

Original Research Article

Awareness of newborn hearing screening in pediatricians and gynaecologists in Maharashtra, India

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ABSTRACT

Background: A successful implementation of newborn hearing screening program requires the active participation of several health care professionals like pediatricians, gynaecologists, neonatologists, nurses and audiologists. These professionals help the parents through the process of screening, diagnosis and intervention. If they are made alert and informed regarding the importance of hearing screening, then accurate diagnosis and early intervention of hearing loss will be possible. Hence, the aim was to study the awareness of newborn hearing screening among pediatricians and gynaecologists in the state of Maharashtra, India.

Methods: Questionnaire was prepared based on the review of literature and after content validation it was administered on 50 paediatricians and 50 gynaecologists via electronic mail and hard copy. Each participant had to place a tick against correct alternative out of 2 alternatives for each question.

Results: The present study revealed that overall awareness level of newborn hearing screening was moderate to high in pediatricians and moderate in gynaecologists. Independent sample t test indicated that there was a significant difference present in the awareness level of pediatricians and gynaecologists.

Conclusions: Majority of paediatricians and gynaecologists lacked complete information regarding the protocol, test procedures used in hearing screening and role of audiologists. Thus, continued education programs are necessary for updating the knowledge base regarding newborn hearing screening in primary care physicians.

Keywords: Awareness, Newborn hearing screening, Pediatricians, Gynaecologists

INTRODUCTION

The ability to hear is one of the five senses which helps us to communicate. Auditory sense is crucial for speech, language, cognitive and social-emotional development of the child. Hearing impairment being one of the most critical sensory impairments has a serious consequence on social and psychological development of the child. If congenital or acquired hearing loss in children remains undetected, it can lead to lifelong deficits in speech and language acquisition, academic performance,

socioeconomic and vocational aspects as well as problems in behaviour and personal-social life.¹⁻²

The Universal newborn hearing screening (UNHS) program enables hearing screening of all well babies and at-risk babies before they are discharged from the hospital or nursing home. The implementation of UNHS allows rapid audiological screening of newborns and further assessment if necessary. The joint committee of infant hearing position statement has recommended that all the states who follow the 1-3-6 benchmark (hearing

screening for all newborns within one month of birth, appropriate follow-up and diagnosis by three months of age and intervention to be initiated by no later than six months of age) must now strive for the 1-2-3 timeline.³ The success of UNHS lies on the capability to form a link between screening and effective diagnosis and treatment. The primary medical care team including physicians, paediatricians as well as the nurses are mainly involved in referral and ensuring a proper follow-up. The audiologists are involved in screening and further detailed audiological evaluation and treatment procedures. Parents form the backbone of this program before the birth of the child to beyond. The program can be successful only with their consent, co-operation and motivation.

The scenario in developing countries is very different with regards to the available resources and infrastructure, uniform/standard protocols used, experienced professionals and awareness in the society. Nishad et al reported an incidence of congenital hearing impairment in 7.21 per 1000 live births in well babies.⁴ In spite of the high prevalence of hearing loss, UNHS is still in the initiation phase in India and confined to individual centres or major hospitals. The medical professionals such as physicians, pediatricians and otorhinolaryngologists help the parents through the process of screening, diagnosis and intervention. Pediatricians and gynaecologists play an important role in preventing the hearing loss at the primary level of intervention. These professionals are the first ones who come in contact with newborns and their parents initially. Thus, their knowledge about the risk factors for neonatal hearing loss and attitude towards early intervention are of extreme importance. Majority of the studies done in India have focussed on the status of newborn hearing screening, awareness of UNHS in medical professionals, parents/caregivers and general public, the availability of these services and the knowledge and practices followed in UNHS.⁵⁻⁷

In India, Maharashtra is the third largest and second most populous state which is situated in the western peninsular region. According to status of disability in India (2000) the incidence of hearing impairment in this state is 270 (per lakh) for the 0-4 years age group and is 742 (per lakh) for the 5-12 years age group. Also, the report indicated that about 7 percent of the people had hearing loss since birth.

Thus owing to the high incidence, it is of utmost importance to study the awareness of newborn hearing screening among paediatricians and gynaecologists in Maharashtra, as the previous studies have suggested that detection of hearing loss is delayed due to lack of awareness regarding different tests used in UNHS and consequences of hearing impairment among health care professionals.⁸

Aim

The aim of the study was to study the awareness of newborn hearing screening in paediatricians and gynaecologists.

Objectives

The objective of the study was to study the level of awareness of newborn hearing screening in paediatricians; to study the level of awareness of newborn hearing screening in gynaecologists; to compare the level of awareness of newborn hearing screening among pediatricians and gynaecologists.

METHODS

Study design

A prospective cross-sectional survey was conducted at school of audiology and speech language pathology, Bharati Vidyapeeth (deemed to be university), Pune, Maharashtra, India. The study protocol was approved by the institutional ethical committee (BVDU/MC/IEC/21) and it was carried out from September 2019 till March 2020. Data was collected using the convenient sampling method.

Questionnaire

The questionnaire was developed based on previous studies in the literature and clinician's experience.^{5,6,9} The questionnaire was given to five audiologists and speech language pathologists with minimum ten years of experience for content validation. The questionnaire was finalised after incorporating the corrections and suggestions given by experts and it consisted of 5 domains: knowledge of newborn hearing screening, protocol used and causes of hearing loss; knowledge of test procedure used; knowledge about impact of hearing loss; role of audiologist in the screening; attitudes and beliefs regarding newborn hearing screening. The total score obtained on the questionnaire was 42. The final questionnaire was administered on 2 groups of medical professionals for pilot study.

Participants

A total of 100 medical professionals participated in the study. Participant information sheet and consent form was given prior to administering the questionnaire. The final questionnaire was administered on two groups. Group I included 50 paediatricians and Group II included 50 gynaecologists.

Inclusion criteria

Professionals who had specialization in paediatrics and gynaecology and professionals working in hospital set-

ups, private clinics, government sector and medical colleges were included in the study.

Exclusion criteria

Medical professionals who had specialization in field other than paediatrics or gynaecology and medical professionals having B.H.M.S. or B.A.M.S. qualification were excluded from the study.

Procedure

Medical professionals who consented to participate in the study were included. The questionnaire was distributed through e-mail as well as through hard copy. 50 questionnaires were distributed through electronic mail and 75 questionnaires were distributed through hard copy. Demographic details were obtained from the professionals. All the participants had to read each question and tick on the option which they thought was correct. Sufficient amount of time was given to complete the questionnaire and reminders were provided either via email or through personal meeting.

Statistical analysis

The obtained data was tabulated in excel sheet and analysed using appropriate statistical analysis based on the distribution of the data. Statistical analysis was done with SPSS version 20 software. The demographic variables were explained using graphical representation and descriptive statistics was used for scores obtained on the questionnaire. The data was normally distributed (Shapiro Wilk's test $p < 0.05$) thus parametric test were used for analysis. For comparison of the two groups independent sample t test was used. 95% confidence interval was considered for the study and result was considered significant if the p value was less than 0.05.

RESULTS

The current study intended to check the awareness level of newborn hearing screening among paediatricians and gynaecologists in the state of Maharashtra, India. A total of 125 questionnaires were distributed out of which 100 responses were obtained that is, 50 paediatricians and 50 gynaecologists. The demographic variables across the two groups are listed in the Table 1.

Objective 1: Level of awareness of newborn hearing screening in paediatricians

Table 2 shows the domain wise scores and the total scores obtained for group I participants that is, 50 pediatricians. It is observed that the mean scores obtained by the pediatricians were quite average with respect to all the domains and the total scores. The range of total scores (maximum obtainable score for the questionnaire is 42) was 22-38. The distribution of total scores of the questionnaire is illustrated in Figure 1. It indicated that

none of the participants had scores less than 50%, 88% of them (n=37) achieved scores between 50-80% and 26% of the participants (n=13) had scores more than 80%.

With respect to domain wise scores obtained by the participants, in domain 1 that is, knowledge of newborn hearing screening, protocol used and causes of hearing loss, it is observed that 72% of the participants (n=36) achieved scores between 50-80% and 28% of the participants (n=14) had scores more than 80%. None of the participants had scores less than 50% in this domain. In domain 2, knowledge of test procedure used, only 4% of the participants (n=2) achieved scores less than 50%, 78% of the participants (n=39) had scores between 50-80% and 18% of the participants (n=9) had scores more than 80%. In domain 3, knowledge of the impact of hearing loss, only 8% of the participants (n=4) had scores less than 50%, 32% of the participants (n=16) achieved scores between 50-80% and 60% of the participants (n=30) had scores more than 80%. In domain 4, role of audiologist in screening, 18% of the participants (n=9) had scores less than 50%, 36% of the participants (n=18) achieved scores between 50-80% and 46% of the participants (n=23) had scores more than 80%. In the last domain 5, attitudes and beliefs regarding newborn hearing screening, 22% of the participants (n=11) had scores less than 50%, 64% of the participants (n=32) achieved scores between 50-80% and 14% of the participants (n=7) had scores more than 80%. For the open ended question in the questionnaire, 64% of the pediatricians felt that implementing the newborn hearing screening program in India is not difficult and only 36% paediatricians said that it was difficult due to lack of awareness in medical professionals, low socioeconomic status of the families thus resulting in poor follow up, cost effectiveness and lack of trained professionals.

Thus, it appears that overall awareness level of newborn hearing screening in pediatricians is moderate to high.

Objective 2: Level of awareness in of newborn hearing screening in gynaecologists

Table 3 shows the domain wise scores and the total scores obtained for group 2 participants, 50 gynaecologists. It is observed that the mean scores obtained by the gynaecologist were quite average with respect to all the domains and the total scores. The range of total scores (maximum obtainable score for the questionnaire is 42) was 17-36. The distribution of total scores of the questionnaire is illustrated in Figure 2. It indicated that only one participant scored less than 50%, 94% of them (n=47) achieved scores between 50-80% and 4% of the participants (n=2) had scores more than 80%.

In domain 1, knowledge of newborn hearing screening, protocol used and causes of hearing loss, it was observed that 90% of the participants (n=45) achieved scores between 50-80%, 8% of the participants (n=4) had scores

more than 80% and only one participant (n=1) scored less than 50%. In domain 2, knowledge of test procedures, only 10% of the participants (n=5) had scores more than 80%, 60% of the participants (n=30) achieved scores between 50-80% and 30% of the participants (n=15) scored less than 50%. In domain 3, knowledge of impact of hearing loss, 54% of the participants (n=27) had scores more than 80%, 40% of the participants (n=20) achieved scores between 50-80%, and 6% of the participants (n=3) scored less than 50%. In domain 4, knowledge of role of audiologist in screening, 22% of the participants (n=11) had scores more than 80%, 52% of the participants (n=26) achieved scores between 50-80% and 26% of the participants (n=13) scored less than 50%. In domain 5,

attitudes and beliefs regarding newborn hearing screening, only 8% of the participants (n=4) had scores more than 80%, 90% of the participants (n=45) achieved scores between 50-80% and only one of the participants (n=1) scored less than 50%. For the open ended question, 58% gynaecologists said that implementation of newborn hearing screening is difficult in India and 42% participants felt it was not difficult. Possible reasons for this difficulty in implementation of newborn hearing screening were similar as stated by group I participants.

To summarize the above results, it appears that overall awareness level of newborn hearing screening in gynaecologists is moderate.

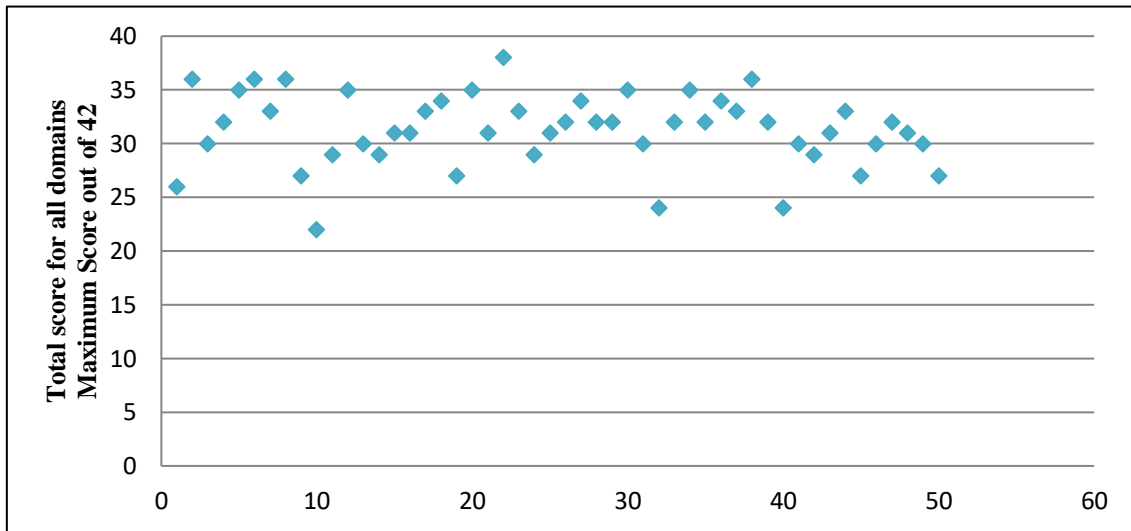


Figure 1: Scatter plot showing distribution of total scores for all domains by group I participants, that is, pediatricians (n=50).

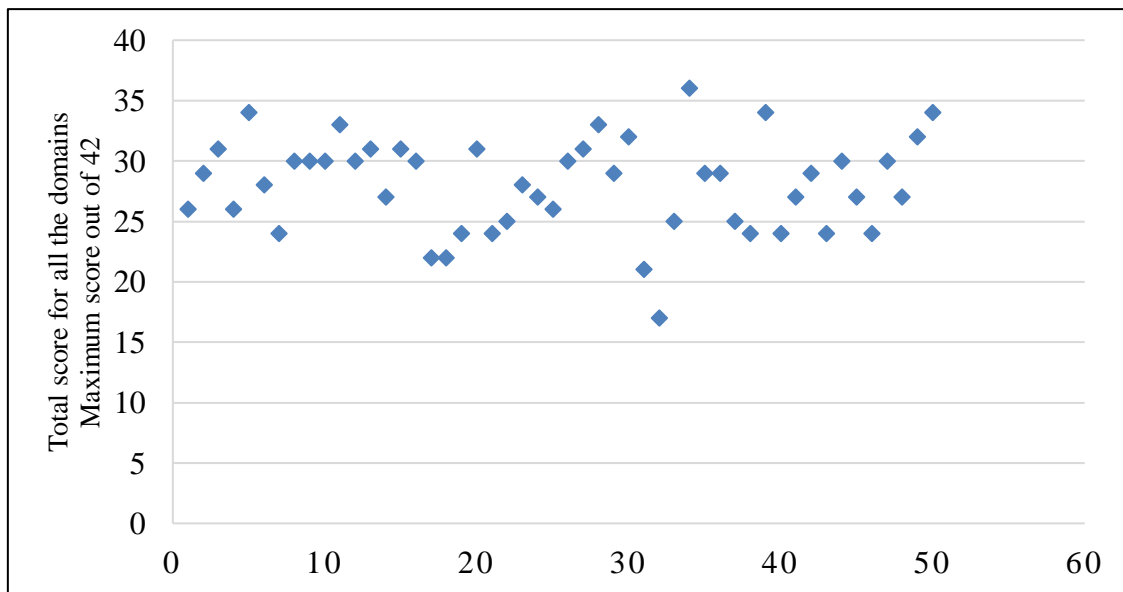


Figure 2: Scatter plot showing the total score obtained by group II participants, that is, gynaecologists (n=50).

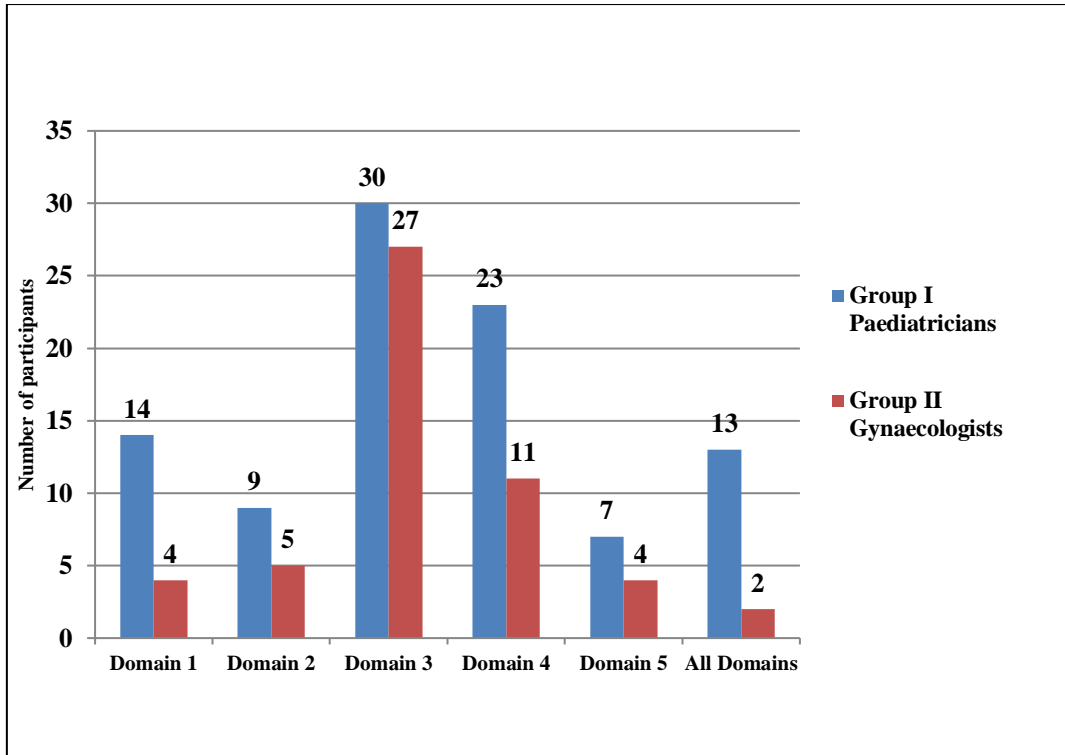


Figure 3: Graphical representation of the number of participants of group I (paediatricians) and group II (gynaecologists) who scored more than 80% on the questionnaire.

Table 1: The demographic variables among paediatricians and gynaecologists.

Participants (n=100)	Age (in years)		Work experience (in years)		Gender distribution		Workplace distribution	
	Mean	Range	Mean	Range	Male	Female	Hospital Set up	Clinic Set up
Group I paediatricians (n=50)	41.86	27-68	11.5	1-40	24	26	30	20
Group II gynaecologists (n=50)	45.8	27-75	15.5	1-52	15	35	27	23

Table 2: The descriptive statistics of domain wise scores and total scores obtained by paediatricians (n=50).

Domain wise scores	Mean	Standard deviation (SD)
Domain 1 (max score=18)	13.24	1.64
Domain 2 (max score=8)	5.38	1.15
Domain 3 (max score=7)	5.58	0.92
Domain 4 (max score=5)	3.40	0.94
Domain 5 (max score=4)	2.92	0.6
Total score (max score=42)	31.2	3.4

Table 3: Descriptive statistics of domain wise scores and total scores obtained by gynaecologists (n=50).

Domain wise scores	Mean	Standard deviation (SD)
Domain 1 (max score=18)	12.24	1.7
Domain 2 (max score=8)	4.50	1.5
Domain 3 (max score=7)	5.46	1.2
Domain 4 (max score=5)	2.92	0.8
Domain 5 (max score=4)	2.68	0.6
Total score (max score=42)	28.04	3.8

Table 4: The mean scores and standard deviation of participants of group I (pediatricians) and group II (gynaecologists).

Scores	Group I (pediatricians) n=50		Group II (gynaecologists) n=50	
	Mean	SD	Mean	SD
Domain 1 (max score=18)	13.24	1.64	12.24	1.7
Domain 2 (max score=8)	5.38	1.15	4.50	1.5
Domain 3 (max score=7)	5.58	0.92	5.46	1.2
Domain 4 (max score=5)	3.40	0.94	2.92	0.8
Domain 5 (max score=4)	2.92	0.6	2.68	0.6
All domains (max score=42)	31.2	3.4	28.04	3.8

Table 5: The test statistics result of domain wise and total mean scores for group I and II participants.

Domain wise scores	Group I and II		
	t	df	P value
Domain 1	2.946	98	0.004
Domain 2	3.226	98	0.002
Domain 3	1.822	98	0.072
Domain 4	2.662	98	0.009
Domain 5	1.913	98	0.059
Total score	4.364	98	0.000

Objective 3: Comparison of the level of awareness of newborn hearing screening among pediatricians and gynaecologists

The domain wise and total scores obtained by the participants of group I (pediatricians) and group II (gynaecologists) is shown in Table 4. It is observed that the mean scores of the group I participants appear to be slightly higher than that of the group II participants in the domains 1, 2, 4, 5 as well as the total score category except for domain 3, knowledge about impact of hearing loss where there is no appreciable difference between the mean scores in both the groups. As depicted in Figure 3, the number of group I participants who scored more than 80% were considerably higher than the group II participants especially in domain 1, knowledge of newborn hearing screening, protocol used and causes of hearing loss, domain 4, role of audiologist in the screening and the overall questionnaire. However, in domain 2, knowledge of test procedures used, domain 3, knowledge about impact of hearing loss and domain 5, attitudes and belief regarding newborn hearing screening, the number of participants who scored more than 80% did not differ much in both the groups.

For statistical analysis, the independent sample t test was performed to compare the domain wise scores and total scores obtained by group I and II which is presented in Table 5. Results indicated that there was a significant difference between domain 1, domain 2 and domain 4 as well as the mean total scores of group I and group II. Thus, the level of awareness between the paediatricians and gynaecologists was statistically different.

DISCUSSION

The participants in the present study were pediatricians and gynaecologists. The mean age of pediatricians was 41.86 years and that of gynaecologists was 45.84 years. It was noticed that the gender distribution was almost similar in paediatricians as compared to gynaecologists where female participants were more than the male participants. Also, more number of pediatricians were attached to hospitals than private clinics whereas there were almost equal numbers of gynaecologists working in both the setups.

It was observed that the mean scores obtained by paediatricians were average with respect to all the domains and the entire questionnaire. The awareness level about the knowledge of newborn hearing screening, protocol used, causes and impact of hearing loss, role of audiologist in screening was moderate to high. However, the awareness level regarding the test procedures used was moderate suggesting that the pediatricians had inadequate information regarding the specific screening tests used, its reliability and further follow up needed. This finding was in concurrence with the findings reported in the literature where they observed majority of the paediatricians had inadequate and incomplete knowledge regarding the protocol used in universal newborn hearing screening and role of the audiologist and speech language pathologist in hearing loss intervention.⁹ It was also noted that majority of the pediatricians had positive outlook towards newborn hearing screening and implementation of the program in different set-ups. Possible reason for this high awareness level and positive attitude could be that the Indian academy of pediatrics (IAP) childhood disability group organized a national

meeting for formulating a consensus statement on guidelines for newborn hearing screening in 2015 and it was published online in 2017.¹⁰ This consensus statement could have been a source of continuing educational information for the participants of the study. Also, another study reported similar finding that in developing countries continuing education regarding infant hearing loss is necessary and the medical education also needs to be regularly updated.¹¹

Similar findings were reported in the literature, that approximately 68% paediatricians gave good response for questions related to causes of hearing loss and the impact of hearing loss in children and 53% of paediatricians showed positive attitude and beliefs about newborn hearing screening.⁶ Other studies have also reported similar findings regarding majority of paediatricians and physicians have awareness about newborn hearing screening as it is introduced in their clinical routine.^{7,12,13}

In the current study, the mean scores obtained by gynaecologists were also average with respect to all the domains and the entire questionnaire. The awareness level about the knowledge of newborn hearing screening, protocol used, causes and impact of hearing loss was moderate to high. However, the awareness level regarding the test procedures used and the role of audiologists in screening was low to moderate suggesting there were knowledge gaps with respect to the screening tests used and importance of hearing and speech language professionals in diagnosis and further follow-up. Their attitude and belief towards newborn hearing screening and its implementation was less positive. These results are in view with the literature findings where they found that pre-natal care providers (obstetricians/gynaecologists) were found to have less awareness about newborn hearing screening and only a few of them counselled the parents regarding the same. Furthermore, they reported that the best time to communicate with parents about newborn hearing screening was before the birth of the baby. Gynaecologists do play an important role from child's birth to mother's care, they are the first point of contact who counsel the parents about the child's development and problems which could be faced by the mother or child. However, if they are not provided up-to-date information on the current hearing screening procedures, diagnosis and intervention, then their communication would be limited.¹⁴

To the researcher's best knowledge majority of the research has focussed on medical professionals like primary care physicians, paediatricians, neonatologists, otolaryngologists and midwives/nurses however very few studies have been done on gynaecologists/obstetricians regarding awareness of newborn hearing screening program.

The present study also focused on comparing the level of awareness regarding newborn hearing screening between pediatricians and gynaecologists. Results revealed that there was a significant difference between the awareness

level of newborn hearing screening between paediatricians and gynaecologists ($p < 0.05$). It was observed that paediatricians had better scores than gynaecologists in the domain of knowledge of newborn hearing screening, protocol used, causes of hearing loss and role of audiologist in the screening. Possible reason for this could be that pediatricians were aware about the consensus statement of Indian academy of pediatrics on newborn hearing screening which has provided the guidelines for newborn hearing screening in India.¹⁰

The reasons listed out by pediatricians and gynaecologists for the open ended question in terms of difficulties faced during implementation of NHS were lack of uniform nationwide policy for UNHS, inadequate infrastructure and accessibility in rural regions, poor primary and secondary level health facilities, lack of trained personnel, lack of appropriate counselling to the families regarding further follow-up, financial constraints due to families' socioeconomic status and refusal to follow up due to social stigma. Similar findings were reported in the literature where they reported the challenges of implementing newborn hearing screening in a developing nation.^{5,15}

CONCLUSION

It can be concluded that the overall awareness level about newborn hearing screening and impact of hearing loss was moderate to high in pediatricians and moderate in gynaecologists. The findings suggest that majority of the paediatricians and gynaecologists lacked complete information regarding the protocol and test procedures used in screening as well as the role of audiologists. There was a significant difference present in the awareness level of paediatricians and gynaecologists with paediatricians having better scores in all the domains than gynaecologists. Majority of the paediatricians and few gynaecologists indicated that implementation of newborn hearing screening program in India was not difficult. The reasons listed for difficulty in implementation was lack of trained manpower, poor follow-up of the families and cost effectiveness of the program. This suggests that there is a need to expand the knowledge base regarding newborn hearing screening among all primary care physicians such as paediatricians, neonatologists, gynaecologists and nurses through continuing education programs.

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