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Original Research Article

Auditory development and its significance: an awareness study among expectant mothers in Kottarakkara taluk, Kerala

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ABSTRACT

Background: Studying pregnant women's awareness of auditory development's importance, especially in India, is an underexplored area. Given mothers' pivotal role in monitoring child development, their understanding of auditory development is crucial. Addressing this gap could reveal insights into early hearing issue detection.
Method: The study utilized a questionnaire survey employing Cluster sampling, gathering data from 103 expectant mothers aged 18 to 35. Of these, 55 were experiencing their first pregnancy, while 48 were on their second. The 16 question survey explored hearing loss, early identification, auditory behaviour, and high-risk indicators.
Results: The study found that pregnant women, on average, exhibited a 42.35% knowledge level regarding the importance of auditory development during gestation. However, their attitude towards this aspect was notably high at 81.53%. This suggests a lack of awareness about auditory development, despite a generally positive attitude among expectant mothers. Importantly, there was a statistically significant difference in knowledge between first-time and experienced mothers ($p<0.05$), with the latter group demonstrating higher awareness, likely due to having older children. Conversely, no significant difference was observed in attitude between the two groups ($p>0.05$).
Conclusions: The study's findings shed light on a crucial aspect: the significance of maternal knowledge concerning hearing and its development. This understanding is pivotal for successful early identification and intervention programs. The study's contribution lies in revealing mothers' perspectives and attitudes towards monitoring their child's speech, language, and motor development, emphasizing the importance of this awareness for early intervention strategies.

Keywords: Newborn, Significance of auditory development, Knowledge, Attitude, Pregnant women

INTRODUCTION

A child's prenatal experiences and health significantly shape his/her development. Early exposure to sensory stimuli, including maternal noises in the womb, is crucial for brain development. While the fetus encounters low-frequency sounds in utero, the extent and timing of their impact on the newborn's brain development remain uncertain. Understanding this influence could clarify how prenatal experiences affect early brain development.[1]

Evidence suggests the foetus starts to hear at about 28 weeks into the third trimester. Reactions to auditory stimulus are constant during this time and a noticeable 30 dB reduction in sounds coming from outside the mother, as both human and animal studies report. Inspite of the reduction on sound reaching the infant, external speech sounds and noises are heard by the foetus and receives only about 30% of phonetic information though can grasp intonation within the amniotic sac effectively. Empirical evidence suggests the developing embryo can hear

mother's voice or its different tones, potentially possessing short-term auditory memory by the end of pregnancy.[2]

Intact auditory skills are crucial for a child's speech, language, social, cognitive and academic development. Normal hearing is essential for oral communication, influencing speech perception and production. Babies rapidly develop language in their early months, emphasizing the need for early detection to prevent long-term impacts on speech, academics, social skills, and emotional health. Undetected hearing loss leads to disabilities, altering life trajectories in speech, academics, social readiness, and emotional well-being.[3]

India is a developing nation, with 2nd population in the world and a very high prevalence of hearing loss.[4] The national institute on deafness and other communication disorders (2002) estimates that every year, 12,000 new babies are diagnosed with hearing loss.[5] There are several causes of infant hearing loss, around 50% are unclear, with the remaining cases likely to be caused by genetic or other sources.[5] The causes of the bilateral congenital hearing loss were unknown (41.5%), genetic non-syndromic (27.2%), prenatal (11.5%), perinatal (9.7%), postnatal (6.6%), and genetic syndromic (3.5%), respectively.[6]

It is estimated that 4000-6000 new-borns and young children who passed the new-born screening test, developed hearing loss at 1-3 years of age. This increases to 16000 to 18000 numbers every year, making it the most prevalent birth condition.[7] Congenital bilateral hearing impairment affects 1 to 5 of 1000 live births, and with persistent unilateral hearing loss also present, the incidence rises to 8of1000 live births.[8]

In India, the prevalence for hearing impairment is 2% more among children’s adults. It is important that the mothers are explained and made aware about the risk factors, effects and management of congenital hearing loss.[9]

Early detection and treatment of hearing loss within first 6 months improve language development, academic success, social integration, and inclusion.[10] According to the center for disease control and prevention (CDC), follow-up documentation is missed among 43% children referred after hearing screening.[10] Language development was reported to be better among children who were identified and provided rehabilitation early. The study reported by Moeller, showed that children who received intervention at an early age (before 11 months) were seen show better vocabulary and verbal reasoning scores at the age of 5 years compared with those who had undergone interventions later.[12]

A cross sectional study was conducted by using questionnaire on general public on awareness and knowledge of hearing loss, hearing management modalities, speech and language pathology at two malls in Saudi Arabia.[13] The results suggested public awareness lacks in hearing loss and management despite moderate speech understanding. Health care professionals crucial for improving community knowledge.

Need of the study

Maternal engagement in monitoring children's development, including hearing, is vital for early intervention. However, there's a lack of research on expecting mothers' awareness of auditory development, especially in Kerala, India. Therefore, the proposed study seeks to look at expecting mothers' knowledge and attitudes about auditory development. It focuses on the impact of normal hearing on speech, language, and overall development. The research aims to uncover any misconceptions or lack of awareness among expecting mothers. Often, parents underestimate the likelihood of hearing issues in new-borns due to their young age, affecting beliefs about early diagnosis of hearing impairment in children.[14]

Only 22.5% of parents reported knowing when their infants normally started turning toward sound, and only 63.4% reported knowing when their infants typically began paying attention to familiar voices, according to a study done in Hong Kong.[15] The study aimed to gauge expecting mothers' understanding and attitudes toward the importance of hearing development, crucial for early intervention success.

The aim of the study was to evaluate the knowledge and attitude about significance of auditory development among expecting mothers

METHODS

Study design

Cross sectional study design was used.

The participants of the study were expecting mothers from Kottarakkara Taluk, Kerala. The study was carried during 2022.

Procedure

A 16 question multiple-choice survey in Malayalam was prepared and administrated on expecting mothers from Kottarakkara Taluk, Kerala. Five audiologists validated it for content and grammar, modified based on their feedback. The final version had two sections: demographic details and maternal knowledge and attitude about auditory development. Consent was obtained after explaining the study's aim, risks, and benefits. This information was also verbally communicated to pregnant women before obtaining their consent. Those who provided consent after receiving this information were included in the present study. Both participant anonymity

and the data confidentiality was maintained. Randomized cluster sampling technique was followed for the data collection.

The survey was administered with the help of Anganwadi teachers and hospital staff, ensuring clarity in responses. The participants for the study were 103 expecting women with varying gestation period from 3 to 7 months from Kottarakkara Taluk, Kerala.

Sample size

Population size of the total female in Kottarakkara thaluk was found to be 312331 (NSSO, Census report 2011). It was reported that around 33% of the total population belonged to the age of 18-35, which will be 103069 and it was also estimated that the prevalence of females to be pregnant as 1%. Keeping this data, the population size of expecting mothers in this Taluk was approximately 1030 and the sample size for the study can be in the range from 103-154.[11]

Inclusion criteria

The participants included were expecting woman of 3 to 7 month gestation, those belonging to different family set ups like nuclear and joint family. They also had reading and writing skills in Malayalam language as the questionnaire was prepared in that language.

Exclusion criteria

Mothers who had any sibling/family member with hearing impairment were not included considering that they already had some hear and say knowledge about hearing impairment and developed some attitude based on the exposure.

Ethical considerations

The study was approved by the Institutional ethical committee, Bangalore speech and hearing trust wide the approval letter no is Bshrf/RC/IEC/D/09/MASLP/2021-22 on 8th July 2022.The documentation was done along the guidelines of APA 7th Edition (American psychological association).

Statistical analysis

Collected responses were categorized by pregnancy status and education level. Responses were coded and later analyzed using IBM SPSS software. Both descriptive and inferential statistics were used to analyze the data. Percentages were calculated to determine overall knowledge and attitude among participants. The Kolmogorov-Smirnov test was used to assess the normality of the data. Mann-Whitney U Test was carried out to compare responses between first and subsequent pregnancies.

RESULTS

Among the 103 participants, 55 were women who were expecting for the first time, while 48 of the participants were pregnancy with their second child.

Table 1 provides an overview of the sample's demographic information. The majority of the participants (51.5%) were between the ages of 26-30. The lowest participants (1%) were in the age range <20. The majority of the participants, 27 (26.2%), were in their 5-month gestation period, whereas the least number of participants, 16 (16.5%), were from their 7 months of gestation. The majority of the participants, 66 (64.07%) reported completing an undergraduate degree, while least 2 (1.94%) were below SSLC.

Table 1: Participant demographic information.

Demographic data	N	Percentage (%)
Age range (in years)		
<20	1	1
20-25	30	29.10
26-30	53	51.50
31-35	19	18.40
Gestation period (in months)		
3	17	16.50
4	23	22.30
5	27	26.20
6	20	19.40
7	16	15.50
Educational qualification		
<SSLC	2	1.94
SSLC	4	3.88
Higher secondary	14	13.59
Undergraduate	66	64.07
Postgraduate	17	16.50

Table 2 and 3 represents the knowledge and attitude about the significance of auditory development during the gestation period and infancy among the mothers who are expecting.

A total of twenty-three questions were provided, which were reduced to 16 after validation. The questionnaire contained of two sections, demographic data and attitude knowledge section. Out of the sixteen questions, ten of them were to assess the knowledge, while six of them were attitude assessing questions. Percentage was done to calculate the total percentage of knowledge and attitude among the subjects. Responses were coded as 3 for yes, 2 for unsure and 1 for no response for the statistical analysis.

Figure 1 represents the overall knowledge of pregnant women who participated in the study. The 42.35% of the participants knew the significance of auditory development during gestation and infancy among expectant mothers, whereas 25.50% of the participants

did not know this information, and 32.15% were uncertain about it. The total mean score was 21. Six (SD=4.43), obtained from the knowledge-based questions.

Table 2: Frequency and percentage table of knowledge-based questions.

Domain	Items	Categories	N	Percentage (%)
Knowledge	Q1	Yes	60	58.25
		Sure	34	33.00
		No	9	8.73
	Q2	Yes	83	80.58
		Sure	11	10.67
		No	9	8.73
	Q3	Yes	21	20.38
		Sure	40	38.83
		No	42	40.77
	Q4	Yes	33	32.03
		Sure	43	41.74
		No	27	26.21
	Q5	Yes	17	16.50
		Sure	47	45.63
		No	39	37.86
	Q6	Yes	29	28.15
		Sure	43	41.74
		No	31	30.09
	Q7	Yes	84	81.55
		Sure	14	13.59
		No	5	4.854
	Q8	Yes	21	20.38
		Sure	45	43.68
		No	37	35.92
	Q9	Yes	18	17.47
		Sure	38	36.89
		No	47	45.63
	Q10	Yes	70	67.96
		Sure	16	15.53
		No	17	16.50

Table 3: Frequency and percentage table of attitude-based questions.

Domain	Items	Categories	N	Percentage (%)
Attitude	Q11	Yes	52	50.48
		Sure	23	22.33
		No	28	27.18
	Q12	Yes	89	86.4
		Sure	8	7.76
		No	6	5.82
	Q13	Yes	91	88.34
		Sure	9	8.73
		No	3	2.91
	Q14	Yes	74	71.84
		Sure	18	17.47
		No	11	10.67
	Q15	Yes	102	99.02
		Sure	0	0
		No	1	0.97
	Q16	Yes	96	93.2
		Sure	2	1.94
		No	5	4.85

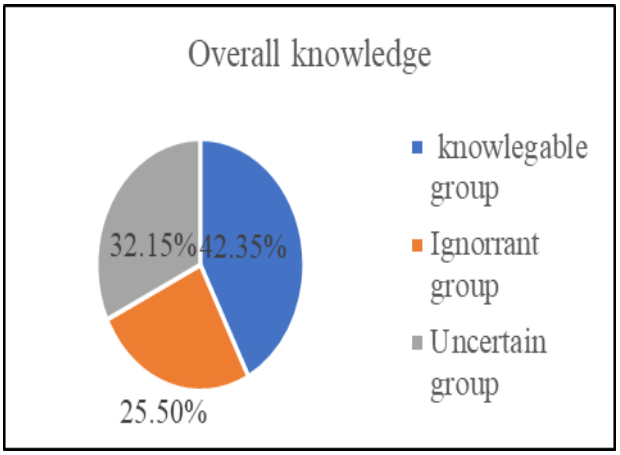

Figure 1: Overall knowledge of sample population.

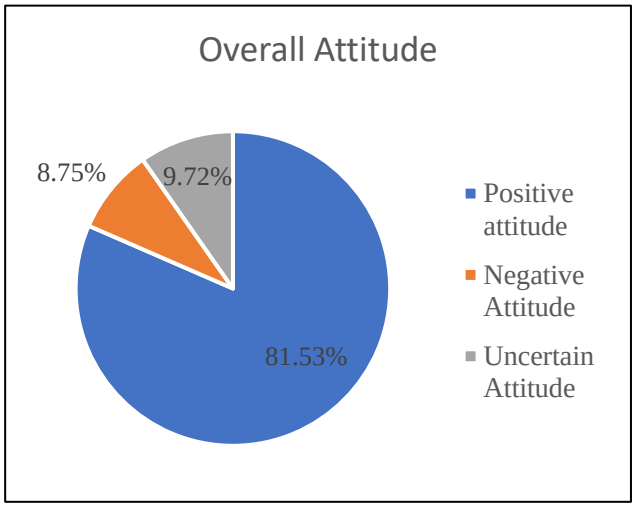

Figure 2: Overall attitude of the sample population.

Figure 2 represents the overall attitude of pregnant women who participated in the study. The 81.53% of the participants had a positive attitude towards the significance of auditory development during gestation and infancy among expectant mothers, whereas 8.75 % had a negative attitude, and 9.72% were uncertain about it. The total mean score was 16.3% (SD=1.6) obtained from the attitude-based questions.

Kolmogorov Smirnov test has been done to assess the normality of the data and the result indicated that the data failed to meet the assumptions of normality ($p<0.05$). Hence non-parametric test, Mann-Whitney U test was used for the comparison of responses obtained from women with their first pregnancy and second pregnancy.

Table 4: Comparison between 1st pregnancy and 2nd pregnancy based on knowledge.

Group	N	Mean rank	P value
1st pregnancy	55	42.19	0.000
2nd pregnancy	48	63.24	

P value was found to be less than 0.05, indicating that there is a significant difference in the knowledge scores between the two groups (1st and 2nd pregnancy) (Table 4).

Table 5: Comparison between 1st pregnancy and 2nd pregnancy based on attitude.

Group	N	Mean rank	P value
1st pregnancy	55	52.29	0.913
2nd pregnancy	48	51.67	

P=0.913 indicating no significant difference in attitude scores between the two groups, (Table 5).

DISCUSSION

The aim of the study was to investigate the knowledge and attitude about significance of auditory development among expecting mothers in Kottarakara Taluk, Kollam district Kerala. Absolutely, hearing loss can significantly impact various aspects of a child's life, including social, emotional, academic, and language development. Mothers play a pivotal role in monitoring these aspects, and early detection of hearing loss is crucial. Recognizing and addressing hearing issues within the first six months of life can substantially improve language skills, academic performance, social integration, and overall participation in society. Early intervention programs can greatly enhance a child's quality of life.[10] That correlation is compelling. Early interventions seem to significantly impact language development in children. Those who received assistance before 11 months displayed higher vocabulary and verbal reasoning scores by age five compared to those who received interventions later. Additionally, late recipients might experience delays in academic growth and classroom comprehension.[12] The literature reviews reveal that the parents are unaware of significance of auditory development.

The present study's aim was related to the knowledge and attitude of pregnant women about significance of auditory development in Kottarakara Taluk, Kollam district Kerala. The findings reveal that pregnant women's overall awareness of the importance of auditory development during gestation is at 42.35%. A notable percentage, 25.50%, lacked this knowledge, while 32.15% were uncertain. The average knowledge score from the questions was 21.6 (SD=4.43). This might relate to the subjects' lower education levels in the rural area, as education significantly impacts individual knowledge. Similar studies have also reported mean knowledge scores below 50% on hearing development.[15] In contrast most of the studies done on the knowledge of pregnant women, parents, caregivers, and different medical professionals around the world about various aspects of infant hearing loss, including causes of infant hearing loss, symptoms of infant hearing loss, newborn hearing screening, and identification and treatment of infant hearing loss. In the study by Kaspar and Newton (2018), most parents were knowledgeable about the causes of

hearing loss.[17] The majority of the mothers in a different study (Yahya and Muneef, 2020) were aware that ear infections (ear discharge and pain) and head injuries/slap on the ear could cause infants to lose their hearing.[18] A delayed birth cry, neonatal jaundice, high-grade fever and infection during pregnancy, early and elderly pregnancy, premature birth, low birth weight (>1.75 kg), and neonatal intensive care unit (NICU) hospitalization for more than five days were among the risk variables with the least amount of common knowledge.

In the current study, pregnant women demonstrated a positive attitude toward auditory development, with 81.53% holding a favorable perspective, 8.75% expressing negativity, and 9.72% feeling uncertain. The average attitude score was 16.3% (SD=1.6) from attitude-based questions. Lam et al study on parents' attitudes toward UNHS found positive sentiments despite limited understanding of screening. Parents acknowledged that screening facilitated early diagnosis, enabling beneficial actions for babies with hearing impairment, aligning with broader literature findings.[15]

A study compares the mothers' knowledge and attitudes toward childhood hearing loss in urban and rural areas.[19] The study found that mothers generally held a moderate level of knowledge and positive attitudes toward childhood hearing loss. Urban mothers exhibited notably higher knowledge compared to rural mothers. Surprisingly, there wasn't a significant correlation between knowledge and attitudes among mothers. Factors like age, race, occupation, and education level strongly influenced knowledge scores, while only race showed a significant correlation with attitude.

In the study comprising 103 participants, 55 (53.3%) were first-time expectant mothers, while 48 (46.6%) were expecting their second child. A statistical analysis using Mann-Whitney U test revealed a significant difference in knowledge between these groups ($p<0.005$), with mothers expecting their second child displaying higher knowledge levels than first-time expectant mothers. However, no significant difference was found in attitudes between the two groups ($p>0.05$). These results align with a study by Sahoo et al where mothers of newborns showed greater awareness of genetic and high-risk factors.[16] Additionally, the majority of participants exhibited a positive attitude toward newborn hearing screening.

When compared to the items on risk factors for hearing loss (mean score 2.3290.79) in a study, the items on identification and intervention had considerably higher maternal knowledge ratings (mean score 2.669 0.69).[20] More than one-third of mothers (68%) believed that it is possible to identify hearing loss as soon as the baby is born, 99% of mothers said they would like to have their baby's hearing tested immediately.

After birth, demonstrating the mothers' extremely favourable attitude toward infant hearing testing. Overall, mothers showed a very favourable attitude toward early hearing loss identification and treatments.

It's interesting that the study found pregnant women had lower awareness of the importance of auditory development, but mothers displayed a highly favorable attitude toward it. This aligns with other studies that also reported lower mean knowledge scores regarding hearing development while showing positive attitudes toward universal newborn hearing screening (UNHS), despite limited understanding of the screening process.[16] The results also indicated that there was a statistically significant difference between the knowledge of the two groups of participants, since the $p<0.05$, compared to 1st pregnancy, pregnant women who had older child were reported to have more knowledge. The study observed no significant difference in attitude scores between the two groups, aligning with findings from Sahoo et al.[16] Interestingly, mothers of newborns exhibited higher awareness of genetic (62.85%) and high-risk factors (56.19%) compared to pregnant women. Most participants held a positive attitude toward newborn hearing screening. This emphasizes the need to educate parents about developmental hearing milestones post-screening. Monitoring a child's speech, language, and motor skills by mothers is vital. Thus, maternal understanding of hearing's significance and development plays a crucial role in the success of early diagnosis and intervention programs.

Limitations

The study was conducted in accordance with the minimum sample size requirement which can have a drawback on the generalization of the present study's results. Difficulties were faced during the process of obtaining consent from the parents and caregivers due to their perception that questions are culturally inappropriate.

CONCLUSION

The results indicated that the pregnant women were less aware about the significance of auditory development. Mothers showed a very favourable attitude towards the significance of auditory development. Similar results are yielded in the study by Lam et al which indicated mean knowledge score regarding hearing development was lower whereas towards positive attitudes to UNHS despite poor understanding of the screening. The results also indicated that there was a statistically significant difference between the knowledge of the two groups of participants. Compared to pregnant women, mothers of new born were more aware of genetic and high-risk register factors. The majority of the participants showed positive attitude towards newborn hearing screening. This outcome highlighted how important it is to educate parents about the developmental milestones related to hearing that can be seen after screening. The development of a child speech, language, and motor skills must be

closely monitored by mothers. Therefore, a mothers' comprehension of the important hearing and its development is crucial to the success of early diagnosis and intervention programmes.

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