

# Impact of voice disorders and microlaryngeal surgery on psychological profiles of Arabic-speaking professional and nonprofessional voice users

Ayatallah Sheikhany<sup>a</sup>, Ahmed Atef<sup>b</sup>, Osama Refaat<sup>c</sup>, Ahmad Al Ali<sup>d</sup>

Departments of <sup>a</sup>Phoniatrics,

<sup>b</sup>Otorhinolaryngology, <sup>c</sup>Psychiatry, Faculty of Medicine, Cairo University, Cairo, Egypt, <sup>d</sup>ENT Specialist

Correspondence to Ayatallah Sheikhany, Lecturer of Phoniatrics, Department of Phoniatrics, Faculty of Medicine, Cairo University, Cairo, Egypt.  
Tel: +20 128 401 4401;  
e-mail: ayasheikhany@gmail.com

**Received** 8 December 2018

**Accepted** 1 February 2019

**The Egyptian Journal of Otolaryngology**  
2019, 35:182–188

## Introduction

Voice disorders that impair normal social communication may cause subsequent emotional distress and are significantly associated with greater risk of anxiety and depression. The occurrence of vocal symptoms and voice disorders in professions where voice is an essential tool may cause stress and anxiety to the professionals suffering from them. Voice disorders in professionals have a major psychoemotional and social impact because they can threaten, shorten, or even end teachers' and singers' careers.

## Aim of the work

Psychological impact of various voice disorders of professional and nonprofessional voice users has not yet been adequately studied according to the authors' knowledge in the Egyptian population. It is therefore of great importance to shed light on the psychological impact of voice disorders on patients in an attempt to improve the quality of life of those patients.

## Patients and methods

During the period of 6 months from June 2014 to December 2014, 40 patients were included prospectively in this work.

## Results and conclusion

Professional voice users are more susceptible to psychological diseases than nonprofessional voice users. The degree of improvement postoperatively in professional voice users was statistically significant in all assessments of this study when compared with the nonprofessional voice users except in self-confidence and worth (Rosenberg self-esteem test). The best degree of improvement postoperatively was detected in the professional voice physically according to Jacobson scoring guidelines. There was a moderate relation between dysphonia and anxiety and depression according to the Voice Handicap Index and Kessler psychological distress scale results in this study.

## Keywords:

dysphonia, nonprofessional, professional, psychological, Voice Handicap Index

Egypt J Otolaryngol 35:182–188

© 2019 The Egyptian Journal of Otolaryngology  
1012-5574

## Introduction

A professional voice user is anyone whose voice is integral to earn a living. Although singers and actors remain the elite and most encountered group of professional voice users, teachers, lawyers, physicians, politicians, salespersons, receptionists, and radio jockeys all fall under the umbrella of this increasingly widening group of professional voice users. In today's world, the importance of the role of our voice, in society, is an undisputed fact. It should be kept in mind that treating or restoring a person's voice is often in fact changing or restoring their complete personality [1].

Professional voice users have more self-reported voice problems and vocal disability than nonprofessionals [2]. Voice disorders in professionals have a major psychoemotional and social impact because they can threaten, shorten, or even end teachers' and singers' careers [3].

In professional voice users, the strain on the voice may initially play a greater role than personality, but it is only in conjunction with the specific personality and perhaps with other factors (stress, allergy, nicotine, gastroesophageal reflux, etc.) that a voice disorder will result in psychological and emotional disorders as well [4].

The prevalence and type of pathologies in the larynx in professional voice users are not well documented; the common pathologies reported are laryngopharyngeal reflux, laryngitis from voice overuse, benign vocal fold lesions, and those due to aging [5]. Care of patients who use their voices professionally requires knowledge

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

and skills not easily mastered within the field of otolaryngology alone. The care for this population is usually through a multidisciplinary team. The laryngologist enlists the expertise of speech language pathologists/phoniatricians to retrain and rehabilitate the professional voice patient. A team approach is mandatory and has been strengthened over the past decade by the establishment of several multidisciplinary voice centers [6].

The voice can be described as an emotional part of each person's 'barometer of emotions.' Studies have indicated that articulatory and laryngeal structures and respiratory muscle activity patterns change in relation to 10 different emotions. This finding indicates an emotional/psychological connection to the voice [7,8].

Stress may reduce social efficiency, affect behavior, and disturb voicing. Also, the occurrence of vocal symptoms and voice disorders in professions where voice is an essential tool may cause stress and anxiety to the professionals suffering from them [8,9].

A voice disorder of any kind particularly when it is persistent can threaten a professional voice user's sense of self-identity, joy of living, and decreased professional self-esteem at significantly higher incidence rates. This, in turn, can trigger a vicious cycle of voice disorder—>emotional distress—>exacerbation of voice disorder [10].

Voice disorders can result in negative physical, social, emotional, psychological health consequences, and can negatively affect communication functioning. Based on the focus group data, such symptoms lead to decreased self-esteem, increased relationship strain, fatigue, frustration, and higher stress levels. Poorer physical and psychological health outcomes may directly result from voice disorders or stem from the normal process of aging. Voice disorders that impair normal social communication may cause subsequent emotional distress and are significantly associated with greater risk of anxiety and depression [11–16].

### Aim of the work

Psychological impact of various voice disorders of professional and nonprofessional voice users has not yet been adequately studied according to the authors' knowledge in the Egyptian population. It is therefore of great importance to shed light on the psychological impact of voice disorders on patients in an attempt to improve the quality of life of those patients.

### Patients and methods

During the period of 6 months from June 2014 to December 2014, 40 patients were examined, 18 men and 22 women, their age ranged from 18 to 63 years at the time of study. They came complaining of change of voice of at least 1 month duration and were diagnosed to have benign vocal fold lesions.

The patients were recruited according to the following inclusion and exclusion criteria:

Inclusion criteria: having benign vocal fold lesions, patients of age between 18 and 65 years, informed consent to participate in these studies.

Exclusion criteria: patients with lesions suspected to be malignant, patients below 18 and above 65 years old, and previous microlaryngeal surgeries (MLSs).

All patients were subjected to history taking including sociodemographic data, present and past medical history, present medications. This history taking was necessary to identify the potential contributing factors, such as thyroid disease and smoking history. Vocal history with careful attention paid to patterns of vocal behavior (including occupational use and social behaviors) that may provide clues to contributory vocal overuse, vocal misuse, and vocal abuse (i.e. phonotrauma). History of excessive talking, prolonged and excessive loudness, use of inappropriate pitch, excessive cough, and throat clearing which are some of the vocally abusive behaviors as well as the state of vocal hygiene was also taken. Voice assessment: the Voice Handicap Index (VHI) was used to measure the physical, functional, and emotional aspects of the voice. The threshold for significant change was based on values determined by during the validation of the questionnaire. Either flexible or rigid laryngoscopic examination and video documentation of preoperative and postoperative findings was done for accurate diagnosis, record keeping as well as for medicolegal importance.

Psychological assessments: the psychological assessment of the voice-handicapped patients consisted of two components:

- (1) The Kessler psychological distress scale (K-10) (administered preoperatively and postoperatively); it is a short scale of mental health. This brief self-report instrument consists of 10 items and is designed to measure the level of distress in clinical and population surveys [17,18].
- (2) The Rosenberg self-esteem (RSE) scale (administered preoperatively and postoperatively).

A 10-item scale that measures global self-worth, measuring both positive and negative feelings about the self. The scale is believed to be unidimensional. All items are answered using a four-point Likert scale format ranging from strongly agree to strongly disagree [19].

All patients were subjected to MLS with cold instruments to excise the benign vocal fold lesions (polyp, cyst, granuloma, nodule), either using the microflap technique or the truncation technique with pedunculated lesion.

#### Postoperative follow-up (1 month)

The VHI, the Kessler psychological distress scale (K-10), and the RSE scale were repeated after 1 month postoperatively from the surgery; total scores and subscale scores were calculated. Laryngeal examination was done with flexible nasopharyngeal laryngoscope to evaluate gross vocal fold appearance, any scars, and the integrity of mucosal waves.

## Results

This study was conducted on 40 patients who are professional voice users, aged between 18 and 63 years with a mean±SD age of 41.35±8.946 years ( $n=20$ ) and a mean±SD age of 40.70±12.616 years old of the nonprofessional voice users ( $n=20$ ), complaining of persistent change of voice for 1 month or more and were diagnosed with benign vocal fold lesions.

All patients were subjected to MLS using cold instruments to excise the benign vocal fold lesions. The VHI, the Kessler psychological distress scale (K-10), and the RSE scale were answered by all the patients preoperatively and repeated after 1 month postoperatively.

Table 1 shows the following results for professional voice users.

Their age ranged between 18 and 63 years with a mean age of 41.35±8.946 years. The duration of the lesions ranged between 2 and 24 months with a mean duration of 8.05±5.511 months. There was a significant reduction in the mean values of total VHI scores as well as all its subscales (functional, physical, and emotional subscales) in the professional voice users 1 month postoperatively as compared with preoperative scores from severe voice handicap to mild voice handicap. There was a significant reduction in the mean values of Kessler psychological distress scale scores in the patients 1 month postoperatively as compared with preoperative scores, from moderate to mild likelihood mental illness. There was an increase in the mean values of Rosenberg self-esteem scale scores in the patients 1 month postoperatively as compared with preoperative scores from moderate to high self-worth.

Table 2 shows the following results of nonprofessional voice users.

The age ranged between 18 and 63 years with a mean age of 40.70±12.616 years. The duration of the lesions ranged between 2 and 24 months with a mean duration of 8.10±5.409 months. There was a significant reduction in the mean values of total as well as all subscales (functional, physical, and emotional) VHI scores in the patients 1 month postoperatively as compared with preoperative scores from moderate handicap to minimal handicap. There was a significant reduction in the mean values of Kessler psychological distress scale scores in the patients 1 month postoperatively as compared with preoperative scores from moderate likelihood mental illness to mild likelihood mental illness. There was an increase in the mean values of RSE scale scores in the patients 1 month postoperatively as compared with preoperative scores from moderate to high self-worth.

Table 3 shows the preoperative versus postoperative results comparison for the whole group under study (professional and nonprofessional voice users).

**Table 1 Relation between different components of professional voice users (N=20) preoperatively and postoperatively**

	Preoperative (mean±SD)	Postoperative (mean±SD)	Differences %	P value
Age (years)	41.35±8.946		–	–
Duration of the lesion (months)	8.05±5.511		–	–
Total VHI	71.20±25.647 (48.8%)	4.55±5.969 (3.972%)	–44.83	0.000
VHI (functional subscale)	21.85±7.969 (54.62%)	0.50±1.100 (1.25%)	–53.37	0.068
VHI (physical subscale)	27.20±10.294 (68%)	2.60±3.393 (6.4%)	–61.6	0.000
VHI (emotional subscale)	22.15±11.089 (55.37%)	1.45±2.164 (3.62%)	–51.75	0.004
Kessler psychological distress scale	25.30±5.904 (50.6%)	13.70±4.566 (27.4%)	–23.2	0.000
Rosenberg test	30.65±3.870 (76.62%)	34.50±3.487 (86.25%)	+9.63	0.000

VHI, Voice Handicap Index. Significant correlation of P value ( $P<0.05$ ).

**Table 2 Relation between different components of nonprofessional voice users (N=20) preoperatively and postoperatively**

	Preoperative (mean±SD)	Postoperative (mean±SD)	Differences %	P value
Age (years)	40.70±12.616		–	–
Duration of the lesion (months)	8.10±5.409		–	–
Total VHI	57.20±25.655 (47.7%)	4.50±4.466 (3.75%)	–43.95	0.000
VHI (functional subscale)	16.85±9.433 (42.12%)	0.90±1.294 (2.25%)	–39.9	0.024
VHI (physical subscale)	19.85±9.767 (49.62%)	1.80±1.936 (4.5%)	–45.12	0.002
VHI (emotional subscale)	20.50±8.924 (51.25%)	1.80±1.881 (4.5%)	–46.75	0.001
Kessler psychological distress scale	24.20±7.310 (48.4%)	14.20±3.861 (28.4%)	–20	0.000
Rosenberg test	29.55±6.262 (73.87%)	35.05±4.298 (87.62%)	+13.75	0.000

VHI, Voice Handicap Index. Significant correlation of *P* value (*P*<0.05).

**Table 3 Comparison of preoperative versus postoperative of different assessments statistics of professional and nonprofessional voice users**

	Preoperative (mean±SD)	Postoperative (mean±SD)	Differences %	P value
Total VHI	64.20±26.293 (53.5%)	4.52±5.203 (3.54%)	–49.96	0.000
VHI (functional subscale)	19.35±8.983 (48.37%)	0.70±1.203 (1.75%)	–46.62	0.000
VHI (physical subscale)	23.52±10.581 (58.8%)	2.20±2.757 (5.5%)	–53.3	0.000
VHI (emotional subscale)	21.32±9.970 (53.3%)	1.62±2.009 (4.05%)	–49.25	0.000
Kessler psychological distress scale	24.75±6.582 (49.5%)	13.95±4.181 (27.9%)	–21.6	0.000
Rosenberg test	30.10±5.168 (75.25%)	34.78±3.873 (86.95%)	+11.7	0.000

VHI, Voice Handicap Index. Significant correlation of *P* value (*P*<0.05).

There was a significant reduction in the mean values of total as well as all subscales (functional, emotional, and physical) VHI scores in the patients 1 month postoperatively as compared with preoperative scores from severe voice handicap to minimal voice handicap.

There was a significant reduction in the mean values of Kessler psychological distress scale scores in the patients 1 month postoperatively as compared with preoperative scores from moderate likelihood mental illness to mild likelihood mental illness. There was an increase in the mean values of RSE scale scores in the patients 1 month postoperatively as compared with preoperative scores from moderate to high self-worth.

## Discussion

This prospective, real-world study shown an important gap in our knowledge of the extent of psychological factors that contribute to voice disorders among professional and nonprofessional voice users. The measurement of psychological distress is vital to monitor the mental health of both individuals and populations at a given point in time and in determining the extent and determinants of trends in mental health over time.

In recent years, subjective quality of life has gained an increasing importance in clinical practice. Following the recommendation by the European Laryngological Society, it is routinely assessed in dysphonic patients. Psychological consequences need to be evaluated by the

patients themselves instead of judgment given by another person. That is what we did in this study by detecting these psychological consequences generally as in Kessler scale (K-10) and RSE. The VHI is regarded as the 'gold standard.' It reflects a patient's judgment about the impact of his voice disorder on daily life and can also be used as a tool for outcome measurement [20].

In this study, emphasis is made on studying the impact of MLS on the psychological profile of Egyptian professional versus nonprofessional voice users for the first time according to our knowledge.

Results in Table 1 show the scoring values of professional voice users assessments preoperatively and postoperatively. According to Jacobson scoring guidelines, Table 1 explains the mean value of total VHI score before MLS which was 71.20 (48.8%) which is classified as a severe voice handicap compared with the VHI score after 1 month which was reduced to 4.55 (3.972%), which is classified as a minimal voice handicap with a degree of improvement of about 91.86% in the voice. There was a statistically significant reduction in the total VHI scores postoperatively with a significant level of reliability (*P*<0.05) when compared with the parameters before and after the surgery, respectively; this result is advocating the same findings that Sethi *et al.* [21].

Results in Table 1 show a significant correlation between the preoperatively physical and emotional



VHI score compared with 1 month postoperatively. The physical subscale domain in Table 1 of VHI [27.20 (68%)] was found to be higher than the other two domains [functional subscale 21.85 (54.62%)] and emotional subscale [22.15 (55.37%)]. This was in agreement with the results of Hsiung *et al.* [22]. This is due to a higher familiarity and association of the patients with the physical symptoms of voice disorders as compared with the functional and emotional symptoms due to the effect of the benign pathological lesion on voice that prevents them to perform their livelihood work in a good manner. Each VHI subscale parameter provided a significant level of reliability ( $P < 0.05$ ) when compared with other VHI parameters before and after the surgery which is also similar to what Sethi *et al.* [21] found in their study in 2012.

Results in Table 1 show that there was a significant correlation in the mean values of the Kessler psychological distress scale scores postoperatively (13.70, 27.4%) (mild likelihood of mental illness) as compared with preoperative scores 25.30 (50.6%) (moderate likelihood of mental illness) with a degree of improvement of about 45.84% and significant level of reliability ( $P < 0.05$ ). That there was an improvement in the mental health and particularly decreased anxiety and depression among the professional voice users postoperatively and led to improvement in the patients' quality of life. Upon reviewing the literature done about studies on professional voice users, there were no similar results describing the psychological profiles. This could be explained by the fact that surgeons always study the degree of improvement of the disease itself without giving much attention to wider scales of improvement such as emotional, social, and physical well beings.

Results in Table 1 show that there was a significant correlation in the mean values of RSE scale scores postoperatively (34.50, 86.25%) (higher self-worth), as compared with the preoperative scores (30.65, 76.62%) (moderate to high self-worth) with a degree of improvement of about 12.56% and significant level of reliability ( $P < 0.05$ ). This means that there was an increase in professional self-confidence postoperatively, that led to more courage to return to their work and audience.

#### Nonprofessional voice users

Table 2 shows the results obtained for the assessment of nonprofessional voice users. There was a significant reduction between total VHI scores of the mean values preoperatively (57.20, 47.7%) (moderate voice handicap) when compared with after 1 month after

surgery, which shows the mean values postoperatively (4.50, 3.75%) (minimal voice handicap) with a degree of improvement of about 92.13%. This indicates a statistically significant reduction in the total VHI scores postoperatively, and a significant level of reliability ( $P < 0.05$ ) when compared with the parameters before and after the surgery, respectively, this result is in agreement with Neibudek-Bogusz *et al.* [23] in their study in 2010.

Results in Table 2 show a significant reduction between the preoperatively functional, physical and emotional VHI scores when compared with 1 month postoperatively. The emotional subscale domain in Table 2 of VHI [20.50 (51.25%)] was found to be higher than the other two domains [functional subscale 16.85 (42.12%) and physical subscale 19.85 (49.62%)], which is due to the fact that nonprofessional voice users were not dependent on their voice for livelihood but for their social and emotional well-being and the effect on their social communications and relationships was of greater impact on them than the functional or physical aspects. Each VHI subscale parameters provided a significant level of reliabilities ( $P < 0.05$ ) when compared with the VHI subscales parameters before and after the surgery; this is also in agreement with in their study in 2010.

Results in Table 2 show that there was a significant reduction in the mean values of Kessler psychological distress scale scores postoperatively (14.20, 28.4%) (mild likelihood mental illness) when compared with the score preoperatively (24.20, 48.4%) (moderate likelihood mental illness) with a degree of improvement of about 41.32% and a significant level of reliability ( $P < 0.05$ ). This indicates that there is a significant decrease in psychological symptoms especially anxiety and depression among nonprofessional voice users postoperatively and led to improvements in the patients' quality of life. Upon reviewing the literature done about studies on nonprofessional voice users, there were no similar results on the psychological profiles. This was previously explained in the professional voice users' domain.

Results in Table 2 show that there was a significant increase in the mean values of RSE scale scores postoperatively (35.05, 87.62%) (higher self-worth), as compared with preoperative scores (29.55, 73.87%) (moderate to high self-worth) with a degree of improvement about 13.75% and significant level of reliability ( $P < 0.05$ ). This means that there was an increase in nonprofessional self-confidence postoperatively which was even more than

the improvement in the professional voice users. This could be justified since the professionals were much more aware and affected by their voice problems and even though the postoperative improvement was noticed, it was not as noticeable as the nonprofessionals.

#### Combined group (professional and nonprofessional) voice users

Results in Table 3 concerned with the combined results of both groups of professional and nonprofessional voice users according to the preoperative and postoperative scores which shows that a significant reduction in the mean value of total VHI scores postoperatively 4.52 (3.54%) (minimal voice handicap) as compared with preoperatively 64.20 (53.5%) (severe voice handicap) with a degree of improvement of about 93.33% and significant level of reliability ( $P<0.05$ ) when compared with the parameters before and after the surgery, respectively. These results are also in agreement with the results obtained in a study done by Sethi *et al.* [21].

The three VHI subscales scores in Table 3 show a significant reduction in their mean values as follows: the mean obtained for functional subscale score preoperatively was 19.35 (48.37%) (severe voice handicap) and the mean obtained postoperatively was 0.70 (1.75%) (minimal voice handicap) with a degree of improvement of 96.38% and significant reliability value ( $P<0.05$ ). The mean obtained for the physical subscale score preoperatively shows 23.52 (58.8%) (severe voice handicap) which was reduced postoperatively to 2.20 (5.5%) (minimal voice handicap), with a 90.64% degree of improvement and a significant reliability value ( $P<0.05$ ) and the mean obtained for emotional subscale score preoperatively was 21.32 (53.3%) (severe voice handicap) while it was decreased postoperatively to 1.62 (4.05%) (minimal voice handicap) with a 92.40% degree of improvement and a significant reliability value ( $P<0.05$ ). The functional subscale score domain in the degree of improvement over the physical and emotional subscale scores in both groups of professional and nonprofessional voice users.

The results in Table 3 show that there was a significant reduction in the mean value of the Kessler psychological distress scale scores postoperatively with a mean value of 13.95 (mild likelihood mental illness) as compared with the preoperatively mean value of 24.75 (moderate likelihood mental illness) with an improvement degree of about 43.63%, indicating a significant decrease in the psychological problems

especially anxiety and depression with significant reliability value ( $P<0.05$ ).

RSE scale scores show a significant reduction in the postoperative mean value of 34.78 (higher self-worth) as compared with the preoperatively mean value of 30.10 (moderate to high self-worth) with an improvement degree of about 15.55% indicating an increase in the patient self-confidence as shown in Table 3.

#### Conclusion

Professional voice users are more susceptible to psychological diseases than nonprofessional voice users. The degree of improvement postoperatively in professional voice users was statistically significant in all assessments of this study when compared with the nonprofessional voice users except in self-confidence and worth (Rosenberg self-esteem test). The best degree of improvement postoperatively was detected in the professional voice physically according to the Jacobson scoring guidelines. There was a moderate relation between dysphonia and anxiety and depression according to the VHI and Kessler psychological distress scale results in this study.

#### Financial support and sponsorship

Nil.

#### Conflicts of interest

There are no conflicts of interest.

#### References

- 1 Nerurkar NK, Kirtane MV, Bhattacharyya AK. Special considerations for the professional voice users. *Laryngol Otorhinolaryngol Head Neck Surg* 2014; 36:324.
- 2 Rosen CA, Murry T. Voice Handicap Index in singers. *J Voice* 2000; 14:370–377.
- 3 Chen SH, Chiang SC, Chung YM, Hsiao LC, Hsiao TY. Risk factors and effects of voice problems for teachers. *J Voice* 2010; 24:183–190.
- 4 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.
- 5 Franco RA, Andrus JG. Common diagnoses and treatments in professional voice users. *Otolaryngol Clin North Am* 2007; 40:1025–1061.
- 6 Cipriani NA, Martin DE, Corey JP, Portugal L, Caballero N, Lester R, *et al.* The clinicopathologic spectrum of benign mass lesions of the vocal fold due to vocal abuse. *Int J Surg Pathol* 2011; 19:583–587.
- 7 Aronson AE. *Clinical voice disorders*. 3rd ed. Stuttgart, New York: Georg Thieme Verlag; 1990.
- 8 Roy N, Bless DM, Heisey D. Personality and voice disorders: a multi trait-multi disorder analysis. *J Voice* 2000; 4:521–548.
- 9 Wellens W, Van Opstal M. Performance stress in professional voice users. *Occupational voice – care and cure*. The Hague: Kugler Publications; 2001. 81–100.
- 10 Rosen DC, Heuer RJ, Levy SH, Sataloff RT. *Psychological aspects of voice disorders. Vocal health and pedagogy: science and assessment*. Vol II. San Diego, CA: Plural Publishing; 2006. 159–186

- 11 Ma EPP, Yiu EML. Voice activity and participation profile: assessing the impact of voice disorders in daily activities. *J Speech Lang Hear Res* 2004; 44:511–524.
- 12 Kooijman PG, De Jong FI, Thomas G, Huinck W, Donders R, Graamans K, Schutte HK. Risk factors for voice problems in teachers. *Folia Phoniatr Logop* 2006; 58:159–174.
- 13 Seifert E, Kollbrunner J. An update in thinking about nonorganic voice disorders. *Arch Otol Head Neck Surg* 2006; 132:1128–1132.
- 14 Plank C, Schneider S, Eysholdt U, Schutzenberger A, Rosanowski F. Voice and health-related quality of life in the elderly. *J Voice* 2011; 25:265–268.
- 15 Spina AL, Maunsell R, Sandalo K, Gusmao R, Crespo A. Correlation between voice and life quality and occupation. *Braz J Otorhinolaryngol* 2009; 75:275–279.
- 16 Elam JC, Ishman SL, Dunbar KB, Clarke JO, Gourin CG. The relationship between depressive symptoms and Voice Handicap Index scores in laryngopharyngeal reflux. *Laryngoscope* 2010; 120:1900–1903.
- 17 Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand SL, *et al*. Short screening scales to monitor population prevalences and trends in nonspecific psychological distress. *Psychol Med* 2002; 32:959–976.
- 18 Baillie AJ. Predictive gender and education bias in Kessler's psychological distress Scale (K10). *Soc Psychiatry Psychiatr Epidemiol* 2005; 40:743–748.
- 19 Rosenberg M. Society and the adolescent self-image. Princeton, NJ: Princeton University Press; 1965.
- 20 Dejonckere PH, Bradley P, Clemente P, Cornut G, Crevier-Uchmann L, Friedrich G, *et al*. A basic protocol for functional assessment of voice pathology, especially for investigating the efficacy of (phonosurgical) treatments and evaluating new assessment techniques: guidelines elaborated by the Committee on Phoniatrics of the European Laryngological Society (ELS). *Eur Arch Otorhinolaryngol* 2001; 258:77–82.
- 21 Sethi A, Datta R, Mishra AK, Singh SP, Sangwan P. *J Laryngol Voice* 2012; 2.
- 22 Hsiung MW, Pai L, Wang HW. Correlation between voice handicap index and voice laboratory measures in dysphonic patients. *Eur Arch Oto-Rhino-Laryngol* 2002; 259:97–99.
- 23 Neibudek-Bogusz E, Woznicka E, Zamsłowska-Szmytko E, Sliwinska-Kowalska M. Correlation between acoustic parameters and voice handicap index in dysphonic teachers. *Folia Phoniatr Logop* 2010; 62:55–60.