

# What do amateur singers who perform in religious services know about vocal health and hygiene?

## O que cantores amadores que se apresentam em cultos religiosos conhecem sobre saúde e higiene vocal?

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### ABSTRACT

**Purpose:** To describe the knowledge of amateur singers who perform in religious services, about vocal health and hygiene, and compare these findings at two different moments. **Methods:** Descriptive, longitudinal research with 100 participants who practice amateur singing in religious services; ages between 18 and 82 years (average 33.72 years), 54 women and 46 men. Participants answered the Initial Questionnaire (Q1), which includes personal data and vocal self-assessment, and the Vocal Health and Hygiene Questionnaire (QSHV), on two occasions with an interval of 20 days and with the questions randomized. The participants were given a feed-back of the QSHV after each application i.e. the correct answers to each item. The data were analyzed descriptively and inferentially. **Results:** Most singers reported some degree of self-assessed vocal alteration and reported at least one vocal symptom (mainly throat clearing and voice failure). The score was higher in the second application of the QSHV and there was no correlation between the vocal self-assessment and the score obtained in the QSHV. **Conclusion:** Amateur singers of both sexes who perform in religious services demonstrated knowledge about vocal health and hygiene corresponding to that of vocally healthy individuals, above the cutoff point in both applications; however, the majority reported vocal changes and symptoms. There was an increase in knowledge about vocal health and hygiene in the second application, however discreet. The level of knowledge about vocal health and hygiene did not correlate with the degree of vocal alteration.

**Keywords:** Voice; Voice disorders; Speech therapy; Singing; Health promotion

### RESUMO

**Objetivo:** Descrever o conhecimento de cantores amadores que se apresentam em cultos religiosos sobre saúde e higiene vocal e comparar esses achados em dois momentos distintos. **Métodos:** Pesquisa descritiva, longitudinal, com 100 participantes que praticavam canto amador em cultos religiosos; idades entre 18 e 82 anos (média 33,72 anos), 54 mulheres e 46 homens. Os participantes responderam ao Questionário Inicial, que inclui dados pessoais e autoavaliação vocal, e ao Questionário de Saúde e Higiene Vocal, este em dois momentos, com intervalo de 20 dias e com as questões aleatorizadas. Foi dada devolutiva desse questionário após cada aplicação, por meio da apresentação das respostas corretas de cada um de seus itens. Os dados foram analisados de forma descritiva e inferencial. **Resultados:** A maior parte dos cantores referiu algum grau de alteração vocal e relatou ao menos um sintoma vocal (principalmente pigarro e falha na voz). A pontuação foi maior na segunda aplicação do questionário e não houve correlação entre a autoavaliação vocal e a pontuação obtida. **Conclusão:** Cantores amadores de ambos os gêneros que se apresentam em cultos religiosos demonstraram conhecimento sobre saúde e higiene vocal correspondente ao de indivíduos vocalmente saudáveis, acima do ponto de corte em ambas as aplicações do Questionário de Saúde e Higiene Vocal. Contudo, a maioria referiu alterações e sintomas vocais. Verificou-se aumento do conhecimento sobre saúde e higiene vocal na segunda aplicação, ainda que discreto. O nível de conhecimento sobre saúde e higiene vocal não se correlacionou com o grau de alteração vocal.

**Palavras-chave:** Voz; Distúrbios da voz; Fonoaterapia; Canto; Promoção da saúde

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## INTRODUCTION

As notable as the importance of the voice for human communication is, it is not commonly remembered that it results from a complex process in the human body, seen as an automatic action. Therefore, due attention is often not given to it and, consequently, vocal health can be put at risk. In the literature, the terms “vocal health”, “vocal care” and “vocal hygiene” can be found as synonyms. However, some authors distinguish these concepts.

Vocal health, according to authors<sup>(1)</sup>, is a broad term that covers aspects such as a clean and clear voice, emitted effortlessly and pleasant to the listener. Thus, a voice is considered healthy when the individual can make variations in quality, frequency, intensity, and modulation, according to his/her needs.

Vocal care aims to recover the voice, whether through prevention or treatment, making it functional for professional use and communication in general<sup>(2)</sup>.

Finally, vocal hygiene is a term used for aspects related to voice guidance and care, which include modifying vocal habits and implementing principles to facilitate the improvement of voice health and care. In short, these are the basic guidelines that help preserve vocal health and prevent the appearance of changes and diseases<sup>(3,4)</sup>.

Many vocal hygiene habits are unknown to the general population, while others, even publicized in the media by experts, are not adopted and do not receive due importance<sup>(5)</sup>. There are also guidelines without any scientific support, disseminated by laypeople<sup>(6)</sup>, and can put vocal health at risk.

When vocal health is affected, vocal disorders may occur<sup>(7)</sup>. Thus, professionals who use their voice for a long time in their activities, such as politicians, salespeople, singers, and teachers, among others, are at high risk of developing vocal changes<sup>(8)</sup>. On the other hand, there is also a group of individuals who do not use their voice professionally but who have a certain intense and periodic vocal demand, whether in speaking or singing. Members of this group include amateur singers who, without having any formal singing training, are vulnerable to developing vocal disorders when subjected to intensive singing activities<sup>(9)</sup>.

In this context, singing often occurs in association with participation in religious services. The appreciation of music in churches, by the media and the audience, has increased the possibility of the participation of new singers. The use of the voice in the context of religious singing requires flexibility and vocal health to adapt to the needs and conditions of voice production, expressiveness, and vocal and body adjustments, according to demand. Amateur church singers, such as choristers and participants in praise groups, normally have little knowledge about the use of their voice, they do not know what attitudes characterize phonotrauma and its damages, for example. Furthermore, many of them do not receive professional monitoring and have several vocal complaints<sup>(10-12)</sup>.

Knowledge about vocal care, health, and hygiene, that is, how much the individual knows about factors that are good or bad for their voice, helps guide actions to promote vocal health, prevent voice disorders, or even specific therapeutic interventions<sup>(13)</sup> and related to vocal self-care<sup>(14)</sup>.

One of the ways to measure this knowledge is the application of the Vocal Health and Hygiene Questionnaire (QSHV-*Questionário de Saúde e Higiene Vocal*). It is an instrument with 31 items on the topic, which allows the calculation of a final score and has proven to be reliable for assessing knowledge on the topic, both in individuals without vocal disorders and in those with dysphonia. As it has a cutoff value that separates dysphoric individuals from vocally healthy individuals, it is considered an accurate diagnostic classifier. Using this cutoff point, it is possible to carry out screenings to identify groups at risk for vocal changes and/or groups in which one wants to know the level of knowledge on this topic<sup>(15)</sup>.

Some studies were carried out using this questionnaire, with adults in general<sup>(16)</sup>, classical and popular singers<sup>(15)</sup>, pastors<sup>(17)</sup>, and theater students<sup>(18)</sup>. In the study with classical and popular singers<sup>(15)</sup>, the results showed that the perception of vocal changes in these two groups seems to be unrelated to the level of knowledge and vocal hygiene. In research with pastors<sup>(17)</sup>, we observed good knowledge about vocal health and hygiene, and, due to the large amount and intensity of speech, the group was considered to be at high vocal risk. Finally, in the study of theater students with and without vocal complaints<sup>(18)</sup>, it was possible to verify that the greater the vocal knowledge, the lower the vocal handicap.

In this context, investigating knowledge about vocal health and hygiene among people who sing in religious services may direct more assertive speech therapy actions in these people's voices. Furthermore, it is interesting to investigate whether a first contact with this information will result in the acquisition of new knowledge after some time.

Thus, this research aimed to describe the knowledge of amateur singers who perform in religious services about vocal health and hygiene and compare these findings at two different moments. Furthermore, the research aimed to analyze the vocal self-perception of these individuals in their vocal symptoms and knowledge about vocal health and hygiene.

## METHODS

This is descriptive, longitudinal research, to which people who practice amateur singing in religious services were invited. The research was previously approved by the institution's Ethics Committee for Analysis of Research Projects (CAAE 58372222.2.0000.0068).

The individuals contacted were encouraged to share the research invitation with other singers in their contacts, creating a snowball effect.

Amateur singers were included, regardless of gender but over 18 years old, with or without vocal complaints, and who sang in religious services at least once a week. Individuals who did not participate in all stages of the research were excluded. All individuals involved signed the Informed Consent Form (ICF).

According to the inclusion and exclusion criteria, a sample of 100 individuals was created, from 18 to 82 years old, consisting of 54 women and 46 men, with an average age of 33.72 years old.

Participants received an invitation to complete the research questionnaire through a link in the Google Forms tool, sent by email and/or instant messaging applications, and

published on social networks. The questionnaire had three parts: 1. Informed Consent Form; 2. Initial Questionnaire (Q1), which contains questions about sociodemographic data (full name, date of birth, cell phone number, email, gender and profession) and aspects related to the voice (vocal complaints, voice self-assessment using the Visual Analogue Scale (VAS) - and vocal symptoms), singing (singing class or training, activity linked to singing in addition to religious practice) and health (COVID-19 infection, speech therapy and interest in carrying it out); 3. *Questionário de Saúde e Higiene Vocal* (QSHV)<sup>(15)</sup>.

The *Questionário de Saúde e Higiene Vocal* (QSHV) is a self-administered instrument that aims to measure knowledge about vocal health and hygiene. In it, the individual indicates, for each of the 31 items, whether they consider it “positive”, “neutral” or “negative” for their voice. At the end, there is access to the answer sheet with the correct answers and each correct answer is worth 1 (one) point. The final score is calculated from the simple sum of correct answers and the cutoff value that separates dysphoric individuals from vocally healthy individuals, which is 23 points<sup>(18)</sup>.

The Visual Analogue Scale was used to analyze the participants’ perception of the degree of deviation/change in their voice. Participants were instructed to classify their current voice on a scale from 0 (no change) to 10 (a lot of change)<sup>(19)</sup>.

Participants who completed Q1 and the QSHV initially (application 1) were invited to fill out the QSHV again after 20 days, with the questions randomized (application 2).

Responses were returned instantly after completing the questionnaire, with Google Forms created to show the correct answer to each question in each of the applications. Participants were encouraged to read the correct answers and compare them with the answers they had given and had no doubts. The objective of showing the correct answers was to encourage participants to analyze their answers more autonomously, to better understand the content, and to use this knowledge acquired in their daily vocal practice.

The data obtained were tabulated and the information from Q1 was considered; The total QSHV scores from the two applications were also considered.

The descriptive analysis considered the absolute and relative frequency and measures of central tendency; in inferential statistics, the following analyses were carried out:

1. Comparison of participants with and without vocal symptoms regarding vocal self-perception, measured by VAS (Student’s t-test for independent samples); Calculations relating to the Student’s t-test were performed using the bias-corrected and accelerated bootstrap sampling method based on 1000 samples. In cases where a violation of the homoscedasticity assumption was observed ( $p \leq 0.05$ , Levene’s test), Welch’s correction for heteroscedasticity was used to calculate the p-value. The effect size of the difference between groups was measured using the d coefficient.
2. Comparison between QSHV scores obtained in application 1 and application 2 (Student’s t-test for paired samples); Calculations relating to the student’s t-test were performed using the bias-corrected and accelerated bootstrap sampling method based on 1000 samples.

The effect size of the difference between groups was measured using the d coefficient.

3. Comparison between the QSHV scores obtained in application 1 and application 2, considering the cutoff point (McNemar test);
4. Correlation between the VAS score and the QSHV scores from application 1 and application 2 (Pearson Correlation Test); the correlation coefficient, 95% confidence intervals, and p-value were calculated using the bias-corrected and accelerated bootstrap sampling method based on 1000 samples.

## RESULTS

The sample had similar participation of women (54%) and men (46%). Most singers reported that they did not smoke, did not use medication, and had never had speech-language therapy, but were interested in doing it. Only half took or took singing lessons and most of them had their singing restricted to religious activities (Table 1).

Most individuals (79%) reported some degree of vocal alteration (Figure 1), with a mean of 4.16 (standard deviation of 2.85) and a median of 5.00 in the VAS (minimum reported was 0.00 and a maximum of 10.00).

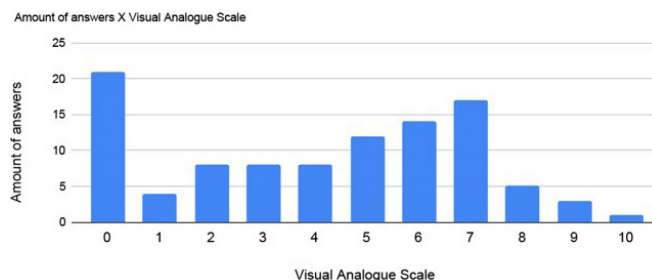
Most of the participants reported having at least one vocal symptom, the most prevalent were clearing the throat and voice cracks (Table 2).

There was an association between vocal self-perception and the symptoms “vocal fatigue”, “scratchy throat”, “burning throat”, “hoarseness” and “weak voice”, and, in all cases, the group with symptoms presented a higher score on the scale than the group without symptoms (Table 2).

There was a difference between the QSHV scores, with a higher mean in application 2 than in application 1 (Table 3).

When classifying the scores of the two applications in the cut-off point and comparing them, a difference was observed between both since individuals who were below the cut-off score (low knowledge about vocal health and hygiene) moved to the same/higher category of the cut-off score (high knowledge about vocal health and hygiene) in application 2 (Table 4).

There was no correlation between VAS scores and QSHV scores in both applications (Table 5).



**Figure 1.** Distribution of values obtained in self-assessment using the Visual Analogue Scale

**Table 1.** Descriptive data regarding the gender, smoking habit, use of medication, taking singing classes, singing activities in addition to religious practice, COVID-19, speech-language therapy follow-up, and interest in speech-language therapy follow-up

Variable	Categories	Absolute frequency (N)	Relative frequency (%)
Gender	Female	54	54.00
	Male	46	46.00
Smoking habit	No	99	99.00
	Yes	1	1.00
Medication use	No	86	86.00
	Yes	14	14.00
Singing class	No	49	49.00
	Yes	51	51.00
Singing activity beyond religious practice	No	82	82.00
	Yes	18	18.00
Did you have COVID-19?	No	50	50.00
	Yes	50	50.00
Do you carry out speech-language therapy?	No, never	78	78.00
	No, but I already had	19	19.00
	Yes I do	3	3.00
Are you interested in undergoing speech-language therapy?	No	21	21.00
	Yes	79	79.00

Subtitle: N = number; % = percent

**Table 2.** Descriptive values and comparative analysis regarding the presence/absence of symptoms and scores on the Visual Analogue Scale

Symptom	Presence	N	Mean	SD	Median	Min.	Max.	P-value	E.S.
Vocal fatigue	No	64	3.64	2.83	4.00	0.00	9.00	0.008*	0.519
	Yes	36	5.08	2.69	6.00	0.00	10.00		
Scratchy throat	No	74	3.70	2.87	4.00	0.00	9.00	0.004*	0.638
	Yes	26	5.46	2.42	6.00	0.00	10.00		
Burning throat	No	88	3.94	2.91	4.00	0.00	10.00	0.014* <sup>w</sup>	0.644
	Yes	12	5.75	1.76	6.00	2.00	8.00		
Phlegm	No	55	4.07	2.98	4.00	0.00	10.00	0.748	0.068
	Yes	45	4.27	2.72	5.00	0.00	9.00		
Hoarseness	No	68	3.47	2.89	3.00	0.00	9.00	0.002* <sup>w</sup>	0.804
	Yes	32	5.62	2.17	6.00	0.00	10.00		
Flaws, breaks in the voice	No	60	3.75	2.86	4.00	0.00	8.00	0.071	0.363
	Yes	40	4.77	2.77	5.50	0.00	10.00		
Excessive air in the voice	No	90	4.00	2.86	4.00	0.00	10.00	0.058	0.566
	Yes	10	5.60	2.41	6.00	0.00	9.00		
Difficulty controlling vocal intensity	No	76	3.89	2.84	4.50	0.00	9.00	0.085	0.391
	Yes	24	5.00	2.80	5.50	0.00	10.00		
Sore throat	No	89	4.00	2.93	4.00	0.00	10.00	0.051 <sup>w</sup>	0.514
	Yes	11	5.45	1.75	5.00	3.00	9.00		
Neck stiffens	No	92	4.02	2.80	4.50	0.00	10.00	0.109	0.611
	Yes	8	5.75	3.11	7.00	0.00	9.00		
Weak voice	No	84	3.89	2.85	4.00	0.00	10.00	0.016*	0.5960
	Yes	16	5.56	2.50	6.00	0.00	9.00		
Other	No	97	4.25	2.84	5.00	0.00	10.00	NC	NC
	Yes	3	1.33	1.53	1.00	0.00	3.00		

Student's t-test for independent samples \*Statistically significant value at the 5% level ( $p \leq 0.05$ ); w calculated with Welch's correction for heteroscedasticity

Subtitle: N = number; SD = Standard deviation; Min. = Minimum; Max. = Maximum; E.S. = Effect size; NC = not calculable due to the low sample number for one of the groups

**Table 3.** Descriptive values and comparative analysis between *Questionário de Saúde e Higiene Vocal* scores in applications 1 and 2

QSHV	Application	N	Mean	SD	Median	Min.	Max.	P-value	E.S.
Scores	1	100	23.36	7.72	27.00	6.00	31.00	0.006*	0.384
	2	100	25.63	6.70	28.00	5.00	31.00		

Student's t-test for paired samples \*Statistically significant value at the 5% level ( $p \leq 0.05$ )

Subtitle: QSHV = *Questionário de Saúde e Higiene Vocal*; N = number; SD = Standard deviation; Min. = Minimum; Max. = Maximum; E.S. = Effect size



**Table 4.** Comparison between *Questionário de Saúde e Higiene Vocal* scores classified by cutoff point

Application	QSHV score classification	2				P-value
		below the cutoff point (low knowledge about vocal health and hygiene)		equal to/above the cutoff point (high knowledge about vocal health and hygiene)		
		n	%	n	%	
1	below the cutoff point (low knowledge about vocal health and hygiene)	13	13.00	15	15.00	0.002*
	equal to/above the cutoff point (high knowledge about vocal health and hygiene)	2	2.00	70	70.00	

McNemar test \*Statistically significant value at the 5% level ( $p \leq 0.05$ )

Subtitle: QSHV = *Questionário de Saúde e Higiene Vocal*

**Table 5.** Correlation analysis between the Visual Analogue Scale score and the Vocal Health and Hygiene Questionnaire scores

Score	Visual Analogue Scale	P-value
	Coef. [CI 95%]	
QSHV (application 1)	-0.017 [-0.221, 0.201]	0.864
QSHV (application 2)	-0.098 [-0.289, 0.099]	0.330

Pearson Correlation Test

Subtitle: Coef. = Coefficient; CI = Confidence interval; QSHV = *Questionário de Saúde e Higiene Vocal*; % = percent

## DISCUSSION

The composition of the sample enabled to minimization of the vocal effects resulting from gender<sup>(19-21)</sup>, smoking<sup>(22)</sup>, and medication use<sup>(23)</sup>.

The vocal self-assessment showed that more than half of the sample perceived their voice as altered. This finding may be associated with the fact that popular singers have a higher incidence of vocal complaints compared to classical singers, and because the most part, they have living conditions that can lead to vocal strain such as singing at high intensity, in unfavorable acoustic environments and without considering their vocal limitations<sup>(15,20)</sup>. It is also possible that this issue is related to the daily vocal demands of these individuals, who may use their voice directly or indirectly in the professional context inappropriately. Also, only half of the participants reported singing lessons and the majority had never undergone vocal improvement with a speech-language therapist.

The most reported symptoms in the research (clearing the throat, voice cracks, vocal fatigue, and hoarseness) were similar to those of another study with amateur evangelical singers. Complaints of clearing the throat and hoarseness may be related to intensive use of the voice, while symptoms of voice failure and vocal fatigue may be associated with the combination of frequent opening of the oral cavity and prolonged use of the voice during singing<sup>(24)</sup>. Many may arrive at singing with vocal symptoms resulting from risk factors to which they were exposed, such as high vocal demand, dust, air conditioning, allergies, and possible undiagnosed laryngological changes.

Another factor that may be associated with these symptoms is the lack of vocal preparation since the characteristic of this type of singing is the transmission of religious messages that

overlap with the artistic issue. According to the literature, most religious singers practice singing without ever having studied singing or using vocal techniques<sup>(10,21,23)</sup>. In this aspect, we observed in the sample studied that only half of the participants reported singing lessons. From this, there is another question to be raised to justify these vocal self-assessment data and the large number of reported symptoms concerns the practice of acquired vocal knowledge. In a study carried out with teachers, even if they knew about factors harmful to the voice, they continued to practice them<sup>(25)</sup>. This may explain why most of our sample obtained a QSHV score corresponding to high knowledge about vocal health and hygiene and, even so, reported several symptoms and negative vocal self-assessment.

Even with vocal complaints, the majority of the sample never had speech-language therapy follow-up, which is in agreement with another study<sup>(15)</sup> which shows that the search for speech-language therapy treatment is reduced in this population. Similarly, popular singers, because they do not always seek technical musical knowledge and because they often have intensive vocal behavior, are more prone to developing vocal changes<sup>(11,14,24)</sup>.

Half of the participants in the sample reported having had COVID-19, which may have affected their voices. A recent study with 30 singers showed that self-reported vocal symptoms that emerged after COVID-19 infection remained, even after cure<sup>(26)</sup>. According to the authors, reported symptoms include muscle weakness and vocal fatigue, followed by pain in the throat, coughing, clearing the throat, difficulty singing, loss of vocal range, difficulty breathing, difficulty maintaining pitch, altered resonance, breathy voice, and hoarseness. In this sense, monitoring the amateur singers investigated in this study may clarify the symptoms mentioned and a possible relationship with the post-COVID-19 syndrome.

Regarding the participants' initial knowledge about vocal health and hygiene, which could be recorded in application 1 of the QSHV, it was observed that the average number of correct answers was 23.36, slightly above the questionnaire's cut-off value. Therefore, the group showed satisfactory knowledge of the topic, which differs from other studies<sup>(9-11)</sup>. This result may be associated with the fact that approximately half of the group took singing lessons, and also due to the ease of access to information via the internet<sup>(5)</sup>, in addition to information that is widely disseminated to the population such as the importance of hydration for the voice and the damage that shouting and smoking cause to the voice<sup>(17)</sup>. In recent years, there has been an increase in the number of campaigns to inform the population about vocal habits<sup>(25)</sup>. However, prior knowledge about vocal health and hygiene did not mean fewer vocal changes, which was proven by the lack of correlation between the QSHV scores and the vocal self-assessment VAS score, similar to other studies<sup>(15)</sup>.

Although there was an improvement in the QSHV score in the second application, the change observed was very slight, with an increase of only 2.3 points in correct answers. Thus, only the participants' contact with information on the topic has a limited scope and the actions must be expanded to obtain more significant results. Furthermore, longitudinal monitoring will allow us to understand whether this increase in knowledge is maintained and/or whether it is reversed into healthier practices.

Although the focus of this study was self-perception and knowledge about vocal health, the absence of some data may have limited the analysis, such as laryngoscopy examination, complete vocal assessment, and data on vocal demand outside of amateur religious singing.

This study allowed us to understand that amateur singers who perform in religious services, although they had some initial knowledge about vocal health and hygiene, presented vocal self-assessments suggestive of changes and had a slight increase in knowledge on the topic after being exposed to the content. Speech-language therapy monitoring for this group can contribute to improving knowledge about vocal hygiene and health care, raising awareness about the identification of vocal complaints<sup>(20)</sup>, including complete speech-language therapy evaluation and otorhinolaryngological evaluation. Furthermore, these singers can be agents that multiply knowledge on issues related to voice self-care and communication and provide guidance to help prevent or treat vocal dysfunctions. This research will continue as a longitudinal follow-up.

## CONCLUSION

Amateur singers of both genders who perform in religious services knew about vocal health and hygiene corresponding to vocally healthy individuals, above the cutoff point, in both applications of the QSHV. However, most of them reported having negative vocal symptoms and vocal changes.

We found that, through the availability of correct QSHV answers after the first application, most participants showed an improvement in their score in the second application, which means that there was an increase in knowledge about vocal health and hygiene, even small.

The level of knowledge about vocal health and hygiene did not correlate with the degree of vocal alteration.

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