Emirati Teachers' Perceptions of Voice Handicap

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Summary: Objectives. The purpose of the study was to explore Emirati teachers' perceptions of voice handicap and to analyze their acoustic characteristics to determine whether acoustic measures of teachers' voice would verify their perceptions of voice handicap.

Methods. Sixty-six Emirati school teachers (33 men and 33 women), with different years of teaching experience and age, and 100 control participants (50 men and 50 women) underwent vocal assessment that included the Voice Handicap Index (VHI-Arab) and acoustic measures (*F*0, jitter%, shimmer%, signal to noise ratio [SNR]).

Results. Significant differences between the teachers' group scores and the control group scores on the following subscales of VHI-Arab: physical ($P = 0.006$), emotional ($P = 0.004$), and total score of the test ($P = 0.002$). No significant differences were found among teachers in the three VHI subscales, and the total score regarding gender (functional $P = 0.307$; physical $P = 0.341$; emotional $P = 0.126$; and total $P = 0.184$), age (functional $P = 0.972$; physical $P = 0.525$; emotional $P = 0.772$; and total $P = 0.848$), and years of teaching experience (functional $P = 0.319$; physical $P = 0.619$; emotional $P = 0.926$; and total $P = 0.638$). The significant differences between the teacher's group and the control group in three acoustic measures: *F*0 ($P = 0.000$), shimmer% ($P = 0.000$), and SNR ($P = 0.000$) were further investigated. Significant differences were found among female and male teachers in *F*0 ($P = 0.00$) and SNR ($P = 0.007$). As for teachers' age, significant differences were found in SNR ($P = 0.028$). Teachers' years of experience did not show significant differences in any of the acoustic measures.

Conclusions. Teachers have a higher perception of voice handicap. However, they were able to produce better voice quality than control participants were, as expressed in better SNRs. This might have been caused either by manipulation of vocal properties or abusive overloading the vocal system to produce a procedurally acceptable voice quality.

Key Words: VHI–Acoustic measurements–Voice.

INTRODUCTION

Teachers are among professional voice users. As they use their voices extensively over their profession for instructing and managing students, the prevalence of voice disorders in teacher population has been evident in several studies.[1–9] Moreover, teachers are at risk for developing voice disorders.[10,11] The impact of voice disorders is evident in teachers' lost working days,[12] reductions in teaching load,[13] and career changes.[14] A study by Roy et al[4] showed that voice disorders tend to be significantly higher in teachers (57.7%) compared with nonteachers (28.8%) with high risk of losing briefly or enduringly their teaching skill. However, the etiology of voice disorders among teachers is still under investigation. Ferriera et al[15] reported that the genesis of vocal symptoms, either organic or environmental, such as hoarseness, vocal fatigue, and dry throat might relate to diverse factors like insufficient hydration, alcohol abuse, smoking, and speaking loudly and excessively. Additional factors pertain to dietetics and stress management,[16] physical and psychological stress factors,[17] muscular tension and body posture[18] family history,[4] and the amount and intensity of voice use.[19]

Gender is another factor affecting incidence of voice disorders. Female teachers seem to be more affected by voice disorders than male teachers.[20] The structure of vocal folds is identified as the main reason, as women are more likely to have vocal symptoms as opposed to men.[3,20] Vilkman[21] noted that a female teacher at an elementary school level produces approximately 1 000 000 vibrations per day, for 30% of the instruction time, whereas a male teacher would produce half the number of vibrations and consequently would show a decreased F0.

Smith et al[13] reported that a large proportion of 280 female teachers (38%) indicated voice problems as opposed to 26% of 274 male teachers. Rusell et al[20] found that women are more prone to voice problems compared with men.

The United States Food and Drug Administration estimate of voice disorders vast cost between USD 30 to 150 billion per year regarding lost productivity, treatment, and education.[22] These include, among others, programs for enhancing vocal training and awareness of voice problems,[23] vocal hygiene and education,[24] and utilization of amplification devices for diminishing vocal loading.[25] However, there is no strong evidence of the effectiveness of preventive programs for teachers' voice problems.[26]

Because of the increased risk for teachers developing occupational voice handicap, personal and social implications of vocal risk factors have been considered. The World Health Organization's International Classification of Impairments, Disabilities, and Handicaps[27] identifies handicap as limitations in individual activities through the disorder and the personal and environmental factors that might change the individual's perceptions of his/her disorder. Thus, self-rate questionnaires, such as the Voice Handicap Index (VHI), were introduced to the assessment battery of voice disorders.

The VHI is a 30-item questionnaire, with reported strong test-retest stability, which investigates individual experiences of

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voice and its impact on life.[28] It entails a functional (functional/VHI-F), physical (physical/VHI-P), and emotional (emotional/VHI-E) subscale with 10 subquestions per category. The respondent rates his/her answer from 0 to 4 (0 = never; 1 = almost never; 2 = sometimes; 3 = almost always; and 4 = always), and the total score is calculated between 0 and 120 and for each subcategory between 0 and 40. The VHI has been translated into diverse languages: German[29–33]; Portuguese[34]; Polish[35]; French[36]; Taiwanese[37]; Hebrew[38]; Swedish[39]; and Arabic.[40] The VHI has been established as a valid and reliable tool for the subjective evaluation of dysphonic patients.[28]

Teacher population has been the focus of perceptual voice assessment and the VHI.[41,42] Various studies[8,28,43–45] measured patient's subjective sensation of voice problems and their psychological and social implications through the VHI.

Other studies[46–51] used the VHI to measure posttreatment enhancement. Others[30,52,53] used the VHI to compare voice characteristics of pre- and post-phonosurgeries; to differentiate between healthy subjects and subjects with voice disorders[38]; to function as an additional assessment tool for voice problems[54–56]; and to assess voice in normally aged people.[57]

In the study of De Medeiros et al,[58] a self-applied questionnaire was used to assess social, demographic, mental, and general health parameters regarding Brazilian teachers' vocal risk factors. The prevalence of possible dysphonia was significantly higher in teachers (52%) compared with probable dysphonia (15%). Moreover, voice problems may lead to perceptions of vocal fatigue. Hoarseness as a prominent symptom allows for acoustic voice analysis to measure frequency, intensity, and perturbation for identifying symptom severity and progress of voice handicap.[59]

A study by Yiu[60] compared working teachers with prospective teachers on their vocal perceptions and their impact on their emotional and social life, communication, and occupation. It was reported that working teachers showed more negative vocal perceptions and problems in communication compared with prospective teachers. The study of Ahlander et al[61] reported that 13% of Swedish teachers reported vocal problems after rating teaching environment comfort through questionnaires using a Swedish validated version of the VHI. Bovo et al[44] used stroboscopy, perceptual and electro-acoustical voice analysis, and the VHI to assess teachers' experimental and control group responses to a voice program preventing the perception of voice handicap. The teachers' experimental group showed significant differences in jitter%, shimmer%, maximum phonation time, and the VHI, compared with the control group. Jacobson et al[28] implied that self-perceptions of voice handicap would equally affect psychosocial parameters. Thomas et al[8] used the VHI to quantify the psychosocial effects of voice handicap and to assess voice handicap subjectively. Furthermore, the fundamental application of the VHI in the voice rehabilitative process encourages patients to develop their self-perceptions of voice problems and professionals to evaluate before planning voice treatment.[37]

As the VHI identifies patients' diverse individual perceptions and needs subjectively, acoustic measures give objective data of voice quality for individuals with voice disorders. Examples on acoustic measures are fundamental frequency (*F*0), which measures the number of cycles of vocal fold vibration per second, jitter% which reflects the change of frequency from one successive period to the next, shimmer% which indicates the percent of small changes in cycle-to-cycle amplitude of the vocal fold signal, and signal to noise ratio (SNR) which is a ratio measure of the energy in the voice signal over the noise in the voice signal.[62] Less shimmer% and jitter% reflect more stability of cycle-to-cycle vocal fold vibration. On the other hand, greater SNR indicates better voice quality.[63] Correlation of acoustic measures with subjective voice complaints is looked at as inconclusive. The study of Laukkanen et al[64] on female teachers reported no significant correlation between vocal fatigue and acoustic measures (fundamental frequency F0, sound pressure level [SPL], jitter%, shimmer%, and alpha ratio [(SPL 1–5 kHz)–SPL (50 Hz–1 kHz)]) recorded before and after a working day. After a working day, *F*0 and alpha ratio were increased, but jitter% and shimmer% were decreased, with more tiredness of throat. Similar findings were identified by Lehto et al,[65] who reported that although *F*0 increased significantly when they recorded telephone customer advisors four times during a working day, no correlation was established between acoustic measures (*F*0, alpha ratio, SPL) and self-rate of voice symptoms. Jonsdottir et al[66] reported that increased *F*0 and SPL might suggest ample vocal adaptation to excessive voice use and not phonatory degradation,[67] explaining why some speakers show different patterns of change after a working day or a task of vocal loading.[68,69]

Similarly, according to the study of Murry et al,[41] objective laboratory voice measurements, such as cycle-to-cycle frequency perturbation (jitter%), cycle-to-cycle amplitude perturbation (shimmer%), and noise to harmonics ratio (NHR), among others, fail to explain why individuals with similar characteristics of voice handicap perceive differently the severity of voice disorders.

On the other hand, Schmidt et al[70] found inconsistent correlation between teachers perception of effectiveness measures and different acoustic measures. Although measures such as (*F*0, jitter%, and shimmer%) did not appear to be related to perceptual judgment of effectiveness, there was a correlation between these judgments and measures such as frequency range and frequency variability.

As previous studies showed indecisive results,[64,70] there is a need to investigate further the relation, if any, between acoustic measures and subjective measures (ie, VHI). Such a correlation, if found, may help clinicians follow up their clients progress using different tools interchangeably and allow them to rely on self-rated scales in case other tools were not available.

The aim of the present study, therefore, was to (1) find out whether there is a difference between the Emirati teachers' group and control group in terms of VHI and acoustic measures and (2) To find whether the self-rating scales of the VHI would be verified by acoustic measures.

METHODS

Subjects

A total of 166 participants were recruited for the study. Sixty-six (66) Emirati school teachers (33 men and 33 women)