

Original Research Article

A study on awareness of hearing health, risk factors, prevention, and intervention of hearing impairment-among pregnant women and mothers of newborn in urban area, Bhubaneswar

Sarita Rautara^{1*}, Subhasmita Sahoo¹, Niharika Dash², Rajib Lochan Bhoi³

¹Department of Audiology and Speech Language Pathology, Sumandeep Vidyapeeth, Gujarat, India

²Speech Language Pathology, Institute of Health Sciences, Bhubaneswar, Odisha, India

³District of Early Intervention Centre, SVPPGIP, Cuttack, India

Received: 01 November 2021

Revised: 13 December 2021

Accepted: 14 December 2021

*Correspondence:

Dr. Sarita Rautara,

E-mail: srautara@yahoo.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The study was aimed at investigating the knowledge of awareness of hearing health, risk factors causing hearing loss and preventive measures for hearing disability at natal stages and awareness regarding the intervention among the pregnant women and mothers of newborn in urban area i.e. in Bhubaneswar.

Methods: 53 pregnant women and 103 mothers of newborn had participated in the present study and were agreed to provide their awareness regarding the questionnaire related to selected parameters their responses were scored and documented for the statistics.

Results: Results indicates that mothers were more aware of the selected parameters like risk factors during natal stages, intervention as compared to pregnant women. Mothers (66.01%) and pregnant women (56.22%) were more aware of prenatal risk factors as compared to peri and postnatal. Almost 60% of total participants were aware of hearing health and intervention for hearing loss. Two-way ANOVA was computed. $p < 0.0001$, indicates statistically significant difference between the selected parameters i.e. awareness of hearing health and intervention and awareness of risk factors and prevention for hearing impairment at natal stages. Post hoc analysis (using unpaired t test by applying Bonferroni correction) suggestive of statistically significant difference of selected parameters from each other among pregnant women and mothers with $p = 0.0002$.

Conclusions: It is very much important to utilize the existing knowledge of the grass root level people like mothers and pregnant women by acquiring their ideas and information regarding the awareness of occurrence of hearing impairment in children which can be done only by spreading adequate information regarding hearing disability.

Keywords: Hearing health, Risk factors, Preventive measures, Hearing impairment, Natal stages, Pregnant women and mothers

INTRODUCTION

In human beings, hearing impairment is an invisible and highly stigmatizing chronic condition is considered to be one of the most frequent sensory deficits.¹ The prevalence of disabling hearing impairment is reported to be highest for both adults and children living in developing

countries, specifically South Asia, Asia-Pacific and sub-Saharan-Africa which is 4 times higher as compared to high income regions.²

According to World Health Organization (WHO) data, worldwide 34 million children were identified with disabling hearing loss.³ In developing countries,

incidence of permanent congenital or early onset hearing impairment is estimated to be six cases per 1000 live births, that is three times higher as compared to the developed countries.^{4,5} The prevalence of sensorineural hearing loss is in 3 healthy neonates per 1,000 live births and 2-4 high-risk infants per 100 birth.^{6,7}

In India, 18.9% hearing disability ranked as the second largest form of disability after locomotor disability.⁸ The prevalence of hearing disability is more in urban (20.5%) as compared to the rural (18.2%) part of India. As per the Indian Census (2011), 23% of the hearing disabled children were lying in the age range of 0-6 years.⁸ According to 76th round of The National Sample Survey (NSS) in 2018, 0.3% hearing disability out of total disability, is considered as the topmost sensory deficit. NSS also states that hearing disability is the second most common form of disability.⁹

Hence, the importance of intensifying action to prevent deafness and causes of hearing loss is considered as a mandatory way as in childhood, 60% of hearing loss is due to preventable causes like environmental factors (like prenatal, perinatal or postnatal factors) and the remaining 40% are due to genetic factors or unknown cause.¹⁰⁻¹²

Prenatal risk factors can be infection in pregnant women during the pregnancy term (rubella or cytomegalovirus) as well as usage of ototoxic medication during treatment.^{10,12} Studies in Oman and Iran had reported the prevalence of consanguinity in hearing impaired population. 70% deaf children were born of consanguineous marriage.^{10,13,14} Literature also supports the perinatal risk factors considered for hearing loss at the time of birth like premature delivery or the newborn suffering from lack of oxygen at the time of birth and/or any diseases like neonatal jaundice, mumps, meningitis or measles. Infant born with low birth weight and/or congenital malformations of the ear and the auditory nerve, also give rise to hearing impairment.^{10,12} Ear diseases like too much of earwax (impacted cerumen) or fluid in the ear, usage of ototoxic medicines in the treatment of neonatal infections, malaria, drug-resistant tuberculosis and cancers are some postnatal risk factors leading to common childhood hearing problem.^{10,15,16}

It is a well-known fact that most of these causative factors can be prevented, at least partially, by improving the primary prevention strategy.¹² An early and consistent awareness of risk factors contributing to hearing loss in infants during the natal (pre to postnatal) period can minimize the risk in fetus.⁵

As per 76th round of NSS, in Odisha, prevalence of hearing impairment is 0.4% in urban parts while 28.45% hearing disability was found to be since birth.¹⁷ Some international and national survey-based studies have been attempted to provide insight into predicting mother's awareness regarding hearing impairment and intervention, however there is lack of documentation

regarding the same in urban area of Khordha district i.e. Bhubaneswar, Odisha.¹⁸⁻²⁰ Hence, a small survey was planned in Bhubaneswar, in order to provide a record regarding awareness of causative risk factors during natal stages contributing to hearing impairment as well as steps taken for intervention or treatment in children with hearing loss, by mothers of newborn and pregnant women.

Aim and objective

The study was aimed at investigating the knowledge of awareness of hearing health, risk factors causing hearing loss and preventive measures for hearing disability at natal stages and awareness regarding the intervention among the pregnant women and mothers of newborn in urban area i.e. in Bhubaneswar.

METHODS

A cross sectional study was conducted among 156 participants comprising pregnant women and mothers of newborn living in urban area for 15 years or more, were collected from Bhubaneswar. All the considered participants had visited and being treated at govt. and private hospitals, maternity home, and nursing homes over a period of 8 months i.e., from August 2020 to February 2021. The participants were selected through purposive sampling. All the participants were divided into two groups consisting of 53 pregnant women considered as group I and group II consisting of 103 mothers of newborn. The inclusion criteria for pregnant women were considered to be the time period from conceived to 9 months while for mothers of new born was after delivery to 6months. Beyond this considered time period for both the group was regarded as an exclusion criterion.

An ethical approval consent was taken from the higher authority of selected hospitals and other setups with prior permission. A survey was done by visiting the selected hospitals (government and private), and maternity and nursing homes in order to collect the information regarding the pregnant women and mothers of newborn with the required inclusion criterion, who have visited them. An approach was made to all the participants to participate in the survey, once the required information was documented. All the participants interested in the survey, were introduced with the aims and the objectives of this study. A written consent and permission were sought from them for their approval.

A close ended questionnaire was used to obtain information from pregnant women and mothers of new born from different hospitals and maternity homes after the permission granted with ethical clearance from all the setups and a structured survey was considered as a data collection strategy.

The questionnaire comprised of questions based on the risk factors, prevention taken by pregnant women and

mothers of new born in all the natal stages (pre, peri and post) for hearing disorder in infants along with the awareness regarding the hearing health and intervention, was constructed initially in English by investigators and validated by 5 experienced ASLPs. The questionnaire was further translated into Odia language by native speakers and then back translated along with proofread in order to ensure that the meaning of the content remains the same. A survey was done by administering the questionnaire on pregnant women and mothers of newborn where the questionnaire was described verbally to all the participants, and they were instructed to put a “√” mark against the options (yes or no) which best described the nature of their information level. The duly filled questionnaires were collected and the responses were noted down which were further compiled for statistical analysis.

The recorded data were documented in Microsoft excel 2018 and analyzed using Statistical Package for Social Sciences (SPSS) version 18.0.0. Mean±SD were used to summarize the overall score along with calculation of percentile score for each factor under the parameters. Two-way ANOVA was used in order to determine the effects of selected parameters and the Post hoc analysis using unpaired t test was used to check the difference between selected parameters of the two groups.

RESULTS

The information was collected from 53 pregnant women (mean age 28.1years) in group I and 103 mothers of newborn (mean age range- 29.3years) in group II.

Figure 1 depicts the percentage of awareness of risk factors and prevention of hearing impairment at prenatal stage, among the pregnant women and mothers of newborn, living in urban area.

As a preventive measure, a good percent (81.55%) mothers of newborn infants were aware of vaccination as compared to pregnant women (67.92%), indicating that mothers were having good information regarding availability of vaccination and immunization for preventable diseases. 75.72% mothers familiar of genetics/ hereditary conditions as risk factors contributing

to hearing loss of newborn which is also higher as compared to pregnant women (58.49%).

Figure 2 depicts the percentile score of awareness of risk factors and prevention of hearing impairment at perinatal stage, among the pregnant women and mothers of newborn of urban area.

Both the groups displayed poor knowledge regarding the perinatal risk factors like low birth weight, delayed cry, premature birth, caesarean complication and neonatal jaundice. Only half the mothers had idea that if their child suffers from jaundice, might loss his/her hearing sensitivity. Although, both the group members were aware of caesarean complication might lead to hearing loss.

Figure 3 depicts the percentile score of awareness of risk factors of hearing impairment at postnatal stage, among the pregnant women and mothers of newborn in urban area.

Table 1: Distribution of subject based on educational level.

Subjects	Up to secondary and other qualifications N (%)	Bachelor and higher degrees N (%)	Total (N)
Pregnant Women	17 (32.08)	36 (67.92)	53
Mothers of New Born	39 (37.86)	64 (62.14)	103

Table 2: Distribution of subjects by gross annual income.

Subjects	<1,00,000 P.A N (%)	1L-3L P.A N (%)	>5L P.A N (%)
Pregnant Women	11 (20.75)	23 (43.4)	19 (35.85)
Mothers of New Born	21 (20.39)	43 (41.75)	39 (37.86)

Table 3: The descriptive statistics of the selected parameters in pregnant women and mothers of newborn in Bhubaneswar.

Area	Subjects	Awareness of the risk factors and prevention of hearing impairment in						Awareness of Hearing health and Intervention for hearing impaired	
		Prenatal stage		Perinatal stage		Postnatal stage		Mean	SD
		Mean	SD	Mean	SD	Mean	SD		
Urban area	Group B1 Pregnant women	2.81	0.76	2.05	0.94	2.49	0.98	2.75	0.82
	Group B2 Mothers of newborn	3.30	0.93	2.38	0.97	2.54	0.90	2.93	0.86

Half of the mothers and pregnant women were knowledgeable of the postnatal causative risk factors like childhood illness, infections in ear or ear discharge and ear injury. They knew if these factors were not treated well before time, it might lead to permanent hearing loss. Both mothers and pregnant women should be educated

regarding all these, so an early identification with quick intervention can be achieved.

Figure 4 depicts the awareness of hearing health and intervention taken by both the pregnant women and mothers of newborn in urban area.

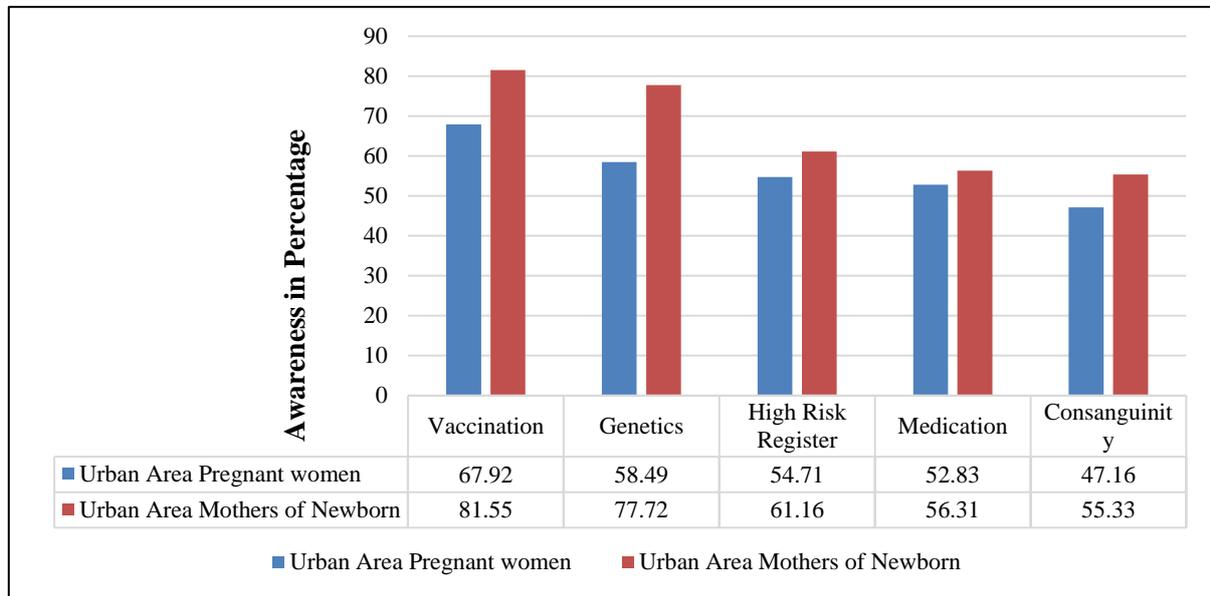


Figure 1: Awareness of risk factors and prevention measures for hearing impairment at perinatal stage among pregnant women and mothers of newborn in urban area.

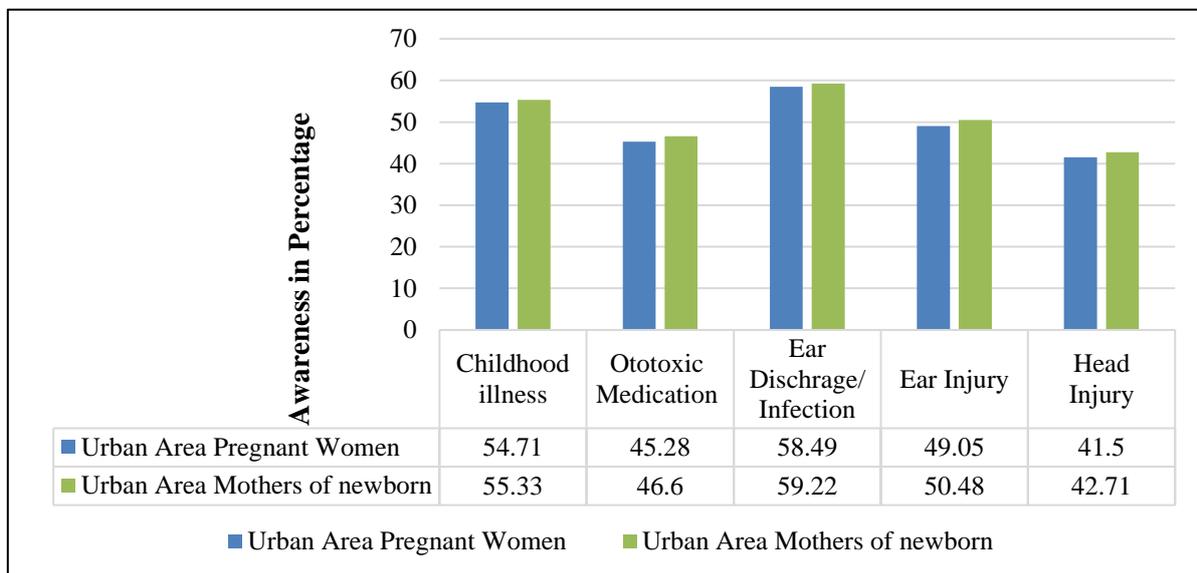


Figure 2: Awareness of risk factors causes for hearing impairment at postnatal stage among pregnant women and mothers of newborn in urban area.

Figure 5 depicts the overall comparison of awareness of risk factors and preventive measures for hearing impairment in all the natal stages and hearing health and its intervention among pregnant women and mothers of newborn in Urban area. More of than 60% of mothers of

newborn (66.01%) as well as of pregnant women (62.26%) were aware of neonatal hearing loss but both the group members still use sharp objects and/or oil as a primary treatment for hearing problem. Half of the participants from both the groups were not acquainted

with newborn hearing screening, which suggests that an immediate implication of NHS scheme at every health care system is in need.

Mothers and pregnant women carry low level of information regarding causative risk factors during the perinatal stage as compared to postnatal factors. More than half of the participants in both the groups were aware of prenatal risk factors as well as of intervention and hearing health. But at the same time, mothers of newborn are display more knowledge regarding the hearing impairment as compared to pregnant women, but none of the groups could achieve 100 percent score for awareness regarding risk factors causing hearing loss as well as about the hearing health and intervention. This

indicates the need of public awareness programs for hearing impairment.

p value obtained is 0.0024, suggesting significant difference between mean scores among pregnant women and mothers. With, $p < 0.0001$, suggesting a significant difference between the selected parameters i.e. awareness of hearing health and intervention and awareness of risk factors and prevention for hearing impairment at natal stages. $p = 0.0137$ suggestive of statistically significant interaction of the selected parameters among pregnant women and mothers of newborn.

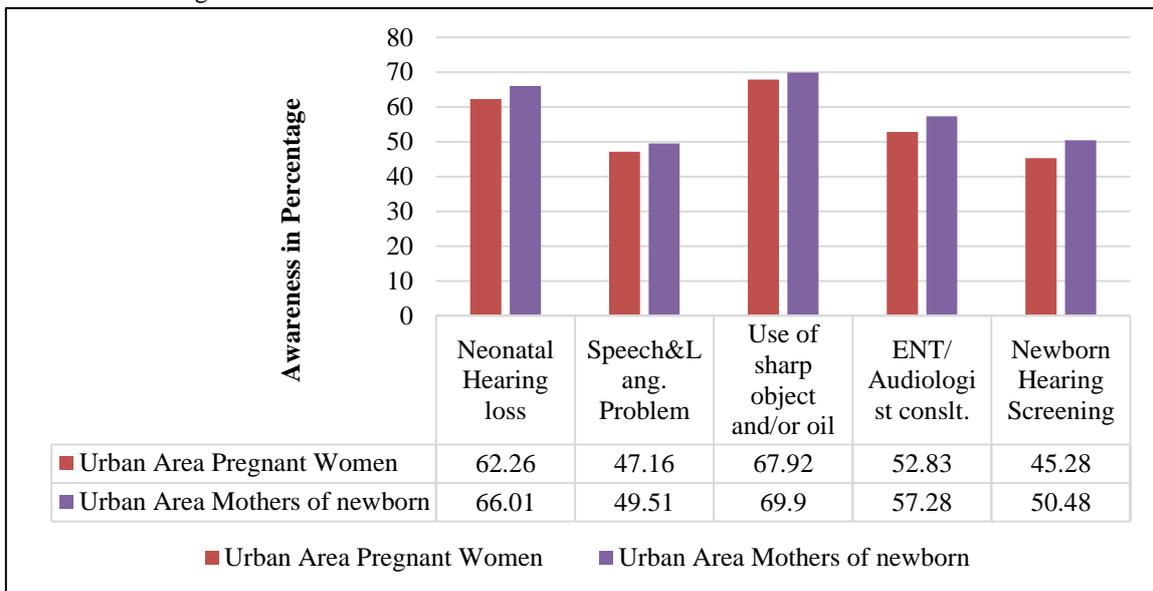


Figure 3: Awareness hearing health and intervention for hearing impairment among pregnant women and mothers of newborn of urban area.

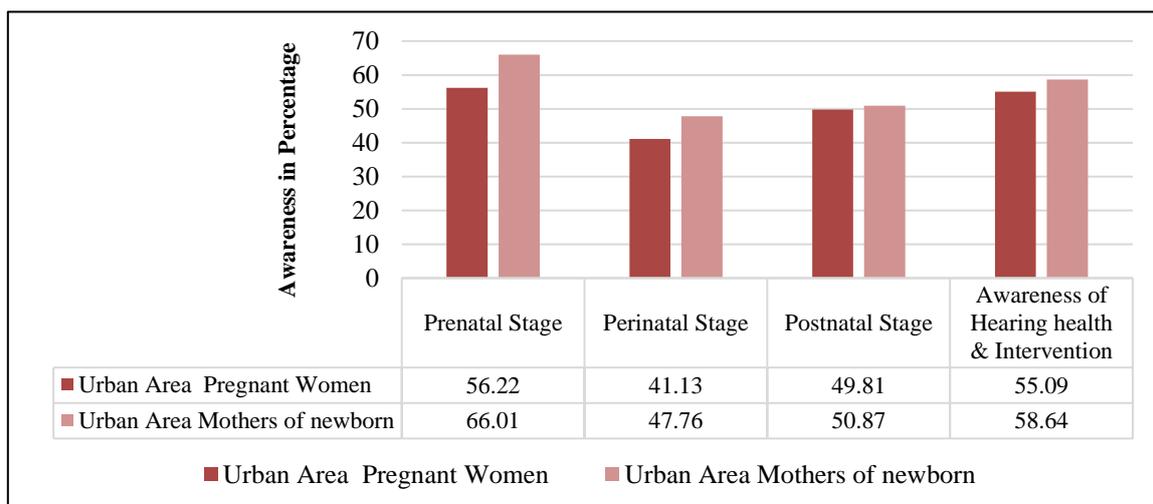


Figure 4: Awareness of causes and prevention measures for hearing impairment and hearing health and its intervention in all natal stages among pregnant women and mothers of newborn in urban area.

Table 4: Depicts results of two-way ANOVA regarding awareness of hearing health and intervention and awareness of risk factors and prevention for hearing impairment at natal stages among pregnant women and mothers of newborn in urban area.

Source	SS	df	MS	F	P
Pregnant women and Mothers	9.68	1	9.68	4.11	0.0024
Awareness of hearing health & intervention and Awareness of causes and prevention for hearing impairment at natal stages.	66.9	3	22.3	21.46	<.0001
Interaction	3.77	3	1.26	1.21	0.0137
Error	640.21	616	1.04		
Total	720.56	623			

Table 5: Post hoc analysis using unpaired t test with applied Bonferroni correction for comparisons of selected parameters with each other in pregnant women.

Selected parameter (in Urban Area)	Mean Difference		Obtained p value		Bonferroni correction
	Pregnant women	Mothers of new born	Pregnant Women	Mothers of new born	
Prenatal-perinatal	0.7547	0.9126	<0.0001	<0.0001	p=0.01
Prenatal-postnatal	0.3208	0.7573	0.004	<0.0001	
Prenatal- awareness of hearing health and intervention	0.0566	0.3689	0.003	0.001	
Perinatal- postnatal	-0.434	-0.1553	0.01	0.002	
Perinatal- awareness of hearing health and intervention	-0.6981	-0.5437	<0.0001	<0.0001	
Postnatal- awareness of hearing health and intervention	-0.2642	-0.3883	0.002	0.0001	

p<0.01 suggest that all the selected parameters are significantly different from each other in pregnant women. All the selected parameters are significantly differing from each other with p=0.01 in mothers of newborn.

A statistically significant difference of selected parameters from each other among group I and group II with p=0.0002.

DISCUSSION

In state like Odisha, peoples' thoughts and their beliefs are still deeply buried within their culture and old traditions despite of urbanization, so public awareness and attitude towards disabilities in childhood are generally poor and often aggravated by superstitious customs and beliefs. Due to poor socio-economic status, financial barriers, and geographical conditions, hearing impairment in children gets easily neglected. Hence, it is important to know the rate of awareness regarding hearing impairment in communities and basically from the grass root level people like pregnant women, mothers of newborn and immediate family members.

In terms of risk factors and prevention during prenatal stage, 75% mothers in the present study are aware of genetics/hereditary conditions, which can be held responsible for hearing impairment in infants. Swanepoel and Almic reported that 67% mothers recognized that hearing loss can be congenital, although 33% were

uncertain or did not know.²¹ However, above mentioned studies are different when compared with the study done by Govender et al where they have reported only 54% mothers are aware of hereditary conditions resulting in hearing loss in infants.¹⁸ Authors have also reported that only 16% mothers were aware of infection or high-risk factors causing hearing loss in infants, however, it is contrasting with the present study results where 60% awareness is noticed in both the groups. Swanepoel et al had also concluded that there is a general awareness of important risk factors for hearing loss although some risk factors were poorly identified which also correlates with the present study in terms of both pregnant women and mothers of newborn, although it varies in scores.²¹ In related to risk factors, in order to support the present study, a study in south India has stated that mothers exhibit good knowledge of risk factors for hearing loss.²⁰ With respect to consanguinity factor, family history and consanguinity has been the cause of 100% of infants with severe – profound impairment.²⁵ Better awareness in mothers regarding the consequences of consanguineous marriage display good maternal knowledge which is different from the present study result, as in state like Odisha, marriages between two family members who are second cousins or closer is considered to be unacceptable except in western and southern parts of Odisha.²²

With respect to perinatal risk factors in terms of low birth weight, prematurity and jaundice, nearly three quarters i.e. 77% of the mothers were unaware of these conditions which could cause hearing loss in their infants.¹⁸ A similar result has been found in an Indian study done by Dudda et al where they had concluded that, mothers were having relatively poor insight for natal causes such as delayed birth cry, neonatal jaundice which is similar to the result provided in the present study for both the groups.²² Poor awareness of risk factors like medications, asphyxia, jaundice, measles and preterm/ low birthweight had also been studied and documented among Nigerian and South African mothers.²³

Dudda et al also concluded that 78.4% mothers were aware of ototoxic medication (consumed by their child) while 81.37% mothers had idea about middle ear infections, causing hearing loss in infants.²² This study is somehow, like the study of Swanepoel and Almic, where 79% mothers having information regarding ear discharge while 69% mothers were aware of drugs/medication as risk factors for infant hearing loss.²¹ However, both studies are equally different from the present study result as 60% mothers had information of ear discharge while only 45% had knowledge regarding the effect of ototoxic medication, suggestive of comparatively low level of information in present study with respect to above mentioned studies.

In the present study, almost 60% mothers and pregnant women were aware of neonatal hearing loss however, more than 50% of them did not know about newborn hearing screening (NHS), which is somehow corelated with 62.5% Nigerian mothers who were not aware of NHS.¹⁹ However, according to a study in Karnataka, 75% mothers were exhibiting knowledge of hearing loss treatment.²⁰ With respect to temporary solution for ear disease, mothers in an urban community in North India, are still using neem or garlic oil which is also prevailing in mothers of present study.²⁵

The decision taken by mothers for neonatal hearing screening or routinely screening their children for hearing loss, or those taken after identifying a hearing loss, are important while such decisions are solely based on mothers' knowledge and attitude toward the risk factors and preventive measures for infant hearing loss as well as on the availability of treatment options.^{21,23} So, both mothers and pregnant women should exhibit good amount of knowledge regarding hearing health, information related to the causative risk factors and preventive measures, which will help the hearing professional team to identify the hearing disability as early as possible with an immediate action towards the intervention and available rehabilitation.

Overall, mothers of newborn were comparatively more aware of hearing impairment with respect to pregnant women but none of them could achieve 100% awareness of risk factors and causes as well as regarding the

treatment or early intervention for hearing impairment. It might be due to less exposure to public awareness programs and camps. There are both international and national studies based on mothers' knowledge regarding hearing impairment, but literature could not support any studies regarding the awareness of hearing impairment in pregnant women. Hence, a step was put forth to highlight the level of awareness and educate the pregnant women, so that they can also lend a helping hand in preventing the causes and pitch in an early identification and intervention care by supporting the neonatal hearing screening and further rehabilitation in case of their hearing impaired child.

In developing country like India, the task of leading a national fight against disabling hearing impairment must be approached with great care. In India, the major hindrances for establishing an effective screening program are the costs involved, the non-availability of equipment and human resources. Thus, educating mothers will support early detection and management of hearing loss. Hence, it is very important for every state wise regional health care and audiological professionals to widespread the systematic nationwide hearing screening programs like National Programme for the Prevention and Control of Deafness (NPPCD) and Rashtriya Bal Swasthya Karyakram (RBSK in the community and educating the mothers of newborn and pregnant women about the importance of hearing health, how to take precaution to prevent the causes and risk factors resulting in hearing loss in order to reduce the aggravation of post consequences of hearing impairment in infants.^{26,27} It is the role of audiologist as well as health care professionals to promote and apprise the knowledge regarding the profession of audiology and the role of an audiologist, as well as the access to audiological services.

CONCLUSION

To focus and create appropriate awareness related to hearing impairment in the community and to make avail the governmental support and facilities available for hearing impaired was the prior objective of the study. To reduce the burden of hearing disability and to improve quality of life was the main motive behind the study. The result of this study suggested that mothers were more knowledgeable regarding the aspects of hearing loss with respect to pregnant women that however, there was also prevalence of misconceptions and lack of information regarding intervention of a hearing-impaired child. It is very much important to utilize the existing knowledge of the grass root level people like mothers and pregnant women by acquiring their ideas and information regarding the awareness of occurrence of hearing impairment in children which can be done only by spreading adequate information regarding hearing disability which can help in early identification and intervention in children with hearing loss while indirectly reducing the burden of hearing disability. The limitation of the present study is that it included a smaller number of

subjects and restricted to urban part of Bhubaneswar. Further it can be recommended that such similar study can be conducted using a greater number of subjects in both the group and including more parameters.

ACKNOWLEDGEMENTS

I would like to acknowledge all the participants, Hospitals and Maternity/Nursing homes staff and authority for allowing the data collection and supporting for this survey.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Taneja MK. Role of ENT surgeons in the national program for prevention and control of deafness. *Indian J Otol*. 2012;18:119-21.
2. Addressing the rising prevalence of hearing loss. Geneva: World Health Organization; 2018. © World Health Organization. 2018.
3. Deafness and hearing loss. World Health Organization (WHO). 2020.
4. Olusanya BO. Neonatal hearing screening and intervention in resource-limited settings: an overview. *Arch Dis Child*. 2012;97:654-9.
5. Olusanya BO. Hearing impairment prevention in developing countries: making things happen. *Int J Pediatr Otorhinolaryngol*. 2000;55:167-71.
6. Prevention of blindness and deafness. Grades of hearing impairment. Geneva: World Health Organization; 2013. Available at: http://www.who.int/pbd/deafness/hearing_impairment_grades/en/. Accessed on 1 March 2020.
7. Report of the International Workshop on Primary Ear & Hearing Care. World Health Organization. 2018;1-19. Available at: http://www.who.int/pbd/deafness/activities/en/capetown_final_report.pdf. Accessed on 1 March 2020.
8. CENSUS OF INDIA 2011 DATA ON DISABILITY. Office of the Registrar General & Census Commissioner, India, New Delhi. 2013.
9. National Sample Survey Organization. Disabled persons in India. NSS 76th round (July-December 2018) Report no. 583 (76/26/1). New Delhi: National Sample Survey Organization, Ministry of Statistics and Programme Implementation, Government of India. 2018.
10. Childhood hearing loss: strategies for prevention and care. © World Health Organization 2016. WHO Library Cataloguing-in-Publication Data.
11. Northern JL, Downs MP. Hearing in children. 5th ed. Philadelphia, PA, London: Lippincott, Williams & Wilkins. 2001.
12. Olusanya BO, Neumann KJ, Saunders JE. The global burden of disabling hearing impairment: a call to action. *Bulletin of the World Health Organization*. 2014;92(5):367-73
13. Khabori MA, Patton MA. Consanguinity and deafness in Omani children. *Int J Audiol*. 2008;47:30-3.
14. Amini SR, Kamali M. Consanguineous marriage among the parents of hearingimpaired students in mashhad. *Iran Rehabil J*. 2010;8:36-9.
15. Smith RJH, Bale Jr JF, White KR. Sensorineural hearing loss in children. *Lancet*. 2005;18(2):879-90; Paludetti G, Conti G, Di Nardo W, De Corso E, Rolesi R, Picciotti PM et al. Infant hearing loss: from diagnosis to therapy. Official Report of XXI Conference of Italian Society of Pediatric Otorhinolaryngology. *Acta otorhinolaryngologica Italica: organo ufficiale della Società italiana di Otorinolaringologia e Chirurgia Cervico-Facciale*. 2012;32(6):347-70.
16. Paludetti G, Conti G, Di Nardo W, De Corso E, Rolesi R, Picciotti PM et al. Infant hearing loss: from diagnosis to therapy. Official Report of XXI Conference of Italian Society of Pediatric Otorhinolaryngology. *Acta otorhinolaryngologica Italica: organo ufficiale della Società italiana di Otorinolaringologia e Chirurgia Cervico-Facciale*. 2012;32(6):347-70.
17. National Sample Survey Organization. Disabled persons in India. NSS 76th round (July-December 2018) Report no. 583 (76/26/1). New Delhi: National Sample Survey Organization, Ministry of Statistics and Programme Implementation, Government of India. 2018.
18. Govender SM, Khan NB. Knowledge and cultural beliefs of mothers regarding the risk factors of infant hearing loss and awareness of audiology services. *J of Public Health in Africa*. 2017;8(557):43-8.
19. Jatto ME, Ogunkeyede SA, Adeyemo AA, Adeagbo K, Saiki O. Mothers' perspectives of newborn hearing screening programme. *Ghana Med J*. 2018;52(3):158-62.
20. Ravi R, Yerraguntla K, Dhanshree R, Gunjawate, Rajashekhar B, Leslie E, Lewis et al., Knowledge and attitude (KA) survey regarding infant hearing loss in Karnataka, India. *Int J Pediatr Otorhinolaryngol*. 2016;85:1-4
21. Swanepoel D, Almec N. Maternal views on infant hearing loss and early intervention in a South African community. *Int J Audiol*. 2008;47:S44-8.
22. Dudda R, Muniyappa HP, Puttaraju S, Lakshmi MS. A Qualitative Study on Knowledge and Attitude towards Risk Factors, Early Identification and Intervention of Infant Hearing Loss among Puerperal Mothers- A Short Survey. *J Clin Diagn Res*. 2017;11(7):MC01-5.
23. Olusanya B, Luxon L, Wirz SL. Ethical issues in screening for hearing impairment in newborns in developing countries. *J Med Ethics*. 2006;32(10):588-91.
24. Selvarajan HG, Arunachalam RK, Bellur R, Mandke K, NagarajanR. Association of family history and

- consanguinity with permanent hearing impairment. *Indian J of Otol*. 2013; 19(2):62-5.
25. Gupta N, Sharma A, Singh PP. Generating an evidence base for information, education and communication needs of the community regarding deafness: a qualitative study. *Indian Journal of Community Medicine*. 2010;35(3):420-3.
26. National Programme for Prevention and Control of Deafness (NPPCD) Operational Guidelines for 12th Five Year Plan. Ministry of Health & Family Welfare Government of India. DIRECTORATE GENERAL OF HEALTH SERVICES. Ministry of Health & Family Welfare Government of India.
27. Rashtriya Bal Swasthya Karyakram (RBSK). National Health Mission, 2013. Ministry of Health & Family Welfare, Government of India. 2013;1-4.

Cite this article as: Rautara S, Sahoo S, Dash N, Bhoi RL. A study on awareness of hearing health, risk factors, prevention, and intervention of hearing impairment-among pregnant women and mothers of newborn in urban area, Bhubaneswar. *Int J Community Med Public Health* 2022;9:294-302.