



Original Article

Prevalence and Risk Factors of Voice Disorders in University Teaching Faculty Members: A Pilot Study

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ABSTRACT

Background: Voice disorder is a multifactorial impairment. Several studies have shown that there is a direct relationship between voice problems and voice-related jobs. Therefore, professional voice users, including teachers, are at high risk of voice disorders, which threatens the employment positions. Also, the investigation of voice impairments among faculty members seems essential. The purpose of this study is to assess the prevalence of voice disorders in faculty members, its impact on the physical, emotional, and functional status of this job group, with and without voice disorders, and the correlation of voice disorders with some risk factors.

Methods: The participants of this study were 114 university teaching faculty members of Mashhad University of Medical Sciences, with a mean age of 43.95 ± 0.98 years. The current cross-sectional descriptive-analytical study used a demographic questionnaire and Voice Handicap Index (VHI) as the data collection instruments. In the present study, based on VHI test results, participants with a total VHI score greater than 14.5 are considered to have voice disorders.

Results: The prevalence of voice disorders among university teaching faculty members was 27.19%. There was a significant correlation between allergy and voice disorders ($P=0.04$). Significant differences were also found between the two study groups in terms of the total score of the VHI and its subscales ($P<0.001$).

Conclusion: Considering the 27.19% prevalence of voice disorders among university teaching faculty members and its effect on the total VHI score, our results confirm that education, prevention, and treatment programs are critical to lessen the frequency of voice disorders related to teaching. However, it has been found that this job group with voice disorders is four times more likely to have allergies than those without voice disorder, which indicates the importance of controlling this problem.

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Introduction

Voice disorder [VD] is a multifactorial impairment that various demographic (gender, aging, working conditions, and stressful personality), environmental (air dryness,

environmental noises), lifestyle (smoking, drinking alcohol), and medical (asthma, allergies, and reflux) factors contribute to its development [1].

Several studies have shown that there is a direct relationship between voice problems and voice-related careers [2-6], which is categorized in demographic contributing factors. Therefore, professional voice users (PVU), including teachers, are at a high risk of voice disorders [4, 7].

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Voice disorders can threaten employment [8] and negatively impact a person's quality of life [9, 10]. For example, it is reported that about 20% of teachers are forced to leave their jobs due to voice problems [9]. According to the reports, the prevalence of voice impairment among teachers ranges from 7% to 80% [2, 3, 5, 11-14]. This wide range in results is due to discrepancies in methodological approaches (such as the study sample size, instrumental assessment, and different outcome measures) and the presence of other contributing risk factors (such as asthma, allergies, and air dryness).

It seems that voice disorders can be prevented by eliminating the underlying risk factors. Although most of the risk factors associated with voice impairment are known, the importance of each factor is still unknown due to cultural and environmental differences [2].

Most studies focused on teaching voice disorders have used school teachers with their unique voice demands. University teaching faculty members are another group of PVU with typical voice demands (e.g., talking for prolonged periods of time, working in settings with background noise, and often raising their voice) and quite a different occupational status from teachers in school (e.g., teaching in large lecture rooms and to large audiences). To the best of our knowledge, the only study that examined the prevalence of voice disorders among university teaching faculty members, found they existed in 47 out of a hundred participants [15].

Self-perception questionnaires have proved effective for recording patient's experiences of voice disorders in subjective voice evaluation studies [16-18]. One of the more widely used questionnaires is the Voice Handicap Index (VHI-30), which is a psychometrically validated instrument for measuring the emotional, functional, and physical effects of the patient's voice problems [8]. This questionnaire can be used as a screening tool to differentiate people with voice disorder from those with normal voice [19].

Only a small number of studies have been conducted on voice disorders in university teaching faculty members, despite the fact that this investigation seems essential. Hence, the present study aimed at investigating the prevalence of voice disorders among this job group, its impact on the physical, emotional, and functional status of the teaching staff of the medical university, with and without voice disorders, and the correlation of voice disorders with some risk factors.

Methods

Participants

An email with a link to an online questionnaire was sent to about 800 university teaching faculty members in Mashhad University of Medical Sciences, out of which, 114 questionnaires were completed. The mean age of participants was 43.95 ± 0.98 .

The inclusion criteria were no history of neurological disorders; surgical, vascular, or traumatic injury; voice therapy; smoking; alcohol or drug use; and no cold symptoms at the time of the test.

Procedure

The study protocol was approved by the Ethics Committee of Mashhad University of Medical Sciences. The university teaching faculty members of Mashhad University of Medical Sciences received the questionnaires and some explanations on how to complete them via e-mail, and they were free to fill them out; likewise, 114 completed questionnaires were returned directly to the authors. The current cross-sectional descriptive analytical study used two scales as the data collection instruments:

1) Questionnaire for collecting demographic information as well as questions regarding inclusion criteria and the voice disorder risk factors

2) The 30-item VHI was used to measure the emotional, functional, and physical effects of the patients' voice problems. The items were scored based on a five-point Likert scale as follows: "never=0", "almost never=1", "sometimes=2", "almost always=3", and "always=4". The cutoff point of the VHI score was calculated for the Persian version, which was 14.5, with a sensitivity of 92% and specificity of 95% [20].

Participants were divided into two groups with voice disorders ($VHI \leq 14.5$) and without voice disorders ($VHI > 14.5$), based on their VHI scores. Participants with a score greater than 14.5 were categorized as having voice disorders.

Statistical Methods

The scores were obtained from the questionnaires and entered into the Stata software (version 14) for analysis. The descriptive analysis involves finding the mean of parameters and determining the prevalence of voice disorders. The analytical analysis includes evaluating the mean differences between VHI scores in subjects with or without voice disorder, using an independent t-test; the correlation of independent variables with voice disorders, using logistic regression. In order to construct a logistic regression model, the relationship between individual independent variables and the variable of voice disorders was firstly monitored in a one-way manner. Then, the variables with P values < 0.2 were selected for the final model.

Results

The prevalence of voice disorders among university teaching faculty members of Mashhad University of Medical Sciences was 27.19%. Demographic information of the faculty studied is presented in Tables 1 and 2, based on subjects with and without voice disorders. In terms of the risk factors affecting voice disorders, a significant correlation was observed only between allergy and voice disorders ($P=0.04$) (Table 3).

Table 4 shows the total score of the VHI and its subscales for the subjects with and without voice disorders. According to the table, the physical aspect was most affected in subjects with voice disorders. There was a significant difference between the two groups of university teaching faculty members in terms of the total score of the VHI and its subscales ($P < 0.001$).

Table 1: Frequency Distributions, Odds Ratio, and Confidence Interval of Descriptive information According to Teacher Status

		Normal voice	Voice Disorder	P value	OR*	95% CI**
Sex	Male	80.50%	19.44%	0.47	0.56	0.11 – 2.73
	Female	84.62%	15.38%			
Marital status	Single	66.67%	33.33%	-	-	-
	Married	73.96%	20.04%			
Infection	No	75.73%	24.27%	0.44	2.72	0.20 – 36.15
	Yes	45.45%	54.55%			
Allergy	No	53.6%	19.4%	0.04	4.70	1.0 – 20.96
	Yes	72.4%	10.6%			

*OR: Odds Ratio; **CI: Confidence Interval

Table 2: Mean and Standard Deviation of Descriptive Information According to Teacher Status

			P value	OR*	95% CI**
Work experience (years)	Normal	11.76 (8.52)	0.98	1.00	0.91 - 1.09
	Disorder	11.48 (7.75)			
	Total	11.68 (8.29)			
Teaching per hours	Normal	13.44 (6.83)	0.73	0.97	0.85 – 1.11
	Disorder	15.83 (6.93)			
	Total	14.12 (7.50)			
Age (years)	Normal	43.82 (8.05)	-	-	41.97 – 45.91
	Disorder	44.53 (8.97)			
	Total	43.95 (0.93)			

*OR: Odds Ratio; **CI: Confidence Interval

Table 3: Multiple Logistic Regression Model for the Association of Independent Variables with Dichotomized Voice Handicap Index (VHI) score (Disorder-normal)

Independent variables		OR*	95% CI**	P value
Sex	Male (reference)	0.56	0.11 – 2.73	0.47
	Female			
Infection	No (reference)	2.72	0.20 – 36.15	0.44
	Yes			
Allergy	No (reference)	4.70	1.0 – 20.96	0.04
	Yes			

*OR: Odds Ratio; **CI: Confidence Interval

Table 4: Mean, Standard Deviation, and Standard Error of the Mean of Voice Handicap Index (VHI) and its Subscales

	Voice	N*	Mean	SD**	SEM***
Functional-VHI	Disorder	31	7.32	5.91	1.06
	Normal	82	1.30	1.65	0.18
Physical-VHI	Disorder	31	13.58	4.03	0.72
	Normal	82	2.14	2.38	0.26
Emotional-VHI	Disorder	31	9.41	5.38	0.96
	Normal	82	1.21	1.62	0.17
Total score of VHI	Disorder	31	30.32	13.37	2.40
	Normal	82	4.59	4.44	0.48

*N: Number; **SD: Standard Deviation; ***SEM: Standard Error of the Mean; VHI: Voice Handicap Index

Discussion

Voice disorders can interfere with interpersonal relationships, disrupt human interactions, and cause a decrease in the quality of life by inducing emotional and psychological problems [21]. Such disorders are more prevalent in particular groups of people such as teachers, university teaching faculty members, factory workers, professional singers, lawyers, consultants, etc. [7, 14].

This study aimed at investigating the prevalence of voice disorders in faculty members, its impact on the physical, emotional, and functional status of this job group, with and without voice disorders, and the correlation of voice disorders with some risk factors. In the present study, based on test results, participants with a total VHI score greater than 14.5 are considered to have voice disorders.

The results of data analysis showed that 27.19% of the respondents had voice disorders at the time of completing the questionnaires, which was higher than the prevalence reported in studies by Baiba Trinite et al. (8%) [2], Faham et al. (21%) [6], Mara Behlau et al. (11.6%) [5], and Nelson et al. (11%) [4]. However, Julián Preciado-López et al. [14] and Seifpanahi et al. [3] reported a 57% and 54.6% prevalence of voice disorders among teachers, respectively. Moreover, Higgins and Smith demonstrated that 45% of teaching faculty members suffered from voice disorders [15], which was higher than that of the current study.

The differences between the studies' results may be due to various factors. First, the prevalence of voice disorders among faculty members is different from that among school teachers. It seems people working as faculty

members may not experience the workplace the same as school teachers do. Therefore, these different workplace demands may consequently cause several problems (e.g., voice disorders) with various severities.

Second, the comparison of the present study with the study by Higgins and Smith showed a discrepancy between the results. This can be explained by allergy among the faculty members. The current study results showed a significant difference in allergy rate between participants with and without voice impairment ($P=0.04$ and $OR=4.70$), which is consistent with the results of the study by Nelson et al. [4]. It seems that the findings of the present study, along with those of Nelson et al., supported the role of allergy in the development of voice disorder. The reason can be attributed to excess mucous in the larynx caused by an allergy that interferes in vocal fold vibration and closure of the glottis and can cause vocal symptoms [22].

Bergmann et al. and Jin-Zhun Wu et al. have demonstrated that the risk of allergies increases with air pollution [23, 24]. Furthermore, Joulaei et al. have reported unhealthy levels of air pollution in Mashhad for eight months per year [25]. Moreover, Hemler et al. have shown that inhaling dry air can lead to dehydration of vocal fold tissue, and deteriorate its vibration, consequently [26]. Hence, it can be concluded that allergy is likely to be the common cause of voice disorders among the faculty members of Mashhad University of Medical Sciences. Thus, this difference can be finally interpreted as a consequence of climate and air pollution.

Furthermore, the current study examined the various subscales of VHI (functional, physical, and emotional) in teaching faculty members with and without voice disorder. In terms of the total score of the VHI and all its subscales, there was a significant difference between the two groups of participants with and without voice disorder. The physical subscale of the VHI represents subjective feelings caused by the larynx discomfort, the emotional subscale characterizes the affective reactions caused by voice disorders, and the functional scale includes statements that describe voice disorder impact on performing everyday activities [8]. Among the three subscales of the VHI, the physical aspect was most affected, which was consistent with the results of the study by Trinite [27].

The present study also investigated the correlation between some risk factors and voice disorders in university teaching faculty members. There was no significant difference between female and male subjects in terms of the incidence of voice disorders ($P=0.47$ and $OR=0.56$). These results were consistent with those of Seifpanahi et al. [3] and Higgins and Smith [15]. Meanwhile, Roy et al. [4], and Smolander et al. [28], showed differences in the prevalence of voice disorders between male and female teachers.

In this study, similar to the study by Chen et al. [29], no significant difference was found in the incidence of voice disorders among teachers with different work experiences ($P=0.98$ and $OR=1.00$). According to table 2, the mean work experience in our study was 11.68 years. However, it is reported that one of the effective

factors in causing voice disorders in teachers is having more than 16 years of teaching experience [9], and that could be the explanation of these results. Also, Mojiri et al., found that teachers with more than 15 years of teaching experience reported more vocal disabilities than those with less experience. Along with this, there was no significant difference in the prevalence of voice disorders among participants with different teaching hours ($P=0.73$ and $OR=0.97$).

The last risk factor investigated in the present study was the upper respiratory tract infections. Consistent with Higgins and Smith [15] but unlike the study by Chen et al. [29], there was no significant difference in the prevalence of voice disorders between participants with and without upper respiratory tract infections ($P=0.44$ and $OR=2.72$).

Conclusion

Given the 27.19% prevalence of voice disorders among University teaching faculty members and its effect on the total score of VHI and its subscales, our results confirm that education, prevention, and treatment programs are critical to lessen the frequency and adverse effects of voice disorders related to teaching, as a high-risk profession. However, it has been found that this occupational group with voice disorders is four times more likely to have allergies than those without voice disorder, which indicates the importance of controlling this problem, especially in professional voice users.

Conflict of Interests: None declared.

References

1. Sanssené C, Bardi J, Welby-Gieusse M. Prevalence and Risk Factors of Voice Disorders in French Tour Guides. *J Voice*. 2019;34(6):911-7
2. Trinite B. Epidemiology of Voice Disorders in Latvian School Teachers. *J Voice*. 2017 Jul;31(4):508-e1.
3. Seifpanahi S, Izadi F, Jamshidi A-A, Torabinezhad F, Sarrafzadeh J, Sobhani-Rad D, et al. Prevalence of voice disorders and associated risk factors in teachers and nonteachers in Iran. *J Voice*. 2016;30(4):506. e19-. e23.
4. Roy N, Merrill RM, Thibeault S, Parsa RA, Gray SD, Smith EM. Prevalence of voice disorders in teachers and the general population. *J Speech Lang Hear Res*. 2004.
5. Behlau M, Zambon F, Guerrieri AC, Roy N. Epidemiology of voice disorders in teachers and nonteachers in Brazil: prevalence and adverse effects. *J voice*. 2012 Sep;26(5):665 e9-18.
6. Faham M, Ahmadi A, Drinnan M, Saadatmand N, Fatahi E, Jalalipour M. The effects of a voice education program on VHI scores of elementary school teachers. *J Voice*. 2016;30(6):755. e1-. e11.
7. Williams NR. Occupational groups at risk of voice disorders: a review of the literature. *Occup. Med*. 2003;53(7):456-60.
8. Jacobson BH, Johnson A, Grywalski C, Silbergleit A, Jacobson G, Benninger MS, et al. The voice handicap index (VHI) development and validation. *Am J Speech Lang Pathol*. 1997;6(3):66-70.
9. Roy N, Merrill RM, Thibeault S, Gray SD, Smith EM. Voice disorders in teachers and the general population. *J Speech Lang Hear Res*. 2004.
10. Ma EP, Yiu EM. Voice Activity and Participation Profile. *J Speech Lang Hear Res*. 2001.
11. Ahmadi F, Nasiriani K, Abazari P. Delphi technique. *Iran J Med Educ*. 2008;8(1):19.
12. 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(1):95-102.
13. Munier C, Kinsella R. The prevalence and impact of voice

14. Preciado-Lopez J, Perez-Fernandez C, Calzada-Uriondo M, Preciado-Ruiz P. Epidemiological study of voice disorders among teaching professionals of La Rioja, Spain. *J voice*. 2008;22(4):489-508.
15. Higgins KP, Smith AB. Prevalence and Characteristics of Voice Disorders in a Sample of University Teaching Faculty. *Contemp Issues Commun Sci Disord*. 2012;39: 69-75
16. Tafiadis D, Chronopoulos SK, Helidoni ME, Kosma EI, Voniati L, Papadopoulos P, et al. Checking for voice disorders without clinical intervention: The Greek and global VHI thresholds for voice disordered patients. *Sci Rep*. 2019;9(1):1-9.
17. Olthoff A, Mrugalla S, Laskawi R, Fröhlich M, Stuermer I, Kruse E, et al. Assessment of irregular voices after total and laser surgical partial laryngectomy. *Arch Otolaryngol Head Neck Surg*. 2003;129(9):994-9.
18. Wuyts FL, Bodt MSD, Molenberghs G, Remacle M, Heylen L, Millet B, et al. The dysphonia severity index: an objective measure of vocal quality based on a multiparameter approach. *J Speech Lang Hear Res*. 2000;43(3):796-809.
19. Niebudek-Bogusz E, Kuzańska A, Woznicka E, Sliwinska-Kowalska M. Assessment of the voice handicap index as a screening tool in dysphonic patients. *Folia Phoniatr Logop*. 2011;63(5):269-72.
20. Moradi N, Pourshahbaz A, Soltani M, Javadipour S. Cutoff point at voice handicap index used to screen voice disorders among persian speakers. *J Voice*. 2013;27(1):130. e1-. e5.
21. Kasper C, Schuster M, Psychogios G, Zenk J, Ströbele A, Rosanowski F, et al. Voice handicap index and voice-related quality of life in small laryngeal carcinoma. *Eur Arch Otorhinolaryngol Suppl*. 2011;268(3):401-4.
22. Simberg S, Sala E, Tuomainen J, Rönnemaa A-M. Vocal symptoms and allergy—a pilot study. *J Voice*. 2009;23(1):136-9.
23. Wu J-Z, Ge D-D, Zhou L-F, Hou L-Y, Zhou Y, Li Q-Y. Effects of particulate matter on allergic respiratory diseases. *Chronic Dis Transl Med*. 2018;4(2):95-102.
24. Bergmann K-C. Weather conditions and climate change have an effect on allergies. *Allergo J Int*. 2016;25(5):131-7.
25. Joulaei F, Peiravi R, Esmaily H, Ketabi D, Moteallemi A. Variations of carbon monoxide and particulate matter concentration in Mashhad, Iran, during 2016. *J Community Health Res*. 2017;3(3).
26. Hemler RJ, Wieneke GH, Dejonckere PH. The effect of relative humidity of inhaled air on acoustic parameters of voice in normal subjects. *J Voice*. 1997;11(3):295-300.
27. Trinite B, editor *The Investigation of Voice Handicap Index in Teachers with and without Self-Rated Voice Disorders. Proceedings of the International Scientific Conference Volume III*; 2018.
28. Smolander S, Huttunen K. Voice problems experienced by Finnish comprehensive school teachers and realization of occupational health care. *Logoped Phoniatr Vocol*. 2006;31(4):166-71.
29. Chen SH, Chiang S-C, Chung Y-M, Hsiao L-C, Hsiao T-Y. Risk factors and effects of voice problems for teachers. *J voice*. 2010;24(2):183-92.