) of the parents were primary or secondary school graduates, 38 (31.6%) were high school graduates, and 44 (36.6%) were university graduates. The anxiety score of the parents who were secondary or primary school graduates was 5.00±5.04, the anxiety score of the parents who graduated from high school was 3.66±3.21, and the anxiety score of the parents who graduated from university was 3.82±4.43. There was no difference in anxiety scores according to the educational status of the parents ($p=0.874$).

Table 2. Anxiety scores by groups

	Group I (min-max) n:40	Group II (min-max) n:40	Group III (min-max) n:40	p* value	P (Pairwise Comparison)
Total Anxiety Score	2.50 (0-8)	2.00 (0-14)	5.50 (0-26)	0.003	0.367^{X} 0.003^{Y} 0.048^{Z}
Mother	2 (0-8)	4.70±3.97	7.00±4.53	0.002	0.060^{X} $<0.001^{Y}$ 0.094^{Z}
Father	2.90±2.38	1.50 (0-12)	5.00 (0-26)	0.203	

* Kruskal Wallis Test, X: Group I- Group II, Y: Group I- Group III, Z: Group II-Group III

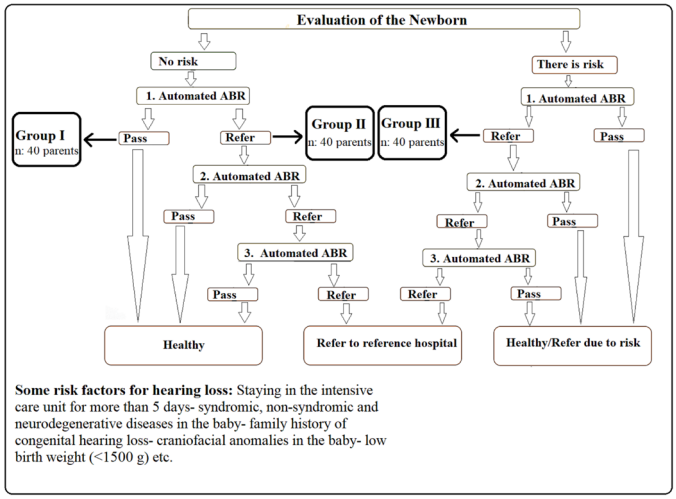

Figure 1. The newborn hearing screening protocol applied in Turkey is shown in the flow chart (11)

DISCUSSION

NHS, whose primary purpose is to diagnose hearing loss early, can be applied differently according to countries. In some countries, it can be combined OAE and A-ABR, while in others, it can be only OAE or only A-ABR. These applications may have advantages or disadvantages compared to each other. Combined OAE and Automated-ABR are excellent methods to predict some auditory disorders such as auditory neuropathy. However, combined administration is time-consuming, and tests are complex for babies who are already sensitive to sleep. It is also costly to administer the two tests. It is inexpensive to apply only OAE, but with this method, diagnosing disorders such as auditory neuropathy becomes challenging. In addition, the false negative rate increases with this application. The protocol applied in Turkey consists of 3 steps, and only Automated-ABR is applied to newborns (Figure 1). According to the protocol, babies who fail the first screening should be tested two more times within a month. Babies born healthy and failing the NHS applied three times (at least one ear) are referred to reference hospitals. Babies with risk factors for hearing loss, such as the NICU, are referred to reference hospitals even if they pass through the NHS. We included only the parents of healthy infants who received the pass and refer result from the screening test performed in the first step and the parents of infants hospitalized in the NICU who received the NHS-refer result. In this way, we aimed to investigate the effect of only hearing screening on anxiety in parents. In our study, it was determined that the parents in group III were more anxious than the parents in group I and group II. When analyzed by gender, it was found that the anxiety level of mothers in group III was higher than in group I. However, there was no difference between the groups in terms of fathers' anxiety levels.

Many factors that cause babies to be hospitalized in the NICU can also cause hearing loss. These include various infections, anomalies and ototoxic agents. The risk of hearing loss increases more than 10 times in infants hospitalized in the NICU (15). Beaula Vincy et al. (12) investigated the anxiety status of parents of healthy-born babies with NHS-pass and NHS-refer results and parents of babies hospitalized in the NICU who had NHS-pass and NHS-refer results in their study. In the study, it was determined that parents of healthy born and NHS-refer babies had higher anxiety levels than parents of healthy born and NHS-pass babies; Parents of NHS-pass babies hospitalized in the NICU had higher anxiety levels than parents of healthy-born and NHS-pass babies; the parents of NHS-referred infants hospitalized in the NICU had higher anxiety levels than the parents of healthy born and NHS-pass infants, and the mothers had higher anxiety levels than the fathers. As a result, the authors stated that NHS-refer result increases anxiety levels in parents of both healthy babies and NICU babies, and providing parents with preliminary information about the NHS can reduce anxiety. Mohd Khairi et al. (16) reported that 18% of mothers of infants who failed the first step of NHS had moderate or severe anxiety. Authors were stated that this group of mothers should be identified and supported psychologically.

The NHS-refer result does not mean that babies have definitive hearing loss. It has been reported that parents' anxiety level due to NHS-refer is generally related to parents' failure to understand the test result and their assumption that their baby has definite hearing loss (17). NHS-refer is only an alert for hearing loss. This information can be told to parents before the test. However, care should be taken when informing parents. Underestimating the NHS too much can reduce parents' trust in the NHS and alienate parents from NHS follow-ups. For this reason, when giving

information to parents about the NHS, parents' interest in the NHS should be kept as high as possible, but it should be explained that the result is only a risk situation for hearing loss.

Unlike studies stating that NHS-refer results in infants cause anxiety in parents, Suppiej et al. (14) evaluated 288 parents and noted that NHS-refer did not cause anxiety. The authors stated that there was no difference in anxiety levels between parents of infants with NHS-pass and refer results hospitalized in the NICU. In addition, there was no difference in anxiety between parents of high-risk NHS-refer infants and parents of low-risk NHS-refer infants. Our study did not find any difference in anxiety levels between the parents of healthy born and NHS-pass babies and the parents of healthy born and refer babies. However, in our study, the anxiety level of parents of NHS-referred infants hospitalized in the NICU was higher than that of parents of healthy-born NHS-pass and NHS-refer infants. In terms of gender, the anxiety level of mothers of NHS-referred infants whose infants were hospitalized in the NICU was higher than that of mothers of healthy-born and NHS-pass infants. However, there was no difference between the anxiety level of mothers of NHS-referred infants hospitalized in the NICU and mothers of healthy-born and NHS-referred infants. When the fathers were examined, it was observed that there was no difference in the anxiety levels of the fathers between the groups. Parents of infants hospitalized in the NICU are often concerned about the infant's overall development due to other health conditions (12). Thus, it can be thought that the direct NHS result from our study did not increase the anxiety level of the parents, and the NICU created more anxiety.

This difference between studies may be due to social and cultural differences. Some societies can be more cold-blooded and they can meet the referral result more calmly. In some societies, superstitious and local beliefs or religious dogmas may be at the forefront (12). In addition, our study showed no relationship between parents' education levels and anxiety levels.

Limitation of this study: According to the NHS protocol implemented in Turkey, babies with risk factors are referred to reference audiology clinics for further audiological examinations, even if they pass through the NHS. Referral of infants to other hospitals may affect parents' anxiety state and may impair the methodology of our study. For this reason, infants hospitalized in the NICU and NHS-pass were not included in our study because they were referred to reference audiology clinics.

CONCLUSION

In this study, the effect of NHS administered to infants on parents' anxiety was investigated, and it was found that healthy-born and NHS-refer results did not increase anxiety in parents. However, mothers of babies hospitalized in the NICU who received the NHS-refer result had a higher anxiety level than the mothers of the babies who were born healthy and received the NHS-pass result. In order to keep the anxiety level of mothers of babies hospitalized in the NICU under control, trainings can be organized for these mothers.

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Conflict of Interest: *The authors declare that they have no competing interest.*

Ethical approval: *Verbal and written consent was obtained from all parents participating in the study. In addition, permission was obtained from the ethics committee of the University for the study (ethics committee project no: 2022/782).*

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