Electroglottography in the Hearing Impaired *

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" Deafness, even profound deafness, does not prevent an individual from producing voice. However, the loss of hearing does affect the control of voice production and when people listen to the speech of a deaf person, a typical reaction is that the speaker's voice sounds 'abnormal'" (Monsen *et al*, 1979).

In order to investigate the effect of hearing impairment on vocal function, it is necessary to observe the glottal wave form separately from the resonance effect of the vocal tract. Therefore, in the present study, electroglottography was used to investigate the vocal fold vibrations during phonation, in hearing impaired individuals.

Fifteen male and fifteen female hearing impaired with a mean age of 23.27 years and 20.77 years respectively, served as subjects. Age ranged from 15-40 years in males, and 15-29 years in females. All subjects had a hearing level of not less than 70 dB HL in the better ear, with no significant associated problems. Electrolaryngograph (Kay Elemetrics Corporation) and High Resolution Signal Analyser (B & K Type 2033) were used for measurement of the parameters like Open Quotient (OQ), Speed Quotient (SQ), Speed Index (SI), 'S' Ratio (SR), Jitter (J) and Shimmer (S).

The above parameters were studied in three vowels [a], [i] and [u], keeping pitch and intensity of phonation constant, as far as possible.

After the statistical analysis of the data thus obtained, the following conclusions were drawn :

(1) The mean OQ for the vowels [a], [i] and [u] was 0.55, 0.56 and 0.55 in males and 0.58, 0.57 and 0.56 in females.

(a) There was no significant difference between males and females, both in normal and hearing impaired groups.

(b) There was significant difference between normal and hearing impaired groups for all the three vowels [a], [i] and [u]. The mean value of OQ was lower in hearing impaired than in normal subjects.

(2) The mean of SQ for the vowels [a], [i] and [u] was 1.75, 1.97 and 1.99 in males and 1.87, 2.20 and 2.10 in females.

(a) There was no significant difference in the mean SQ between

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males and females in hearing impaired, but normal male and female subjects differed significantly.

(b) There was no significant difference between the SQ of [a], [i] and [u] in normal and hearing impaired subjects.

(3) The mean SI for the vowels [a], [i] and [u] was 0.22, 0.27 and 0.30 in males, and 0.21, 0.28 and 0.30 in females.

(a) There was no significant difference in the mean SI between males and females in hearing impaired group. But there was difference in normal group between males and females.

(b) There was no significant difference in the mean SI between normal and hearing impaired subjects for the vowels [a], [i] and [u].

(4) The mean SR for the vowels [a], [i] and [u] was 1.04, 1.24 and 1.03 in males and 1.07, 1.09 and 1.05 in females.

(a) There was no significant difference in the mean SR between male and female subjects, in both normal and hearing impaired groups, for the vowels [a], [i] and [u].

(b) There was no significant difference between normal and hearing impaired subjects in SR for the vowels [a], [i] and [u].

(5) The mean values of Jitter for the vowels [a], [i] and [u] was 0.326, 0.111 and 0.199 msec, in males and that in females was 0.092, 0.094 and 0 089 msec.

(a) There was no significant difference in the mean Jitter of the vowels [a], [i] and [u] between males and females , in normal and hearing impaired groups.

(b) For the vowels [a], [i] and [u] there was no significant difference between normal and hearing impaired groups.

(6) The mean shimmer for the vowels [a], [i] and [u] in hearing impaired males was 0.445. 0.815 and 0.955 dB and that in females was 0.541, 0.571 and 0.480 dB respectively.

(a) There was no significant difference in the mean shimmer for the vowels, between males and females, both in normal and hearing impaired groups.

(b) For the vowels [a], [i] and [u] there was no significant difference between normal and hearing impaired groups.

Recommendations

(1) To investigate on a larger sample of different age groups, varying degrees and types of hearing loss and different age of onset.

(2) To include other parameters.

(3) To delineate the developmental changes in the parameters in the hearing impaired.

(4) To observe the effect of modifying the deviant parameters on the improvement of voice quality in the hearing impaired individuals.