

5. SUMMARY

Hearing loss is a common problem in newborns. Some cases are due to auditory neuropathy spectrum disorder (ANSD), a problem in the transmission of sound from the ear's innermost part (the inner ear) to the brain. The causes of ANSD are unknown several factors have been linked to auditory neuropathy in children. However, a clear cause and effect relationship has not been proven. Some children who have been diagnosed with auditory neuropathy experienced certain health problems as newborns, or during or shortly before birth. These problems include jaundice, premature birth, low birth weight, and an inadequate supply of oxygen to the unborn baby. The impact of ANSD on a child's hearing ability varies amongst individuals. It is not possible to predict either a degree of hearing loss or a prognosis for speech and language development and communication ability based on the diagnosis of ANSD. Hearing loss may vary from mild to profound. More so ever, available information on the prevalence rate of auditory neuropathy is poor & limited. Prevalence rate vary from researcher to researcher as per the availability of cases and data.

Hence, the current study was taken up to explore ANSD, its related etiologies, prevalence rate, clinical & audiological profile. 730 SNHL children were participated in the study. . Out of 730 children (49%, n=359) were male and (50.8%, n=371) were female. Mean age of study group was 2.9 yrs and SD (standard deviation) age was 2.24yrs.

Objectives & Hypotheses of the study are as follows:

Objectives:

1. To determine prevalence rate of auditory neuropathy.
2. To determine the related etiologies.

3. To determine the audiological profile of children with auditory neuropathy.

Hypotheses:

1. Prevalence of auditory neuropathy spectrum disorder:
2. There will be no significant prevalence rate of auditory neuropathy spectrum disorder.
3. Related etiologies of children with ANSD.
4. There will be no much etiologies associated with auditory neuropathy.
5. For comparison of audiological findings of children with ANSD:
 - 3.1. There will be no significant difference in between the audiological profile of children with ANSD and children with SNHL.
 - 3.2. There will be no significant sex difference in between the audiological profile of children with ANSD and children with SNHL.
 - 3.3. There will be no significant difference in between the audiological profile of male children with ANSD and SNHL.
 - 3.4. There will be no significant difference in between the audiological profile of female children with ANSD and SNHL.

For the purpose of the study, complete case history & audiological data of each patient was taken. Comparison of each data was done by using the descriptive statistics, Pearson test correlation and t-test. Test calculated PTA threshold at each frequency, PTA average, DPOAE values, SAT thresholds, SDS score, Impedance values and BERA values, prevalence rate & related etiologies.

5.1.1 The following were the findings of current research study:

- 1) There is a statistically significant/high prevalence rate of ANSD. Present study showed approximately (5%, n= 39) of prevalence rate out of 730 SNHL children.
- 2) Present study showed out of 39 ANSD children. 84.6 %,(n=33) showed related medical etiologies.
- 3) In present study almost all the 39 children statistically showed audiological characteristics of ANSD
 - i. Several independent sample *t*-tests were performed to find out the differences between children with ANSD and children with SNHL in their audiological characteristics. The obtained results for PTA showed that, for right ear, children with ANSD did not obtain significantly higher scores than children with SNHL on PTAR_AVG. Additionally, more detailed analyses revealed that, children with ANSD obtained significantly lower scores than children with SNHL on PTAR_250HZ,PTAR_500HZ, PTAR_4KHZ. Furthermore, for left ear, children with ANSD obtained significantly lower scores than children with SNHL on PTAL_AVG. Additionally; more detailed analyses revealed that, children with ANSD obtained significantly lower scores than children with SNHL on PTAL_250HZ, PTAL_500HZ, PTAL_1KHZ, PTAL_2KHZ, PTAL_4KHZ. Furthermore, the obtained results for DOAPE, for both ears, children with ANSD obtained significant scores than children with SNHL on all frequencies of distortion product, noise floor, and signal to noise.

Based on obtained results; i.e. there is significant difference between the audiological profile of children with ANSD and children with SNHL
 - ii. There will be no significant sex difference in between the audiological profile of children with ANSD and children with SNHL.

- iii. There was a statistically significant difference in between the audiological profile of male children with ANSD and SNHL. Several independent sample *t*-tests were performed to find out the differences between male children with ANSD and children with SNHL. The detailed analyses were showed that, on PTAL_AVG, children with SNHL were scored higher scores than children with ANSD. Similarly, on all frequencies of distortion product, noise floor, and signal to noise ratio for both the ears children with ANSD obtained significantly higher scores than children with SNHL.
- iv. There was a statistically significant difference in between the audiological profile of female children with ANSD and SNHL.' To test thisseveral independent sample *t*-tests were performed to find out the differences between female children with ANSD and SNHL. PTA results of both the ears; and partially rejected for DOAPE results for both ears. The overall results for DOAPE, for both ears, on all frequencies of distortion product, noise floor, and signal to noise showed that children with ANSD obtained significantly higher scores than children with SNHL.

5.1.2 Points to be considered:

1. Both ABR and behavioral thresholds are poor predictors of speech discrimination ability.
2. Behavioral thresholds may improve over the first 1-2 years of life.
3. Absent or elevated stapedial reflexes (SRs) Behavioral thresholds anywhere in the range from normal to profound, and any configuration.
4. In some cases, the behavioral thresholds may appear to be satisfactory, with age-appropriate speech development, but the child may exhibit features consistent

with auditory processing difficulties. There should be a local protocol for the ongoing monitoring of such cases.

5. OAEs which are present at initial assessment may disappear over time in some of the cases. May find variable responses from one test session to another, but generally reliable within a single session.
6. Speech discrimination poorer than the behavioral audiogram would suggest.
7. Hearing aids may be of less benefit than the behavioral audiogram would suggest.
8. Greater difficulties hearing in competing noise than expected from the behavioral audiogram, and other features indicative of auditory processing difficulties.
9. As thresholds usually bear little relationship to speech discrimination ability, management decisions for these children should be guided much more by functional communication development rather than behavioral or ABR thresholds.
10. Children with any clinical/medical/hereditary history. Complete Audiological battery should administered on such patient.

5.2 Conclusion:

In this study, we have incurred the previous and ongoing trends, clinical presentation and audiological findings of auditory neuropathy spectrum disorder, along with its prevalence rate, most obvious associated etiologies and their subsequent effects on hearing and communication. Auditory Neuropathy spectrum disorder usually associated with various syndromes and other pathological sign and symptoms along with varies clinical findings. Our result showed, 5% of prevalence rate, 39 children out of 730 showed significant characteristic of ANSD. By viewing its intricate etiological characteristics and prevalence rate, varies clinical and audiological findings, thus it's recommended that the required test of batteries should be needed, So that ANSD can be diagnosed or detected at its very beginning of onset. More so

ever follow-up and counselling regarding the appearance of neuropathies is therefore important in such patients. A hereditary etiology indicated in a majority of cases of auditory neuropathy spectrum disorder.

Children with ANSD should be monitored carefully. We should guard against giving false hope that the condition will recover, but equally we should be careful to avoid assigning a long-term diagnosis prematurely.

5.3 Limitation of the study:

1. The current study had relatively small sample size.
2. Subject above 12yrs were not considered in study.

5.4 Research Needs:

- More studies needed to rule out better clinical tools to help determine site of lesion.
- Evidence regarding clinical management and use of amplification is still limited. More research needed especially with infants and young children.
- Studies aimed at evaluating hearing aid outcomes Vs cochlear implant outcomes

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