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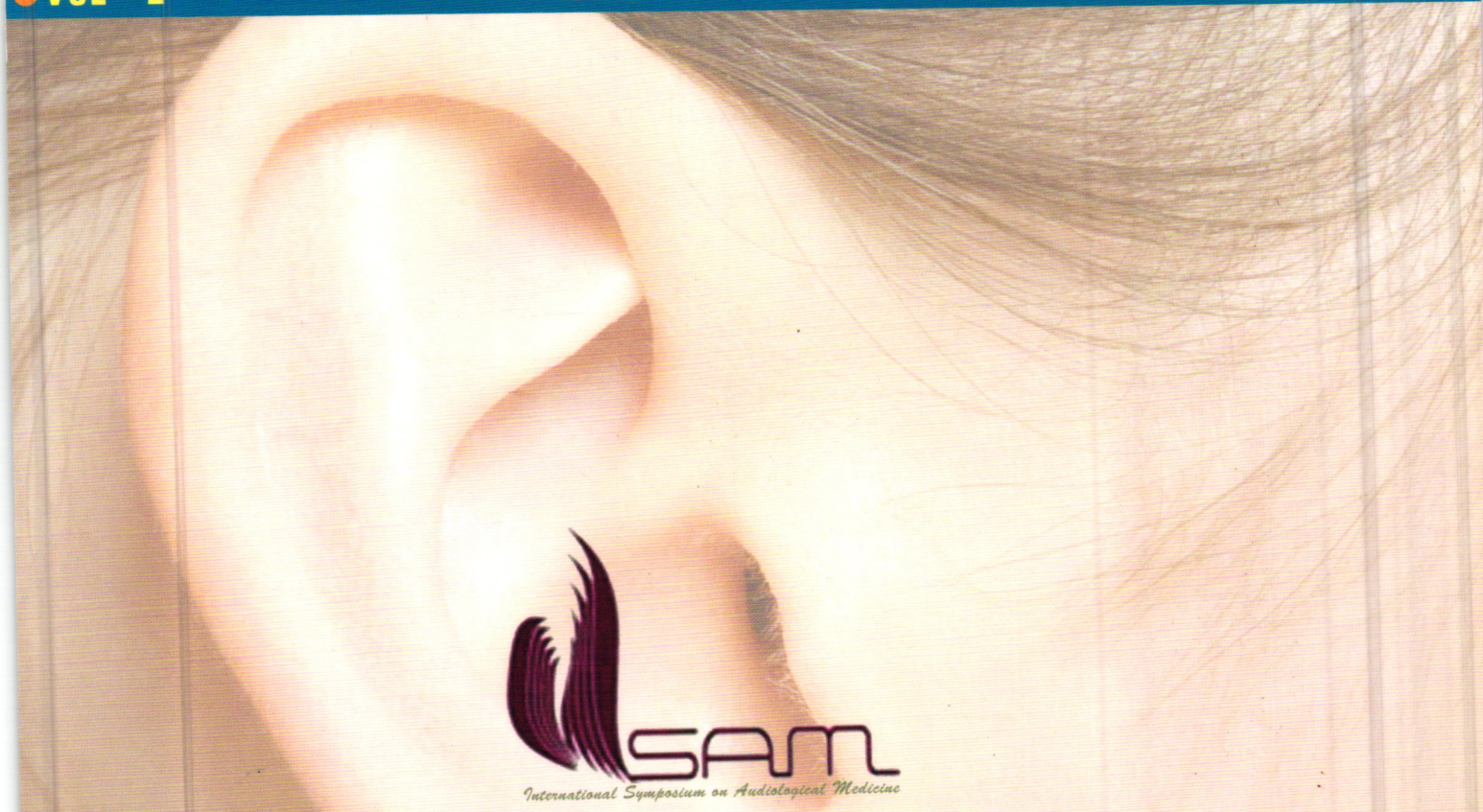

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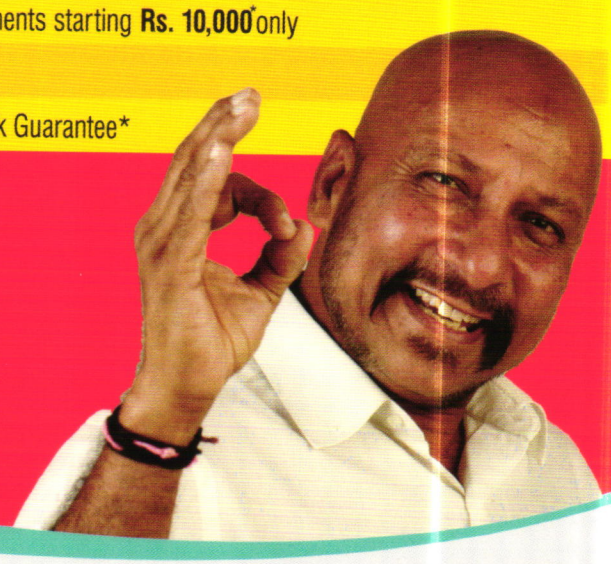

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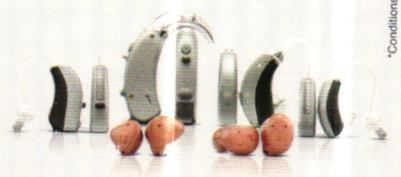

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Editorial

India is shining, due to all its young, dynamic, intelligent professional work force. The future of this country of 1.2 billion people, depends on the present practices and future plans. The profession of Audiology that will touch the lives of 12 million people with hearing impairment has a gigantic task ahead of it. It requires far sighted approaches to create the pathway to progress for the profession of Audiology and a Disability free nation. The Audiology education in India has evolved to cater to the changing needs of the nation under directives from Rehabilitation Council of India. The qualified professionals need to imbibe realistic practices that meet the need of local community in this mosaic culture. The reality education has been incorporated into the curriculum but needs to be structured to help the professionals acquire appropriate diagnostic and rehabilitation protocols.

The Govt. of India in its need for prevention and control of Deafness has started national programs. Several state governments, corporate sector and the non govt. organizations are working towards the welfare of persons with hearing impairment. The consensus among the different agency apart, there should be cooperation among the professionals like Otologists, Neuro-otologists, Audiologists, Physicians, AVT Therapists. These are essential to provide comprehensive Hearing health care to the teeming millions with hearing impairment. The department of Health & Family Welfare, the department of Social Welfare or Handicapped Welfare, the School & Mass Education Department and many other offices created to help the persons with disability need to have consonance of functioning in several matters involving the hearing impaired persons to have perfect integration of service delivery.

The Knowledge, Skill and Technology in the field of Hearing health care has grown to create hope for the hearing impaired persons. But knowledge and awareness about these products, services and the professionals is lacking among the general public as well as among allied professionals. Thus created capacity of the institutions are underutilized wereas affected persons suffer the life of disability. There is a need for professionals-public interface for better delivery of services.

The International Symposium on Audiological Medicine-2011 is working towards showcasing the clinical practice and the clinician in the country, who work for the welfare of persons with hearing impairment. The public show of Audiology is HEAR-EXPO, that is planned as a twin event to educate general public and bring about overall awareness about hearing health care. The future will tell how these events help to let the professional services percolate down to the individual with hearing impairment. The professionals all over the country need to cooperate for an integrated network of referral system. The ISAM will continue to strive to bring all the partners in hearing health care together for collective progress.

Prof. Satya Mahapatra

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EFFECT OF PROGRESSIVE FILTERING OF SPEECH STIMULUS ON ABR AND IT'S CO-RELATION WITH BEHAVIOURAL SPEECH PERCEPTION

Rukmangathan. T. M., Archana. G., Hariprakash., Rajshekhar. B.

Introduction: Auditory brainstem Response (ABR) is a complex response to any external stimuli that represents neural activity generated at several anatomical sites (Hood & Berlin 1986). In addition to click, ABRs can be evoked using a wide array of stimuli, including pure tones and speech sounds (Krishnan, 2002; Russo et al.-2004).Responses elicited for the speech and non-speech stimuli exhibited considerable variation this suggests there is a possibility of differential processing for different stimuli at the level of brainstem (Hayes & Kraus, 2001). The ABR response to speech provides a way to access subcortical auditory processing mechanisms and may be used as a biological marker of deficient sound encoding associated with learning and auditory processing disorders. Speech evoked brainstem responses are divided into transient and Frequency Following Responses. Where, transient responses are onset/offset response and peak B represents spectral motion within burst and C represents transition from burst to onset of vowel. Accurate manifestation of these peaks in brainstem is hallmark of normal speech perception (Sininger & Starr 2001).

Need: Currently click evoked ABRs don't have any correlation with speech perception. Transition from consonant to vowel is vital information in perception of speech sounds, also burst energy is important clue in differentiating different stop consonants, and these changes are depicted in brainstem as C and B respectively. Difficulty in perception of stop consonant could be achieved either by degradation of transition or burst energy and spectral motion, thus in turn can be expected to be present as a change in either B or C in brainstem responses. If such a correlation exists, it would extend the current application of ABR further in to speech perception. Also it also possible to extend the clinical application of ABR, especially in young children and difficult to test population cannot be done for determining speech perception.

Aim: Current study aimed to check the effect of progressive filtering of speech stimulus on brainstem responses and behavioural perception.

Method: Speech evoked auditory brainstem response were obtained from normal hearing individuals with the age range of 20 to 24 years. (Normal audiometric thresholds Speech Discrimination scores more than 90% ,presence of OAE) .A natural speech syllable /ta/ was used to obtain the auditory brainstem responses using IHS Smart EP Software, ER-3earphones were used, impedance ranging 2-5 k Ohms, electrode montage as F_z-A_2 and a repetition rate of 5.1/s, with alternating polarity. Recording window was kept as 25msec, filter setting as 150Hz-3000Hz and artefact rejection as 23.8 micro volt. Stimulus preparation: stimulus used in the current study is natural /ta/ of 154 ms and further it was low pass filtered at cut off of 2 kHz (|ta 2k|), 1 kHz (|ta| 1k) and 500 Hz (|ta| 500Hz). All the filtered stimuli where normalized and calibrated .Behavioural task was carried out using 2 interval forced choiced method. Subjects were asked to write down the order of presentation. A total combination of 16 stimulus set were created and randomly presented three times. Error analysis was carried out to check the percentage of errors and what type of errors were made. Repeated measures of ANOVA were carried out with respect to latency for all four stimuli.

Results: The mean V^{th} peak latency was 6.29, 7.3, 7.98, and 8.61ms latencies for /ta/ unfiltered, /ta/ 2 kHz, /ta/ 1 kHz, /ta/ 500 Hz respectively with Standard deviation of 0.36, 0.60, 0.43 and 0.33 respectively. The mean latency of B was 12.75, 14.2, 14.50 and 14.50 for /ta/ unfiltered, /ta/ 2 kHz, /ta/ 1 kHz, /ta/ 500 Hz

respectively. The mean latency of C was 17.7, 17.7 17.9 and 17.9 ms for /ta/ unfiltered, /ta/ 2 kHz, /ta/ 1 kHz, /ta/ 500 Hz respectively. Behavioural analysis 94 % error was observed for /ta/ 500 stimulus followed by /ta/ 1kHz 80% /ta/ 2 kHz 60%.

Discussion: The present study was aimed at studying effect of filtered speech on brainstem responses. The above results evidences, prolongation of Vth peak latency in ABR with different filter cut-off. This prolongation could be a result of change in onset of burst stimuli following filtering where in, decreasing the low pass filter cut off did not change intensity of stimulus rather, caused difference in minimum to maximum energy thus leading to reduced spread of excitation in basilar membrane. Though V^{th} peak was prolonged but, it was easier to identify because of morphology. Whereas, other transient markers B and C systematically changed in morphology in such a way that, when filtered with a low pass cut-off of 2 KHz, two different peak were evident marking B and C. Where, this segregation disappeared and single negative peak dominated the region of B and C when information was filtered progressively. It is assumed that, this single increased negativity at 14 ms is suggestive of B, rather than C since transient changes in burst are more affected as a result of progressive filtering. On the other hand C disappears, suggesting significant difficulty in identification of transition from consonant to vowel. These electrophysiological finding strongly co-related with behavioural perception, where 94% of subjected substituted /pa/ instead of /ta/ when filtered cut off was at 500 Hz. The above evidences suggest, increased difficulty in behavioural speech perception are represented as changes in transient markers suggesting good correlation between two measures. Thus, these electrophysiological findings can be used to extrapolate the behavioural performance, extending the current application of auditory brainstem responses.

Conclusion: Degraded speech has a negative effect on transient responses of brainstem, which also has a good correlation with behavioural speech perception.

A PROFILE OF CHILDREN WITH HEARING IMPAIRMENT ATTENDING PRESCHOOLS

Prasanta. K. S., Krishanu. M. R.

Introduction: Children with hearing loss need assistance **Nachiketa** when the problem results in a handicap. amplification, speech reading, communication training, counseling, or other professional services. Chermak (1981) states that hearing impaired often is classified by time of onset, that is prenatal, or postnatal. Prelingual hearing impaired refers to the onset of hearing loss prior to the development of speech and language; post-lingual hearing impairment is classified as postnatal in onset, acquired and/ or delayed onset of hearing loss. Congenital sensorineural hearing loss exerts of hearing loss exerts a tremendous effect on the child's speech language development as well as on the areas of socialization and family relationships. Any degree of hearing loss can affect the young child, and early intervention, obviously is necessary. Early identification of hearing loss followed by a timely and effective intervention programme for children with hearing impairment is necessary to minimize the negative effects of hearing loss on the development of cognition, psychosocial and verbal communication skills. Such early intervention programmes need to be multidisciplinary, technically sound and take cognizance of the context in which the child and family function. According to Bamford et. al. (1998) although some audiologic procedures are easier to carry with out with very early identification (e.g, electrophysiologic testing, probe tube microphone testing), and early identification of hearing impairment carries the potential for better progress and earlier management decisions, it must not be overlooked that the identification of newborn and very young babies brings heightened sensitivity to the process. Often, later or late identification is accompanied by some degree of parental suspicion that might mitigate the challenging information being presented to the parents; in the case of early identification following newborn hearing screening, prior parental suspicion is likely to be much less common.

Aim of the study: The main aim of this study is to obtain accurate and reliable baseline information regarding current status of the intervention process for children with hearing loss in A.Y.J.N.I.H.H/E.R.C. Questionnaire-based interviews were carried out to obtain information from 30 hearing impaired children's guardians regarding the median ages of suspicion of hearing loss, diagnosis and placement of hearing aids. The referral process, diagnosis and the management of these children is described.

Method: A 39 item questionnaire designed for the caregivers was used in the study. The instrument contained multiple-choice questions and open-ended items about the child's demographic information, age of suspicion of hearing loss, age at which he was diagnosed to have hearing loss, age at which hearing aid was prescribed, age at which he obtained hearing aid. The maximum, minimum, mean ages and standard deviations were then found out using the Statistical Package (SPSS) for Windows Version 11.

Results: The participants of the study consisted of 30 parents of children aged 21 to 84 months. Majority belonged income group of less than rupees 6500 per month a cut-off used by the government of India to consider free distribution of hearing aids. The participants belonged to rural areas and mostly resided (70%) in a joint family. Age at which child was diagnosed with hearing loss is at minimum 6 months and maximum 38 months. 16 of them are profound sensorineural hearing loss, 9 are severe, moderately severe 4 and moderate is 1. 26 of them (86.7%) are using body-worn hearing aid and the rest 4 (13.3%) are using behind-the-ear hearing aid. 11 of them (36.7%) were first suspected by mother, father 6 (15%), both parents 3 (10%), grand-mother 5 (16.7%), grand-father 2 (6.7%), uncle 1 (3.3%). 23 of them (76.7%) suspected hearing loss due to no response to loud sound, 1 (3.3%) pre-mature child, 4 (13.3%) as child was not

speaking. Only 6 (20%) family members had advised the child's parents to visit to doctor on suspecting hearing loss of the child. The mean age of child's acceptance of hearing aid is 1.47 months with SD±1.45. Mean age of parent's acceptance of their child with hearing aid is 6.53 months. Instances of child rejecting hearing aid are that the child never rejects 13 (43.3%), rejects when child is angry is 5 (16.7%), rejects when playing is 3 (10%). Minimum age of suspicion of hearing loss of the child is 8 days and maximum is 2 years. Parents visited first doctor when their child's age was at minimum 3 months, maximum 2 years 4 months. Parents visited first ENT when their child's age was at minimum 3 months, maximum 2 years 4. Age at which doctor said that child has hearing loss was minimum 6 months, maximum 30 months. Child is diagnosed to have hearing loss at an age of minimum 6 months, maximum 38 months, Age at which child was prescribed with a hearing aid was minimum 9 months, maximum age was 42 months. Hearing aid was obtained when the child's age was minimum 9 months, maximum 36. Age at which child uses hearing aid more than 8 hours a day is at the minimum age of 0 months, maximum 48 months. Most of the parents (46.7%) think that maximum delay has been taken in establishing hearing loss of the child. Parents complain that the hearing aid used by the child had been damaged after a mean period of 3.99 months, due to which child could not use hearing aid. Parents come for therapy when the age of the child is minimum 4 months, maximum 44 months. Improvement is noticed in the child after mean duration of 9.60 months. 17 of the parents (56.7%) had no complaints of family's negative attitude for the child having a hearing loss and using hearing aid. However, 7 of them (23.3%) have agreed that their family members do not accept the child with hearing aid. 5 of them (16.7%) have complaints of their mother-in-law taunting. 12 parents (40%) have agreed that the society have a general negative attitude with their child having hearing loss and using a hearing aid and 17 of them (56.7%) have no complaints against their society's attitude.

Discussion &Conclusion: Early identification of hearing loss in children plays a very important role in the intervention, management and maximum utilization of the critical age. The most vital factor is the awareness of parents in this respect. More awareness camps should be organized regarding the early identification of hearing loss in children and, if suspected, immediately visiting doctors and ENT for a regular check up. Emphasis should also lie upon immediate diagnosis of hearing loss, obtaining hearing aid and beginning therapy sessions as quickly as possible. Parents and society should be counseled for a more sensitive role and encouraging the child for better communication. If the above factors are met with, then the intervention and management is not only faster but also effective in building up the child for a much better and brighter future.

JUGULAR FORAMEN SCHWANNOMA: PROFILING THE AUDIOLOGICAL CHARACTERISTICS - A SINGLE CASE STUDY

Safaa. A., Archana. G., Rajashekhar. B.

Introduction: The jugular foramen is a large aperture in the base of the skull located behind the carotid canal. It connects the posterior cranial fossa and the jugular fossa. It provides the passage for the lower cranial nerves (IX^{th}, X^{th} and XI^{th} cranial nerves).It is divided into three compartments namely the anterior (the passage for IX^{th} cranial nerve and inferior petrosal sinus), middle (for X^{th} and XI^{th} cranial nerves) and posterior compartment(junction of the sigmoid sinus and the jugular bulb). The lesions can be congenital, infectious or tumoral. Tumors in this region are very rare and few cases have been reported in the literature. It is difficult to determine the exact location of the tumor within the foramen or the cranial nerve and is also known as Vernett's Syndrome. The classification system describes four types: type A, type B, type C and type D (Samii et al,1995). Depending on the location and the extent of the tumor the symptoms are variable. When the tumor is located in the intracranium, it maybe misdiagnosed as acoustic neuroma. These schwannoma's are reported generally in females between 14 and 63 years (Kaye et al 1984).

Need for study: Jugular schwannoma has been described to be a rare case in literature and it also manifests in a manner that is similar to the acoustic neuroma. There is no literature review on the profiling of the audiological findings that would provide support in differentiating with respect to acoustic neuroma.

Aim: Profiling the audiological characteristics of the jugular foramen schwannoma and to differentiate it from acoustic neuroma.

Method: Current study focused on a 31 year old female presenting with complaint of vertigo, headache which was intermittent and blurring of vision along with nausea and vomiting during the episode. Gait disturbances were also observed. Neurological evaluation was carried out for Stelwag sign, Rhomberg's sign, heelshin test, finger nose test. Nystagmus and dys-diadokinesia were also been evaluated. Detailed audiological evaluations were carried out which included Conventional Pure Tone Audiometry (PTA), Speech Audiometry, Oto-acoustic Emission, the Auditory Brainstem Responses (site of lesion testing) and Late latency responses. ABR was carried out at 90dBnHL with a repetition rate of 11.1/sec with alternating polarity using click as a stimulus with 24 ms time window and single channel was selected. As this was a site of lesion testing, repetition rate was varied from 11.1 to 90.1 /sec and different montage also used which can help in better diagnosis of the condition.

Results: Neurological assessment was done and the cerebellar signs were found to be present. The Stelwag sign was present; bilateral nystagmus was present; finger nose test indicated clumsiness on the right side; heelshin test was done and was found to be present. Rhomberg sign was absent.MRI findings indicated IXth and Xth nerve complex not seen separately from the mass lesion and beaking of mass into the jugular foramen. The VIIth and VIIIth nerve complex seen separately from the lesion with no evidence of involvement. The final impression quoted a lobulated altered signal intensity extra axial lesion in the right cerebello-pontine angle and perimedullary cistern. PTA revealed minimal hearing loss in the right ear and normal hearing in the left ear. Further, there was good PTA-SRT correlation and a 100% was obtained in the SDS scores. The transient –evoked oto-acoustic emissions (TEOAEs) were also present bilaterally which was indicative of normal outer hair cell functioning.ABR testing revealed all peaks were present within normal latency in the left ear; initial peaks were present within normal latencies while V^{th} peak was absent in the right ear. Late

Latency Responses (LLR) was also present with good amplitude, which was indicative of normal cortical functioning. A final impression of retrocochlear pathology was given. In the present case, the results obtained from the audiological evaluation were correlated with the MRI findings and the symptoms that were reported and based on these the diagnosis was done.

Discussion: The jugular foramen schwannoma's are extremely rare intracranial extraaxial tumors. The symptoms that the jugular foramen schwannoma exhibits are very similar to that of acoustic neuroma and they may emerge either with acoustic or cerebellar signs. Keen observation of the symptoms presented along with the audiological findings and MRI will help to differentiate the jugular foramen schwannoma's from the acoustic neuromas. The audiological evaluation revealed a minimal hearing loss in the right side and good SRT-PTA correlation along with 100% score in Speech discrimination task (SDS) unlike the acoustic neuromas unlike that obtained in acoustic neuromas. The auditory brainstem responses showed all peaks present on the left side; initial peaks were present and absent V^{th} peak on the right side indicative of higher centre lesion (at the level of superior olivary complex or lateral lemniscus). This was again different when compared to the responses obtained from acoustic neuromas where all the peaks are absent. Further, the MRI findings of the case showed a cerebello-pontine angle tumor with beaking of the mass into the jugular foramen. This when correlated with the presenting signs such as with hearing loss, cerebellar signs, gait disturbances, vision deficits aids in classification of the schwannoma into the different types. Based on the classificatory system provided the case is classified as a type A tumor. This plays a role in deciding the best management option for the schwannoma. Also, a minimal hearing loss was reported. However, the OAEs reported normal outer hair cell functioning. The MRI revealed obstructive hydrocephalus due to compression of the 3^{rd} and 4^{th} ventricle and correlating these findings a peripheral loss maybe ruled out and the possibility of a central lesion is considered.

Conclusion: Individuals with jugular foramen schwannoma present with different types of symptoms. The clinical presentation maybe similar to the acoustic neuromas and hence a detailed evaluation is important for accurate identification and differentiation of these schwannoma's. Neurological, audiological and radiological findings play an important role in confirming the schwannoma. Also the correct identification of the type of schwannoma helps in further management of these rare tumors.

AUDITORY SHORT TERM MEMORY SKILL AMONGST HIGH AND LOW ACADEMIC ACHIEVERS IN ENGLISH AND BENGALI

Jagannath. S., Arumoy. S., Piyali. K., Nachiketa. R.

Introduction: Literacy has become an important prerequisite for the realization of personal and social status. Formal literacy is primarily imparted in schools and colleges which require special linguistic and metalinguistic abilities to understand the classroom discourse. Metaphonology is one such type of metalinguistic ability which is known to contribute to comprehension of the communication patterns used in the classrooms. The domain in metaphonology which significantly contribute to comprehension of language and literacy acquisition in children is phonological processing. Plaza & Cohen (2006) strongly suggest that written language acquisition relies on the need for diversifying written language measures and analyzing their specific predictors such as phonological processing (PP) and phonological awareness (PA). Gupta (2003) suggests that human vocabulary acquisition processes and aspects of human verbal short term memory which is one of the subskills of phonological processing skills may be related. In children, reliable correlation has been obtained between digit span, non word repetition ability, and vocabulary acquisition (Gathercole, 1992). Although quiet a bit of work has been done in English to facilitate acquisition of literacy and how the deficits in phonological processing affect linguistic comprehension and production there is a dearth of research in Bengali in this area (Kumar & Karanth, 2006).

Aim of the study: The aim of the study is to compare the auditory short term memory skill of high achieving and low achieving children (8-12 years) across Bengali and English.

Objectives of the study: The primary of objectives of this study are to develop a survey form for assessing short term memory skill in English and Bengali, to compare the performance of high and low academic achiever in Bengali and English on the developed Survey form for short term memory skill, to compare the skill of Bengali of high and low academic achiever with the performance of English of the same groups.

Methodology: For the purpose of cross linguistic comparison, checklists in Bengali and English was developed which was the first objective of the study. A survey form for assessing phonics and phonological processing skills in English and Bengali was prepared. The participants of the present study comprise 42 females, in the age range of 8-12 years (with mean age of 9 years 5 months) attending class III to class V in regular school. The participants were classified under two groups based upon the performance in last mid term examination (average of marks scored in Bengali, English and Mathematics) and as identified by the class teachers as poor achievers and high achievers. All the participants were native Bengali speakers who have been exposed to formal Bengali and English since their pre-school ages. Equal number (n=7) of high achievers and (n=7) low achievers, 14 students from each class (III, IV and V) participated in the study amounting for a total number of 42 participants. Five randomly selected letters are included in the task repetition of letters, and the initial consonant or consonant cluster with the following vowel or the vowel with the following consonant or consonant cluster in final position has been considered in the task repetition of nonsense words in short term memory. The scoring was done within two hours after the test was over and the results were tabulated. The maximum obtained scores were same in English and Bengali checklist.

Results: Significant difference (pd"0.05) among the low achievers and high achievers were obtained for short term memory skill in both the languages. On comparing between two languages, the obtained mean

score was higher in English for both the groups high achievers and low achievers whereas standard deviation of low achievers is higher in English and standard deviation of high achievers is higher in Bengali.

Discussion & Conclusion: It can be concluded that nature of the language plays an important role in performance on metaphonological skills. The difference in scholastic performance between low achievers and high achievers may be attributed to inadequate short term memory skill of the low achievers. Consequently, this issue should be carefully considered during classroom teaching. In academic syllabus, metalinguistic tasks should be provided importance and during classroom curriculum, foreign language should be exposed adequately for better understanding. Bengali being an orthographically shallow language can be taught effectively by teaching letter to sound correspondence as compared to English which needs a whole word approach. The SLPs should also build up there skills in this area and provide assistance to children who are poor language learners but do not present any overt symptoms of delay or deviance of linguistic skills.

DOES SACCULE HAVE FREQUENCY CODING? A MEASUREMENT USING VESTIBULAR EVOKED MYOGENIC POTENTIAL (VEMP)

Ranganathan. M., Thamizharasan. S., Keerthiraj. A., Rajan. N. D.

Introduction: The ear houses some of the most sensitive organs such as cochlea and vestibular system. Both work in the pressure phenomenon. Both the parts have similar sensory receptors, through which afferents get information about the external world. Vestibular system consists of saccule, utricle and semicircular canals. Among these saccule and utricles functions similar to cochlea. The Saccule is the major hearing organ in the lower species; the Saccule of these animals is capable of encoding sound frequencies in three dimensional spaces and the saccular afferents in fishes without accessory auditory structures exhibit similar frequency selectivity in response to particle motion as in human beings. VEMP is formed by myogenic responses activated through sound or galvanic stimulation and recorded by surface electromyography. The course of the potential is the saccular macula, lower vestibular nerve, lateral vestibular nucleus, descending vestibulospinal pathways and motoneurons of the ipsilateral sternocleidomastoid (SCM) muscle. 2 Auditory stimulation with high intensity sounds is the most often employed method, with the response captured in the cervical musculature during muscle contraction.

Objective: Present study was taken up with an aim of assessing the frequency tuning of possibly the saccule and utricles in terms of VEMP latency and amplitude on normal hearing subjects as various studies indicate difference of opinion.

Method: 15 subjects (10 males and 5 Females) with no earlier complaint of vertigo, hearing sensitivity within 20 dBHL for frequencies from 250 Hz to 8000 Hz and 'A' type tympanogram with normal acoustic reflexes were selected for the study. VEMP recording was done with Neuro Audio 70.0 software in lying position with SCM muscle contraction. Acoustic stimuli used for eliciting VEMP were 100 dBnHL of Click, and tone bursts of 500 Hz, 1000 Hz, 2000 Hz and 4000Hz.

Results & Discussion: All the subjects had P1 and N1 component for the all the acoustic stimulation used. Among the waveforms 4 KHz tone burst elected VEMP had poor morphology compared to others in terms of amplitude. The mean latency for different acoustic stimulus of P1 ranged between 11 to 14 msec and N1 ranged between 17 to 20 msec. On observation Click and tone burst of 4 KHz had minimum P1 latency of 11 msec; and minimum N1 latency of 17 msec. Even in ABR latency findings, the shortest latency observed for clicks and tone burst of 4 KHz due to stimulation of sensory receptors near basal turn of the cochlea. In the recordings tone burst of 500 Hz had the longest latency in P1 and N1. The same finding could be observed in ABR latency due to stimulation away from the basal end lower frequency tone bursts. The paired 't' test finding also indicates statistically significant difference in P1 latency observed between click versus tone bursts of 500 Hz, 1 KHz, 2 KHz at the confidence level of $p<0.05$, whereas P1 latency of Click and tone burst of 4 KHz did not show any difference. "T values of P1 latency between 500 Hz versus 1 KHz, 2 KHz and 4 KHz showed statistically significant difference at $p<0.05$ similar findings observed for "t" test at 1 KHz versus 2 KHz, 4 KHz and 2 KHz and 4 KHz. When 't' test was run on N1 latency for clicks, tone bursts of 500 Hz, 1 KHz, 2 KHz, 4 KHz showed statistically significant difference at $p<0.05$ confidence level. In general 500 Hz tone burst had greater amplitude when compared to all other acoustic stimulation mentioned.

Conclusion: VEMP is a vital tool in every clinic in now days. This is only test to check the integrity of inferior of vestibular nerve connecting from saccule to vestibular nuclei. As saccule is the hearing organ in lower animals in the evolution human has got separate organ for hearing. Even though there are evolutionary changes there could be some remaining properties of responding to acoustic stimulus and having difference frequency coding at the saccule, as the sensory receptors at cochlea and saccule are having similar characteristics. This study also shows there is statistically significant difference in latencies of P1 and N1 using different stimulation. Stimulation near basal turn of the cochlea had shortest latency and stimulation away from basal end had longest latency. Still the findings need to be strengthened by surveying on more number of subjects. Generally, VEMP can be elicited using different acoustic stimulation, P1 - N1 have different latencies but the latencies are uniform within the type of acoustic stimulation.

PREDICTION OF AMBIENT NOISE LEVEL INSIDE THE AUDIOMETRY BOOTH WITHOUT SLM AND NOISE DOSIMETER

Debadatta. M.

Introduction: Background noise can have significant effect on audiometric result. Ambient noise level must therefore be very low to ensure the noise does not elevate threshold results. Acceptable environmental noise levels, to ensure accurate results. Calculating the perfect ambient noise level inside the audiometry booth is really difficult without taking the help of sound level meter (SLM) and noise dosimeter. Accurate noise level only can be known by objective method but it can be done through by subjectively, but exploring this concept is crucial because calculation of noise level inside the test booth is being carried out subjectively.

Objectives: **1.** To study the ambient noise level inside the audiometry booth without SLM and noise dosimeter. **2.** To compare the final output of noise level from the subjective method with sound level meter and dosimeter.

Methods: The participants included 30-50 normal hearing sensitivity individual, who will be tested with a calibrated audiometry with one octave frequency from 125Hz to 8 KHz. The results of each octave frequency of 30-50 normal hearing individual has to combine and finally, the mean threshold has to obtain (reference to 0dBHL) and so on for each octave frequency. Then the RETSLPs of earphone cushion should be added with the threshold for each octave. The attenuation factor (in dB) also consider of earphone cushion for each octave frequency (for noise).Then have to see the how much threshold shift occur above 30dBA permissible ambient noise level of each 10dB increase the noise level. If the threshold increases 5/10dB then the mean threshold should be obtained for each octave, and the finally increased noise add to the normalized ambient noise level (i.e 30dB).

Results: From this measurement the output results compare with the SLM reading, it shows plus/minus - 5/7dB difference with the SLM reading. So we can predict the ambient noise level inside the audiometry booth approximately to the SLM reading.

Conclusion: The present study focused on the investigation of ambient noise level inside the test booth. Though, by this method it is difficult to reach at accurate measurement of noise, still it shows plus/minus 5/ 7 dB variable with SLM findings. Thus this study can be performed to measure the noise level in the test booth and can give an approximate value of noise level where the SLM/Dosimeter is not available.

RELATION BETWEEN HEARING LOSS AND COGNITION AMONG OLDER ADULTS

Swathi. P. D., Sanjana. J. K., Hafeez. M. D., Bhargavi. C. H.

Introduction: Hearing loss negatively impacts social and behavioral interactions. Hearing loss initiates a number of negative consequences including poor quality of life, reduced social activity, depression, loss of cognitive function, and further uncorrected hearing loss may contribute cognitive decline. Research on aging indicated that compromised auditory input does exaggerate cognitive deficits (Arlinger, 2003). Auditory and cognitive abilities generally decrease as age increases (Rawool, 2007). When hearing is compromised the cognition must work harder to make sense of the input.

Need for the study: The past researches concerned with the association of hearing loss and cognition are limited. Most of the studies are reported in Western population. Very little information is known about Indian population. Hence, present study was proposed to investigate the relation between hearing loss and cognition in older adults.

Aim of the study: The present study was aimed **(1)** To identify the affect of hearing loss on cognition among older adults. **(2)** To identify the changes among scores as age increases. **(3)** To identify the difference among the gender.

Methodology: Total of 52 subjects with >50 years old were selected. Pure tone audiometry was performed using Proton DXS audiometer in a sound attenuating chamber under unaided conditions. Pure tone average of air conduction thresholds at 500 Hz, 1 KHz, and 2 KHz was calculated for each ear and all the thresholds were expressed in dB HL. Cognitive testing was performed using Addrenbrooke's cognitive examination (ACE) - revised version in Telugu language to know the cognitive abilities. Regression models were used to examine the association between hearing loss and cognition.

Results: Results indicated that significant relation found between age, hearing loss and cognitive abilities. As the age progresses cognitive abilities were decreased. Though there is a difference between males and females cognitive abilities, but statistically it was not significant. Cognitive abilities decreased from the age of 60 years.

Discussion: Decrease in cognitive abilities can be due to hearing loss or due to the age or can be due to any other factor. When compared with other studies which studied the relation between hearing and cognition like present study, there was significant change in their cognitive abilities. It was observed that in hearing impaired group cognitive abilities are much poorer than the normal hearing same age group adults. This indicates that there is a significant affect of hearing loss on cognitive abilities in older adults. It was also found that as age progresses hearing loss also increased and cognitive abilities became poorer. This study was also aimed also aimed at the differences in gender, but statistically there was no significant difference between males and females, but males performed better than females. These results can be contributed to more psychological stress observed in females. There are studies which indicate psychologically females are more affected than males. This could be one of the reasons for the poorer cognitive abilities in females than in males. It was found in Western population that cognitive abilities decreased from 50 years onwards, but in current study this change was observed from 60 years onwards.

Conclusion: This study highlights the relation between hearing loss and cognition. Hence while handling the patients with hearing loss the cognitive aspects also need to be considered for rehabilitation purpose.

EVALUATING EFFECTS OF OCCUPATIONAL NOISE THROUGH SELF REPORTING QUESTIONNAIRES

Joshi. B. P., Prakash. S. G. R., Aparna. R., Winnie. A., Rathna. K. S. B.

Introduction: Noise is considered as the cause of about 30% of all cases of acquired hearing loss and is defined as a sound or sounds at such amplitude as to cause annoyance or to interfere with communication (Bridger, 2000). Noise is probably the most common occupational health problem, especially in the manufacturing industries and is easy to identify, not very difficult to measure, and in most cases controllable, although noise abatement is sometimes quite costly (Suter,1992). Hearing protection can be a satisfactory solution, as long as protectors are properly fitted, worn, and maintained. Unfortunately, noise and hearing conservation problems do not always receive the attention they deserve because the effects of noise are not deadly and individuals with noise-induced hearing loss may not become aware of the condition until it is of handicapping proportion and by that time, it is permanent(Peterson et al. 1978, 1981 and 1983). Hearing loss from exposure to noise in the workplace is one of the most common of all industrial diseases and workers can be exposed to high noise levels in workplaces as varied as construction industries, foundries and textile industries. Shearing caused by any sound has an impact on the stereocilia of the hair cells of the basilar membrane of the cochlea; when excessive, these forces can cause cell death (Rabinowitz, 2003). The effect of occupational noise on health is also strongest for annoyance, stress, sleep and cognitive performance which may adversely affect 'quality of life' rather than illness (Stansfend, 2003). Occupational Safety and Health Administration (1970) allows 8-hour exposures at levels of 90 dB(A), 4hour exposures at 95 dB(A), 2hour exposures at 100dB, 1hour exposure at 105 dB, 30 minutes exposure at 100dB, 15 minutes at 115 dB(A) before requiring noise control or hearing protection.

Aims of the study: The aims of the current study are **(1)** to measure industrial noise using sound level meter **(2)** to measure the effects of occupational industrial noise on employees in domains like auditory, hearing loss, physiological, psychological and civilian life using self reported noise effects questionnaire.

Method - Tools: Bruel & Kjaer 2240, class 1 sound level meter, self report questionnaire.

Subjects: A total of 60 employees in age range of 29-58 years with noise exposure ranging from 1 year - 26 years for about 5 – 8 hours per day and exposed to intermittent and vibratory noise participated in the study. The subjects were randomly selected from an ordnance factory in Medak district.

Procedure: The current study involved the noise measurement method and a questionnaire based survey. The noise levels were measured using Bruel & Kjaer 2240, class 1 sound level meter to assess the noise exposure levels among employees. The noise levels were measured and recorded in different sections of the ordnance factory at various instances. A self report questionnaire comprising of 33 questions on different domains like auditory effects (ear infections, tinnitus and giddiness), hearing loss effects (communication difficulties due to hearing loss), physiological effects (hypertension, diabetes etc due to noise), psychological effects (stress and annoyance) and civilian life effects (exposure to noise outside the industry) was adapted from NIOSH generic job stress questionnaire developed by National Institute for Occupational Safety and Health (1991). The same was given to five senior audiologists for validation. Responses were obtained in terms of yes, no, and not sure. Interviewer explained about the questionnaire, obtained consent and interpreted each and every question to the subjects. Prior to administration of questionnaire a detailed noise exposure

data was obtained. The responses obtained were calculated and subjected to statistical analysis using one way ANOVA and post hoc and factorial analysis.

Results: The noise measurements were carried out in all the eight units in the factory and revealed highest level of noise in vehicle assembly unit (maximum: 106 dB & minimum: 85dBA) followed by final acceptance unit (vehicle on: 105dBSPL & vehicle off-85dBA), light machine shop unit (85dBA), FMS compressor unit (80-85 dBA), mechatronic execution unit (80-84dBA) and HMS compressor unit (75-76dBA) in other two units noise levels were well below norms.The effects of occupational noise on industrial employees was calculated by computing the mean values on different domains like auditory, physiological, psychological, hearing loss, civilian life. The highest mean value was obtained for psychological domain (10.32), followed by hearing loss (8.20), civilian life (6.98), auditory (6.42) and physiological (6.41) domain. Post hoc multiple comparisons revealed psychological effects domain and hearing loss effects domain significantly differed with all other domains whereas auditory effects, physiological effects and civilian life effects had no significant differences($p<0.05$). The results also reveal correlation between age, No. of years of noise exposure, hours of exposure/ day, type of noise, ear protective device used and hearing conservation program.

Discussion: The highest effect of noise was observed for psychological domain and least effects were seen on physiological domain indicating that most workers were stressed out. Similar results were also reported by Mathenson and Stansfend(2003) who stated that occupational noise has strongest effect on stress, sleep and cognitive performance rather than on any illness thereby affecting quality of life. Mokhtar, Kamaruddin, Khan and Mallick (2007) also reported that physiological factors are least affected by noise exposure. Therefore, it can be postulated that individuals may not be able to judge the physiological effects on their own in self report questionnaires and these may be manifested as psychological problems.

Conclusion: The current study throws a light on the fact that though ear protective devices are used in industries as mandatory to control effects of noise on workers, but no proper training on effects of noise and correct use of ear protective devices is provided leading to greater psychological problems. To overcome the problems of high noise levels in industries the management should take up measure by concentrating on controlling noise by engineering methods rather than struggling with the intricacies of audiometric testing, hearing protection devices, training and record keeping. This would be a very sensible approach wherever feasible but instances where needed proper ear protective devices for employees, scheduling of employees in shifts, implementing latest technologically advanced equipments, periodical monitoring of hearing of employees along with employees training should also be incorporated.

CONTRALATERAL SUPPRESSION OF DPOAE'S USING TONE AND NOISE AS CONTRALATERAL SUPPRESSOR STIMULUS

Reeta. R., Ankush. Y., Bhanu. S., Anupama. M.

Objectives: To compare contralateral suppression of DPOAE'S using tone and noise as contralateral suppressor stimulus.

Methods: Changes in the distortion product Otoacoustic emission (DPOAE) levels induced by contralateral stimuli of different spectra were measured in 10 normally hearing adults with normal audiometric criteria. Two types of contralateral stimuli were used: (i) a set of pure tones with the same frequencies as used for DPOAE stimulation; and (ii) broad-band noise with a bandwidth of 840-6,000 Hz.

Results: Results reveal that OAE'S had an effect of different stimulus on amplitude. A small suppressive effect was observed mainly in the mid-frequency region. Broad-band noise was more effective at suppressing DPOAEs than tone complexes. Using tone as suppressor stimulus, the average amplitude suppression observed was 1.5dB difference. Using Broad Band noise as suppressor stimulus average amplitude suppression observed was 3.2dB difference.

Conclusion: Based on the results of this study, it is concluded that DPOAE changes induced by contralateral stimuli but are not frequency-specific.

KNOWLEDGE, ATTITUDE AND PRACTICE AMONG PRIMARY SCHOOL TEACHERS TOWARDS AUDITORY PROCESSING DISORDERS IN CHILDREN

Rinnu. J. C., Deepthi. K. J., Krishna. Y.

Introduction: Impairment of hearing in any form has a direct impact on verbal communication. Defective hearing can be either in-terms of loss of sensation or difficulty in processing auditory information. The presence of latter inspite of normal hearing is called as Auditory Processing Disorders (APD). Auditory Processing Disorder (APD) is an auditory-specific perceptual deficit in the processing of auditory stimuli that occurs in spite of normal peripheral hearing thresholds and normal intellectual capacity (ASHA, 2005). The prevalence of APD is estimated to be approximately 2–3% in children, with a ratio of 2 : 1 between boys and girls (Chermak & Musiek, 1997). In a sample of 3,120 school children aged 8 to 15 years screened using the Screening Checklist for Auditory Processing, 3.2% had suspected (C)APD (Muthu Selvi, 2009; Muthu Selvi & Yathiraj, 2010). Expression of symptoms of APD may vary, but common complaints include significant listening difficulties in background noise, inconsistent responses to auditory stimuli and difficulty with sound localization (Bellis, 2003; Chermak, et al., 1997; Musiek, et al., 1982). They also typically present with learning and listening difficulties resulting in poor scholastic skill and social development. While APD is an audiologic diagnosis, assessment and management of individuals diagnosed with APD typically involves a multidisciplinary team, often including audiologists, speech-language pathologists, psychologists, educators, parents and physicians. Teachers serve an important role in identifying children "at risk" for (C)APD, and serve as a major source of referrals to the audiologist (AAA,2010). Smoski, Brunt, and Tannahill,1992, found that children diagnosed with APD were judged by their teachers to be poorer listeners than a group of control participants and that the greatest listening difficulty was noted in the presence of noise.

Aim of the study: To investigate knowledge, attitudes and practices among primary school teachers towards APD in children.

Method: The study design was a single group descriptive survey design. A questionnaire was developed in English, which included 23 items covering 6 items in attitudes towards children with listening difficulties and 17 items in knowledge and practice sections. If the subject was unaware or not sure of the disorder, questions were given with respect to specific characteristics exhibited. The questionnaire was distributed to 53 lower and upper primary school teachers in the age range of 26 - 45 years in the Udupi Taluk of Karnataka. Questions in the attitude section consisted of statements whereas the questions in knowledge and practice section were polar, all of which was closed ended. All the 3 sections were rated on a 2 point rating scale. Questionnaire was given to 5 experts in Speech and Hearing profession and teachers for content validity. Final questionnaire was used for the study after incorporating the changes. Oral consent was taken from the participants prior to the administration of the material.

Results: Descriptive statistical analysis was used to analyze the results. Results showed that 96.22 %, (51/53) of participants were either unaware or not sure of the disorder. However 84.9% (45/53) of participants presumed that APD is some disorder that is related to hearing and may manifests with specific difficulties in listening. 79.2% of subjects strongly agreed that teachers often find time to help children with listening difficulties in classroom and believed that they can play a significant role in improving performance and academic skills of children with listening difficulties. Additionally 88.6% (47/53) of participants reported that they have noticed children with difficulties in following lessons in the presence of noise, difficulty in reading

/ remembering instructions / staying focused while listening, difficulties in following rapid speech / discriminating speech sounds in their classroom.

Discussion & Conclusion: The study revealed a significant lack of knowledge among teachers about APD in children. A positive correlation is also noticed between knowledge and practice towards the disorder. First steps required to develop services include the promotion and development of interdisciplinary teamwork and education among teachers and other professionals, a need for additional resources and public awareness in Indian settings , a clearer understanding of the definition of APD, and evidence-based assessment and management of this condition. Thus this study can help in early identifying children with processing deficits in whom the language learning and academic performance affects markedly, by teacher awareness which in turn can aid in early intervention.

DO HEARING AID CAUSE HEARING LOSS?

Sarita. R., Sovon. D., Nachiketa. R., Preeti. S.

Introduction: WHO (2003) report suggests hearing aids are needed for 4 to 6 percent of the population of South East Asia which is estimated to be about 60 to 75 million and among the currently used hearing aids, the pocket type is dominant in India, Bangladesh, Pakistan along with many Africa countries. The Government of India provides Body level hearing aids to the individuals with hearing loss under a scheme called Scheme of Assistance to Disabled Persons for Purchase/Fitting of Aids/Appliances (ADIP Scheme).Hearing aids are of different categories based upon their gain as prescribed by the electro acoustic standards (Dhillon2001). ANSI in 1987 prescribes an acoustic gain of 68 dB with maximum output of 131 dB for a hearing aid used in moderate to severe degree of Hearing impairment(ANSI 1987).With a gain of 68 dB after amplification the conversational speech intensity(50-65 dab)(Levitt and Webster,1991) would be108-123dBSPL in the ear canal.

Aim of the study: Aim of this study is to discuss about the risk of hearing loss from amplification.

Method: The study was done in two phases.

Phase I-Case study: A case study of a child aged 4.5 years, male attending a regular school in class one. He had been a regular user of an Elkon mild class body level hearing aid for hearing aid user (10hours a day) since last 2 years. The mother came with a complaint of reduced hearing and a need for a re-evaluation. Her complaint was based upon the deteriorating auditory behaviour of the child and the child's habit to push up the volume control of the hearing aid from"3"to"5".The child had treated hyperbilurubemia for six days after birth. He had superior intelligence and there was no regression of any developmental skills neither he had a history of any disease.

Phase II: Measurement of the hearing aid output The study was conducted in preschool for the children with hearing impairment with a teacher student ratio of 1/8. Tool Used- Hearing aids (Elkon mild, moderate and strong class), Sound Level Meter (B&K 2240 SLM), 2cc coupler, case history preforma used at AYJNIHHERC Procedure- After obtaining the consent the instrument was placed in the classroom. A recording sample of LA eq measure of 20 minutes was collected during the regular class hours while teaching and during the lunch break.

Results & Discussions:

Phase1-The pure tone audiogram in first visit was suggestive of bilateral moderate sensorineural hearing loss with pure tone average of 50dBHL in right ear and 53.3dBHL in left ear. Child was fitted with bilateral mild class hearing aid. After two years again pure tone eudiometry was done which shows severe sensorineural hearing loss in left ear and moderately severe sensorineural hearing loss in right ear. Pure tone average of right ear was68.33dBHL and left ear was 75dBHL. Auditory steady state response (ASSR) was also done which suggest bilateral moderately severe hearing loss.

Phase 2-The output (LA eel) of the Elkon mild, moderate and strong class hearing aid was 94.4 dB,105.6 dB 123.5 dB respectively during class hours and 90dB, 92dB and 107dBrespectively during lunch hours.
Discussion: In the present case there is deterioration in hearing thresholds. The cause of deterioration may be attributed to a disease causing hearing loss or due to amplification. The contribution of the disease has

been ruled out from medical psychological and developmental evaluations. Usually, low-frequency limits are about 40 dB and high-frequency limits about 75 dB (Sataloff, 1993). It may mean people with hearing loss more than 40 dB in low frequencies and more than 75 dB in high frequencies are safe hearing aid users. In the case study the loss has progressed both in the low and high frequencies till maximum of 70 dBHL in the 2 and 4 KHz. It may be possible that the outer hair cells (OHCs) are primarily damaged by high noise exposure so the hearing loss does not extend beyond 70 dB. The review of literature puts forth a few queries: Firstly "Is the DRC applicable to the persons with hearing loss?" Secondly "Are hearing aids safe for people with thresholds more than 40 dB in low frequencies and 70 dB in high frequencies?" Byrne and Dillon in 1986 suggested that If hearing aid users are provided with real ear insertion gain and input spectrum recommended to the hearing aid is same as that reported by Macrae in 1990, it seems that a small amount of noise induced permanent threshold shift (NIPTS) is inevitable for hearing aid user with severe to profound sensory-neural hearing loss, particular at higher frequency. The predicted amount of NIPTS shows very small deterioration in hearing threshold level which must be accepted as the cost of the advantage gained from the hearing aid. Measurement of TTS in 24 hour interval gives a decent idea about the risk of threshold shift in a prospective hearing aid user (Macrae, 1991).

AUDITORY PERCEPTION OF RHYMING WORDS

Debarshi. B., Nachiketa. R., Anisha. S.

Objectives: Among the school going population in India, 55.8% of the poor achievers have reading disorders. Nearly 20% of school-going population has scholastic problems. Learning at classroom is greatly dependent on good auditory perceptual skills. Metalinguistic skills, particularly metaphonological skills greatly influence language learning during early school grades and reportedly children with LD are poor at these skills. Rhyming ability is among the earliest stages during the acquisition of phonological awareness and influences reading, writing acquisition. Also a child's sensitivity to rhyme appears to develop relatively early and typically, easily and rhymes are greatly accessible to preschoolers. Rhyming activities teach children the similarities and differences in the sounds of words. The importance of phonological awareness skill in children exposed to transparent orthographies has not been unanimously supported. There is a strong need for exploring the role of phonological awareness in reading development, in Indian context. Objectives of the study were (1) Development and validation of Bengali rhyming checklist, (2) Comparison of overall performance of participants with and without SLD on the developed rhyming checklist, and (3) Comparison of performance of participants with and without SLD on the rhyming checklist. The aim of this paper is to study the auditory perception of Bengali rhyming words in children with and without SLD.

Methods: 60 children were grouped into two groups, group-A having children with SLD and group-B having children without SLD, with 30 participants in each group. All participants were within 8-11 years of age, with hearing sensitivity less than 25dBHL, native Bengali speakers, attending regular school, no history of ear discharge and middle socioeconomic background. The study was carried out in three stages. In first stage, development, validation, and test-retest reliability measures of the test tool were obtained; during second stage, the rhyming checklist was administered through recorded presentation of the stimulus items; and during stage three, the results were discussed and concluded with limitation of present study.

Results: Children with SLD scored significantly low on the rhyming judgment task as against those without SLD ($p<.05$) for both words. Performance of children with SLD on familiar word rhyming judgment task was significantly better as against that for the non-sense words ($p<.05$). Those without SLD showed no significant difference on familiar and non-sense word rhyming judgment tasks ($p<.05$).

Discussion: Children with SLD are poor in rhyming judgment ability for both familiar and non-sense words in comparison to those without SLD. There is an influence of semantics on rhyming word perception by children with SLD but not on those without SLD. The developed rhyming checklist may be used as a screening tool for children at risk of SLD at primary school grades. Rhyming activities may be utilized by teachers and parents to promote language learning in young learners. It is an attempt towards the usefulness of metaphonological skills in reading writing acquisition, in Indian context.

EVALUATION OF EFFECT OF OBJECTIVE PRESSURE THERAPY IN TYMPANOSCLEROSIS THROUGH IMPEDANCE AUDIOMETER

Biswal. N. C., Satya. N. M.

Introduction: Gibb, A. G., (1971) described tympanosclerosis as an end product of past otitis media in which the region of excessive collagen production was obscured. Clinically there is conductive hearing loss from impaired ossicular movement by plaque formation or from ossicular disruption (erosion of long process of incus and stapes crura). By naked eye appearance there is the presence of white patches in the tympanic membrane or raised white masses in the tympanic cavity. In Myringosclerosis, there will not be any hearing loss so any sort of surgical or conservative treatment is not recommended. Most commonly ossicular chain problem is observed in tympanosclerosis where surgery results in improvement in absolute bone conduction & pure-tone average. Here improvement occurs in the low frequencies. This again is effective for a short term period. There is tendency for re-fixation of the ossicles by fibrous tissue or bone. When stapes is involved, usually mobilization of stapes or stapedectomy is done. Here again results are not as good as otosclerosis with a post operative Air-Bone gap of 20dB or less reported in 72% of cases (Gormley P. K., 1987). Complication such as dead ear can also occur post operatively. Albu-et-al reported sensorineural involvement in 4% (1 of 25) of their post-operative cases. Gormley, (1987) found a 5% (3 of 67) incidence of post operative sensorineural hearing loss. Hence there was a constant search for a safe and non-invasive procedure which was met by conservative treatment where the client was asked to do valslva and toynbee maneuver repeatedly which is also called as pressure therapy and is highly subjective.

Objectives: This present study aims to evaluate the effect of objective pressure therapy in tympanosclerosis through impedance audiometer.

Method: Thirty tympanosclerotic subjects were selected from the audiology clinic of ENT Department, S.C.B. medical College, Cuttack all of them were evaluated through audiometry and tympanomerry. After that they had to attend five objective pressure therapy sessions, where in each session there audiogram and tympanogram was recorded.

Results: A significant difference was found between the mean of pre therapy and post therapy, air conduction thresholds and tympanogram compliance values.

Conclusion: The findings of this study will be helpful to objectively administer pressure therapy to tympanoscloresis clients.

ACOUSTICAL AND PERCEPTUAL ASPECTS OF HEARING AID PROCESSED SIGNAL

Kranthi. S., Prakash. S. G. R., Shivaprasad. B., Bhargavi. C. H.

Introduction: Digital hearing aids are becoming increasingly common and have already replaced a considerable portion of the hearing aids that use the older analogue technology. Digital signal processing has several advantages over analog signal processing including miniaturization, low power consumption, low internal noise, reproducibility, stability, programmability and signal processing complexity (Hickson, 1994). There are several cues that enable a person to hear and perceive speech which include time, frequency and intensity domain. Place of articulation of stops can be cued by different acoustic properties, including burst template (Blumstein & Stevens, 1979), spectral movements (Fischer-Jogersen, 1978) and formant transitions (Kewley-Port & Pisoni, 1983).

Need & Aims of the study: There is a possibility that the speech transmitted through the hearing aid, besides increasing the intensity of the signal, alters the frequency and temporal properties resulting in speech not sounding natural. The challenge of relating electro-acoustic measurement data to hearing instrument user requirements and preferences is both daunting and attractive. Despite extensive efforts many fundamental properties of speech and ambient sounds are not well represented in the commonly applied measurement techniques especially in digital hearing aids (Frye, 2000). Attempts to capture the brief temporal dynamic properties of speech through hearing instruments have been reported over the years (Schweitzer, 1986). Test stimuli have been proposed based on long term average speech spectrum(Byrne et al, 1994), temporal envelope fluctuations (Fastl, 1987), International collegium for rehabilitation audiology (ICRA, Derschler, 2001) International speech test signal(ISTS,2010). However, the above materials developed are mostly related to English language and use speech discourse and also there are no studies which indicate how speech signal is processed by the hearing aid. Therefore, there is a need to know the frequency and temporal parameters that are affected by digital signal processing.

Aims: The aims of the study are **(1)** to find out the acoustical aspects of voiced and voiceless stop syllables of Telugu (VOT, mean pitch and total duration) processed by the hearing aid using anechoic chamber and analyzing with PRAAT **(2)** to find out the perceptual aspect of hearing aid processed voiced and voiceless stop syllables of Telugu.

Method: The method is divided into two parts: **Part - I: Acoustic analysis of hearing aid processed signals-Stimuli:** Six consonant-vowel Telugu syllables, three voiced stops (/b/, /d/, /g/) and three voiceless stops (/p/, /t/, /k/) were paired with the vowel /a/.

Tools: Five hearing aids (2 Analog & 3 Digital), anechoic chamber, 2CC HA 2 coupler, laptops and PRAAT software.

Procedure: The stimuli were recorded by a male speaker using microphone and was fed into a computer using the Creative Wave Studio software (Creative Technology, Japan) with a sampling frequency of 22050 Hz at a quantization rate of 32 – bit and were analyzed using PRAAT software for obtaining burst spectrum and burst duration and mean pitch. The stimuli were presented at an intensity of 60dBSPL to the anechoid chamber of Fonix FP40 (loud speaker). Three analog and three digital hearing aids programmed for a 50 dB sensori neural hearing loss using the NAL-NL1 fitting formula were used. Each hearing aid was placed

in the test chamber coupled to a 2CC HA 2 coupler which was connected to a microphone, the output from microphone is fed to a computer having the Creative Wave Studio software. The stimuli recorded from hearing aids were analyzed using PRAAT software (version 4. 2 .01) for obtaining the burst spectrum, burst duration and mean pitch. The obtained data for the above two conditions were computed and subjected to statistical analysis using SPSS software version 10 for obtaining statistical significance.

Part - II: Perceptual analysis of hearing aid processed signals - Subjects: Ten normal hearing subjects in the age range of 15 - 25 years participated in the study.

Procedure: The original and hearing aid processed stimuli recorded in the computer were presented randomly to the subjects through headphones at 40dBSL. The subjects were asked to identify and repeat the stimuli.

Results & Discussion: The obtained data was analyzed in terms of the Mean pitch, VOT and Total duration in all conditions and were subjected to one way ANOVA to find significant difference between them and results revealed no statistical significance ($p<0.05$) between original, analog and digital hearing aid processed signal, suggesting there is no effect on the above mentioned parameter for syllables processed by either analog and digital hearing aid. This finding was similar to that reported by Steven and Blumstein (1975, 1978).

Conclusions: The study showed that overall there was a spectral change in the speech signal when it was processed through digital hearing aids. These changes were more for the frequency parameters than for the temporal parameters. However, these changes were not statistically significant. The change in the burst spectrum of processed stimuli in the high frequency may be attributed to the frequency response of the hearing aids. The spectral change was more for one particular hearing aid, which was judged as sounding metallic. The remaining hearing aids did not have major spectral changes and the subjects perceived them to sound natural. The metallic quality of the particular hearing aid may be due to excess gain in the high frequency region. This study thus indicates that only when there are major spectral changes in the output of a hearing aid it is judged as being perceptually of poor quality. Minor changes result in the hearing aid sounding natural.

EVALUATING PRESCRIPTION OF BODY WORN HEARING AIDS IN PRESCHOOL CHILDREN USING PARENTS EVALUATION OF AURAL/ORAL COMMUNICATION

Sarita. R., Sovon. D., Nachiketa. R.

Introduction: A child perceives the acoustic correlates of the physical world through hearing, which is vital for spoken language acquisition. Hearing impairment that is bilateral in nature results in significant delay in language development and academic achievement for both children with mild and moderate hearing loss as well as for those whose losses are in severe and profound ranges. Amplification enables a child with hearing impairment to access spoken words and environmental sounds. The entire process of prescription of amplification for children essential involves the determination of hearing thresholds, the selection of amplification, the fitting of amplification, the verification of response, and the evaluation of the effectiveness of the fitting for the individual. Subjective measures are useful clinical tools to evaluate performance with amplification in a range of general everyday life situations in case of very young children. Parents' Evaluation of Aural/Oral Performance of Children (PEACH) at the National Acoustic Laboratories in Australia, was developed by Ching and Hill (2007) to evaluate the fitting along with the effectiveness and outcome of amplification for infants and children with hearing loss ranging from mild to profound degree in real life situation by a systematic use of parental observations of their child's development of audition and listening skills following the use of hearing aid.

Objectives: To find-out the differences of PEACH scores for hearing aid usage periods within the pre-school children using body-worn hearing aids. To find-out the correlation between the hearing aid usage period and PEACH score. To find-out the dependency PEACH scores are dependent on the age of hearing aid fitting.

Methodology:

1. Participants: It comprises of parents of 30 children with an age range from 31 to 72 months with profound and severe-to-profound degree of hearing loss, (congenital in nature), using pseudo binaural fully analog body-worn hearing aids by using functional gain measures with an usage period range of 2 to 48 months which were distributed under the ADIP scheme at AYJNIHH,ERC and were attending regular Pre-school and speech language therapy program including auditory - verbal approach at the same institute.

2. Tools: The questionnaire based Parents' Evaluation of Aural /Oral Performance of Children (PEACH) scale, as developed by Ching and Hill was translated into Bangla language and used as the tool in the study along with statistical analysis using SPSS software (version 14.0) was carried out for the data obtained. The statistical tests including descriptive Statistics, One-Sample Kolmogorov- Smirnov test. One-way Analysis of Variance (ANOVA) with Least Significant Difference (LSD) Post-Hoc analysis and Pearson's Correlation Coefficients (r) were implemented to analyze the obtained data.

Results: The mean PEACH score of all the children in the present study was 17.40 which is lower than the overall PEACH score of 44.The difference between PEACH scores for each hearing aid usage period (HAUP) groups was significant at the 0.05 level of significance. The difference in PEACH scores of groups I and II; II and III; III and IV are not significant. The PEACH scores increased with increase in hearing aid usage period ranging from 2 to 48 months are highly dependent on the development of oral and auditory

skills. A positive correlation was found between the hearing aid usage period and PEACH scores (r=0.67) significant at the 0.01 level was obtained.

Conclusion: The present study provides information on the importance of using subjective tools to evaluate the functional outcomes of prescribed hearing aids in terms of aural and oral performance of children with hearing impairment in real life situation. Evaluation of prescribed body worn hearing aid can be effectively done by evaluating the aided functional performance of pre- school children with profound or severe-to-profound degree of hearing loss using the PEACH scale as developed by Ching and Hill (2007) which utilises parental observations of their child's development of aural, oral or both performances, has potential to complement objective hearing aid evaluation like functional gain measures. A significant difference in PEACH score was evident after a usage of hearing aid of more than 12 months. PEACH scale could be use to track the changes in aided aural, oral or both performances of pre-school aged children with profound or severe -to-profound degree of hearing loss.

EFFECT OF VENTING: COMPARISON OF ELECTROACOUSTIC CHARACTARISTICS AND SPEECH DISCROMINATION SCORES FOR BODY WORN HEARING AID USERS

Ramit. R. B., Mita. S., Ashok. K. S.

Introduction: This study was conducted to find the difference in electro-acoustic characteristics of the body worn hearing aids when fitted with regular, parallel or diagonally vented ear mould and its affect of the speech discrimination scores on subjects having sloping sensori-neural hearing loss. The ear mould is a vital component of any hearing aid since it forms the connection between the ear and hearing aid. Ear moulds are the most important factor in the inhibition of acoustic feedback .Vented ear moulds affects the amplification and transmission of low frequency sounds that enter the ear canal via the hearing aid. By providing a free passage of air, unwanted low frequency sounds can escape through the vent, effectively reducing the amount of low frequency amplification that the person with hearing impairment is receiving. Audiologists choose the size of the vent based on the requirement of each person. Brugel and Schornk (1991) demonstrated the improvement in the speech discrimination scores with different dimensions of the vents. Venting mainly affect the low frequency response from 0 Hz up to approximately 1 KHz, with the frequency range affected depending strongly on the vent size and hearing aid gain (Dillon, 2001b). Generally, the wider the vent, the greater the benefits in terms of comfort and aeration (George and Hamilton, 1978). Wide, short vents give the greatest reduction in low frequency amplification. Vents have the advantage of being able to be used with all types of hearing aids and can often be inserted or modified by the audiologist very quickly and easily. Venting is one of the simplest means of reducing the occlusion effect (OE) and reducing excessive low frequency amplification. Vents may not be fitted if there is risk of acoustic feedback, the ear canal is too small to allow room for the vent or low frequency amplification is needed.

Aim of the study: To examine the change in the electro-acoustic characteristics for parallel vent and diagonal vent in body worn hearing aid users and to estimate the effect of parallel and diagonal vent on speech discrimination score in body worn hearing aid users.

Methodology- Subjects: subjects with acquired (post lingual) sloping hearing loss were selected for the study. All subjects had verbal mode of communication. 19 (14 male and 5 female) adults in the age range 18-70 years participated in the study. All the subjects were using monaural body worn hearing aids with regular ear moulds. Apart from 19 individual hearing aids of the subjects additional 11 hearing aids were also taken for the study of electro-acoustic characteristic only.

Tools: MAICO MA 53 Diagnostic audiometer with free field system and GSI-38 Immittance meter were used in the study for hearing assessment and speech discrimination scoring of all the subjects. Fonix FP 40 D hearing aid test system was used for electro-acoustic characteristics measurement of the body worn hearing aids in sound treated room. All the tests were carried out in Audiometric Test Room as per ANSI S3.1-1991 specification.

Procedure: Five Electro-acoustic characteristic [High Frequency Average Output Sound Pressure Level with input of 90dB (HFA OSPL90), Full on Gain (FOG) , Equivalent Input Noise Level (EINL), Total Harmonic Distortion (THD) and frequency Limit (F1-F2)] were measured for all the 30 hearing aids with regular ear mould, parallel and diagonal vent. Speech Discrimination scores for the 19 subjects fitted with

regular, parallel and diagonally vented ear moulds were also measured. One way ANOVA, Friedman's test and paired t test for pair wise comparison was implemented for statistical analysis of the data.

Results & Discussions: Major changes in the electro-acoustic characteristics of the body worn hearing aids was observed on HFA OSPL90, FOG and EINL which reduced to 7.31%, 9.19% and 7.72% when parallel vent of 2mm were bored in the regular ear moulds respectively. Not many changes were observed in total harmonic distortion and frequency limits. Present study in the electro-acoustics characteristics between the parallel and diagonal venting of 2mm made in the regular ear moulds. Parallel/ Diagonal vents improved the Speech Discrimination score by 9%. All the subjects reported ease of listening along with a better discrimination. The cumulative impact of venting can be seen on improvement of speech discrimination scores.

Conclusion: In clinical practice especially with the analog body worn hearing aids, audiologist must conduct the hearing aid trial with regular mold as well as vented moulds. The better discrimination scores and the perceptive good quality of amplified sound must guide the choice of ear mould and the tone control setting for the benefit of persons with sloping configuration of their hearing loss.

HEARING LOSS PROFILE IN SCHOOL GOING CHILDREN WITH HEARING IMPAIRMENT

Prasanta. K. S., Sanjay. K. B., Nachiketa. R.

Introduction: The hearing profile of children attending special schools needs to be explored to have an idea about the hearing loss profiles. This would help in allocating resources like hearing aids and teaching materials for children. Although there have been a few studies on hearing screening of children attending regular schools, studies depicting the hearing loss profile of special school going children is rare.

Aim of the study: This study explores the hearing loss profile of the students attending special school for the hearing impaired in rural West Bengal.

Objectives: 1. To investigate the type and degree of hearing loss. **2.** To investigate the status of ME as revealed by the otoscopic examination and immittance, Type of hearing aid distributed, 3. To investigate the risk indicators and probable etiology of children.

Methods: A camp was being conducted under the ADIP scheme for the distribution of hearing aids. 274 Students from 38 special schools for the hearing impaired in West Bengal participated in the meet. The location was of the camp was the venue for inter-school athletics meet for the hearing impaired.

Procedure: A case history followed a detailed Oto-laryngological evaluation followed by audiological evaluation and hearing aid trial.

Test environment: Two quiet rooms with a noise level below 50 dBA were selected for the study. Data Collection and Analysis was done by five qualified audiologist with a working experience of five years or more. Statistical analysis was done in SPSS version 10.

Results: The mean age of the children was 13. 6 years. The male to female ratio is 2:1. It was seen that profound hearing loss is the most common type of hearing loss in both the right ear and the left ear accounting for about 58%. Severe hearing loss accounting for nearly 34% of the total number of ears. The most frequently encountered type of hearing loss among the student is sensorineural cases accounting 84% of the total ear being tested. The analysis of the otoscopic examination revealed that 72% of the ears reported "No abnormality detected". The most frequent type of tympanogram obtained was "A Type" accounting for 65% of the ears being tested. 58% of the cases were prescribed with an extra strong class hearing aid under the ADIP scheme and around 38% of the cases were recommended for a strong class hearing aid. 77% of the subjects could not report the cause of the hearing loss. The most frequently encountered cause of hearing loss is reported to be formation of pus (7%).None of our subjects reported that maternal rubella to be the cause of hearing loss. The prominent encountered diseases accounting for hearing loss in children were identified high fever, measles and typhoid. Cross tabulation revealed that essential both the left and right ear had similar type of hearing loss and the hearing loss was essentially symmetrical. There was good association of otoscopic examination and tymapnometry with the type hearing loss revealed in audiogram and revealed significant extent of association. Similarly a good association was revealed between otoscopic examination and tymapnometry.

Discussion: Males outnumbered the number of female attaining special schools, the number of males being double than that of female. The study reveals that nearly 42% of the cases tested could have derived some benefit in aural mode of education as the hearing loss was of severe degree or less than it. Although test group was mainly adolescent, all the students depended on their teachers to come for testing. The cross tabulation and correlation function testing revealed that high degree of correspondence between type of hearing loss, immittance audiometry and the otoscopic finding but otoscopic finding is slightly better than the immittance audiometry in it correlation to the diagnosed type of hearing loss. Most of the children attending the camp were above 10years of age and had not received amplification till that age. They mostly used gestural mode of communication. There is a need to consider other rehabilitation options like manual communication as all the students were late identified and had crossed the critical to acquire language.

RESOLUTION OF (IATROGENIC) SUDDEN SENSORINEURAL HEARING LOSS AND FACIAL NERVE PALSY AFTER STAPEDECTOMY: A SINGLE CASE STUDY

Sanjana. J. K., Srihimaja. N., Anusha. S., Prakash. S. G. R.

Introduction: An Iatrogenic disease may be advertently caused by a physician or surgeon or by a medical or surgical treatment or a diagnostic procedure. Otosclerosis develops most frequently in people between the ages of 10 and 30 and in most cases, both ears are affected; however, about 10-15% of patients diagnosed with otosclerosis have loss of hearing in only one ear (Brown DJ, 2003). Good candidates for the surgery are those who have a fixed stapes from otosclerosis and a conductive hearing loss of atleast 20dB but patients with a severe hearing loss might still benefit from a stapedectomy, if only to improve their hearing to the point where a hearing aid can be of help and the procedure can improve hearing in more than 90% of cases (Nadol JB,2001). About 90% of patients will have markedly improved hearing following the procedure, while 8% experience only minor improvement and about half the patients who had tinnitus before surgery will experience significant relief within 6 weeks after the procedure (Mark H.Beers, 2001). The most serious risk is an increased hearing loss, which occurs, is about 1% of patients and because of this risk, a stapedectomy is usually performed on only one ear at a time (House HP, 2002). Less common complications include: temporary change in taste due to nerve damage (S.K. De et al,1979), perforated eardrum (Mark H.Beers,2001), vertigo that persist and require surgery (E.Atacan,2001), damage to the chain of three ossicles attached to the eardrum (A.Hall,1958), partial facial nerve paralysis (Shea JJ,2001), ringing in the ears (House HP,2002). The reported incidence of SNHL varies between 0.2% and 1% in patients who have undergone primary stapedectomy (Mann WJ, 1996). In cases of revision stapedectomy, rates of up to 14% have been reported (Lesinski, 1989). Facial nerve palsy (FNP) represents the most outward and noticeable cranial neuropathy (F.Strle, 2009). Iatrogenic facial nerve injury is one of the ear, nose, and throat (ENT) surgeon's greatest fears during ear surgery; despite the technological advances, the overall risk of iatrogenic FNP remains considerably high and the incidence has been estimated to be 0.6%-3.7% (Schuring AG, 1988). In revision mastoid surgery, the frequency may be as high as 4%-10% (Wiet RJ, 1982). Following ear surgery, FNP may present immediately post-operation or develop with delayed onset (Asma, 2009).

Case Report: A 17 year-old-man with a unilateral conductive hearing loss in his left ear underwent left-sided stapedectomy. Before surgery, he did not complain of tinnitus, and his family history was negative for sensorineural hearing loss. During surgery, the hole in the footplate was covered by temporalis fascia, and prosthesis was used. Post operative hearing results were satisfactory. His pre-operative pure tone average (PTA) was 35dBHL in left ear and 'As' type of tympanogram in left ear and post-operative pure tone average was 20dBHL. But immediately after the surgery, the patient showed left facial nerve palsy. It was recommended to proceed to exploration surgery within three weeks when clinical and neuro-physiological observations predict an unfavourable prognosis. During his follow-up examination, 3 months after the surgery, he complained of tinnitus and diminished hearing, a week after surgery and resolved spontaneously. He denied any excessive strain, lifting weights, head trauma, or upper respiratory infection in the period of that week and when sent for ENT examination, it revealed both otoscopic function and vestibular function were within normal limits. The results of audiometry revealed moderate sensorineural hearing loss (PTA=45dBHL) in right ear and severe mixed hearing loss (PTA=75dBHL) in left ear with 'A' and 'Cs' type of tympanogram in right and left ears respectively. Computed Tomography showed a satisfactory position of the prosthesis. When Electro-NeuroMyography (ENMG) was done, the clinical findings suggestive of left facial nerve palsy

and the patient was treated with steroid therapy. The follow-up examination was done after 1 month and the results of audiometry was the same i.e., moderate sensorineural hearing loss in right ear and severe mixed hearing loss in left ear. Therefore the patient was recommended by the neurologist to continue steroid therapy and the ENT physician for hearing aid.

Discussion: The development of delayed SNHL and immediate facial nerve palsy after successful stapedectomy is a known and severe complication of that surgical procedure. Schuknecht (1962) reported that delayed SNHL developed 6months after surgery in 2 patients in his series of 750 primary stapedectomy cases. The results of long-term follow-up and the final outcome of treatment in those patients were not described. Shea Jr (1963) described 2 patients in whom delayed SNHL developed suddenly several months after primary stapedectomy. Before the development of hearing loss, both of those patients had complained of fluctuations in their hearing, which might have been a sign of serous labyrinthitis. Hora (1964) described 2 patients with delayed hearing loss after stapedectomy. Noam Yehudai (2006) reported a patient with delayed post-stapedectomy sensorineural hearing loss that developed 15 months after surgery and resolved completely after treatment with an oral steroid. During the stapedectomy surgery, when the crura of stapes fractured toward the facial nerve, the chances of facial nerve injury are more (Mark May, 2000). The case described in this report suggests that delayed post-stapedectomy SNHL, which is an extremely troublesome complication, might nevertheless have a favourable outcome. The patient described did seem to fulfil the criteria for this diagnosis and the cause of his condition may be due to intravestibular granuloma or perilymphatic fistula. The increased middle ear pressure was suggested as a cause of immediate post-stapedectomy SNHL. The SNHL in contralateral ear may be an indication of sympathetic cochlea-labyrinthitis (Michele Richards, 2002; Harris JP,1985). The facial nerve injury must be treated by undergoing exploration and neurolysis of facial nerve (Mark May, 2000) and drugs like hydrocortisones, steroids may be helpful. The alternative option is hearing aid fitting (Mark H.Beers, 2001).

Conclusion: As iatrogenic hearing loss is a rare condition, audiologists must be aware of these factors for early identification through a detailed medical history and a frequent documentation of the audiograms, for better intervention strategies through appropriate referrals, thereby developing a team approach management. More descriptive studies should be conducted in this area to give a better theoretical approach to iatrogenic hearing loss.

PRESENCE OF MULTIPLE CAUSES & LEADING TO HIGH FREQUENCY SENSORINEURAL HEARING LOSS IN A SINGLE CASE

Sandhya. R., Anant. K., Shalini. S., Abinash. K.

Introduction: High frequency sensorineural hearing losses are due to many factors such as- viral infection, NIHL, Genetic factors, AIHL, ototoxicity, Syndrome etc.,. All these causes are common which leads to high frequency sensorineural hearing loss. Depending on the causes, they have different treatment and rehabilitation program. If four causes are present in a single case then which rehabilitation program should be done? Which factors will be more prior as conclusion than which are more superimposed? NIHL? Hereditary loss or? Progressive or Non progressive consideration of primary factor.

Objective of the study: To Identify the main cause by analyzing all common causes seen with the case.

Methodology: One person aged 50 years, was the subject for the study with the complaint of reduced hearing sensitivity in both ears since 2 years. It was ascertained through structured interview that he had recent history of viral infection, works in an industry since 25 years and mother has same problem. Detailed audiological evaluation was carried out including otoscopic examination, pure tone Audiometry, Tympanometry and reflexometry.

Results & Discussions: Otoscopic examination revealed cone of light visible in both ears, pure tone audiometry showed in right ear Moderately Severe sensorineural Hearing Loss & in left ear Profound Hearing Loss. Tympanometry revealed 'A' type tympanogram with no reflex in both ears which indicates no middle ear pathology. As the result of audiological evaluation all the mentioned causes might have lead to high frequency sensorineural hearing loss. But the rehabilitation plan depends upon the causes, type & degree of hearing loss. Few studies reveal that genetic cause is superior and others show that viral infection is superior.

Conclusion: As per the client, hearing loss was in existence from past few years but it worsened after the viral fever. It is unknown whether the hearing loss due to Noise exposure or hereditary, progressive or non progressive Consideration of Primary factor - further study needs to be done.

TEMPORAL PROCESSING ABILITIES IN CHILDREN WITH LEARNING DISABILITY USING GAPS IN NOISE TEST

Suparna. H. S., Joshi. B. P., Prakash. S. G. R., Rathna. K. S. B.

Introduction: Auditory temporal processing may be defined as the perception of the temporal envelope or the alteration of durational characteristics of a sound within a restricted or defined time interval (Musiek et al, 2005). Auditory perception, which requires precise and accurate processing of the timing elements of sound, is crucial to the most basic processing at the neuronal level to complex higher level speech perception and spoken language processing. In particular, temporal processing skills are critically important to phonemic distinctions (e.g., voice-onset time [VOT]), lexical and prosodic distinctions, and auditory closure, as well as underlying many other auditory perceptual skills (Chermak and Musiek, 1997). Temporal processing may be conceptualized as four subprocesses including: (1) temporal resolution, (2) temporal patterning, (3) temporal integration, and (4) temporal masking (Shinn, 2007). Many studies have reported the presence of auditory deficits in the dyslexia population. Moreover, deficits are demonstrated across a wide range of auditory tasks, classic temporal order judgement and repetition tests, to frequency and intensity discrimination, gap detection , illusory movement detection, frequency and amplitude modulation detection, categorical perception of phonemes and non-speech analogues and backward masking (Tallal P 1980, Rey V, De Martino S, Espesser R, Habib M 2002, De Martino S, Espesser R, Rey V, Habib M 2001, Share DL, Jorm AF, MacLean R, Matthews R 2002).

Aim of the study: The present study was aimed to find out minimum gap detection ability in children with Learning Disability and to compare it with typically developing children.

Methodology: A total of 14 subjects participated in the present study in which 07 subjects were typically developing children and 07 were children diagnosed with Learning Disability. All the subjects ranged from 7 to10 years of age. All subjects presented normal pure tone thresholds (i.e., 20 dB HL from 250 Hz to 8 KHz) bilaterally. All subjects were tested while seated in a sound-treated room. The GIN stimuli were recorded on a compact disc and played through a calibrated audiometer. The stimuli were presented through supra aural headphones at 40 dB SL with regard to pure tone average or speech recognition threshold to each ear independently. All subjects were given practice items, which were placed at the beginning of the CD to insure the task was understood. They were instructed to say which one of the three stimuli had a Gap every time and as soon as they heard a gap or brief period of silence.

Results: The mean scores obtained were about 7.24ms in right ear and 7.32ms in left ear in children with Learning Disability and 3.05ms in right ear and 3.17ms in left ear in typically developing children, indicative of poorer performance in children with Learning Disability. One way ANOVA results between two groups revealed significant difference of Gaps in Noise Tests. ($p<0.001$). The obtained results suggest a variation in the gap detection abilities in persons with typically developing children and in children with Learning Disability indicative of interference in their temporal processing abilities.

Discussion: Results showed that the children with Learning Disability performed significantly poorer when compared with their age-matched control group which is supported by the study done by Hautus, Setchell, Waldie, & Kirk, 2003 due to the underlying cause of auditory temporal processing deficit seen in these children.

Conclusion: Successful treatment outcomes are dependent on stimulation and practice that induce cortical reorganization (and possibly reorganization of the brainstem), which is reflected in behavioral changes (i.e., learning) (Kolb, 1995; Merzenich & Jenkins, 1995; Russo, Nicol, Zecker, Hayes, & Kraus, 2005) which needs effective intervention by a multidisciplinary team. As such, intervention for individuals experiencing communicative or academic difficulty should be undertaken by a multidisciplinary team, which may include audiologists, speech-language pathologists (SLPs), educators, psychologists, parents, and others. The audiologist provides auditory training to the children with Learning Disability, thereby precise and accurate processing of the timing elements of sound and temporal processing skills will improve which is crucial to the most basic processing at the neuronal level to complex higher level speech perception and spoken language processing. Clinicians should assign the priority for treatment to those auditory processing deficits identified in children with Learning Disability.

EVALUATION OF PARENTAL STRESS IN DIFFERENT DOMAIN, IN VARIOUS STAGES OF REHABILITATION OF CHILDREN WITH HEARING IMPAIRMENT

Sovon. D., Arumoy. S., Nachiketa. R.

Introduction: According to classification in India of Persons with Disability Act (PWD act) is "Hearing Impairment" can be defined as a loss of sixty dB/ more than more loss in the better ear in the conventional range of frequencies. According to ICIDH-2 new terms proposed are "Activity Limitation" for "Disability" and "Participation Restriction" for "Handicap". ICIDH also defined impairment as any loss or abnormality of physical/ abnormal structure functions generally taken to be at organ level. Stress is "a particular pattern of disturbing psychological and physiological reactions that occur when an environment event threatens important motives and taxes one's ability to cope". Intrapsychic and interpsychic changes can also be observed in a subject who is stressed. The results of hearing loss with disturbed or delayed speech and communication development influence the other family members and the entire family system. Constant confrontation with the disability may arouse in family members and other involved persons such feelings and grief, disappointment, helplessness, and aggression.

Objectives: There are some objectives of this study based on which the study is carried out. The objectives are (1) to develop a questionnaire to assess the parental stress in case of hearing impaired child, (2) to assess the parental stress level though that questionnaire of hearing impaired child's parents at different stages of intervention programme, (3) to find out area which is potentially more stressor to the parents of hearing impaired child, and area, which is least stressor to parents of hearing impaired, (4) to find if male and female child with hearing impairment induces different degrees of stress on their parents, (5) to find out the effect of the Family dynamic(joint family and nuclear family) on parents stress.

Methods: Fifty-nine questions are selected with the view of some professionals working with hearing impaired for a period of five years and more. 21 judges (speech and language pathologists and psychologists) rate these fifty-nine items those had mean less than three were rejected. Then the final questionnaire was developed, which is consisting of fifty four items. The developed questionnaire was divided into seven domains, like before diagnosis, after diagnosis, social, communication, economic difficulties, and career adjustment, physical and mental changes in parents due to hearing impaired child. Parents were oriented about the need of the study and then the questionnaire was given to participant to rate as per their experiences. Questionnaires are translated into Bengali with the help of native speaker and given to the judges for relevance judgment. Judgment of the relevancy of all answers is done by judges in a five point rating scale where, 1- least relevant, 2- Somewhat relevant, 3- Relevant, 4- Very relevant, 5- Most Relevant.

Results: SPSS version 11.5 software are used for analysis to determine is there any significant difference in stress level of the level of intervention. Analysis of Variance is administered to obtain the conclusion of our objective. And for post hock analysis independent sample "t" test was done. The raw score given by parents are analyzed to get the total stress level. The raw score of indirect item are subtracted from the direct item related to stress. The stress level score are then analyses through SPSS software.

Discussion: The results reveal that there is a significant relation between parental stress and duration of intervention program. There is no significant difference in parental stress level for male and female child and also for different family dynamics. This study suggests that different family structure has no effect on parental stress. In Indian context, a nuclear family does not mean that no other family members are living with the family. Generally, relatives from both sides do visit from time to time. Especially, at the time of the child's birth and after some time mothers usually get help from some family members. It is not only from extra burden of child rearing, but also helps n household chores. From the present study it can be concluded that, the parental stress due to child's hearing impairment is maximum in social domain indicative of need of counseling towards issue concerning awareness of hearing impairment and speech problems associated with its especially to the family members, neighbors with whom the child plays or and local leaders who can bring about an attitudinal change in the surroundings of the child. The above study is suggestive of an urgent need of parental counseling just after their child diagnosed with hearing impairment.

COCHLEAR MICROPHONICS OR INSTRUMENTAL ERROR: CAUTIOUS INTERPRETATION

Sanjay. M., Anuradha., Kanwardeep. S., Naresh. K. P.

Introduction: Auditory neuropathy is a hearing disorder where outer hair cell function within the cochlea is normal, but inner hair cell and/or the auditory nerve function is disrupted. Auditory neuropathy is diagnosed when the OAEs are present in the absence of ABR waves. Reversing click polarity while doing ABR may also uncover the diagnosis of auditory neuropathy. Auditory neuropathy is marked by presence of cochlear microphonics in the absence of subsequent ABR waves. Cochlear microphonics is checked by changing the polarity of the stimulus from rarefaction to condensation and looking for reversal. However, There have been many studies which shows the effect of stimulus polarity on the latency of ABR waves. Some investigations have reported significantly shorter ABR wave V latency values for rarefaction than for condensation clicks in most normal hearers (Emerson, brooks, Iaker & chiappa, 1982; Kevanishvilli and Aphonchenko, 1981; Schafer and leitner, 1980; Stockard et al, 1979) although the magnitude of difference is small, average of about 0.2 msec. Other investigators have, however, noted opposite polarity pattern- that is shorter latency values for condensation than for rarefaction clicks (Borg and lofquist, 1982a; Stockard et al, 1979). Up to date no study has reported on the significance of consideration of this factor while checking for ABR waveform reversal in auditory dyssynchrony cases. In our clinic, we come across the finding where the time difference between the Rarefaction and Condensation waveform can be misinterpreted as CM reversal and we are reporting that study.

Study: The study included five pediatric patients in the age range of less than 3 years who reported to the speech and hearing unit of P.G.I.M.E.R., Chandigarh with the chief complaint of reduced hearing since birth. They had normal birth history. They reported no history of hyperbilirubinemia, neonatal jaundice, birth asphyxia, high grade fever as encephalitis and meningitis. Their motor developmental history revealed normal attainment of motor milestones however speech milestones were delayed due to hearing loss. The children were tested thoroughly for the hearing sensitivity and the protocol of testing used was: Behavioral observation audiometry (BOA), Impedance audiometry, Otoacoustic emissions and auditory brainstem response. Behavioral Observation Audiometry showed severe-profound degree of hearing loss. Impedance audiometry showed normal type A tympanogram and Otoacoustic emissions were absent. Auditory brainstem response audiometry was done using NEUROAUDIO software. No significant wave V was observed at 95 dB nHL using alternating polarity stimuli. But when the polarity of stimulus was changed to rarefaction and then condensation, waveform appeared to show CM reversal. This arose the suspicion of auditory dyssynchrony. But the results were contradicting as OAEs were absent. This made us to look for some other factors that might be contributing to the reversal of waveform. Then we subjected 5 normal adults of age range between 18-25 years with no complaint regarding hearing to ABR testing. Prior to ABR testing they were subjected to pure tone audiometry to confirm for normal hearing, impedance audiometry to rule out any middle ear pathology, Otoacoustic emissions to check for cochlear integrity. Pure tone audiometric thresholds were within normal limits. Impedance audiometry also showed normal type A tympanogram and present ipsilateral as well as contralateral reflexes. Otoacoustic emissions were also present with SNR at three consecutive frequencies to be greater then 6 dB. Then they were subjected to ABR testing. Wave I, III and V were observed at 90 dB nHL in both ears using alternating polarity stimuli. When the polarity of the stimulus was changed from rarefaction to condensation, wave I appeared to be reversed. It was found that the latencies for rarefaction waveform were shorter than condensation waveform in left ear whereas in right ear condensation waveform

latencies are shorter then rarefaction wave. These latency differences were so prominent that wave I appeared to be reversed in all cases. However, these contradictory findings made us to look for another factor responsible for it. On subjective listening to the stimulus through both the earphones, the qualitative differences were found between the stimuli being delivered through both earphones. The clicks being delivered by the right earphone were found to be lesser in rate and reduced in intensity than stimulus delivered through left ear phone. The earphones were then sent to the company for inspection and were replaced by new similar earphones. ABR was repeated on the same subjects. Latency differences were again found between the rarefaction and condensation wave. But they were in agreement with those reported in literature. And the waveform did not appear to be reversed. This revealed that the earlier waveform reversal was due to defective earphones rather than Auditory Dyssynchrony.

Discussion: In case of our pediatric subjects the otoacoustic emissions were absent in all cases but ABR waveform showed reversal. Moreover the case history did not reveal any risk factors for auditory dyssynchrony. This prompted us to look minutely into the waveform and on careful observation, latency differences were observed in the early wave components which appeared like reversal. On performing ABR on normal hearing adults, latency differences between Rarefaction and condensation waveform were observed but the differences were larger than reported in literature. These latency changes appeared as reversal of waveform and led to the provisional diagnosis of auditory dyssynchrony/auditory neuropathy. However, in all these cases the case history did not suggest auditory dyssynchrony which prompted us to inspect the instrumental error. It was found that stimulus delivered by right and left earphone is different therefore earphone were sent for repair. After repair latency differences were still present but they were in agreement with the literature and did not appear as reversal. Conclusion: ABR waveform reversal should not be considered as the only parameter to confirm auditory dyssynchrony because the reversal can be due to the erroneous latency differences in the rarefaction and condensation waveform due to instrumental error. The ABR results must be correlated with otoacoustic emission to confirm the diagnosis of auditory dyssynchrony. When the results are contradicting then one should look for latency differences as a factor which might lead to misdiagnosis of Auditory Dyssynchrony.

THE PERCEPTION OF CITY DWELLERS OF KOLKATA ABOUT SPEECH AND HEARING DISABILITIES

Sarita. R., Mita. S., Piyali. K., Nachiketa. R.

Introduction: The National Institute on Deafness and other communication disorder, 2002 quotes hearing loss to be an occult disorder and is often ignored ; and Robert West (1999) one of the renowned speech pathologist quotes, every body knows what stuttering is except the experts. Many perceptions about speech and hearing disabilities are culture specific and needs to be understood. Most of the perceptions which are read and taught are of western origin and publication; culture specific studies are needed to understand and implement management strategies better. Unlike the west rehabilitation process is a personal affair and in case of children primarily begins by family initiatives (Rout and Singh, 2010). Views of the common man need to be understood so as to target the barrier towards accessing rehabilitative help.

Aim of the study: To explore the perception of city dwellers of Kolkata about speech and hearing disabilities.

Methodology: The survey was conducted at the location in a quiet surrounding. A total number of one hundred and four candidates belonging to various parts of Kolkata from 21 years to 52 years (64 male and 40 females) participated in the study. The mean age and standard deviation are 36.5 years and +/-8.6 years respectively. A validated questionnaire was used for the purpose of the study. The questionnaire had six questions, three questions pertaining to hearing and three questions pertaining to speech and language disabilities. The purpose of the survey was explained to the participants followed by obtaining consent. The data was collected by an ASLP in a one to one interview which took time duration of 5 minutes. A SPSS version 11.0 was used to descriptively analyze the data.

Results: When the participants were asked "have you seen any hearing impaired person?" 97% participants have seen person with hearing impairment. When asked "what do you think which might have caused hearing problem?" 66% of the participants believed that the causes of hearing loss are of biological origin and 14% of them perceived hearing loss as of environmental origin. When asked "where would you suggest a person with hearing impairment to go for help, 58% recommended them a hospital, 19% of them recommended for using gestures, helping personally and financially etc. and 3.8% of the total participants referred them to rehabilitation organizations. Similarly, participants when asked, have you seen a person with speech problem? 90% of the participants acknowledged that they have come across the person with speech and language disorder. When asked "what do you think would have caused this speech problems?" Only 4% of the total participants considered the environmental factors, majority of them (55%) considered the biological origin and 15% opined towards different myths like problem in tongue, short uvula etc. When asked "where would you suggest a person with speech problem to go for help, 41% referred to hospital and 23% do not have any distinct idea for referral, 9.6% of the participants referred the clients to speech language pathologist and 5.8% of the candidates referred them to ear, nose and throat professionals.

Discussion: WHO estimates six persons in amongst 100 people would be having hearing impairment while Indian survey (NSSO 2003) indicates less than one person would be having hearing impairment. With such a low prevalence 97% would not have come across the disability. In the present survey 97% of people came across a person with hearing impairment. This indicates the underestimation of NSSO 2003. Appropriate estimation of prevalence always helps in allocating resources towards management. 66% of the participants believed that the causes of hearing loss are of biological origin. They perceived hearing loss as a disease.

If hearing loss is perceived as a disease rather than a condition, the management of HI is primarily through surgery or medicines. As any disease HI is also expected to come along with symptoms of pain, redness etc. which is usually not the case. About 50% of hearing loss are genetic in nature and 70 % of the genetic hearing loss are non-syndromic, many environmental causes like environmental toxins, ototoxic antibiotics prescribed for some disease are often not expected to cause hearing loss (Diefendorf,2009). Only 14% of them perceived hearing loss as of environmental origin and attributed to noise. Only 3.8% of the total participants refer the persons with hearing impairment to rehabilitation organization. Thus, this data depicted that the audiologist is not a known profession and it needs significant amount of advertisement and awareness program. 90% of the participants acknowledge that they have come across the person with speech and language disorder. This indicates a high prevalence of speech impairment which is not included under disabilities in the PWD Act, 1995. This data depicts that common people are more aware about hearing impairment compare to speech language impairment. Only 4% of the total participants consider the environmental factors may cause speech and language disorder and majority of them (55%) consider the biological factors. This finding suggests speech impairment is perceived as a disease. Because of this perception 41 % referred them to a hospital and 5.8% of the candidates recommended them to ear, nose and throat professionals though they do not practice speech therapy. Speech therapy is primarily behavioral in nature. If a client expects medicines or surgery he would not follow therapeutic instructions adequately. During interview regarding referral for speech and language therapy, only 9.6% of the participants refer the clients to speech language pathologist, whereas no one recognize audiologist in case of hearing loss, although the majority of ASLP in India practice audiology. This reflects that speech language pathology and audiology are less known professions. However the 10 % of the common mass recognized speech pathology as an independent profession but do not know about the role of an audiologist.

Conclusion: There is a need of large scale study and the government should allocate funds towards advertisement and awareness campaigning.

EFFECT OF PROGRESSIVE FILTERING OF SPEECH STIMULUS ON ABR AND IT'S CO-RELATION WITH BEHAVIOURAL SPEECH PERCEPTION

Rukmangathan. T. M., Archana. G., HariPrakash., Rajshekhar. B.

Introduction: Auditory brainstem Response (ABR) is a complex response to any external stimuli that represents neural activity generated at several anatomical sites (Hood & Berlin 1986). In addition to click, ABRs can be evoked using a wide array of stimuli, including pure tones and speech sounds (Krishnan, 2002; Russo et al.-2004).Responses elicited for the speech and non-speech stimuli exhibited considerable variation this suggests there is a possibility of differential processing for different stimuli at the level of brainstem (Hayes & Kraus, 2001). The ABR response to speech provides a way to access subcortical auditory processing mechanisms and may be used as a biological marker of deficient sound encoding associated with learning and auditory processing disorders. Speech evoked brainstem responses are divided into transient and Frequency Following Responses. Where, transient responses are onset/offset response and peak B represents spectral motion within burst and C represents transition from burst to onset of vowel. Accurate manifestation of these peaks in brainstem is hallmark of normal speech perception (Sininger & Starr 2001).

Need: Currently click evoked ABRs don't have any correlation with speech perception. Transition from consonant to vowel is vital information in perception of speech sounds, also burst energy is important clue in differentiating different stop consonants, and these changes are depicted in brainstem as C and B respectively. Difficulty in perception of stop consonant could be achieved either by degradation of transition or burst energy and spectral motion, thus in turn can be expected to be present as a change in either B or C in brainstem responses. If such a correlation exists, it would extend the current application of ABR further in to speech perception. Also it also possible to extend the clinical application of ABR, especially in young children and difficult to test population cannot be done for determining speech perception.

Aim: Current study aimed to check the effect of progressive filtering of speech stimulus on brainstem responses and behavioural perception.

Method: Speech evoked auditory brainstem response were obtained from normal hearing individuals with the age range of 20 to 24 years. (Normal audiometric thresholds Speech Discrimination scores more than 90% ,presence of OAE). A natural speech syllable /ta/ was used to obtain the auditory brainstem responses using IHS Smart EP Software, ER-3earphones were used, impedance ranging 2-5 k Ohms, electrode montage as F_z-A_2 and a repetition rate of 5.1/s, with alternating polarity. Recording window was kept as 25msec, filter setting as 150Hz-3000Hz and artefact rejection as 23.8 micro volt. Stimulus preparation: stimulus used in the current study is natural /ta/ of 154 ms and further it was low pass filtered at cut off of 2 kHz (|ta 2k|), 1 kHz (|ta| 1k) and 500 Hz (|ta| 500Hz). All the filtered stimuli where normalized and calibrated .Behavioural task was carried out using 2 interval forced choiced method. Subjects were asked to write down the order of presentation. A total combination of 16 stimulus set were created and randomly presented three times. Error analysis was carried out to check the percentage of errors and what type of errors were made. Repeated measures of ANOVA were carried out with respect to latency for all four stimuli.

Results: The mean V^{th} peak latency was 6.29, 7.3, 7.98, and 8.61ms latencies for /ta/ unfiltered, /ta/ 2 kHz, /ta/ 1 kHz, /ta/ 500 Hz respectively with Standard deviation of 0.36, 0.60, 0.43 and 0.33 respectively. The mean latency of B was 12.75, 14.2, 14.50 and 14.50 for /ta/ unfiltered, /ta/ 2 kHz, /ta/ 1 kHz, /ta/ 500 Hz

respectively. The mean latency of C was 17.7, 17.7 17.9 and 17.9 ms for /ta/ unfiltered, /ta/ 2 kHz, /ta/ 1 kHz, /ta/ 500 Hz respectively. Behavioural analysis 94 % error was observed for /ta/ 500 stimulus followed by /ta/ 1kHz 80% /ta/ 2 kHz 60%.

Discussion: The present study was aimed at studying effect of filtered speech on brainstem responses. The above results evidences, prolongation of Vth peak latency in ABR with different filter cut-off. This prolongation could be a result of change in onset of burst stimuli following filtering where in, decreasing the low pass filter cut off did not change intensity of stimulus rather, caused difference in minimum to maximum energy thus leading to reduced spread of excitation in basilar membrane. Though V^{th} peak was prolonged but, it was easier to identify because of morphology. Whereas, other transient markers B and C systematically changed in morphology in such a way that, when filtered with a low pass cut-off of 2 KHz, two different peak were evident marking B and C. Where, this segregation disappeared and single negative peak dominated the region of B and C when information was filtered progressively. It is assumed that, this single increased negativity at 14 ms is suggestive of B, rather than C since transient changes in burst are more affected as a result of progressive filtering. On the other hand C disappears, suggesting significant difficulty in identification of transition from consonant to vowel. These electrophysiological finding strongly co-related with behavioural perception, where 94% of subjected substituted /pa/ instead of /ta/ when filtered cut off was at 500 Hz .The above evidences suggest, increased difficulty in behavioural speech perception are represented as changes in transient markers suggesting good correlation between two measures. Thus, these electrophysiological findings can be used to extrapolate the behavioural performance, extending the current application of auditory brainstem responses.

Conclusion: Degraded speech has a negative effect on transient responses of brainstem, which also has a good correlation with behavioural speech perception.

CAN RH INCOMPATIBILITY CAUSE HEARING LOSS? - A CASE STUDY

Srikanth. K., Sandhya. R., Atulya. K., Jyoti. V.

Introduction: Hearing impairment is the most common sensory disorder affecting more than 500 million people in the world (WHO 2008). There are various causes for this sensory impairment which are broadly divided in to congenital and acquired. More than 60% of the cases are due to genetic causes (Petit et al. 2001). Non-syndromic forms, in which the hearing deficit is the only clinical sign, are highly heterogeneous, with >80 loci already reported and 30 genes identified so far.

Objective: To show the importance of genetic analysis in identification of cause for hearing loss.

Methodology: Detailed audiological evaluation which includes case history, otoscopy, pure tone audiometry, impedance audiometry, and brainstem evoked response audiometry and genetic analysis were performed.

Results: The 19 years female bought to the clinic with the complaint of unable to hear since birth and client is 2nd issue to non consanguineous parents, natal history reveals normal except rH incompatibility (mother rH –ve & father rH +ve). No family history of hearing loss as reported. The detailed audiological evaluation reveals bilateral profound hearing loss with bilateral "As" type of tympanogram which reveals presence of middle ear pathology. Client has been sent to genetic evaluation for further analysis. We hypothesize that genetic mutation might cause hearing loss.

Discussion & Conclusion: The conclusion of this study is that the genes are predisposing factors causing hearing loss which many of us neglect, through which early detection and intervention of the problem in next generation will be easy & parents get prepared for the consequences.

AWARENESS ABOUT THE BENIFITS OF A DISABILITY CERTIFICATE

Sovon. D., Jagannath. S., Nachiketa. R., Mita. S.

Introduction: Disability certificate is a unique certificate which defines the percentage disability in all over India except the state of Jammu and Kashmir for the person with disabilities. The government, both central and state government organises multiple disability identification and intervention camps across India. By the use of disability certificate they can avail discounts, benefits and facilities for various purposes. It was experienced that many candidates coming to a camp were not sure about the purpose of their visit and had been brought to the camp by some organization. This study was aimed to identify the the awareness of the beneficearies about benefits from disability certificate.

Objective of the study: The main objective of the study is to find the awareness about the usefulness of disability certificate as perceived by the beneficieries.

Method: Seventy three participants between the age ranges of three to sixty three years with the mean age of 36.24 years were the participant of this study. These participants were taken from the nine audiological camps conducted by in association with the government of West Bengal in various places over Kolkata.The camps were speceficaly conducted to issue disability certificates. The tools for this study was Elkon milli audiometer and a questionnaire. The questionnaire had a total of questions. The evaluations begun by administering the questionnaire followed by an audiological evaluation. The total audiometric results were given as report to them followed by an ENT evaluation and a disability certificate was issued.

Results: Majority (67.3%) of the beneficiaries were adults male & female. The degree of hearing loss among the participants were distributed as mild 5.5%, moderate 2.3%, moderately severe 9.6%, severe 16.4% and profound 66.2%. The distribution of the type of hearing loss is conductive 2.3%, mixed 27.9% and sensorineural 69.8%. The most common difficulty faced by a hearing handicapped person was the difficulty in communication, present in 61.6% people followed by difficulty in social interaction, present in 21.9%. The most common usefulness of disability certificate was found to be for obtaining transport benefit (30.1%), but as many as 41% subject had no idea about the utility of disability certificate.

Discussion: An Handicapped certificate rather than a Disability certificate would be of more use because it would help quantifiying the amount of difficuilty a client faces in day today envornment. The WHO (2001) recommends to quantify the effect of the loss in body structure and function (Impairment) in terms of both Activity limitations (Disability) and Participation Limitations (Handicapped). There has been a recommendation to include speech discrimination scores by the 2001 ammendement of the PWD act but its usually not possible as the evaluations are done in camp settings and word list for SDS is not available in most of the Indian languages. Majority of the clients coming to a camp are people with severe to profound hearing loss and have a limited language capability. Most of the clients were un aware or vaguely aware about there purpose of visit and had been brought there by some agensies. There is a need to create a awareness programme both for the voluntiers and the beneficiaries regarding the benefits which can be availed from the government baced upon the disability certificate. The programme should precede or should run paralley during the camps. The materials used for the purpose of awareness should be standard and controlled in terms of content and quality. Permanent hearing Impairment is a non reversible condition, its not a "disease". The beneficiaries need to be empowered about how to live along with it by availing the facilities provided by the government.Parallely a message about the same should be send to the society through the personnels and professionals so that the society broadens up their perception, drops down prejudices and accommodates the "differentely abled" in the mainstream.

Conclusion: The above result suggests that the awareness about the disability certificate and various schemes over the disability certificate is very limited. The population of Kolkata including the professionals should be educated about issues pertaining to the significance of the disability certificate and the factors which would facilitate inclusion of the persons with hearing impairment. This can be best achieved at camps which are conducted in rural and urban areas.

A STUDY ON EFFECTIVENESS OF HEARING AIDS AS A TREATMENT OPTION FOR PATIENTS WITH TINNITUS

Mayuri. D., Thejesh. R., Prakash. S. G. R., Aparna. R.

Introduction: Tinnitus can be considered the perception of sound in the absence of acoustic stimulation and is usually accompanied by sensorineural hearing loss due to aging, noise exposure, or ototoxic medications (Chung et al1984; Ahmad & Seidman2004; Lockwood2005; Rybak2005). The cornerstone of most tinnitus treatments is counseling (Tyler, 2006). Many tinnitus management techniques advocate the use of sound as a therapeutic tool, hearing aids have been used both for masking (Hazell et al1985; von Wedel et al1998; Vernon & Meikle2000) and habituation based tinnitus therapies such as tinnitus retraining therapy (Jastreboff & Hazell1993; Formby & Keaser 2007). The use of hearing aids for patients who have a hearing loss may also indirectly help to reduce the effects of tinnitus by improving communication and therefore reducing stress (Surr et al1985) and anxiety (Carmen & Uram2002). Many tinnitus patients report that the primary benefit of attending a specialized tinnitus clinic is the fitting of hearing aids (Sanchez & Stephens2000) and approximately 50% of hearing aid patients attained relief from tinnitus, and an average 10% improvement is found in tinnitus handicap inventory score six weeks after the fitting of hearing aids (Surr et al1985, 1999). In today's clinical environment ethical practice requires clinicians to provide information about success and complications of treatment (McKenn & Irwin2008). For tinnitus patients the decision whether to undertake one treatment or another is complicated due to lack of data outlining the treatment effectiveness & absence of a clear gold standard treatment (Dobie1999).

Need for the study: Despite hearing aids are used in tinnitus management from last 60 years, but little has been published to support their effectiveness in India but earlier studies, which have cast doubts over the effectiveness of hearing aids, cannot reflect current state of art, as technology changes every day. In order to assess the effectiveness of any treatment it is important that a validated measure is used (Dobie1999). In this study the tinnitus handicap questionnaire (THQ; Kuk et al1990) is used which enables the assessment of patients' perception of tinnitus impact and to monitor changes in treatment outcome, it is a 27-item self-assessment three-factor scale which assesses the handicap caused by tinnitus in typical everyday situations and is considered a useful tool for rating of the handicap associated with tinnitus. The THQ is broad in scope and is comprised of subscales covering a mix of social, emotional, sleep problems, and interference with hearing function.

Aim of the study: The current study is aimed to quantify the effectiveness of hearing aids as a tinnitus treatment option by measuring and comparing the pre and post-intervention scores of Tinnitus Handicap Questionnaire.

Objectives: (1) To measure the Tinnitus Handicap Questionnaire scores of patients prior to fitting of hearing aid. **(2)** To measure the Tinnitus Handicap Questionnaire scores of patients six weeks following the usage of hearing aid. **(3)** To compare the Tinnitus Handicap Questionnaire scores of patients prior and post usage of hearing aid.

Method: Total 15 subjects of the age range 25 to 60years with moderate to severe sensorineural hearing loss participated in the study. Subjects who received additional therapies, fitted with combination of instruments and with low tinnitus handicap scores at their 1st evaluation were excluded. All the subjects were selected from the patients visiting AYJNIHH, SRC for the audiological intervention and were chronic tinnitus sufferers

with tinnitus present all the time and they considered their tinnitus to be a major problem. All subjects underwent systematic tinnitus evaluation and after that counseling was given regarding management options such as sound therapy and amplification. Patients self selected to proceed with hearing aids and choice of hearing aid was based on audiometric results. Due to the typical audiometric profile of the majority of the subjects, behind the ear or in the ear hearing aids were selected.

Procedure: The THQ was given to patients prior to the fitting of hearing aids and six weeks following the usage of hearing aid. Participants were instructed to use numbers between 0 and 100 to indicate how much they agreed or disagreed with each item, where 0 - strongly disagreed and 100 - strongly agreed, questions with no responses were left blank and no scores were assigned to them. The questions representing the subscales of the THQ were analysed separately. The responses to each question were recorded and a mean of the scores was obtained for each factor. Factor 1 represented the related psychological, emotional, and physical distress caused by tinnitus, and Factor 2 hearing and tinnitus. Factor 3, outlook on tinnitus, was excluded from analysis due to poor reliability (Kuk, et al, 1990).

Results: THQ scores prior and post treatment (1774.5; 1255.4) were obtained; higher score indicated greater tinnitus impact. The obtained data was subjected to paired t-test analysis (Mean 519.1; SD 304.4; t-6.605), which suggested that there is significant difference between the pre and post treatment scores ($p<0.05$) however, some individuals showed large improvements, others modest or even worsening of tinnitus handicap. Further t-test was done to investigate which factor of the THQ improved significantly, Factor 1, social, emotional, and behavioural effects of tinnitus (pre1169; post 804; mean364.4; SD215.4; t-6.551) and Factor2,hearing and tinnitus (pre605.2; post 450; mean154.7; SD109; t-5.465),both the factors found to differ significantly ($p<0.05$) after hearing aid usage. This result suggests that the hearing aids had a therapeutic effect (Factor 1) in addition to any benefit in improving hearing (Factor 2).

Discussion: Given the widespread use of hearing aids in different tinnitus treatment approaches there is a need to document effectiveness of modern hearing aids. This study sought to quantify the effectiveness of hearing aids in tinnitus management and the results suggest that given the choice, persons with hearing loss and tinnitus should strongly consider at least a trial with amplification. The main areas of complaint by tinnitus sufferers are psychosocial or hearing related (Sanchez, 1997) and in the current study provision of hearing aids predictably improved hearing related tinnitus effects (THQ F2) and also reduced psychosocial effects (THQ, F1), suggesting a therapeutic effect on tinnitus beyond improving hearing ability. Based on change in individual items on the THQ many participants showed improvement in measures of functional handicap (depression, tension, anxiety and sleeplessness, relaxation) and social handicap (social life, attending to tasks, concentration), suggesting improvements in quality of life. Further studies are needed to experimentally compare hearing aid benefits in tinnitus reduction to any other treatment and to determine whether any one type of aid (or settings) offers greater benefit over any other.

Conclusion: This study demonstrates the reduction in patients' tinnitus handicap after using the hearing aids suggesting that hearing aids are effective tinnitus management tools and the results provide clinicians with useful information to provide clients considering tinnitus management options however, there is need to conduct such studies on large number of subjects.

HIGH RISK INDICATOR IN CHILDREN WITH HEARING IMPAIRMENT

Debarshi. B., Nachiketa. R., Aprajita. D.

Introduction: Hearing impairment in a child is a silent hidden disability. If hearing loss in children goes undetected in the first few months of life it can adversely affect the child's speech & language development, social and emotional development & academic achievements. In the course of 1950s the newborn hearing screening was first started. Due to lack of standardized procedures the results of behavioral observation was only the test to relay. Due to lack of consistency in the behavioral observation some authors recommended the use of high risk factors for the identification of hearing impaired infants. It is also said that if a high-risk register (HRR) can identify the majority of the hearing impaired babies, there would be no need for universal hearing screening. Recommendations for hearing screening have gradually shifted from 1980's to 1990's from recommending screening of specific populations of infants "at risk" to screening of all infants i.e. universal screening as approximately 50% of children with sensori-neural hearing loss do not have established risk factors & would be missed by programs screening only those at risk. In India no dedicated national program has been carried out so far, for early detection of hearing loss in new-born. In such condition the high risk checklist will be of great help to begin with hearing screening as it is efficient and should identify a disease that is 14 times more prevalent in the register than in the general population had also recommended use the HRR only if universal newborn hearing screening is not possible.

Objectives: The objectives of this study are **(1)** to evaluate whether the high-risk indicator recommended by JCIH, 2007, can indicate the presence of hearing loss in children in India, **(2)** to find out the additional risk indicators apart from those prescribed by JCIH, which may also lead to hearing loss, **(3)** to calculate the percentage of normal hearing children who exhibited some of the risk indicators, **(4)** to calculate the percentage of hearing impaired children who did not exhibited any risk indicators, **(5)** to evaluate the efforts made by the hospitals in the area of early identification for hearing impairment.

Methods: Two hundred parents having children with hearing impairment and 60 parents having normal hearing children were taken as participants. The hearing loss of the child is within the range from mild to profound degree (prelingually hearing impaired) & it may be either acquired or congenital and within the age of 7 yrs. the hearing status of both the hearing impaired and normal hearing children was confirmed by audiologists. Detail case history including some demographic data, a detail medical history of mother before conception, during the pregnancy period, & during delivery, and also the medical history of the child's perinatal, natal and postnatal conditions. Parents were asked about the JCIH (2000) and non JCIH indicators. Records of medical histories were kept for each patient.

Results: Statistical analysis was done by using SPSS-11 software. The participants were divided into two groups- clinical group (the hearing impaired subjects) and the control group (the normal hearing subjects). The analysis revealed that the JCIH and non JCIH indicators can differentiate between the clinical and control group and can predict the presence of hearing loss in children in India. The first objective was to evaluate whether the high-risk indicator recommended by JCIH, 2007, can indicate the presence of hearing loss in children in India and in result it was found that 13.3% of the normal hearing children exhibit some of the JCIH indicators but 32% of hearing impaired children don't. It reveals JCIH indicators as a better predictor of hearing loss in India. The additional risk indicators like low birth weight, delayed birth cry, pneumonia, neonatal seizures, history of abortion or miscarriage before the issue, maternal trauma, prematurity, maternal stress, malnutrition, RH incompatibility can also lead to hearing loss.16.7% of them exhibit some of non- JCIH indicators, whereas, 46.5% of hearing impaired children don't.

Discussion: It can be concluded that there is an urgent need to start the newborn haring screening program in India. The JCIH and non-JCIH indicators can be used as a screening tool. It also reiterates the importance of prenatal care for prevention of congenital hearing loss. Awareness regarding the first trimester of gestation, proper vaccination of mother should be built up for preventive purpose. Awareness of common public should also be built up by organizing various public awareness camps, electronic media, newspaper etc awareness should also be brought up in medical professionals like E.N.T doctors, pediatricians, physicians etc.

SPEECH RECOGNITION PERFORMANCE OF CHILDREN: A BATTERY FOR TELUGU

Rathna. K. S. B., Panchanan. M.

Introduction: Speech audiometry is an essential component of the audiological test battery, as it provides information concerning one's sensitivity to speech stimuli and the understanding of speech at supra-threshold levels. With regard to the history of materials for speech audiometry, different kinds of materials have been developed by several investigators in English and non-English languages. Several such attempts have also been made to develop and standardize materials for speech audiometry in Indian languages.

Aim of the study: With reference to Telugu (South Indian Dravidian Language) limited number of materials is available for measuring open-set speech recognition performance in children. The study intends to develop speech material in Telugu for assessing speech recognition performance of children.

Method: The words were collected from different sources and were subjected to familiarity assessment. The words rated as most-familiar and familiar were subjected to subjective and objective validation. Two lists of bisyllabic words in Telugu were developed. The phonemes on which the test items were constructed were based on the frequency of occurrence of phonemes in Telugu (Rao & Thenarasu, 2007). Equivalence analysis of difficulty between the word lists was evaluated for three groups (Group I: children with an age of 7 years, Group II: children with an age of 8 years and Group III: children with an age of 9 years) of subjects with normal hearing. Subsequently, performance intensity (PI) function for each list was also measured for the same groups.

Results & Discussion: The results revealed that there was no statistically significant difference ($p<0.05$) between scores obtained by three groups for each list and between two lists for each group. The two word lists developed were found to be equally difficult for all the groups. The performance-intensity (PI) function curve showed semi linear function, and the linear portion of the curve indicated an average linear slope showing approximately 4% increase in word recognition score per dB for both the lists. The mean word recognition scores increased as the presentation levels increased and the subjects reached maximum score at SAT+35 dB SL for both the lists. This remained unchanged thereafter at higher intensity i.e. at SAT+45 dB SL. However, the normal range of recognition scores (i.e. 90%-100%) was obtained at 25 dB SL with reference to SAT for both the lists. The two word lists thus developed were found to have sufficient reliability and validity in assessing speech recognition performance of children in Telugu.

Conclusion: The developed speech material can be further administered on hearing impaired population and other clinical population to check the applicability. This test material can be used in selecting appropriate rehabilitative options and also to measure the efficacy of different rehabilitative devices. This test material can be used to further develop speech in noise (SPIN) test, time compressed speech test, filtered speech test and other special test for differential diagnosis of auditory disorders.

HEARING SCREENING FOR TYPICALLY DEVELOPING SCHOOL GOING CHILDREN IN RURAL AREAS (KADAPA)

Prasen. K. K. R., Murali. P.

Objectives: The purpose of hearing screening is to identify students with possible hearing losses which may affect their intellectual, emotional, social, speech, and/or language development. The key to successful remediation is early identification and intervention, which may prevent educational problems and permanent hearing losses. Even mild hearing losses may be educationally and medically significant. Hearing level in some children may be abnormal due to conductive, sensorineural causes. In Kadapa, the hearing screening test is not conducted for newborns at public hospitals.

Methods:

Subjects: 181 children from Bharathiya Vidya Mandir High School, kadapa.

Age Range: 7 to 15 years.

Procedure: We evaluated the hearing level at the sweekaar degree college of audiology speech and language pathology - kadapa to determine the type, degree and possible causes of hearing loss in these children. Every child was underwent Otoscopic examination prior to the hearing test. Pure tone audiometry followed by immittance audiometry performed.

Results: Out of 181 children 42 had compacted earwax, 21 children with secretory otitis media (SOM) and hearing sensitivity of children with ear wax were tested before and after wax removal, 19 children had normal hearing and 23 had mild conductive hearing loss in the 250Hz to 500Hz frequency range, after removal of the wax all the children had normal hearing. In children with secretory otitis media (SOM), one had normal hearing, 11 had mild conductive hearing loss across 250Hz to 500Hz and 9 had moderate conductive hearing loss across 250Hz to 2000Hz frequency range. Out of 62 four children had moderate sensorineural hearing loss across 500Hz.

Conclusion: Hearing loss is a silent handicap, it's only evident when the hearing loss substantially high. Especially children less than the age group of 10-15years, does not realize their hearing loss and the symptoms of mild and moderate degree hearing loss is less evident. As we know the hearing loss affects scholastic performance in children and the awareness is very poor in rural places it's high time that we create a hearing map of their schools to facilitate the hearing skills.

DEVELOPMENT OF LOW REDUNDANCY LOW PASS FILTERED SPEECH TEST IN ODIA

Manoranjan. M., Satya. N.M.

Need for the study:

The available western test materials are of little significance in India, because of the multiplicity uses of languages. Assessing APD required administration of skill specific material in Indian languages. In spite of the fact Odisha is a state with 36,804,660 populations speaking the native language Odia; there is availability of no such test material. So there is a need for developing test for assessing CAP skills.

Objective: 1. To develop low pass filtered test in Odia language, **2.** To investigate the effect of low pass filtered material on speech perception, **3.** To analyse ear differences in perception, if any.

Methodology:

The recorded monosyllabic words were used as a low pass filtered stimuli at 1500 cut off frequency. The subjects taken for this study were 30 normal adults in the range of 18-30 Yrs. All subjects are native Odia speaker. None of the subjects had history of any neurological involvement and any language problem, were initially tested to ensure normal auditory functioning prior to administering the low pass filtered speech test.

Results:

The results revealed that there was a significant difference in low pass filtered speech perception score at 0.01 levels and obtained a range of normative score for both the ear.

Conclusion:

The findings of the present study on the Indian population are consistent with the finding obtained on the western population and similar to the non-native Odia speakers. The present study revealed that Low Pass Filtered Speech Test can be administered in any ear among the adults to screen out APD.

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