Audiological Monitoring of Infants with Risk Indicators for Hearing Loss

Monitoramento Audiológico em Bebês com Indicadores de Risco para Deficiência Auditiva

Monitoreo de la Audición en los Bebés con Índice de Riesgo para la Pérdida Auditiva

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Abstract

Objective: To describe the results of an audiological monitoring program for infants with risk indicators for hearing loss and identify the profile of mothers of infants who participated in the program. **Methods:** Descriptive and cross-sectional study. Fifty-six records were collected of infants between 6 and 18 months with "pass" result in Newborn Hearing Screening and presence of risk factors for hearing loss. Parents/guardians answered two questionnaires: concerning the sociodemographic profile of mother; and infant's motor, hearing and language development; and the following audiological monitoring procedures were performed: Behavioral Observation Audiometry, Visual Reinforcement Audiometry and Cochlear-eyelid Reflex research. **Results:** Of the 56 selected infants, only 22 (39.28%) participated in the audiological monitoring; with a mean age of 11.6 months, predominantly male, mixed ethnicity and more frequent risk indicators: ototoxic medication, permanence in intensive care unit for more than five days, hyperbilirubinemia and severe perinatal anoxia. All of the infants evaluated had adequate responses in the Behavioral Observation Audiometry and Cochlear-eyelid Reflex research; 19 (86.36%) infants had adequate results in the Visual Reinforcement Audiometry. Of the 22 mothers, all had their children in public hospital and 18 (81.8%) received no guidance on audiological monitoring before participating in this study. **Conclusion:** There was normal predominance in the auditory development of the infants assessed, predominance of young and housewife mothers, and high dropout rate, indicating a need for actions to promote information about the importance of monitoring the auditory development and strategies that facilitate access and adhesion to audiological monitoring.

Keywords: Hearing; Hearing Tests; Risk Index; Infant; Hearing Loss.

Resumo

Objetivo: Descrever os resultados de um programa de monitoramento audiológico em lactentes com indicadores de risco para deficiência auditiva e identificar o perfil das mães dos bebês que participaram do programa. Método: Estudo descritivo e transversal. Foram coletados 56 prontuários de lactentes

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entre 6 e 18 meses, resultado "passa" na Triagem Auditiva Neonatal e presença de indicadores de risco. Os pais/responsáveis responderam dois questionários sobre o perfil sociodemográfico materno e o desenvolvimento motor, auditivo e da linguagem do lactente, e foram realizados os procedimentos: Audiometria de Observação Comportamental, Audiometria com Reforço Visual e pesquisa do Reflexo Cócleo-palpebral. Resultados: Dos 56 lactentes selecionados, 22 (39,28%) compareceram ao monitoramento, com média de 11,6 meses, predominância do sexo masculino e etnia parda. Indicadores de risco mais frequentes: medicamento ototóxico, permanência em unidade de terapia intensiva maior que cinco dias, hiperbilirrubinemia e anóxia perinatal grave. Todos os bebês avaliados apresentaram respostas adequadas na Audiometria de Observação Comportamental e presença do Reflexo Cócleo-palpebral, e 19 (86,36%) resultados adequados na Audiometria com Reforço Visual. Das 22 mães, todas tiveram filhos em maternidade pública e 18 (81,8%) não foram orientadas sobre o monitoramento audiológico antes da participação neste estudo. Conclusão: Predomínio de normalidade no desenvolvimento auditivo dos lactentes avaliados, perfil de mães predominantemente jovens e donas do lar, e alta taxa de evasão, indicando a necessidade de ações que promovam informações sobre a importância do acompanhamento do desenvolvimento auditivo e estratégias que facilitem o acesso e a adesão ao monitoramento audiológico.

Palavras-chave: Audição; Testes Auditivos; Indicador de risco; Lactente; Perda Auditiva.

Resumen

Objetivo: Describir los resultados de un programa de monitoreo de la audición para niños con índice de riesgo para la pérdida auditiva e identificar el perfil de las madres de los bebes que participaron en el programa. Métodos: Estudio descriptivo y transversal. Recogieron 56 registros de niños entre 6 y 18 meses, resultado "pasa" en el Triage Auditivo del Recién Nacido e índice de riesgo. Los padres/tutores respondieron cuestionarios sobre el perfil sociodemográfico de la madre y el desarrollo motor, de la audición y del lenguaje infantil. Realizados los procedimientos: Audiometría de la Observación Conductual, Audiometría de Refuerzo Visual e investigación de Reflexión Chocleo-párpado. Resultados: Solo 22 (39,28%) niños participaron del monitoreo, con media de 11,6 meses, hubo predominio masculino y origen étnico mixto. Índices de riesgo más frecuentes: medicamentos ototóxicos, permanencia en la unidad de cuidados intensivos, hiperbilirrubinemia y anoxia perinatal severa. Todos los niños lograron respuestas adecuadas en la Audiometría de la Observación Conductual y en el Reflexión Chocleo-párpado, y 19 (86,36%) resultados adecuados en el Audiometría de Refuerzo Visual. Todas las madres tenían a sus hijos en el hospital público y 18 (81,8%) no fueron orientadas acerca del monitoreo antes de la participación en este estudio. Conclusión: Predominio normal en el desarrollo auditivo de los niños, predominio de las madres jóvenes y amas de casa y alta tasa de deserción, lo que indica la necesidad de acciones para promocionar informaciones sobre la importancia y estrategias que faciliten el acceso y la adhesión a el monitoreo.

Palabras clave: Audición; Pruebas Auditivas; Índice de Riesgo; Lactante; Pérdida Auditiva.

Introduction

Hearing loss in newborns and infants is considered a serious public health problem, because it results in harm to language, cognitive, social and emotional development[1].

Considering the high prevalence of hearing loss in newborns, both in developed and under-developed countries[2–5], the Joint Committee on Infant Hearing (JCIH)[6] has determined that Newborn Hearing Screening (NHS) must be measured by physiological measurements by means of the Auditory Brainstem Response (ABR) test and/or by Otoacoustic Emission (OAE) testing. In Brazil, in the year 2010, Law No.12.303 was passed, making it mandatory to perform NHS in all maternity clinics and hospitals in the country[7].

The infant that obtained the "pass" result in NHS and who has risk indicators for hearing loss (RIHL) either late and/or progressive, must undergo audiological monitoring, according to Lewis et al (2010)[3], until the third year of life. However, the JCIH (2007)[6] recommends that the baby should be monitored at least once in the period between 24 and 30 months of age, while the Care Guidelines for Newborn Hearing Screening (CGNHS) (2012) [8] recommend that monitoring must be performed between 7 and 12 months of age. These authors

also recommend that NHS in newborns with RIHL should preferably be performed by automatic ABR (ABR-A), because it is a procedure with broader scope that may identify retrocochlear changes that are not identified by means of OAE[3,6,8].

Audiological monitoring enables evaluation of the development of behavioral and linguistic aspects connected with maturation of the auditory pathways and abilities of detection, discrimination, location and recognition of sound. Therefore, there is evident need for performing audiological monitoring for the detection and diagnosis of late and/or progressive hearing loss, thereby enabling adequate treatment to be provided so that the child develops its auditory skills as close as possible to the period of greater neural plasticity and development of language.

The CGNHS[8] recommend audiological monitoring of babies with RIHL and a "pass" result in NHS by means of Visual Reinforcement Audiometry (VRA) with transducers inserted into the child's ears and Acoustic immittance testing. However, in the literature, there are also records of other procedures for audiological monitoring, such as VRA in a free field setup, by using a portable or conventional audiometer coupled to loud speaker systems and reinforced lighting; Behavioral observation audiometry (BOA); and Conditioned Play Audiometry (CPA); in addition to Cochlear-eyelid reflex research (CER) and electrophysiological measurements such as OAE and ABR[2,9–12].

In a study by Araújo et al.[13] involving 169 infants with RIHL and "pass" result in NHS, the authors applied a questionnaire to the parents/guardians, by means of telephone contact, about the infant's auditory and language development, and in the case of suspected change, the parents were asked to bring the baby for audiological monitoring. Five babies were summoned, and three were evaluated, of whom two were identified as having conductive hearing loss.

In another research[12] conducted with 159 infants with "pass" result in NHS, with and without RIHL, babies between six and 32 months old were monitored by means of behavioral responses to calibrated and uncalibrated sounds. The research found that the majority of children with or without RIHL had adequate responses to the procedures, however, the presence of RIHL produced an effect on the responses; that is, the majority of the inadequate responses were from babies with RIHL.

The literature shows that audiological monitoring has demonstrated a low rate of late and/or progressive hearing losses, however the losses diagnosed were initially neglected by the families or caregiver professionals; moreover, delay in auditory abilities has been shown in various studies, which could culminate in delayed oral language development[9,12,13].

The family's knowledge about the development of hearing within the pattern of normality is important for identifying changes; and in science, monitoring is important as it may help with guiding parents to identify simple, but important signs that show whether or not the baby is developing within the expected patterns.

Conducting this study is therefore justified, to contribute and back up the importance of audiological monitoring to promote the early detection of late and/or progressive hearing losses and identify delays in hearing development in infants, with the objectives of describing the results of an audiological monitoring program in infants with RIHL and identifying the profile of the mothers of babies who participated in the program.

Methods

This was a descriptive cross-sectional study. This study was approved by the Research Ethics Committee of the institution, CAAE Protocol No. 39852214.6.0000.0057. All the parents/guardians of the infants included in the research signed the Term of Free and Informed Consent (TFIC), in accordance with Resolution No. 466/2012 of the National Health Council (NHC).

The authors selected the record charts of infants who underwent NHS at a Speech Therapy clinic-school in the period from May 2013 to November 2014, who fulfilled the following inclusion criteria: Ages between six and 18 months; "pass" result in NHS with transient OAE; and presence of one or more RIHL, in accordance with JCIH[6] and Lewis et al[3]. Excluded from the study were incomplete record charts, and persons who refused to sign the TFIC.

NHS was performed in accordance with the protocol of the institution, which uses OAE for screening all the babies, and the newborn with RIHL are referred to a reference institution in Hearing Health Care in the state, to have ABR performed.

The parents/guardians were invited by means of telephone contact to have the audiological monitoring procedures of the infant performed, at a date and time according to the vacancies available.

Initially the RIHL data were collected from the infants' record charts, considering RIHL present in an isolated manner, and when associated with other factors.

The parents/guardians responded to two questionnaires: one containing questions about the mother's sociodemographic profile, drawn up by the researchers; and the other of Araújo et al. (2013)[13] adapted by the authors, with respect to the infant's motor, auditory and language development. The response possibilities were "yes" for positive responses; "no" for negative responses; and "did not know how to report" for situations about which the parents/guardians did not know how to answer the question.

All the infants were submitted to the following procedures: BOA, VRA in a free field and CER research.

For BOA, percussion of rattle, rattle-like and triangle instruments were used while the infant was sitting on the guardian's lap. The first examiner remained behind the participant, performing percussion of the instruments, and the second examiner remained in front of the infant, performing the distraction technique. The instruments wear presented at weak intensity and in the right and left side locations, alternately, at a distance of approximately 20 centimeters from the auricle.

Responses were considered adequate, according to Northern and Downs[14]: localization of the source of sound laterally between 4 and 7 months of age; localization of the source of sound laterally and indirectly downwards between 7 and 9 months of age; localization of the source of sound laterally and directly downwards between 9 and 13 months of age; localization of the source of sound laterally, directly downwards and indirectly upwards between 13 and 16 months of age; and localization of the source of sound laterally and directly downwards and upwards between 16 and 21 months of age.

After BOA, VRA was performed to research the minimal response levels (MRL) and the speech awareness threshold (SAT) with the infant in the acoustic cabin, seated on the guardian's lap, according to Lidén and Kankkunen (1969)[15]. The audiometer model AC 33 from Interacoustics® was used, calibrated in accordance with the international standard ISO 8253-1, and free field system with Suzuki & Ogiba coupled to Orlandi® Speakers, composed of two sound speakers for the output of auditory stimulus, each with four illuminated visual play reinforcements, positioned at Azimuth 90° and at 50 centimeters from the baby.

To research the MRLs, conditioning was initially performed, in which visual stimulation and frequency-modulated (warble) tones in the sound field were presented simultaneously, with an intensity of 50 dB SPL, at the frequency of 1000 Hz. After this time interval, evaluation with visual stimulation was performed, presented after the sound stimulation that was supplied bilaterally, in an alternated manner, at the frequencies of 500, 1000, 2000 and 4000 Hz, with the technique of descending 10 dB in steps of 10 dB at a time. For the SAT research, the evaluator's voice was used, also in the descending technique by means of using the same equipment.

The VRA results were considered adequate according to the parameters adapted from Lemos et al. (2007)[16], when the baby's head turned in the direction of the sound stimuli, with an interval of approximately 5 seconds for response to the presentation of visual reinforcement, otherwise, the reinforcement was not presented. The minimum response level considered for the warble tone and for speech was up to 30 dB SPL, in accordance with Suzuki and Ogiba[17].

The CER research was conducted with percussion of the agogô instrument, large bell, in the lateral plane with an intensity higher than 90 dB SPL[18]. CER was considered present when the infant made the movement of blinking his/her eyes to the intense sound, according to Azevedo et al[19].

After performing the procedures, the parents/guardians were duly instructed to follow up the auditory development of the babies with adequate results; those with infants that had inadequate results, received referral for having ABR performed and to seek an otorhinolaryngologist for audiological evaluation and diagnosis, at the reference institution in Hearing Health Care of the state; and the infants that did not cooperate with having the procedures performed, not only received referral, but were integrated into the routine of attendance at the institution.

The infant's age was measured in months, according to the date of birth recorded on the birth

certificate. For ethnicity, the skin color reported by the parents/guardians was adopted, in accordance with the official nomenclature of demographic census (white, mulatto, yellow, indigenous or black)[20].

For data tabulation and analysis, the program Statistical Package for Social Science (SPSS) version 21 was used. For analysis of the normality of quantitative variables, the Shapiro-Wilk normality test was performed. The quantitative variables of the sociodemographic questionnaire (mother's age at time of infant's birth); from the infants record chart (infant's age); the MRLs, and the SAT of the VRA were analyzed by mean and standard deviation. The categorical variables collected from the infant's record chart (sex, RIHL presence); from the sociodemographic questionnaire (infants' ethnicity and maternal variables: type of birth, maternity, educational level, marital status, profession, family income, infant's birth order and about audiological monitoring guidance); the responses with reference to the questionnaire about the infants' motor, auditory and language development; result of VRA, BOA and presence of CER were expressed by means of simple and relative frequencies.

Results

Record charts were selected of 56 infants who fulfilled the inclusion criteria. Of these, the parents/guardians of 14 (25%) could not be contacted because the number provided was wrong or it was identified as nonexistent, appointments were made for 15 (26.78%) but they did not show up, and five (8.92%) were unable to make appointments for other reasons, such as they were already being followed up at another institution, or they were no longer resident in the same municipality. The participants in data collection were 22 infants (39.28%), whose ethnicity was as follows: one (4.54%) was white, 17 (77.3%) mulatto and four (18.2%) black. The parents/guardians did not report any babies of yellow or indigenous ethnicity.

In Table 1 the demographic and RIHL data of the participants are demonstrated.

Table 1. Demographic data and risk indicators for hearing loss (RIHL) of infants attended in the audiological monitoring program

Infants (N = 22)	
Age (months)	11.6 ± 2.51
Sex (male)	13 (59.1%)
Ethnicity (mulatto)	17 (77.3%)
RIHL	
Ototoxic Medication	7 (31.8%)
ICU	5 (22.7%)
Hyperbilirubinemia	4 (18.2%)
Severe Perinatal Anoxia	4 (18.2%)

Legend: RIHL= Risk indicator for hearing loss; ICU= Intensive Care Unit

Of the 22 infants evaluated, nine (40.9%) presented the combination of two or more RIHL, with the most common combination being permanence in the intensive care unit (UTI) for longer than five days, and the use of mechanical ventilation, either accompanied by other indicators, or not, which occurred in three babies (13.6%). Of the total of 22 mothers, all had their children in public maternity hospitals, with 13 (59.1%) being by normal birth and 9 (40.9%) by cesarean section. For 15 (68.2%) mothers, the baby evaluated was their first child, and 18 (81.8%) mothers had not been instructed about audiological monitoring before being invited to participate in the present research.

In Table 2, the sociodemographic data of the mothers of infants evaluated may be observed.

Table 2. Mother's sociodemographic profile

Mothers (N = 22)		
Age at time of infant's birth (years)		26.6 ± 7.07
Educational level		
	Primary school incomplete	1 (4.5%)
	Primary school complete	2 (9.1%)
	High school incomplete	2 (9.1%)
	High school complete	15 (68.2%)
	Higher education	2 (9.1%)
Marital Status		
	Single	2 (9.1%)
	Stable Union	16 (72.7%)
	Married	4 (18.2%)
Profession		
	Housewife	12 (54.5%)
	Remunerated Occupation	8 (36.4%)
	Domestic Worker	1 (4.5%)
	Student	1 (4.5%)
Family Income		
	Up to 1 minimum wage	3 (13.6%)
	From 1 to 3 minimum wages	17 (77.3%)
	Above 3 minimum wages	2 (9.1%)

When performing BOA, all the infants had adequate results in localizing the source of sound, according their respective age groups. In Figure 1 it is possible to observe how many infants obtained adequate and inadequate responses, or did not cooperate with completely performing the VRA, and one baby (4.54%) did not cooperate with partially performing the procedure. The presence of CER was observed in all the infants evaluated.

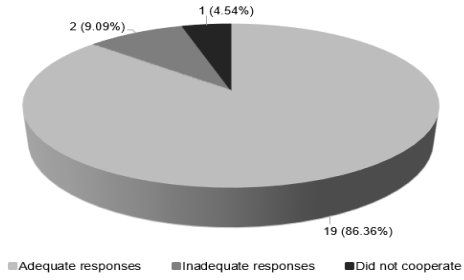

Figure 1. Visual Reinforcement Audiometry (VRA) Result

The mean value of the result of each frequency with reference to the minimum response levels of the VRA are set out in Table 3.

Table 3. Minimum levels of response of infants assessed in visual reinforcement audiometry (VRA)

Frequency	500 Hz	1000 Hz	2000 Hz	4000 Hz	Alert Level for Speech
Mean (dB SPL)	30.75	30.71	31.19	31.43	30.71
Standard Deviation	2.44	2.39	3.84	4.5	3.27
	N = 20	N = 21	N = 21	N = 21	N = 21

Legend: dB SPL= Decibel sound pressure level; Hz= Hertz

In Figure 2 it is possible to observe the positive responses to the questionnaire on motor, auditory and language development per age group, of the 22 infants evaluated. Of the two infants who presented inadequate results in the VRA, negative responses were obtained for one infant to the questions "Does the baby recognize some names in the family?", "Does baby try to imitate sounds you make for him/her?" and "Does he/she wave goodbye when you ask him/her to?"; and no negative responses were found in the questionnaire of one infant. As regards motor development, 100% of the infant we able to sit without support; that is they presented adequate development for performing the procedures.

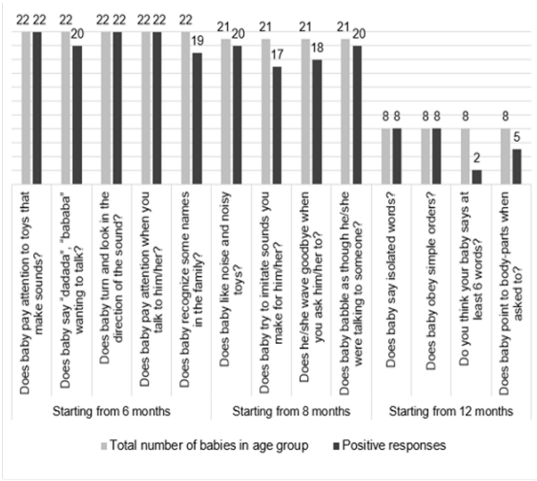

Figure 2. Positive responses to the questionnaire about motor, auditory and language development per age group of infants evaluated

Discussion

Two infants evaluated had inadequate results in the VRA, who, in spite of excluding a profound degree of change in the better ear, presented MRL values below of the expected values in all of the frequencies evaluated (500, 1000, 2000 and 4000 Hz) and in SAT. These findings corroborate those in the literature[9,12,13], that demonstrate a low rate of inadequate results in one or more monitoring procedures. These auditory changes are more difficult to identify, because they are hardly perceptible, and are not clearly manifested in the child's behavior, being capable of resulting in delay in the development of language. Without audiological monitoring, the possible changes found in this study could be neglected, both by the parents/guardians and by the professional caregivers of the babies.

Of the infants with inadequate responses, one 14-month-old baby presented permanence in the ICU for longer than five days, mechanical ventilation and ototoxic medication as RIHL; and one 11-month-old baby presented with congenital infection as RIHL. In view of the combination of RIHL and change in the VRA, the presence of late and/or progressive change in hearing could be expected. Therefore, specific medical evaluation and physiological procedures such as ABR are necessary for the differential diagnosis.

The results found indicate the need for performing two or more procedures to compose audiological monitoring, because one single procedure does not appear to be efficient to evaluate the development of auditory abilities[2,9–12], seeing that the infants with inadequate results in the VRA obtained adequate results in BOA. The procedures used for evaluating newborn babies and infants do not offer absolute results, as they are incapable of obtaining the auditory thresholds with precision. Therefore, the cross-check principle proposed by Jerger and Hayes (1976)[21], began to be used in the audiological evaluation of populations that are difficult to evaluate, such as babies under 3 years of age. JCIH (2000)[22] also propose the use of cross-checking to perform NHS.

The cross-check principle is characterized as the use of the result of a procedure to confirm the result of another performed previously[21,23]. As far as audiological monitoring is concerned, ABR is used to confirm the results of behavioral evaluations such as VRA and BOA, particularly when there are divergences in the results between the two procedures performed in parallel[23], as reported in the present research.

This concerns a limitation of this study - the fact that ABR was not performed, and also not during NHS, due to the institution's protocol with regard to audiological monitoring. Referring subjects to have ABR performed at another institution does not allow access to the result of this procedure at the time of audiological monitoring, thereby not allowing researchers to take the opportunity of doing a cross-check to confirm the results of evaluations of babies involved in this study.

As regards RIHL, there was predominance of the use of ototoxic medication, permanence in ICU and hyperbilirubinemia. Technological

advancement has helped the survival of preterm newborn babies and the reduction in neonatal mortality, and has consequently brought about the increase in the occurrence of risk indicators such as permanence in the ICU, prematurity and use of ototoxic medication, which may be observed in this study[24]. Other studies[11–13,25] involving audiological monitoring have also verified one or more of these three indicators as being one of the most frequent, however, in three of these, the main indicator was the family history of hearing loss, and in the other, it was prematurity.

The presence of RIHL, particularly of the indicator prematurity, may be the reason for the negative responses found in the questionnaire about the infant's motor, auditory and language development, irrespective of the result found in the VRA, BOA procedures and CER research. This is because the RIHLs may influence the development of the baby and culminate in a possible delay in maturation of auditory abilities and development of language, seeing that negative responses were found to the questions "does baby recognize some names in the family?; "Does baby try to imitate sounds you make for him/her?"; "Does baby babble as though he/she were talking to someone?" among others that may indicate this delay. Therefore, the parents/guardians must be instructed to follow up the baby's auditory and language development.

The parents/guardians of one of the infants with inadequate results in the audiological monitoring responded positively to all the questions in the questionnaire. According to one study[26], the ways mothers use to observe the auditory development of their children, comparing them with other children, perceiving whether the child looks when he/she is called, or whether he/she reacts to sounds such as clapping hands, are not inadequate, however, light and moderate hearing losses, that show no evident signs, are diagnosed late, at the time of going to school, which corroborates the study of Araújo et al[13], who identified no negative responses from the parents of infants who had inadequate results in monitoring, when they were asked whether the child heard well.

The use of subjective methods of evaluation requires the cooperation and responses of the infant so that the evaluation will be successful, because the results depend on the behavior observed during the procedure. Therefore, the uncooperative behavior of the child became a limitation for evaluating and obtaining the results in this research. Moreover, the results found indicated whether or not there was a possible change, and objective evaluations were necessary to confirm and specify the result previously found. In spite of these limitations, the behavioral methods gave the audiologist the opportunity to evaluate the auditory and linguistic behavior of the infant during the attendance, and have a lower cost than the objective methods, with regard to the equipment used.

The lack of knowledge about the purpose of the evaluations made by the infant's health care professionals and the evaluations made during audiological monitoring culminate in the belief that it would be possible to identify hearing losses by means of otoscopic exam[26]. This belief, allied to the lack of guidance of the infant's professional caregivers, corroborate in reinforcing the idea that it is unnecessary to perform audiological monitoring.

As regards the failure to show up with infants in the monitoring program, the results revealed a high rate of evasion by the participants (60.7%), indicating the need for actions that promote more information among the population and health professionals, about what audiological monitoring is, its importance to follow up the development of auditory abilities, and the risk that late and/or progressive hearing losses may lead to in oral language development[27].

Of the total 56 infants, 15 (26.78%) appointments were made, but they did not show up for attendance. In the literature, the main reasons found[11,27] for non-adhesion to audiological monitoring by the mothers were: forgetting the day of the consultation, because the appointment was made for a time months after the NHS; lack of knowledge with respect to the baby's hearing health; socioeconomic situation; impossibility of appearing at the time of the attendance; mother of two or more children needing her care; low level of education and lack of information about the importance of audiological monitoring for the child's hearing health.

In the present research, the researchers were unable to contact the parents/guardians of 14 babies (25%) because the telephone number provided was wrong or identified as being nonexistent. At present the possibility of the population have access to mobile telephones guarantees communication at any time with the subscriber, however mobile phones are more predisposed to problems of mobile

telephone signals and change of contact number easily occurs. No show by babies with audiological monitoring appointments in this study corroborates the above-mentioned factors described in the literature.

Another reason that favors non-adhesion to monitoring is the lack of knowledge about its importance, and lack of appreciation of early audiological monitoring by health professionals involved in the pre-, peri-, and post-natal periods, in addition to the doctors that follow-up the development of infants[5,11,28,29]. In the present study, 18 mothers (81.8%) who kept the appointments received no guidance about monitoring before they were contacted to participate in the research, culminating in the lack of information about the importance of audiological monitoring.

The sociodemographic profile of the babies' mothers who participated in the monitoring is in agreement with a study[11] that analyzed communication strategies to guarantee maternal adhesion to an audiological monitoring program, confirming that the mothers felt more motivated and encouraged to follow the guidance when they have a higher educational level and/or when their partner is interested in the baby's hearing health, improving the chances of adhering to monitoring. The fact of the baby being the first child also contributes to adhesion, because inexperienced mothers tend to be more concerned with the baby's health because they have no way of comparing this with another model of normal auditory development[11].

Conclusion

The results of the audiological monitoring program in infants with RIHL revealed predominance of normality in the development of auditory abilities of the infants evaluated, a small number of changes and a high rate of evasion.

The profile of the babies' mothers who participated in the audiological monitoring program was predominantly made up of young women and housewives, and the participant infant was the first born child.

The results obtained in this study indicated the need for actions that promoted providing more information to the population about the significance and importance of following up the auditory development of infants with RIHL, in addition to strategies that facilitate access and adhesion to audiological monitoring.

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