




# Singing Style, Vocal Habits, and General Health of Professional Singers

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## Abstract

**Introduction** For the singer, the voice is a medium used to express feelings that capture the listener. Every singing style has specific demands, and a vocal alteration may prevent the singer from meeting them.

**Objective** To compare the singing style, the vocal habits, and the general health data of professional singers.

**Methods** Cross-sectional, quantitative and retrospective study of a survey database. Data on the singing style, the vocal habits, and the health conditions and history of 57 professional singers, 31 female singers and 26 male singers, aged from 19 to 57 years old (average of 32 years old), from a mid-sized town were analyzed

**Results** There was a prevalence of female ( $54 \pm 2\%$ ) popular singers ( $91 \pm 2\%$ ), in the adult age ( $51 \pm 2\%$ ), nonsmokers ( $89 \pm 2\%$ ), nonusers of alcohol ( $77 \pm 2\%$ ), with respiratory problems ( $53 \pm 2\%$ ), mainly rhinitis ( $23 \pm 2\%$ ), and without other health problems. There was a significant use of alcohol in males ( $p = 0.010$ ); among the alcohol users, there was a significant presence of respiratory problems ( $p = 0.046$ ), of pharyngitis/tonsillitis ( $p = 0.003$ ), and of gastroesophageal reflux (GER) ( $p = 0.043$ ); there was a significant presence of GER in subjects reporting endocrine problems ( $p = 0.023$ ), of gastritis ( $p = 0.023$ ), and of pharyngitis/tonsillitis ( $p = 0.030$ ).

**Conclusion** There was a predominance of adult professional popular female singers, with complaints of respiratory issues (with a higher prevalence of rhinitis), without other general health issues, of nonsmokers, and of nonusers of alcohol.

## Keywords

- ▶ voice
- ▶ singing voice
- ▶ singing style
- ▶ speech
- ▶ language and hearing science

## Introduction

The voice also expresses feelings that cannot be expressed in spoken words. For the singer, the voice is a medium used to express feelings that capture the listener; it also has an intellectual and artistic role interconnecting the body and the mind of the singer to interpret a song.<sup>1,2</sup>

The singer needs to take special care in keeping the mind and the body healthy, mainly the aspects regarding phonation.<sup>2</sup>

Every singing style has specific demands, and a vocal alteration may prevent the singer from meeting them. As we evaluate the demands of the singing style, and the professional workload, vocal habits, and personal ambitions of the singer, it is possible to assess the needs of the singer and to implement a voice-training program.<sup>1</sup>

Higher education institutions and music schools in Brazil teach only two singing styles: classical and popular.<sup>3</sup>

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The classical singing style corresponds to the opera and demands complex adjustments, including vocal quality with harmonic richness, and accurate articulatory control and vocal projection. This allows the voice to stand out from the orchestra even without electronic amplification, and it requires long training.<sup>4</sup>

The popular singing style does not have a technical standard, as the classical does; it is learned informally, mainly through vocal imitation, and may favor vocal misuse.<sup>5</sup> Two important characteristics of this singing style are electronic amplification and voice adjustments close to the spoken voice.<sup>6,7</sup>

Elements such as the evolution of voice quality through the career, vocal habits, age, workload, extra jobs, and quality of life may be harmful to professional singers in particular.<sup>8</sup>

The present investigation aims to verify and compare the singing style, the vocal habits, and the general health data of professional singers.

## Methods

Cross-sectional, observational, analytical, quantitative and retrospective study using data from professional singers from a mid-sized town, previously approved by the Research Ethics Committee of our institution (40680614.7.0000.5346). The data on professional singers before speech therapy was gathered. The inclusion criteria were: professional singer of any style; aged from 19 to 57 years old – within this age range, the phonation has not suffered aging-related hormonal or structural influence, and no more alterations due to the mutational voice period are expected –; and informed consent adherence. The exclusion criteria were: incomplete dataset; laryngeal affections verified by a laryngologist; report of pregnancy; and failed audiological screening.

Finally, data on singing style, vocal habits, and health conditions and history of 57 professional singers, 31 females and 26 males, aged from 19 to 57 years old (average of 32 years old), were analyzed descriptively and comparatively. The Pearson chi-squared test was used, with a significance level of 5% ( $p \leq 0.05$ ).

## Results

There was a significant use of alcohol in males ( $p = 0.010$ ); among the alcohol users, there was a significant presence of respiratory problems ( $p = 0.046$ ), of pharyngitis/tonsillitis ( $p = 0.003$ ), and of gastroesophageal reflux (GER) ( $p = 0.043$ ); there was a significant presence of GER in subjects reporting endocrine problems ( $p = 0.023$ ), gastritis ( $p = 0.023$ ), and pharyngitis/tonsillitis ( $p = 0.030$ ).

## Discussion

There was a predominance of adult professional popular female singers, with complaints of respiratory issues (with a higher prevalence of rhinitis), without other general health issues, and most singers did not use alcohol nor tobacco. There was a significant use of alcohol in males; among the alcohol users, there was a significant presence of respiratory problems,

**Table 1** Results of descriptive analysis of variables: age, gender, singing style, vocal habits, and health condition and history

|                          |                         | n   | %      |        |
|--------------------------|-------------------------|-----|--------|--------|
| AGE (YEARS OLD)*         | 19–24                   | 19  | 33 ± 2 |        |
|                          | 25–44                   | 29  | 51 ± 2 |        |
|                          | 45–64                   | 9   | 16 ± 2 |        |
| GENDER                   | Female                  | 31  | 54 ± 2 |        |
|                          | Male                    | 26  | 46 ± 2 |        |
| SINGING STYLE            | Classical               | 5   | 9 ± 2  |        |
|                          | Popular                 | 52  | 91 ± 2 |        |
| TOBACCO USE              | No                      | 51  | 89 ± 2 |        |
|                          | Yes                     | 6   | 11 ± 2 |        |
| ALCOHOL USE              | No                      | 44  | 77 ± 2 |        |
|                          | Yes                     | 13  | 23 ± 2 |        |
| RESPIRATORY HEALTH ISSUE | No                      | 27  | 47 ± 2 |        |
|                          | Yes                     | 30  | 53 ± 2 |        |
| GENERAL HEALTH ISSUES    | Neurological            | No  | 57     | 100    |
|                          |                         | Yes | 0      | 0      |
|                          | Psychiatric             | No  | 55     | 96 ± 2 |
|                          |                         | Yes | 2      | 4 ± 2  |
|                          | Endocrine               | No  | 54     | 95 ± 2 |
|                          |                         | Yes | 3      | 5 ± 2  |
|                          | Gastritis               | No  | 54     | 95 ± 2 |
|                          |                         | Yes | 3      | 5 ± 2  |
|                          | Pharyngitis/Tonsillitis | No  | 45     | 79 ± 2 |
|                          |                         | Yes | 12     | 21 ± 2 |
|                          | Gastroesophageal reflux | No  | 40     | 70 ± 2 |
|                          |                         | Yes | 17     | 30 ± 2 |

\*Age groups according to Medical Subject Headings<sup>37</sup>: 19 to 24 years old: young adult; 25 to 44 years old: adult; 45 to 64 years old: middle-aged.

of pharyngitis/tonsillitis, and of GER; there was a significant presence of GER in subjects reporting endocrine problems, of gastritis, and of pharyngitis/tonsillitis (► **Tables 1–3** and **4**). In our study, there was a predominance of professional singers within the adult age group (25 to 44 years old), which is in agreement with another study, in which the majority of singers were young adults within the age group between 20 and 40 years old.<sup>9</sup> According to other studies involving singers, this is the age period of maximum vocal efficiency.<sup>9–13</sup> Although there is no consensus in the literature, some studies considered that the period of maximum vocal efficiency occurs between the ages of 25 and 45 years old, when structural larynx changes can be identified<sup>9,14</sup> (► **Tables 1** and **2**).

There was a majority of female subjects (54 ± 2%), which is in agreement with results from some studies,<sup>4,10,12,13,15–19</sup> and in contrast with results from other studies.<sup>2,5,20</sup> This suggests that men present a greater voice handicap when compared with women. We inferred that female singers are more prone to participate as volunteers in research studies.

**Table 2** Results of the comparative analysis according to gender, singing style, vocal habits, and health conditions and history as a function of age

|                          |                         | AGE (YEARS OLD)* |         |         | p-value |
|--------------------------|-------------------------|------------------|---------|---------|---------|
|                          |                         | (19–24)          | (25–44) | (45–64) |         |
| SEX                      | Female                  | 9                | 18      | 4       | 0.510   |
|                          | Male                    | 10               | 11      | 5       |         |
| SINGING STYLE            | Classical               | 0                | 4       | 1       | 0.248   |
|                          | Popular                 | 19               | 25      | 8       |         |
| TOBACCO USE              | No                      | 17               | 25      | 9       | 0.845   |
|                          | Yes                     | 2                | 4       | 0       |         |
| ALCOHOL USE              | No                      | 15               | 22      | 7       | 1.000   |
|                          | Yes                     | 4                | 7       | 2       |         |
| RESPIRATORY HEALTH ISSUE | No                      | 10               | 13      | 4       | 0.936   |
|                          | Yes                     | 9                | 16      | 5       |         |
| GENERAL HEALTH ISSUES    | Endocrine               | No               | 18      | 28      | 0.736   |
|                          |                         | Yes              | 1       | 1       |         |
|                          | Gastritis               | No               | 18      | 27      | 1.000   |
|                          |                         | Yes              | 1       | 2       |         |
|                          | Pharyngitis/Tonsillitis | No               | 16      | 23      | 0.612   |
|                          |                         | Yes              | 3       | 6       |         |
|                          | Gastroesophageal reflux | No               | 14      | 21      | 0.577   |
|                          |                         | Yes              | 5       | 8       |         |

\*Age groups according to Medical Subject Headings<sup>37</sup>: 19 to 24 years old: young adult; 25 to 44 years old: adult; 45 to 64 years old: middle-aged Pearson chi-squared test ( $p \leq 0.05$ )

There was a majority of female subjects in the predominant popular singing style, which is in line with another study showing a majority of female subjects in the popular singing style<sup>15</sup> (► **Tables 1 and 3**).

We verified the prevalence of the popular in relation to the classical singing style (5 classical singers and 52 popular singers), as was also found in the study by Loiola-Barreiro et al.<sup>15</sup> The town analyzed has an university offering a bachelor's degree in music, and as classical singing demands great phonation refinement and specific adjustments leading classical singers to attend singing courses,<sup>12</sup> a prevalence of the classical singing style was expected. However, the popular singing style was predominant; it is known that some popular singers begin their professional careers based only on the talent they present for singing,<sup>13,17</sup> and this may be the case in our study (► **Tables 1 and 4**).

It is important to include here a brief literature review on the vocal habits and on the general health of classical and popular singers. Classical singers are usually more disciplined due to the demand on musicality, vocal extension, vocal quality, vocal perception, and on tuning.<sup>12,21,22</sup> The study by Dassie-Leite et al.<sup>12</sup> indicated that classical singers are aware of good vocal habits, despite not having any formal training. The study by Achey et al.<sup>16</sup> found out that North American classical singing students still present high levels of lack of vocal preparation, although there is a great concern regarding vocal health. The study by Quintela et al.<sup>23</sup> revealed that classical

singing teachers have little training on the prevention of vocal affections. Popular singers have their own style, often based on imitation, which makes them more prone to vocal abuses.<sup>12</sup> In axé, bossa nova, samba, or sertanejo, Brazilian ramifications of the popular singing style, singers meet the phonation demands without training on the prevention of vocal affections, therefore without knowing how to properly care for and how to preserve their voices. A study from 2005<sup>24</sup> demonstrated that popular singers have the same degree of knowledge on vocal habits when compared with classical singers, in contrast to what the literature had described before that.

In our study, most of the singers were nonsmokers, as found by Ferreira et al.,<sup>25</sup> and most of them ( $77 \pm 2\%$ ;  $n = 44$ ) did not use alcohol, in contrast with the study by Puhl et al.<sup>26</sup> In the study by Gehling et al.,<sup>20</sup> most singers (90%) used alcohol, and a minority used tobacco (regarding tobacco use, this was also found by Garzón García et al.).<sup>5</sup> In our study, it is noteworthy that popular singers used alcohol more frequently ( $n = 11$ ), and as the refinement of the phonation demands are lower, it may indicate less vocal care. In another study comparing flamenco singers with classical singers, there was no significant difference in alcohol or tobacco use (► **Table 1**).<sup>5</sup>

A study from 1998<sup>27</sup> about professional training of 10 classical singers and 10 popular singers indicated that 20% of the singers used tobacco and that 20% used alcohol. In another study from 2002,<sup>13</sup> only 1 out of 26 individuals mentioned using alcohol. More recently, in 2010,<sup>26</sup> a study

**Table 3** Results of the comparative analysis according to age, singing style, vocal habits, and health conditions and history as a function of gender

|                          |                         | GENDER |      | <i>p</i> -value |       |
|--------------------------|-------------------------|--------|------|-----------------|-------|
|                          |                         | FEMALE | MALE |                 |       |
| AGE (YEARS OLD)*         | 19–24                   | 9      | 10   | 0.510           |       |
|                          | 25–44                   | 18     | 11   |                 |       |
|                          | 45–64                   | 4      | 5    |                 |       |
| SINGING STYLE            | Classical               | 3      | 2    | 1.000           |       |
|                          | Popular                 | 28     | 24   |                 |       |
| TOBACCO USE              | No                      | 29     | 22   | 0.396           |       |
|                          | Yes                     | 2      | 4    |                 |       |
| ALCOHOL USE              | No                      | 28     | 16   | <b>0.010</b>    |       |
|                          | Yes                     | 3      | 10   |                 |       |
| RESPIRATORY HEALTH ISSUE | No                      | 13     | 14   | 0.370           |       |
|                          | Yes                     | 18     | 12   |                 |       |
| GENERAL HEALTH ISSUES    | Endocrine               | No     | 30   | 24              | 0.587 |
|                          |                         | Yes    | 1    | 2               |       |
|                          | Gastritis               | No     | 29   | 25              | 1.000 |
|                          |                         | Yes    | 2    | 1               |       |
|                          | Pharyngitis/Tonsillitis | No     | 27   | 18              | 0.099 |
|                          |                         | Yes    | 4    | 8               |       |
|                          | Gastroesophageal reflux | No     | 23   | 17              | 0.469 |
|                          |                         | Yes    | 8    | 9               |       |

\*Age groups according to Medical Subject Headings<sup>37</sup>: 19 to 24 years old: young adult; 25 to 44 years old: adult; 45 to 64 years old: middle-aged  
Pearson chi-squared test ( $p \leq 0.05$ )

found that the alcohol use among classical and popular singers was 40%, with predominance in the popular singers, which is in line with the results from our study.

A study from 2011<sup>12</sup> found that tobacco and alcohol use among popular and classical singers was very low, as was found in our study. The decline in tobacco use among singers in recent years portrays an increase in the degree of awareness on damaging habits, once widespread within the musical culture. This change in behavior was present in other studies, indicating advances in vocal habits and in the care for general health.<sup>5,12,13,15,25–27</sup>

Alcohol use was higher in adults ( $n = 7$ ), and higher in men ( $n = 10$ ) than in women ( $n = 3$ ). Epidemiological studies in Brazil show that alcohol use is predominant in males,<sup>28</sup> but there are no studies on singers (– Tables 2 and 3).

Environmental factors, such as exposure to pollution and sudden changes in temperature, also interfere with vocal health.<sup>18</sup> More than half of the singers who participated in the research ( $n = 30$ ), and most of the classical singers ( $n = 3$ ), reported some type of respiratory problem, such as asthma, bronchitis and, mainly, rhinitis and sinusitis ( $n = 24$ ). This result is in line with the findings from the study by Goulart et al<sup>29</sup> (18.9% for rhinitis and 10.8% for rhinitis and sinusitis in singers) and with the study by Vieira et al,<sup>30</sup> who found rhinitis as the prevalent allergic disorder in singers. This study<sup>30</sup> also found that rhinitis is one of the

most frequent airway diseases, and that it can affect up to 20% of the general population. The high incidence of respiratory problems may be related to the climate in the region, which is humid subtropical. Humidity, rainfall, and episodes of rapid and wide temperature change are factors that can favor the emergence, and increase the effects, of respiratory diseases. Upper respiratory tract infections are very common in this region due to the climate.<sup>31,32</sup> The climate may have consequences to the general health, therefore, allergic or nasal disorders can trigger subsequent symptoms, such as coughing and throat clearing, which promote vocal fold aggression and alter the vocal quality. Considering that one of the levels of vocal production is respiratory, diseases that affect the respiratory system can have direct effects on the voice, such as difficulty in achieving sharp notes, sonority breaks, and compromised vocal agility.<sup>2,25</sup> Respiratory allergies may be prevalent in females, justified by hormonal influences, more frequent within the young-adult age group<sup>31</sup>; our study found a higher occurrence within the adult female age group (– Tables 1, 2, and 3).

In our study, there was no significant presence of GER in singers; but there was a significant presence of GER in subjects reporting endocrine problems, gastritis, and pharyngitis/tonsillitis. According to the literature, GER is commonly found among singers due to the increase in intra-abdominal pressure used for proper breathing, performance, or stress

**Table 4** Results of the comparative analysis according to age, sex, vocal habits, and health conditions/history as a function of singing style

|                          |                         |        | CLASSICAL | POPULAR | p Value |
|--------------------------|-------------------------|--------|-----------|---------|---------|
| AGE (YEARS OLD)*         |                         | 19–24  | 0         | 19      | 0.244   |
|                          |                         | 25–44  | 4         | 25      |         |
|                          |                         | 45–64  | 1         | 8       |         |
| GENDER                   |                         | Female | 3         | 28      | 1.000   |
|                          |                         | Male   | 2         | 24      |         |
| TOBACCO USE              |                         | No     | 5         | 46      | 1.000   |
|                          |                         | Yes    | 0         | 6       |         |
| ALCOHOL USE              |                         | No     | 4         | 40      | 1.000   |
|                          |                         | Yes    | 1         | 12      |         |
| RESPIRATORY HEALTH ISSUE |                         | No     | 1         | 26      | 0.356   |
|                          |                         | Yes    | 4         | 26      |         |
| GENERAL HEALTH ISSUES    | Endocrine               | No     | 5         | 49      | 1.000   |
|                          |                         | Yes    | 0         | 3       |         |
|                          | Gastritis               | No     | 5         | 49      | 1.000   |
|                          |                         | Yes    | 0         | 3       |         |
|                          | Pharyngitis/Tonsillitis | No     | 5         | 40      | 0.573   |
|                          |                         | Yes    | 0         | 12      |         |
|                          | Gastroesophageal reflux | No     | 4         | 36      | 1.000   |
|                          |                         | Yes    | 1         | 16      |         |

\*Age groups according to Medical Subject Headings<sup>37</sup>: 19 to 24 years old: young adult; 25 to 44 years old: adult; 45 to 64 years old: middle-aged  
Pearson chi-squared test ( $p \leq 0.05$ )

There was a significant use of alcohol in males ( $p = 0.010$ ); among the alcohol users, there was a significant presence of respiratory problems ( $p = 0.046$ ), of pharyngitis/tonsillitis ( $p = 0.003$ ), and of gastroesophageal reflux ( $p = 0.043$ ); there was a significant presence of gastroesophageal reflux in subjects reporting endocrine problems ( $p = 0.023$ ), gastritis ( $p = 0.023$ ), and pharyngitis/tonsillitis ( $p = 0.030$ ).

management. Ingestion of substances such as tobacco, caffeine, alcohol, and high-fat foods also favors the return of gastric contents to the glottic level, causing vocal irritation.<sup>9,20,33</sup> The study by Lloyd et al<sup>34</sup> investigated the relationship between GER symptoms and oropharyngeal pH levels in professional and semiprofessional singers, and found that mild GER was present in 95% of the participants by objective evaluation, although only 75% of the participants had signs of self-reported GER using subjective evaluation. The same occurred in another study,<sup>13</sup> in which among laryngeal alterations, GER was the prevalent pathology in popular singers, with a slight predominance in women<sup>13</sup> (► **Table 1**).

Recently, a bibliographic review<sup>33</sup> assumed that the predominance of GER in female subjects occurs because the majority of the samples is composed of female subjects in studies that correlate singing and pathology. In our study, the difference between genders was not statistically significant. Among alcohol users, there was a significant presence of respiratory problems, of pharyngitis/tonsillitis, and of GER. Among the habits that cause GER, the use of alcohol is the most cited, as it is an agent that favors the production of acid by the stomach. In addition, it can reduce the tonus of the upper and lower esophageal sphincters, causing GER.<sup>9,33</sup> Although cited in the literature, only one study<sup>35</sup> presented

evidences regarding the combination of alcohol use and GER (► **Tables 1, 3, and 4**). We did not find reported in the literature the combination of alcohol use and respiratory problems or pharyngitis/tonsillitis.

We did not find predominance of alcohol use, of respiratory, or of general health issues in the popular singing style. These results disagreed with those of the study by Dassié-Leite et al,<sup>12</sup> in which, among the vocal abuses prevalent in singers, there was lack of hydration, alcohol use, tobacco use, lack of appropriate vocal technique for singing, sleep dysregulation, bad eating habits, exposure to noisy and smoky environments, as well as vocal abuse. Other factors, such as financial instability, stress, and unorganized schedules also seem to affect the vocal health of singers.<sup>12</sup> Other studies<sup>1,12,36</sup> claim that singers often report intensive voice use and allergic attacks (► **Table 4**).

Further studies may include a larger number of classical singers.

## Conclusion

There was a prevalence of adult female popular singers, nonsmokers, nonusers of alcohol, with respiratory problems, mainly rhinitis, and without other health problems. There was a significant use of alcohol in males; among the alcohol

users, there was a significant presence of respiratory problems, of pharyngitis/tonsillitis, and of GER; there was a significant presence of GER in subjects reporting endocrine problems, gastritis, and pharyngitis/tonsillitis.

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#### Conflicts of Interests

The authors have no conflicts of interests to disclose.

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