

Acoustic Analysis for Individual's Voice From Uttarakhand



Medical Science

KEYWORDS : Acoustic analysis, Fundamental frequency, Jitter, Shimmer

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ABSTRACT

The aim of the present study is to develop normative value of acoustical analysis for individual's voice from uttarakhand. Total 60 adults (30 male and 30 female) were participated in the present study. Voice sample were recorded for vowel /a/ and analyzed with Dr. Speech software. The voice parameters F0, F0 max, F0 min, Jitter, and Shimmer were analyzed. Data analysis was carried out with SPSS (17). The mean F0 was 129 Hz for male and 233 Hz for female. There were significant difference observed between male and female voice for F0, F0 max, F0 min, and Shimmer.

Introduction

Voice plays a major role in speech and communication. Individual's voice is a part of their personality. A "normal voice" is one that is pleasing to the ear and has a balance of sound through the mouth and nose. It also matches a person's size, age and gender. Senturia and Wilson (1968) reported that normal voice should have a good quality, appropriate balance of oral and nasal resonance, appropriate loudness, and habitual pitch level suitable for the age, size and sex of individual and proper voice inflections. Voice characteristics provide information not only related to the individuals laryngeal status but also the social origins, emotional state, physique, age and sex. Any deviation from these guidelines is considered as voice disorder.

Voice disorders are generally assessed subjectively by a speech language pathologist or laryngologist/ENT. Perceptual analysis of voice disorders has significant limitations that can lead to confusion between the observers while differentiating between normal and abnormal voice. Computerized analysis gives more accurate information than the perceptual analysis. Dr. Speech is one of the software which provides quantitative and qualitative information about individual's voice.

Acoustic analysis provides quantitative assessment of voice quality and vocal function. Computerized voice analysis represents an essential diagnostic advancement because it provides objective acoustic measurements. Since the literature have shown that the variance in results which competes the computerized acoustic analysis and it is necessary to develop normative value for individual's voice by using software.

Methodology

This study was approved by the ethics committee for research, SRH University, Dehradun. The individuals were informed about the goals and procedure of the study. A total of 60 adults (30 males and 30 females), age range 20-30 years were participated in the present study. This study included 60 samples of phonation of vowel /a/. The data were collected and analyzed with Dr. Speech (DRS) Tiger Electronics, USA. The persons with vocal abusers, history of laryngeal or voice pathologic abnormalities or recent history of cough and cold were excluded from the study.

All the data were recorded in a sound treated room. Voice recording were done in their habitual loudness with a microphone placed at 5cm from the volunteer's mouth, and the person sitting in a comfortable position. Sustained vowel /a/ was recorded for the acoustic assessment. All the recordings were repeated for three times. Analysis was performed in terms of fundamental frequency (F0), F0 max, F0 min, jitter, and shimmer. Statistical analysis was carried out by using SPSS (17).

Results and Discussion

A total of 60 participants of equal number of sexes were assessed for acoustical analysis. The voice parameters like F0, F0 max, F0 min, Jitter, and Shimmer were assessed. Mean and Standard deviation for all the parameters are shown in table below.

Table 1. Means and SD of acoustic measures for participants

	Male		Female		P value
	Mean	SD	Mean	SD	
F0	129	12	233	20	<0.05
F0 max	132	13	236	20	<0.05
F0 min	127	12	232	19	<0.05
Jitter	0.23	0.09	0.24	0.06	>0.05
Shimmer	2.03	0.29	2.40	0.37	<0.05

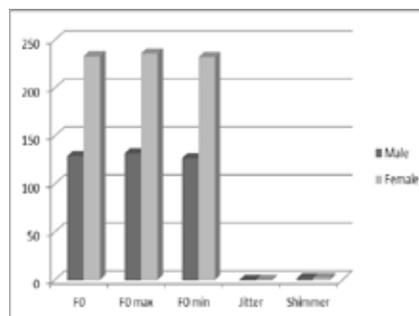


Fig. 1. Acoustical analysis of males and females voice

The mean fundamental frequency was 129 Hz for male and 233 Hz for female. All the voice parameters assessed were higher in female compare to male (Fig.1). There were sig-

nificant difference between male and female for F0, F0 max, F0 min, and Shim. This could be due to influenced by the length of the vocal cord which is longer in males. However there were no significant difference between male and female for jitter.

The present study reveals that the mean fundamental frequency was higher in male (129Hz) than the other studies by Behlau and Tosi (113Hz), Araujo, Grellet, and Periera (127Hz), Felipe, Grillo, and Grachi (120Hz) and Horii (125Hz) and lesser than the ones found by Morente et al (139Hz) for /a/. The mean of same parameter for women (233Hz) was higher than the one found by Araujo, Grellet, and Periera (215Hz) and lower than Morente et al (267Hz).

The jitter average was lower for male (0.23) and female (0.24) than Felipe, Grillo, and Grachi (0.49) and (0.61) respectively. The jitter mean value was not significantly different between male and female. Similar results were found in a study by Horii (1980). However it disagrees from another study done by Araujo, Grellet, and Periera (2002). The shimmer average were 2.03 and 2.40 for male and female respectively which is higher than Felipe, Grillo, and Grachi findings (0.23) and (0.22) and similar to the one found by Araujo, Grellet, and Periera (2.37) and (2.52).

This study findings are not similar to other studies, might be the reason of they would have used different acoustic analysis programs. Result differences among the different softwares could be due to the recording criteria, microphone placement, the way the programs calculate the parameters. Moreover, cultural variance could be the one reason for result difference. The present study result and study done by others confirm the need to develop the normative value for each software along with cultural variance.

Acknowledgement

We would like to thank the research committee and the participants. This study is a part of project and funded by SRH University, Uttarakhand.

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