



An analysis of hearing screening test results in 2291 premature infants of Chinese population



Lili Huang^{a, b, 1}, Fei Xiong^{a, b, 1}, Jinrong Li^{a, b}, Fan Yang^{a, b, *}

^a Department of Pediatrics, West China Second University Hospital, Sichuan University, Chengdu, Sichuan, 610041, China

^b Key Laboratory of Birth Defects and Related Diseases of Women and Children (Sichuan University), Ministry of Education, China

ARTICLE INFO

Article history:

Received 25 August 2016

Received in revised form

18 January 2017

Accepted 21 January 2017

Available online 27 January 2017

Keywords:

Premature infant

Hearing screening

Automated auditory brainstem response

Risk factors

ABSTRACT

Objective: The aim of this study was to analyze the hearing screening program among preterm infants as well as to identify risk factors associated with failing primary newborn hearing screening.

Methods: The retrospectively selected population included all preterm infants who had primary hearing screening in a neonatal ward from January 1st, 2013 to December 31st, 2015 at West China Second University Hospital, Sichuan University. The newborn hearing screening (NHS) procedure was performed in all preterm infants by automated auditory brainstem response (AABR). Infants who failed the primary hearing screening received a second screening at 42 days after birth. Infants who failed both tests were referred to a tertiary audiology center for diagnostic confirmation and management before 6 months of age. The final diagnosis for referred infants was obtained by telephone follow-up. The risk factors associated with failure to pass the primary hearing screen were evaluated and analyzed for preterm infants.

Results: Among 2291 preterm infants recruited, 155 infants (6.8%) failed the primary hearing screening with an abnormal AABR. Of these 155 infants, 113 (72.9%) passed the secondary screening. At the end of the follow-up, 1 infant (0.04%) was diagnosed with hearing loss, 3 infants had delayed language development, and 40 infants were lost to follow up. Multivariate regression analysis revealed that gestational age ≤ 32 weeks (Odds ratio [OR] = 2.093, 95% confidence interval [CI] 1.370–3.196), super hyperbilirubinemia (≥ 25 mg/dl) (OR = 3.560, 95% CI 1.009–12.560), and respiratory failure (OR = 1.971, 95% CI 1.188–3.265) were associated with failure to pass newborn hearing screening.

Conclusion: The prevalence of failure to pass primary hearing screening among preterm infants was 6.8% in our study, and we found a relatively low prevalence of hearing loss (0.04%). Super hyperbilirubinemia, gestational age ≤ 32 weeks, and respiratory failure were risk factors associated with failure of preterm infants to pass the primary hearing screening. Our results suggest that preterm infants with hyperbilirubinemia, gestational age ≤ 32 weeks, and respiratory failure should be closely followed.

© 2017 Elsevier B.V. All rights reserved.

1. Introduction

Hearing loss is one of the most common defects in childhood. The incidence of hearing loss is reported to be between 0.1 and 0.6% in healthy infants worldwide [1–4]. Approximately, 2–4% infants in neonatal intensive care units (NICU) suffer from either congenital or perinatal hearing loss. However, some researchers have

estimated the incidence of hearing loss reaches 10% in premature infants [3,5]. Previous studies have shown that auditory sensation is important for the development of speech and language skills, particularly during the first 6 months of life and that hearing impairment without timely treatment can seriously affect language skills and cognitive and behavioral development in infants [1,6,7]. Hence, early newborn hearing screening is critical and makes it possible for early diagnosis and intervention. In order to identify hearing impaired infants in an appropriate period to intervene, identifying the risk factors of neonatal hearing loss is also important. The Joint Committee on Infant Hearing (JCIH) searched for specific risk predictors that are associated with hearing impairment [3,8], and found that intrauterine infections, family history of

* Corresponding author. Department of Pediatrics, West China Second University Hospital, Sichuan University, Chengdu, Sichuan, 610041, China.

E-mail addresses: 1007310492@qq.com (L. Huang), xiongfei7922.student@sina.com (F. Xiong), lijinrong224@163.com (J. Li), 506742295@qq.com (F. Yang).

¹ These authors contributed equally to this work.

hereditary childhood sensorineural hearing loss, low birth weight, craniofacial anomalies, bacterial meningitis, ototoxic medications, hyperbilirubinemia (super hyperbilirubinemia: ≥ 25 mg/dl; severe hyperbilirubinemia: ≥ 20 mg/dl), low Apgar scores, mechanical ventilation lasting 5 days or longer, and a possible syndrome known to be associated with hearing loss were all predictors [9]. Furthermore, risk factors associated with hearing loss that were listed in the 2007 JCIH Position Statement expand on those of older risk registries [10]. However, the screening protocol based on those risk factors is only able to identify 50% of infants with hearing loss [9]. Worldwide, the incidence of hearing loss in preterm infants is higher than in full-term healthy newborns [2]. Due to advances in antenatal and neonatal care, the proportion of infants born preterm that survive has increased. Hence, more attention should be paid to preterm infants. In the present study, we aimed to analyze hearing screening among preterm infants and to identify risk factors associated with failing primary newborn hearing screening.

2. Subjects and methods

2.1. Study subjects

A total of 2291 preterm infants who received a primary hearing screening in the neonatal ward of West China Second University Hospital, Sichuan University, were recruited from January 1, 2013 through December 31, 2015. All infants survived to discharge and were born at a gestational age that was less than 37 weeks. The medical records of these infants were collected to evaluate relevant risk factors, including gender, multiple births, mode of delivery, birth weight, gestational age, respiratory failure, infection (include sepsis, meningitis, and severe pneumonia), hyperbilirubinemia, asphyxia, and intracranial hemorrhage. Each risk factor evaluated is a common complication seen in this population. This project has been approved by the Ethics Committee of West China Second University Hospital of Sichuan University. The data regarding final diagnosis of hearing loss was obtained by telephone follow-up. All data were de-identified of personal information after data collection, and the authors did not have access to identifying information on individual participants.

2.2. Hearing screening

Hearing screening tests were performed prior to discharge once each preterm infant was in stable condition. The hearing screening was carried out by using an automated auditory brainstem response (AABR) method. AABR screening was performed by trained nurses using a MAICO MB11 BERA phone (MAICO Diagnostic GmbH Berlin). The screening test was carried out under natural sleeping conditions in the newborn ward according to the MAICO instructions. A "PASS" result indicated that the subject had an auditory brainstem response at 35 dB HL and had normal auditory responses within the range of 2000–5000 Hz. The "REFER" result indicated that the subject needed to complete a secondary screening or be referred to a tertiary audiology center for diagnostic confirmation and management.

2.3. Statistical analyses

Data were analyzed using SPSS 22.0. Multivariable logistic regression analysis was used to assess the association of the different risk factors on failure to pass the primary hearing screening. Continuous variables are expressed as mean \pm standard deviation (SD). The results of the logistic regression are shown in odds ratios (ORs) with 95% confidence intervals (CIs). A P -value < 0.05 was considered to be statistically significant.

3. Results

3.1. Basic information

A total of 2291 preterm infants were enrolled. Demographic and clinical characteristics of the population studied are presented in Table 1. Table 2 shows the prevalence of different risk factors. The characteristics of the 21 premature infants with super hyperbilirubinemia are shown in Table 3.

3.2. Hearing screening

Of the 2291 preterm infants evaluated, 2136 infants (93.2%) passed the primary screening in both ears, whereas 155 patients (6.8%) failed their primary screening test. Among the 155 preterm infants who failed the primary screening, 113 infants (72.9%) passed the secondary screening and 1 infant did not receive a secondary screening. After the second hearing screening, 1 infant (0.04%) failed and was referred to a tertiary audiology center; after a full audiology evaluation, a diagnosis of hearing loss was confirmed in this infant. At the end of follow-up, 3 infants had retarded language development, needing speech therapy. Forty infants were lost to follow-up.

3.3. Risk factors for the failure of primary hearing screening

Multivariable regression analysis was conducted among all preterm infants to identify risk factors for failing the primary hearing screening. These results are shown in Table 4. Gestational age ≤ 32 weeks (OR = 2.093, 95% CI 1.370, 3.196), super hyperbilirubinemia (≥ 25 mg/dl) (OR = 3.560, 95% CI 1.009, 12.560), and respiratory failure (OR = 1.971, 95% CI 1.188, 3.265) were found to be the risk factors significantly associated with failing the primary hearing screening.

4. Discussion

Hearing screening in neonates is recognized as a crucial method to detect hearing loss early. In this study, the prevalence of failing the primary hearing screening in a population of surviving preterm infants was 6.8%. However, after full audiological diagnostic workup, the prevalence of hearing loss was found to be relatively low (0.04%). The prevalence of hearing loss has been found to be about 0.1–0.6% in healthy infants worldwide [1,2], with an even higher incidence in very premature infants (up to 15.3%) [11]. However, there exists disagreement in the estimates of hearing loss, with some authors reporting a much lower prevalence (0.3–2.2%) in preterm infants [12–15]. Several studies in Chinese populations found different results as well. Sun et al. [16] found the incidence of premature infants failing the hearing screen to be as high as 34.09%. Xia et al. [17] found similar results, with 38.4% of premature infants failing the primary screening and 18.3% of those who failed the primary screening also failed the secondary screening. In the auditory brainstem response (ABR) test conducted three months after birth, the failure rate was 22.2% [17]. Li et al. [18] found the incidence of hearing loss in premature infants to be up to 7.76%. However, in this study, we found a much lower prevalence (0.04%) of hearing loss in preterm infants. In our study, 6.8% of premature infants failed the primary hearing screening, and only 0.04% of the population was actually diagnosed with hearing loss; these results are inconsistent with other reports from Chinese populations. There are many different factors that may contribute to the large diversity in the incidence of hearing loss in premature infants reported in the literature [12], including differences in cohort selection and differences in birth weight or gestational age

Download English Version:

<https://daneshyari.com/en/article/5714649>

Download Persian Version:

<https://daneshyari.com/article/5714649>

[Daneshyari.com](https://daneshyari.com)