Dichotic Rhyme Test in Malayalam: A Normative Study

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Abstract

The present study was aimed to develop dichotic rhyme test in Malayalam and also to establish normative data for newly developed test on Malayalam speaking individuals. The test consisted of 18 pairs of commonly spoken, rhyming, bi-syllabic words in Malayalam. The words in these pairs started with six plosive consonants (/p/, /t/, /k/, /b/, /d/ and /g/) and the two words in a pair differed only in initial consonant. . These pairs were dichotically presented to the subjects at 60dB HL intensity level. The subjects taken for developing normative values were one-hundred (50 males & 50 females), right handed normal young adults in the age range of 16 to 30 years, whose mother tongue was Malayalam. The responses were scored in terms of single correct scores, double correct scores and ear correct scores. Comparison of single correct scores between ears showed right ear advantage.

***Key words**: Dichotic, CAPD, ear advantage.*

Central Auditory Processing Disorder [(C)APD] refers to difficulties in the processing of auditory information in the central nervous system, as demonstrated by poor performance in one or more of the following skills: sound localization and lateralization, auditory discrimination, auditory pattern recognition, temporal aspects of audition, including temporal integration, temporal discrimination, temporal ordering and temporal masking, auditory performance in competing acoustic signals (including dichotic listening) and auditory performance with degraded acoustic signals.

In dichotic speech tests different speech items are presented to both ears either simultaneously or in an overlapping manner and the subject is asked to repeat everything that is heard (divided attention) or repeat whatever is heard in one specified ear (directed attention). The more similar and closely acoustically aligned are the test items, more difficult is the task. One of the more commonly used tests in this category is the Dichotic digits test (Musiek, 1983).

Dichotic listening tasks utilizing sentences, words, digits and syllables have been useful in predicting cerebral dominance for speech. These tests have also been used to study the relationship between cerebral dominance and learning disabilities (Ayers, 1980; Obrzut. & Boliek, 1980), cognitive development, auditory linguistic deficits, auditory processing disorders and language disorders.

Dichotic rhyme test (DRT) was introduced by Wexler and Halwes (1983) and modified by Musiek, Kurdziel-Schwan, Kibbe, Gollegly, Baran, & Rintelmann, (1989). This test is well aligned and composed of simple common words. The patient, although presented with two words, generally reports only one, with slightly more than 50% of all words recognized being those presented to right ear (Wexler & Halwes, 1983; Musiek et al, 1989). This unique pattern of performance is presumed to be the result of some type of dichotic 'fusion' of the signals, which occur low within the central auditory nervous system. Fusion in the dichotic listening condition takes place when words with similar spectral shape (waveform envelop) are presented to the listener (Repp, 1976). The waveform envelop for words is generally determined by the low frequency energy, which is essentially its fundamental frequency (Repp, 1976, 1977). Therefore if two words presented dichotically have similar spectral envelopes and are temporally aligned, they will fuse and will be heard as one word (Repp, 1977). The words in DRT for the most part are words that are perfectly or partially fused. Due to the fusion this test is also called as Fused dichotic words test (FDWT).

The rationale behind Dichotic Rhyme Test has come from series of experiments carried out by Repp (1976). A normative data by Bellis (2003) indicated no significant effect of age or ear on the Dichotic Rhyme test. Normative values (2 standard deviations above and below the mean) were 32% - 60% each ear. The performance on DRT is influenced by both stimulus related and subject related factors are as follows.

Berlin, Lowe-Bell, Cullen, & Thompson, 1973 also reported that scores were higher for voiceless stop /pa, ta, ka/ than for the voiced stops /ba, da, ga/ in pairs of natural syllable. The voiceless stops are said to be 'dominant' than voiced stops.

Porter, Trondle, and Berlin (1976) reported that velar sounds were reported correctly than alveolar sounds, which in turn were more correctly identified than labial sounds. Similar findings were observed by Berlin et al (1973), who reported that velars are more correctly followed by the bilabials and the

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apicals (alveolar sounds) with least correctness. Speaks, Niccum, Carney, & Johnson, 1985 used eight pairs in which velars competed with non-velar sounds (bilabials or alveolars). For six of these pairs velars dominated non-velar sounds. In Indian context Rajagopal (1996) found similar results in their study, where velar sounds were best perceived followed by labial sounds and alveolar sounds.

Hugdahl (2007) stated in his study that the right-ear advantage (REA) is typically observed in verbal dichotic listening, indicating a left hemisphere superiority for speech processing. Twenty healthy participants listened to dichotic presentations of consonant-vowel syllable pairs with different attention instructions. The results showed that the interaural intensity difference significantly affected the ear advantage.

Hugdhal et al., (2007) examined the effect of differences in the right or left ear stimulus intensity on the ear advantage using dichotic CV test. For this purpose, interaural intensity difference were gradually varied in steps of 3 dB from -21 dB in favour of the left ear to +21 dB in favour of the right ear, also including a no difference baseline condition. The results showed a significant right ear advantage for interaural intensity differences from 21 to -3 dB. It was concluded that the right ear advantage in dichotic listening to CV syllables withstands an interaural intensity difference of -9 dB before yielding to a significant left ear advantage. The same can be applicable to DRT.

Berlin et al., (1973a) showed greater right ear advantage as the onset time discrepancy increased. It was found that intelligibility for leading ear increases, as time separation increases, which is called as "lag effect". Between 15 and 30ms of onset time separation the leading ear intelligibility dropped. But intelligibility in both lag and lead ears improved beyond 30msec of time separation.

In dichotic rhyme task there is no onset time variations, as both the competing words are aligned temporally to fuse. Thus lag effects may not significantly influence the performance of DRT.

Musiek (2005) showed that dichotic fusion paradigms are resistant to shifts in ear performance associated with changes in attention. Their study was to assess the performance of normal listeners on a dichotic consonant-vowel and a dichotic rhyme (fusion) test. Results from the study supported the hypothesis that dichotic rhyme tests are resistant to alterations in the laterality of attention and have implications for the development of test paradigms that can be used to segregate attention from pure auditory deficits in the clinical domain.

Similar results were obtained by Asbjornsen and Bryden (1996). Their study examined the effect of biased attention on the fused dichotic words test (FDWT) and the CV syllables dichotic listening test (CVT) with two different instructions: to direct attention to the left ear or to the right ear. Results revealed that highly significant differences on the CVT but only a marginal shift in performance on the FDWT. While the FDWT is not completely unaffected by attention manipulations, it is far less influenced by such effects than the CVT.

Right-ear advantage in dichotic listening is a reflection of the left hemisphere's dominance for speech perception and related functions (Studdeit-Kennedy and Shankweiler, 1970; Kimura, 1961, 1967). A much debated question is whether gender differences exist in the functional organization of the brain for language. A long-held hypothesis posits that language functions are more likely to be highly lateralized in males and to be represented in both cerebral hemispheres in females.

The first report on gender difference using fused dichotic word test was been reported by Wexler and Lipman (1988). They have used fused dichotic word test of 120 trials. Results reveal that males showed higher right ear advantage on the first 60 trials, relative to female subjects. These results suggest that males respond to the novelty of a new task with relative left hemisphere activation while females respond with relative right hemisphere activation.

The electrophysiological supports for these findings have come from experiment by Shaywitz et al (1995). They have used echo-planar functional magnetic resonance imaging (fMRI) using blood oxygen level- dependent (BOLD) method, during orthographic (letter recognition), phonological (rhyme) and semantic (semantic category) tasks. The results reveal that for phonological task (rhyme), men showed lateralized left inferior frontal gyrus, where as women showed more diffuse neural systems that involve both right and left inferior frontal gyrus regions. Similar results were obtained by Ikezawa et al., (2008) using dichotic consonant-vowel test.

But meta-analysis of functional imaging studies by Sommer, Aleman, Bouma, & Kahn, (2004) reveals that there is no significant difference in language lateralization between men and women.

The effect of age on dichotic listening may be different depending on the type of stimuli used. Dichotic listening on children suggest that the more linguistically loaded stimuli presented, the more pronounced the maturational effects are likely to be. Berlin, Hughe, Lowe-Bell & Berlin (1973b) studied the performance of normal hearing children between ages 5 and 13 on a set of dichotic CV test. Their results showed a right-ear advantage (REA) that remained relatively constant throughout the age range. In contrast to these results in Indian context finding by Krishna (2001) reveals that even at the age of 12 the results were not matched with adult score on dichotic CV test.

Cross-sectional dichotic listening study by Pohl, Grubmiiller & Grubmuller, (1984) using thirty pairs of one-syllable words and thirty pairs of four-syllable numbers reveal the developmental course of ear asymmetry. Middle-class children with age range of 4 to 10 were taken as subjects. A significant decrease in REA for both word and number pairs was found. Although right-ear and left-ear performance both increased with age, the developmental gain in left-ear performance was greater than the gain in right-ear performance, thus resulting in a decrease in REA with age.

Contrasting results were found using dichotic sentence identification by Jerger, Chmiel, Allen and Wilson (1994). They have analyzed the clinical records of 356 individuals, 203 males and 153 females, to whom the Dichotic Sentence Identification (DSI) test had been administered as part of routine audiometric assessment. The age range considered for study was 9 to 91 years. Results revealed that larger right-ear advantage, or left-ear deficit, was observed with increasing age. Comparison of male and female data suggested gender difference in the effect of age on the left-ear deficit. Males show a larger effect than females in both modes of test administration.

Porter et al, (1976) studied practice effects on dichotic listening task using dichotic CV material. They investigated long-term effects of practice on performance by testing once a week over a period of 8 weeks. Results revealed that a slight increase in double correct responses (28% - 38%), a slight drop in both single correct responses (65% - 58%) and decreased either correct responses (7% - 4%). However, overall dichotic performance does not become a stable measure (i.e., does not reach an asymptote) until subjects have experienced at least 300 dichotic trials. Similar results were also reported earlier by Ryan and Mc Neil (1974); Johnson and Ryan (1975).

The response of a listener on dichotic listening task includes written down response, or orally repeating the heard stimuli or a visual recognition. As the process involved in these activities varies, there could be some differences in responses. Lutz Jancke (1993) evaluated the difference in results with respect to the three response conditions using dichotic CV test. Testing was administered three times to 56 male right handers and 50 male left handers. During each experimental session the subjects had to perform this dichotic test using a different response condition. On one occasion they were required to verbally report the perceived syllables (speak condition), on another occasion they were asked to write down the syllables they had heard (write condition), and lastly, they were asked to visually recognize the stimuli (visual condition) which were presented onto a monitor screen. Results revealed that there is no significance influence of response mode on right ear advantage.

Morais (1981) The dichotic listening test is supposed to produce lateral differences in performance that would be in relationship with the functional asymmetry of the brain. The hypotheses that inferiority of one ear would be due either to a delay in reaching the processing centers, or to a loss of information as a consequence of a longer pathway, it is claimed that the first is inconsistent with some empirical data and the second is, until now, entirely speculative.

Kimura (1961) theorized that the contralateral pathways are stronger and more numerous than are in ipsilateral pathways. When monotic or non-competing stimuli are introduced, either pathway is capable of transmitting the appropriate neural signal. However, when dichotic (competing) auditory stimuli are presented, the ipsilateral pathways are suppressed by the stronger contralateral pathways. Objective evidence for this hypothesis has come from studies of dichotic listening in subjects with surgical sectioning of the corpus callosum.

Bode, Sininger, Healy, Mathern and Zaidel, (2007) examined two commonly used dichotic listening tests for measuring the degree of hemispheric specialization for language in individuals who had undergone cerebral hemispherectomy: the consonant-vowel (CV) nonsense syllables and the fused words (FW) tests. Results revealed that most syllables or words are reported for the ear contralateral to the remaining hemisphere, while few or none are reported for the ear ipsilateral to the remaining hemisphere. In the presence of competing inputs to the two ears, the stronger contralateral ear-hemisphere connection dominates/suppresses the weaker ipsilateral ear-hemisphere connection.

Patients with a complete section of the corpus callosum have been observed to exhibit strong left-ear suppression when different speech stimuli are presented to both ears simultaneously. Sugishita et al.(1994), conducted a study where in a consonant-vowel syllable dichotic listening test was given to five right-handed patients with partial sections of the corpus callosum. Despite the common assumption that damage to the posterior part of the trunk of the corpus callosum causes strong left-ear suppression, the results indicated that damage to the splenium cause strong left-ear suppression.

Musiek, Kurdziel-Schwan, Kibbe, Gollegly, Baran and Rintelmann, (1989) studied the performance of normal hearing individuals and patient undergone commissurectomy on dichotically presented monosyllabic rhyme words. Data was collected from a group of 115 normal hearing individuals and 6 patients with commissurectomy for intractable seizures (2 weeks postoperatively). Results reveal that spilt-brain patients yielded marked left ear deficit, as seen on other dichotic speech tests and demonstrated a right-ear enhancement, producing a large inter-ear differences. This right-ear enhancement on the dichotic rhyme task (DRT) may suggest a release from central auditory competition in the left hemisphere. The dichotic rhyme task's normative data results and sensitivity to lack of callosal transmission make it worthy of further clinical and basic research.

It is ideal to have speech tests in all languages as the individual perception of speech is influenced by his/her first language or mother tongue (Singh and Black, 1966). Dichotic rhyme test has not been developed in many Indian languages including Malayalam. Hence there is a need to develop Dichotic rhyme test in Malayalam to assess the binaural interaction phenomenon in individuals with Malayalam as their first language. The test could be used as an assessment tool for Central Auditory Processing Disorders (CAPD).

The aim of the present study was to develop the Dichotic rhyme test using commonly spoken words in Malayalam, and also to develop normative data for the developed test on Malayalam speaking adults.

Method

Subjects: A total of 100 (50 male and 50 female) subjects in the age range of 16 to 30 years participated in the study. All subjects were right-handed native speakers of Malayalam language. Subjects had pure tone thresholds within 15 dB HL in octave frequencies from 250Hz to 8kHz for air conduction and from 250Hz to 4kHz for bone conduction. They had speech identification scores of 80% or more and A-type tympanograms in both ears. They had no history or presence of any otological or neurological problems.

Procedure: The study was carried out in two phases.
Phase I (Construction of the test material): 18 pairs (36 members) of Malayalam rhyming words consisting of /p/, /t/, /k/, /b/, /g/ in the initial position and which has a syllable structure of CVCV was taken from a standard Malayalam dictionary and Malayalam newspapers and magazines. Members of each pair differed from each other only in the initial consonant and the members of the pair differed only in one phonetic feature (either voicing or place of articulation).

Familiarity test: These 36 words were given to 10 adult native speakers of Malayalam (5 males and 5 females) to rate on a 5 point scale as - Very unfamiliar (Not heard), Unfamiliar (Heard but not commonly used), Quite familiar (Less commonly used), Familiar (Commonly used), Very familiar (Most commonly used) respectively from 0 to 5. The rating score of two or more was set as the criteria for inclusion of the test material. All of the words had a rating of greater than or equal to 2, and so were considered as familiar and taken for the construction of test material.

An adult native speaker of the language was asked to produce each of these 36 words 3 times in a continuous manner and the words were recorded using "PRAAT" software with a sampling frequency of 22050 Hz and digitization of 16 bits. For the test material, the middle word of the 3 continuous words was considered to get a flat frequency spectrum. These words were analyzed using Adobe Audition 3.0 computer software.

The final portions of the members of each pair were made identical using cross-splicing, (i.e., the initial, distinctive portion of the one member of each pair was cross-spliced onto the final, non-distinctive portion of the other member, making the final portion of the members of each pair identical). E.g., in /para/ - /thara/, the portion of /ara/ in either /para/ or /thara/ was selected and positioned in both the words, thus the portion /ara/ was same in both the words.

After cross splicing, the total duration of rhyming words were made equal by reducing the voicing bars or by reducing the steady state portion of the vowel, of the initial CV portion of the word. Cross splicing was done to reduce the intrinsic variability among the final syllables in a rhyming pair. Using Adobe Audition 3.0 Software, the two members of each Rhyming pair were recorded on stereo tracks with 0 millisecond delay between each member of the pair. The word pairs were 10 seconds apart on stereo tracks.

Stimuli were placed on a stereo track such that one member of the pair was routed to one ear and the other member of the pair was routed to the other ear. These 18 rhyming pairs (randomly) along with initial calibration tones were recorded onto the Compact Disk. These 18 rhyming pairs were randomly chosen again and words in each pair were counter balanced (i.e, in the first 18 pairs if "para" was presented to the right ear and "thara" was presented to the left ear, then in the second 18 pairs the channel designations were reversed). Thus, the list consisted of a total of 36 pairs of rhyming words.

Phase II (Establishing normative data): The testing was carried out in a well lit air-conditioned sound treated double room, using a calibrated Orbiter 922 dual channel diagnostic audiometer. The ambient noise levels were within 35dB SPL (ANSI, 1999). Subjects who passed the subject selection criteria were administered the dichotic rhyme test. The VU meter was adjusted to the 1 kHz calibration tone. The 36 pairs of dichotic stimuli were presented at an intensity level of 60 dB HL. Subjects were instructed to respond on an open set answer sheet. The task involved writing down the rhyming words heard after each presentation. All subjects were encouraged to guess when unsure of the word or words.

Scoring: The subject responses were analyzed and scored in terms of three different scores:
1) Single correct scores: Total number of correct responses for the right ear or the total number of correct responses for the left ear.
2) Double correct scores: Scores obtained when subject correctly responded to both the stimuli presented to the two ears.
3) Ear correct scores: To get total ear correct scores, the double correct score was added to single correct score of respective ear and were used for analysis.

The raw data obtained from the subjects was subjected to statistical analysis. The mean, range and standard deviation were calculated. 'Repeated measure of ANOVA for ears with independent factor as gender' was used to evaluate the main effect and the interaction between gender and ear. Independent and paired t-test was also used to reveal the significant difference between genders on ear correct scores and between ears correct scores with-in gender. SPSS version 17.0 software was used in analysis of the data. Further details on results are discussed under results and discussion chapter.

Results and Discussion

Comparison of ear correct scores with in gender: The mean and standard deviation of the two gender-groups were calculated separately. The mean scores obtained for the right ear were better than that obtained for left ear in both males and females. Repeated measures of ANOVA revealed a significant main effect for the ears [F (1, 98) = 210.7 (p<0.001)] but it did not show the interaction effect for the ear and gender [F (1, 98) = 0.20, (p>0.05)].

The scores for right ear were better than the left ear for both males and females, which was statistically significant. As depicted in Table 1, the mean scores for the right ear was 23.06 in males and 19.98 in females and the mean scores for the left ear was 20.16 n males and 17.02 in males.

Table 1. The mean values, standard deviation, the range and the t-scores along with the level of significance for the ear correct scores (Maximum score = 36)

	Ear	Mean	SD	t	p
Females	Rt	23.0	2.49	10.9	P<0.001
	Lt	19.9	1.43		
Males	Rt	20.1	1.43	9.71	P<0.001
	Lt	17.0	1.39		

Rt- right ear, Lt- left ear

Paired sample "t" test results revealed a significant difference (p<0.01) between the left and the right ear scores for both males and females. The results obtained from the present study are consistent with results from studies conducted on the western population by Musiek et al. (1989), Wexler and Halwes (1983) and Berlin et al. (1973). Musiek, et al. (1989) reported normative values of 30% - 73% for right ear and 27% - 60% for left ear in a group of 115 normal hearing subjects.

Berlin et al. (1973a) reported a right ear advantage (REA) for dichotic speech stimuli. This REA is seen in normals because the left anterior temporal lobe is closer to the left primary speech areas than the right anterior temporal lobe. Therefore, it is postulated that there is less 'transmission loss' to the left posterior- temporal- parietal lobe on the basis of proximities within areas of the brain. Due to this proximity there is more efficient interaction between the shorter pathways (Berlin et al. (1973). A Similar findings have been reported in studies conducted by Studdert-Kennedy and Shankweiler (1967). They reported of right ear superiority in the perception of speech stimuli when normal hearing listeners are stimulated dichotically with speech stimuli.

Kimura (1967) attributed this difference in ear accuracy as a function of stimulus type to bilateral asymmetry in brain function (BAF). The BAF hypothesis suggests that (i) The contralateral auditory neural pathways are dominant over the ipsilateral pathways during the dichotic stimulation. (ii) Performance superiority of a particular ear is a result of that ear being contralateral to the hemisphere involved in the perception of a given type of sound.

In particular, the hypothesis implies that the left cerebral hemisphere is dominant in perception of sounds conveying language information while the right hemisphere is dominant for perception of non-speech sounds such as melodies (Kimura, 1967). Thus, the results of the present study indicated that there existed a significant REA for the dichotic rhyme stimuli.

Comparison of ear correct scores and double correct scores across gender

Comparison of ear correct scores across gender: As it can be seen from table 2, the mean ear correct scores for females were better than males for both left and right ears. For the right ear, the mean score for females were 23.06 and the mean score of males were 20.16. For the left ear, the mean score for females were 19.98 and the mean scores for the males were 17.02. Females had higher scores compared to males for both right and left ears.

Independent t-test was carried out for comparison of gender within each ear. Independent sample't' test revealed a significant difference between males and females for the left ear ($p < 0.05$). Although the mean ear correct scores, for the right ear, for females were higher compared to males independent "t" test did not reveal any significant difference ($p > 0.05$).

Table 2. The mean values, standard deviation and "t" test results for the comparison across genders for the ear correct scores. (Maximum score= 36)

Ear	Gender	Mean	SD	t	p
Right	Female	23.0	2.49	7.1	0.001
	Male	20.1	1.43		
Left	Female	19.9	1.43	10.4	0.003
	Male	17.0	1.39		

Comparison of double correct scores across gender: In table 3, it can be seen that that the mean double correct scores were better for females as compared to males. The mean double correct scores were, 9.46 for females and 8.10 for males, respectively. The mean scores for females were higher than males for double correct scores. Independent "t" test was done to find out the significant difference between the scores for males and females. Independent "t" test revealed a statistically significant ($p < 0.05$) difference between males and females for double correct scores.

Table 3. The mean values, standard deviation, and results of independent "t" scores for the double correct scores

Subjects	Mean	SD	t	p
Female	9.46	2.19	2.90	0.004
Male	8.10	2.48		

Although the dichotic listening procedure has been used as a non-invasive neuropsychological technique for assessing laterality of speech perception, it has tended to underestimate the proportion of the right-handed population that is left-hemisphere lateralized for speech perception (Segalowitz & Bryden, 1983) and individual differences in hemispheric representation of language. These underestimations may be due to dichotic procedures being susceptible to attentional biases, order of report effects, and/or memory effects that obscure functional differences between the cerebral hemispheres.

Kahn et al. (2008) studied sex differences in handedness, asymmetry of the Planum Temporale and functional language lateralization. This study was aimed to provide a complete overview of sex differences in several reflections of language lateralization: handedness, asymmetry of the Planum Temporale (PT) and functional lateralization of language, measured by asymmetric performance on dichotic listening tests (Right Ear Advantage) and asymmetry of language activation as measured with functional imaging techniques. Based on the results they concluded that there is no sex difference in asymmetries of the Planum Temporale, dichotic listening or functional imaging findings during language tasks. The observed sex effect may therefore be caused by publication bias.

Thus, gender difference seen for the left ear in the present study, can be the result of procedural variability or underestimation of this dichotic test to individual differences in hemispheric representation of language. It is difficult to attribute this difference in scores on dichotic task between males and females to sex difference in hemispheric lateralization.

Comparison of ear correct scores with double correct scores

As it can be seen from Table 4, the double correct scores were lower when compared to the ear correct scores in both genders. The mean values were, between 17.02 and 23.06 for the ear correct scores and between 8.1 and 9.46 for the double correct scores, in females and males respectively.

The double correct scores were found to be lower when compared to the ear correct scores. Paired sample 't' test was done to see the difference between single correct scores and double correct scores. The difference in scores between ear correct scores and double correct scores were statistically significant ($p < 0.05$). This is in agreement with the previous reports by Wexler and Halwes (1983) and Musiek et al. (1989) that on a dichotic rhyme task although subjects are presented two words (one word to each ear), the precise alignment of the words, as well as the fact that the final vowel-consonant elements in each pair of words are identical, result in the subjects perceiving only one word the vast majority of the time.

Table 4. The Mean (M) values, standard deviation(SD), and results of paired sample test for the comparison between ear correct scores and double correct scores in males and females

	Score	M	SD	t	p
Female	RECS	23.0	2.49	55.71	<0.001
	DCS	9.4	2.2		
	LECS	19.9	1.43	35.06	<0.001
	DCS	9.4	2.2		
Males	RECS	20.1	1.44	19.63	<0.001
	DCS	8.1	2.5		
	LECS	17.0	1.39	40.72	<0.001
	DCS	8.1	2.5		

Conclusions

The Dichotic rhyme test in Malayalam language developed for the study is revealed to be clinically useful, and the normative scores have been found. The study affirms that there exists a significant right ear advantage for dichotic stimuli. The double correct scores were found to lower when compared to ear correct scores. Mean value of Double correct scores, and Ear correct scores for both right and left ear, were greater in females than compared to males. However the sensitivity of the developed dichotic rhyme test in Central Auditory Processing Disorders needs to be evaluated before incorporating to routine clinical test battery. The clinical utility of the Dichotic rhyme test in learning disability and pure word deafness needsto be explored.

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