Voice characteristics of elderly college teachers: A pilot study

ABSTRACT

Background: Rise in the age of retirement for teachers has created opportunities to continue in the profession even after 60 years of age. Elderly teachers will be more prone to developing voice problems due to their continuing teaching assignments, and age-related changes in larynx. Aim: To profile the voice characteristics of elderly teachers through comprehensive voice assessment. Materials and Methods: Stroboscopic, perceptual, acoustic, aerodynamic, and self percept features of voice in 20 elderly teachers were assessed using the Sri Ramachandra voice assessment protocol. Statistical Analysis: Differences between genders were calculated using independent t-test. Inter-judge reliability for perceptual analysis was calculated using intra-class correlation coefficient. Results: Stroboscopy revealed sarcopenic changes of vocal muscles, such as discoloration of vocal folds, incomplete closure, and reduced mucosal waves. On GRBAS scale, the subjects were rated as predominantly breathy, asthenic, and strained. Subjects showed reduced Maximum Phonation Time (11-13 seconds) and increased s/z ratio (1.21 in males and 1.19 in females). Mean F0 was 121 Hz (males) and 172 Hz (females). Mean I range [28.4 dB (A) in males and 24.2 dB (A) in females] was reduced and shimmer (5.80% in males and 4.84% in females) values were increased. Dysphonia Severity Index revealed mild to moderate deviation (0.07 in males and 0.16 in females). However, on self evaluation of voice through Voice Disorder Outcome Profile, scores revealed certain physical changes with less or no obvious functional limitation. Conclusion: This study documents the trends in voice-related changes in elderly teachers. This information may be crucial for voice professionals to advice elderly teachers and management to advocate “good vocal health.”

Key words: Dysphonia Severity Index, elderly teachers, voice analysis, voice protocol

INTRODUCTION

Regulatory bodies in India have recently enhanced the permissible upper age limit of college teachers. Currently, opportunities are available for teachers to remain in teaching even after retirement. Elderly professors are given an emirital status after their retirement and continue to teach till the age of 70 years and above. Teachers are more prone to voice problems due to excessive stress and prolonged use of voice for teaching.[1] Changes in pitch, hoarseness, pitch break, increased strain, voice breaks, vocal tremor, breathiness, instability, reduced loudness, vocal fatigue, physical fatigue, and inadequate breath support for speaking are characteristics of “senile” voice of the elderly.[2] It is difficult to surmise whether the voice problems in elderly teachers are due to the process of aging or teaching. Furthermore, a probe into health-related issues and life style factors may help identify risk factors that are relevant to the Indian environment. Thus, this pilot study was conceived to carry out a multiparametric voice analysis in elderly teaching staff to characterize their voice.

AIM

The present study aimed to profile the voice characteristics of 20 elderly college teachers using the Sri Ramachandra voice assessment protocol.[3]
MATERIALS AND METHODS

Twenty elderly teachers from a university teaching hospital (11 males and 9 females) in the age range of 60 to 75 years (Mean: 64.3 years; SD: 3.6) participated in the study. The details regarding teaching experience and hours of teaching per week are tabulated in Table 1.

The Sri Ramachandra voice assessment protocol[3] was used to profile the voice characteristics of elderly teachers. The protocol included the following:

Stroboscopic analysis: The Atmos Media stroboscope was used to obtain laryngeal images which were assessed by the Otolaryngologist and Speech Language Pathologist (SLP) for structure and function. The parameters[4] assessed were glottal closure, regularity, symmetry of the vocal fold vibration, mucosal wave and amplitude of vocal fold vibration, nonvibratory portion (if any), and hyper-adduction of ventricular bands. The findings were tabulated and descriptive statistics was applied.

Perceptual analysis: The perceptual evaluation was done for both phonation and conversation samples and was judged by two SLPs independently. The GRBAS scale[5] was used for the perceptual analysis of voice for conversation tasks and phonation samples were judged for pitch, loudness, and quality. Inter-judge reliability was calculated using intra-class correlation coefficient.

Aerodynamic and Acoustic analysis: The subjects were instructed to phonate /a/, /i/, and /u/ for three trials and the maximum was taken as Maximum Phonation Time (MPT). s/z ratio was also calculated. LingWaves Phonetogram Pro and Signal Analysis - phnetogram module (version 2.4) was used to measure Dysphonia Severity Index (DSI). Following steps were used to obtain a phnetogram: The subjects were modeled by the clinician to sustain the vowel /a/ at four levels: Low pitch-low intensity; low pitch-high intensity; high pitch-low intensity; and high pitch-high intensity and the samples were recorded.

Frequency-, intensity-, and perturbation-related parameters were extracted and DSI[6] was calculated using the formula: 

\[ DS1 = 0.13 \times MPT + 0.0053 \times F_0 - 0.26 \times I_1 - 1.18 \times \text{jitter} + 12.4 \]

The data obtained from aerodynamic and acoustic analysis were descriptively analyzed using mean and standard deviation. Significant difference between males and females were calculated using independent t-test.

Self evaluation of voice: Voice Disorder Outcome Profile (V-DOP)[7] was used to collect information on self-perceived severity of the voice problem. It consisted of two parts. The first part included a question regarding the severity of the voice problem and the second part included 32 questions under three domains: physical, emotional, and functional. The severity ranged from normal to severe in a visual analogue scale. Furthermore, information on vocal health and related concerns/perceptions of communication in daily life from elderly teachers was also collected using 10 open-ended questions. In addition to the 10 questions, two questions were included for female subjects (Appendix 1). Descriptive statistics was applied.

RESULTS

Stroboscopic evaluation

Structural and functional changes in larynx were observed in all subjects who consented for stroboscopic evaluation. Among males, 50% of them had grade II sulcus vocalis, 25% had atrophic changes, and 25% had interarytenoid edema with features of laryngopharyngeal reflux disease. Among females, 33.3% of them had interarytenoid edema, 16.4% had laryngopharyngeal reflux signs, and 50% of them had hypofunctional voice with mild compensation with ventricular folds. The findings of various parameters on stroboscopic evaluation are tabulated in Table 2. The results revealed that 50% of males and 83.3% of females had incomplete closure.

Different patterns of incomplete closure was observed, among which 33% of the females had longitudinal gap, 25% of males, and 16.7% of females had irregular closure. 16.7% of the females had anterior gap, 25% of the males had vocal fold bowing, and 16.7% of females had double gap.

Perceptual analysis of voice

Phonation samples were judged for the perceptual correlates of various pathological conditions.