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Effect of COVID-19 Quarantine on Voice Handicap Index in Female Classical Singers

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SUMMARY: Objective. This study aimed to verify the impact of vocal deviation in the quality of life of classical female singers over the quarantine imposed by the COVID-19 pandemic through self-assessments.

Methods. Fifty five professional classical female singers filled out an online questionnaire including general questions such as identification, age, professional experience time, vocal classification, time of singing, and rehearsal studies. They all answered the protocol Classical Singing Handicap Index, adapted for this research, which analyses three subscales: Disability, Handicap, and Impairment.

Results. There was no significant difference in the perceived total handicap index score (40% of 120 points). Regarding the three domains analyzed, Disability was significantly higher than Impairment ($P = 0.012$). In addition, the correlation with the variables identified that Impairment subscale showed a negative correlation with the variable hours of rehearsal ($r = -0.335$, $P = 0.040$).

Conclusions. The COVID-19 quarantine does not seem to cause a significant impact on the voice of professional classical female singers probably due to their degree of experience and vocal preparation.

Key words: Classical singer—Voice—COVID-19—Vocal Handicap Index.

INTRODUCTION

The new and worrying world reality is being solidified with the novel coronavirus outbreak (Coronavirus Disease 2019 - COVID-19), which was initially reported in China, in December 2019.^{1,2} Although the rapid spread of this disease has caused profound changes in global health systems,³ it has also shown an impact on social relations.^{1,4} In order to reduce the spread of the disease, policies around the world have implemented quarantine, a preventive social restriction measure.⁵ However, this measure ended up affecting several communities causing enormous consequences on the professional, financial, and emotional fields. Among these communities are the classical singers, who depend on performance and social interaction for their livelihood.

Classical singing is a style known to be technically complex and professionals must develop all their vocal potential.⁶ This activity requires a constant contact with other singers, whether in participation in choirs, operas or classrooms⁷ in live performances with present audience considered the main source of income. However, performance cancellation policies have been implemented for this community since vocalization seems to be a potential disseminator of COVID-19 through droplets and aerosols.^{7,8} In the midst of this reality, many singers found

an outlet in virtual performances as a safe way to continue their professional activity, but less enjoyable than the traditional method of singing in spaces with better acoustics and the ability to interact with the audience.^{7,9}

In addition, the singing voice is responsible for disseminating the emotion and interpretation of a musical piece, requiring from the artist a special control of mind and body, especially in aspects related to phonation.^{10,11} Predominantly, classical singers are disciplined and familiarized with vocal health habits due to the musicality demand, vocal extension, vocal quality, perception, and tuning.^{12–14} Nevertheless, emotional disorders such as stress and anxiety can negatively affect the professional activity and may develop a voice handicap on singers, impairing their quality of life.¹⁰ A study conducted by Adi Primov-Fever et al⁹ examined the effect of COVID-19 on singing and speaking voice professionals, and found that the pandemic is perceived by participants as a stressful period unfavorable to the vocal well-being.

Considering that COVID-19 quarantine brought profound changes in the classical singer's scenario,⁸ we hypothesized that the impact of social isolation may have generated negative responses in the professional, emotional, and vocal levels of the classical singer. Therefore, the aim of the present study is to verify the impact of vocal deviation in the quality of life of classical female singers over the quarantine imposed by the COVID-19 pandemic by the application of the protocol Classical Singing Handicap Index (CSHI), proposed by De Ávila et al¹⁰ and adapted for this research.

MATERIALS AND METHODS

Study design and participants

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informed consent form prior to responding the questionnaire. This research was designed as an observational cross-sectional study, using an online questionnaire and a protocol adapted for the context imposed by the COVID-19 pandemic. The survey was distributed to professional female classical singers who had at least 1 year of professional experience in the area of classical singing. Participants were recruited randomly from former university students who had a publicized career. All participants were native speakers of Brazilian Portuguese who lived in Brazil.

Considering the unusual situation provided by the COVID-19 quarantine where social distance was imposed across the country, invitations were made electronically via e-mail over a period of 2 weeks (starting in the first week of July 2020). Thus, 55 professional Brazilian classical singers participated in this study.

Measures

An identification questionnaire was developed to characterize the sample of the present study. Only female classical singers were included in the present study due to the more considerable participation of women in this type of research compared to men.¹⁵ The questionnaire contained data on vocal classification, age, years of professional experience, weekly time of singing studies, and dedication to rehearsals. The professional experience time was answered using a five-point scale, with one corresponding to 1 year of experience, and five corresponding to 5 years or more of experience. The vocal classification was answered by choosing one of the three categories presented: soprano, mezzo-soprano, or contralto. Age, weekly rehearsal and study time were investigated through open-ended questions.

The Protocol *CSHI*¹⁰ was adapted for the present research considering the COVID-19 quarantine. It comprises 30 items, divided into three subscales: Disability, Handicap, and Impairment. Disability corresponds to the functional domain and refers to the impact of quarantine on professional activities; Handicap corresponds to the emotional domain and is related to the psychological impact caused by the quarantine; and Impairment corresponds to the organic domain associated with the self-perception of the characteristics of vocal emission during quarantine. Each subscale consists of ten items that are answered using a five-point Likert scale, with 0 corresponding to never, 1 - almost never, 2 - sometimes, 3 - almost always, and 4 - always. By means of simple summation of the raw

scores, each subscale could total a maximum of 40 points. The responses of the severity of each subscale were summed to obtain the total scores of each individual with a maximum total of 120 points, considering that the higher the score, the greater the severity of voice handicap.

Statistical analysis

The data were entered into Microsoft Office Excel 2016 spreadsheets and analyzed using the SPSS version 20 (SPSS Inc., Chicago, IL). Nonparametric tests were used because the normality of the data was not confirmed by the Kolmogorov-Smirnov test ($P > 0.060$). Data are presented as mean \pm standard deviation (SD), median, minimum and maximum and 95% confidence interval. The comparison between the CSHI domains were made using the Friedmann test. The Kruskal-Wallis test was used to compare the indices obtained in the CSHI with the categorical variable vocal classification. The post-hoc analysis of multiple comparisons was performed when a significant value was identified. In addition, the Spearman Correlation test was used to correlate the scores obtained in the CSHI with the other continuous variables (age, time of singing, and weekly singing hours). All results with error probability $P < 0.05$ were considered as statistically significant.

RESULTS

Only female singers participated in the study (37 ± 11 years). Forty-four singers were classified as soprano (79.5%), eight as mezzo-soprano (15.4%), and three as contralto (5.1%). Rehearsal time over the quarantine period was 7.4 ± 4.8 hours/week, and study 6.2 ± 5.8 hours/week. Two singers were professional for 1 year (3.6%), three for 2 years (5.5%), two for 3 years (3.6%), five for 4 years (9.1%), and 43 for 5 years, or more (78.2%).

The means, SD, median, minimum, and maximum values of the data referring to the distribution of the scores obtained by the classical singers ($N = 55$) in the Disability, Handicap, Impairment, and Total domains of the CSHI protocol is presented in Table 1.

The total average score obtained was 47.7 points, representing 40% of a total of 120 points. Friedman's test showed that the scores for the three CSHI domains differ between the singers [$X^2(3) = 107.652$; $P < 0.001$]. The multiple comparison test showed that the mean score of the Disability

TABLE 1.

Distribution and comparison between the average scores obtained in the CSHI protocol

	Mean \pm SD	Median	Minimum	Maximum	PValue
Disability	17.5 \pm 9.2	16.0	2	40	< 0.001*
Handicap	15.9 \pm 8.7	14.0	0	33	
Impairment	14.2 \pm 10.0	13.0	0	38	
Total	47.7 \pm 25.2	44.0	2	110	

* Friedman test, $P < 0.05$. Impairment X Handicap $P = 0.496$; Impairment X Disability $P = 0.012$; Handicap X Disability $P = 1.000$.

subscale is significantly higher than that of the Impairment subscale ($P = 0.012$).

Table 2 shows the comparison between scores obtained in the subscales of the CSHI protocol with the variable vocal classification. The Kruskal Wallis test showed that the scores of the CSHI subscales do not differ between the vocal classifications [$X^2(2) = 0.050$; $P = 0.975$].

The Spearman correlation showed that the subscale Impairment had a negative correlation with the variable hours of rehearsal ($r = -0.335$, $P = 0.040$). A complete list of the correlations is presented in Table 3.

DISCUSSION

The social isolation caused by the novel coronavirus outbreak has had repercussions on notable changes in the world scenario, affecting the health system, educational, and cultural areas.¹⁶ The community of classical singers was one of the biggest affected, making it impossible for the singer to be on stage and interacting with other professionals in the field.⁷ This conducted us to the hypothesis that the quarantine could cause a quality of life handicap in classical singers, considering the impact on professional, emotional, and vocal aspects. However, we found that the quarantine did not have a significant impact on the perceived handicap index in all determined variables.

The average score obtained through the responses of the CSHI protocol represents less than a half of the total possible score (40%), probably due to the preparation of the singer and the classical singing technique required by refined training.^{6,17} However, the subscale Disability reached the highest individual score and was significantly greater than Impairment. Although professional activities are more impacted due to the social isolation, the investigated singers are able to maintain a standard of vocal quality through the dedication on singing studies and rehearsals.

The mean weekly rehearsal time was over 7 hours, and the study period was over 6 hours. This can be considered

an average period of dedication in a context outside the pandemic.¹³ Primov-Fever, Roziner, and Amir⁹ pointed out that despite the stress generated by the COVID-19 pandemic, the investigated singers increased their vocal study practices. This can be explained by the convenient time provided by social isolation that may have facilitated singers' vocal preparation by channeling their stress and anxiety through practicing.⁹

Restrictions related to singing and other vocal performances due to the COVID-19 pandemic are known to cause professional, financial and emotional consequences.¹⁸ Although still under investigation, singing is considered a potential disseminator of the disease due to aerosol particles released by vocalization.^{7,8,19–21} This concern made choral environments, churches, concert halls and practice spaces, such as stages, theatres, and other locations, inactive during the pandemic.⁷ Nonetheless, despite the singers discerning an impact on professional activities it was not enough to cause anxiety and concern as well as perceiving significant vocal changes.

The vocal and psychological preparation that the classical singing technique offers to professionals may be the reason for the reduced vocal impact of the investigated singers. Classical singers are known for developing a refined vocal technique and work with diverse skills. They learn acting, body coordination, presentation skills, and how to communicate the emotion and the meaning of music to the audience.^{11,22} With proper vocal development, it is believed that the classical singer improves resistance that does not allow the occurrence of frequent vocal complaints or more considerable impact on voice.¹⁰ Moreti et al.²³ adopted a similar protocol to measure the voice handicap in modern singing and found that amateur singers presented a greater handicap when compared to classical singers. This suggests that classical technique may prepare the voice demands and conduct it to a stable condition.¹⁰ In addition, with the development of different skills, the singer embraces the possibility to continue their performance for their audience using technology, like virtual concerts.^{7,9}

TABLE 2.
Comparison between CSHI scores and vocal classification

	Vocal Classification	Mean \pm SD	Median	IC 95%	P Value
Disability	Soprano	16.9 \pm 8.7	16	1.7; 2.,1	0.833
	Mezzo-Soprano	18.8 \pm 11.3	23	7.0; 30.7	
	Contralto	18.0 \pm 4.2	18	-20.1; 56.1	
Handicap	Soprano	17.4 \pm 8.7	18	14.2; 20.6	0.397
	Mezzo-Soprano	14.7 \pm 10.2	13	4.0; 25.4	
	Contralto	10.5 \pm 3.5	10,5	-21.3; 42.3	
Impairment	Soprano	13.1 \pm 10.1	9	9.4; 16.8	0.843
	Mezzo-Soprano	14.2 \pm 10.1	14	3.5; 24.8	
	Contralto	15.5 \pm 7.8	15,5	-54.4; 85.4	
Total	Soprano	47.5 \pm 25.3	44	38.2; 56.7	0.975
	Mezzo-Soprano	47.7 \pm 29.8	51,5	16.4; 78.9	
	Contralto	44.0 \pm 0.0	44	44.0; 44.0	

TABLE 3.
Correlations between scores obtained in the CSHI and the variables age, professional experience, rehearsal, and singing studies

		Age	Professional Experience	Rehearsal	Study
Disability	r	-0.128	-0.054	-0.296	-0.069
	p	0.443	0.695	0.072	0.681
Handicap	r	-0.251	-0.133	-0.241	0.148
	p	0.128	0.332	0.146	0.376
Impairment	r	-0.069	-0.083	-0.335*	-0.092
	p	0.679	0.547	0.04	0.581
Total	r	-0.145	-0.11	-0.304	-0.005
	p	0.386	0.425	0.064	0.978

* The correlation is significant at the 0.05 level (two-tailed). Age: years; professional experience: years; rehearsal: yours/week; study: hours/week.

As for the vocal classification described in Table 2, the majority of respondents were sopranos (79.5%), which reflects the reality of classical singers in which in the female classification there is a predominance of high-pitched voices.^{10,24–26} However, the vocal classifications had no significant relationship with the scores of the subscales, indicating that the impact of the quarantine was similar for all types of voices.

The variable hours of rehearsal described in Table 3 presented a negative correlation with a subscale Impairment ($P = 0.04$). This indicates that the greater the perception of the impairment, the least time of rehearsal are dedicated. This can be explained by the fact that classical singers, in general, are significantly disciplined at work and comprehend vocal hygiene habits to carefully preserve their voices. According to Dassie-Leite, Duprat, and Busch,¹³ classical singers experience valuable vocal habits, such as vocal warm-up and medical care, despite receiving no formal training. In addition, Achey, He, and Akst¹⁴ observed that students at a classical singing conservatory reported more assiduous attention to vocal hygiene practices, especially in preparation for performances.

On the other hand, it must be considered that in the quarantine period there is a more considerable concern with health, especially with regard to respiratory capacity. According to Helling et al.,²¹ if the respiratory system is compromised due to illness similarly to a sequelae of COVID-19 disease, the singing can become more effortful and the vocal performance can be damaged.

The correlations between age, professional experience, weekly study hours, and the protocol subscales demonstrated no statistically significant interactions. The mean age of participants was 37 years, which shows that respondents were in the period of maximum vocal efficiency according to the literature.²⁷ It is interesting to observe that some of them were over 45 years old and remain professionally active, which is an indication that singing can benefit the longevity of the voice.^{28–30} In addition, 78.2% of the sample depicted five or more years of experience in classical singing indicating a greater

vocal preparation in the face of the required technique and lesser influence of the perceived handicap.

Strengths and weakness of the study

The importance of this study is in verifying the vocal handicap perceived by female classical singers in the face of the quarantine imposed by the COVID-19 outbreak. As such, it contributes with information about the reality of singers in the professional, emotional, and vocal realms. This study may support the community of classical singers in terms of the perception of these parameters in this extremely unusual period.

Nonetheless, two limitations should be pointed out. First, the sample size was limited by the time of collection. A more considerable number of participants could improve the specificity of the study and its results. Second, our study aimed to analyze classical singers in the context of the quarantine without considering their laryngeal conditions or vocal disorders, as proposed by the original protocol used in this study. Hence, our sample may contain healthy and dysphonic singers. Future research may consider participants who may present vocal complaints in the context of the pandemic.

CONCLUSION

Professional classical female singers reported reduced handicap index in the face of the COVID-19 quarantine. The years of experience and the vocal preparation seem to have favored singers in this unique period without affecting their vocal quality and quality of life.

APPENDIX

CSHI – adapted

Please check the choice key that indicates your experience over the past three months during the time of the COVID-19 pandemic.¹⁰

Choice key: 0 – never; 1 - almost never; 2 – sometimes; 3 - almost always; - 4 always.

The impact of quarantine on professional activities (Disability)					
1. I have not had any more performances due to the quarantine.	0	1	2	3	4
2. I have taken longer to warm up my voice during the quarantine.	0	1	2	3	4
3. I notice that my voice is tired or altered during the quarantine.	0	1	2	3	4
4. I have to change aspects of my vocal technique because the quarantine limits my studies.	0	1	2	3	4
5. The quarantine forces me to modify songs or limit my repertoire.	0	1	2	3	4
6. Because of the quarantine, I am forced to limit my usual study/rehearsal time.	0	1	2	3	4
7. I am forced to take longer periods of vocal rest during quarantine.	0	1	2	3	4
8. I need to avoid volume dynamics due to the quarantine.	0	1	2	3	4
9. I need to take medicine continuously in the quarantine.	0	1	2	3	4
10. Quarantine forces me to limit the social use of my voice.	0	1	2	3	4
Psychological impact of the quarantine (Handicap)					
1. My anxiety is greater than usual in the quarantine.	0	1	2	3	4
2. The people I live with do not understand my emotional complaint in the quarantine.	0	1	2	3	4
3. The people I live with have criticized my voice in the quarantine.	0	1	2	3	4
4. The quarantine makes me nervous or less sociable.	0	1	2	3	4
5. I feel that in the quarantine I get worried when I have to vocalize.	0	1	2	3	4
6. I feel that my career is at risk because of the quarantine.	0	1	2	3	4
7. Colleagues, directors and critics have already noticed my vocal difficulties in the quarantine.	0	1	2	3	4
8. I am forced to cancel professional appointments because of the quarantine.	0	1	2	3	4
9. I avoid scheduling future professional appointments in the quarantine.	0	1	2	3	4
10. I have avoided talking to people in the quarantine.	0	1	2	3	4
Self-perception of the characteristics of my voice in the quarantine (Impairment)					
1. I have difficulties with respiratory control because of the quarantine.	0	1	2	3	4
2. My vocal performance varies during the day in the quarantine.	0	1	2	3	4
3. I think my singing voice is hoarse or noisy in quarantine.	0	1	2	3	4
4. I have noticed difficulties in sustaining the notes.	0	1	2	3	4
5. My vocal range has reduced or changed in the quarantine.	0	1	2	3	4
6. I have noticed difficulties in balancing my vocal resonance in the quarantine.	0	1	2	3	4
7. Singing has been difficult or tiring in the quarantine.	0	1	2	3	4
8. My vocal quality worsens during rehearsals in the quarantine.	0	1	2	3	4
9. I notice that my voice is more tired after rehearsing in the quarantine.	0	1	2	3	4
10. My vocal performance worsens at certain times of the day in the quarantine.	0	1	2	3	4

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