Original Article

Artigo Original

Correlation between vocal tract symptoms and modern singing handicap index in church gospel singers

Sintomas do trato vocal e índice de desvantagem vocal para o canto moderno em cantores evangélicos

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Keywords

Self-Assessment
Voice
Quality of Life
Religion
Singing

ABSTRACT

Objective: To verify the correlation between vocal tract discomfort symptoms and perceived voice handicaps in gospel singers, analyzing possible differences according to gender. **Methods:** 100 gospel singers volunteered, 50 male and 50 female. All participants answered two questionnaires: Vocal Tract Discomfort (VTD) scale and the Modern Singing Handicap Index (MSHI) that investigates the vocal handicap perceived by singers, linking the results of both instruments ($p<0.05$). **Results:** Women presented more perceived handicaps and also more frequent and higher intensity vocal tract discomfort. Furthermore, the more frequent and intense the vocal tract symptoms, the higher the vocal handicap for singing. **Conclusion:** Female gospel singers present higher frequency and intensity of vocal tract discomfort symptoms, as well as higher voice handicap for singing than male gospel singers. The higher the frequency and intensity of the laryngeal symptoms, the higher the vocal handicap will be.

Descritores

Autoavaliação
Voz
Qualidade de Vida
Religião
Canto

RESUMO

Objetivo: correlacionar os sintomas de desconforto do trato vocal e desvantagem de voz percebida em homens e mulheres cantores evangélicos. **Método:** participaram 100 cantores evangélicos, 50 do gênero masculino e 50 do feminino. Todos os participantes responderam a dois questionários: Escala de Desconforto do trato vocal (EDTV) e o Índice de Desvantagem para o Canto Moderno (IDCM). Foi realizada a comparação entre os gêneros, tanto em relação aos sintomas do trato vocal como em relação aos índices de IDCM, por meio do teste Mann-Whitney. Para a correlação entre as respostas na Escala de Desconforto no Trato Vocal e IDCM, foi utilizado o teste de Correlação de Sperman ($p<0,05$). **Resultados**: cantoras evangélicas apresentaram maior frequência e intensidade de sintomas de desconforto do trato vocal, bem como maior desvantagem vocal para o canto, quando comparadas aos cantores evangélicos. Considerando as respostas de todos os cantores, houve correlações positivas entre os sintomas de desconforto do trato vocal e a desvantagem vocal para o canto. **Conclusão**: as percepções de desconforto em trato vocal e de desvantagem para o canto foram diferentes entre os cantores evangélicos do gênero masculino e feminino no grupo estudado. O maior desconforto no trato vocal e desvantagem no canto foram verificados pelas cantoras. Quanto maior foi a frequência e a intensidade de sintomas de desconforto no trato vocal, maior foi a desvantagem vocal.

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Received: January 27, 2016

Accepted: April 13, 2017

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Financial support: nothing to declare.

Conflict of interest: nothing to declare.

INTRODUCTION

Praise groups in the evangelical environment are generally made up of those faithful involved in ministry through music and song. By praise ministry, we understand by this the name given in many protestant and some Catholic churches to the ecclesiastical departments responsible for providing the liturgical music and for the musical ensembles, satisfying the spiritual and emotional needs of the faithful[1]. Therefore, currently, they are a part of the praise group comprised of amateur and professional singers, instrumental musicians and sound technicians. The praise group in evangelical churches has an important role in leading the faithful to praise and adore God using song throughout the realization of the mass[2], taking on an important function in Church programs. Gospel singers generally develop their singing for personal satisfaction, vocation or talent, becoming in this manner amateur singers, almost always without training or specialized coaching[3].

Amateur singers can present diverse complaints in relation to their voice and in terms of vocal tract discomfort symptoms, such as: hoarseness, failures and loss of voice, difficulty to attain high or low notes, constant coughing, pain in the neck region, as well as a tight sensation or lump in their throat and a feeling of dryness[4,5]. These alterations can be a consequence of a lack of understanding of vocal anatomy and physiology, the inappropriate use of the voice, and a lack of knowledge of specific vocal techniques and training for use with the singing voice, which can also compromise the voice-related quality of life of the singer. As well as the lack of preparation and vocal understanding observed in gospel singers, there is also the presence of religious aspects and spirituality, which lead them to participate in their religious acts almost always at a high vocal intensity, including during singing, interfering in the vocal practice of these individuals[2,6]. It is important to underline that the presence of symptoms could simply show a more intense use of the voice and does not signify the presence of dysphonia. However, it is also worth paying attention to these complaints or discrete symptoms, to be able to prevent inappropriate alterations and even permit the emergence of a singing voice produced comfortably and easily.

Given this, instruments, which assess vocal tract discomfort symptoms and voice-related quality of life for gospel singers are important tools to understand their complaints and better comprehend this population. Though they have been developed with the intention of identifying vocal problems, they can help to distinguish individuals who require attention in terms of their vocal production[7].

One of the existing assessment instruments for vocal clinics is the Vocal Tract Discomfort (VTD) scale, which measures the frequency and intensity of vocal tract discomfort symptoms[8]. The use of this scale can be effective when applied on singers, given that singing makes greater demands for muscular force than speaking[9]. Therefore, it is principally beginner singers who may show signs of discomfort while singing.

In terms of the specific procedures related to singing, developed to research vocal self-perception, two of them were translated and adapted for Portuguese, including the Classical Singing Handicap Index – CSHI[10] and the Modern Singing Handicap Index– MSHI[7]. The MSHI is a questionnaire adapted from the Voice Handicap Index – VDI[7,11,12] procedure and is the most adequate to be used with gospel singers, who develop their voices in the popular style. Therefore, it shows itself to be more sensitive to identify possible vocal problems for this population.

There are few studies that assess voice handicaps for singing with gospel singers[3,13,14] and the few that do exist are divergent in terms of their findings. One study reports no difference according to gender[3], while another showed that women presented a higher rate of voice handicap[13].

The literature repeatedly shows that women have a greater risk of developing vocal problems and a greater occurrence of dysphonia[15-18]. It is known that men and women present different anatomies in laryngeal structures, which can contribute to the appearance of vocal alterations, and the literature reports that women are more predisposed to vocal alterations due to characteristics particular for each gender[16-18]. However, there is a need for further research to be carried out with the aim of better understanding this question.

Given this, the objective of this study was to correlate the vocal tract discomfort symptoms and the voice handicap observed in male and female gospel singers.

METHODS

An observational, cross-sectional study. The present study was approved by the Ethics Committee of the institution (CEP 302.062/2013), and all the participants signed the free and informed consent.

Sample

The sample for this study was of convenience with 100 gospel singers of both genders who volunteered, with an average age of 38 (minimum of 18 and maximum of 78). They were divided into two groups according to gender: 50 singers in the Male Group (MG) with an average age of 37.9 years and 50 singers in the Female Group (FG) with an average age of 37.9 years. The minimum and maximum time singing reported by singers in the MG was, one and 63 years (average of 11.5 years). In terms of singers from the FG, the minimum time singing was one year and the maximum time was 41 years (average of 11.2 years).

Singers who reported practicing gospel singing with experience of at least one year were included in both groups. Singers considered to be visitors to the praise ministry were excluded (singers who did not belong to the determined church, but who were participating occasionally in some activity being held). Occasional non-gospel participants and singing teachers were also excluded as well as individuals who reported prior vocal problems with medical or speech-therapy treatments.

Procedures

All participants responded to a questionnaire to obtain demographic data and vocal history as well as to two instruments: the Vocal Tract Discomfort - VTD[17] scale and the Modern Singing Handicap Index - MSHI[7].

The questionnaire for demographic data and vocal history covered aspects such as: age, profession, type of singing (chorus, vocal group, solo, etc.) and time for use of singing voice, with semi-open and closed questions, used mainly to characterize the sample.

The Vocal Tract Discomfort – VTD[8] scale, translated into Brazilian Portuguese by Rodrigues et al.[17], is an self-evaluation scale in which the individual records the frequency and intensity of eight qualitative vocal tract symptoms: burning, tightness, dryness, sore throat, itching, sensitive throat, irritated throat and feeling of lump in throat. The questions were answered by the singers according to the frequency and intensity of the symptom, on a scale from 0 to 6. For frequency, the scale varied from never (0) to sometimes (1-2), frequently (3-5) and always (6). For the intensity of the symptom, the scale permits the responses: never (0), light (1-3), moderate (4-5) and extreme (6).

The Modern Singing Handicap Index – MSHI is made up of 30 items, distributed into three subscales: incapacity, disadvantage and defects, which correspond to the functional, emotional and organic domains, respectively. Each question is responded to according to a five-point scale, which varies from zero to four: 0 = never, 1 = almost never, 2 = sometimes, 3 = almost always and 4 = always. The maximum value for each subscale is 40 points and the total score, calculated by the sum of the three domains, is 120 points. The higher the score, the greater the handicap perceived by the individual[7]. Despite being recommended for professional singers, the MSHI can also be used with amateur singers[3,7].

The questionnaire and procedures were applied on days and times corresponding to church meetings, before or after the mass, in a random manner and according to the schedule of each participant. As a way to deal with ethical questions, all the individuals were invited to watch a presentation about care of the voice carried out on a scheduled day, subsequent to the collection of data. Those who presented voice complaints were sent for vocal and laryngological assessment, on the day of the talk.

Analysis of the data

The comparison between genders was realized, both in relation to vocal tract discomfort symptoms as well as MSHI indexes, using the Mann-Whitney test. For the correlation between the responses to the Vocal Tract Discomfort scale and MSHI, the Spearman Correlation test. For the correlation test, the proposal of Dancey and Reidy[19] was adopted which showed that the values for classification of the correlation are: r = 0.10 to 0.30 (weak); r = 0.40 to 0.60 (moderate); r = 0.70 to 1 (strong). In all the statistical tests, the level of significance of 5% ($p<0.05$) was adopted.

RESULTS

Comparison between genders

Tables 1 and 2 show the comparison between the Female and Male Groups, referent to the frequency and intensity of the symptoms on the Vocal Tract Discomfort (VTD) scale, respectively. It is possible to observe that there was a significant difference between the groups, with the gospel singers presenting more frequent and more intense vocal tract discomfort symptoms.

In Table 3, the comparison between the domains of the procedure Modern Singing Handicap Index (MSHI) between the Female and Male Groups can be seen. It is possible to observe that there was a difference between the groups, with the gospel singers presenting a greater handicap for singing, in all the domains of the procedure.

Correlation between VTD and MSHI

Tables 4 and 5 show the significant correlations between the Vocal Tract Discomfort (VTD) scale and the Modern Singing Handicap Index (MSHI) for gospel singers. The correlations show that the greater the frequency and intensity of the vocal tract discomfort symptoms, the greater the handicap for singing. In the present study, all the discomfort symptoms in the vocal tract were correlated with all the subscales of the MSHI procedure, both in terms of frequency and intensity.

Table 1. Average and standard deviation (SD) of the values referent to the frequency of vocal tract symptoms reported by evnagelical individuals from the Female and Male groups using the Vocal Tract Discomfort (VTD) scale

VTD Symptoms	Female		Male		P value
	Average	SD	Average	SD	
Burning	1.10	1.37	0.66	1.09	0.09
Tightness	0.70	1.21	0.30	0.73	0.10
Dryness	1.30	1.32	0.76	1.13	0.02
Sore Throat	1.14	1.27	0.60	1.05	0.03
Itching	1.08	1.27	0.48	1.01	0.00
Sensitive Throat	1.00	1.27	0.64	1.38	0.01
Irritated throat	1.04	1.14	0.82	1.43	0.05
Lump in Throat	0.56	0.83	0.24	0.65	0.01
Total score	1.07	0.84	0.68	0.93	0.51

Mann-Whitney Test ($p<0.05$)
Caption: never = 0; sometimes = 1 to 2.99; frequently = 3 to 4.99; always = 5 to 6

Table 2. Average and standard deviation (SD) of the values referent to the intensity of vocal tract symptoms reported by evnagelical individuals from the Female and Male groups using the Vocal Tract Discomfort (VTD) scale

VTD Symptoms	Female		Male		P value
	Average	SD	Average	SD	
Burning	1.16	1.47	0.70	1.19	0.09
Tightness	0.74	1.20	0.30	0.67	0.08
Dryness	1.30	1.55	0.82	1.22	0.12
Sore Throat	1.30	1.55	0.76	1.30	0.04
Itching	1.14	1.37	0.70	1.35	0.02
Sensitive Throat	0.88	1.22	0.60	1.28	0.085
Irritated Throat	1.36	1.49	0.66	1.33	0.00
Lump in Throat	0.74	1.15	0.28	0.83	0.01
Total Score	1.16	0.90	0.73	0.98	0.21

Mann-Whitney Test ($p<0.05$)
Caption: none = 0; light = 1 to 2.99; moderate = 3 to 4.99; extreme = 5 to 6

Table 3. Average and Standard deviation (SD) from the domains of the Modern Singing Handicap Index (MSHI) procedure for gospel singers from the Male and Female Groups

MSHI domains	Female		Male		P
	Score	SD	Average	SD	
Incapacity	10.34	9.87	5.86	7.65	0.01
Handicap	9.86	10.11	4.46	7.76	0.00
Defect	13.22	10.74	6.44	8.59	0.00
Total	33.42	27.85	16.76	20.65	0.00

Mann-Whitney Test ($p<0.05$)

Table 4. Correlation values between frequency of reported symptoms using the Vocal Tract Discomfort (VTD) scale and domains of the Modern Singing Handicap Index (MSHI) for gospel singers

VTD Symptoms	Incapacity		Handicap		Defect		Total	
	P value	r	P value	r	P value	r	P value	r
Burning	0.00	0.45	0.00	0.33	0.00	0.50	0.00	0.49
Tightness	0.00	0.42	0.00	0.34	0.00	0.32	0.00	0.43
Dryness	0.07	0.17	0.03	0.21	0.00	0.30	0.00	0.27
Sore Throat	0.00	0.42	0.00	0.35	0.00	0.46	0.00	0.48
Itching	0.00	0.28	0.00	0.26	0.00	0.41	0.00	0.37
Sensitive throat	0.00	0.38	0.00	0.32	0.00	0.44	0.00	0.43
Irritated Throat	0.00	0.45	0.00	0.32	0.00	0.41	0.00	0.44
Lump in Throat	0.00	0.36	0.00	0.38	0.00	0.37	0.00	0.41
Total Score	0.00	0.46	0.00	0.42	0.00	0.54	0.00	0.52

Spearman Correlation ($p<0.05$)

Table 5. Values for correlation between intensity of the symptoms reported using the Vocal Tract Discomfort (VTD) scale and domains for the Modern Singing Handicap Index (MSHI) for gospel singers

VTD Symptoms	Incapacity		Handicap		Defect		Total	
	Valor p	r	Valor p	r	Valor p	r	Valor p	r
Burning	0.00	0.36	0.00	0.29	0.00	0.46	0.00	0.44
Tightness	0.00	0.36	0.01	0.25	0.01	0.25	0.00	0.32
Dryness	0.00	0.29	0.05	0.18	0.00	0.31	0.00	0.29
Sore Throat	0.00	0.39	0.00	0.40	0.00	0.44	0.00	0.45
Itching	0.00	0.33	0.01	0.23	0.00	0.45	0.00	0.39
Sensitive Throat	0.00	0.42	0.00	0.27	0.00	0.39	0.00	0.39
Irritated Throat	0.00	0.36	0.00	0.31	0.00	0.38	0.00	0.39
Lump in Throat	0.00	0.40	0.00	0.40	0.00	0.40	0.00	0.44
Total Score	0.00	0.46	0.00	0.41	0.00	0.52	0.00	0.00

Spearman Correlation ($p<0.05$)

DISCUSSION

Gospel singers give great importance to the transmission of emotional content during religious singing, using it as a form of adoration, oration, supplication and personal fulfillment. As these are in fact the priorities of evangelicals during worship, they can end up giving less emphasis to vocal quality while singing. Additionally, few gospel singers perceive their vocal alterations or consider them important[5], since the majority sing for years without ever having studied the area or using vocal technique[4,20].

Many gospel singers do not show specific vocal training or knowledge regarding voice production, as well as lacking professional coaching. These factors can lead to the appearance of vocal complaints and vocal tract discomfort symptoms as well as a feeling of tightness or a lump in the throat, a feeling of a weak or too strong voice for singing or being out of tune[5,9]. These symptoms, when frequent and intense, can increase the risk of vocal alterations, which consequently generate an impact on the voice-related quality of life of the singer, which can limit their activities within the church. Therefore, this study seeks to compare vocal tract discomfort symptoms and voice handicaps in men and women, given that it is important to consider that anatomical differences between men and women exist[18], and correlate the vocal tract discomfort symptoms with the Modern Singing Handicap Index for gospel singers.

The Vocal Tract Discomfort (VTD) scale permits the measurement of the frequency and intensity of vocal tract discomfort symptoms. Up until this time, no studies were realized that investigate vocal tract discomfort symptoms utilizing the VTD scale in gospel singers. Given this, the application of this procedure on the population of the present study is of great importance, since such symptoms can indicate excessive force on the laryngeal and perilaryngeal musculature, due to a lack of vocal training and understanding. It can also be a sign of the exaggerated demands placed on the voice while singing, which can consequently entail a feeling of vocal and laryngeal discomfort.

The MSHI questionnaire is made up of 30 questions that assess the voice handicap for singing in three subscales[7]: an incapacity (related to any reduction or restriction in the ability to execute a habitual activity)[21], defect (considered as any loss or anatomo-physiological or physiological abnormality, temporary or permanent) and the handicap (resultant from the incapacity or defect), being characterized by a limitation or restriction in carrying out the role expected by the individual, possibly generating social, cultural or economic consequences.

Vocal self-assessment allows an understanding of the perception of the individual in terms of specific aspects of their vocal problems[22]. Such information is essential to qualify and quantify the impact of the alteration of the voice in the life of the individual, as well as favoring a greater awareness of the effects generated by the vocal problem[22,23].

The authors of one study[3] that utilized the MSHI and investigated the voice handicap in gospel singers while singing, concluded that amateur church singers presented significant voice handicaps and that, the greater the vocal alteration, the greater the handicap. Another study[14], which evaluated voice handicaps in gospel singers from traditional and Pentecostal churches using the MSHI procedure, found that the women from the Pentecostal church showed a worse voice handicap index than women from the traditional church. However, research that investigates if the presence of vocal tract discomfort symptoms can affect the voice-related quality of life were not found, given that such symptoms are generally related to excessive use of the voice when singing and to a lack of vocal training.

In the present study it was possible to observe that all the vocal tract discomfort symptoms, assessed using the VTD scale, were more frequent and intense for the female group than the male group (Tables 1 and 2). Other studies with popular singers and church singers also found that with females there were a greater number of vocal problems and laryngeal symptoms, such as tiredness while speaking, loss of voice, the feeling of a lump in the throat and a shortness of breath[5,24]. These results can be explained by the predisposition to vocal alterations present in women[17], due to anatomical characteristics of the laryngeal structures and to the glottal size of the female vocal folds[18], hormonal changes and a lower level of hyaluronic acid in the surface layer of the lamina propria in comparison with men[25]. This can contribute to the appearance of laryngeal and vocal alterations. We can also suppose that women present better self-perception of their symptoms and vocal alterations in comparison to men.

Beyond the contributions found in the studies cited, another study involving teachers[17] observed that those who presented vocal complaints presented seven to eight vocal tract discomfort symptoms, while those without complaints, presented 2.5 symptoms. The dry and irritated throat symptoms were reported as the most frequent and most intense, however in different proportions for both groups. For the group without vocal complaints, the frequency and intensity for the symptom of dryness was respectively 3.69/3.66 and 2.23/2.30 and for the irritated throat symptom it was 3.91/3.88 and 1.17/1.23. In the present study, it was possible to observe results similar to those of the teachers without vocal complaints, both in values as well as in the higher occurrence of the same symptoms, which indicates that these singers, even when singing in a harmful manner, presented low scores on the VTD scale (Tables 1 and 2). The Female Group showed greater frequency and intensity of the irritated, sensitive, and dry throat symptoms. Such symptoms can be related to a lack of hydration before and during the presentations, associated with a lack of vocal preparation, generating vocal maltreatment and tension while singing, which can contribute to the presentation of the symptoms found in the population of this study.

In terms of voice handicaps for singing, female gospel singers presented significantly higher voice handicaps than the male group in the three subscales for the MSHI procedure, incapacity, defect and handicap (Table 3). In terms of the influence of gender on the voice handicap data, studies diverge in their findings. One study that investigated voice handicaps in amateur singers in a church choir found no difference between the genders[3]. On the other hand, another analysis using the voice handicap index with gospel singers[13] showed higher indices in the female group than in the male group, corroborating the findings of the present study. The fact that women showed greater voice

handicaps than the men could indicate the capacity to perceive with greater clarity any restriction in ability while singing, be it of an organic, functional or emotional nature.

In terms of correlations between the two procedures, it was possible to observe a correlation of all vocal tract discomfort symptoms, both in terms of frequency and intensity with all the MSHI procedure subscales (Tables 4 and 5); except for the frequency of the "dryness" symptom, which was not correlated with the incapacity subscale (Table 4). It is worth underlining that no strong correlation was observed between the symptoms of laryngeal discomfort and voice handicap. In terms of frequency, the "burning", "sore throat" and "irritated throat" symptoms showed values moderately correlated with all the MSHI subscales, signifying that these symptoms are indicative of alteration or restriction in activities in gospel singing and influenced the voice handicap index related to singing. In respect of the intensity of symptoms, a moderate correlation with all the MSHI procedure subscales, mainly in terms of the "defect" subscale was observed. The "lump in the throat" and "sore throat" symptoms were those that obtained moderate correlation values with all the MSHI procedure subscales, which indicates that the more intense the symptoms, the greater the voice handicap for singing. Such findings could indicate that there is an excessive use of the laryngeal and perilaryngeal musculature while singing in the church, which shows tension in the phonatory mechanism during this activity, leading to the appearance of vocal tract discomfort symptoms with a consequent impact on the voice-related quality of life for singing. Probably, this occurs due to a lack of technical and voice preparation, together with the little knowledge in terms of vocal care[5,9].

The data in the present study reveals that, the more frequent and intense the vocal tract discomfort symptoms are, the worse the voice handicap for singing. There are no studies that correlated the modern singing handicap index with the vocal tract discomfort symptoms or any other aspect in gospel singers. However, one study[26] that correlated the VCD scale procedure data with the Voice-related quality of life (V-RQOL) in individuals with cervical alterations found a negative correlation between these procedures, indicating that, the greater the frequency and intensity of the symptoms, the worse the voce-related quality of life, corroborating the results of this study.

The findings of this study permitted the verification that differences in terms of self-perception of gospel singers of male and female genders exist. Additionally, the results show that vocal tract discomfort symptoms impact the voice-related quality of life of gospel singers. This data permits us to underline that gospel singers require interdisciplinary work with speech-language therapists and vocal coaches with the aim of improving and developing singing technique, as well as to care for the singing voice, given that many gospel singers are amateurs.

One of the limitations of the present study is that it was not possible to know, given the results, if the singers who agreed to participate in this study, presented some difficulty that led them to be interested in participating in the study, given that vocal and laryngological assessments were not considered during data collection. Another limitation to be considered is the age bracket of the sample. It may be considered very extensive, involving voice and hearing alterations resultant from aging. Initially, however, the aim was to understand the Brazilian reality for singers in evangelical churches. Future research is necessary to improve knowledge in terms of this population so that prevention and vocal care be directed according to the self-perception of gospel singers and in terms of different age brackets given that the elderly also make up an increasingly numerous part of the population of singers in churches.

CONCLUSION

Female gospel singers present greater frequency and intensity of vocal tract discomfort symptoms, as well as greater voice handicap for singing. Additionally, the greater the frequency and intensity of the vocal tract discomfort symptoms, the greater the voice handicap for gospel singers.

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Author contributions

JP participated in the application of the procedures, interpretation of the data and elaboration of the manuscript; KCAS participated in the outlining and drafting of the study, the interpretation of the data and elaboration of the manuscript; LTDS participated in the interpretation of the data and in the elaboration of the manuscript, JSR participated in the interpretation of the data and in the elaboration of the manuscript; AGB participated in the critical revision of the study; FZ participated in the critical revision of the study; MB participated in the interpretation of the data and in the critical revision of the study. All authors read and approved the final manuscript.