

Karna S L

Ganesh Man Singh Memorial
Academy of ENT-Head Neck Studies
Institute of Medicine(IOM)
Maharajgunj, Kathmandu, Nepal

Correspondence to:

Sureshwar L Karna
Ganesh Man Singh Memorial
Academy of ENT-Head & Neck
Studies
Institute of Medicine(IOM)
Maharajgunj, Kathmandu, Nepal
E-mail:sureshwarlal21@hotmail.com

MATERIAL FOR SPEECH AUDIOMETRY FOR NEPALESE POPULATION

Objective:

To develop standardize Spondee list in Nepali Language to determine Speech Reception Threshold (SRT) for adult population and to find out the relationship between PTA & SRT.

Material & Methods :

This prospective study was conducted by selection of bisyllabic words, familiarity check and construction of list of most familiar bisyllabic words and standardizing the spondees with 30 adult Nepali speaker subjects, during July 2010 to February 2011 at Ganeshman Singh Memorial academy of ENT-Head Neck Study, IOM, Kathmandu, Nepal

Results & Conclusion:

The Nepali Spondee list is reliable and standardized and it can be clinically used to track the SRT in Nepalese population speaking adult population.

Keywords : Spondee, Pure-tone audiometry, Speech audiometry, Speech Reception threshold,

INTRODUCTION :

Pure-tones are not common in everyday life situation. The pure tone audiometry (PTA) provides a quantitative evaluation of hearing for artificial sounds and offers limited information about the subject's ability to perceive speech. The information received from pure-tone audiogram can predict only gross information regarding the degree of problem in speech communication. Since difficulties in hearing and understanding speech are the greatest complaint from hearing impaired, it is logical that test of hearing function should be performed with speech stimuli¹. Speech audiometry is a procedure by which we measure the ability of the auditory system to analyze, integrate, process and interpret the complex sounds of human voice. Speech audiometry has different parameters. One of the parameter is detection of Speech Reception Threshold (SRT) and is expressed in dB HL. The co-relation between PTA & SRT is a valuable in diagnosis. Lack of expected relationship may suggest functional (non-organic) disorder or other invalidating patient behaviors². SRT alone has limited diagnostic value, but when combined with other tests, it gives many clinically useful information such as basic communicative competence for aural language input, basis for test to find out Speech Identification Score (SIS), site of lesion, central auditory disorders, Most Comfortable and Uncomfortable Loudness Level(MCL & UCL) and Dynamic Range (DR/range of comfortable loudness) required for evaluation and fitting of amplification devices, detecting the Pseudo-hypoacusis. Many materials can be used as test stimuli in different parameters of speech audiometry. For SRT, Spondees (Bi-syllabic equally stresses meaningful word) in mother tongue of patient is required. Selection of material should be done considering; familiarity of the word, linguistic characteristics of the language, average difficulty level of the words.

MATERIAL AND METHODS:

This prospective study was conducted from July 2010 to February 2011 at Ganeshman Singh Memorial academy of ENT-Head Neck Study, IOM, Kathmandu, Nepal. There were two aspects of this study- Preparation & familiarization of Spondee list and Standardization, Check for validity and test-retest reliability. 168 bisyllabic, equally stressed, meaningful common words of daily conversation in Nepali language were selected. Three Nepali mother tongue speakers were selected as judge for the purpose of meaningful, bisyllabic, equally stressed and familiarity check. The sheets containing word list with instruction for scoring were given to judges and they were requested to rate the familiarity by using three point scale as given in proforma sheet. The familiarity rating scale was based on occurrence and use

in daily conversational language. F1: frequently occurring (most familiar), F2: fairly occurring (familiar) and F3: rarely occurring (unfamiliar). Judges were requested to judge the list independently. From most familiar rated words 30 words were selected randomly. The list was administered in a sound treated room using 2 channel well calibrated diagnostic audiometer to otologically fit and with normal hearing, 30 (13 Male & 17 Female) subjects of age range 18 to 45 years old, fluent in reading writing and speaking nepali. The minimum intensity level at which subject correctly repeated more than 50% of the spondee words presented was taken as SRT level. None of the words was repeatedly presented at any intensity level. After detection of SRT level for both ears, in order to find out the minimum intensity level above SRT at which most of the subjects repeated 100% or most of the spondee words presented, the full list of spondee words were presented at 5dBSL, 10 dBSL, 15 dBSL and 20

Tab:1. Mean and Standard deviation of statistical facts of both ears

		Mean	Standard deviation	Minimum	Maximum
Right Ear	PTA	18.75	3.58	10.00	25.00
	SRT	25.67	5.21	10.00	35.00
	SRT - PTA	6.92	4.13	-5.00	15.00
Left Ear	PTA	19.09	3.85	8.30	25.00
	SRT	24.67	6.29	10.00	35.00
	SRT - PTA	5.58	5.71	-5.00	15.00

Tab:2. Combined Mean and Standard deviation of statistical facts

	Mean	Standard deviation	Minimum	Maximum
PTA	18.91	3.69	8.30	25.00
SRT	25.16	5.74	10.00	35.00
SRT - PTA	6.24	4.98	-5.00	15.00

Tab:3. Combined Mean and Standard deviation Score of Test I and Test II

	Test I		Test II	
	Mean	Standard Deviation	Mean	Standard Deviation
SRT	26.00	4.59	23.00	2.41
PTA	18.98	3.34	15.79	3.70
SRT - PTA	7.02	5.30	7.71	3.12

Tab.4. Percentage of correct response obtained from List I and List II

	List I		List II	
	Mean	Standard Deviation	Mean	Standard Deviation
5 dBSL with respect to SRT	85.22	8.44	83.77	7.31
10 dBSL with respect to SRT	93.11	8.28	96.22	5.19
15 dBSL with respect to SRT	96.89.02	5.51	99.00	2.11
20 dBSL with respect to SRT	99.22	2.61	99.78	1.22

Tab: 5. Spearman's correlation between the data obtained from List I and List II

	'r' value	'p' value
5 dBSL with respect to SRT	.818	.000
10 dBSL with respect to SRT	.900	.000
15 dBSL with respect to SRT	.900	.000
20 dBSL with respect to SRT	.842	.000

dBSL. The spondee words missed by most of the subjects were removed from the final list obtained after the result. The reliability of spondees were checked by test/re-test methods of randomly selected 5 subjects from the original group after a period of two weeks.

RESULTS:

The audiological measures obtained from 30 subjects were statistically analyzed and revealed above as shown in Table 1-5.

DISCUSSION:

Carhart (1970) suggested use of spondees as test stimuli for assessing SRT. The most commonly employed and recommended speech stimuli to detect SRT are Spondiac words³⁻⁴. Table 1 revealed that the mean SRT – PTA difference for right ear was 6.92 and standard deviation was 4.13. Similarly, the mean SRT – PTA difference for left ear was 5.58 and standard deviation was 5.71. Table 2 revealed that the combined mean difference between SRT and PTA was 6.24 which is in agreement with the previous researchers. The obtained SRT – PTA difference value fall under the normative range i.e., + 12 dB⁵. As per research work carried out at Harvard University of USA, the test should differ no more than 2.8 dB upon retest. Table 3 revealed that the difference between mean and standard deviation of Test I and Test II are within clinically accepted limits. Data of Table 4 revealed that percentage of correct response increased with increase in intensity above the threshold. Even at 20 dBSL with respect to SRT, 100% correct response were not obtained. This may be because all the subjects were not the

native speaker of Nepali and the results of non-native speaker might have influenced the results. All the spondee words were repeated correctly by most of the subjects at 20 dBSL with respect to SRT. Hence all the words can be used for clinical purpose to find out the SRT. The data of Table 5 reveals high positive correlation between two list at all the levels tested. The 'r' and 'p' value of both list are highly significant. Hence any list can be used for clinical purpose.

CONCLUSION:

It is not possible to have common speech material for all the languages, and that indicates the need for tests to be developed in different language. Speech audiometry being an important diagnostic tool, it is essential to develop speech material in Nepali language. In fact, the material to find out SRT is not available in any of the language spoken in Nepal. Therefore, it was decided to include both the group of subjects having Nepali as mother tongue and as a second language. Since the Nepali Spondee list is reliable and standardized, it can be clinically used to track the SRT in Nepali speaking adult population. However, further similar study has to be carried out to develop speech material to detect SRT in older children.

REFERENCES :

- Hirsh, I.J., Davis, H., Silverman, SR., Reynolds, E.G., Eldert, E., & Benson, R.W. Development of materials for Speech audiometry. *Journal of Speech and Hearing Disorders*. 1952; 17: 321-337
- Jerger, J., et al. Some relations between normal hearing for pure tones and for speech. *Journal of Speech and Hearing Disorders*, 1959; 2: 126 – 140.
- American Speech, Language and Hearing Association. Guidelines for determining the threshold level for Speech.. ASHA. 1979; 21: 353-356
- American Speech, Language and Hearing Association. Determining Threshold Level for Speech [Guidelines]. 1988. Available from www.asha.org/policy
- Chaiklin, J.B., Font, J. & Dixon, R.F. j. Spondee threshold measured in ascending 5 dB steps. *Journal of Speech & Hearing Research*, 1967; 10: 141-145.