Abstract

Background: With age as an important factor associated with acquired hearing loss in the adult population, difficulty in speech discrimination is reported under various conditions such as in noisy or in quiet. The aspect primarily contributing to this difficulty is reduction in temporal processing speed. Speech sounds consists of very highly time varying acoustic cues. One of the objective method of assessing the highly time varying signal at the brainstem level is using Speech Evoked Auditory Brainstem Response (SEABR), which can be used to understand the age related timing changes in Younger Aged (YA) to Middle Age (MA) and Older Age(OA) population.

Hypothesis: Elderly listeners would demonstrate impairment in the neural encoding at brain stem region that would be evident from SEABR measures.

Aim and Objectives: To compare the brain stem timing changes in YA,MA and OA using the electrophysiological measure, SEABR. Further, the study aimed at establishing its clinical utility by measuring SEABR in the first time hearing aid users.

Method: the study adopted an observational study design and conducted from 2011 to 2015 over a period of 4 years. A total of 171 participants were recruited for the three normal hearing groups, namely YA, MA and OA. Additionally 29 participants with first time hearing aid users were recruited to assess the clinical utility of SEABR. Consonant vowel stimuli /da/ was used to elicit the SEABR responses in all the groups. The study was approved by the institutional research and ethics committee.

Results: The results of the current study were encouraging in such a way that the trajectory of SEABR changes was captured across the age groups. There were a statistically significant differences obtained for the OA groups with that of YA and OA for SEABR. Individual peak measures allowed to peek into the detailed description of the SEABR measures. Also the first time hearing aid users group showed gross information of the utility of SEABR measures from hearing aids.

Conclusion: the current study provides a window in understanding the complex neural encoding of speech sounds in humans and clinically, useful information on the process of hearing aid section and fitting. It also gives insight to the hearing aid manufactures considering up gradation of Digital Signal Processing strategies for the benefit of the hearing impaired. SEABR, hence provides a wealth of information on how the highly time varying signals that are encoded in the brain stem and help in unravelling the complex temporal processing mechanism in humans and providing insight into the timing measures in clinical practice assessment and rehabilitation.

Future directions: The study opens up large array of research in SEABR and its clinical utility in hearing aid users and cochlear implantees.