Association between voice disorder and self-reported temporomandibular dysfunction symptoms in teachers

Associação entre distúrbio de voz e sintomas de disfunção temporomandibular autorreferidos por professores

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ABSTRACT

Purpose: To verify the relationship between voice disorder and temporomandibular dysfunction (TMD) in elementary and middle school teachers. **Methods:** The participants of this study were 138 teachers - 96 women and 42 men, with a mean age of 38 years. The teachers responded to a questionnaire with five questions on voice disorder and temporomandibular dysfunction symptoms. The data were analyzed using an association test (Chi-square) to verify the association between voice disorder and temporomandibular dysfunction symptoms, as well as the relationship of the symptoms with sex and age. **Results:** The temporomandibular dysfunction symptoms reported by the teachers, from the most to least frequently mentioned, were as follows: headache or facial pain, pain at the end of the day, and pain when speaking excessively. The results showed a statistically significant difference for the symptom pain when speaking excessively, pain at the end of the day, and temporomandibular joint snap in teachers without voice disorder. A statistically significant difference was observed for the female sex, regarding temporomandibular dysfunction. Temporomandibular dysfunction was more frequently reported than voice disorder, with higher incidence in female than in male teachers. **Conclusion:** The findings showed a statistical association between voice disorder and temporomandibular dysfunction in teachers. Further studies with integrated clinical assessment on the relationship between voice symptoms and TMD in different age groups are warranted.

Keywords: Voice; Voice disorders; Temporomandibular joint dysfunction syndrome; Facial pain; Articulation disorders

RESUMO

Objetivo: Verificar a relação entre distúrbio de voz e sintomas de disfunção temporomandibular em professores do ensino fundamental. **Métodos:** Participaram deste estudo 138 professores, 96 do gênero feminino e 42 do gênero masculino, com média de idade de 38 anos. Os professores responderam questionário, com cinco questões de autorreferência à presença de alteração de voz no presente e sintomas de disfunção temporomandibular. Os dados foram analisados por meio de teste de associação (Qui-quadrado) para verificar associação entre distúrbio de voz e sintomas de disfunção temporomandibular, além da relação de cada um deles quanto a gênero e idade. **Resultados:** Os sintomas de disfunção temporomandibular relatados pelos professores foram: dor de cabeça ou na face, dor ao final do dia e dor ao falar muito. Os resultados mostraram diferença significativa para os sintomas de dor ao falar muito, dor ao final do dia e estalido na articulação temporomandibular, em professores sem distúrbio de voz. Houve diferença significativa para o gênero feminino, quanto a distúrbio de voz. Constatou-se maior número de autorreferência à disfunção temporomandibular, quando comparado ao distúrbio de voz, com diferença significativa para o gênero feminino. **Conclusão:** Os achados apontam associação estatística entre distúrbio de voz e sintomas de disfunção temporomandibular, em professores. Destaca-se a importância de outras pesquisas com avaliação clínica integrada, para aprofundar dados referentes a sintomas vocais e DTM, em relação à idade.

Descritores: Voz; Distúrbios da voz; Síndrome da disfunção da articulação temporomandibular; Dor facial; Transtornos da articulação

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INTRODUCTION

Voice disorder in teachers may be related to several etiologies such as organic lesions of the vocal chords, inefficient control of breathing, laryngeal tension[1], and changes in the temporomandibular joint (TMJ) articulation[2]. It is fundamental to understand the above relationship in clinical assessment of voice disorder (VD)[3], especially when dealing with professionals who rely on voice.

Several studies have shown different vocal symptoms in teachers with VD[4-12]. The most common symptoms include hoarseness, vocal fatigue, and tiredness or pain when speaking[13,14].

On the other hand, the most frequent complaints in subjects with temporomandibular disorder (TMD) are joint noises[15], pain when speaking or facial pain[16-18], deviations and displacement of the mandible, vocal fatigue, catching mandible, hoarseness[13,19], reduced vertical amplitude, and deviation of mandibular movements during speech[20]. As noted from the brief description of symptoms, some are common to VD as well as TMD.

The correlation between VD and TMD could be because of the prolonged use of one's voice, resulting in severe laryngeal tension, TMJ pain, and difficulty in performing mandibular movements[2,21]. TMDs, in turn, can cause changes in the mandibular movements because of muscle and joint conditions[19]. The literature[22] also states that TMDs directly interfere with mandibular muscles and the cervical region because of improper posture and movement of the head and hyoid bone. As a result, the suprahyoid muscle and laryngeal activities are modified. Further, the phonation function is compromised because of the disharmony[22].

The relationship between VD and TMD could be directly associated with pain in the masticatory muscles[23]. In most cases, the pain is related to changes in muscular activity, which may involve hypofunctioning or hyperfunctioning of various muscles of mastication[24].

In a previous study[25], the authors were unsuccessful in verifying the relationship between pain in the muscles involved in the physiological process of mastication, lateral and posterior structures of the TMJ, and vocal acoustic measures of the glottal source. However, the authors stated that TMD could be accompanied by muscle tension, latching of the mandibular opening, and excessive cervical and shoulder girdle tensions.

Another study[26] involving voice assessment through audio-perceptual analysis showed that patients with TMD experienced progressive voice deterioration because of changes in resonance, loudness, pitch, and articulation.

From theoretical and clinical perspectives, it is essential to understand the correlation between VD and TMD, because such problems involve multifactorial causes, thus, requiring multidisciplinary care[27]. In addition, actions that include the promotion of health and prevention of changes, which are both related to VD and symptoms of TMD, may improve the vocal wellbeing of teachers.

The purpose of this study was to investigate the association between VD and symptoms of TMD in elementary and high school teachers, as well as possible associations of the disorders in terms of gender and age.

METHODS

This cross-sectional and observational study was approved by the Committee of Ethics in Research of the Pontifícia Universidade Católica de São Paulo (PUC-SP), under No. 137/08. After a detailed explanation of the study, the teachers signed a Free and Informed Consent Form.

A workshop was conducted on the World Voice Day. One-hundred and thirty-eight teachers (96 women and 42 men; age, between 22 and 58 years) from public elementary schools in the city of Barueri, São Paulo participated in the workshop. Before beginning the research activity, all teachers were informed about the procedures.

The teachers received an adapted questionnaire[28,29] (Appendix 1) that contained five closed questions with alternatives "yes/no" that were related to self-reported VD (if you have or had altered voice) and symptoms of TMD (headache or facial conditions involving pain, pain score, snapping noises when opening and closing the mouth, limitation and difficulty in moving the jaw, and episodes of lockjaw). Data regarding functional status and vocal habits were not investigated in this study because this was not part of the research objective.

We conducted a descriptive analysis of the data and the association with the variables of age, gender, self-reference to VD, and symptoms of TMD.

For analysis of the age variable, participants were divided into two groups based on the mean age (≤ 38 and ≥ 39 years). For assessing the TMD, the group with ages more than 39 years comprised 105 teachers and the group with ages less than 38 years comprised 33 teachers. For assessing VD, the group with ages more than 39 years comprised 61 teachers and the group with ages less 38 years comprised 77 teachers. In both the groups, teachers with and without complaints of TMD and VD were considered.

A teacher was considered to have TMD if he/she confirmed headache or facial pain and three or more symptoms under "pain," which is an indispensable symptom for characterization of TMD[28]. A subject was considered to have VD when he/she self-referenced to the presence of altered voice.

The association between VD and symptoms of TMD based on variables such as gender and age was performed using the chi-square test. For all analyses, a significance level of 5% was utilized.

RESULTS

The main symptoms of TMD for the total group of teachers, in descending order, were as follows: headache or face pain

(89.86%), pain at the end of the day (74.64%), and pain when speaking excessively (68.84%). TMD symptoms and significant VD, in descending order, were as follows: snapping of TMJ, pain when speaking excessively, and pain at the end of the day (Table 1). Significant differences were noted for gender (female) for self-reported TMD (Table 2). No age-related differences were found between VD and symptoms of TMD (Table 3).

DISCUSSION

Symptoms of headache or face pain due to TMD, which is the main symptom reported by participants, were accompanied by three or more characteristics[2,18]. Among the main characteristics observed in the present study, the most common were as follows: symptoms of pain when speaking excessively, waking up, chewing, and opening the mouth, and TMJ snapping. Such symptoms can further reduce the amplitude of jaw opening while speaking[19], and therefore, may affect voice quality[23], thereby causing VD.

Statistically significant associations were observed between VD and symptoms of pain while talking excessively, pain at the end of the day, and TMJ snapping when opening and closing the mouth. Previous studies[2,22] have shown that the occurrence of VD is associated with a change in laryngeal activity because of the stress when speaking and tension in the suprahyoid muscles. Similar data have been reported in studies conducted in teachers and the general population[2,4,13,15,17]. For teachers, the above symptoms may be because of the long periods of speech, considering that most teachers speak in classrooms with several students in noisy conditions, and therefore, compelling them to speak loudly or exert force while speaking.

According to the findings of this study, the symptoms of pain when speaking excessively, pain at the end of the day, and TMJ snapping when opening and closing the mouth, appear

Table 1. Distribution of temporomandibular dysfunction symptoms associated with the presence of voice disorder

TMD Symptoms	VD				p-value
	Present		Absent		
	n	%	n	%	
Headache or face pain	124	89.86	14	10.14	0.159
Pain when waking up	81	58.70	57	41.30	0.399
Pain when speaking excessively	95	68.84	43	31.16	0.011*
Pain at the end of the day	103	74.64	35	25.36	0.014*
Pain when opening the mouth	63	45.65	75	54.35	0.195
Pain when chewing	49	35.51	89	64.49	0.243
TMJ joint snap when opening and closing the mouth	74	53.62	64	46.38	0.003*

*Significant values (p<0.05) – Chi-square test
Note: TMD = Temporomandibular dysfunction; VD = Voice disorder

Table 2. Gender-based distribution of self-reported voice disorder and temporomandibular dysfunction

Gender	TDM							VD						
	Present		Absent		p-value	Total		Present		Absent		p-value	Total	
	n	%	n	%		n	%	n	%	n	%		n	%
Male	27	64.29	15	35.71	0.032*	42	100.00	16	38.10	26	61.90	0.197	42	100.00
Female	78	81.25	18	18.75		96	100.00	48	50.00	48	50.00		96	100.00
Total	105	76.09	33	23.91		138	100.00	64	46.40	74	53.62		138	100.00

*Significant values (p<0.05) – Chi-square test
Note: TMD = Temporomandibular dysfunction; VD = Voice disorder

Table 3. Age-based distribution of temporomandibular dysfunction symptoms and voice disorder

Age	TDM							VD						
	Present		Absent		p-value	Total		Present		Absent		p-value	Total	
	n	%	n	%		n	%	n	%	n	%		n	%
≤ 38	15	45.45	18	54.55	0.868	33	100.00	35	45.50	42	54.55	0.807	77	100.00
≥ 39	46	43.81	59	56.19		105	100.00	29	47.50	32	52.46		61	100.00
Total	61	44.20	77	55.80		138	100.00	64	46.40	74	53.62		138	100.00

Chi-square test (p<0.05)
Note: TMD = Temporomandibular dysfunction; VD = Voice disorder

to be related to excessive orofacial muscle activity, TMJ imbalance, and laryngeal structure disharmony due to prolonged voice use. The above data are similar to those shown in previous studies[2,21], indicating that prolonged voice use is the main cause of VD appearance and symptoms of TMD in teachers.

The statistical association between vocal change and TMJ snap when opening and closing the mouth confirms previous findings[20] of complaints of TMJ noise during speech. According to the literature[13,15-17,19], joint noises, pain when talking, orofacial pain, deviations and displacement of the mandible, vocal fatigue, hoarseness, and locking of the jaw are common symptoms in subjects with TMD. Considering the continuous speech activity and professional use of voice in teachers, the observed association is relevant and supported in the literature[2,21,22].

More women were classified as having TMD or VD, although in the statistical analysis, this difference was only verified for TMD. These findings are in agreement with those in previous studies[2,5,11] that showed high incidences of TMD and VD in females. However, the results differed from those in some other studies that showed high incidences of only VD in women[6,12].

Studies[1,2,10,11] have shown that VDs in women may be related to stress, physiological and biological conditions of the larynx, and an overload of female cultural and social roles. However, the present study results showed no significant differences between genders for VD. Perhaps the study sample, which had higher numbers of female teachers, contributed to the results.

No differences between the two established age groups were observed, in both TMD and VD. The researched TMD and VD symptoms were self-reported by both female and male participants of both age groups, by considering the mean age (≤38 and ≥39 years) as reference. The age group differed from that shown in previous studies[2] in terms of the association of among age, TMD, and VD. Thus, the study result does not rule out the importance of verifying the age factor in further studies.

The positive association between VD and TMD for elementary and high school teachers observed in our study reinforces the importance of speech assessment of symptoms of TMD in subjects with VD to understand and properly direct this relationship in any clinical assessment VD[3].

On the basis of the study findings, we suggest that speech therapists show special attention to the symptoms of TMD and include specific strategies in promoting the prevention or therapeutic intervention of VD.

Considering the methodology used in this study, it seems appropriate that further studies investigate the relationship between TMD and VD by including clinical evaluation beyond self-reported assessment in teachers and other professionals who rely on voice.

For future research with clinical evaluation of symptoms of TMD and VD, we recommend a clinical evaluation, although questionnaires should not be ruled out, because this is a cost-effective and important tool that could be utilized as a first-line survey in determining the extent of knowledge the subject has on his or her voice condition and TMD. In any action performed by speech therapists on teachers, self-reported diagnoses provide an informal view of factors that affect an individual.

CONCLUSION

The results of this study indicate a statistical association between VD and TMD symptoms based on the pain characteristics when speaking excessively, pain at the end of the day, and TMJ snap. TMD predominantly occurred in females than in males. No differences in the incidence of VD between genders were observed.

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Appendix 1. Questionnaire on voice disorder and temporomandibular dysfunction in teachers

Dear teacher: The table below aims to conduct a survey on the conditions of temporomandibular articulation and voice. Please answer all the questions with an x in the appropriate spaces or fill in the blanks as requested.

Description of temporomandibular dysfunction symptoms (TMD) and voice disorder (VD)	
1. Do you have headaches or facial pain?	( ) no ( ) yes
2. When does this situation occur?	
2.1. When you wake up	( ) no ( ) yes
2.2. At the end of the day	( ) no ( ) yes
2.3. When you chew	( ) no ( ) yes
2.4. When you speak excessively	( ) no ( ) yes
2.5. When you open your mouth too much	( ) no ( ) yes
3. How would you classify this pain?	( ) Absent ( ) Soft ( ) Moderate ( ) Acute
4. Do you have a “snap” noise when opening and closing the mouth?	( ) no ( ) yes
5. Do you have or have you ever experienced a change in your voice?	( ) no ( ) Yes, I have ( ) Yes, I have

Adapted from:

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