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Auditory Evoked Potential with Speech and Non-Speech Stimulus

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Abstract:
The current study was conducted to investigate and compare click stimulus and speech stimulus auditory evoked potentials. Auditory brainstem responses (ABRs), MLR, LLR were obtained on 42 normal hearing subjects at 70dBnHL level. Two stimuli, a standard acoustic click and the burst portion of the syllable |ba| were used to evoke the AEPs. The results of the present study indicate that AEPs can be obtained reliably with both click and speech stimuli. However, speech evoked AEPs exhibit stronger amplitude as compare to clicks for LLR test. This research results offer an opportunity to better understand speech processing from brain stem to auditory cortex level in normal and disordered population. Study finding suggests that speech evoked AEPs might be more useful for differential diagnosis of population with various auditory processing disorders.

Keywords: *LLR, MLR, ABR, click, Auditory evoked potential, normal hearing*

1. Introduction

Auditory evoked potential plays significant role in hearing assessment as they are reliably recorded from different site such as brain stem , auditory cortex etc. ABR widely used in audiology and neurotology as an objective tool for assessing hearing sensitivity and auditory nerve function [Hall(2006); Hood(1998), Jacobson(1985); McPherson et al (1996)]. Auditory brainstem response (ABR) which is early evoked potential has latency of 10 ms with 1 uV amplitude. The ABR represents the initial processing and transmission of acoustical signals through the auditory nerve and brainstem. [Starr (1988); Hall (2006); Hood (1998); Jacobson (1985); McPherson et al (1996); Picton et al (2000) ; Kraus et al (2005)] with distinct peak which are denoted in roman numerical I – V. Short acoustic signals, such as clicks, tone bursts and tone pips have been mainly used in clinical practice to elicit the ABR [Moller (1994)]. The ABR response, a measure of neural integrity, has been shown to be extraordinarily useful as a screening tool for hearing loss and detecting other auditory system abnormalities, such as acoustic neuronal. [Hall (2006); Hood (1998); Jacobson (1985); Kraus et al (2005)]

The Middle Latency Auditory Evoked Potential (MLAEP) is series of wave's form which observed in a 10 to 80 millisecond interval following an auditory stimulus [Hall (2006); Hood (1998), Jacobson (1985); Liégeois-Chauvel et al (1996)]. The MLAEP site of generation still area under research but it appears to have multiple generators, with a greater participation of thalamic-cortical pathways and a lesser contribution from the inferior colliculus and the reticular formation (midbrain) [Purdy et al (2002); Kraus et al. (1983); Hall (2006); Hood (1998), Jacobson (1985)]. MLAEP indicates functioning of cortical activity involved in primary auditory abilities (recognition, discrimination and figure-background) and non-primary auditory abilities (selective attention, auditory sequence and auditory/visual. integration) [Hall (2006); Hood (1998), Jacobson (1985); Kraus et al. (2005); Moller (1994). MALP peaks are denoted as Po, Na, Pa, Nb. various research studies reported that Na and Pa component higher amplitude than other components. Hence they are widely used to identify auditory disorders. Na and Pa component are used for the behavioural auditory threshold estimation in children and adults [Davies (2002) Hall (2006); Hood (1998), Jacobson (1985)]. Further, in young children it can provide information about integrity of central auditory nervous system.

LLR (P_1, N_1, P_2, N_2, P_3):

The late evoked potentials are complex signals of the neural processing of the acoustic signal in the auditory cortex, typically elicited in response to clicks and speech [Hall (2006); Hood (1998), Jacobson (1985); Edgemont (1999)]. Late auditory evoked waveforms are the cortical responses occur within 50 - 300ms after the acoustic stimulation to the ears. The peak potentials in the wave forms are denoted as N_1, P_2, N_2 and P_3 [Hall (2006); Hood (1998); Jacobson (1985); Eggermont (1999) McPherson (1996)]. These peaks

represents different site of generations in the auditory cortex mainly from structures of the thalamocortical and cortico-cortical auditory pathways, primary auditory cortex and associated cortical areas [Picton et al (2000); Kraus et al. (1993).; Näätänen(1994); Sharma et al(2009); Picton et al (2002); Vaughan et al(1970); Hall(2006); Hood(1998),Jacobson(1985)]. They also reflect the neural activity even of the dendrites involved in the skills of attention, discrimination, memory, integration and decision making. The morphological change in the wave form indicates that response is being presented in the auditory cortex (Picton 2006). The P_3 or P300 is regarded as a cognitive potential and considered as most effective test procedure to evaluate the auditory cortex functioning. In recent years, the use of different stimulus such as vowel or consonant in measurement of long latency auditory evoked potentials (LLAEP) has got more attention [Kraus et al. (2005).; Näätänen(1994); Sharma et al (2009); Picton et al (2002); Hall(2006);Hood(1998),Jacobson(1985)]. There are various researches which indicate that it is possible to capture the LLAEP reliably, even in young children [Purdy et al (2002); Sharma et al (2009)]. Thus, the family of AEPS offers reliable testing of auditory pathway objectively and provides invaluable information about auditory functioning across the auditory pathway i.e. brain stem, thalamus and cortical area [Kraus et al. (1993); Kraus et al. (2005); Sharma et al (2009); Picton et al (2002); Hall (2006)] . They provide greater flexibility and strength to identify persons with different auditory deficits. In spite its potential use and ease in measurement and interpretation for clinical purposes, the use of AEPS are very limited especially in country like ours because of lack of appropriate database and undue fear of complexity in audiology and speech professionals in recording and interpretation of AEPs waveforms [Kraus et al. (2005); Näätänen (1994); Sharma et al (2009); Hall (2006)]

Hence this study attempts to compare the AEPs recording by using click and speech stimulus to establish norms to provide data based so that AEPS can be used as a routine clinical tool for evaluation and rehabilitations.

2. Methods

2.1. Subjects

42 audio logically normal children in age range of 8 to 14 years of both the gender with mean age of 11.8 years were selected. They had normal hearing of $\leq$ 25dBHL on pure tone across audiometric octave band frequencies. All had normal tympanogarm with presence of reflexes at normal sensation levels. All were screened with TEOAE and AABR for any underlying auditory synchrony/ neuropathy.

2.2.Instrumentation

The AC 40 dual channel clinical audiometer (Version 2) was used for pure tone testing and speech audiometry. The GSI Tympstar middle ear analyzer was used for tympanometry and acoustic reflex measurement and recording. GSI Audio Screener was used to screen with TEOAE and AABR. The study was conducted on IHS Smart EP version 3.56. It was ensured that all the equipment were in calibrated condition. (ANSI S 3.6- 1978)

2.3.Materials

Standard click and speech stimulus /ba/ provided by the manufacturer were used to record the AEPs.

2.4.Test Procedure

On the day of tests, each subject was evaluated using the tools noted above, and otoscopy was performed on all subjects to ensure that no visible external or middle ear abnormalities were present on the day of the test. Pure tone thresholds were acquired from 250 to 8000 Hz via air conduction, and when clinically appropriate, bone conduction thresholds were also acquired from 250 to 4000 Hz. As indicated above, tympanometry and acoustic reflexes were recorded to rule out middle ear pathology. TEOAE and AABR were also conducted to rule out for any underlying auditory synchrony/ neuropathy. All the testing was performed in recommended test environment and with standardised test protocol.

2.5.ABR recording

Subjects were seated in a reclining chair in an electrically shielded and acoustically treated room. Silver chloride electrodes (AgCl) were placed at the recording sites, after cleaning those sites with an abrasive gel. Electroencephalography (EEG) paste and surgical adhesive tape was used to hold the electrodes firmly in place. In essence, standard and well accepted ABR protocols were used throughout all ABR acquisitions.

All stimuli were presented through headphones and 2000 sweeps were obtained at 70 dB NHL. Stimuli were presented at a repetition rate of 21.1 per second for all recordings. A filter setting of 10 Hz - 3000 Hz was used and responses were amplified 100 K times. The analysis window was set to post stimulus epoch.

2.6.ABR Analysis

Recorded ABR waveforms for click were analyzed with respect to latency and peak-to-peak amplitude of wave V.

3. Middle Latency Evoked Potential

For the MLAEP measurements, the electrodes were inserted for recording of auditory evoked potentials occurring on channel A and the recording of eye movements and blinking on the B channel [15].

On channel A, the active electrode was placed at Cz connected to the input (+) of the pre-amplifier, and the reference electrode placed on the mastoid of the stimulated ear and connected to the input (-). The ground electrode was placed on Fpz connected to the ground position. [Kraus et al (1993); Sharma et al (2009)]

On channel B, the active electrode was placed on the supraorbital position contralateral to the ear stimulated connected to the input (+) of the pre-amplifier and the reference electrode on the infraorbital position on the same side connected to the (-) input. With this arrangement of electrodes, we sought to establish the amplitude of the eye movement and previous blink and research potentials in order to delimit the level of rejection that was used in each test. With this procedure, the interference of the eye movement artefacts were minimized, since this rejection limit was adopted for channel A so that, consequently, eye movements were not captured by it, thus not interfering in the MLAEP recordings. . [Kraus et al. (1993); Sharma et al(2009); Picton et al (2002); Vaughan et al(1970); Woods et al. (1987)]

4. Late Latency Evoked Potential

Similar electrode placements were employed to prevent contamination of responses from muscular artefacts i.e. The electrodes were inserted for recording of auditory evoked potentials occurring on channel A and the recording of eye movements and blinking on the B channel unlike MLAEP recordings. [Hall (2006); Hood (1998); Jacobson (1985)]

Following protocol were used for ABR, MLR, LLR [Hall (2006); Hood (1998)]

Stimulus	**ABR**	**MLR Click / Ba**	**LLR**
Rate	11.1	7.1	1.1
Polarity	Alternate	Alternate	Alternate
Transducer	Insert ear phone	Insert earphone	Insert earphone
Intensity	70 dB nHL	70 dB nHL	70dB nHL
Filters	10-3000Hz	10-1500Hz	1-30Hz
Amplification	100Hz	100K	100K
Runs	2	2	2
Analysis window	Overall 15ms	Overall 100ms	Overall 500ms
Sweeps	2000	1000	250

Table 1

5. Results & Discussion

The present study aimed at studying the comparison of speech evoked and clicks auditory evoked potentials. Speech and click stimulus are independent variable and different potential as dependent variables.

Table … showing click evoked auditory potential (ABR, MALR, LLR)

Descriptive Statistics										
	N	**Range**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**	**Skewness**		**Kurtosis**	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
p1	42	32.00	55.00	87.00	71.0714	8.03769	-.338	.365	-.318	.717
n1	42	19.00	110.00	129.00	1.2162E2	5.00221	-.469	.365	-.385	.717
p2	42	30.00	149.00	179.00	1.6643E2	6.71417	-.179	.365	-.221	.717
Amp p1	42	2.57	2.98	5.55	4.1938	.71700	.080	.365	-.659	.717
Amp n1	42	4.30	3.40	7.70	5.0936	.83125	.631	.365	1.665	.717
Amp p2	42	3.20	2.20	5.40	3.4162	.59874	.826	.365	1.893	.717
Pa	42	9.00	15.00	24.00	19.8095	2.70715	.289	.365	-.912	.717
Na	42	12.00	28.00	40.00	33.5238	3.29995	.178	.365	-.738	.717
Amp pa	42	1.50	.40	1.90	1.0967	.29708	.340	.365	.733	.717
Amp na	42	1.88	1.10	2.98	1.9740	.39814	.474	.365	1.079	.717
Peakv	42	.70	5.40	6.10	5.8595	.16683	-.472	.365	.095	.717
Ampeakv	42	1.40	.20	1.60	.8288	.29333	.218	.365	1.276	.717

Table 2

Descriptive Statistics										
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
S P1Amp	42	3.60	2.90	6.50	5.1660	.77424	-.310	.365	.198	.717
S N1Amp	42	3.80	3.50	7.30	5.4410	.84329	-.056	.365	-.031	.717
S P2Amp	42	4.57	2.55	7.12	4.0305	.86493	1.112	.365	2.703	.717
S NA	42	18.00	16.00	34.00	23.5238	5.12401	.559	.365	-.826	.717
S PA	42	18.00	28.00	46.00	36.9524	5.40529	-.002	.365	-1.189	.717
S Amp NA	42	1.60	.60	2.20	1.4943	.42883	.103	.365	-.998	.717
S Amp PA	42	2.10	1.10	3.20	2.3636	.54168	-.214	.365	-.296	.717
S Peak V	42	1.50	5.40	6.90	6.0257	.28419	.526	.365	1.018	.717
S peak V Amp	42	1.20	.40	1.60	.9967	.28466	.060	.365	-.285	.717
S P2	42	40.00	149.00	189.00	1.6952E2	8.39930	-.001	.365	.056	.717
S P1	42	47.00	55.00	102.00	76.7381	9.15199	.236	.365	.441	.717
S N1	42	33.00	110.00	143.00	1.2748E2	8.18457	.195	.365	-.461	.717

Table 3: Showing speech evoked auditory potential

To check that all obtained data are in normal distribution Kolmogorov – Smirnov test of normality used.

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
p1	.117	42	.162	.969	42	.304
n1	.094	42	.200*	.951	42	.068
p2	.104	42	.200*	.970	42	.331
ap1	.115	42	.190	.951	42	.073
an1	.114	42	.194	.949	42	.058
ap2	.090	42	.200*	.960	42	.150
Pa	.213	42	.000	.905	42	.002
Na	.129	42	.077	.958	42	.126
apa	.127	42	.086	.962	42	.172
ana	.138	42	.044	.942	42	.34
peakv	.215	42	.71	.920	42	.16
ampeakv	.151	42	.17	.938	42	.24
sP1	.088	42	.200*	.982	42	.749
sN1	.105	42	.200*	.966	42	.244
sP2	.092	42	.200*	.984	42	.806
sP1Am	.140	42	.77	.941	42	.032
sN1Am	.103	42	.207*	.977	42	.532
sP2Am	.125	42	.100	.934	42	.018
SSNA	.189	42	.101	.921	42	.007
SSPA	.134	42	.055	.945	42	.043
SSamlNA	.182	42	.052	.925	42	.09
SSamlPA	.115	42	.183	.949	42	.059
sPeakv	.147	42	.023	.962	42	.181
sPeakvaml	.079	42	.200*	.980	42	.644

Table 4

Descriptive statistics presented data in Table. Indicate that mean for speech evoked and click evoked different potentials are within normal distribution. The difference of means between the two group (speech and click evoked potential) is quite big in the context of their standard deviation. Positive skewness in the distribution for both stimuli. The Kolmogorov – Smirnov Z value are not statically significant ($p>0.05$). Thus the small skewness in the two distributions is not major concern and the two distributions met the assumption of normality therefore further analysis done by using parametric test.

Table-1 showing means values of Click and speech evoked ABR

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
peakv	Click	42	5.8595	.16683	.02574
	speech stimulus	42	6.0257	.28419	.04385
ampeakv	Click	42	.8288	.29333	.04526
	speech stimulus	42	.9967	.28466	.04392

Table 5

	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
peakv	-3.268	82	.002	-.16619	.05085
	-3.268	66.259	.002	-.16619	.05085
Ampeak v	-2.661	82	.009	-.16786	.06307
	-2.661	81.926	.009	-.16786	.06307

Table 6

Table.1 indicating mean values of click and speech evoked ABR wave form latency and amplitude. Mainly peak V latency and amplitude means were compared with speech and click evoked potentials. Independent t tails test was applied to check statistically significant difference. The statistical treatment has shown that the means of peak V only latency have statically significant difference ($p< 0.005$). [Kraus et al. (1993); Näätänen (1994); Reddy et al (2004); Sharma et al (2009)].

5.1. Wave latency: ABR

Both stimuli (clicks and speech burst) evoked ABR waveforms. Click evoked ABR showed normal latencies, speech burst evoked ABR exhibited statistically significantly (independent sample 't'-test) delayed latencies for wave V. Similar research finding and value were reported by Reddy et al 2004.

5.2. MLR

MLR waveform results indicated consistence presence of peak Na and Pa for speech and click stimulus. The means of both the peaks and their latencies and amplitudes were compared by applying two independent sample't' tailed test for statistical significance. The statistical analysis indicated that there exist statistically significant difference between the click and speech evoked MLR amplitude and latencies. The latency of Na with clicks and speech differed significantly with p value 1.372 whereas Pa latency differed significantly with value of 3.488 at p value < 0.05.

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
pa	Click	42	19.8095	2.70715	.41772
	speech stimulus	42	23.5238	5.12401	.79065
na	Click	42	33.5238	3.29995	.50919
	speech stimulus	42	36.9524	5.40529	.83405
apa	Click	42	1.0967	.29708	.04584
	speech stimulus	42	1.4943	.42883	.06617
ap2	Click	42	3.4162	.59874	.09239
	speech stimulus	42	4.0305	.86493	.13346

Table 7

t		df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
pa	-4.154	82	.000	-3.71429	.89422
	-4.154	62.234	.000	-3.71429	.89422
na	-3.509	82	.001	-3.42857	.97720
	-3.509	67.835	.001	-3.42857	.97720
apa	-4.940	82	.000	-.39762	.08050
	-4.940	72.986	.000	-.39762	.08050
ap2	-3.784	82	.000	-.61429	.16232
	-3.784	72.956	.000	-.61429	.16232

Table 8

The statistical analysis of Na and Pa amplitude and latency also differed significantly between clicks and speech stimulus with value at p-value 0.05. [Kraus et al. (2005); Moller (1994); Näätänen (1994); Reddy et al (2004); Sharma et al (2009)]. Auditory processing with click and speech syllable shown significant difference in terms of onset response of the speech – evoked cortical potential. Evoked potential with speech stimulus shows delayed and less robust synchronized auditory nerve fiber activity. [(Banai et al 2005); Baldeweg et al, 1999; Kraus et al., 1996; Lachmann et al., 2005]. Similar results were also seen with the amplitude of the peaks. The higher peak amplitudes were observed with the speech evoked potentials. [Kraus et al. (1993); Näätänen (1994); Woods et al. (1987); Hall (2006)]. Middle latency responses can be affected by changes in various stimulus parameters, including frequency, levels, duration, rise time and fall time (McPherson and Starr 1993; Mendel 1980; Chen et al., 1997). An inverse relationship were found between latency and frequency but latency was only slightly affected by changes in stimulus level (McFarland et al., 1977). MLAEP may be valuable indices of central auditory processing disorders (Musiek and Baran, 1987; Pasman et al., 1997) various research reported that abnormalities in various components. MLAEP can be recorded with different stimulus which had significant difference in patient with central or temporal lobe lesions comparing with other radiological imaging techniques. Rappaport et al., 1994; Hendler et al., 1990). Similar finding seen in subjects with learning disorders, specific language disable by using different stimulus recording. Children with learning disability shown significant difference with control group in terms of latency prolongation and absent MLAEP component with various stimuli. (Kileny and Berry, 1983; Jerger et al., Kraus et al., 1985).

6. LLR Test Results

LLR waveforms were identified with peaks mainly P1 and N1. Their absolute latency and amplitude were calculated and means were compared for both the stimulus Speech and click. Independent‘t’ tails test were applied to check statically significant differences between them. After statistical treatment it was found that that there was statically significant difference in the means of peak potentials of both the stimulus at *p* value 0.05 levels. However, Latencies in speech evoked potentials are delayed compared to click evoked potential. Similar results were also seen with the amplitude of the peaks. The higher peak amplitudes were observed with the speech evoked potentials. [Kraus et al. (1993); Näätänen (1994); Woods et al. (1987); Hall (2006)].

It can be observed from the Table – that there exist significant difference between click and speech evoked p1, p2, and N1 and N2 latencies.

Group Statistics						
		group	N	Mean	Std. Deviation	Std. Error Mean
p1		click	42	71.0714	8.03769	1.24024
		speech stimulus	42	76.7381	9.15199	1.41218
n1		click	42	1.2162E2	5.00221	.77186
		speech stimulus	42	1.2748E2	8.18457	1.26291
p2		click	42	1.6643E2	6.71417	1.03602
		speech stimulus	42	1.6952E2	8.39930	1.29604
ap1		click	42	4.1938	.71700	.11064
		speech stimulus	42	5.1660	.77424	.11947
an1		click	42	5.0936	.83125	.12827
		speech stimulus	42	5.4410	.84329	.13012
ap2		click	42	3.4162	.59874	.09239
		speech stimulus	42	4.0305	.86493	.13346

Table 9

	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
p1	-3.015	82	.003	-5.66667	1.87949
n1	-3.957	82	.000	-5.85714	1.48010
p2	-1.865	82	.001	-3.09524	1.65923
ap1	-5.970	82	.000	-.97214	.16283
an1	-1.901	82	.001	-.34738	.18271
ap2					
	-3.784	82	.000	-.61429	.16232

Table 10

With regards to obtaining the LLR waveform responses in children, The LLR component of P1, N_1, P2 and N2 were obtainable in 100% of the children for both click and speech. [Näätänen (1994); Purdy et al (2005); Sharma et al (2009)]. All N1 P1 N2 components respond to sleep change in physical energy that has remained constant at least for short time Näätänen and Picton (1987). Thus a stimulus onset from the quite background or continuous tone that occasionally changes its frequency is usually associated with N1 wave (Picton et al 2000). N1 thus seems to reflect auditory cortex mechanism sensitive change (Näätänen and Picton 1987 Alain et al 1997)]. The presence of N1 to stimulus provides physiological correlate of the arrivals at the auditory cortex of sensory information. N1, therefore reflect the presence of audible stimuli up to brain (Kennedy 2006). LAEP can be elicited by complex stimulus such as speech stimuli and may be used to assess cortical discrimination capacity to detect changes within these stimuli (Martin and Boothroyd 1999; Martin et al 2007). These speech stimulus may be presented while the patients is using hearing aids thus providing functional measures of amplification benefit (Gravel et al 1989; Korczak et al 2005 ; Dillon 2005 Purdy et al 2005) and auditory cortex of sensory information. The slow P1 N1 P2 cortical ERP is measure of choice when an electrophysiological estimate of hearing threshold is required for any patient who is likely to be passive and alert. (Hyde 1997; Lightfoot 2005) .However, in present research the P3 component was obtained in 95% with speech stimulus which is higher than the click. Suggesting that speech stimulus equally or is slightly more effective in eliciting the LLR. Thus, speech stimulus can provide greater sensitivity and specificity to identify auditory disorder. These values emphasize the point here that though LLR can be effective electrophysiological tool but it should be used with caution in absence of normative values [Ohlrich et al (1978); Kraus et al. (1993).; Moller (1994); Näätänen(1994); Reddy et al (2004); Sharma et al(2009); Vaughan et al(1970); Woods et al. (1987); Hall (2006)].

7. Discussion & Conclusion

The auditory evoked potentials have been used as an objective method of evaluating individuals with normal hearing as well as individuals with hearing impairment [Hall (2006)]. The current study uses both click and speech stimulus to record AEPs and found that evoked potentials are more consistently obtainable with speech stimulus in majority of children. Speech burst elicited auditory evoked potential may indicate abnormal neurophysiologic representation of speech at the level of the cochlea, eighth nerve and brainstem, thalamus, auditory cortex which routine click evoked potentials may not be able to provide .[Kraus et al . (1993).; Moller (1994); Näätänen(1994); Reddy et al (2004); Sharma et al(2009); Vaughan et al(1970); Woods et al. (1987); Hall (2006)] Moreover, speech evoked potentials have higher amplitudes in all AEPs recordings but slight delayed appearance as compared to clicks. Which seems to be reasonable as speech acoustic stimulus occupies greater time to process and lasts longer. Further, the real representation of speech sound in auditory cortex is ultimate goal in persons with communicative disorders. Thus the study emphasizes the importance of using speech burst in identification of auditory deficits and evaluation of treatment modalities holds great promise. [Kraus et al. (1993); Näätänen (1994); Reddy et al (2004); Sharma et al (2009)]. LLAEPs evaluate the top order of signal processing in the central auditory. Thus, the presence of components, especially the P_1, N1 indicates that the auditory sensation occurred, which may enables us to make an inference relation about the psychoacoustic threshold of the individual. Early identifications of hearing impairment, brings to professionals in the intervention phase in hearing loss, concerns about the indication process and adaptation of electronic devices applied to deafness in the infant population. [Hall (2006)]. There are various changes accorded in intervention strategies in recent years. Therefore it has to justified, that hearing aids selection which mainly relies on the Electro acoustic characteristics of hearing aids and sound pressure generated by hearing aids or electrical changes induced by cochlear implant. There has to be procedure through which audiologist can rely that sound has reached up to the level of auditory cortex. [Ohlrich et al (1978); Sharma et al (2009); Hall (2006)]. The current research advocates that speech evoked potential can play significant role to check the auditory processing of acoustic stimulus through hearing aids and cochlear implant, at different levels of auditory pathways in presence of hearing losses arising from different etiological condition. This may further refine the selection of amplification devices in persons with hearing losses. Thus, the AEPs measurement with speech stimulus may offer better solutions to all the intricacies inflicted by subjective estimations of hearing loss and amplification selection procedure in young children and difficult to test populations. Therefore, we suggest that subject with poor speech perception /processing disorder instead of using clicks in audio logical assessment, speech stimulus should be used in clinical practice, [Kraus et al. (1993); Näätänen(1994); Reddy et. al. (2004); Sharma et. al.(2009)].

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