

Anxiety in female teachers with dysphonia: correlation between the voice handicap index and anxiety state

Rasha Mohammed Shoeib, Jilan F. Nassar and Hassan H. Ghandour

Unit of Phoniatics, Department of Otorhinolaryngology, Faculty of Medicine, Ain Shams University, Cairo, Egypt

Correspondence to Rasha Mohammed Shoeib, MD, Unit of Phoniatics, Department of Otorhinolaryngology, Faculty of Medicine, Ain Shams University, 11411 Cairo, Egypt
Tel: +20 966 559 040 307/+20 100 535 5092;
e-mail: shoeibr@yahoo.com

Received 26 January 2012
Accepted 11 February 2012

The Egyptian Journal of Otolaryngology
2012, 28:142–148

Background

Female teachers are at particular risk of developing voice disorders. They are more likely to have psychiatric disorders such as anxiety or depression.

Aim

To assess the presence of anxiety in female teachers with dysphonia, paying particular attention to the association between the patient's self-evaluation of her voice handicap and anxiety state.

Participants and methods

Thirty-nine female teachers with dysphonia were subjected to a voice assessment protocol, Arabic voice handicap index (VHI), to quantify the degree of handicap related to voice disorders and assessment of anxiety using the Manifest Anxiety Scale of Taylor. The results obtained were compared with the results of 34 normal female teachers who were subjected to the same assessment protocols.

Results

There were highly significant differences between both the groups in the scores of VHI and the anxiety scale. Anxiety showed a significant correlation with the duration of dysphonia, the grade of dysphonia, the total score of VHI, and its three domains.

Conclusion

Anxiety is frequent among dysphonic female teachers, with a significant association between the patient's self-evaluation of her voice handicap and anxiety state. Such a high association advocates for both vocal education programs and psychiatric consultations.

Keywords:

anxiety, dysphonia, female teacher, voice handicap index

Egypt J Otolaryngol 28:142–148
© 2012 The Egyptian Oto - Rhino - Laryngological Society
1012-5574

Introduction

Voice disorders are very common among voice professionals, especially those in education, such as teachers [1]. They have a high risk of developing dysphonia in comparison with the general population [2]. The relation between dysphonia and teaching work has been reported in several studies [3,4]. Teachers are frequently required to use their voices for prolonged periods and work in noisy and stressful environments that make them strain their voices, with little time for rest and recovery. Dysphonia is frequent among female teachers, especially at the start of their careers [5]. The social significance of dysphonia in teachers is not only related to sick leave but also to the fact that a dysphonic voice causes a feeling of insecurity, a lack of authority, and a change in personality [6]. Roy *et al.* [2] reported that about 58% of 1243 teachers compared with 29% of 1288 nonteachers had voice problems throughout their lives. They believe that these voice problems have had a negative influence on their work and social life. These results support the notion that teaching is a high-risk occupation for voice disorders.

The higher number of female teachers reveals the predominance of women in the field of education [7].

Teaching is an activity primarily performed by women [6]. This maximizes the presence of vocal disorders among female teachers not only due to the anatomical and physiological characteristics of this sex but also due to the social aspects related to the female sex [8]. Dysphonia has been reported to be present in 68.2% of female teachers [9]. The higher number of female teachers in the study carried out by Tutya *et al.* [10] and Souza *et al.* [6] indicates the sex profile of the population of teachers as well as the higher incidence of voice deviation in this population.

Stress and psychological tension could play an important role in the development of dysphonia in professional voice users. Teachers who reported voice disorders were more likely than the others to have psychiatric disorders such as anxiety or depression [8]. Female teachers, as professional voice users, are at particular risk of developing voice disorders. They present aggravating and risk factors in their work process that may result in dysphonia. They encounter emotionally charging situations, anxiety, and stress related to work positions and functions, in addition to double and triple workloads [11]. Stress and psychological tension could play a role in aggravating their voice disorders. However, voice impairment can affect all

aspects of an individual's life, and their impact has been reported to be as huge as that of life-threatening illnesses [12]. Several quality-of-life questionnaires have been developed to assess the impact of a specific illness on the patient's life. Among these questionnaires, there are some that are related to voice, some of which have already been validated in the Arabic language, such as the voice handicap index (VHI). This tool has been tested to be valid and reliable, and can be used for the evaluation of individuals with vocal problems [13].

However, despite the numerous papers published on voice disorders in professionals working in education [6,7,14], few papers have examined the relation between anxiety and voice disorders in female teachers. Therefore, the aim of this study was to assess the presence of anxiety in female teachers with dysphonia, paying particular attention to the association between patient's self-evaluation of her voice handicap and anxiety state.

Participants and methods

Participants

This study was carried out on 39 female teachers with a history of dysphonia. They presented at the Phoniatic Unit, Ain Shams University Hospitals, during the period from June 2010 to August 2011. Their mean age was 37.03 ± 5.17 years, age range 29–47 years. The results obtained from this group were compared with the results obtained from 34 normal female teachers who did not have any voice disorders. They were selected randomly from the same schools of the study group. Their mean age was 36.24 ± 4.55 years, age range 30–46 years.

Procedures and clinical tools

All individuals in both the groups were subjected to the following assessment procedures:

Voice evaluation protocol carried out in the Phoniatic Unit, Ain Shams University Hospitals [15]:

Patients' interview focused mainly on the duration of dysphonia, the presence of phonasthenic symptoms, number of years of teaching experience, and number of hours of teaching per day.

Auditory perceptual assessment of patient voice focused on the degree of dysphonia following the modified GRBAS scale [16], which classify dysphonia from 0 to 3, where '0' represents normal voice, '1' represents slight dysphonia, '2' represents moderate dysphonia, and '3' represents severe dysphonia.

Visualization of the glottis was carried out using a rigid telescope or a flexible nasofibroscope. Examination was carried out using a computer integrated Rhino-Laryngeal Stroboscope system from Kay Elemetrics Group, USA.

Acoustic voice analysis was carried out using Computerized Speech Lab model 4300 from Kay Elemetrics Group, to determine the following parameters: average pitch, jitter (%), shimmer (dB), and the harmonics-to-noise ratio (H/N).

An Arabic VHI [13] was filled by all individuals of both the groups. It is a self-administrated patient questionnaire that quantifies the degree of handicap related to voice disorders. It was used as a subjective patient tool to describe her voice and the effect of voice on quality of life. It includes 30 items that encompasses three domains: functional (F), physical (P), and emotional (E). The items are answered on a five-point scale, where 0 indicates 'never' and 4 indicates 'always'. Each domain has a score from 0 to 40, with the latter indicating the greatest handicap. Scores are calculated by simply adding up the gross values and can vary from 0 to 120; the higher the score, the greater the voice handicap.

Assessment of the degree anxiety was carried out using the Manifest Anxiety Scale of Taylor [17]. This test is used as a measure of emotional responsiveness. It consists of 55 items (questions) to explore the degree of the individual's anxiety state. It can be used to assess the presence of anxiety and determine its degree. The patient answers with 'Yes' or 'No' for each item of the test. The anxiety score varies as follows: 'below 16' represents no anxiety, '16–25' represents a mild degree of anxiety, '26–36' represents a moderate degree of anxiety, and scores more than '37' indicate a severe degree of anxiety.

Statistical methods

Quantitative variables were presented as mean and SD. Qualitative variables were presented as frequency and percentage. The Kolmogorov test was carried out to test normality. Parametric variables were compared between two groups using an independent-sample *t*-test, between more than two groups using one-way analysis of variance, followed by the Scheffe test as a post-hoc test. The correlation between parametric variables was assessed using the Pearson correlation coefficient.

Nonparametric variables were compared between two groups using the Mann–Whitney test and between more than two groups using the Kruskal–Wallis test, followed by the Dunn test as a post-hoc test. The correlation between nonparametric variables was assessed using the Spearman rank correlation coefficient.

Significance level used was 0.05. SPSS statistical package version 18 (IBM Corporation, Chicago, USA) was used for data analysis.

Results

This study included 39 female teachers with a history of dysphonia. The mean duration of dysphonia was 7.00 ± 1.83 years (ranging from 5 to 11 years). The mean number of years of teaching experience was 11.54 ± 2.93 (ranging from 8 to 19 years). The mean number of hours of teaching per day was 7.46 ± 2.29 (ranging from 4 to 12 h). Thirty-one of the participants (79.5%) reported phonasthenic symptoms with a duration that ranged from 5 to 9 years. None of the participants were smokers.

Among the 39 dysphonic participants, only two of them (5.1%) reported that the voice problems resulted in no limitation in their daily living and teaching activities. The grade of dysphonia ranged from slight to severe degrees; five patients (12.8%) had a slight degree of dysphonia, 17 patients (43.6%) had a moderate degree of dysphonia, and 17 patients (43.6%) had a severe degree of dysphonia.

There is more than one classification of voice disorders; according to the classification of Kotby 15, the study group ($n = 39$) was further classified into three sub-groups, which included 16 patients (41%) with hyperfunctional dysphonia, 13 patients (33.3%) with vocal fold nodules, and 10 patients (25.7%) with vocal fold polyps. The mean scores of the average pitch, jitter (%), shimmer (dB), and the H/N were 191.29 ± 16.52 , 1.33 ± 0.50 , 1.58 ± 0.55 , and 10.96 ± 1.61 , respectively.

The mean of the total scores of VHI was 93.38 ± 15.24 (ranging from 61 to 112). The mean scores of the three domains of VHI functional, physical, and emotional were 30.51 ± 5.33 , 30.44 ± 5.40 , and 32.46 ± 5.02 , respectively. The mean score of the emotional domain was found to be higher than those of the physical and functional domains. The score of the emotional domain ranged from 21 to 38, whereas the score of the functional domain ranged from 17 to 37 and that of the physical domain ranged from 18 to 37.

The mean scores of anxiety as determined by the Manifest Anxiety Scale of Taylor were 35.90 ± 8.74 (ranging from 23 to 48). Eight Patients (20.5%) had a mild degree of anxiety, 11 (28.2%) had a moderate degree of anxiety, whereas 20 patients (51.3%) had a severe degree of anxiety.

For the normal control group ($n = 34$), the mean number of years of teaching experience was 11.03 ± 2.65 (ranging from 7 to 17 years). The mean number of hours of teaching per day was 7.53 ± 1.87 (ranging from 5 to 12 h). Although none of the participants were smokers or had a history of dysphonia, 11 of them (32.35%) had one or more symptoms of phonasthenic manifestations during their teaching activities. The duration of phonasthenic symptoms ranged from 3 months to 2 years. Among these 11 participants who reported phonasthenic manifestations, only three of them (27.27%) reported that these symptoms resulted in limitations in their daily living and teaching activities. The mean scores of the average pitch, jitter (%), shimmer (dB), and the H/N were 243.77 ± 15.21 , 0.50 ± 0.13 , 0.57 ± 0.16 , and 16.06 ± 1.30 , respectively. The mean of the total scores of VHI was 3.24 ± 2.27 (ranging from 0 to 8). The mean scores of the three domains of VHI functional, physical, and emotional were 1.03 ± 0.93 , 1.44 ± 1.0 , and 0.76 ± 0.92 , respectively. All the scores of the three domains of VHI ranged from 0 to 3. The mean scores of anxiety as determined by the Manifest Anxiety Scale of Taylor were 16.09 ± 4.42 (ranging from 11 to 29). Eight participants (23.52%) had a mild degree of anxiety and two participants (5.9%) had a moderate degree of anxiety.

Comparisons of both groups showed that there was no statistically significant difference ($P > 0.05$) between the studied group (group 1) and their controls (group 2) in

terms of age, number of years of teaching experience, and number of teaching hours per day. There was a highly significant difference ($P < 0.001$) in acoustic voice parameters, the total score of VHI, and the scores of its three domains and anxiety scores as determined by the Manifest Anxiety Scale of Taylor as shown in Table 1.

The degree of anxiety as measured by the Manifest Anxiety Scale of Taylor showed a highly significant difference between both the groups. All dysphonic patients had anxiety that ranged between mild and severe degrees, whereas 10 (29.4%) of the normal teachers had anxiety that ranged between mild and moderate degrees Table 2.

In the study group ($n = 39$), among the patients who were diagnosed with hyperfunctional dysphonia, six (37.5%) had a mild degree of anxiety, five (31.3%) had a moderate degree of anxiety, and five (31.3%) had a severe degree of anxiety. In the group of patients with vocal fold nodules, four (30.8%) had a moderate degree of anxiety and nine (69.2%) had a severe degree of anxiety. Two patients (20%) with vocal fold polyps had a mild degree of anxiety, two (20%) had a moderate degree of anxiety, whereas six patients (60%) had a severe degree of anxiety. The score and degree of anxiety were significantly higher among patients with vocal fold nodules in comparison with patients with hyperfunctional dysphonia and vocal fold polyps as shown in Table 3 and Fig. 1.

All the patients (100%) with a slight degree of dysphonia had mild anxiety. Among the patients with a moderate degree of dysphonia, three patients (17.64%) had mild anxiety, 11 (64.70%) had moderate anxiety, and three patients (17.64%) had severe anxiety. All the patients (100%) with a severe degree of dysphonia had a severe degree of anxiety Fig. 2.

The results of correlation between the anxiety state and the parameters studied in female teachers with dysphonia showed that both the scores and the degree of anxiety had a significant correlation with the duration and the grade of dysphonia, acoustic voice parameters, and the VHI (total score and its three domains). Also, the age of the patient had a significant correlation with the degree of anxiety. A nonsignificant correlation was found in the number of years of teaching experience and the number of hours of teaching per day as shown in Table 4.

The results of the correlation between the grade of dysphonia and the parameters studied showed a significant correlation between the grade of dysphonia and the duration of dysphonia, acoustic voice parameters, and the total score of VHI and its three domains. A nonsignificant correlation was found with age, the number of years of teaching experience, and the number of hours of teaching per day as shown in Table 5.

Discussion

There has been growing interest in recent years in the study of the relationship between dysphonia and teaching

Table 1 Results of comparison of both groups in terms of all the parameters studied

Parameters	Mean \pm SD		P value	Significance
	Group 1 (n=39)	Group 2 (n=34)		
Age (years)	37.03 \pm 5.17	36.24 \pm 4.55	0.494	NS
Number of years of teaching experience	11.54 \pm 2.93	11.03 \pm 2.65	0.443	NS
Number of teaching hours per day	7.46 \pm 2.29	7.53 \pm 1.87	0.890	NS
Average pitch	191.29 \pm 16.52	243.77 \pm 15.21	<0.001	HS
Jitter (%)	1.33 \pm 0.508	0.50 \pm 0.13	<0.001	HS
Shimmer (dB)	1.58 \pm 0.55	0.57 \pm 0.16	<0.001	HS
Harmonics/noise ratio (H/N)	10.96 \pm 1.61	16.06 \pm 1.30	<0.001	HS
Voice handicap index (VHI)				
Total score	93.38 \pm 15.24	3.24 \pm 2.27	<0.001	HS
Functional domain	30.51 \pm 5.33	1.03 \pm 0.93	<0.001	HS
Physical domain	30.44 \pm 5.40	1.44 \pm 1.0	<0.001	HS
Emotional domain	32.46 \pm 5.02	0.76 \pm 0.92	<0.001	HS
Anxiety scores (Manifest Anxiety Scale of Taylor)	35.90 \pm 8.74	16.09 \pm 4.42	<0.001	HS

HS, highly significant.

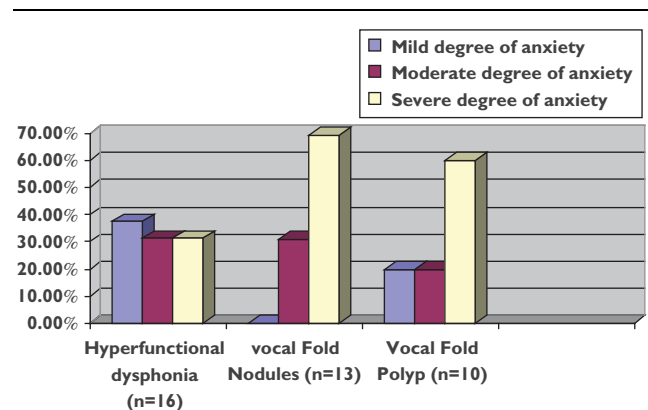
Table 2 Comparison of both groups of the degree of anxiety as measured by the Manifest Anxiety Scale of Taylor

Parameters	Group 1 (n=39)	Group 2 (n=34)
No anxiety	0 (0%)	24 (70.6%)
Mild degree of anxiety	8 (20.5%)	8 (23.5%)
Moderate degree of anxiety	11 (28.2%)	2 (5.9%)
Severe degree of anxiety	20 (51.3%)	0 (0%)

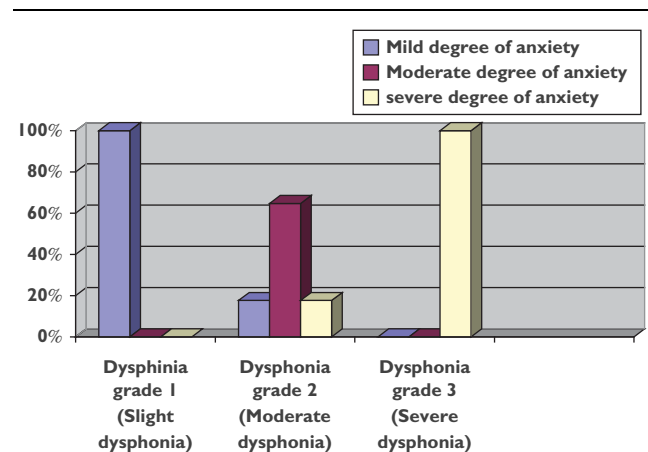
$P < 0.001$ highly significant differences.

work. Teachers have the highest prevalence of voice changes when compared with other professionals [12]. Voice disorders are common among teachers, with one in two female teachers and one in four males complaining of dysphonia [5]. Smith *et al.* [8] reported that female teacher had a higher probability of reporting voice problems compared with male teachers, even though both of them had similar teaching characteristics. Therefore, in the current study, the selection of female teachers with dysphonia was made on the basis of the previous findings that female teachers were more likely to have dysphonia [18] and have significantly more voice disorders than male teachers [3–8].

Dysphonia in teachers can have negative personal, emotional, and economic effects. The relationship between emotion and voice problem has been generally recognized [19]. Female teachers with dysphonia presented a higher level of psychological distress than the normal population [20]. A significant number of female teachers reported voice impairment as a chronic source of stress, anxiety, or frustration [21]. The relationship between voice problems and the degree of anxiety, and the effect of these problems on the patient's life in female teacher need to be clarified. Therefore, the aim of this study was to assess the presence of anxiety in female teachers with dysphonia, paying particular attention to

Figure 1

Distribution of the degree of anxiety among the patients of group 1 (n=39).

Figure 2

Distribution of the degree of anxiety among the grades of dysphonia in group 1.

Table 3 Comparison of the three subgroups of the scores of anxiety as measured by the Manifest Anxiety Scale of Taylor

Parameter	Hyperfunctional dysphonia (n=16)	Vocal fold nodule (n=13)	Vocal fold polyp (n=10)	P value
Anxiety score (mean \pm SD)	31.25 \pm 8.63	40.0 \pm 6.24	38.0 \pm 8.88	0.015

Table 4 Results of correlation between both scores and degree of anxiety as measured by the Manifest Anxiety Scale with related parameters in group 1 (n=39)

Parameters	Scores of anxiety (correlation coefficient)	Degree of anxiety (correlation coefficient)
Age (years)	0.266	0.318*
Number of years of teaching experience	0.269	0.301
No of hours of teaching/day	-0.165	-0.058
Duration of dysphonia	0.343*	0.356*
Grade of dysphonia	0.882**	0.874**
Average pitch	-0.784**	-0.856**
Jitter (%)	0.583**	0.599**
Shimmer (dB)	0.613**	0.613**
Harmonics/noise ratio (H/N)	-0.402*	-0.442**
Voice handicap index (VHI)		
Total score	0.779**	0.821**
Functional domain	0.569**	0.633**
Physical domain	0.779**	0.836**
Emotional domain	0.739**	0.7**

*P<0.05 (significant correlation).

**P<0.001 (highly significant correlation).

Table 5 Correlation between the grade of dysphonia and the related parameters in group 1 (n=39)

Parameters	Correlation coefficient
Age (years)	0.241
Number of years of teaching experience	0.254
No of hours of teaching/day	-0.102
Duration of dysphonia	0.329*
Average pitch	-0.854**
Jitter (%)	0.608**
Shimmer (dB)	0.674**
Harmonics/noise ratio (H/N)	-0.493**
Voice handicap index (VHI)	
Total score	0.760**
Functional domain	0.602**
Physical domain	0.748**
Emotional domain	0.736**

*P<0.05 (significant correlation).

**P<0.001 (highly significant correlation).

the association between patient's self-evaluation of her voice handicap and anxiety state.

Emotions contribute to voice disorders, which in turn result in psychological problems. When negative social reactions are given to people with voice problems, they may start to withdraw from social contact, develop anxiety about their employment prospects, or become frustrated because of their failure in achieving the social and employment interactions with their defeated voice [22]. In the current study, 37 patients (95%) reported that their voice problem resulted in limitations to their daily living and teaching activities. Similar results have been reported by Wan [23], who found that teaching professionals perceived their voice problem as a limitation to their job performance and future career options. This impact of voice impairment on the daily life and teaching activities was found to be more severe among female teachers.

In the current study, phonasthenic symptoms were reported by teachers in both the groups. These symptoms were reported by 80% of female teachers with dysphonia

in comparison with 32% of normal teachers. Phonasthenic symptoms lasted for a long duration (up to 9 years) in dysphonic teachers, whereas in normal individuals, these symptoms lasted for less than 2 years. These findings were supported by Cohn *et al.* [24], who found that voice fatigue is the most common symptom reported by teachers and may indicate poor use or abuse of voice. Moreover, Gotaas and Starr [25] found that the symptoms of voice fatigue were prevalent among teachers who spent more time in activities that were vocally demanding and anxiety producing.

Souza *et al.* [6] reported that vocal fold pathologies were more prevalent in teachers with more than 7 years of teaching experience. In our study, the number of years of teaching experience and the number of teaching hours per day showed a nonsignificant difference between both groups of teachers. Also, our results showed a nonsignificant association between the grade of dysphonia and the age of the patients, number of years of teaching experience, and number of teaching hours per day. The lack of significant associations between dysphonia and age group or years of teaching work was also found in other studies carried out by Simberg *et al.* [26] and Preciado *et al.* [27]. They found that these factors do not exert an accumulative effect on the vocal pathology of teaching staff. These findings may point to the presence of other factors that may be responsible for the development of dysphonia in teachers.

Psychological stress or anxiety was considered as a factor contributing to voice problems among teachers [25]. In the current study, anxiety was found in all dysphonic female teachers in comparison with 29.4% of normal participants. These findings were in agreement with Morrison [28], who reported that the vocal musculature is a highly sensitive instrument and is strongly influenced by anxiety and changes in the affective state. During states of emotional stress and anxiety, high levels of muscular tension in the organs involved in voice production may eventually lead to voice disorders. A positive relationship between voice disorders and various psychological problems was also found in previous studies [29,30]. Psychogenic factors might cause voice disorders by increasing tension in the laryngeal muscles, especially for hyperfunctional dysphonia [30]. However, voice disorders can adversely affect quality of life; they have been suggested as a cause of psychological symptoms such as stress, depression, and anxiety [29].

Teachers may be at a higher risk of developing vocal fold nodules and hyperfunctional dysphonia than individuals in other occupations [31]. In the present study, anxiety was significantly higher among patients with vocal fold nodules in comparison with patients with hyperfunctional dysphonia and vocal fold polyps. These findings are supported by Goldman *et al.* [32] who found that patients with vocal fold nodules had significantly increased scores of anxiety, voice use, and somatic complaints. Also, previous studies have shown a significant correlation between the development of vocal fold nodules and disordered emotional states and anxiety [33].

Acoustic voice parameters reflect the degree of impairment in a patient's voice. These parameters were found to be more affected with an increase in the severity of voice problems. In the present study, these parameters were significantly correlated with the grade of dysphonia and anxiety. The current study yielded results similar to those of Bhuta *et al.* [34], in which dysphonia was found to be significantly correlated to acoustic voice parameters.

One interesting feature of the present study is that it showed a significant correlation between anxiety and the degree of dysphonia. Our results showed that all the patients with a severe degree of dysphonia had a severe degree of anxiety. This significant association between anxiety and dysphonia was similar to that found in previous studies carried out by Souza *et al.* [6], Roy *et al.* [19], and Wan [23]. Furthermore, this study showed a significant association between anxiety and duration of dysphonia. Also, Gotaas and Starr [25] reported that teachers who had a prolonged duration of dysphonia tended to perceive speaking situations as being tense. They were prone to respond to these situations with a higher level of anxiety compared with normal teachers. Wan [23] found a significant correlation between voice impairment and emotional status such as anxiety, stress, and emotional exhaustion. De Alvear and Martinez [35] reported that teachers become stressed when they feel that job demands are higher than their ability to cope with them.

The attitudes of students toward teachers with dysphonia might increase their stress. Teachers who experience stress may deal with a vicious cycle: stress and anxiety contribute to voice problems and voice problems contribute to them [3]. Many teachers reported that their voice problems had a negative effect on their performance at work [2].

The opinion of the patient about her well-being should always be taken into consideration when trying to comprehend the actual impact of a disease. Thus, it is important to assess the individual's perception about the effect of an illness on their personal, social, and professional lives [36]. The use of quality-of-life questionnaires such as the 'VHI' for dysphonic patients is important as the impact that a voice deviation has on the life of an individual does not necessarily have a direct relationship with the degree of dysphonia [37]. VHI is a useful measure that could help the patient and the clinician to assess the degree of disability that a voice disorder is causing [38]. Dysphonia can affect the patient's life and this may be reflected in VHI (total scores and its three domains). This can be seen in our results from the significant differences in the results of VHI between both groups, which were higher in dysphonic female teachers in comparison with normal teachers. The scores of emotional domain were significantly higher than the scores of physical and functional domains of VHI. Also, a significant correlation was found between anxiety and VHI in female teachers with dysphonia. Moreover, our results showed a significant association between the grade of dysphonia and VHI. This is in agreement with the results of Ghandour

et al. [38] who found a significant correlation between VHI scores and the degree of dysphonia. Dysphonia is hypothesized to be a reliable reflection of the degree of voice handicap. The more severe is the degree of dysphonia, the more difficult for people to hear, the more restriction in joining conversation with the resultant emotional effects on the patient herself. This may lead to the feeling of upset, incompetence, tension or anxiety[2]. Dysphonia was found to be significantly correlated to voice-related quality-of-life and VHI scores [39]. Therefore, it is important to map the impact of dysphonia in the lives of these professionals in order to better understand the patients' perspective about their voice problems.

Conclusion and recommendations

Anxiety is frequent among dysphonic female teachers, with a significant association between a patient's self-evaluation of her voice handicap and anxiety state. Such a high association of anxiety in female teachers with dysphonia advocates for both vocal education programs and psychiatric consultation. Therefore, it is important to evaluate the degree of anxiety in female teachers with dysphonia to prevent this situation from being aggravated and negatively affecting their career.

Acknowledgements

Conflicts of interest

There are no conflict of interests.

References

- Mattiske JA, Oates JM, Greenwood KM. Vocal problems among teachers: a review of prevalence, causes, prevention and treatment. *J Voice* 1998; 12:489-499.
- Roy N, Merrill RM, Thibeault S, Gray SD, Smith EM. Voice disorders in teachers and the general population: effects on work performance, attendance and future career choices. *J Speech Lang Hear Res* 2004; 47: 542-551.
- Smith E, Lemke J, Taylor M, Kirchner HL, Hoffman H. Frequency of voice problems among teachers and other occupations. *J Voice* 1998; 12: 480-488.
- Sala E, Laine A, Simberg S, Pentti J, Suonpää J. The prevalence of voice disorders among day care center teachers compared with nurses: a questionnaire and clinical study. *J Voice* 2001; 15:413-423.
- Nerrière E, Vercambre MN, Gilbert F, Kovess Masféty V. Voice disorders and mental health in teachers: a cross-sectional nationwide study. *BMC Public Health* 2009; 9:370-377.
- De Souza CL, Carvalho FM, de Araújo TM, dos Reis EJFB, Lima VMC, Porto LA. Factors associated with vocal fold pathologies in teachers. *Rev Saude Publ* 2011; 45:914-921.
- Ferreira LP, de Oliveira Latorre MRD, Pinto Giannini SP, de Assis Moura Ghirardi AC, de Fraga e Karmann D, Silva EE, *et al.* Influence of abusive vocal habits, hydration, mastication and sleep in the occurrence of vocal symptoms in teachers. *J Voice* 2010; 24:86-92.
- Smith E, Kirchner HL, Taylor M, Hoffman H, Lemke JH. Voice problems among teachers: Differences by gender and teaching characteristics. *J Voice* 1998; 12:328-334.
- Sliwiska Kowalska M, Niebudek Bogusz E, Fiszer M, Los Spychalska T, Kotylo P, Sznurowska Przygocka B, *et al.* The prevalence and risk factors for occupational voice disorders in teachers. *Folia Phoniatri Logop* 2006; 58:85-101.
- Tutya AS, Zambon F, Oliveira G, Behlau M. Comparison of V-RQOL, VHI and VAPP scores in teachers. *Rev Soc Bras Fonoaudiol* 2011; 16:3.
- Alves LA, Robazzi MLCC, Marziale MHP, de Felipe ACN, Romano CC. Health disorders and teachers' voices: a workers' health issue. *Rev Latino-Am Enfermagem* 2009; 17:566-572.

- 12 Verdolini K, Ramig LO. Review: occupational risks for voice problems. *Logoped Phoniatr Vocol* 2001; 26:37–46.
- 13 Malki KH, Mesallam TA, Farahat M, Bukhari M, Murry T. Validation and cultural modification of Arabic voice handicap index. *Eur Arch Otorhinolaryngol* 2010; 267:1743–1751.
- 14 De Medeiros AM, Barreto SM, Assunção AA. Voice disorders (dysphonia) in public school female teachers working in Belo Horizonte: prevalence and associated factors. *J Voice* 2008; 22:676–687.
- 15 Kotby MN. *The accent method of voice therapy*. 1st ed. San Diego, California: Singular; 1995.
- 16 Kotby MN. Voice disorders: recent diagnostic advances, new dimensions. *Otolaryngol Head Neck Surg* 1986; 11:337–340.
- 17 Taylor KF. *Psychopathology: its causes and symptoms*. London: Butterworth; 1953.
- 18 Dejonckere PH. Gender differences in the prevalence of occupational voice disorders. In: Dejonckere PH, editor. *Occupational voice: care and cure*. The Hague- Netherland: Kugler Publications; 2001. pp. 11–20.
- 19 Roy N, McGrory JJ, Tasko SM, Bless DM, Heisey D, Ford CN. Psychological correlates of functional dysphonia: an investigation using the Minnesota multiphasic personality inventory. *J Voice* 1997; 11:443–451.
- 20 Yiu EML. Impact and prevention of voice problems in the teaching profession: embracing the consumers' view. *J Voice* 2002; 16:215–228.
- 21 Lee SY, Lao XQ, Yu IT. A cross-sectional survey of voice disorders among primary school teachers in Hong Kong. *J Occupat Health* 2010; 52:344–352.
- 22 Green G. The interrelationship between vocal and psychological characteristics: a literature review. *Aust J Hum Commun Dis* 1988; 16:31–43.
- 23 Wan CC. *Correlation of voice problems and emotional status in teachers*. The University of Hong Kong; 14 May 1999 [Dissertation].
- 24 Cohn JR, Spiegel JR, Sataloff RT. Vocal disorders and the professional voice user: the allergist's role. *Ann Allergy Asthma Immunol* 1995; 74:363–376.
- 25 Gotaas C, Starr CD. Vocal fatigue among teachers. *Folia Phoniatr* 1993; 45:120–129.
- 26 Simberg S, Sala E, Vehmas K, Laine A. Changes in the prevalence of vocal symptoms among teachers during a twelve-year period. *J Voice* 2005; 19:95–102.
- 27 Preciado J, Pérez C, Calzada M, Preciado P. Frequency and risk factors of voice disorders among teaching staff of la Rioja, Spain. Clinical study: Questionnaire, function vocal examination, acoustic analysis and videolaryngostroboscopy. *Acta Otorhinolaringol Esp* 2005; 56:161–170.
- 28 Morrison M, Rammage L. *The management of voice disorders*. San Diego: Singular Publishing Group; 1994.
- 29 Krischke S, Weigelt S, Hoppe U, Köllner V, Klotz M, Eysholdt U, et al. Quality of life in dysphonic patients. *J Voice* 2005; 19:132–137.
- 30 Dietrich M, Verdolini Abbott K, Gartner Schmidt J, Rosen CA. The frequency of perceived stress, anxiety and depression in patients with common pathologies affecting voice. *J Voice* 2008; 22:472–488.
- 31 Schneider B, Bigenzahn W. Vocal risk factors for occupational voice disorders in female teaching students. *Eur Arch Otorhinolaryngol* 2005; 262:272–276.
- 32 Goldman SL, Hargrave J, Hillman RE, Holmberg E, Gress C. Stress, anxiety, somatic complaints and voice use in women with vocal nodules: preliminary findings. *Am J Speech Lang Pathol* 1996; 5:44–52.
- 33 Yano J, Ichimura K, Hoshino T, Nozue M. Personality factors in pathogenesis of polyps and nodules of vocal cords. *Auris Nasus Larynx* 1982; 9: 105–110.
- 34 Bhuta T, Patrick L, Garnett JD. Perceptual evaluation of voice quality and its correlation with acoustic measurements. *J Voice* 2004; 18:299–304.
- 35 De Alvear RB, Martínez Arquero G. Teachers' voice disorders collateral effects. *Otorinolaryngologia* 2009; 8:129–135.
- 36 Benninger MS, Sataloff RT. The evaluation of outcomes and quality of life in individuals with voice disorders. *J Singing* 1999; 56:39–43.
- 37 Behlau M, Hogikyan ND, Gasparini G. Quality of life and voice: Study of a Brazilian population using the voice-related quality of life measure. *Folia Phoniatr Logop* 2007; 59:286–296.
- 38 Ghandour H, Nassar J, Shoeib R. Correlation between voice handicap index scores and both acoustic measures and grade of dysphonia in non-organic voice disorders. *Sci J Az Med Fac (girls)* 2007; 28:559–568.
- 39 Jones SM, Carding PN, Drinnan MJ. Exploring the relationship between severity of dysphonia and voice-related quality of life. *Clin Otolaryngol* 2006; 31:411–417.