

# The Prevalence of Laryngeal Pathologies in an Academic Population

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**Summary: Objective.** The main purposes of the present study were to determine the prevalence of laryngeal pathology and voice disorders and to identify their associated risk factors among the workers, teachers, and nonteachers, from a Portuguese university.

**Study Design.** Cross-sectional study.

**Methodology.** A total of 101 participants have volunteered to participate in a voice survey. Data were collected using a questionnaire followed by the diagnosis of laryngeal pathology based on the videolaryngoscopic examination conducted by experienced otolaryngologists.

**Results.** The mean age of the participants was 43 years. Nearly half of the sample had a diagnosis of pathology, with functional disorders being the most frequent laryngeal pathology. None of the demographic, behavioral, and occupational factors analyzed were statistically associated with laryngeal pathology. Although university teachers do not have an increased risk of laryngeal pathology, self-perceived voice disorders were more prevalent in teachers than in nonteachers. Vocal effort and the number of years teaching have a significant effect on voice disorders prevalence among teachers.

**Conclusions.** Voice disorders have a higher rate of occurrence among university teachers. Demands of teaching, like vocal effort and years of teaching, and not other demographic and/or behavioral factors, are the risk factors that increase the rate of occurrence of voice disorders among the university teachers. Risk factors that predispose to laryngeal pathology were not detected in the present study. However, the high prevalence of functional laryngeal pathologies underlines the importance of further investigation toward this type of laryngeal pathology in this academic population.

**Key Words:** Laryngeal pathology–Voice disorders–Prevalence–Risk factors–University teachers.

## INTRODUCTION

Voice disorders can have significant influence on a person's life, as the voice is an important tool for communication. Psychological, emotional, employment-related problems, effects on family and friends, and reduced quality of life can all arise from voice disorders.<sup>1,2</sup> The relationship between personality and voice problems has been reported,<sup>3</sup> and tends not to support the hypothesis that some personality features have negative effects on vocal disability.

A considerable number of studies have focused on the prevalence of self-perceived voice disorders and risk factors that seem to predispose to their occurrence,<sup>4–7</sup> and teachers, from elementary to secondary teachers, have been extensively studied in this context,<sup>8–22</sup> with few studies focused on university teachers.<sup>23</sup> The results of such studies reveal differences between prevalence values, and a consensus has still not been reached about the most important risk factors for voice disorders. Conflicting definitions of voice disorder and methodological differences in procedures including, range of ages, definition of voice problem, and data collection on selected groups may underlie some of the variations in studies.<sup>24</sup>

The role of laryngeal pathology in voice disorders has received surprisingly little attention.<sup>14,15,25–29</sup> The reason for this lack of attention may result from the tendency only to seek assistance in extreme situations, such as, a burnt throat, sensation of a foreign body in the larynx, or other conditions, and changes from “normal” quality, loudness, or pitch are frequently ignored. However the laryngeal pathology can be the cause of extended periods of sick leave and the need for vocal rehabilitation with or without surgery.<sup>11,30</sup> Significant financial costs are associated with this voice-related absenteeism, for both individuals and organizations where they work.<sup>31</sup>

Few studies have tested the connection between voice disorders and laryngeal pathology in the same population, and this was a peculiarity of the present study. The target group of the study was university teachers, for which little information is available.

## PURPOSES OF THE STUDY

The main purposes of the present study were (1) to determine the prevalence of laryngeal pathologies and voice disorders in an academic population, (2) to identify risk factors that seem to predispose to the occurrence of laryngeal pathologies and voice disorders, and (3) to investigate if laryngeal pathologies and voice disorders have a higher rate of occurrence among university teachers than in other professions.

To address our research questions, the following three parts were evaluated—part I, Analysis of laryngeal pathology and voice disorders in the academic population; part II, Comparison between teachers and nonteachers, and part III, Analysis of laryngeal pathology and voice disorders among teachers.

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## METHODS

### Participants

A total of 101 university teachers and nonteachers (students, researchers, laboratory technicians, administrative staff, telephone operators, and canteen employees), who work or study at a Portuguese university, have volunteered to participate in a voice survey conducted in our laboratory. Most of the participants were female (68%). Both sexes ranged in age from 20 to 63 years; females had a mean age of 46 years (standard deviation = 10.2), and males 43 years (standard deviation = 11.6). University teachers represent about half of the participants; specifically, there were 53.5% teachers ( $n = 54$ ) and 46.5% nonteachers ( $n = 47$ ).

Before going to the physician's office, the participant answered aloud questions included in a questionnaire, in the presence of a speech and language pathologist. Diagnosis of laryngeal pathology was based on a video image system (Xion Medical, Berlin, Germany), that allowed the amplification and recording of the images using a specific software (DIVAS, Xion Medical, Berlin, Germany). To obtain the images two procedures were used, the videolaryngoscope with a rigid optic fiber or the nasolaryngoscope with a flexible optic fiber. The latter procedure was used whenever the participant presented impediments in conducting the rigid laryngoscope. Examination was performed jointly by an otolaryngologist and a speech and language pathologist. Whenever necessary, immediately after the evaluation, the two voice specialists reviewed the video images to confirm the diagnosis. Recommendations of medication, voice therapy, and/or surgery were provided to the participants diagnosed with laryngeal pathology.

The laryngeal diagnoses were organized in groups according to the Verdolini system.<sup>32</sup> (1) healthy (if there were no structural or functional larynx abnormalities or pathology); (2) minor abnormalities (if there was a minor structural or functional larynx variation not interfering with phonation, eg, posterior glottal chink, slight arytenoid asymmetry, slightly reduced anterior-posterior larynx dimension); (3) functional disorders (eg, ventricular phonation; supraglottic tension, and longitudinal gap); (4) discrete mass lesions of the vocal folds (eg, nodules, polyps, and cysts); or (5) distributed vocal tissue changes (eg, Reinke edema and laryngitis).

Informed consent was obtained from all the subjects who participated in the study.

### Data collection/questionnaire

A screening questionnaire has been developed to assess data from all participants during the voice survey. An attempt was made to include most of the factors that may influence voice, using questions designed to cover issues that otolaryngologists and speech and language pathologists commonly experience in their clinical practice with patients with voice symptoms, with a construction similar to the one used by other authors in the past.<sup>9,10,14,33</sup> The questionnaire covered 28 items in six main domains. An attempt was made to present the questions in the form of statements that did not allow for degrees of interpretation: (1) demographic characteristics (gender, age, place of birth, and current

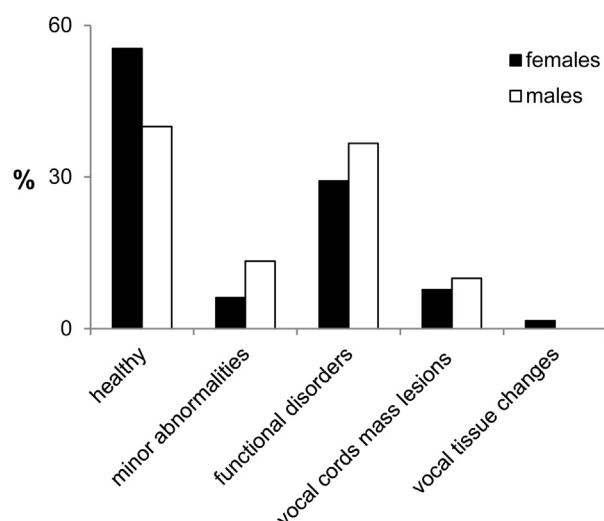
occupation); (2) potential voice-related habits ("How many cups of coffee do you drink daily?"; "How many cups of decaffeinated tea do you drink daily?"; "How many cups of tea with caffeine do you drink daily?"; "How many glasses of carbonated beverages do you drink daily?"; "How many glasses of alcoholic beverages do you drink daily?"; "How many cigarettes do you smoke daily?"); (3) specific vocal activities during an average work day ("Do you talk a lot?"; "Do you talk loud?"; "Do you talk too fast?"; "Do you feel that lately you make more vocal pauses when you talk?"); (4) frequency of voice used in recreational environments ("How frequently do you use your voice in noisy environments?"; "How frequently do you use your voice in smoky environments?"; "How frequently do you use your voice in air-conditioned environments?"); (5) frequency of symptoms and/or signs of voice disorders ("How often do you feel dry throat?"; "How often do you feel burn throat?"; "How often do you feel the sensation of foreign body in the larynx?"; "How often do you feel hoarseness?"; "How often do you feel sore throat?"; "How often you need to clear the throat?"; "How often do you cough?"; and (6) potential voice-related questions for teachers ("How many hours per week do you teach?"; "Since when are do you teach?"; "On average, how many students per class do you teach?"; "Is it noticeable the noise inside the classroom?").

To evaluate the personal habits, data were collected as a categorical variable in number of cups or glasses according to the type of beverage: <1, [1,2], [2,4], or  $\geq 4$ . Number of cigarettes was also collected as a categorical variable: <6, [6,10], or  $\geq 10$ . To evaluate the effects of voice used in different types of recreational environments (noisy, smoky, and with air conditioner), responses were categorized as follows: (1) never, (2) monthly, (3) weekly, or (4) daily. The frequency of symptoms/signs was graded as follows: (1) never, (2) rarely, or (3) often. Prevalence of voice disorders was based on Roy et al<sup>9</sup> question: "For the purposes of this study, we consider a voice disorder to be any time your voice does not work, perform, or sound as you feel normally should, so that interferes with communication. Have you ever had a voice disorder like this?" Possible responses were "yes" or "no." Information regarding medical and surgical history was also elicited.

The questionnaire was made selecting questions from the clinical history included in the guidelines used in our laboratory to diagnose and manage patients with laryngeal pathology. The questionnaire showed high agreement among the speech and language pathologists and otolaryngologists who designed the voice survey. The questionnaire usability in terms of consistency of style and clarity of the language resulted from a consensus between two specialist voice clinicians and two consenting volunteers.

### Statistical methods

Cross-tabulations were used to perform bivariate analyses between selected variables, with statistical significance based on the chi-square test for independence. Equality of means between two independent samples was tested using Student's *t* test. Binary logistic regression was used whenever a significance dependence was analyzed between the predictors and the dependent variable "laryngeal pathology" (absent vs



**FIGURE 1.** Laryngeal diagnoses organized in groups according to the Verdolini system<sup>32</sup>.

present). Odds ratios (ORs) and confidence intervals (CIs) were reported for this type of multivariable analysis. ORs designate the risk of an outcome in a group compared with the risk of the outcome in the comparison group. An OR of 1.0 means no association between variables, greater than 1.0 indicated a positive association and less than 1.0 indicated a negative

association. CIs were computed and when the CI did not overlap the value 1.0, no significant dependence was present between the predictor and the dependent variable.

Tests of significance were based on the 0.05 level. Statistical analysis was performed using the *Statistical Package for Social Sciences Version 17.0* (SPSS Inc, Chicago, IL, USA).

## RESULTS

### Part I—analysis of laryngeal pathology and voice disorders in the academic population

Laryngeal pathology and its relation to age and gender. A total of 101 participants were evaluated in the present study, including teachers, students, researchers, laboratory technicians, administrative staff, telephone operators, and canteen employees. The results indicated that laryngeal pathology was present in 48% of the samples. Figure 1 shows the laryngeal diagnoses organized in groups according to the Verdolini system.<sup>32</sup> Laryngeal diagnoses were not statistically different between males and females ( $\chi^2 = 3.169$  [4];  $P = 0.530$ ). Functional disorders were the most frequent pathology for both sexes.

Participants with and without laryngeal pathology were distributed according to age, gender, place of birth, and occupation (Table 1). Age ranged from 20 to 63 years (mean = 43; sd = 12.4), and females were predominant. A binary logistic regression procedure was used with “laryngeal pathology” (0 = absence vs 1 = presence) being the dependent variable and age and sex being the predictor variables. Laryngeal pathology was not dependent on age (OR, 1.01; 95% CI, 0.97–1.05) and sex (OR, 0.55; 95% CI, 0.23–1.32).

**TABLE 1.**  
Participants Distributed According to Gender, Age, Place of Birth, and Occupation

Characteristic	With Laryngeal Pathology		Without Laryngeal Pathology	
	%	n	%	n
Gender				
Male	37.5	18	26.4	14
Female	62.5	30	73.6	39
Male age (y)				
20–29	11.1	2	14.3	2
30–39	27.8	5	14.3	2
40–49	33.3	6	42.9	6
50–59	16.7	3	21.4	3
≥60	11.1	2	7.1	1
Female age (y)				
20–29	10.0	3	10.3	4
30–39	6.7	2	17.8	7
40–49	43.3	13	30.8	12
50–59	26.7	8	38.5	15
≥60	13.3	4	2.6	1
Place of birth				
Portugal	91.7	44	83.0	44
Other country	8.3	4	17.0	9
Occupation				
Teacher	52.1	25	56.6	30
Nonteacher*	47.9	23	43.4	23

\* Students, researchers, laboratory technicians, administrative staff, telephone operators, and canteen employees.

**TABLE 2.**  
Characteristics of Lifestyle, Voice Use, and Use of Voice in Recreational Environments as Predictors of Laryngeal Pathology (ORs, Odds Ratio; CIs, Confidence Intervals)

Selected Characteristics of Lifestyle (i), Voice Use (ii), and Utilization of Voice in Recreational Environments (iii)		95%CI		
		ORs	Lower	Upper
(i)	Drink coffee	0.82	0.57	1.19
	Drink decaffeinated tea	0.87	0.60	1.27
	Drink tea with caffeine	1.29	0.54	3.09
	Drink carbonated beverages	1.09	0.60	1.96
	Drink alcoholic beverages	1.29	0.54	3.09
(ii)	Talks a lot	1.78	0.56	5.24
	Talks loudly	1.39	0.52	3.73
	Talks too fast	0.70	0.26	1.87
	Shout and yell	0.50	0.20	1.57
	Frequent vocal pauses.	0.78	0.30	1.98
(iii)	Voice use in noisy environments	0.71	0.44	1.14
	Voice use in smoky environments	1.50	0.78	2.87
	Voice use in air-conditioned environments	1.20	0.84	1.71

**TABLE 3.**  
**Participants With and Without Laryngeal Pathology—Relative Frequency of Symptoms/Signs Reported (%) and Comparison of their Mean Frequencies**

Symptom/Sign	Relative Frequency (%)			Mean Frequency	n	t	df	P-Value
	Never (=1)	Rarely (=2)	Often (=3)					
Dry throat								
With laryngeal pathology	31.3	29.2	39.6	2.08	48	−0.353	94	0.725
Without laryngeal pathology	37.5	22.9	39.6	2.02	48			
Burn throat								
With laryngeal pathology	81.3	12.5	6.3	1.25	48	1.345	94	0.182
Without laryngeal pathology	66.7	25.0	8.3	1.42	48			
Sensation of foreign body in the larynx								
With laryngeal pathology	58.3	18.8	22.9	1.65	48	0.493	94	0.623
Without laryngeal pathology	50.0	27.1	22.9	1.73	48			
Hoarseness								
With laryngeal pathology	33.3	20.8	45.8	2.13	48	−1.192	94	0.236
Without laryngeal pathology	37.5	33.3	29.2	1.92	47			
Sore throat								
With laryngeal pathology	89.4	2.1	8.5	1.19	48	−0.038	93	0.970
Without laryngeal pathology	83.3	14.6	2.1	1.19	48			
Clear the throat								
With laryngeal pathology	31.3	27.1	41.7	2.10	48	−0.734	94	0.465
Without laryngeal pathology	33.3	35.4	31.3	1.98	48			
Cough								
With laryngeal pathology	62.5	22.9	14.6	1.52	48	0.391	94	0.697
Without laryngeal pathology	62.5	16.7	20.8	1.58	48			

Laryngeal pathology and its relation to lifestyle, voice use, and use of voice in recreational environments. To study the dependence of laryngeal pathology from lifestyle, voice use, and use of voice in recreational environments, three binary logistic regression procedures were used using “laryngeal pathology” (0 = absence vs 1 = presence) as dependent variable. The addition of gender and age to the model was not statistically significant for all three regression procedures.

To assess the association between lifestyle factors and laryngeal pathology, participants were questioned about several lifestyle characteristics (eg, drinking coffee, drinking decaffeinated tea, drinking tea with caffeine, drinking carbonated beverages, drinking alcoholic beverages, and to be a non-smoker, smoker, or ex-smoker). As smoking was not a common habit it was dropped from the sequent analysis. Laryngeal pathology was not dependent on drinking coffee, drinking decaffeinated tea, drinking tea with caffeine, drinking carbonated beverages, or drinking alcoholic beverages (Table 2). To assess the association between voice use and laryngeal pathology, participants were questioned about several characteristics of voice effort (talking a lot, talking

loudly, talking too fast, shouting or yelling, and doing frequent vocal pauses). Laryngeal pathology was not dependent on voice effort (Table 2). Finally, to assess the association between the use of voice in selected environment types (noisy, smoky, or with air conditioner) and the occurrence of laryngeal pathology, participants were asked to report how frequently they used their voice in these environments. Inspection of Table 2 reveals that laryngeal pathology was not dependent on vocal use in noisy, smoky environments, or air-conditioned environments.

**Laryngeal pathology and the occurrence of voice symptoms/signs.** To assess the association of specific voice symptoms/signs and the occurrence of laryngeal pathology, the questionnaire included a checklist of seven symptoms and participants were instructed to identify the symptoms they had experienced during the last year. Possible responses were “yes” or “no.” The frequency of symptoms/signs was also inquired using a scale of “never,” “rarely,” or “often.” Table 3 shows that the mean frequency of selected symptoms/signs felt by the participants during voice use did not distinguish participants with and without laryngeal pathology.



**TABLE 4.**  
Frequency Distributions of Teachers Compared With Nonteachers According to Gender, Age, and Type of Laryngeal Pathology<sup>32</sup>

Characteristic	Nonteacher		Teachers	
	%	n	%	n
Gender				
Male	31.9	15	31.5	17
Female	68.1	32	68.5	37
Age classes (y)				
20–29	12.8	6	9.3	5
30–39	21.3	10	11.1	6
40–49	29.8	14	42.6	23
50–59	29.8	14	27.8	15
≥60	6.4	3	9.3	5
Type of laryngeal pathology				
Healthy	48.9	23	53.7	29
Minor abnormalities	6.4	3	9.3	5
Functional disorders	31.9	15	31.5	17
Vocal folds mass lesions	12.8	6	3.7	2
Vocal tissue change	—	—	1.9	1

## Part II—comparison between teachers and nonteachers

Teachers and nonteachers were distributed according to age, gender, and type of pathology, organized in groups according to the Verdolini system<sup>32</sup> (Table 4). Age of teachers ranged from 22 to 63 years (mean = 46; standard deviation = 10.3), and age of nonteachers ranged from 20 to 63 years (mean = 43; standard deviation = 11.1). Females were predominant in both groups. One purpose of this study was to investigate if the profession of teachers increases the probability to have a laryngeal pathology. There was no statistically significant difference ( $\chi^2 = 0.168$  [1];  $P = 0.682$ ) between the proportion of teachers with laryngeal pathology (51.1%) and nonteachers with laryngeal pathology (46.3%).

Lifestyle, voice effort, and use of voice in recreational environments reported by teachers and nonteachers. Cross-tabulations were used to perform the analysis between the variable “to be a teacher” (0 = no vs 1 = yes) and (i) several lifestyle characteristics (drinking coffee, decaffeinated tea, tea with caffeine, carbonated beverages, and alcoholic beverages), (ii) some characteristics of voice use (talking a lot, talking loudly, talking too fast, shouting or yelling, and making frequent vocal pauses), and (iii) use of voice in recreational environments (noisy, smoky, and environments with air conditioning). Teachers were significantly more likely “to talk a lot,” “to talk loudly,” and “lately doing more frequent vocal pauses” than nonteachers (Table 5). The higher vocal effort and the increase of vocal pauses frequency are probably related with the fact that most of the teachers (72%) reported that “the noise inside the classroom is noticeable.”

Voice symptoms/signs reported by teachers and nonteachers. A cross-tabulation was used to study the association

**TABLE 5.**  
Association Between Being a Teacher (or a Nonteacher) and Characteristics of Lifestyle, Voice Use, and Use of Voice in Recreational Environments

Selected Characteristics of Lifestyle (i), Voice Use (ii), and Utilization of Voice in Recreational Environments (iii)		n	$\chi^2$	df	P-Value
(i)	Drink coffee				
	Teacher	54	1.650	3	0.648
	Nonteacher	47			
	Drink decaffeinated tea				
	Teacher	52	5.605	3	0.132
	Nonteacher	40			
	Drink tea with caffeine				
	Teacher	52	2.888	3	0.409
	Non-teacher	41			
	Drink carbonated beverages				
	Teacher	51	3.258	3	0.354
	Non-teacher	42			
	Drink alcoholic beverages				
	Teacher	51	5.494	3	0.064
	Non-teacher	42			
(ii)	Talks a lot				
	Teacher	54	7.840*	1	0.005
	Non-teacher	46			
	Talks loudly				
	Teacher	54	5.332*	1	0.021
	Non-teacher	46			
	Talks too fast				
	Teacher	54	0.468	1	0.494
	Non-teacher	46			
	Shout and yell				
	Teacher	53	1.973	1	0.160
	Non-teacher	46			
	Frequent vocal pauses				
	Teacher	54	8.484*	1	0.004
	Non-teacher	46			
(iii)	Voice use in a noisy environments				
	Teacher	54	4.253	3	0.235
	Non-teacher	47			
	Voice use in a smoky environments				
	Teacher	54	4.015	3	0.260
	Non-teacher	47			
	Voice use in air-conditioned environments				
	Teacher	54	1.705	3	0.636
	Non-teacher	47			

\* Significant at the 0.05 level.

between the variables “to be a teacher” (0 = no vs 1 = yes) and “to perceive a particular symptom/sign” (0 = no vs 1 = yes). Statistical significance was based on the chi-square test for independence. There was a strong association between the variables ( $\chi^2 = 5.086$  [1];  $P = 0.024$ ) with teachers having a significantly greater chance (67%) to have a particular voice symptom than nonteachers (33%). The frequency of symptoms/signs was

**TABLE 6.**  
**Teachers Versus Nonteachers—Relative Frequency of Symptoms/Signs Reported (%) and Comparison of Their Mean Frequencies**

Symptom/Sign	Relative Frequency (%)			Mean Frequency	n	<i>t</i>	df	<i>P</i> -Value
	Never (=1)	Rarely (=2)	Often (=3)					
Dry throat								
Teacher	35.2	22.2	42.6	2.07	54	0.187	99	0.852
Non-teacher	29.8	29.8	40.4	2.11	47			
Burn throat								
Teacher	70.4	18.5	11.1	1.41	54	−0.876	99	0.383
Non-teacher	74.5	21.3	4.3	1.30	47			
Sensation of foreign body in the larynx								
Teacher	36.2	27.7	36.2	2.00	54	3.974*	99	0.000
Non-teacher	72.2	16.7	11.1	1.39	47			
Hoarseness								
Teacher	37.0	25.9	37.0	2.00	54	0.495	99	0.622
Non-teacher	31.9	27.7	40.4	2.09	47			
Sore throat								
Teacher	87.0	9.3	3.7	1.17	54	0.703	98	0.484
Non-teacher	82.6	10.9	6.5	1.24	47			
Clear the throat								
Teacher	33.3	33.3	33.3	2.00	54	0.651	99	0.517
Non-teacher	27.7	34.0	38.3	2.11	47			
Cough								
Teacher	66.7	14.8	18.5	1.52	54	0.642	99	0.522
Non-teacher	53.2	31.9	14.9	1.62	47			

\* Significant at the 0.05 level.

also inquired using a scale of “never,” “rarely,” or “often.” Table 6 shows that the mean frequency of most of the symptoms/signs felt by the participants during voice use did not distinguish teachers from nonteachers, except the “sensation of foreign body in the larynx” that was significantly more self-perceived by teachers compared with nonteachers.

### Part III—analysis of laryngeal pathology and voice disorders among teachers

**Voice disorders and laryngeal pathology.** Self-perceived voice disorders experienced during the last year and defined as “any time the voice does not work, perform, or sound as it normally should, or interferes with communication”<sup>15</sup> were twice as prevalent among teachers than among nonteachers ( $\chi^2 = 5.086$  [1];  $P = 0.024$ ). But there was no association between being a teacher and to visit the otolaryngologist ( $\chi^2 = 50.891$  [1];  $P = 0.345$ ), and only a minority of teachers (4%) had consulted a speech and language pathologist for their voice problem. Laryngeal pathology among teachers was not related to voice disorders ( $\chi^2 = 1.375$  [1];  $P = 0.241$ ).

**Working load related to laryngeal pathology and voice disorders.** Fifty-four teachers participated in the voice survey (Table 4). Teachers ranged in age from 22 to 63 years (mean = 46; sd = 10.3), and females were predominant (68.5%). Working load was measured using three factors: “teaching hours/week,” “number of years of profession,” and “number of students/class” (Table 7). A binary logistic

regression procedure was used to study how the dependent variable “laryngeal pathology” (0 = absence vs 1 = presence) was related to (i) gender, (ii) age, (iii) teaching hours/week, (iv) number of years of profession, and (v) number of students/class (Table 8). Using a 0.05 criterion of statistical significance, none of the variables had significant partial effects, although the significance level obtained for the predictor “age” ( $P = 0.058$ ) is an indication that some association between age and teachers’ laryngeal pathology may exist. The same procedure was used with the dependent variable “voice disorder” (0 = absence vs 1 = presence) and the same predictors (Table 9). Number of years of teaching is the only significant risk factor ( $P = 0.036$ ) of “voice disorder.”

**Symptoms/signs reported by teachers.** For most of the teachers, symptoms occurred in the last 5 years although 80% of teachers give lessons for more than 10 years, which may indicate that the voice disorder is only self-perceived when teaching

**TABLE 7.**  
**Characteristics of the Variables Used to Define Teachers Working Load**

Variables	Min	Max	Mean	sd
Teaching h/wk	4	16	11	2.5
Number of years of profession	1	36	19	9.6
Number of students/class	12	100	30	16.5

**TABLE 8.**  
Logistic Regression Data Relating Laryngeal Pathology to Gender, Age, and Work-Related Factors Among Teachers

Predictor	B	Wald	df	P	Exp(B)
Gender	−0.981	1.915	1	0.166	0.375
Age	0.096	3.592	1	0.058	1.100
Teaching h/wk	0.083	1.672	1	0.196	1.086
Number of years teaching	−0.077	2.149	1	0.143	0.925
Number of students/class	0.006	0.089	1	0.766	1.006
Constant	−3.144	2.799	1	0.094	0.043

Abbreviations: B, regression coefficients; Wald, chi-square statistic; P, significance level associated with the regression coefficients; Exp(B), odds ratio.

is continued over a long period of time. This corroborates the low value obtained for the correlation coefficient between years of teaching and time when symptoms started to occur ( $r_{\text{Pearson}} = 0.415$ ;  $P = 0.028$ ).

Symptoms usually associated to voice disorders were analyzed before and after classes. Teachers were asked to report whether they had experienced any of a variety of commonly reported voice-related symptoms/signs (eg, dry throat, burn throat, sensation of foreign body in the larynx, hoarseness, sore throat, clear the throat, and cough). Differences of proportions were evaluated for statistical significance using a *t* test. The results are shown in Figure 2. As expected, more teachers reported that they perceived more symptoms after the classes, with special emphasis to “sensation of foreign body in the larynx” ( $P = 0.001$ ), “hoarseness” ( $P = 0.010$ ), “clear the throat” ( $P = 0.000$ ), and “cough” ( $P = 0.000$ ).

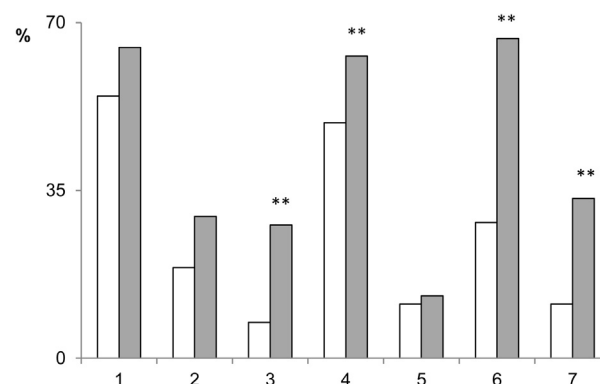
## DISCUSSION

Within the total sample analyzed in the present study a higher prevalence of laryngeal pathology (48%) was detected compared with other published studies,<sup>25–27</sup> with the exception of the sample composed of elderly people.<sup>29</sup> It is possible that because

**TABLE 9.**  
Logistic Regression Data Relating Voice Disorders to Gender, Age, and Work-Related Factors Among Teachers

Predictor	B	Wald	df	P	Exp(B)
Gender	0.063	0.010	1	0.922	1.065
Age	−0.035	0.653	1	0.419	0.965
Teaching h/wk	0.006	0.029	1	0.865	1.006
Number of years teaching	0.105	4.417	1	0.036	1.110
Number of students/class	0.014	0.615	1	0.433	1.014
Constant	−0.425	0.070	1	0.791	0.654

Abbreviations: B, regression coefficients; Wald, chi-square statistic; P, significance level associated with the regression coefficients; Exp(B), odds ratio.



**FIGURE 2.** Comparison between symptoms/signs felt by teachers before the classes (white bars) and after the classes (gray bars). Legend—(1) dry throat; (2) burn throat; (3) sensation of foreign body in the larynx; (4) hoarseness; (5) sore throat; (6) clear the throat; (7) cough. \*\*Significant difference at  $P \leq 0.05$ .

the voice survey was voluntary it may have favored the participation of people that suspect they have a voice disorder and this would explain the inflated prevalence rate of laryngeal pathology in the population. In the present study, it was not possible to identify the risk factors that seem to predispose to the occurrence of laryngeal pathology. This contrasts with previous findings in which laryngeal pathology was more frequent among females,<sup>25–27</sup> and elderly people.<sup>25–27,29</sup> However, because only 32 males volunteered for the present study and the participants had a mean age of 43 years, it is difficult to compare the results of the present work with previous studies.

The results for the voice disorders detected in the university teachers were more in line with previous studies. Voice disorders were more prevalent among teachers than nonteachers,<sup>8–13,18–23</sup> and a low number of university teachers sought professional help, either from an otolaryngologist or a speech and language pathologist.<sup>12,18,33</sup> The explanation for this problem proposed by Russell et al<sup>12</sup> is that teachers view voice problems as an occupational hazard and are most likely unaware of the help that is available for them. Two risk factors related to the frequency of voice disorders among university teachers include: (1) the significantly higher vocal effort made by teachers compared with nonteachers, and (2) the number of years of teaching. However, the number of teaching hours/week and number of students/class had no effect on voice disorders. It seems that voice disorder is only self-perceived when teaching is continued over a long period. Longitudinal studies would be important to get more insight into the association between the development of voice disorders and the career longevity of a university teacher.

In the present study, the prevalence of laryngeal diagnoses was high among university teachers and nonteachers. But functional laryngeal pathologies prevailed among university teachers, and this underlies the importance of further investigation into the etiology, diagnosis, and their therapeutic management among university teachers.

## Limitations of the study

For this study participants were not selected “randomly” from a pool of all possible participants; they voluntarily participated in

a voice survey that was part of a project run in our laboratory. This recruitment approach may inflate the real prevalence rates of laryngeal pathology in the population of interest, because probably a certain proportion of the volunteers with voice problems might have had reasons to participate in the study.

## CONCLUSIONS

This study examined the prevalence of laryngeal pathology and voice disorders, and risk factors that predispose their occurrence in a sample of university workers, including university teachers. The results indicated that laryngeal pathology was present in 48% of the sample, and the most frequent diagnoses was functional disorders.

University teachers do not run an increased risk of laryngeal pathology. However, the results of this preliminary investigation suggest that university teachers are at higher risk of voice disorders compared with nonteachers. Two risk factors related to the occurrence of voice disorders were detected among university teachers: (1) a significant higher vocal effort was made by teachers compared with nonteachers, and (2) the number of years of teaching had a significant effect on voice disorders. Results suggested that the demands of teaching, and not other demographic and/or behavioral factors, underlie voice disorders for the university teachers.

In the present work, the prevalence of laryngeal diagnoses was high among university teachers and nonteachers. Functional laryngeal pathologies prevailed, and this underlines the importance of further investigation toward etiology, diagnostic, and therapeutic management of this type of laryngeal pathology in this academic population.

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