

Aetiology of Hearing Loss in Cochlear Implantees: A Study of 191 Cases at CI Centre, CMH, Dhaka

Tukir Rahman

(BSc in Audiology & Speech Language Pathology)

Supervisor: Lt. Col. Dr. Mohammad Delwar Hossain (Cochlear Implant Surgeon, CMH)

Abstract:- Normal hearing is essential for communication in social life. Severe to profound hearing loss influences one's capacity to hear, yet distract to learn and has, in turn, have far-reaching consequences owing to one's inability to communicate adequately in society. Luckily, the dominant part of this hearing impaired individual can benefit from the cochlear implant. The goal of the research was to investigate the different hearing impairment aetiologies of patients in the cochlear implant program and serves as sampling material for future preventive public health care actions. This was a Survey medical research study conducted in the cochlear implant center situated in Dhaka cantonment from October 2019 to January 2020 of the deafened children who worked-up under the cochlear implant program. Total 191 children were included with hearing impairment. Collected data was: age, gender, date of birth, clinical profile and hearing impairment aetiology. All the information were analyzed in a study period, out of which prenatal 84(47.40%), perinatal 16(8.37%), postnatal 91(44.23%) hearing impaired was found. The most common cause of deafness in the study was Difficulty in pregnancy (19.89%), Consanguinity marriage (14.13%) was the 2nd leading cause then chronologically Anemia (12.56%), CMV (9.94%), Trauma (9.42%), sudden hearing loss (8.37%), LBW & Hereditary (7.85%), Rubella (6.80%), High Fever (5.76%), Typhoid (4.71%), Meningitis (3.66%), Others (2.62%), Noise (1.57%) was found. Among 191 patient 27 were adults and Among the adults major aetiology of hearing loss was Sudden loss (25.92%), Trauma & Noise (18.51%) were the 2nd leading cause, Hereditary & Meningitis (14.81%) were the 3rd leading cause. The major aetiological factor that caused deafness in the study was difficulty in pregnancy. Awareness programs for community and primary medical provider for early detection of hearing abnormality at ground level should be promoted, which will serve as sampling for future actions in public health.

Keywords:- Hearing Loss, Aetiology, Cochlear Implantation, Pregnancy Difficulty.

I. INTRODUCTION

Hearing loss isn't having the option to hear sound in one or the two ears. individuals may lose the entirety of their hearing or simply part of it. Extreme (>70–95 dB) to

significant hearing loss (>95 dB) has a frequency of 1–2 for every 1000 babies (Nikolopoulos, 2010). The reasons for deafness are many, yet the treatment is the equivalent. With the presentation of cochlear implantation (CI), a protected, productive, and cost-effective treatment for severe to profound sensorineural hearing loss (SNHL) was found. CI is the best neural prosthesis to date, with in excess of 220 000 embedded people worldwide in 2011 (Cosetti and Waltzman, 2011).

The main purpose of the investigation was awareness about etiology of hearing loss. Research at this point will impact positive social change by expanding awareness for specialist organizations in all parts of the child and family's advancement of awareness. This could change the concentration and productivity of certain intervention and administrations from child to family-focused to turn out to be progressively successful in delivery, or potentially to just create consciousness of the potential ways a conference loss impacts a hearing family.

➤ Objective of the Study

- To know the most affected aetiology of Hearing loss in Cochlear Implantees.
- To know the aetiology of Hearing loss in adult Cochlear Implantees.
- To know the onset (pre,peri,postnatal) aetiology of hearing loss in Cochlear Implantees.

II. MATERIALS AND METHOD

In this part, the study design, the sampling and data collection process of the study was discussed. This part was described as the setting of the investigation and the procedure of data collection. There was additionally being some contention about ethical issues of the investigation. When all is said in done, this section is intended to talk about the method of this study.

➤ Study Design

Survey medical research study design was used to conduct this study. Information was collected from patients & parents/careers (in case of a child).

➤ *Study Place*

The study was conducted at the CI center, ENT department, Combined Military Hospital (CMH) in the Dhaka city. CMH is convenient for collecting data. So this has been selected for the study place.

➤ *Study Population*

Cochlear implantees at Dhaka CMH was selected as the population of the study.

➤ *Sample Size*

The investigator has considered a large number of samples (191 cases) because the investigator could analyze deeply the data that came from those populations.

➤ *Sampling Procedure*

Purposive clinical sampling method was used to select the study sample. A purposive sample is a non-probability sample that is selected based on the characteristics of a population and the objective of the study.

➤ *Data Collection Tool*

A checklist was used as the data collection tool for this study. The checklist was developed based on the research need. The data collection checklist which is validated by ENT specialist and an audiologist is given below (Appendix part).

➤ *Data Collection Procedure*

The investigator used the Survey data collection procedure to collect the data. According to Fraenkel and Wallenp (2000, p. 436), face to face interview is the best way to get full cooperation of the participant in a survey. So the investigator took data from the patient face to face. Sometimes via mobile phone. The interview was conducted in bengali so that participants can understand easily. The checklist of the data collection tool was structured by close-ended questions like multiple types of questions and open-ended questions. The duration of the data collection was 4 weeks. The approximant time duration for each patient was 10 minutes.

➤ *Data Analysis*

The investigator used the descriptive method because generally descriptive analysis is used in combination with the survey method. There are many useful ways to illustrate descriptive data as well as tables, bar graphs, pie charts (Baileyp, 1997). The investigator used the tables. This was used because it is an easy and simple method so that the reader could understand the findings easily (Hicksp, 1999).

➤ *Eligibility Criteria for Participants*

Participants were selected who receipt Cochlear Implant.

III. RESULT

➤ *Result 01*

Table 1 Aetiology of Hearing Loss and the Number of the Affected Patient

Aetiology	Number
Rubella	13
Typhoid	9
Trauma	18
Anemia	25
LBW	15
Pregnancy	37
Meningitis	7
ENT Difficulty	6
Consanguinity	27
Noise	3
Sudden loss	16
Hereditary	8
CMV	19
High Fever	11
Others	5

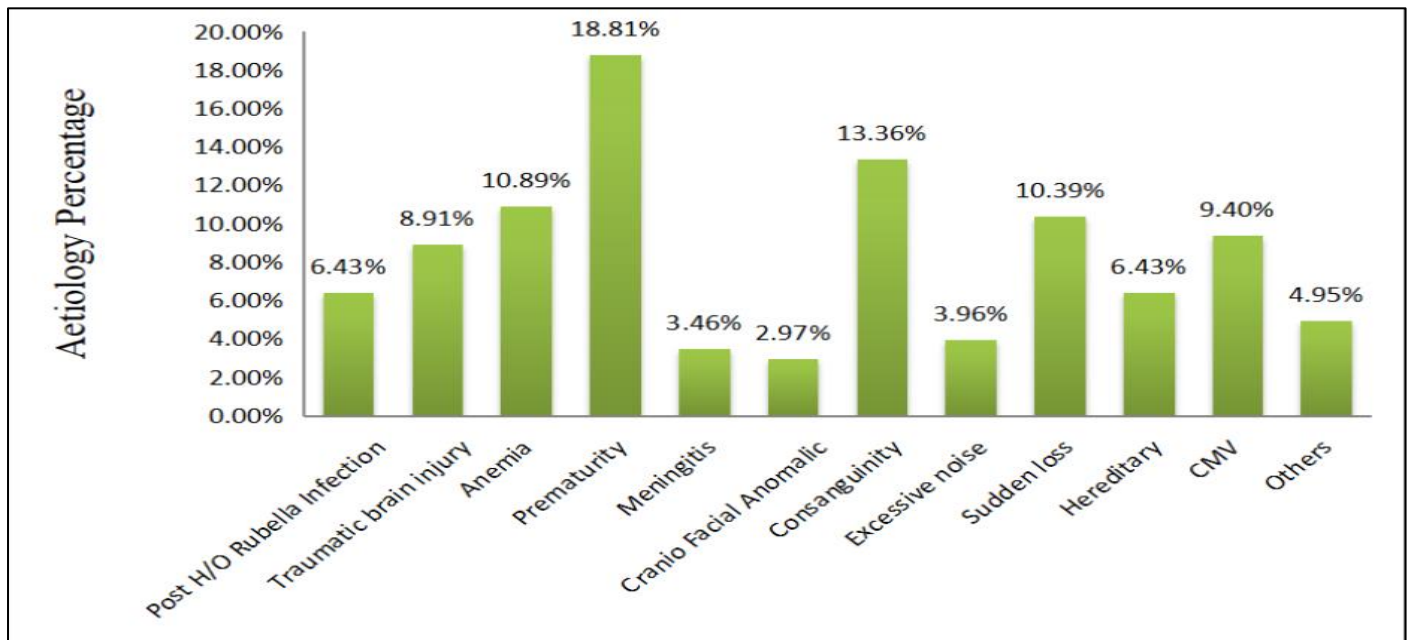


Fig 1 Aetiology of Hearing Loss and the Number of the Affected Patient

Among 191 implentees major aetiology of hearing loss was Difficult in pregnancy (19.89%), Consanguinity marriage (14.13%) was the 2nd leading cause then chronologically Anemia(12.56%), CMV(9.94%), Trauma(9.42%), sudden hearing loss(8.37%), LBW & Hereditary(7.85%), Rubella(6.80%), High Fever(5.76%), Typhoid(4.71%), Meningitis(3.66%), Others(2.62%), Noise(1.57%)

➤ Result 02:

Table 2 Aetiology of Hearing Loss and the Number of Affected Adult Patients

Aetiology	Number
Hereditary	4
Trauma	5
Noise	5
Sudden loss	7
Meningitis	4
others	2

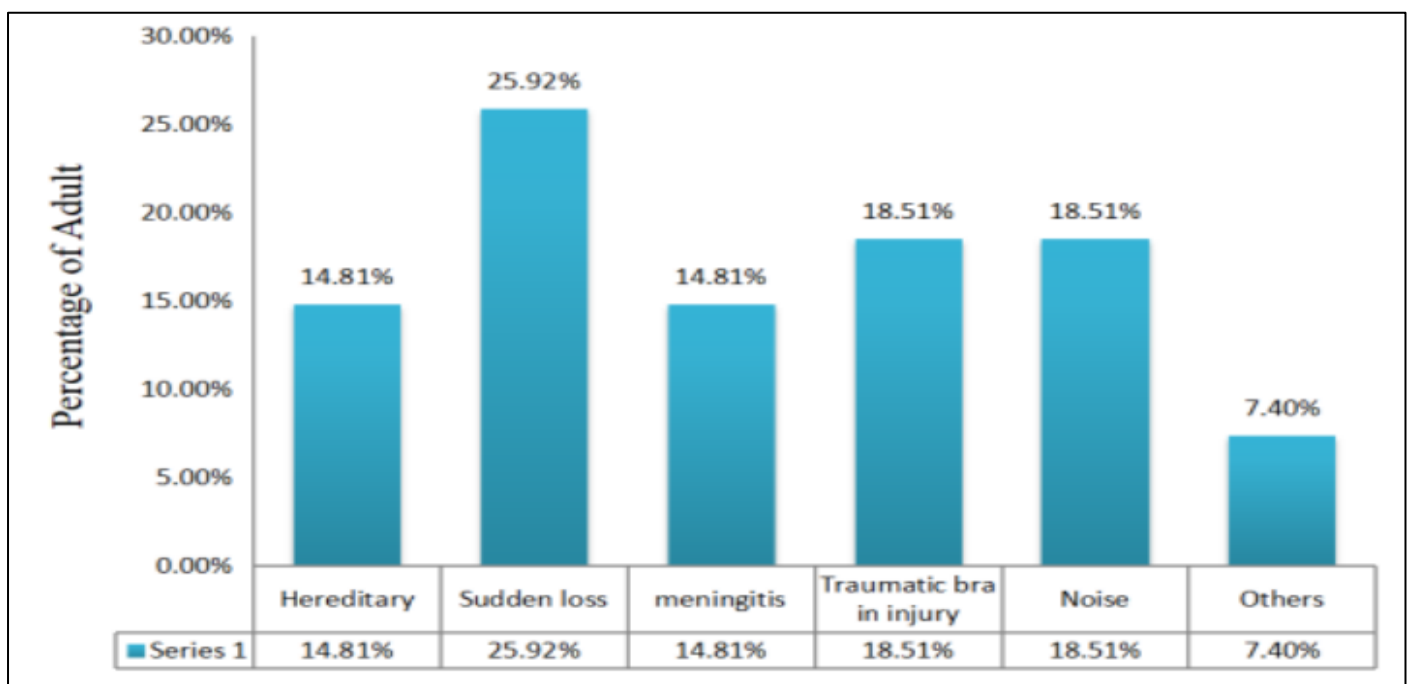


Fig 2 Aetiology of Hearing Loss and the Number of Affected Adult Patients

Among 191 patient 27 were adults. Among 27 patients major aetiology of hearing loss was Sudden loss(25.92%), Trauma & Noise (18.51%) were the 2nd leading cause, Hereditary & Meningitis (14.81%) were the 3rd leading cause, Others (7.40%).

➤ *Result 03:*

Table 3 Onset of Hearing Loss

Onset	Number
Prenatal	84
Perinatal	16
Post Natal	91

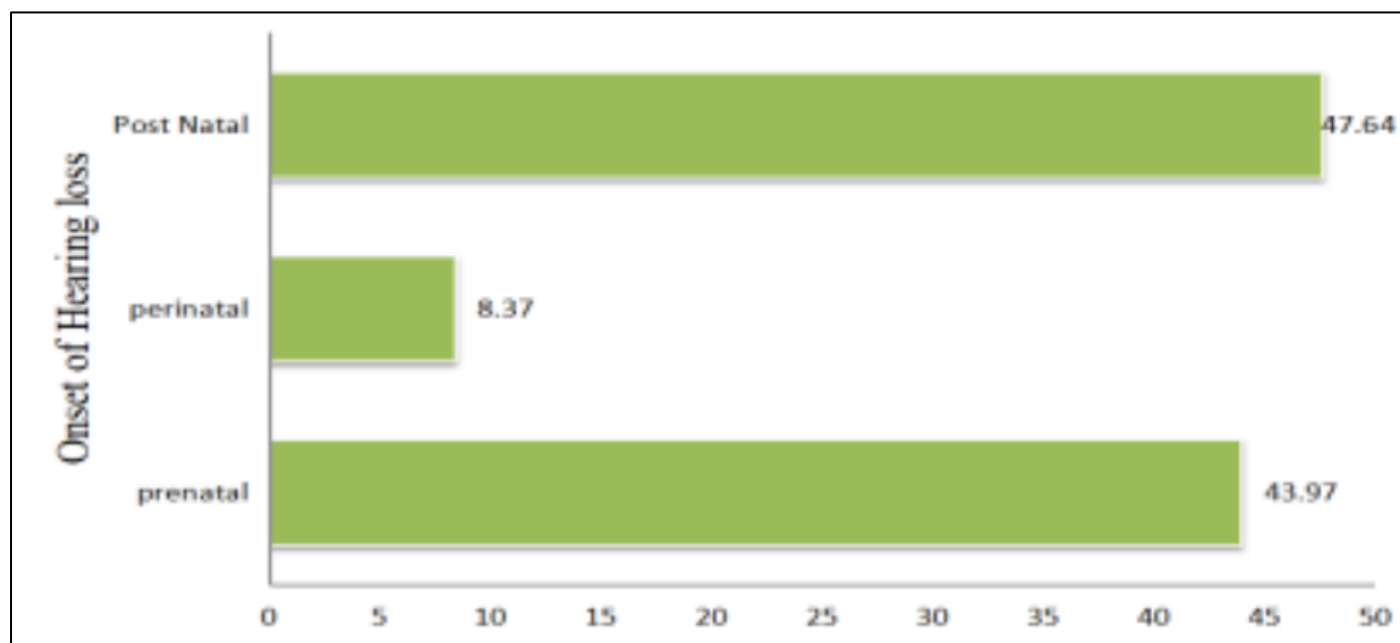


Fig 3 Onset of Hearing Loss

Among 191 cochlear implantees, onset of the hearing loss was prenatal(47.40%), perinatal(8.37%), postnatal (44.23%).

IV. DISCUSSION

Ehrenhaft PM & Wagner JL &Herdman RC found pregnancy difficulty is one of the major aetiology of hearing loss. In the present study, it found in 19.89% of cases. BhuttaP and his colleagues have shown that pregnancy difficulty affect 5-6% of children in high-income countries in their second year of life. The most common aetiology of hearing loss found in this study was Difficult in pregnancy (19.89%), Consanguinity marriage (14.13%) was in 2nd leading cause ,HerambaGanapathyPSelvarajan reported that about 18.6% of hearing loss due to consanguinity marriage (Korver et al., 2017). Then Anemia (12.56%), Kathleen M. SchiefferP and his colleagues reported that about 7.30% hearing loss due to anemia (Schieffer et al., 2017). Chronologically CMV & Trauma (9.42%), sudden hearing loss (8.37%), LBW & Hereditary (7.85%), Rubella (6.80%), High Fever (5.75%), Typhoid (4.71%), Meningitis (3.66%), Others (2.61%), Noise (2.09%) are the aetiologiesP of hearing loss.

Sudden hearing loss is one of the major aetiology of hearing loss of adults. Peter C Weber &MD & FACS stated that about 34% of hearing loss of adults due to sudden loss of

hearing. In this study, the major aetiology of hearing loss was Sudden loss (24%) in case of adults. which is concordant with the finding of the study. TraumaP(20%) was in 2nd leading cause, Hereditary, Meningitis & Noise (16%) combined 3rd leading cause, Others(8%).

Among 191 cochlear implenteesP onsets of the hearing loss was prenatal (47.40%), perinatal (8.37%), postnatal (44.23%). No previous study has determined the proportion of onset of hearing loss of cochlear implantees.

ACKNOWLEDGMENTS

First appreciation goes to all-powerful Allah who has given me enough capacity, persistence, and insight to do this investigation effectively. I might want to appreciate my parents who always encourage me to do this examination. At that point, my insight goes to individuals who help me various timesim different situation to finish the examination. I am a lot of obligated to my honorable supervisor Lt Col Delwar Hossain (Specified ENT Specialist, Head-neck & CI Surgeon CMH, Dhaka Cant. Dhaka) for helping me by giving thought and rule in each progression of the investigation. I need to recollect everything companions with the sentiments of appreciation for their motivation and backing in various basic circumstances of the venture. I am appreciative of every one of the principals with hearing impairment child’s parents,

specialists and audiologists for offering me to authorization to gather information. I might likewise want to offer special gratitude to Audiology and Speech-Language Pathology Dept. also, PISER (Proyash Institute of Special Education and Research Affiliated with Bangladesh University of Professionals) due to giving me the chance to do this investigation.

REFERENCES

- [1]. Artal R, Sherman C. Exercise during pregnancy: safe and beneficial for most. *PhysSportsmed.* 1999;27:51-75.
- [2]. Asghari A, Farhadi M, Daneshi A, et al. The Prevalence of Hearing Impairment by Age and Gender in a Population-based Study. *Iran J Public Health.* 2017;46(9):1237–1246.
- [3]. Borton, S. A., Mauze, E., & Lieu, J. E. C. (2010). Quality of life in children with unilateral hearing loss: a pilot study. *American Journal of Audiology*, 19, 61-72. doi: 10.1044/1059-0889(2010/07-0043)
- [4]. Camporesi EM. Diving and pregnancy. *Semin Perinatol.* 1996;20:292-302.
- [5]. Carroll YI, Eichwald J, Scinicariello F, et al. Vital signs: noise-induced hearing loss among adults — United States 2011–2012. *MMWR Morb Mortal Wkly Rep* 2017;66:139–44.
- [6]. Depoy, E., & Gitlin, L. (1998). *Introductio to research: Understanding and applying multiple stratgies.* New York: Mosby.
- [7]. Entin PL, Coffin L. Physiologic basis for recommendations regarding exercise during pregnancy at high altitude. *High Alt Med Biol.* 2004;5:321-334.
- [8]. Forge A, Schacht J. Aminoglycoside antibiotics. *Audiol Neurootol* 2000;5:3–22
- [9]. Gravel, J.S., & O’Gara, J. (2003). Communication options for children with hearing loss. *Mental Retardation and Developmental Disabilities Research Reviews*, 9, 243–251.
- [10]. Haddad J, Keesecker S. Hearing loss. In: Kliegman RM, Stanton BF, St. Geme JW, Schor NF, eds. *Nelson Textbook of Pediatrics.* 20th ed. Philadelphia, PA: Elsevier; 2016:chap 637.
- [11]. Hammer MS, Swinburn TK, Neitzel RL. Environmental noise pollution in the United States: developing an effective public health response. *Environ Health Perspect* 2014;122:115–9.
- [12]. Nikolopoulos T.T. Treating options for deaf children. *Early Hum Dev.* 2010;86:669–674.
- [13]. P L Dhingra (2008) diseases of Ear, Nose and Throat - 2nd edition; pages 13-16 and 32.
- [14]. Sha SH, Schacht J. Emerging therapeutic interventions against noise-induced hearing loss. *Expert Opin Invest Drugs* 2017;26:85–96.
- [15]. Stachler RJ, Chandrasekhar SS, Archer SM, et al. Clinical practice guideline: sudden hearing loss. *Otolaryngol Head Neck Surg* 2012;1463 Suppl:S1–S35.

APPENDIX

Data collection form

Thesis Name: Aetiology of Hearing Loss in Cochlear Implantees: A Study of 191 Cases at CI center, CMH, Dhaka

Name: Age: Sex:
 DOB:/...../..... Phone Number: +8801.....

Address:.....

Child position:..... No of siblings:.....

Date of Cochlear Implant:/...../..... Referred By:

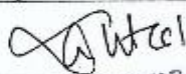
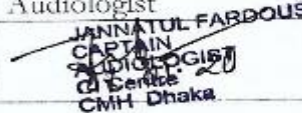
Chief Complaints:

Clinical Sign:.....

Duration of HL:..... Complication:.....

Pre-Natal			Peri-Natal	Post-Natal		
Malnutrition	Diabetes	Rubella	Problem in Pregnancy Length	Meningitias	Trauma	Drug
Typhoid	Trauma	Blood Pressure	Problem in Labour Length	Chicken Fox	Malaria	Rubella
Ototoxicity	Jaundice	Syphilis	Birth Cry: Normal / Delayed	Jaundice	Mumps	CMV
Rh incompatibility	Anemia	Malaria	Low Birth Weight	Noise	Pneumonia	Typhoid
Viral infection	Consanguinity	Others	Other Difficulty	Sudden loss	Hereditary	Others
No Complication			No Complication	No Complication		

Hearing Status:

Signature of supervisor	Signature of Audiologist
	

MOHAMMAD DELWAR HOSSAIN
 LT COL
 Classified ENT, Head-Neck &
 Cochlear Implant Surgeon
 OIC, Cochlear Implant Center
 CMH Dhaka

JANNATUL FARDOUS
 CAPTAIN
 AUDIOLOGIST
 OIC Service
 CMH Dhaka

 Signature