Relationship between Vocal Intensity, Pitch and Nasality in Cleft Palate Speakers *

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This study was conducted to find out the effect of pitch variation and the effect of intensity variation on the degree of nasality perceived by the listeners.

The different pitch levels taken into consideration were habitual pitch, 100 Hz above habitual pitch and 30 Hz below habitual pitch. The different intensity levels were 65 dB, 70 dB and 80 dB SPL. Vowels [a, i, u, e, o] and [ae] were chosen for phonation to represent the high, intermediate and low positions of the front and back vowels.

The study was undertaken on ten cleft palate subjects who had undergone surgery and were fitted with prosthetic aid.

In order to study the comparison between the nasality ratings at the different pitch and intensity levels, the following hypotheses were put forth and the results were obtained using the Sign Test and the product-moment coefficient of correlation :

(1) There is no significant difference in nasality when pitch is raised above the habitual pitch.

The hypothesis was rejected at 0·05 level of significance.

(2) There will be no significant difference in nasality when pitch is lowered below the habitual.

The hypothesis was accepted at 0·05 level of significance.

(3) There will be no significant difference in nasality when the intensity of phonation is increased above the normal intensity.

The hypothesis was rejected at 0·05 level of significance.

(4) There will be no significant difference in nasality when the intensity of phonation is decreased below the normal intensity.

The hypothesis was accepted at 0·05 level of significance.

In order to study the above hypotheses, the following experiments were undertaken :

(1) The subject's habitual pitch was measured using the set-up shown in Block Diagram 1. The subject was instructed to phonate vowel /a/ using the habitual pitch and keeping intensity constant at 70 dB $\pm$ 2 dB SPL. The phonation was recorded for a duration of 2·5 seconds. The procedure was repeated for the other

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test vowels [i, u, e, o] and [ae].

(2) The subject was instructed to phonate vowel /a/ at a pitch 100 Hz above the habitual keeping intensity constant at 70 dB SPL. The phonation was recorded and the procedure was repeated for the vowels [i, u, e, o] and [ae].

(3) The subject was instructed to phonate vowel [a] at a pitch 30 Hz below the habitual, keeping intensity constant at 70 dB SPL. The phonation was recorded and the procedure was repeated for the other five test vowels.

(4) The subject was instructed to phonate vowel [a] at habitual pitch raising the intensity to 80 dB SPL. The phonation was recorded and the procedure repeated for the other five vowels.

(5) The subject was instructed to phonate vowel [a] at habitual pitch but lowering the intensity to 65 dB SPL. The phonation was recorded and the procedure was repeated for the vowels [i, u, e, o] and [ae].

Thirty recordings were made for each subject. This was repeated for the remaining nine subjects. Altogether there were three hundred phonations.

Four trained speech pathologists were employed for rating the severity of nasality of the subjects. The recorded phonations were replayed in a sound treated room and nasality ratings were obtained on a four point rating scale.

Conclusions

(1) Cleft palate subjects in the present study had significantly less nasality at the higher pitch level than the habitual.

(2) The degree of perceived nasality was significantly less at the higher intensity level.

(3) The degree of perceived nasality did not change significantly as pitch or intensity was lowered.

Recommendations

(1) Future research should attempt to extend the findings to a larger number of cleft palate subjects.

(2) Similar study to be carried out with subjects who do not use any prosthetic aid.

(3) Similar stud to be carried out with subjects using prosthesis and without using prosthesis and to evaluate the use of prosthesis in nasality rating.

(4) Similar study to be carried out with subjects who exhibit functional nasality.

(5) The study may be repeated increasing the number of intensity and pitch levels.

(6) The optimum pitch of the subjects may be measured to find out whether the pitch that was associated with less nasality was near the optimum pitch.