

Maternal Perspectives of Newborn Hearing Loss in Resource Constrained Settings of Rawalpindi Pakistan

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ABSTRACT

Objective: The objective of this study was to assess knowledge of mothers regarding risk factors, early identification, and intervention for infant hearing loss and to determine association between hearing loss and consanguineous marriages in Pakistan.

Study Design: Analytical cross-sectional study.

Place and Duration of Study: Out Patient Department of tertiary care hospitals in Rawalpindi Pakistan, from Mar to Jun 2021.

Methodology: 111 mothers consented to participate. Data was collected using a structured researcher administered questionnaire. It included four sections with 37 questions that were answered in yes, no, or unsure. Analysis was done using SPSS software.

Results: Mothers' knowledge of two risk factors was high with most respondents being aware of head injury or slap to the ear (n=94) being a risk for hearing loss, followed by ear pain/discharge (n=88). 66.7% (n=72) of participants considered use of ototoxic drugs by mother during pregnancy to be a potent risk factor for neonatal hearing loss. The mothers' understanding of natal causes such as delayed birth cry and neonatal jaundice was poor. Their understanding of postnatal causes such as high fever, frequent hospitalization, and long stay in NICU was also limited. Mothers who were employed had significantly more awareness in certain factors than housewives. 45.4% (n=49) of the mothers believed being in a cousin marriage influenced infant hearing loss while 38.9% (n=42) disagreed, and 15.7% (n=17) were unsure.

Conclusion: Only half of all participating mothers were fully aware of the possible risk factors and causes of infant hearing loss. Seminars and public awareness programs should be arranged to educate mothers about risks of infant hearing loss.

Keywords: Bilateral hearing loss, Deafness, Infant, Maternal behavior, Maternal and child health, Risk factors.

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INTRODUCTION

Hearing loss is the one of the most prevalent disorders in the developing world.^{1,2} Hearing loss can be congenital or acquired later in life. Failure to detect and manage hearing loss promptly compromises early childhood development with long lasting developmental consequences. For instance, the detection of congenital and early onset hearing loss after 6 months of age is strongly associated with significant deficits in speech, linguistic, cognitive, psychosocial, and educational development in the affected children, even with appropriate rehabilitation.³ Parental decisions regarding early identification of hearing impairment and provision of appropriate intervention have life-long consequences for the hearing-impaired child. Such a decision is predicated on parental knowledge and attitude regarding available options.^{3,4} Reports have shown that public awareness and attitude towards childhood disabilities in developing countries, are poor and often exacerbated by unfavorable superstitious

beliefs with poor public awareness and attitude towards disabilities in childhood aggravated by superstitious customs and beliefs in developing countries.^{2,3,5}

Multiple etiological causes contribute to infant hearing loss such as prenatal, perinatal, or postnatal conditions, along with genetic factors.⁵ Primary prevention with newborn screening performed by audiologist can allow for quicker and better rehabilitation before the child enters adult life.⁶⁻⁸

Pakistan is a developing country with bilateral hearing loss affecting around 1.6 people per 1000 in Pakistan, with consanguineous families accounting for 70% of the increase.⁹ According to a survey carried out in Pakistan's rural areas, 7.9% prevalence of deafness was estimated.¹⁰ Autosomal recessive non-syndromic hearing loss, which accounts for 80% of genetic cases, is typically congenital, whereas autosomal dominant non-syndromic hearing loss, which accounts for the remaining 20% of cases, is often progressive with a later age of onset X-linked or maternal mitochondrial DNA-related modes of inheritance are rare. The

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frequency of hearing loss increases with inter family marriages, because it leads to increased chances of a child inheriting two copies of a defective gene from a shared common ancestor, perpetuating otherwise recessive genetic disorders. Focused genetic counselling and health education will lead to a decrease in the prevalence of inherited HL. Parental awareness and attitudes toward hearing loss is critical for the success of early identification and rehabilitation programs initiated by various public and private organizations. However, there is a scarcity of research in Pakistan that investigates mothers' perspectives on the risk factors for hearing loss, as well as its early detection and intervention.

METHODOLOGY

A cross-sectional study was conducted at a tertiary level facility of Rawalpindi Pakistan. Mothers reporting to Out-patient Department of Ear Nose and Throat Department were surveyed about their knowledge of risk factors regarding infant hearing loss, its early detection, and early interventions for it. Non-probability consecutive sampling was done to acquire a sample size of 111 mothers over a period of four months, starting from March 2021 and concluding in June 2021. Data collection commenced after obtaining approval from Institution Review Committee (IRC)/ Ethical Review Board (ERB), certificate reference number: A structured questionnaire adapted from Dudda *et al.*⁴ and Memon *et al.*¹⁰ was used as a data collection tool. All respondents signed a written consent form after giving informed consent. Name, age, gender, profession, education, consanguinity, and history of previous deliveries was recorded as part of demographic variables in data collection tool. It was divided into five sections. The first section included five questions about newborn care. The second part contains fourteen questions about the risk factors of hearing loss in infants. The third section assessed respondents' beliefs about early detection of hearing loss through their responses to six questions. The fourth section assessed respondents' knowledge about early intervention in case of hearing loss. For those who were unable to complete the questionnaire themselves due to lack of literacy, four interviewers recorded respondents' answers on the data collection tool. The collected responses were recorded as being yes, no, or unsure. The findings were statistically analyzed using the Statistical Package for Social Sciences (SPSS) software version 20.0 (IBM, New York).

RESULTS

Our sample consisted of 111 completely and correctly filled data collection tools. The mean age of respondents was 35.19±10.16 years comprising of 64% (n=71) housewives and 36% (n=40) working women. More than half of the respondents (55%, n=61) had attained university level of education while 66.6% (n=74) of spouses had attained university level of education. 86.4% (n=96) women had delivered children in a hospital while 10.8% (n=12) delivered at home. 52.2% (n=58) of the respondents had delivered through spontaneous initiation of labor while 45% (n=50) delivered via a cesarean section in a hospital. Majority of the participants in our survey did not have a consanguineous marriage (63.9%, n= 71) while 35.1% (n=39) of respondents reported being married to their cousin. Most of the respondents in our survey were not pregnant (90.9%, n=101) at the time of data collection. 7.2% (n=8) of respondents reported having a family history of infant hearing loss.

44.1% (n=49) of respondents believed being in a cousin marriage influenced infant hearing loss while 37.8% (n=42) disagreed, and 15.3% (n=17) were unsure. Most mothers were aware that hearing loss can be caused by head injury or slap to the ear (84.6%, n=94). Notably, 71.1% (n=79) mothers believed that family history could be a major risk factor for hearing loss. 64.8% (n=72) of participants considered use of non-prescribed ototoxic drugs by mother during pregnancy to be a potent risk factor for neonatal hearing loss. However, maternal understanding of natal causes such as delayed birth cry (40.5%, n=45) and neonatal jaundice (29.7%, n=33) was far less.

Study showed low maternal awareness of role of audiologist in screening and identification of hearing loss in children (57.6%, n=64). Maternal awareness of the appearance of congenital hearing loss (92.7%, n=103), as well as attitudes toward the importance of screening programs (89.1%, n=99) and follow-up testing (85.5%, n=95), were high. The mothers were also aware of hearing loss symptoms such as sudden withdrawal of child, inconsistent responses to name call and low school performance which could indicate the presence of late-onset hearing loss (84.6%, n=94) or auditory dyssynchrony (86.4%, n=96). Encouragingly, (72.9%, n=81) mothers believed that home remedies for ear pain and discharge were not effective. Chi-square test was applied on participants education level and was significant (*p*-value <0.05) for higher education having more awareness regarding relation between

hearing loss and neonatal jaundice, ear pain and discharge, whether audio therapy is necessary for a child wearing a hearing aid and whether children with congenital hearing loss can speak like hearing children. Chi square was also applied to working women’s awareness for factors compared to housewives. It came out to be significant (p -value <0.05) for working women having more awareness regarding relation between neonatal jaundice, premature delivery, low birth weight (<1.75 kg) or more than 5 days NICU admission and hearing loss along with awareness of role of audiologist in screening, assessing, diagnosing and managing hearing loss. Chi square was also applied to consanguinity and level of awareness, but no factors came out to be strongly significant.

Table-I: Demographic Characteristics of Participants

Maternal Age: Mean =35.20±10.15		
Demographic Variable	(n)	%age
Occupation		
Housewife	71	64.0%
Working woman	40	36.0%
Education of Respondent		
No education	2	1.8%
Matric	14	12.7%
Intermediate	18	16.4%
University	61	55.5%
Below matric	15	13.6%
Education of Spouse		
Matric	13	11.8%
Intermediate	11	10.0%
University	74	67.3%
Below matric	12	10.9%
Currently Pregnant		
Yes	9	8.2%
No	101	91.8%
Birth Given at		
Hospital	96	88.9%
Home	12	11.1%
Mode of Birth		
Natural delivery	58	53.7%
C-section	50	46.3%
Consanguineous Marriage		
Yes	39	35.5%
No	71	64.5%

DISCUSSION

Globally, the World Health Organization projects that by 2050 nearly 2.5 billion people will have some degree of hearing loss with the majority requiring hearing rehabilitation. Over 1 billion young adults are at risk of permanent, avoidable hearing loss due to unsafe listening practices.¹¹ In response to the World Health Assembly resolution WHA70.13 on prevention

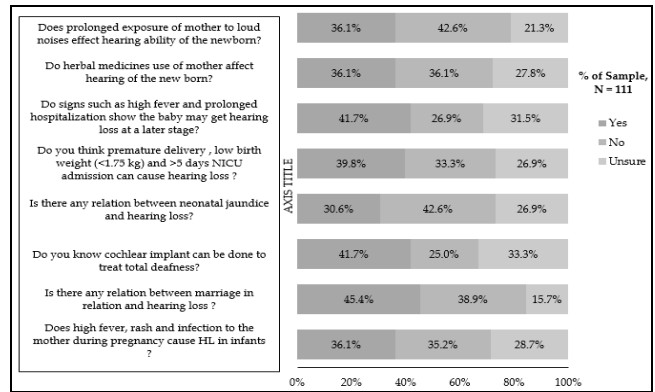


Figure-1: Risk Factors Associated with Low Maternal Awareness

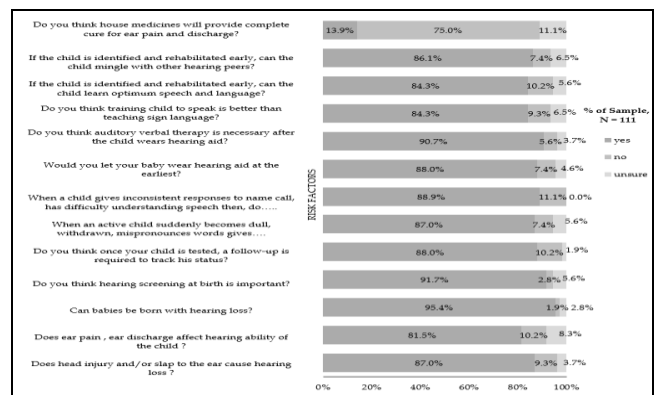


Figure-2: Risk Factors Associated with High Maternal Awareness

of deafness and hearing loss, the Government of Pakistan initiated actions in 2017 for the provision of hearing aids free of cost to all its citizens, and a limited number of cochlear implants for deaf children. Currently, the government plans to launch the largest National Newborn Screening Program, which will ensure early identification of hearing loss, ensuring prompt rehabilitation, so that every citizen of the country will have the opportunity to realize their highest potential in spite of their hearing impediment,² narrative contributed by Dr Maryam Mallick, Technical Advisor, WHO Pakistan in World Report On Hearing 2021.

Unidentified congenital hearing loss can have a negative impact on speechlanguage development, academic performance, and socioemotional development.^{4,8} In this regard, existing ENT clinics may be staffed with trained audiologists in order to perform accurate screening for hearing loss with no additional burden on the national health economy using existing international sources of funding.¹² Otoacoustic Emissions (OAEs) are an important screening test

that can be performed in neonates to detect hearing loss by eliciting low intensity sounds by outer hair cells in a normal cochlea by using a sensitive microphone placed in the external ear canal and analyzed by computer. Inter-family marriages have been associated with multiple genetic diseases. Hearing loss has been documented to be uniquely associated with genetic mutations within Indian and Pakistan families.^{9,13} However, cultural and social norms prevent physicians from initiating conversation regarding genetic screening and counselling against cousin marriages.¹⁴ This needs to be targeted with effective policy measures at the national level to lessen the burden of genetic diseases on Pakistan's fragile healthcare sector. A study conducted in Saudi Arabia concluded there was 76% increased risk for consanguineous marriage progeny to develop SNHL when compared to non consanguineous progeny. According to the another study conducted in Saudi Arabia the risk of having more than one child with SNHL in consanguineous marriage is 3.5 times higher than that of non consanguineous mating.

According to WHO, In children, almost 60% of hearing loss can be prevented through measures such as immunization for prevention of rubella and meningitis, improved maternal and neonatal care, and screening for, and early management of, otitis media-inflammatory diseases of the middle ear. Identification is the first step in addressing hearing loss and related ear diseases. Clinical screening at strategic points in life ensure that any loss of hearing and ear diseases can be identified as early as possible. Once diagnosed, early intervention is key. Medical and surgical treatment can cure most ear diseases, potentially reversing the associated hearing loss. However, where hearing loss is irreversible, rehabilitation can ensure that those affected avoid the adverse consequences of hearing loss. A range of effective options are available. Hearing technology, such as hearing aids and cochlear implants, when accompanied by appropriate support services and rehabilitative therapy are effective and cost-effective and can benefit children and adults alike.

Maternal hearing loss recognition knowledge is critical to the success of an early detection and intervention program and our findings are similar to other low literacy developing countries.^{4,15,16} Our study revealed an elevated level of awareness of mothers regarding ear infections (79.3%), slap to the ear or head injury (84.7%), family history (71.2%), ototoxic medications (64.9%) as major causes of hearing loss,

consistent with mothers in South Africa (79%) identified ear discharge as a risk factor,^{6,17} due to the visible nature of this condition. Mothers with low literacy had limited knowledge of neonatal jaundice, delayed birth cry, infant's admission to the Neonatal Intensive Care Unit (NICU) for more than five to seven days as a higher risk factor for developing neonatal hearing loss which may delay the detection of hearing loss and subsequent timely intervention, similar to a study done in Sindh, Pakistan, showing limited maternal knowledge on newborn care.¹⁰ This contrasts with a study done in India which found that 7.6% of women were aware that stillbirth, neonatal mortality, obstetrical complications, and congenital malformations could lead to consanguineous marriage.⁴

In developing countries like Pakistan, the major hindrances for establishing an effective screening program are the costs involved, the non-availability of equipment and human resources.^{18,19} Thus, educating mothers will support early detection and management of hearing loss. Mothers' attitudes toward the importance of screening, follow-up testing, and the advantages of early intervention for infant hearing loss are favorable.³ A lack of understanding about the management of hearing loss, age-appropriate hearing aid fitting, cochlear implant therapy need, and home medicines will cause a delay in hearing loss intervention and life-long consequences for the children involved.

LIMITATION OF STUDY

Our study was limited by its small sample size and limited access to tertiary care hospitals. Language barrier was also encountered where the participant's primary mode of communication was a language other than Urdu. Paternal level of awareness was also not acquired as very few fathers accompanied their children or spouses to ENT clinics.

CONCLUSION

Our study concluded that: Only half of all participating mothers were fully aware of the possible risk factors and causes of infant hearing loss. There was better understanding about the screening of hearing loss and its interventions amongst the mothers. There was significant association between the level of education of mother and their awareness regarding infant hearing loss. The relation between mother's working status and awareness was also significant, with working women having better understanding.

Conflict of Interest: None.

Author Contribution

Following authors have made substantial contributions to the manuscript as under:

SFM: Supervision, conception, design, revising & final approval of the version to be published.

NR: Co-Supervision, Drafting of Article, Data analysis, Revising & final approval of the version to be published.

FA:, AS:, AAM: Conception, Design, Intellectual Content & final approval of the version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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