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Original articles

Stomatognatic system changes in dysphonic individuals

Alterações de sistema estomatognático em indivíduos disfônicos

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ABSTRACT

Purpose: to verify the presence of disorders of the stomatognathic system and its association with sex, profession, allergies report and diagnosing of type of dysphonia of the dysphonic individuals who sought treatment in a speech therapy clinical school.

Methods: quantitative and retrospective study, through the database. Sample of 69 subjects of records of both sexes, aged between 19 and 44 years. Data were collected on age, gender, profession, report of allergies, diagnosis of the type of dysphonia, respiratory tract and antroposcópica evaluation of the stomatognathic system: occlusion, horizontal and transverse bite disorders, width and depth of the hard palate, breathing mode and voltage lips, tongue and cheeks.

Results: 28,99% (n=20) were professional voice users; 33,33% (n=23) showed allergies; mixed respiratory type with 75,36% (n=52), followed by the top with 20,29% (n=14) and costodiafragmatic abdominal with 4,35% (n=3); functional dysphonia (n=42; 66,67%), followed by organicofuncional (n=19; 23,54%) and organic (n=8; 11,59%). In association os stomatognathic system disorders with types and mode breathing, dysphonia types, professional voice and allergies report were no significance, only females with no vertical bite changes.

Conclusion: patients were predominantly women; grown ups; not voice professionals; with functional dysphonia; no history of allergies or stomatognathic system disorders; with appropriate type and mode breathing, with only female association with no vertical bite changes.

Keywords: Dysphonia; Voice Disorders; Speech, Language and Hearing Sciences; Stomatognathic System; Voice

RESUMO

Objetivo: verificar a presença de alterações do sistema estomatognático e sua associação com o sexo, profissão, relato de alergias e diagnóstico fonoaudiológico do tipo de disfonia em indivíduos disfônicos que procuraram atendimento em uma clínica-escola fonoaudiológica.

Métodos: estudo quantitativo e retrospectivo, por meio de banco de dados. Amostra de 69 prontuários de sujeitos de ambos os sexos, com idades entre 19 e 44 anos. Coletaram-se dados sobre faixa etária, sexo, profissão, relato de alergias, diagnóstico fonoaudiológico do tipo de disfonia, tipo respiratório e dados da avaliação antroposcópica do sistema estomatognático: oclusão, alterações horizontais e transversais de mordida, largura e profundidade do palato duro, modo respiratório e tensão de lábios, língua e bochechas.

Resultados: 28,99% (n=20) eram profissionais da voz; 33,33% (n=23) relataram alergias; tipo respiratório misto com 75,36% (n=52), seguido pelo superior com 20,29% (n=14) e costodiafragmaticoabdominal com 4,35% (n=3); tipo de disfonia funcional (n=42; 66,67%), seguido pelo organofuncional (n=19; 23,54%) e orgânico (n=8; 11,59%). Nas associações de alterações do sistema estomatognático com tipos e modos respiratórios, tipos de disfonia, profissionais da voz e relato de alergias não houve significâncias, apenas do sexo feminino com ausência de alterações verticais de mordida.

Conclusão: os pacientes estudados eram predominantemente mulheres; adultos; não profissionais da voz; com disfonia funcional; sem relato de alergias ou alterações de sistema estomatognático; com tipo e modo respiratórios adequados, havendo associação apenas do sexo feminino com ausência de alterações verticais de mordida.

Descritores: Disfonia; Distúrbios da Voz; Fonoaudiologia; Sistema Estomatognático; Voz

INTRODUCTION

The stomatognathic system (SS) consists of different structures such as fixed bones of the head, jaw, hyoid, sternum, muscles of mastication, swallowing, facial, among others[1-3]. Such structures are of great relevance to the SS functions (speaking, breathing, swallowing, sucking and voice) are carried out smoothly along with the central nervous system and peripheral control[1,4,5].

There must be balance between the skull and the cervical spine to the stability of head position and support of dynamic activities. Thus, it is possible to mobilize the skull moving bones, cartilage, joints and muscles to perform the functions. In the case of vocal production, which is one of SS functions, it is still necessary to have mastery of content to be transmitted and integrity of the vocal apparatus[6,7].

With regard to speech, it is known that the SS operates as a voice filter, because the tongue, lips, pharynx and nasal cavity modify the voice quality by acting as resonators. Thus, changes in the configuration of these structures, as well as in the muscles that make up the vocal apparatus or aids that act indirectly, as postural, functional and / or tone changes simultaneously interfere in the performance of functions of breathing, phonation, articulation and resonance[8]. These data elucidate the orofacial motor and the voice have a close relation, both on anatomical, functional, physiological features as neuromuscular[2].

Thus, knowledge about the physiology of these aspects is required in the vocal rehabilitation process in order to recognize the association between these two areas of Speech Therapy[9,10]. The integrated view of SS structures and vocal production can subsidize speech and language therapy, helping to optimize results and reducing treatment time.

Considering the above, this study aimed to verify the presence of the stomatognathic system changes and its association with gender, profession, report of allergies, respiratory type and speech and language diagnosis of the type of dysphonia in dysphonic individuals who sought treatment at a speech therapy school clinic.

METHODS

This transversal, quantitative and retrospective survey was performed by collecting information from the voice database of a school clinic. The study group was composed of subjects who underwent speech therapy evaluation in the period from 1998 to 2012 and signed the consent to evaluations through the Informed Consent (IC). The study was approved by the Ethics Committee of the institution of origin under number 23081.016945 / 2010-76.

The inclusion criteria for subjects were: speech therapy diagnosis of dysphonia, aged between 18 and 44 years old and both genders. The records whose data were incomplete, or had evidence of neurological diseases, syndromes, psychiatric, metabolic or endocrine issues, laryngeal surgery history and / or any surgical procedure of head and neck, registration of hearing loss, speech therapy and / or orthodontic registration and smoking habits and alcohol consumption were excluded from the survey[11].

Considering the age group, 315 subjects were found, of whom 158 were discarded because they did not contain in the records all the necessary evaluations for this study. They were excluded even: 36 report of orthodontic or speech therapy for voice and / or orofacial motor prior to assessment in school clinic; 29 by smoking and / or alcohol abuse; 17 by a history of endocrine or metabolic diseases; 4 with hearing loss and 2 for dental flaws. Thus, the sample totaled 69 records, of whom 58 (84.06%) were female subjects and 11 male (15.94%), aged between 19 and 44 years (mean 27.07 years).

The variables considered for collection of survey data from medical records of patients were: profession (being classified in “voice professional” or “no voice professional “), allergies report (presence or absence); speech diagnosing the type of dysphonia, respiratory type and SS assessment data (data of anthroposcopic evaluation of the stomatognathic system: occlusion, horizontal and transverse bite changes, width and depth of the hard palate, breathing mode and lips, tongue and cheeks tension).

The speech therapy diagnostic provided classification of the type of dysphonia (functional, organofunctional or organic) and it was based on the ENT diagnosis and the findings of the speech clinical evaluation[6].

For the evaluation of the SS, we used a protocol adapted from school clinic. The data were considered related to occlusion and other dental issues, muscle tension and stomatognathic functions (breathing, chewing and swallowing)[12].

Regarding occlusion, it was considered its classification (Class I, Class II, Class I and II or I and III and Class III of Angle) and also changes the horizontal bite (absent, overjet and anterior crossbite), vertical changes (absent, overbite, anterior open bite, posterior

open bite) and transverse bite changes (absent, unilateral posterior crossbite and bilateral posterior crossbite)[12]. As for the morphology of the hard palate, width and depth aspects were analyzed (normal or altered)[12].

For the evaluation of lips, tongue and cheeks muscle tension, touch tests were performed with gloved finger and resistance tests with a tongue depressor. Tension was considered as normal or altered for each structure[12].

The diagnosis of breathing mode (nasal or oral) was carried out by analyzing the lips posture throughout anamnesis and assessment in order to verify if the patient remained with half-open or open lips indicative of oral or oronasal breathing, or if it remained with occluded lips, indicative of nasal breathing. Also, we used the Glatzel mirror was gently placed below the nostrils to observe the nasal flow, which assisted in the information about the existence of nasal obstruction. Finally, the nasal possibility test was carried out that the patient should remain with a sip of water in the mouth in order to check the ability to maintain nasal breathing. So the breathing mode was classified as nasal when the subject did not present indicative of blocking the upper airway and proper posture of lips and showed the possibility of nasal breath for over two minutes, the reverse of the information enabled the classification in breathing oral or oronasal mode[12].

All patients had undergone ENT examination which included visual inspection of the larynx, which is considered ENT diagnostic of laryngeal condition for further conclusion of the speech diagnosis.

Data were tabulated and the variables were described and analyzed statistically using the Person's Chi- Square nonparametric test. 5% significance level was adopted.

RESULTS

With regard to the occupation of the 69 subjects studied, it was found that 28.99% (n = 20) were voice professional individuals. Regarding allergic factors, 33.33% (n = 23) had allergy, and these, 65.22% (n = 15) reported rhinitis, 8.69% (n = 2) sinusitis, 4.35% (n = 1) bronchitis, 13.04% (n = 3) rhinitis and sinusitis, and 4.35% (n = 1) rhinitis and asthma. The predominant respiratory type was mixed with 75.36% (n = 52), followed by the superior with 20.29% (n = 14) and diaphragmatic breathing with 4.35% (n = 3). The predominant dysphonia was functional (n = 42; 66.67%), followed by organofunctional (n = 19; 23.54%) and organic (n = 8; 11.59%).

Table 1 shows the descriptive results of the evaluation of the stomatognathic system.

Table 2 shows the association between the respiratory type and reporting of presence of allergies and SS changes.

It is observed in Table 3, the association between respiratory mode and reporting of presence of allergies and SS changes.

It is visualized, in Table 4, the association between speech diagnosis of the types of dysphonia and reporting of presence of allergies, SS changes and the respiratory type.

Table 5 shows the association between voice professional and types of dysphonia, a reporting of allergies and SS changes.

Table 6 displays the association between reporting of presence of allergies and SS changes.

It is observed in Table 7 the association between gender and SS changes.

Table 1. Descriptive results of the evaluation of the stomatognathic system

Classification	Subclassification	n	%
Occlusion	Normal Occlusion	46	66,67
	Class I	17	24,64
	Class II	6	8,69
	Class III	0	0
Horizontal bite changes	Absent	64	92,75
	Anterior crossbite	5	7,25
	Overjet	0	0
Vertical bite changes	Absent	60	86,95
	Anterior open bite	4	5,60
	Overbite	4	5,60
	Posterior open bite	1	1,45
Transverse bite changes	Absent	55	79,71
	Unilateral posterior crossbite	13	18,84
	Bilateral posterior crossbite	1	1,45
Palate width	Altered	9	13,04
	Normal	60	86,96
Palate depth	Altered	14	20,22
	Normal	55	79,71
Respiratory mode	Oral	7	10,14
	Nasal	46	66,67
	Oronasal	16	23,19
Lips tension	Altered	3	4,35
	Normal	66	95,65
Tongue tension	Altered	14	20,29
	Normal	55	79,71
Cheek tension	Altered	9	86,95
	Normal	60	13,04

Descriptive analysis.
Caption: n= number of subjects; %= percentage of subjects.

Table 2. Association between the respiratory type and reporting of presence of allergies and stomatognathic system changes

Allergies; Types of SS changes	Subclassification	Respiratory types			p-value
		Mixed	Superior	DB	
		n	n	n	
Allergies	Yes	14	7	2	0,121
	No	38	7	1	
Occlusion	Normal	37	7	2	0,625
	Class I	11	5	1	
	Class II	4	2	0	
	Class III	0	0	0	
Horizontal bite changes	Absent	49	12	3	0,487
	Anterior crossbite	3	2	0	
	Overjet	0	0	0	
Vertical bite changes	Absent	46	12	2	0,542
	Anterior open bite	2	1	1	
	Overbite	3	1	0	
	Posterior open bite	1	0	0	
Transverse bite changes	Absent	42	11	2	0,343
	Unilateral posterior crossbite	10	2	1	
	Bilateral posterior crossbite	0	1	0	
Palate width	Altered	7	2	0	0,787
	Normal	45	12	0	
Palate depth	Altered	12	2	0	0,515
	Normal	40	12	3	
Lips tension	Altered	3	0	0	0,598
	Normal	49	14	3	
Tongue tension	Altered	12	1	1	0,356
	Normal	40	13	2	
Cheek tension	Altered	5	3	1	0,287
	Normal	47	11	2	

* Statistically significant results ($p \leq 0.05$) - Chi-Square test

Caption: DB= diaphragmatic breathing ; n= number of subjects; SS= stomatognathic system.

Table 3. Association between the respiratory mode and reporting of presence of allergies and stomatognathic system changes

Allergies; Types of SS changes	Subclassification	Respiratory Mode			p-value
		Oronasal	Oral	Nasal	
		n	n	n	
Allergies	Yes	9	11	3	0,052
	No	7	4	35	
Occlusion	Normal	9	4	33	0,448
	Class I	4	2	11	
	Class II	3	1	2	
	Class III	0	0	0	
Horizontal bite changes	Absent	14	7	43	0,537
	Anterior crossbite	2	0	3	
	Overjet	0	0	0	
Vertical bite changes	Absent	13	6	41	0,650
	Anterior open bite	2	1	1	
	Overbite	1	0	3	
	Posterior open bite	0	0	1	
Transverse bite changes	Absent	13	6	36	0,408
	Unilateral posterior open bite	2	1	10	
	Bilateral posterior open bite	1	0	0	
Palate width	Altered	1	2	6	0,343
	Normal	15	5	40	
Palate depth	Altered	1	2	11	0,269
	Normal	15	5	35	
Lips tension	Altered	0	0	3	0,456
	Normal	16	7	43	
Tongue tension	Altered	2	1	11	0,568
	Normal	14	6	35	
Cheek tension	Altered	4	2	3	0,073
	Normal	12	5	43	

* Statistically significant results ($p \leq 0.05$) - Chi-Square test
Caption: n = number of subjects; SS = stomatognathic system.

Table 4. Association between the speech diagnosis of the types of dysphonia and reporting of presence of allergies, the stomatognathic system changes and the respiratory type

Allergies; Types of SS changes Respiratory type	Subclassification	Type of dysphonia			p-value
		organofunctional	Functional	Organic	
		n	n	n	
Allergies	Yes	7	13	3	0,871
	No	12	29	5	
Occlusion	Normal	13	27	6	0,806
	Class I	5	10	2	
	Class II	1	5	0	
	Class III	0	0	0	
Horizontal bite changes	Absent	16	40	8	0,215
	Anterior crossbite	2	3	0	
	Overjet	0	0	0	
Vertical bite changes	Absent	16	37	7	0,851
	Anterior open bite	1	2	1	
	Overbite	2	2	0	
	Posterior open bite	0	1	0	
Transverse bite changes	Absent	15	35	5	0,332
	Unilateral posterior crossbite	3	7	3	
	Bilateral posterior crossbite	1	0	0	
Palate width	Altered	3	5	1	0,915
	Normal	16	37	7	
Palate depth	Altered	5	8	1	0,681
	Normal	14	34	7	
Lips tension	Altered	1	2	0	0,286
	Normal	17	41	8	
Tongue tension	Altered	4	9	1	0,843
	Normal	15	33	7	
Cheek tension	Altered	2	7	0	0,408
	Normal	17	35	8	
Respiratory mode	Oral	3	4	0	0,623
	Nasal	13	28	5	
	Oronasal	3	10	3	
Respiratory type	Mixed	13	33	6	0,864
	Superior	5	7	2	
	DB	1	2	0	

* Statistically significant results ($p \leq 0.05$) - Chi-Square test
Caption: DB= diaphragmatic breathing; n=number of subjects; SS= stomatognathic system.

Table 5. Association between voice professional and types of dysphonia, a reporting of allergies and stomatognathic system changes

Types of dysphonia, Allergies and SS changes	Subclassification	Voice professional		p-value
		No	Yes	
		n	n	
Type of dysphonia	Organofunctional	12	7	0,871
	Functional	32	10	
	Organic	5	3	
Allergies	Yes	16	7	0,851
	No	33	13	
Occlusion	Normal	32	14	0,782
	Class I	12	5	
	Class II	5	1	
	Class III	0	0	
Horizontal bite changes	Absent	45	19	0,645
	Anterior crossbite	4	1	
	Overjet	0	0	
Vertical bite changes	Absent	42	18	0,246
	Anterior open bite	4	0	
	Overbite	3	1	
	Posterior open bite	0	1	
Transverse bite changes	Absent	40	15	0,279
	Unilateral posterior crossbite	9	4	
	Bilateral posterior crossbite	0	1	
Palate width	Altered	7	2	0,631
	Normal	42	18	
Palate depth	Altered	11	3	0,485
	Normal	38	17	
Lips tension	Altered	2	1	0,865
	Normal	47	19	
Tongue tension	Altered	10	4	0,969
	Normal	39	16	
Cheek tension	Altered	5	4	0,273
	Normal	44	16	
Respiratory mode	Oral	5	2	0,686
	Nasal	34	12	
	Oronasal	10	6	
Respiratory type	Mixed	38	14	0,801
	Superior	9	5	
	DB	2	1	

* Statistically significant results ($p \leq 0.05$) - Chi-Square test
Caption: DB= diaphragmatic breathing; n=number of subjects; SS= stomatognathic system.

Table 6. Association between reporting of presence of allergies and stomatognathic system changes

Classification SS changes	Subclassification	Allergies		p-value
		Yes	No	
		n	n	
Occlusion	Normal	16	30	0,465
	Class I	4	13	
	Class II	3	3	
	Class III	0	0	
Horizontal bite changes	Absent	20	44	0,189
	Anterior crossbite	3	2	
	Overjet	0	0	
Vertical bite changes	Absent	21	39	0,843
	Anterior open bite	1	3	
	Overbite	1	3	
	Posterior open bite	0	1	
Transverse bite changes	Absent	20	35	0,127
	Unilateral posterior crossbite	2	11	
	Bilateral posterior crossbite	1	0	
Palate width	Altered	3	6	1,000
	Normal	20	40	
Palate depth	Altered	4	10	0,672
	Normal	19	36	
Lips tension	Altered	1	2	1,000
	Normal	22	44	
Tongue tension	Altered	4	10	0,672
	Normal	19	36	
Cheek tension	Altered	3	6	1,000
	Normal	20	40	
Respiratory mode	Oral	3	4	0,052
	Nasal	11	35	
	Oronasal	9	7	

* Statistically significant results ($p \leq 0.05$) - Chi-Square test
Caption: n=number of subjects; SS= stomatognathic system.

Table 7. Association between gender and stomatognathic system changes

Classification SS changes	Subclassification	Gender		p-value
		Female	Male	
		n	n	
Occlusion	Normal	37	9	0,404
	Class I	15	2	
	Class II	6	0	
	Class III	0	0	
Horizontal bite changes	Absent	53	11	0,311
	Anterior crossbite	5	0	
	Overjet	0	0	
Vertical bite changes	Absent	52	8	0,020*
	Anterior open bite	4	0	
	Overbite	2	2	
	Posterior open bite	0	1	
Transverse bite changes	Absent	44	11	0,189
	Unilateral posterior c rossbite	13	0	
	Bilateral posterior crossbite	1	0	
Palate width	Altered	50	10	0,671
	Normal	8	1	
Palate depth	Altered	46	9	0,849
	Normal	12	2	
Lips tension	Altered	3	0	0,440
	Normal	55	11	
Tongue tension	Altered	12	2	0,849
	Normal	46	9	
Cheek tension	Altered	9	0	0,161
	Normal	49	11	
Respiratory mode	Oral	7	0	0,312
	Nasal	39	7	
	Oronasal	12	4	

* Statistically significant results ($p \leq 0.05$) - Chi-Square test
Caption: n=number of subjects; SS= stomatognathic system.

DISCUSSION

The relation between voice disorders and allergic changes involving the upper airways encompasses mainly changes the resonance and vocal projection, causing laryngeal effort as a compensatory mechanism[2].

The literature states that the allergic factors are one of the common etiologies of dysphonia[2]. In addition, a high percentage of patients with allergic rhinitis usually presents change in breathing mode[13]. In this study, most subjects showed no allergies and had nasal breathing mode (Table 1), however, although not significant, most of the subjects who had allergy, they had oral breathing mode (Table 3), which meets the literature.

There is a relation between the complaints of allergic and / or digestive disorders and dysphonia, since these are co-factors for the establishment of dysphonia and laryngeal injury[14]. In this work, this relation was not observed, with predominance of subjects with independent functional dysphonia have allergies or not (Table 4).

There was still, in the descriptive analysis, the majority percentage of dysphonic subjects presented normal bite, occlusion, width and depth of palate, lip, tongue and cheeks tension (Table 1), a finding that does not corroborate with the literature. For voice production, the individual uses the respiratory and

digestive system structures. Thus, posture, tone and mobility of SS organs directly influence the joint and interfere with vocal projection in laryngeal and pharyngeal adjustments and therefore they have some relation with the voice quality and the resonance system[2]. The tongue position in the oral cavity affects the resonance of the voice, the body tongue in anterior and high position can produce a childish voice, as the tongue in a retracted position, can produce a muffled resonance with more severe pitch[2].

Although the larynx to be a key body for voice production, it is known that other structures have an equal importance to the production of a normal voice, among which we highlight the muscles of the abdomen, thoracic cavity, lungs, pharynx, oral and nasal cavity, and changes to these structures can cause vocal dysfunctions[2]. In the present study, the percentage majority had nasal breathing and mixed respiratory type (Table 1). Research that analyzed the type and breathing mode of future professionals of voice and spoken and sung voice professional also found nasal and mixed type mode, corroborating the findings of this investigation[15-17].

The nasal breathing is considered essential for the proper functioning of the larynx and other structures and SS functions, since the mixed respiratory type is not ideal, however, it is considered acceptable in subjects that do not have great vocal demand as voice professionals[2,6]. It was not found in this survey relation between the SS changes with the type (Table 2) and the breathing mode (Table 3). These data were expected, considering that most of the subjects (28.99%) was not voice professional and could perform daily activities without automated diaphragmatic breathing. Nevertheless, it is known that diaphragmatic breathing is essential for a normotensive voice production and optimal for voice professional[6,15-17].

In this study, the percentage majority had functional dysphonia, characterized by disorders of the vocal behavior, and can be the primary type by misuse of the voice, secondary by vocal inadequacies or psychogenic order[6]. It is believed that this type of dysphonia is what may have greater influence on SS, considering that SS is directly or indirectly part of the vocal production[6], however, this claim was not confirmed in this survey. Nevertheless, comparing the types of dysphonia, the major SS changes in the aspects of horizontal, vertical and transverse bite changes; occlusion; width and depth of palate; breathing mode and lips, tongue and cheek tension; as well as the respiratory type changes occurred in subjects with functional dysphonia (Table 4).

This finding suggests that, in the studied group, SS changes did not interfere directly in dysphonia presented by the subjects, but could be acting together with other vocal and laryngeal features such as auxiliary in worsening of voice changes or prognosis, without setting a direct relation between type of dysphonia and a specific SS change. In another survey, also found no change in vocal quality of mouth breathers who had SS changes compared to the vocal quality of a control group of nose breathers without SS changes, agreeing with the results of this study[9].

A work that evaluated the activity of masticatory muscles through electromyography in two groups of women, and the study group with dysphonia and the control group without dysphonia, showed that even in the jaw rest, dysphonic women had the masticatory musculature activity significantly increased when compared to the control group,[18] possibly because most dysphonic individuals presents muscle hypertension. However, another study found that even in the absence of pain, subjects with symptoms of temporomandibular disorders can present acoustic voice changes, as the vocal production relates to all the muscles and influences the movement of the larynx, or because of functions disorganization of the temporomandibular join occurs overload at the laryngeal level[19]. In this study, most subjects presented with normal muscle tension, however, it is known that the evaluation through touch is subjective and prone to failure, but it is still the most widely used in school clinic practices for easy access and low value (Table 1).

There was no association between voice professional and non-professional with SS changes, respiratory type and type of dysphonia. However, most voice professional subjects (minority in the sample) did not present SS changes, but the predominant respiratory type was mixed and the type of dysphonia was functional (Table 5). In the voice professional, an impairment that affects the air function can negatively influence loudness, pitch and voice quality as well as the temporal aspects of emission[2,10,16,17,20,21].

Inadequate respiratory type can impair vocal production considering that does not have the necessary air support, which creates stress and overload the other levels of vocal production as laryngeal[21,22]. In this survey, the predominant type in the entire sample was mixed, where there is little movement of the upper and lower chest regions being

accepted for individuals who do not have great vocal demand and use their voice only in everyday speech. But it is contraindicated for professional vocal use, as insufficient air support can cause imbalance between respiratory, phonation, resonant and articulation levels, as well as fatigue, vocal instability and lack of ar[6,16,17]. These factors may influence the type of dysphonia, and they are usually related to functional dysphonia, and subsequently the organofunctional. Such statements agree with the findings of this study (Table 5) in which, although no significant association, most dysphonic subjects had functional dysphonia type, followed by organofunctional and organic.

Regarding the significant association found among women with no vertical bite changes data were not found in the literature that could base this aspect, so it is suggested more studies to clarify this finding.

CONCLUSION

The studied dysphonic patients were predominantly women; adults; no voice professionals; no history of allergies; with functional dysphonia; SS without changes; with proper type and mode of breathing and there was no SS changes association with the type of dysphonia, type and mode of breathing or voice professionals, only female with no vertical bite changes.

REFERENCES

1. Rehder MI, Ferreira LP, Befi-Lopes DM, Limongi SCO. Inter-relações entre voz e motricidade oral. In: Ferreira LP, Befi-Lopes DM, Limongi SCO. (Org.). Tratado de fonoaudiologia. São Paulo: Roca, 2004. p.59-64.
2. Tavares JG, Silva VA, Alves EHA. Considerações teóricas sobre a relação entre respiração oral e disfonia. Rev Soc Bras Fonoaudiol. 2008;13(4):40510.
3. Castro MSJ, Toro AADC, Sakano E, Ribeiro JD. Avaliação das funções orofaciais do sistema estomatognático nos níveis e gravidade de asma. J Soc Bras Fonoaudiol. 2012;24(2):119-24.
4. Felicio CM. Fonoaudiologia aplicada a casos odontológicos. São Paulo: Pancast, 1999.
5. Nascimento GKBO, Cunha DA, Lima LM, Moraes KJR, Pernambuco LA, Régis RMFL et al. Eletromiografia e superfície do músculo masseter durante a mastigação: uma revisão sistemática. Rev CEFAC. 2012;14(4):725-31.
6. Behlau M. Voz: o livro do especialista. Rio de Janeiro: Revinter, 2001.
7. Bonatto MTRL, Silva MAA, Costa HO. A relação entre respiração e sistema sensório-motor oral em crianças disfônicas. Rev CEFAC. 2004;6(1):58-66.
8. Garcia RAS, Campiotto AR. Distúrbios vocais x distúrbios musculares orais: possíveis relações. Pró-Fono R Atual Cient. 1995;7(2):33-9.
9. Viegas D, Viegas F, Atherino CCT, Baeck HE. Parâmetros vocais em respiradores orais. Rev CEFAC. 2010;12(5):820-30.
10. Nishimura CM, Gimenez SRML. Perfil da fala do respirador oral. Rev CEFAC. 2010;12(3):5058.
11. Colton RH, Casper JK, Leonard R. Compreendendo os problemas de voz: uma perspectiva fisiológica ao diagnóstico e ao tratamento. Rio de Janeiro: Revinter, 2010.
12. Genaro KF, Berretin-Felix G, Rehder MIBC e Marquesan IQ. Avaliação miofuncional orofacial-protocolo MBGR. Rev CEFAC. 2009;11(2):237-55.
13. Lemos CM, Willo NS, Mion OG, Júnior JFM. Alterações funcionais do sistema estomatognático em pacientes com rinite alérgica: estudo caso-controle. Braz J Otorhinolaryngol. 2009;75(2):268-74.
14. Cielo CA, Finger LS, Roman-Niehues G, Deuschle VP, Siqueira MA. Disfonia organofuncional e queixas de distúrbos alérgicos e/ou digestivos. Rev CEFAC. 2009;11(3):431-9.
15. Soares EB, Brito CMCP. Perfil vocal do guia de turismo. Rev CEFAC. 2006;8(4):5018.
16. Soares EB, Brito CMCP. Hábito e perfil vocal em coralistas. Acta ORL. 2009;27(1):2835.
17. Cielo CA, Hoffmann CF, Scherer T, Christmann M. Tipo e modo respiratório de futuros profissionais da voz. Rev Saúde. 2013;39(1):12130.
18. Rodrigues-Bigaton D, Schwarzenbeck A, Berni KC, Guirro RR, Silvério KC. Activation pattern masticatory muscles in dysphonics woman. Electromyogr Clin Neurophysiol. 2010;50(6):289-94.
19. Boton LM, Morisso MF, Silva AMT, Cielo CA. Dor muscular em cabeça e pescoço e medidas vocais acústicas de fonte glótica. Rev CEFAC. 2012;14(1):104-13.
20. Rossi DC, Munhoz DF, Nogueira CR, Oliveira TCM, Britto ATBO. Relação do pico de fluxo expiratório com o tempo de fonação em pacientes asmáticos. Rev CEFAC. 2006;8(4)50917.
21. Christmann MK, Scherer TM, Hoffmann CF, Cielo CA. Tempo máximo de fonação de

futuros profissionais da voz. Rev CEFAC. 2013;15(3):622-30.
22. Silvério KCA, Pereira EC, Menoncin LM, Dias CAS, Santos CLG, Schwartzman PP. Avaliação vocal e cervicoescapular em militares instrumentistas de sopro. Rev Soc Bras Fonoaudiol. 2010;15(4):497504.