

## **CHAPTER 5**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.0 INTRODUCTION**

This chapter presents the conclusions of the study, and recommendations for further research. The main objective of the study is to discover if the Transient otoacoustic emissions Screening tests are affected by the status of the external/ middle ear as determined by Tympanometry test in this group of infants.

The high pass rate difference demonstrated in the present study for passable TEOAE scores in Group A and in Group B, highlights the influence that external/middle status have on TEOAE screening. The present study showed a significant relationship between TEOAE screening and Tympanometry, with higher pass rate in group A compared to group B.

In Group B, inspite of the fewer ears with abnormal tympanogram, there was a greater percentage of TEOAE failures and fewer passes highlighting the influence of the external/middle ear status affecting the TEOAE screening results. Of the 61 ears in group B indicating external/ middle ear conditions, 68.9 % failed the TEOAE screening showing a greater relationship between TEOAE and external / middle ear conditions.

TEOAE screening test 34% of infants with hearing loss to be identified and referred for audiological assessment. This study was also able to diagnose 23.7% as having sensorineural type hearing loss in the follow up audiological assessment by Auditory Brainstem test (ABR).

TEOAE screening is followed by ABR threshold test for those who obtained an abnormal TEOAE and normal tympanogram by an ABR. Such approach has the merit of raising the overall specificity of the screening without the need for extra time referred for the screening of all babies using ABR.

The use of Tympanometry was felt to be satisfactory for the purposes of the study. It was easy to interpret in agreement with Holte et al, 1991, especially when combined with ear examination to determine the presence of apparent abnormalities without attempting to reach a precise diagnosis.

As the TEOAE technique is simple, fast, non - invasive and sensitive it could be used as an objective test for screening peripheral auditory dysfunction in neonates and infants.

The present study done in university hospital was on an infant age group from 2 months to 2.6 years, including infants with high risk factors who had been admitted to special care nursery. The model of screening followed was similar to the National Institute of health consensus statement and recommendation to begin with an evoked otoacoustic emissions test followed by ABR for all infants who fail the TEOAE test. In this study tympanometry

test was also included to study the effects of external of middle ear conditions on the screening test.

## **5. 1 RECOMMENDATIONS**

Based on the above mentioned findings and conclusions, the following recommendation are proposed in the area of practice and research in relation to the hearing screening test.

### **5. 1. 1. Application**

1. Hearing screening programs should be implemented in all hospitals using Transient Evoked Otoacoustic Emissions test (TEOAE) for early identification and intervention.
2. All infants admitted to the neonatal intensive care unit be screened for hearing loss before being discharged from the hospital, as data have shown that infants admitted to the neonatal intensive care unit (NICU) have an increased risk of significant bilateral sensorineural loss (1-3 percent).
3. Parental concern about the child's responses should be sufficient reason to initiate prompt formal hearing evaluation.
4. It is recommended that a newborn hearing screening should include all infants and not just those with 'high risk' factors. Focusing on hearing screening on those at highest risk for hearing loss has disadvantages as research shows that this approach misses 50% of children who are eventually diagnosed in the severe to profound hearing impairment (NIH

Consensus statement,1993). Reduced hearing acuity during infancy and early childhood interferes with the development of speech and verbal language skills. Moreover delayed identification and management of severe to profound hearing impairment may impede the child's ability to adapt to life in a hearing world or in the deaf community.

5. Examination and cleaning of the external ear canal are important current components of a Neonatal screening process and should be given emphasis. It was applicable in the infants group used in this study as the TEOAE pass rate improved after follow-up by ear specialist for wax removal and treatment of the external /middle ear conditions.

As seen the preferred model for screening should begin with Transient evoked Otoacoustic emission test (TEOAE), followed by a more conventional approach to determine the nature and degree of the hearing impairment with tests such as Auditory Brainstem response test (ABR) and Tympanometry. The comprehensive intervention and management programs must be an integral part of a universal screening program to receive adequate auditory, linguistic, and social stimulation requisite to speech and language learning, social and emotional development.

6. This study should be done with other age group especially as the pre-school and school entry level. Appropriate referral for audiological follow up and educational intervention should be done after the screening. This will ensure that students will not lag behind in their studies.

## 5. 2. RESEARCH

A possible area of research is to determine the level of hearing loss that can be detected by TEOAEs as several studies indicate that TEOAEs are able to detect hearing loss of  $\geq 30\text{dBHL}$  (Choi et al, 1999), whereas others found that hearing loss  $> 20\text{dBHL}$  can be detected by TEOAEs. Studies in adults (Kemp, 1978; Kemp et al 1986) have shown that the EOAE can be recorded in most normal hearing adults, but where an ear has an hearing deficit of more than about  $15\text{dBHL}$ , no EOAE is present.

Another possible research area is in the Probe fitting procedure that needs to be more standardized than the present one, as fitting the probe is actually the single most important part of making an OAE measurement.

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