The Impact of the Reactivity to Stress in Teachers with Voice Problems

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Key Words

Stress • Occupational voice • Teachers • Voice Handicap Index • Stress Reactivity Index

Abstract

Aims: One of the objectives of our study on voice and vocal health was to find out whether there is a relation between the reactivity to stress and voice problems in teachers. **Materials and Methods:** For this, we used a sample of 447 individuals amongst future teachers and teachers in active service, since they form a group with both a high index of voice problems and stress. In order to gather the necessary information for the study, we applied the Voice Handicap Index and the 'índice de reactividad al estrés' (IRE; Stress Reactivity Index). **Results:** The results indicate that those individuals with voice problems have a greater reactivity to stress. It was observed that some items of the IRE show a relatively great difference between the groups with and without voice problems. The majority of these items concern vegetative signs that are linked to aspects of voice emission. **Conclusion:** Reactivity to stress is a useful factor to bear in mind in teachers with voice problems.

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Introduction

The teaching group is one of the work groups with the highest risk of suffering from voice problems [1–6]. Many epidemiological studies highlight this risk in teachers [7–

9], which worsens when considering primary school teachers in particular. A recent investigation by Munier and Kinsella [10], who analyzed the prevalence of voice problems in teachers, shows that only 20% of them have not suffered from voice problems. Teachers generally attribute their voice problems to their job and there is a higher index of absenteeism for this reason [11].

Although the etiology of voice problems is diverse, it seems that physical and psychoemotional variables are the main risk factors [5, 12]. However, having to speak for many hours [13] at high intensity is also an important factor to take into account.

Together with voice problems, stress also frequently occurs in this group. Teachers attribute its origin to causes such as having to work with little motivated pupils, being assessed by third parties or carrying a heavy workload [14]. Furthermore, they have to speak or sing during long periods in stressful situations with intensity and good voice quality and in environments which require an inefficient and harmful use of the voice [15, 16].

In jobs such as teaching, where an efficient and healthy voice is essential, important elements come into play, such as position, degree of muscle intensity [17, 18], breathing, laryngeal operation or a good use of the resonating cavities for an ideal amplification of the voice. An imbalance in these elements could negatively affect voice emission.

The stress system coordinates the general stress response, which occurs when a stressor agent of any type exceeds a threshold [19]. We know that stress is a useful response as long as it is adequate to the causing stimulus and does not overrule the control and response capaci-

Table 1. Distribution of voice problems in students and teachers

	Number	Percent	χ^2	p
Students (n = 252)				
With no voice problems	196	77.8	4.67	0.031
With voice problems	56	22.2		
Teachers (n = 195)				
With no voice problems	134	68.7		
With voice problems	61	31.3		

Voice problems = VHI score >9; no voice problems = VHI score ≤9.

ties. The organism is prepared to react to situations of diverse nature, but damage to physical or psychic health is caused when the factors that induce stress have a marked intensity, frequency and duration which exceed the mechanisms that the subject uses to face them [20].

For many decades studies have been carried out in order to understand how stress affects health and illnesses [21, 22]. These studies show how the emotional reactions or stress are correlated with different cardiovascular [23], circulatory [24] disorders, amongst others.

González de Rivera [22] calls the individual way of reacting to possible stressful situations 'reactivity to stress' and defines it as a group of response norms (cognitive, behavioral, emotional, and vegetative) which determine the effects of external stress factors.

The investigation carried out by Demmink-Geertman and Dejonckere [25, 26] seems interesting to us. They studied the relation between nonorganic dysphonia and the subjective experience of a dysfunction of the autonomic nervous system (neurovegetative lability) and came to the conclusion that subjects with nonorganic dysphonia report significantly more complaints or symptoms related to a possible dysfunction of the autonomic nervous system than subjects with no voice problems.

In the field of investigations into the relation between stress and voice problems, we found some interesting studies which suggest that individuals with functional dysphonia have personality features or temperament characteristics which can predispose them to suffer from voice problems [27]. In a similar line of investigation but with a wider range of variables and types of voice pathology, Roy et al. [28] observed that patients with functional dysphonia and vocal nodule, apart from having specific personality features, showed higher reactivity to stress compared to patients with spastic dysphonia or unilateral vocal fold paralysis. Van Mersbergen et al. [29] found

similar results in patients diagnosed with functional dysphonia who showed the same level of reactivity to stress as those individuals with social anxiety.

Our aim was to check if, in the teaching group, the way to react to stress was closely related to the perception of voice problems.

Materials and Methods

In order to gather data, we used a sample of 447 individuals (252 students and 195 teachers), enrolled in the following way: teacher training students of the courses 2006–2007 and 2007–2008 who study the subject 'voice education' in the UAB (Universitat Autònoma de Barcelona) and teachers from nursery and primary education schools in Barcelona who work with children aged between 3 and 11 years.

We used the Voice Handicap Index (VHI) [30] in order to discriminate between those individuals with voice problems and those who do not perceive voice difficulties. A score above 9 indicated a voice problem. In order to assess the individual response tendency to stressful situations we used the 'índice de reactividad al estrés' (IRE; Stress Reactivity Index) [31, 32], which measures the usual norms of cognitive, emotional, vegetative and behavioral response to situations perceived as potentially damaging, dangerous or unpleasant, on a 5-point Likert scale (from 0 to 4). This test allows to analyze the total IRE or the 4 response norms separately (vegetative IRE, emotional IRE, cognitive IRE, and behavioral IRE). If the categorized score is below 0.6, the reactivity to stress is considered to be low; if it is between 0.6 and 1, the reactivity to stress is considered to be high but not worrying, and if it is above 1, the reactivity to stress is considered to be too high. In order to show the global difference of intensity of the responses between individuals with or without voice problems, we used scores (from 0 to 138) obtained from the sum of all the responses given.

The data were analyzed using the statistical program SPSS (v. 15). For continuous outcome variables that were normally distributed, the Student t test was used. For discrete outcome variables, χ^2 tests were used. The significance level was set at $p \leq 0.05$.

Results

The data show that there is an important percentage of participants with voice problems. This rate is significantly higher in the teaching group ($p = 0.031$; table 1).

The scores of the IRE indicate a significantly ($p < 0.001$, t test) higher reactivity to stress in individuals (teachers and controls) with voice problems (mean = 44.8, SD = 13.51), compared with those without voice problems (mean = 33.7, SD = 14.85). This tendency is found in both the teachers and controls (table 2).

Figure 1 presents the relation of voice problems and IRE scores in students and teachers. A relatively great

Fig. 1. The relation between voice problems and IRE scores in students and teachers. The percentage of individuals with scores that are considered to be low, high but not worrying, and too high are indicated. Significance level $p < 0.001$ (χ^2 test).

Table 2. Mean and standard deviation of the IRE scores of the students and teachers

	Number	Percent	Score
Students (n = 252)			
With no voice problems	196	77.78	37.0 ± 14.00
With voice problems	56	22.22	47.4 ± 13.93
Teachers (n = 195)			
With no voice problems	134	68.7	33.7 ± 16.29
With voice problems	61	31.3	42.3 ± 12.00

Voice problems = VHI score >9; no voice problems = VHI score ≤9.

percentage of students and teachers who perceive voice problems showed a reactivity to stress that is too high, compared to students and teachers without voice problems. Moreover, there is an almost inexistent or very low proportion of individuals with voice problems and low reactivity to stress.

Since reporting voice problems and IRE scores are similar in students and teachers, the following analysis was carried out with the students and teachers in one group. Significant differences were found between individuals with and without voice problems in all the response norms of the IRE (vegetative, emotional, cognitive, and behavioral) (table 3).

The Student t test was applied in order to observe whether certain items of the IRE show a higher reactivity in the groups with or without voice problems. We found

Table 3. The scores of the IRE subtests of individuals with (VHI score >9) and without voice problems (VHI score ≤9)

	Mean ± SD	t value	p value
Vegetative IRE			
Without voice problems	1.0 ± 0.50	-5,978	<0.001
With voice problems	1.3 ± 0.45		
Emotional IRE			
Without voice problems	1.1 ± 0.65	-5,849	<0.001
With voice problems	1.5 ± 0.64		
Cognitive IRE			
Without voice problems	1.3 ± 0.54	-3,031	0.003
With voice problems	1.5 ± 0.58		
Behavioral IRE			
Without voice problems	1.1 ± 0.55	-3,072	0.002
With voice problems	1.5 ± 0.50		

The level of significance (p) is estimated by the t test.

that 17 of them are significantly more present in the group with voice problems (table 4). It is worth mentioning that 10 of these 17 items (IRE4, IRE5, IRE10, IRE12, IRE13, IRE14, IRE17, IRE19, IRE21, and IRE22) refer to vegetative responses.

Discussion

The results obtained indicate that extreme reactivity to stress is significantly more present in the group of individuals with voice problems.

Table 4. Most present items in the group with voice problems

Num-ber	Items of the IRE in the group with voice problems	t value	P value
IRE1	Concern, inability to relax and be calm	-2,908	0.004
IRE4	Desire to sigh, chest oppression, feeling of breathlessness	-4,947	<0.001
IRE5	Palpitations, tachycardia	-2,446	0.013
IRE6	Feelings of depression and sadness	-4,822	<0.001
IRE10	Nausea, sickness, instability	-2,069	0.040
IRE12	Tingling or sleepiness of hands, face ...	-2,493	0.013
IRE13	Stomach upsets, abdominal pain ...	-2,972	0.003
IRE14	Headache	-4,250	<0.001
IRE16	Decrease in activity	-2,320	0.021
IRE17	Loss of sexual appetite or sexual dysfunction	-3,341	0.001
IRE19	Sleepiness	-3,311	0.002
IRE20	Apprehension, feeling of getting ill	-5,811	<0.001
IRE21	Exhaustion or excessive tiredness	-5,475	<0.001
IRE22	Frequent urination	-3,283	0.001
IRE24	Feelings of aggressiveness or increase in irritability	-2,117	0.035
IRE27	Need of being alone and not being disturbed	-2,905	0.004
IRE29	Anxiety, more liability to fear, fears	-3,686	<0.001

The level of significance (p) is estimated by the t test.

However, a high reactivity to stress does not necessarily entail having voice problems, although the pertinent study shows that individuals who suffer voice problems tend to have too high a reactivity to situations which they perceive as stressful.

It was also observed that individuals with voice problems present higher reactivity levels in all 4 types of response of the IRE, i.e. vegetative, emotional, cognitive and behavioral, but mostly in the vegetative type. This statement is derived from the 17 items found as the most discriminative in the population with voice problems. Of these 17 items, 10 are of the vegetative type. These results are in accordance with those of Demmink-Geertman and Dejonckere [26], who showed a relation between vocal dysfunction and neurovegetative symptomatology.

In conclusion, the results of the pertinent study indicate that individuals with a high IRE score present higher vulnerability to suffering from voice problems. Thus, we agree with Kooijman et al. [12] about the importance of considering the psychoemotional factors in the diagnosis and treatment of voice.

The way responses of the vegetative type can affect voice production and consequently generate voice problems remains unresolved. This field should be further explored.

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