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Dores corporais em coristas eruditos

ABSTRACT

Purpose: To identify and characterize the presence of body pain related to voice usage in choral singers. **Methods:** A questionnaire investigating the occurrence of voice problems, vocal self-evaluation, and a report of body aches was given to 50 classical choral singers and 150 participants who were non-singers. Thirteen types of aches were investigated that were distributed into two groups: larynx proximal ache (temporomandibular joint, tongue, sore throat, neck, back of the neck, shoulder, and pain while speaking) and distal ache (headache, backache, chest, arms, hands, and ear ache). **Results:** Classical choral singers had less presence of pain than the general population. The most related pain types reported in singers were sore throat, chest, and shoulder, respectively. **Conclusion:** Reduced vocal signs of pain in singers may suggest that singers can benefit from vocal training once they have better voice usage due to voice practice, offering a protective effect to the development of voice disorders since voice training builds up a better musculoskeletal endurance.

RESUMO

Objetivo: Identificar e caracterizar dores corporais em coristas eruditos. **Métodos:** Foi aplicado um questionário autoexplicativo a 50 coristas eruditos e 150 sujeitos da população geral, com questões de caracterização pessoal e sobre a presença e frequência de 13 tipos de dores corporais: cabeça, pescoço, nuca, ombros, costas, peito, mão, ouvido, língua, articulação temporomandibular, garganta e dor ao falar. **Resultados:** Coristas eruditos relataram menos dores do que a população geral. Os tipos de dores mais relatados por coristas foram garganta, costas e ombros, respectivamente. **Conclusão:** A baixa ocorrência de dores corporais em coristas eruditos sugere que o uso vocal saudável, aliado ao treino da musculatura respiratória e de produção vocal, pode oferecer uma maior resistência musculoesquelética, prevenindo o aparecimento de doenças associadas a ela.

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INTRODUCTION

Pain is defined by the International Association for the Study of Pain (IASP) as an “unpleasant sensory and emotional experience associated or related to real or potential tissue injury”. According to the institution, musculoskeletal pain is the most common. Therefore, in one of its last campaigns, IASP drew attention to the disabling pain experienced by people all over the world who suffer from musculoskeletal injuries⁽¹⁾. The association between body aches and vocal symptoms has been observed clinically, but is still not properly investigated. When an individual uses their voice in an improper way, producing tension and struggling to speak, they may feel discomfort or even pain during phonation. This pain, called *odynophonia*, is considered a sign and symptom of vocal problems⁽²⁾.

The presence of a vocal problem can manifest itself through different symptoms and can be caused by changes in structures and systems that are not necessarily linked to the larynx^(3,4). One study investigated the musculoskeletal patterns in patients with vocal disorders and found muscular complaints in 69% of the participants⁽⁵⁾. Furthermore, the weakness or imbalance of some muscle groups may aggravate the vocal symptoms by reducing the support structure necessary to maintain optimal function⁽²⁾.

Muscle tension dysphonia is probably the most common cause of functional dysphonia and comprises a series of complaints of muscle tension or discomfort such as pain during phonation, sense of physical tension, pain in the throat, headache, and pain or discomfort in the temporomandibular joint (TMJ), neck, and chest⁽⁶⁾. Vocal training can be considered as a prophylactic measure with regard to voice disorders as it stimulates a balanced use of the muscles involved in voice production and speech.

Voice professionals tend to give more importance and attention to aspects involving vocal health because any change in voice can compromise its performance. Choral singers have an important vocal demand and depend on a clean and balanced voice to have a good professional performance. Conservatory students seem to give more importance to vocal health and are more aware of the necessary precautions against developing a voice problem than the general population⁽⁷⁾. To investigate such a possibility, choral singers were selected for this study as this style of singing requires technique and a good self-perception about the use of voice. We believe that vocal training provides greater musculoskeletal resistance, and therefore reduces the occurrence of bodily pain, especially in the region near the larynx.

The purpose of this study is to identify the presence of bodily pain in choral singers, to verify its correlation with the occurrence of vocal problems, absenteeism, and the demand for specific treatments and to compare these with the results obtained with the general population.

METHODS

This study, protocol no. 1050/11, was approved by the ethics committee of the Centro de Estudos da Voz (CEV). This

is a descriptive cross-sectional study. Participants answered a self-explanatory questionnaire, which investigated information about their voice, work, and the presence of bodily pain⁽⁸⁾. Data collection was carried out from October 2007 to January 2008 in the city of São Paulo. All participants signed an informed consent form.

Fifty members of a professional choir (29 women and 21 men), aged between 18 and 57 years and 150 participants from the general population (87 women and 63 men), aged between 18 and 63 years and who were not involved with any professional activity related to classic or popular singing, participated in this study. All choir participants exercised another profession, and their participation in the choir, although professional, was not remunerated. The number of participants from the general population was as large as possible to allow statistical comparison with the group of classical singers.

All participants completed a self-explanatory questionnaire (Appendices 1 and 2), which consisted of 11 closed-ended questions divided into 5 information categories: (1) identification data (gender, profession, and years of service), (2) factors related to professional practice (activity, years of service, and daily hours), (3) vocal self-assessment, (4) data related to voice (report of the occurrence of voice-related problems during professional activity, need to take time off from work due to voice-related problems, and search for an ear, nose, and tongue (ENT) specialist /speech-language pathologist (SLP) due to voice-related problems), and (5) location of pain in different body regions during and/or after professional use of the voice.

The identification data and factors related to professional practice were used to characterize the sample. For classical singers, questions were directed to specific issues of singing practice (Appendix 1), and for the general population, questions were generic and therefore applicable to individuals in any profession (Appendix 2). Because the identification data and factors related to professional practice contained different questions for both groups, they were not used in the statistical analyzes.

In the investigation of the vocal self-assessment, the voice was to be classified by the subject by means of a Likert scale of five points, which contained the following options: excellent, good, fair, poor, or very poor. The questions related to voice and professional activity and aimed to verify if the subject had had voice-related problems during their professional activities, if they had ever needed to take time off work due to voice-related problems, if they had ever consulted an ENT specialist due to voice-related problems, and if they had ever consulted an SLP due to voice-related problems.

The presence of bodily pain has been investigated with regard to its occurrence and frequency. We surveyed 13 types of bodily pains: headache, sore tongue, TMJ pain, sore throat, nape pain, shoulder pain, back/spine pain, neck pain, chest pain, arm pain, hand pain, ear pain, and pain while speaking. To determine the frequency, participants could provide answers through a Likert scale of five points: never, sometimes, often, almost always, and always.

For the data analysis, the location of the pain was grouped into two categories: proximal and distal to the larynx. Considered proximal pains were: TMJ/jaw pain, sore tongue,

sore throat, neck pain, shoulder pain, neck pain, and pain while speaking. Considered distal pains were: headache, back/spine pain, chest pain, arm pain, hand pain, and ear pain.

The frequency of pains was also grouped for better data analysis. The “never” option was regarded as “the absence of bodily pain”. The options “sometimes”, “often”, “almost always”, and “always” were considered as “presence of bodily pain”.

For statistical analysis, the software SPSS (Statistical Package for Social Sciences), version 19.0 was used. The level of significance adopted for all results was 5%, $p \leq 0.05$. To compare the vocal self-assessment, the variables of pain reports and the relationship between pain and the data on voice were combined in a likelihood ratio test that was adjusted by the Bonferroni correction. Fisher’s exact test, adjusted by the Bonferroni correction, was used to try to identify whether the groups differed from each other in each type of pain variable. The odds ratio was calculated, whose value should be effectively higher than one or effectively lower than one. If the range formed by the upper and lower limits does not contain the value one, then the value of the odds ratio can be considered effective, indicating a risk difference belonging to one group or the other. Also, the Mann-Whitney test, adjusted by the Bonferroni correction, was applied to verify that the groups differed in relation to the total, proximal, and distal pain groups.

RESULTS

The vocal self-assessment was similar between groups ($p=0.509$) and showed that most of the participants from the general population and the singers considered their voice to be good (48% of the general population and 54% of the choral singers). The general population also mentioned the fair (25.3%), good (24%), poor (2%), and very poor (0.7%) options. For the singers, excellent and fair classifications had the same occurrence (20% each), followed by poor (6%). No singer rated their voice as bad.

The values related to the presence or absence of 13 kinds of bodily pain studied revealed that the frequency of all of them was higher in the general population (Table 1). It was noted that there is no relationship between the bodily pains and other variables such as voice problems, cancellation of performances, consultation with ENT specialists, and consultation with an SLP in the group of choral singers. However, consultations with SLPs were associated with TMJ pain and pain while speaking.

The average of pains was higher for the general population. The occurrence of proximal pains did not differentiate both groups. But, when we compared the total number of pains or just distal pains, a higher incidence was observed among participants from the general population (Table 2).

The calculation of the odds ratio showed that being a choral singer can be considered a protective factor for the occurrence of headaches, pains in the back, neck, arms, hands, and ears (Table 3).

DISCUSSION

According to the Brazilian Association for the Study of Pain (SBED)⁽⁹⁾, biological, social, and psychological factors influence the sensation of pain and, in addition, each individual rates and interprets their pain according to past experiences. Research shows that the perception of pain is closely related to people’s emotional states⁽¹⁰⁾.

In this study, it was found that, in 12 of the 13 surveyed pains, choral singers reported less bodily pain than the general population. The only exception was the sore throat item, which will be further explored later (Table 1). As classical singers have a routine of exercises for the strengthening and relaxation of the muscles involved in vocal production⁽⁷⁾, it is possible that this training contributes to a lower incidence of pain by favoring the development of greater muscular endurance. These results can be attributed not only to the physiological benefits provided by the practice of singing but also to the fact that the practice of choral singing is often viewed as a pleasurable activity⁽²⁾.

By dividing the pains studied in the distal and proximal groups, it was observed that there was no difference between the groups for the occurrence of proximal pain. The incidence of distal pain was higher among participants from the general population (Table 2). When comparing the odds of a choral singer versus a subject from the general population of presenting bodily pain, we observed that the risk among participants from the general population is greater. This indicates that practicing classical singing can be a protective factor since all choir participants have some parallel professional activity not necessarily connected to singing. This protective factor was more significant for headache, pain in the back, neck, arms, hands, and ears (Table 3).

According to the literature, the main problems found among the singers are related to inadequate vocal hygiene, which can include the use of incorrect breathing techniques, great musculoskeletal tension and resonance imbalance⁽¹¹⁾. Research shows that trained singers have a more developed control of the respiratory, laryngeal, and articulatory dynamics⁽¹²⁾ and that, the more trained the voice, the better the vibration symmetry of the vocal folds and the linearity of the muscular system⁽¹³⁾.

In the singing activity, pain symptoms are usually secondary to muscular tension created to compensate for an inadequate vocal technique^(4,14). Perhaps, lower pain reports were found among the choral singers due to the intensive training and the excellent vocal technique required of all participants in this choir. We believe that not only the training but also a better understanding, perception, and control of structures involved in vocal production are directly related to the outcome of this research.

Singers usually have greater sensitivity and awareness about all that is related to voice and, sometimes, associate body aches with changes in vocal quality^(3,4). This relationship was not observed in this study. The choral singers showed no

Table 1. Relationship between the occurrence of pain and the variables related to voice problems during professional activity

	Choral singers					General population				
	Yes		No		p-value	Yes		No		p-value
	n	%	n	%		n	%	n	%	
Have experienced vocal problems	19	38	31	62		43	28.6	107	71.3	
Headache	9	18	41	82	>0.999	70	46.7	80	53.3	0.103
TMJ pain	7	14	43	86	>0.999	39	26	111	74	0.001*
Sore tongue	2	4	48	96	>0.999	12	8	138	92	>0.999
Sore throat	28	56	22	44	>0.999	79	52	71	47.3	0.011*
Nape pain	12	24	38	76	>0.999	57	38	93	62	<0.001*
Shoulder pain	15	30	35	70	>0.999	68	45.3	82	54.7	<0.001*
Backache	19	38	31	62	>0.999	87	58	63	42	0.011*
Neck pain	13	26	37	74	>0.999	74	49.3	76	50.7	0.019*
Chest pain	0	0	50	100	>0.999	37	24.7	113	75.3	0.093
Sore arms	4	8	46	92	>0.999	44	29.3	106	70.7	0.005*
Sore hands	3	6	47	94	>0.999	38	25.3	112	74.7	0.100
Ear pain	1	2	49	98	>0.999	37	24.7	113	75.3	<0.001*
Pain while talking	10	20	40	80	>0.999	19	12.7	131	87.3	<0.001*
Cancellation of performance/time off from work due to vocal problems	8	16	42	84		8	5.3	142	94.7	
Headache	9	18	41	82	>0.999	70	46.7	80	53.3	0.147
TMJ pain	7	14	43	86	>0.999	39	26	111	74	0.206
Sore tongue	2	4	48	96	>0.999	12	8	138	92	>0.999
Sore throat	28	56	22	44	>0.999	79	52	71	47.3	0.066
Nape pain	12	24	38	76	>0.999	57	38	93	62	0.479
Shoulder pain	15	30	35	70	>0.999	68	45.3	82	54.7	0.469
Backache	19	38	31	62	>0.999	87	58	63	42	0.469
Neck pain	13	26	37	74	>0.999	74	49.3	76	50.7	0.491
Chest pain	0	0	50	100	>0.999	37	24.7	113	75.3	0.680
Sore arms	4	8	46	92	>0.999	44	29.3	106	70.7	0.048*
Sore hands	3	6	47	94	>0.999	38	25.3	112	74.7	>0.999
Ear pain	1	2	49	98	>0.999	37	24.7	113	75.3	0.408
Pain while talking	10	20	40	80	>0.999	19	12.7	131	87.3	0.009*
Consultation with ENT due to vocal problems	16	32	34	68		27	18	123	82	
Headache	9	18	41	82	>0.999	70	46.7	80	53.3	>0.999
TMJ pain	7	14	43	86	>0.999	39	26	111	74	0.007*
Sore tongue	2	4	48	96	>0.999	12	8	138	92	>0.999
Sore throat	28	56	22	44	>0.999	79	52	71	47.3	0.290
Nape pain	12	24	38	76	>0.999	57	38	93	62	0.049*
Shoulder pain	15	30	35	70	>0.999	68	45.3	82	54.7	0.136
Backache	19	38	31	62	>0.999	87	58	63	42	0.197
Neck pain	13	26	37	74	>0.999	74	49.3	76	50.7	0.292
Chest pain	0	0	50	100	>0.999	37	24.7	113	75.3	0.323
Sore arms	4	8	46	92	>0.999	44	29.3	106	70.7	0.034*
Sore hands	3	6	47	94	>0.999	38	25.3	112	74.7	0.144
Ear pain	1	2	49	98	>0.999	37	24.7	113	75.3	0.047*
Pain while talking	10	20	40	80	>0.999	19	12.7	131	87.3	0.001*
Consultation with a speech-language pathologist due to vocal problems	12	24	38	76		28	18.6	122	81.4	
Headache	9	18	41	82	0.425	70	46.7	80	53.3	0.294
TMJ pain	7	14	43	86	0.048*	39	26	111	74	0.003*
Sore tongue	2	4	48	96	>0.999	12	8	138	92	0.466
Sore throat	28	56	22	44	>0.999	79	52	71	47.3	0.210
Nape pain	12	24	38	76	>0.999	57	38	93	62	0.009*
Shoulder pain	15	30	35	70	>0.999	68	45.3	82	54.7	0.092
Backache	19	38	31	62	0.171	87	58	63	42	0.056
Neck pain	13	26	37	74	0.707	74	49.3	76	50.7	0.095
Chest pain	0	0	50	100	>0.999	37	24.7	113	75.3	0.149
Sore arms	4	8	46	92	>0.999	44	29.3	106	70.7	0.038*
Sore hands	3	6	47	94	>0.999	38	25.3	112	74.7	0.227
Ear pain	1	2	49	98	0.240	37	24.7	113	75.3	0.026*
Pain while talking	10	20	40	80	0.046*	19	12.7	131	87.3	0.002*

*Significant values ($p \leq 0.05$) – Fisher's exact test**Caption:** ENT = Ear, nose and tongue specialist; TMJ = temporomandibular joint

Table 2. Comparison of the occurrence of total, proximal, and distal pain to the larynx between choral singers and the general population

Amount of pain	Choral singers			General population			p-value
	n	Mean	Standard deviation	n	Mean	Standard deviation	
Total	50	2.46	2.04	150	4.41	3.41	<0.001*
Proximal to the larynx	50	1.74	1.48	150	2.32	1.95	0.108
Distal to the larynx	50	0.72	0.88	150	2.09	1.75	<0.001*

*Significant values ($p \leq 0.05$) – Mann-Whitney test, adjusted by the Bonferroni correction

Table 3. Comparison of the occurrence probability of each type of pain between the general population and choral singers

Groups	Statistics	Pain head	Pain TMJ	Pain tongue	Pain throat	Pain nape	Pain shoulders	Pain back	Pain neck	Pain chest	Pain arms	Pain hands	Pain ears	Pain talking
General population <i>versus</i> Choral singer	Odds-ratio	3.98*	2.15	2.08	0.87	1.94	1.93	2.25*	2.771*	–	4.77*	5.31*	16.04*	0.58
	Lower limit	1.81	0.89	0.45	0.45	0.93	0.97	1.16	1.365	–	1.60	1.56	2.14	0.25
	Upper limit	8.77	5.19	9.66	1.66	4.01	3.83	4.34	5.627	–	14.06	18.07	120.2	1.34

*Significant values ($p \leq 0.05$) – Odds-ratio

Caption: TMJ = temporomandibular joint

link between pain and the occurrence of vocal problems or the need to cancel performances (Table 1).

Jaw tension has become a very common complaint among singers⁽¹⁵⁾ and although few choral singers in this study have reported it, TMJ pain and pain when speaking were related to the search for a consultation with SLPs (Table 1). This relationship may indicate that the speech therapist is recognized by the choral singers as a professional who treats pain in the facial region and vocal-related pain⁽¹⁶⁾.

Despite the general reports of pain among the choral singers having been lower than in the general population (Tables 1 and 2), some considerations about the most reported pain by this group are important. Throat pain was reported more frequently, which can be explained by the high vocal levels demanded of this group of professionals as they belong to the vocal elite of voice-related professionals. Thus, it is known that any vocal or laryngeal change (which may be accompanied by pain) is a big problem for this population⁽¹⁷⁾.

Back pain was the second most reported among the choral singers. Singers are usually sitting while practicing or rehearsing. Many studies indicate that postural alignment can directly interfere with respiratory muscle activity and consequently in vocal technique, and may cause pain^(18,19). In addition, choir rehearsals are usually long, which can enhance the damage caused by an inappropriate postural alignment.

The third type of pain most reported by the choral singers was pain in the shoulders. Although voice specialists advise that there is no movement of the neck and shoulders during phonation, it is possible that the musculature of these structures develop overactivity during the phonation process⁽²⁰⁾. Excessive muscle tension is a common mistake while singing⁽²⁾, besides being the main responsible factor for the pain referred to by voice patients, leading to a sequence of events that unbalance the muscular system^(2,4).

The group of choral singers reported less neck pain than the general population (Table 1), and this difference was prob-

ably due to the good vocal training attained by this group. The effect of vocal training seems to have a great influence on the development and improvement of voice production and perception as a set of actions and reactions^(7,21) in addition to being a primary prevention method against vocal disorders⁽²²⁾.

With this study, we can infer that the practice of singing and conscious vocal use contribute to lower levels of bodily pain, probably due to well-developed vocal production and breathing techniques, in addition to the general sense of well-being brought about by this activity. In further studies, comparisons will be made between the levels of bodily pain in choral singers and other vocal professionals in order to verify that proper vocal training is related to a lower rate of bodily pains, and consequently, the quality of life of individuals who use voice as a work tool.

CONCLUSION

Choral singers showed low rates of body pain in comparison to the general population. This low rate in the reporting of bodily pain is probably due to better muscular endurance gained over the period of constant training and practice, and one that is indispensable to classical singers.

Unlike the general population, classical scholars have no pain associated with vocal problems and absenteeism. The conscious use of the voice, allied to training, can be a protective factor against the development of general voice disorders and pain.

*TV collaborated with data collection and analysis, as well as the elaboration of the manuscript; ACG collaborated with literature review, data collection and analysis; MB cooperated with research design, orientation of the study and correction of the text.

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Appendix 1. Self-assessment protocol for choral singers

Identification						
1. Gender:	Female			Male		
2. Age:						
3. Profession:						
4. Years of service as a choral singer:	1 to 5 years	6 to 10 years	11 to 15 years	16 to 20 years	over 21 years	
5. Weekly hours of singing practice:	0 to 2 hours	2 to 4 hours	4 to 6 hours	6 to 8 hours	over 8 hours	
Voice and activity						
6. Have you ever had singing lessons?					Yes	No
7. Do you sing other musical genres?					Yes	No
8. Have you ever experienced vocal problems while singing?					Yes	No
9. Have you ever needed to cancel a performance due to vocal problems?					Yes	No
10. Have you ever consulted an ENT specialist due to vocal problems?					Yes	No
11. Have you ever consulted an SLP specialist due to vocal problems?					Yes	No
Vocal self-assessment						
12. How would you rate your voice?	Excellent	Good	Fair	Poor	Very poor	
Pain						
13. When training, rehearsing or performing, do you often feel any of these symptoms? If yes, with what frequency?						
a. Headache	never	sometimes	often	almost always	always	
b. Jaw/TMJ pain	never	sometimes	often	almost always	always	
c. Sore tongue	never	sometimes	often	almost always	always	
d. Sore throat	never	sometimes	often	almost always	always	
e. Nape pain	never	sometimes	often	almost always	always	
f. Shoulder pain	never	sometimes	often	almost always	always	
g. Back/spine pain	never	sometimes	often	almost always	always	
h. Neck pain	never	sometimes	often	almost always	always	
i. Chest pain	never	sometimes	often	almost always	always	
j. Sore arms	never	sometimes	often	almost always	always	
k. Sore hands	never	sometimes	often	almost always	always	
l. Ear pain	never	sometimes	often	almost always	always	
m. Pain while speaking	never	sometimes	often	almost always	always	

Caption: ENT = ear, nose, and tongue; SLP = speech-language pathologist; TMJ = temporomandibular joint

Appendix 2. Self-assessment protocol for participants from the general population

Identification					
1. Gender:	Female		Male		
2. Age:					
3. Profession:					
4. Years of service	1 to 5 years	6 to 10 years	11 to 15 years	16 to 20 years	over 21 years
5. Daily work hours:	0 to 2 hours	2 to 4 hours	4 to 6 hours	6 to 8 hours	over 8 hours
Voice and activity					
6. Have you ever experienced vocal problems during your professional activities?				Yes	No
7. Have you ever needed to take time off from work due to vocal problems?				Yes	No
8. Have you ever consulted an ENT specialist due to vocal problems?				Yes	No
9. Have you ever consulted an SLP specialist due to vocal problems?				Yes	No
Vocal self-assessment					
10. How would you rate your voice?	Excellent	Good	Fair	Poor	Very poor
Pain					
11. During your professional activity, while or after speaking, do you often feel any of these symptoms? If yes, with what frequency?					
a. Headache	never	sometimes	Often	almost always	always
b. Jaw/TMJ pain	never	sometimes	Often	almost always	always
c. Sore tongue	never	sometimes	Often	almost always	always
d. Sore throat	never	sometimes	Often	almost always	always
e. Nape pain	never	sometimes	Often	almost always	always
f. Shoulder pain	never	sometimes	Often	almost always	always
g. Back/spine pain	never	sometimes	Often	almost always	always
h. Neck pain	never	sometimes	Often	almost always	always
i. Chest pain	never	sometimes	Often	almost always	always
j. Sore arms	never	sometimes	Often	almost always	always
k. Sore hands	never	sometimes	Often	almost always	always
l. Ear pain	never	sometimes	Often	almost always	always
m. Pain while speaking	never	sometimes	Often	almost always	always

Caption: ENT = ear, nose, and tongue; SLP = speech-language pathologist; TMJ = temporomandibular joint