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Original Article

Infant Hearing Loss: Are Mothers Aware?

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ABSTRACT

If hearing impairment goes unnoticed, negative effects on the infant's communication, academic, learning, socio-emotional, and language skills occur. Mothers have an essential and significant role in screening and early intervention. Hence, the level of their knowledge and attitude needs to be addressed. **Objective:** To determine the maternal awareness towards infant hearing loss. **Methods:** This cross-sectional study was conducted at Isra University, Islamabad from February to July 2020. The study recruited a sample of n=377 pregnant women aged 18-45 years, utilizing convenience sampling. A basic demographic sheet and a Maternal Awareness about Hearing Loss questionnaire were used for data collection. Data were statistically analyzed using SPSS Version 26.0. ANOVA and independent sample t-test statistics were utilized to determine any significant difference in knowledge and attitude scores for demographic variables and $p< 0.05$ was considered significant. **Results:** Overall mothers responded positively to knowledge and attitude items with good scores for knowledge (25.71 ± 6.27) and attitude (8.01 ± 1.88). There was a significant ($p<0.05$) difference in knowledge and attitude scores for educational level, financial status, and employment status and age revealed significant difference for level of knowledge. **Conclusions:** This study concluded that maternal awareness about hearing loss is variably distributed for different risk factors and has a positive attitude about hearing loss and a highly positive attitude and willingness to accept the management options in case hearing loss is detected.

INTRODUCTION

Hearing impairment (HI) is a common disability and according to the World Health Organization (WHO), 6.1% of the total population of the world is suffering permanent hearing loss (HL) including 7% of children, with an estimated 900 million HL by 2050 [1]. Prevalence of permanent HL above 40 dB in neonates varies from 1-6/1000 (overall 2.21/1000) with higher prevalence in Asian countries and Neonatal Intensive Care Unit (NICU) population [2]. In Pakistan too, 1.6 per 100 have bilateral HL and 70% increase is due to consanguineous families [3]. HL affects children by causing a delay in receptive and expressive language development. Language delays may result in hurdles to achieving academic goals; it affects the ability of children to communicate causing feelings of depression, loneliness, frustration, and poor self-concept as well as affecting vocational choices [4]. Detection of HI under the age of 6 months positively affects language acquisition and lingual achievements [5]. According to Nasralla et al., when parents accept the HI of their child, this is the start of the communicational development of the child both verbal as well as gestures [6]. The establishment of the National Health Service (NHS) is extremely helpful in reducing the average age for identification of babies with permanent childhood hearing loss. The overall success depends on providing timely and effective diagnostic and intervention services [7]. It also depends on parental

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perception, educational level, and economic and social status and these factors could limit the timely screening and intervention. So, it is very important to assess the parental perspective towards screening [8]. The parents of neonates have a very important role in screening and early intervention. Their decisions mainly depend on the knowledge they have and their attitude. Their decisions toward the identification of HL and early intervention of HL may have lifelong effects on the infant's life [9]. The attitude of parents toward their children's HI depends on the knowledge and hopes they have for their child's growth which also depends on culture, and socio-societal values [10]. Infants who suffer from hearing loss need the right support, care, and early intervention services to promote healthy development. If hearing impairment goes unnoticed for many years, it may have negative effects on the infant's communication and language skills because most children pass the age of development of language. Thus, Parental awareness of infant HL is of significant importance for the implementation of Early Hearing Detection and Intervention (EHDI) programs to be done successfully [11]. Hence, keeping in view the high prevalence of HL [3], the importance of parental involvement in the identification and early intervention of HL [9], and the fact that parental attitudes toward their HI children depend on knowledge and hopes which might vary with culture and socio-societal values, this study was conducted. The objective of the study was to determine maternal awareness of infant hearing loss [3, 9].

The rationale behind this study was to explore the existing knowledge and information of mothers about childhood HL and about childhood HL which could eventually lead to early intervention and management of these children. The study highlighted the crucial role of mothers in the implementation of the early detection of childhood hearing loss. This study is very important since on the one hand, it highlight the knowledge and attitude of mothers in the implementation of early detection of childhood hearing loss and, on the other hand, provided policymakers valuable data to design future strategies for early detection and management of HI children.

METHODS

This cross-sectional study was conducted at Isra University, Islamabad over 6 months from 1st February to 31st July 2020. The study recruited a sample of n=377 pregnant women from the Gynecology outpatient department of Sir Ganga Ram Hospital, Lahore utilizing convenience sampling, after calculating a sample of n=377 participants using the Raosoft online calculator, at a confidence level of 95%, margin of error 5% and population of 2000. Inclusion Criteria: The sample included women of reproductive age including 18-45 years and who were pregnant in any trimester. Exclusion Criteria: Females who were not pregnant and below or above age 18-45 years were excluded from the study. A basic demographic sheet and standardized questionnaire for Maternal Awareness about hearing loss for pregnant women were used for data collection [12]. Maternal Awareness about Hearing Loss is a reliable tool to determine maternal awareness regarding hearing loss for pregnant women developed by Olusanya *et al.*, (12). The tool has high reliability of α=0.84 and 0.83 for the 2-mains. It consists of a total of 15 items, including in the first domain it has 12 items designed to ascertain a respondent's knowledge with a score range of 12 to 38, and in the second domain it has 3 items with a score range of 3 to 9 to measure the attitude toward early detection and intervention. For each item, the responses noted included 1 for "No" response, 2 for "Not sure" and 3 for "Yes" with a mean score of 2.5 and above considered high [12]. The study was conducted following ethical approval of research from the Advanced Study and Research Committee, Isra Institute of Rehabilitation Sciences (IIRS), Isra University, Islamabad, vide reference number F.I/IUIC-IIRS/ASRC-055/2020, and informed consent of participants. All ethical principles were followed and the confidentiality of participants was maintained. Data were collected by the researchers directly from the pregnant women who visited the hospital, using the questionnaire, and the questionnaires were filled by the researchers as per participant responses. Following data collection, it was statistically analyzed using SPSS Version 26.0. One-way ANOVA was used to determine statistically significant differences in knowledge and attitude for age, education, financial status and number of children, while independent sample t-test statistics were utilized to determine any significant difference in knowledge and attitude scores for demographic variables of employment status and any disability in facility $P< 0.05$ was considered significant.

RESULTS

The current cross-sectional study with a sample of n=377 comprised a population of 18-45 years with 225 (59.7%) being 25-31 years of age and 159 (42.2%) having secondary and university level education. Financial status of most 196 (52%) was middle level and majority 308 (81.7%) were unemployed with 226 (59.9%) having 1-2 children. The majority 338 (89.7%) had no disability in a family (Table 1).

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Table 1: Demographic Variables of the Participants

Variables	Group	n (%)
Age (Years)	18-24	86 (22.8)
	25-31	225 (59.7)
	32-38	56 (14.9)
	39-45	10 (2.7)
Educational level	No formal Education	37 (9.8)
	Primary	22 (5.8)
	Secondary	159 (42.2)
	University Level	159 (42.2)
Financial Status	Low	159 (42.2)
	Middle	196 (52)
	High	22 (5.8)
Employment Status	Yes	69 (18.3)
	No	308 (81.7)
No. of Children	Nil	93 (24.7)
	1-2	226 (59.9)
	3-4	40 (10.6)
	Above 4	18 (4.8)
Any Disability in the Family	Yes	39 (10.3)
	No	338 (89.7)

Most mothers responded positively to knowledge items with high mean scores except for items "Convulsions can cause HL" and "Native medicine can cause HL", for which most were unsure; "Jaundice can cause HL" and "Hearing impaired children can still hear and speak" for which most mothers responded negatively with low mean scores. For attitudes, most mothers responded positively with high mean scores for each item (Table 2).

Table 2: Descriptive Statistics of Maternal Knowledge and Attitude (n=377)

Group	Item	No n (%)	Unsure n (%)	Yes n (%)	Mean ± SD
Knowledge	Babies can be born with HL	36 (9.5)	74 (19.6)	267 (70.8)	2.61 ± 0.66
	High fever can cause HL	84 (22.3)	134 (35.5)	159 (42.2)	2.20 ± 0.78
	Measles can cause HL	101 (26.8)	128 (34)	148 (39.3)	2.12 ± 0.80
	Ear discharge can cause HL	78 (20.7)	103 (27.3)	196 (51)	2.31 ± 0.80
	Convulsions can cause HL	114 (30.2)	146 (38.7)	117 (31)	2.01 ± 0.78
	Drugs can cause HL	105 (27.9)	139 (36.9)	133 (35.3)	2.07 ± 0.79
	Native medicine can cause HL	126 (33.4)	153 (40.6)	98 (26)	1.93 ± 0.77
	Prolonged Noise can cause HL	103 (27.3)	125 (33.2)	149 (39.5)	2.12 ± 0.81
	Jaundice can cause HL	134 (35.5)	112 (29.7)	131 (34.7)	1.99 ± 0.84
	Delay in crying at bath can cause HL	59 (15.6)	77 (20.4)	241 (63.9)	2.48 ± 0.75
	Detection is possible soon after birth	43 (11.4)	79 (21)	255 (67.6)	2.56 ± 0.69
	Hearing impaired children can still hear and speak	312 (82.8)	15 (4)	50 (13.3)	1.31 ± 0.69
	Total	-	-	-	25.71 ± 6.27
Attitude	Would like baby tested after birth	36 (9.5)	3 (0.8)	338 (89.7)	2.80 ± 0.59
	Would use hearing aids	82 (21.8)	9 (2.4)	286 75.9)	2.54 ± 0.83
	Would use hearing aids if provided at no cost	48 (12.7)	29 (7.7)	300 (79.6)	2.67 ± 0.69
	Total	-	-	-	8.01 ± 1.88

Anova statistics (Table 3) show that knowledge mean scores of participants differ significantly (p=0.000) for different age groups with the highest scores (26.91 ± 6.27) for the 25-31 years age group, while attitudes scores did not reveal significant difference for different age groups (p=0.132). Knowledge and attitude scores revealed significant (p=0.000) differences for educational level with the highest scores for university level. Knowledge and attitude scores also revealed significant (p=0.000) differences in the Financial status of mothers with the highest scores for higher levels of status. There was no significant difference in knowledge and attitude scores for several children with p=0.292 and p=0.069 respectively. Knowledge and attitude scores revealed significantly higher scores for those who were employed with p=0.000 and p=0.012 respectively. There was no significant difference in knowledge and attitude scores for any disability in a family with p=0.427

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and p=0.063 respectively.

Table 3: Demographic Variables vs. Mean Scores of Maternal Knowledge and Attitude. Cross Tabulation (n=377)

Variable	Category	Group (n)	Mean ± SD	f/t	P
Age (Years)	Knowledge	18-24 (86)	23.02 ± 5.96	8.783	0.000
		25-31 (225)	26.91 ± 6.27		
		32-38 (56)	25.25 ± 5.46		
		39-45 (10)	24.30 ± 6.17		
	Attitude	18-24 (86)	7.92 ± 2.01	1.881	0.132
		25-31 (225)	8.16 ± 1.74		
		32-38 (56)	7.52 ± 2.14		
		39-45 (10)	8.20 ± 1.69		
Education	Knowledge	No Formal Education (37)	22.00 ± 6.32	22.745	0.000
		Primary (22)	23.41 ± 6.04		
		Secondary (159)	24.09 ± 5.76		
		University Level (159)	28.50 ± 5.65		
	Attitude	No Formal Education (37)	7.35 ± 2.19	9.689	0.000
		Primary (22)	6.45 ± 2.77		
		Secondary (159)	7.97 ± 1.91		
		University Level (159)	8.42 ± 1.41		
Financial Status	Knowledge	Low (159)	23.68 ± 5.84	21.592	0.000
		Middle (196)	26.73 ± 6.12		
		High (22)	31.23 ± 5.12		
	Attitude	Low (159)	7.63 ± 2.12	7.722	0.000
		Middle (196)	8.21 ± 1.70		
		High (22)	9.00 ± 0.00		
No of children	Knowledge	Nil (93)	26.13 ± 6.74	1.248	0.292
		1-2 (226)	25.86 ± 6.32		
		3-4 (40)	23.95 ± 5.12		
		>4 (18)	25.44 ± 5.12		
	Attitude	Nil (93)	7.81 ± 2.14	2.382	0.069
		1-2 (226)	8.15 ± 1.77		
		3-4 (40)	7.48 ± 1.89		
		>4 (18)	8.56 ± 1.29		
Employment Status	Knowledge	Yes (69)	29.19 ± 5.56	5.286	0.000
		No (308)	24.93 ± 6.16		
	Attitude	Yes (69)	8.52 ± 1.27	2.523	0.012
		No (308)	7.90 ± 1.97		
Any Disability in Family	Knowledge	Yes (39)	26.46 ± 6.092	0.795	0.427
		No (338)	5.62 ± 6.29		
	Attitude	Yes (39)	8.54 ± 1.47	1.863	0.063
		No (338)	7.95 ± 1.91		

DISCUSSION

The current study utilized a sample of N=377 mothers, aged 18-45 years and 42.2% having secondary and University level education each with 52% belonging to the middle class to determine the maternal awareness towards infant Hearing Loss (HL), since Parents have been reported to be more effective than professionals in the early diagnosis of a wide range of child health problems [13]. The study results showed that maternal awareness was good about prevailing risk factors that cause hearing loss in infants and excellent attitude towards infant hearing testing right after birth and fitting of hearing aids except for item "convulsions can cause HL" and for which most were unsure; "Jaundice can cause HL" and "Hearing impaired children can still hear and speak" for which most mothers responded negatively with low mean scores. For attitudes, most mothers responded positively with high mean scores for each item. Similarly, Al-Yahya *et al.*, in a Saudi Arabian study reported a high level of awareness of mothers about risk factors except for the impact of late crying of baby, jaundice after birth, high-grade temperature, and infections during

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pregnancy [14]. In slight disagreement, a study by Dudda *et al.*, reported great awareness of mothers for visible factors and for attitudes they were positive for early screening and follow-up for HI, however, knowledge was deficient for newborn jaundice, Neonatal Intensive Care Unit (NICU) stay, late occurring and neural HI, its management, fitting of hearing devices and need of rehab [15]. Jattoo *et al.*, revealed a low level of knowledge regarding screening of newborns for HI and risk factors of HI, however, they revealed acceptance of screening [16]. A low level of knowledge regarding newborn Hearing screening, though there is a will to accept screening among mothers [17]. A very positive maternal attitude towards early detection of hearing loss is a wake-up call to all related healthcare professionals. Technology has expanded the band of possibilities related to infant hearing screening. Parental denial when HL is diagnosed is a usual source of concern in early intervention [16]. However, it is appreciated that a majority of mothers showed a highly positive response regarding their infant's hearing test right after birth and readiness to use hearing aids for their children if needed. When the option of free hearing aid provision was given, only a minimal increase occurred. The current study showed that knowledge mean scores of participants differed significantly (p=0.000) for different age groups with the highest scores for the 25-31 years age group, while attitudes scores did not reveal significant differences for different age groups (p=0.132). Similarly, in another study age was the only factor associated with knowledge [18]. In the present study, Knowledge and attitude scores revealed significant (p=0.000) differences for educational level with the highest scores for university level. The study results documented that those participants who have secondary and tertiary level education revealed better knowledge about risk factors of HL and a positive attitude toward early detection of HL in their infants. In contrast, study by Jatto *et al.*, revealed no association with educational level [16]. Educational level did not have any association with awareness as well [17]. However, in a study by Yunis *et al.*, both mother and father's educational level seemed to predict childbirth morbidity with illiteracy in mothers contributing to a 3 to 5 times increase in NICU admission and longer hospital stay [19]. In the current study knowledge and attitude scores, also revealed significant (p=0.000) differences in the Financial status of mothers with the highest scores for higher socioeconomic status. Similarly, the literature reveals the acceptance of screening for HL is associated with the financial situation [16]. Willingness to accept NHS was associated with financial status [17]. In a similar analogy, in the present study Knowledge and attitude scores revealed significantly higher scores for those who were employed with p=0.000 and p=0.012 respectively. Present study results showed that maternal knowledge about the presence of hearing loss at the time of birth was good and lower level of maternal knowledge about HL due to high fever. The maternal knowledge for ear discharge, measles, prolonged noise, and jaundice scores was in decreasing order with maternal knowledge about ear discharge was more than other factors. An international study conducted recently in 2021 documented similar results. Postpartum mothers' knowledge was highest for measles and ear discharge but low for native medicine as well as on other causes of infant HL. The maternal attitude was generally very positive and the majority would accept hearing aid as an Infant Hearing Loss (IHL) intervention [20]. Another study revealed maternal awareness of measles, discharging ear, jaundice, native medicine, and birth asphyxia causing hearing loss in decreasing order of frequency; with very positive behavior towards National Health Service (NHS), and increased acceptance of Hearing Aids (HA) [18]. Discharging ear is a familiar childhood ailment for many mothers [21]. A questionnaire-based study by Kaspar *et al.*, in 2017 showed that parental responses were positive and higher readiness level towards their baby's hearing screening. The current study supports the results of this study [22]. The current study showed that maternal knowledge was good about prevailing risk factors causing HL and excellent attitude towards infant hearing testing after birth and fitting hearing aids if required. A cross-sectional study was conducted in 2018 in Saudi Arabia to assess maternal awareness about IHL. This study's results were consistent with the current study as maternal knowledge was good towards risk factors and great attitude for hearing testing of their babies rightly after birth [14].

CONCLUSIONS

This study concluded that maternal awareness about hearing loss is variably distributed for different risk factors and has a positive attitude about hearing loss and a highly positive attitude & willingness to accept the management options in case detected hearing loss.

Authors Contribution

Conceptualization: AA,
Methodology: MA, TD
Formal analysis: AA, NM, GS
Writing, review and editing: NM, AI, GS

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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