

ROLE OF ELECTROPHYSIOLOGY IN EARLY DETECTION OF HEARING IMPAIRMENT

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ABSTRACT: In the present study about 72 children with complaints of hearing impairment attending the Outpatient department of Government Ear, Nose and Throat Hospital were taken up. These children were chosen randomly and were followed up from consultation stage till the final diagnosis after completion of all the tests. The age range of children was from 1 year to 7 years. 43 Children were males and 29 children were females. All the children attended the Government E.N.T. Hospital for evaluation and further evaluations were done at the Hearing Aid Centre. Most of the children were from poor socio-economic status (White Ration Card Holders). Average time taken for each child ranged from 60 minutes to 120 minutes since the physiological tests have to be done for the children under sedation as they are not co-operative. The Aims and Objectives of this study are 1. Early detection of hearing impairment in children has been the main aim of this study. Children of age groups, ranging from 1 – 7 years with a complaint of hearing impairment are taken up for this study. Main emphasis being on sensori-neural hearing loss with or without speech impairment, cases of external and middle ear conditions are excluded. 2. Assessment of the type and degree of hearing loss and knowing probable site of pathology by conducting a battery of tests- PTA (pure tone audiometry), FFA (Free field Audiometry), Impedance Audiometry, OAE (otoacoustic emissions), and BERA (Brain stem Evoked Response Audiometry). 3. Knowing efficacy and accuracy of Electrophysiological tests in children who are otherwise uncooperative or cannot understand and follow the subjective tests. 4. Comparing the results of Electrophysiological tests and subjective tests. 5. Analyzing the data in terms of gender, etiology, type of hearing loss etc. With the advent of the advanced electrophysiological tests of hearing like BERA, OAE, Electrocochleography and Auditory Steady State Response audiometry (ASSR), it is now possible to diagnose hearing loss even in a new born baby with certainty and accuracy.

KEY WORDS: Electrophysiology, Hearing impairment, early detection.

INTRODUCTION: Communication is the key word in today's world and hearing is the basic need for any effective communication. Hearing is an important special sense and an essential requisite for any individual to understand and develop speech. Hearing loss may have many implications on human lives. We cannot fully appreciate the importance of hearing until we have lost it. The

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potential losses are education, career, friends, relationships and social life, as the sufferer is left alone in a world of silence.

Human beings are distinct from other creatures in their ability to speak and communication in a meaningful language. Acquisition of speech and language are totally dependent on one's ability to hear and thus children who are born deaf may remain deaf mutes unless identified and rehabilitated at an early age. Early diagnosis of hearing loss by physiological and Electrophysiological tests is the key factor. With the understanding of the physiology of hearing, we have been able to establish how complicated the process of hearing is and how much in depth knowledge is required to establish the diagnosis of a child with hearing disability. This study is carried out to emphasize the importance of electrophysiology and its role in the early identification, intervention and rehabilitation of a child with hearing impairment.

METHODS AND MATERIALS: Children with complaints of hearing impairment attending the OPD at Govt. ENT Hospital, Visakhapatnam which is having an outpatient turnover of 250 – 300 per day, are chosen as subjects. A thorough clinical history is taken and ENT examination is carried out. Children with external and middle ear diseases are excluded as the main emphasis is on Sensorineural hearing loss in early childhood.

After the provisional diagnosis they are referred to the Department of Audiology at Rani Chandramati Devi (RCD) Children's Hospital and Rehabilitation Centre, Visakhapatnam for a thorough audiological evaluation. The child is subjected to a battery of investigations which included both subjective and objective tests of hearing. Altogether 72 children were examined and the results are analysed.

TESTS PERFORMED:

- 1) Free Field Audiometry and Behavioural Observation Audiometry.
- 2) Impedance Audiometry
- 3) Otoacoustic emission test(OAE)
- 4) Auditory Brainstem Evoked response Audiometry (BERA).

DISCUSSION: In the present study about 72 children attending the Government Ear, Nose and Throat Hospital were taken up. These children were chosen randomly and were followed up from consultation stage till the final diagnosis after completion of all the tests.

The age range of children was from 1 year to 7 years.

43 Children were males and 29 children were females.

All the children attended the Government E.N.T. Hospital for evaluation and further evaluations were done at the Hearing Aid Centre situated at Rani Chandramani Devi Children's Hospital and Rehabilitation Centre. Most of the children were from poor socio-economic status (White Ration Card Holders).

Average time taken for each child ranged from 60 minutes to 120 minutes since the physiological tests have to be done for the children under sedation as they are not co-operative.

It was also noted that in 49 cases, the history of consanguineous marriage among parents, either maternal uncle (First Degree), first cousin or distant relative was present. 9 Children had history of ear discharge which is common among young children especially from poor economic strata.

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Of the 72 children examined the breakup of the problem after diagnosis are as follows:

Profound degree of deafness	-	47
Severe degree of deafness	-	43
Moderately severe deafness	-	5
Mild deafness	-	3
Autism	-	2
Mental Retardation	-	2

Deafness is the single largest disability in any given population. There are about 250 million deaf people in the world. In India, about 100 children are born deaf every day, which may be potential deaf mutes.

According to WHO, 10 children out of every 1000 live births may be suffering from varying degrees of deafness. About 7-8 of them with moderate hearing loss may be benefited by hearing aids and speech therapy. Remaining 2-3 children with severe to profound loss may remain deaf mutes.

But with the recent advances in the management of deafness it is now possible to rehabilitate these children also by performing Cochlear Implant surgery. Studies have shown that best results are achieved if the implantation is surgery. Studies have shown that best results are achieved if the implantation is done around 3 years age. Hence the aim is an early diagnosis and habitation.

Subjective tests like tuning fork Tests, pure tone audiometry, speech. Audiometry and other behavioural responses are not reliable in this age group.

But with the advent of the advanced electrophysiological tests of hearing like Brain Stem Evoked Response Audiometry (BERA), Otoacoustic Emissions (OAE), Electrocochleography and Auditory Steady State Response audiometry (ASSR), it is now possible to diagnose hearing loss even in a new born baby with certainty and accuracy.

It is observed and proved beyond doubt that Electrophysiological tests are of immense value in the early identification and management of hearing impairment in children. An early intervention can change the life of a deaf mute into a child with normal hearing and speech.

CONCLUSION: Advent of Computers, Digital Technology and facilities for analysis of data which can be stored and retrieved at a later date has improved the diagnostic ability of the physiological functions of hearing and its pathology.

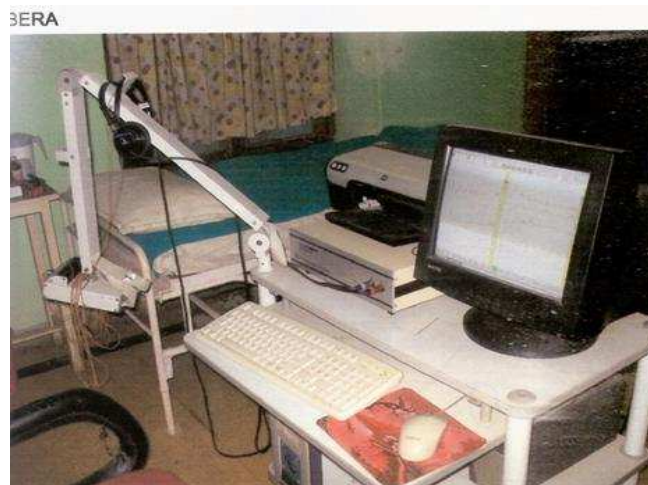
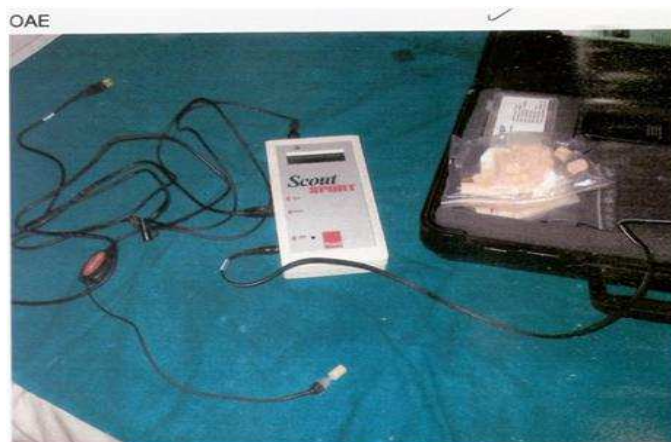
Today, with the most advanced testing tools and equipment available in most clinics of our country it is possible to diagnose hearing disability in days old infants. Early diagnosis helps in early rehabilitation and this saves the number of children who later would have developed into the dreaded category of "Deaf & Dumb", as the common man says. This has been only possible with the role of Electrophysiological test battery developed in recent years. Knowledge of physiology of hearing, assessment of physiology of hearing in pediatric population, particularly by way of Electrophysiological study, has greatly contributed to the well-being of not only our children but also our society. This is true especially in our country as the number of children born with congenital deafness is far more than in other countries due to major causative factors like consanguineous marriages, inadequate perinatal health facilities in rural areas and lack of awareness among the public.

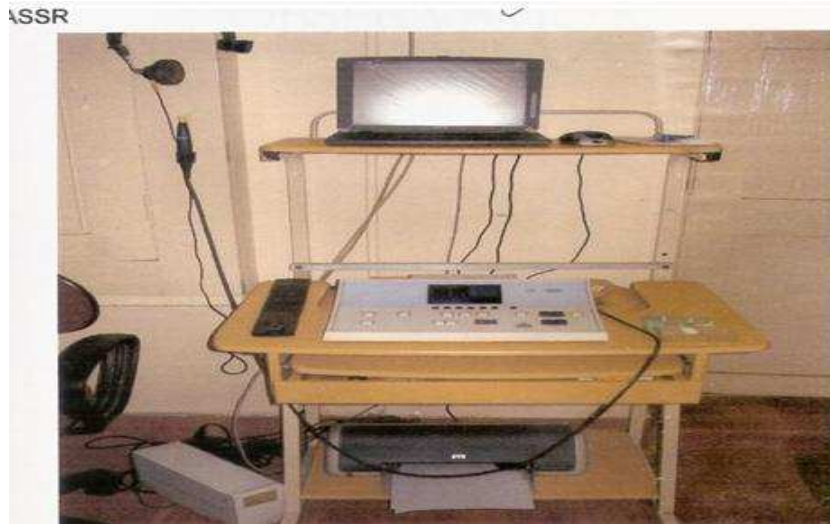
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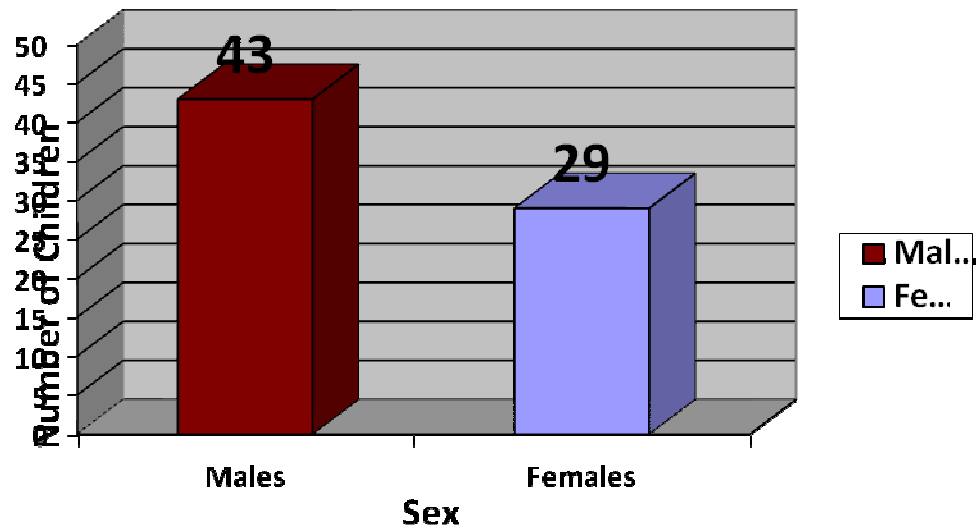




RESULTS AND DISCUSSION:

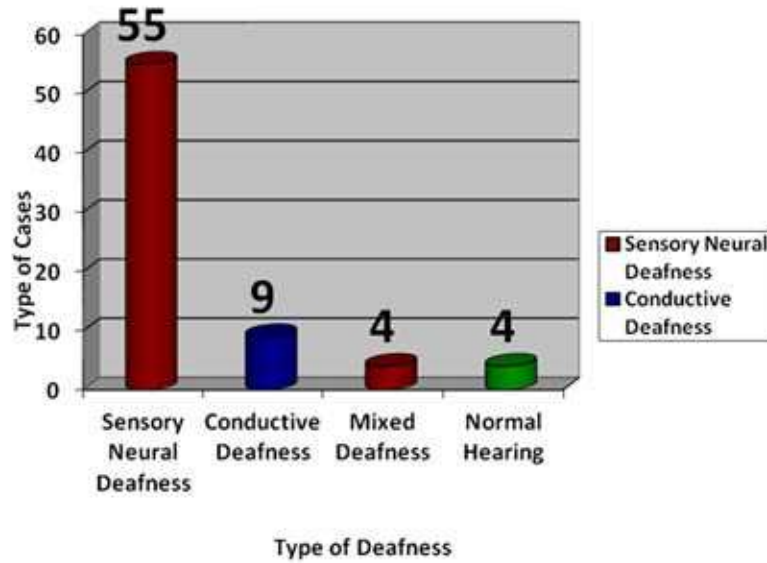
Male Vs Females Distribution of Cases selected for the study

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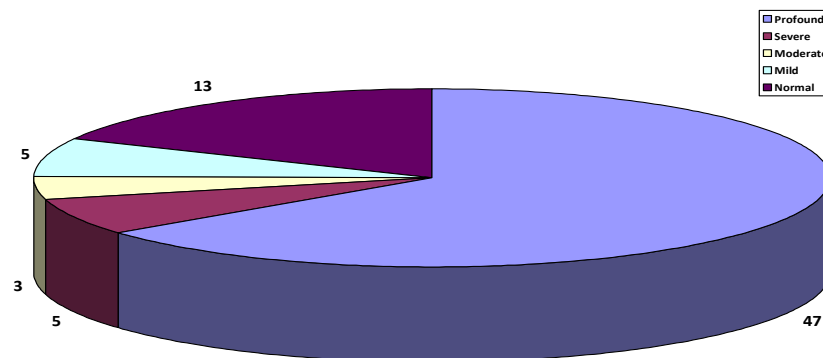


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Distribution as per Type of Deafness



Degree of Deafness



Causewise Distribution

