

# SIGNS AND SYMPTOMS OF THE AUTONOMIC DYSFUNCTION IN TEACHERS

## *Sinais e sintomas da disfunção autônoma em professores*

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### ABSTRACT

**Purpose:** to compare signs of general autonomic dysfunction related to the voice in teachers with and without complaints. **Methods:** adhibition of the Questionnaire of Autonomic Dysfunction (QAD) in 83 teachers, including 60 women and 23 men, with an average age of 37,6. The participants were distributed in two groups, with or without voice complaints, defined according to number of symptoms marked in the Protocol of Signs and Voices Symptoms. **Results:** the group with voice complaints presented an average of 13,7 symptoms in the QAD of autonomic dysfunction and the group without complaints 7,7 ( $p=0,001$ ). Considering only voice related neurovegetative signs, the group with complaints presented an average of 4,7 symptoms and the group without complaints 1,8 ( $p<0,001$ ). When compared to the group without voice complaints the most predominant voice related symptoms in the group with voice complaints were: fatigability when speaking ( $p<0,001$ ), need of constantly swallowing ( $p=0,014$ ), sore throat ( $p=0,001$ ), neck pain while speaking ( $p=0,003$ ), temporomandibular pain or discomfort ( $p=0,017$ ), constant need to yawn ( $p=0,023$ ), frequent throat clearing ( $p=0,010$ ) and tension in the head while speaking ( $p=0,019$ ). The symptoms observed in the group without complaints were: nose obstruction (33,3%), difficulty breathing through the nose (29,2%) and sneezing (25%). **Conclusion:** the group with voice complaints showed more number of neurovegetative symptoms, particularly on issues related to the voice, than the group without complaints.

**KEYWORDS:** Faculty; Voice; Autonomic Nervous System; Voice Disorders; Working Environment

### ■ INTRODUCTION

Teachers have higher risk to develop voice disturb when compared to general population<sup>1</sup>, which may influence the professional performance<sup>2</sup> and cause economic losses for these professionals and the educational system<sup>3</sup>.

The work environment in which the teacher acts may offer risk to development of voice disturbances<sup>4-7</sup>. Besides the environment influence, there is the emotional factor involving the professional coping to stress situations at work. A study with

teacher from São Paulo public schools showed relation between voice disorder and stress, due teachers in their own work environment to have a high psychic demand related to low control of their activities, which may make them susceptible to illness<sup>8</sup>.

Emotional disorders frequently cause autonomic dysfunction<sup>9</sup>. The autonomic nervous system (ANS) is composed by two main types, sympathetic and parasympathetic, working coordinated and antagonistic in order to regulate involuntary functions<sup>10</sup>. It has central components as thalamus and limbic system, which are associated to emotions and visceral behavior. This system is responsible to homeostasis and for its response to external stimuli, as, for example, the "fight or flight" response that occurs when a threatening situation intensely stimulates the sympathetic nervous system which may cause increase in adrenalin, heartbeats and blood pressure<sup>11</sup>.

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Sympathetic system has the function to mobilize the body to activity and it acts to modulate the organs functions as heart, gastro intestinal tract, and sweat glands. Besides, it increases the body activities to assure the body may respond to stress. The parasympathetic system has the antagonist function, decreasing body activities, in order to restore energy<sup>10</sup>. Voice has the role to express emotion (*barometer of emotion*) and there for the voice disturbance may be interpreted as stress sign<sup>12</sup>.

Besides voice, mental and behavior disturbances, gastric and cardiovascular dysfunctions are related to organization factors<sup>13</sup>. Stress, anxiety, and depression may appear in patients with vocal folds lesions, paradoxical vocal fold disorder, and muscle-tension dysphonia<sup>14</sup>. In females, functional dysphonia may be a manifestation of stress and anxiety, with hyperactivity of ANS<sup>11</sup>. Patients with behavioral dysphonia have higher occurrence of neurovegetative symptoms<sup>15</sup>.

The Questionnaire of Autonomic Dysfunction (QAD) was used in some researches to quantify the number of neurovegetative symptoms in subjects with dysphonia compared to subjects without voice disturbances<sup>11,15,16</sup>, without reporting the profession of participants. The QAD was developed initially in a research performed in Utrecht University, Netherlands, in order to relate functional dysphonia and ANS dysfunction<sup>11</sup>. After, it was translated/adapted to Brazilian Portuguese in the research relating behavioral dysphonia with neurovegetative symptoms<sup>15</sup>.

Considering teachers are professionals that have risks to develop voice disorders and stress, the purpose of this research is to compare the autonomic dysfunction signs in teacher with and without vocal complaints, defined by clinical investigation, using QAD.

## ■ METHODS

This research was evaluated and approved by Ethical in Research Committee of *Centro de Estudos da Voz (CEV)*, under the protocol number 0417/09.

The inclusion criteria adopted for this study was the participant to be a teacher, working in classroom and without neurological or psychiatric diseases reported.

83 teachers participated of the research, 60 women and 23 men, with mean age of 37.6 years, teaching at elementary or high schools of 6 schools (1 private and 5 public), from *Rio de Janeiro* city. A teacher of each school was previously trained to deliver the protocols of Vocal Signs and Symptoms (VSSQ)<sup>1,17</sup> and Autonomic Dysfunction (QAD) to the other teachers. All the subjects that accepted to participate of the research had to sign an informed consent term.

The sample was divided in two groups, according to the presence or absence of vocal complaint by the teacher. This division was done in two steps to evaluate the perception of the teacher to its own complaint. In the first step it was considered the self-reported complaints with a closed-question and two answer options ("yes" or "no"), regarding the presence or absence of vocal complaints at that moment. In the second step it was considered the number of vocal symptoms observed in VSSQ, translated/adapted to Brazilian Portuguese<sup>17</sup>. The mean of symptoms expected in Brazilian teachers is 3.7<sup>17</sup>. Therefore, subjects having until three vocal symptoms were included in the group without vocal complaint and the subjects with four or more symptoms were included in the group with vocal complaint.

With the purpose to observe the teacher's perception regarding its own vocal complaint, self-reported complaint was compared to measured one (mean number of vocal symptoms presented at VSSQ). Statistical data were obtained based on measured complaint at VSSQ. After formatting the groups with and without vocal complaint, the focus of the research was to analyze QAD.

QAD is a list of 46 neurovegetative symptoms, with "yes" or "no" response options, 22 are related to ANS but without direct relation to voice, 16 are related to ANS and voice, 6 are not-relevant, that is, without relation with neurovegetative or voice aspects, and 2 are reliability questions, in order to evaluate the participant's consistence in answering the questions<sup>15</sup> (figure 1).

The statistical analysis was done using ANOVA Test and the Kappa concordance coefficient. The softwares used were SPSS V16, Minitab 15, and Excel Office 2007. The significance level adopted was 0.05 (5%).

Name: \_\_\_\_\_ date: \_\_\_\_\_

Mark the symptoms or complaints that you have been feeling lately. There is no right or wrong answers.

	Symptoms or complaints	Presence	
		YES	NO
1	Cold hands	YES	NO
2	Cold feet	YES	NO
3	Excessive transpiration	YES	NO
4	Excessive sensitiveness to coldness	YES	NO
5	Excessive sensitiveness to heat	YES	NO
6	Diarrhea	YES	NO
7	Constipation	YES	NO
8	Puffiness	YES	NO
9	Aerophagia	YES	NO
10	Nausea	YES	NO
11	Lack of appetite	YES	NO
12	Eruclatations	YES	NO
13	Hiccups	YES	NO
14	Heartburn	YES	NO
15	Dizziness	YES	NO
16	Tinnitus	YES	NO
17	Dancing spots before the eyes	YES	NO
18	Difficult concentration	YES	NO
19	Disturbed sleep	YES	NO
20	Lack of energy	YES	NO
21	Feelings of psychic tension	YES	NO
22	Renal problems	YES	NO
23	Need of constantly swallowing	YES	NO
24	Sore throat	YES	NO
25	Hyperventilation	YES	NO
26	Specific allergy	YES	NO
27	Frequent sneezing	YES	NO
28	Fluctuating nose obstruction	YES	NO
29	Difficulty breathing through the nose at rest	YES	NO
30	Habitual mouth breathing at rest	YES	NO
31	Hearing loss	YES	NO

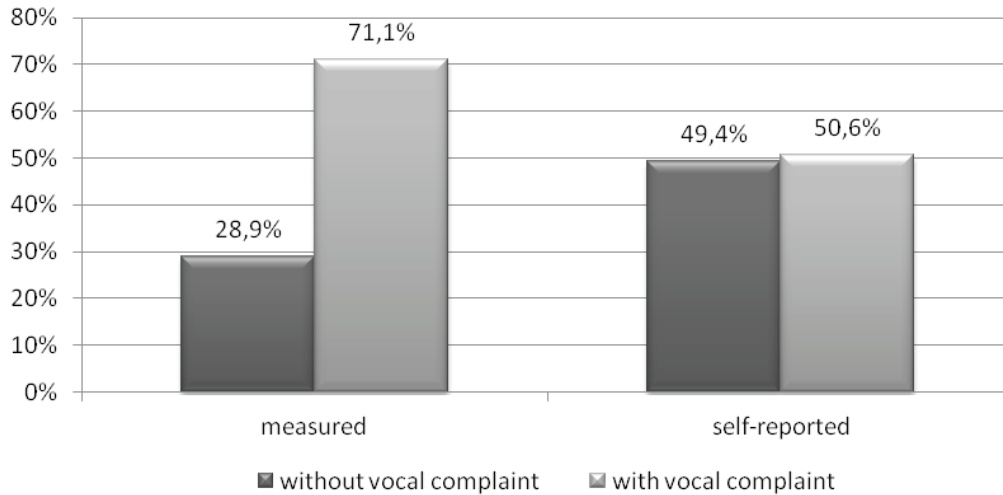
	Symptoms or complaints	Presence	
32	Feelings of tension in the head while speaking	YES	NO
33	Headache	YES	NO
34	Constant need to yawn	YES	NO
35	Gnashing of teeth	YES	NO
36	Temporomandibular pain or discomfort	YES	NO
37	Neck pain (while or after speaking)	YES	NO
38	Chest discomfort (while or after speaking)	YES	NO
39	Fatigability when speaking	YES	NO
40	Frequent throat clearing	YES	NO
41	Chronic illness	YES	NO
42	Palpitations	YES	NO
43	Social (communicative) handicap	YES	NO
44	Nail biting	YES	NO
45	Sensation of extreme tiredness	YES	NO
46	Feelings of mental stress	YES	NO

Figure 1 – Autonomic dysfunction protocol (ADP)

## ■ RESULTS

Analyzing the perception of vocal complaint report by the teacher, it was observed that 42 subjects affirmed to have vocal complaint and

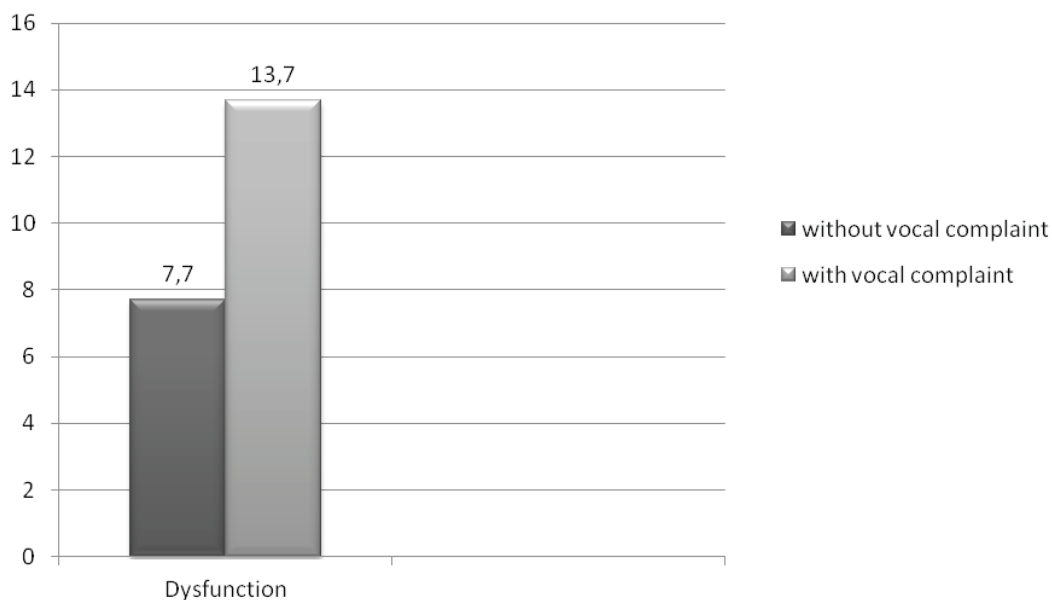
41 affirmed not to have vocal complaint ( $p=0.877$ ). But, when the sample was grouped according to the number of vocal symptoms, the group of teachers with vocal complaint increased up to 59 participants and the group without complaint decreased to 24 participants ( $p<0.001$ , figure 2).



**Figure 2 – Relation between measured complaint (according to the numbers of symptoms marked in vocal sign and symptoms protocol) and the reported complaint.**

Both studied groups had nervevegetative symptoms with predominance in teachers with vocal complaint (table 1). In this group the mean of total nervevegetative symptoms was 13.7, while in the group without vocal complaint the mean was

7.7 (figure 3). Considering the mean of symptoms related to voice, the group with complaints had 4.7 symptoms against 1.8 in the group without vocal complaint ( $p<0.001$ , table 2).



**Figure 3 – Mean of autonomic dysfunction signs and symptoms in groups with and without vocal complaint**

**Table 1 – Autonomic dysfunction signs and symptoms related to voice in both groups**

Signs and symptoms	Without vocal complaint		With vocal complaint		p-value
	N	%	N	%	
<b>Symptoms not related to voice</b>					
Cold hands	0	0.00%	6	10.20%	0.105
Cold feet	1	4.20%	9	15.30%	0.159
Excessive transpiration	5	20.80%	15	25.40%	0.658
Excessive sensitiveness to coldness	4	16.70%	12	20.30%	0.701
Excessive sensitiveness to heat	9	37.50%	19	32.20%	0.644
Diarrhea	2	8.30%	6	10.20%	0.797
Constipation	8	33.30%	19	32.20%	0.921
Puffiness	10	41.70%	27	45.80%	0.734
Aerophagia	3	12.50%	17	28.80%	0.115
Nausea	1	4.20%	16	27.10%	0.019*
Eructations	6	25.00%	8	13.60%	0.207
Hiccups	3	12.50%	7	11.90%	0.936
Heartburn	9	37.50%	26	44.10%	0.583
Dizziness	3	12.50%	18	30.50%	0.087
Tinnitus	4	16.70%	14	23.70%	0.479
Dancing spots before the eyes	2	8.30%	13	22.00%	0.141
Difficult concentration	1	4.20%	19	32.20%	0.007*
Disturbed sleep	6	25.00%	30	50.80%	0.031*
Lack of energy	10	41.70%	36	61.00%	0.108
Palpitations	2	8.30%	16	27.10%	0.06
Nail biting	3	12.50%	7	11.90%	0.936
Sensation of extreme tiredness	6	25.00%	27	45.80%	0.08
<b>Symptoms related to voice</b>					
Need of constantly swallowing	1	4.20%	17	28.80%	0.014*
Sore throat	1	4.20%	24	40.70%	0.001*
Hyperventilation	4	16.70%	8	13.60%	0.715
Frequent sneezing	6	25.00%	23	39.00%	0.226
Fluctuating nose obstruction	8	33.30%	25	42.40%	0.446
Difficulty breathing through the nose at rest	7	29.20%	20	33.90%	0.677
Habitual mouth breathing at rest	3	12.50%	17	28.80%	0.115
Feelings of tension in the head while speaking	1	4.20%	16	27.10%	0.019*
Constant need to yawn	2	8.30%	19	32.20%	0.023*
Gnashing of teeth	3	12.50%	13	22.00%	0.318
Temporomandibular pain or discomfort	0	0.00%	12	20.30%	0.017*
Neck pain (while or after speaking)	1	4.20%	21	35.60%	0.003*
Chest discomfort (while or after speaking)	2	8.30%	9	15.30%	0.399
Fatigability when speaking	2	8.30%	31	52.50%	<0.001*
Frequent throat clearing	1	4.20%	18	30.50%	0.010*
Social(communivative) handicape	0	0.00%	4	6.80%	0.191
<b>Nonrelevant issues</b>					
Lack of appetite	0	0.00%	4	6.80%	0.191
Renal problems	3	12.50%	10	16.90%	0.613
Specific allergy	8	33.30%	32	54.20%	0.084
Hearing loss	4	16.70%	9	15.30%	0.872
Headache	8	33.30%	30	50.80%	0.147
Chronic illness	3	12.50%	8	13.60%	0.897
<b>Reliability</b>					
Feelings of mental stress	7	29.20%	29	49.20%	0.096
Feelings ofpsychictension	11	45.80%	41	69.50%	0.043*

\* Statistic significant p-values ( $p \leq 0.05$ )  
Statistic test ANOVA

**Table 2 – Number of symptoms in autonomic dysfunction protocol (ADP)**

Real complaint	Symptoms related to voice		Symptoms not related to voice		Not relevant	
	Without complaint	With complaint	Without complaint	With complaint	Without complaint	With complaint
Mean	1.8	4.7	4.1	6,2	1,1	1,6
Median	1	4	4	6	1	2
Standard deviation	1.5	3.6	2.8	3,5	1,2	1,1
CV	86%	77%	69%	56%	115%	67%
Min	0	0	0	1	0	0
Max	5	16	10	14	5	4
N	24	59	24	59	24	59
CI	0.6	0.9	1.1	0,9	0,5	0,3
p-value	<0.001*		0.009*		0.071	

\* Statistic significant p-value ( $p \leq 0.05$ )

Statistic test ANOVA

**Subtitles:** SD = standard deviation; CV = coefficient of variation; N = number of subjects; CI = confidence interval

**Table 3 – Comparison between sexes regarding number of neurovegetative symptoms in each group**

Symptoms	Without Complaint		With Complaint	
	Female	Male	Female	Male
Mean	8.3	7.1	14,8	8,6
Median	7.5	6.5	15	7
SD	5.7	4.3	7,7	4,2
CV	69%	60%	52%	49%
Minimum	0	1	2	4
Maximum	18	14	30	15
N	12	12	48	11
CI	3.2	2.4	2,2	2,5
p-value	0.577		0.013*	

\* Statistic significant p-value ( $p \leq 0.05$ )

Statistic test ANOVA

**Subtitles:** SD = standard deviation; CV = coefficient of variation; N = number of subjects; CI = confidence interval

Comparing both sexes, women had higher number of neurovegetative symptoms with predominance in the group with vocal complaints ( $p=0.013$ , table 3).

## ■ DISCUSSION

Voice is a complex manifestation; depending on muscle actions and may suffer emotions and personality influence<sup>18</sup>. Although voice is the teacher's work instrument, the health-disease process related to voice is still little understood by this professional, having as consequence little perception of its own self-evaluation and its voice disturbs<sup>6,19-21</sup>.

The teacher difficulty in perceiving itself as a voice professional may be an obstacle for the teacher to evaluate its own voice<sup>6</sup>.

The teachers participating of this research also had difficulty to perceive their own complaints, fact observed in the change in sample distribution. When composed from self-reported complaint (presence or absence of vocal complaint), the group with complaint had 42 teachers and without complaint 41. After counting the vocal symptoms marked in VSSQ, the group with vocal complaint increased to 59 and without complaint decreased to 24. This fact reinforce that it is insufficient to ask the teacher about the presence or absence of vocal complaint

(self-reported complaint), and it should be chosen to use a more detailed investigation, identifying possible vocal symptoms, with the help of specific tools, as VSSQ, and previous history, for example.

Teachers have higher risk to develop psychic illness when compared to other groups<sup>22</sup>. The interaction between subjects' characteristics and environment demands may generate disturbances in behavior, cognitive and physiological aspects. Stress and depression may be responses to environment demands<sup>23</sup>. When the subject can balance the stress situations and its environment, the ASN keep itself balanced, providing a better quality of life, and, therefore, of work.

The effects of environment demands in teachers' life may be understood in table 1, in which the most relevant neurovegetative symptoms without direct relation to voice in the vocal complaint group were: difficult concentration, disturbed sleep, nausea, palpitations, and dizziness.

The mean of symptoms related to voice in complaint group was 4.7 and in the group without vocal complaint was 1.8 (Table 2), which demonstrates that teachers with vocal complaint have more autonomic dysfunction than the ones without vocal complaint. Perhaps this occurs due to the fact that teachers with vocal problems have to change communication strategy in classroom, which may affect the stress and, as consequence, the number of symptoms<sup>17</sup>.

Analyzing the group without vocal complaint, the most frequent symptoms were (Table 1): Fluctuating nose obstruction (33.3%), difficulty breathing through the nose at rest (29.2%), and frequent sneezing (25%). Although these symptoms had occurred of the same way between groups, these data points out that the groups without vocal complaint also showed symptoms classified in QAD as related to voice. Research with teachers shows that as higher the time teaching, higher is the lack of air complaint. Other study points out teachers have more tendency to develop sore throats and breathing allergies than non-teachers.

In Table 1, the symptoms related to voice that were more frequent in vocal complaint group when compared to without vocal complaint one were: fatigability when speaking ( $p < 0.001$ ), need of constantly swallowing ( $p = 0.014$ ), sore throat ( $= 0.001$ ), neck pain while or after speaking ( $p = 0.003$ ), ATM pain or discomfort ( $p = 0.017$ ), constant need to yawn ( $p = 0.003$ ), constant hawk ( $p = 0.010$ ), and tension in head while speaking ( $= 0.019$ ). A research done with dysphonic teachers working in public schools in *Mogi das Cruzes* city (SP) showed a relation between dysphonia and vocal fatigue<sup>24</sup>.

There is a correlation between voice self-perception and temporomandibularjoint dysfunction (TJD) in women, considering that as severe the TJD, higher the vocal disturb perception<sup>25</sup>. The symptoms related to voice presented by the vocal complaint group showed that teachers of the present research may be susceptible to develop voice disturbances and autonomic dysfunction. Literature also points out studies relating the disturbances in ANS with QAD use, but in subjects with voice disorders from general population, without specifying the subjects' profession<sup>11,15,16</sup>. Other studies observe the relation between vocal complaint and ASN dysfunction symptoms with or without direct relation with voice in functional dysphonia, initially experienced only in female subjects<sup>11</sup>, and afterwards in both sexes, with predominance in women<sup>16</sup>. Although the current study did not evaluate whether the teachers with vocal complaint had deviated voices, it is worthy to point out that these data agree with a research with behavior dysphonia subjects<sup>15</sup>.

In table 3, comparing the symptoms according to sex, it is possible to observe that in vocal complaint group women had mean symptoms 14.8 while men had 8.6 ( $p = 0.013$ ). This higher number of symptoms in females may be explained by the accumulation of social roles played by women in social and work environment, which may generate an overload and increase in stress of these professionals.

The results points out the teachers from this study have risk to develop neurovegetative symptoms, mainly those direct related to voice. They also showed that the participants had little perception about their own vocal complaint, which reinforce the importance of using ADP in clinical help, as well as investment in vocal health programs, and guidance for teachers<sup>20</sup>.

It is worthy to highlight the importance of speech-language pathologist to pay attention the amount of neurovegetative symptoms that the teachers presents in ADP, mainly those related to vocal symptoms, in order to the teacher to be properly routed to the specialist, and the vocal rehabilitation may happen quickly.

## ■ CONCLUSION

The group of teachers with voice complaint had higher number of neurovegetative symptoms than the group without vocal complaint, mainly in issues related to voice, and predominantly in females.



**RESUMO**

**Objetivo:** comparar sinais de disfunção autônoma gerais e relacionados à voz em professores com e sem queixas vocais. **Métodos:** aplicação do Protocolo de Disfunção Autônoma (PDA) em 83 professores, sendo 60 mulheres e 23 homens, com a média de idade de 37,6 anos. A amostra foi dividida em dois grupos, com e sem queixas vocais, definidas de acordo com o número de sintomas apresentados no Protocolo de Sinais e Sintomas Vocais. **Resultados:** o grupo com queixa vocal apresentou a média de 13,7 sintomas no PDA e o grupo sem queixa 7,7 ( $p=0,001$ ). Considerando apenas os sintomas neurovegetativos relacionados com a voz, o grupo com queixa obteve a média de 4,7 sintomas e o grupo sem queixa 1,8 ( $p<0,001$ ). Os sintomas relacionados com a voz que mais predominaram no grupo com queixa vocal, quando comparado com o grupo sem queixa, foram: cansaço quando fala ( $p<0,001$ ), necessidade de engolir constantemente ( $p=0,014$ ), dor de garganta ( $p=0,001$ ), dor no pescoço enquanto fala ( $p=0,003$ ), dor ou desconforto na ATM ( $p=0,017$ ), necessidade constante de bocejar ( $p=0,023$ ), pigarros constantes ( $p=0,010$ ) e tensão na cabeça quando fala ( $p=0,019$ ). Os sintomas observados no grupo sem queixa foram: nariz entupido (33,3%), respiração nasal difícil (29,2%) e espirros (25%). **Conclusões:** o grupo com queixa vocal apresentou maior número de sinais neurovegetativos, principalmente nas questões relacionadas à voz do que o grupo sem queixa.

**DESCRIPTORIOS:** Docentes; Voz; Sistema Nervoso Autônomo; Distúrbios da Voz; Ambiente de Trabalho

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