

# RISK FACTORS FOR VOICE PROBLEMS IN PROFESSIONAL ACTORS AND SINGERS

## DEJAVNIKI TVEGANJA ZA GLASOVNE TEŽAVE PRI POKLICNIH PEVCIH IN IGRALCIH

Nataša PREBIL<sup>1\*</sup>, Irena HOČEVAR BOLTEŽAR<sup>1,2</sup>, Maja ŠEREG BAHAR<sup>1,2</sup>

<sup>1</sup>University Clinical Centre Ljubljana, Department of Otorhinolaryngology and Head and Neck Surgery, Zaloška 2, 1000 Ljubljana, Slovenia

<sup>2</sup>University of Ljubljana, Faculty of Medicine, Vrazov trg 2, 1000 Ljubljana, Slovenia

Received: Apr 16, 2019  
Accepted: Feb 14, 2020

Original scientific article

### ABSTRACT

#### Keywords:

risk factors,  
voice disorders,  
voice quality

**Introduction:** The purpose was to determine the incidence of voice disorders in a group of professional actors and singers, to compare the two groups, and to investigate the potential causes of their voice problems.

**Methods:** 65 actors and 63 singers from professional theatres and choirs were included. The data concerning voice problems, their possible causes, and factors adversely affecting voice quality were obtained through a questionnaire. The results were compared between the groups of professional singers and actors, and between the subgroups of singers and actors both with and without frequent voice problems.

**Results:** The incidence of frequent voice problems over the entire career in singers and actors was lower than reported in the literature. Professional actors displayed more inappropriate life and vocal habits than the singers. Significant risk factors for voice disorders in singers turned out to be loud speech ( $p=0.029$ ) and the presence of allergies or asthma ( $p=0.048$ ). No such significant risk factors were found in actors.

**Conclusion:** The study confirmed the importance of preventive examination of the vocal tract function before enrolling in studies for an elite voice user. Professional singers and especially actors demonstrated insufficient knowledge of proper voice care. The results suggest that elite voice users require additional information on voice hygiene and occasional professional help from college to the end of career. Speech and language therapists can play a crucial role in such voice care in order to effectively prevent voice problems in elite voice users.

### IZVLEČEK

#### Ključne besede:

rizični faktorji,  
glasovne motnje,  
kakovost glasu

**Uvod:** Namen raziskave je bil ugotoviti, kako pogosto se pojavljajo glasovne težave v skupini poklicnih igralcev in pevcev, raziskovali smo tudi potencialne vzroke zanje.

**Metode:** Vključili smo 65 poklicnih igralcev in 63 poklicnih pevcev iz profesionalnih gledališč oziroma pevskih zborov in od njih s pomočjo anonimnega vprašalnika dobili podatke o glasovnih težavah in morebitnih vzrokih zanje. Primerjali smo skupini pevcev in igralcev ter podskupini poklicnih pevcev oziroma igralcev s pogostimi glasovnimi težavami in brez njih.

**Rezultati:** Pojavnost pogostih glasovnih težav v celotni karieri je bila pri pevcih in igralcih nižja kot v drugih podobnih raziskavah. Izkazalo se je, da imajo poklicni igralci pomembno več neprimernih govornih navad ter negativnih dejavnikov za glas kot poklicni pevci. Kot pomembna rizična dejavnika za pogoste glasovne težave sta se pri pevcih izkazala glasen govor ( $p = 0,029$ ) in prisotnost alergij ( $p = 0,048$ ). Pri igralcih nismo našli nobenega pomembnega dejavnika tveganja za glasovne težave.

**Zaključek:** Rezultati raziskave so potrdili pomen preventivnega pregleda funkcije vokalnega trakta pred začetkom študija za poklic elitnega uporabnika glasu. Poklicni pevci in še posebno poklicni igralci so pokazali preslabo poznavanje skrbi za glas. Rezultati raziskave kažejo, da bi tako poklicni pevci kot igralci tudi v času študija in svoje poklicne poti potrebovali dodatne informacije o skrbi za glas ter občasne usmerjene preglede. Prav logoped bi lahko imel ključno vlogo v vseživljenjski skrbi za glas in preprečevanje glasovnih težav pri elitnih glasovnih uporabnikih.

\*Corresponding author: Tel. + 386 31 651 334; E-mail: [natasa.prebil@kclj.si](mailto:natasa.prebil@kclj.si); [prebil.natasa@gmail.com](mailto:prebil.natasa@gmail.com)

## 1 INTRODUCTION

In modern societies, about one third of the labour force works in professions in which one's voice is the primary tool. Voice problems are common throughout the general population, but they are even more common in professions which require prolonged voice use such as talking in surroundings with background noise, situations where there is a great distance between the speaker and the listener, poor room acoustics, a lack of adequate equipment such as voice amplifiers, etc (1).

Professional actors and singers perform a profession that requires a great vocal load and good voice quality at the same time. At work, they expose their vocal tract to various risk factors, which are more likely to cause voice problems. It is to be expected that frequent voice problems can jeopardise their professional careers. Therefore, they are legitimately classified among elite voice users as proposed by Koufman and Isaacson (2).

Singers and actors are among the most frequent visitors of voice clinics. In Boston, it was established that subjects working in arts and entertainment have the greatest relative risk for voice disorders requiring special care in a tertiary laryngological centre among all the patients' occupations (3).

Only a few surveys on the incidence of voice disorders in singers and actors have been performed. A systematic review and meta-analysis was conducted in order to find the incidence of self-reported voice problems in singers. The overall prevalence of self-reported dysphonia in singers was 46.09% (95% confidence interval: 38.16-54.12), with an incidence of 40.53% in classical singers (4).

Goulart and Vilanova conducted a survey in a group of professional actors on the occurrence of voice problems during their everyday vocal load. Thirty-five percent of the included actors reported voice problems, with 16% reporting problems since the beginning of their professional careers (5).

In Slovenia, candidates for the study of classical solo singing and (drama) acting must pass a phoniatic ear, nose and throat examination in order to prove that their vocal tracts are healthy and capable of the great vocal load required for their future occupation. The future actors also have a speech therapist's assessment of both speech and articulation before being accepted into the study programme. Therefore, future professional singers and actors must prove that they have healthy vocal tracts before their enrolment in the study programmes for occupations that involve a great vocal load and demand for high voice quality (6). There have been no studies on the prevalence of voice problems in elite voice users in Slovenia. The purpose of the study was to determine how frequently professional actors and singers report their

voice problems, to compare the two groups in regards to voice problems, and to identify the risk factors for their voice problems.

## 2 METHODS

Only professional actors and singers were included in the study. One hundred and thirty questionnaires were sent to the 5 largest professional theatres in Slovenia and 126 questionnaires to singers in the two largest professional choirs in Ljubljana.

The data on voice problems of professional actors and singers and their possible causes was obtained through this anonymous questionnaire. The questionnaire was similar to the one used for future (dramatic) acting and solo singing students during their phoniatic examinations, which are administered before they can be accepted to their selected study programmes. The questions sought information on age, gender, length of career, daily vocal load, voice rest during voice problems, vocal habits (speaking loudly, shouting frequently and fast speaking rate), factors affecting voice quality (gastroesophageal reflux, frequent throat clearing, allergies and asthma, smoking). All of the questionnaires that were returned were included in the study. In order to establish the prevalence of the voice problems of these elite voice users over different time periods, the professional singers and actors were asked about their voice problems during their studies, over the last year, and throughout their careers. Recurrent voice problems over the entire career with an impact on working ability manifesting more than three times per year were considered "frequent voice problems". They also detailed their opinion of the reasons for their voice problems.

The results of the questionnaires obtained from the professional singers were compared to the results of the professional actors. In order to identify the factors causing voice problems, data on vocal load, vocal habits and certain factors influencing voice quality in a subgroup of singers and actors with frequent voice problems over the entire career was compared to data from those with infrequent or no voice problems.

The data in the completed forms was statistically analysed using the  $\chi^2$  test, the Fisher's exact test, the t-test, and the Mann-Whitney test (in the case of non-normal arrangement of the data) included in the programme package SPSS 20.0 (SPSS Inc., Chicago, USA). All the statistical tests were two-sided and a p-value of 0.05 was considered to be statistically significant.

### 3 RESULTS

Of the 130 questionnaires distributed to professional theatres in Slovenia, a total of 65 (50%) questionnaires were returned. Out of 126 questionnaires sent to professional choirs, we received 63 (50%). Thus, 128 subjects were included in our study: 65 professional actors (27 females, 38 males; mean age 43.03 years; SD 11.93 years) and 63 professional singers (32 females, 31 males; mean age 45.05 years; SD 11.52 years) There were no statistical differences between the singers and the actors regarding age (t-test,  $p=0.557$ ) and gender (Fisher exact test,  $p=0.294$ ).

All included questionnaires were at least 90% completed. Professional actors had worked in their occupation between 1 and 47 years (mean 19.66 years; SD 12.19 years) and professional singers between 1 and 39 years (mean 18.83 years; SD 10.53 years). There were no significant differences between the groups regarding length of career (Mann-Whitney test,  $p=0.679$ ). Professional actors reported from 2 -16 hours of daily vocal load, while singers' daily vocal load ranged from 1 -7 hours.

The great majority of actors and singers had voice problems following the completion of vocal loading tasks while suffering from an upper respiratory tract infection. Thirteen singers and thirteen actors did not specify the cause of their voice problems. All these elite voice users did not report frequent voice problems or reported no problems. The groups did not differ in regards to the incidence of voice problems in any of the periods of their professional life or in the cause of their voice disorders (Table 1).

**Table 1.** Frequency and causes of voice problems in professional singers and actors during their studies, over the last year and over their entire careers. Fisher's exact test and chi-squared test were used for statistical analysis. (URI = upper respiratory tract infection).

Paramater	Professional Singers N=63	Professional Actors N=65	P
Frequent voice problems during their studies	1	1	1.000
Frequent voice problems in the last year	9	5	0.265
Frequent voice problems in their careers	13	8	0.241
Cause of voice problems			
• URI	5	7	0.729
• vocal load	8	6	
• URI + vocal load	37	39	

There were some significant differences between professional actors and professional singers regarding diseases and vocal and other habits influencing voice quality. Professional actors reported speaking loudly more frequently as well as a fast speaking rate, shouting and smoking. At least one inappropriate vocal habit (speaking loudly, fast speaking rate, frequent shouting) was reported in 31 singers and 59 actors (Fisher exact test,  $p=0.000$ ). On the other hand, professional singers more frequently reported typical symptoms of gastroesophageal reflux (heartburn and/or regurgitation) (Table 2).

**Table 2.** Parameters affecting voice quality in professional singers and in professional actors. Fisher's exact test and Mann-Whitney test were used for statistical analysis.

Paramater	Professional Singers N=63	Professional Actors N=65	P
Smoking	11	33	0.000
Symptoms of gastroesophageal reflux	26	15	0.037
Frequent throat clearing	27	33	0.376
Allergies, asthma	19	10	0.058
Speaking loudly	26	57	0.000
Shouting frequently	4	29	0.000
Fast speaking rate	16	44	0.000
Voice rest during voice problems	34	3	0.254
Vocal load / hours per day (mean/standard deviation)	6.25 / 2.44	4.23 / 1.20	0.000
Vocal load during spare time	21	19	0.704

Comparing professional singers with frequent voice problems during their career to those without frequent voice problems revealed significant differences in two parameters. The professional singers with frequent voice problems reported more often loud speech and allergy problems than the singers without frequent voice problems (Table 3).

**Table 3.** Parameters affecting voice quality in professional singers with frequent voice problems in their careers and in professional singers without frequent voice problems. Fisher’s exact test, t-test, and Mann-Whitney test were used for statistical analysis.

Paramater	Professional Singers With Frequent Voice Problems N=13	Professional Singers Without Frequent Voice Problems N=50	P
Age in years (mean / standard deviation)	44.38 / 9.13	45.22 / 12.14	0.818
Length of career in years (mean / standard deviation)	20.00 / 8.82	18.52 / 10.99	0.655
Vocal load in h/day (mean / standard deviation)	4.46 / 1.18	4.16 / 1.21	0.430
Smoking	4	7	0.216
Symptoms of gastroesophageal reflux	8	18	0.216
Frequent throat clearing	7	20	0.531
Allergies, asthma	7	12	0.048
Speaking loudly	9	17	0.029
Shouting frequently	1	3	1.000
Fast speaking rate	6	10	0.075
Vocal load during spare time	6	15	0.329

**Table 4.** Parameters affecting voice quality in professional actors with frequent voice problems in their careers and in professional actors without frequent voice problems. Fisher’s exact test, t-test, and Mann-Whitney test were used for statistical analysis.

Paramater	Professional Actors With Frequent Voice Problems N=8	Professional Actors Without Frequent Voice Problems N=56	P
Age in years (mean / standard deviation)	44.38 / 9.13	45.22 / 12.14	0.818
Length of career in years (mean / standard deviation)	20.00 / 8.82	18.52 / 10.99	0.655
Vocal load in h/day (mean / standard deviation)	4.46 / 1.18	4.16 / 1.21	0.430
Smoking	6	27	0.259
Symptoms of gastroesophageal reflux	2	12	1.000
Frequent throat clearing	5	27	0.708
Allergies, asthma	0	10	0.337
Speaking loudly	7	49	1.000
Shouting frequently	4	25	1.000
Fast speaking rate	4	40	0.244
Vocal load during spare time	2	17	1.000

Comparing the group of professional actors with frequent voice problems (n=8) to the group of professional actors without frequent voice problems (n=56) did not offer up any particular differences (Table 4). One of the actors did not provide an answer about frequent voice problems.

#### 4 DISCUSSION

Professional actors and singers depend on their voices to pursue their profession. They need healthy vocal tracts with great endurance to manage the great vocal load at work. In Slovenia, only such candidates are enrolled in study programmes as elite vocal users. In the phoniatic examination performed prior to their acceptance (solo singing or drama acting), they must demonstrate both normal anatomy and function in their vocal tract (6). In the event that they report vocal and life style habits that may jeopardize their voice quality over the course of their careers, they receive information on proper voice care. They are also informed of the fact that maintaining harmful habits and an improper life style during their careers can lead to serious voice problems and can even endanger their career in the long run.

Our study did not reveal frequent voice problems in a considerable section of the included professional singers and actors. Only 12.3% of actors and 20.6% of singers admitted having recurrent voice problems that prevent their performance more than three times per year in their career. The data from the literature shows voice problems occurring more often than in our research, although the study design was not exactly the same in other studies. Goulart and Vilanova reported 35% of the actors included in their study with voice problems in the daily voice load. In 16% of actors, the problems started even at the beginning of their careers (5). In classical choir singers or professional opera choristers, self-reported voice problems were detected in 38% - 43.59% (7, 8). We suppose that one of the important reasons behind the small percentage of professional actors and singers with voice problems in our study is the preventive phoniatic examination and, in the case of future actors, also the speech therapist's assessment before enrolment in the study of drama acting or solo singing in Slovenia. Consequently, only one actor and one singer from our study had frequent voice problems during their study period and also later in his/her career. On the other hand, at the time of their study, the vocal load was not as extensive as later on in their careers, therefore voice problems become more evident after one starts working in an occupation with great vocal load. It is possible that other studies included singers and actors who did not conclude a proper professional study programme, and did not have to demonstrate having a healthy and well-functioning vocal tract. The data for this assumption are lacking in the literature.

Another piece of evidence for the correct selection of candidates as future actors is the fact that only 12.5% of actors had frequent voice problems in their careers in spite of the fact that half of them were smokers, and almost all of them had improper voice habits. There were no significant differences between the singers and the actors regarding frequent voice problems in their

educational period, in the last year, and over their entire career. On the contrary, the actors' daily vocal load was significantly greater than the vocal load of the singers.

Another reason for the small percentage of singers with frequent recurrent voice problems in our study could be their style of singing, and proper education. In a group of 100 healthy singers, Koufman et al tried to find out whether factors such as gender, professional or amateur singing, and style of singing influence vocal muscles' tension. The lowest incidence of excessive muscle tension was observed in professional singers, singers with formal singing education, and in singers of classical opera or choir singing (9). The singers in our study were members of two professional choirs with a classical singing repertoire. A formal education in singing training is a necessity for employment in a professional choir. Pestana et al. reported in his meta-analysis that the overall prevalence of self-reported dysphonia in singers was 46.09%, with an incidence of 40.53% in classical singers. In their systematic review and meta-analysis, the authors stressed a considerable heterogeneity of the reviewed studies including lacking data on the professional education of the participants of the study (4).

The unhealthy vocal and other behaviour noticed among elite voice users in our study is worrying because it can result in benign vocal fold lesions (10). The presence of inappropriate speech habits in almost all included actors (90.8%) is understandable, since their work often requires loud speech, fast talking, crying, shouting, singing and dancing at the same time (11). The nature of the work of professional choir singers does not demand other harmful speech habits but voice overload is possible. Nevertheless, professional singers expressed inappropriate speaking habits at a rate of almost 50%. Speaking loudly was also one of the risk factors for frequent voice disorders during their career of professional singer. On the other hand, other studies do not report such a high incidence of voice abuse as ours. One of the published voice profile analyses of 16 solo singers revealed voice abuse only in 6% (12). It is possible that one of the reasons for our unfavourable results about considering proper voice care is a lack of information on vocal hygiene during the career. Candidates for elite vocal performers receive information on possible improper vocal and lifestyle habits that can influence their voice quality and their careers only at the time of phoniatic examination before being accepted into the academy. Later on, during their studies, they have courses on singing techniques, rhetoric issues and performing, but no lectures on the physiology of phonation, voice disorders, voice care and vocal hygiene. We suppose that supplementing a curriculum for solo singers and actors with such information would be beneficial for the voice health of these elite vocal performers.

The professional singers in our study reported typical symptoms of gastroesophageal reflux more often than the actors. We can find the results of frequent gastroesophageal reflux in singers in the literature (13-15). Even in recent papers, opera singers and solo singers reported heartburn, regurgitation, coughing and hoarseness more often than the controls (16). The reason is probably the increased intraabdominal pressure during singing which causes the retrograde flow of gastric content up the oesophagus to the level of the larynx and pharynx (17). The occupation of a professional singer or actor combines a lifestyle with working late, inappropriate nutritional habits, late meals in the evening or even at night and a lot of stress. All these are risk factors that influence acid reflux. It is also possible that professional singers report LPR more often because of their need for a high voice quality and are more watchful in terms of voice changes (18). In any event, allergy and asthma, but not gastroesophageal reflux, were found to be risk factors for frequent voice problems in singers. Professional singers should be aware of a possible negative influence of these diseases on their voice quality, and should seek early medical help when having such health problems.

In the group of professional actors, we need to highlight the problem of smoking, as almost half of them reported smoking. Other studies also proved smoking to be a problem in the majority of actors (19, 20). Another research study showed that the percentage of improper habits (smoking, late meals in the evening, vocal abuse), regardless of voice education and getting information about voice hygiene, remains high (21). Smoking is not as frequent among singers as among actors, as was also shown in our study (17% of singers are smokers). Among Broadway musical theatre performers, tobacco use was reported by only 10.4% of them (22). The low percentage of smokers among singers was found also in a study of Timmerman (12).

Professional singers more often considered voice rest during voice problems (54%) than professional actors (46%). It is possible that they are more sensitive to the quality of their voices because, in singing, even a slight alteration of the voice can influence one's performance capabilities. On the other hand, there are some reports of more abusive voice use during hoarseness in singers as well. A study by Boominathan showed that only 22% of singers considered voice rest during voice problems (23).

A person having a voice problem or getting over an acute respiratory infection, should reduce voice load to avoid the development of a functional voice disorder (24). Even though professional singers and actors are aware of the necessity for voice rest during voice problems, they cannot always fully consider it due to the nature of their work. The results of our study showed that a great majority of the participants had voice problems following

the completion of vocal loading tasks while suffering from a respiratory infection.

In order to further reduce inappropriate lifestyle issues, improper habits and speech abuse, the managers of theatres and professional choirs should organize occasional workshops for their employees, where they will be able to renew their knowledge of the anatomy and functioning of the vocal tract, the causes of voice problems and methods of preventing problems. Such knowledge can help them to avoid the occurrence of voice disorders. In this area of lifelong education for elite voice users, the speech therapist can play a very important role, not only with information on the influence of harmful factors on the voice, but also with practical instructions for the most rational voice use and the correct method of phonation and modulation of phonation when performing and talking.

## 5 LIMITATIONS OF THE STUDY

One of the limitations of the study is the subjective perception of voice problems reported in the questionnaire. In the case of additional phoniatric and speech pathologist examination of the included professional singers and actors, a better insight would be given into the actual state of the voice apparatus of elite voice users in Slovenia.

On the basis of the questionnaire used we did not obtain information about the exact time of appearance of voice problems. Therefore we cannot exclude the possibility that ageing of the voice or hormonal problems influenced voice quality in the participants.

Another limitation of the study is the small number of participants. In the evaluation of this factor, it should be noted that there are only a few professional choirs and only eleven professional theatres in Slovenia.

## 6 CONCLUSION

The present study among elite voice users in Slovenia

confirmed the importance of preventive examinations before enrolment in the study of drama acting and solo singing. According to the results, professional actors and singers have insufficient knowledge or disrespect of proper voice care. Worse voice behaviour was demonstrated by actors, whose percentage of inappropriate speech and smoking habits was far too high for a representative of elite voice users. Speaking loudly and having an allergy or asthma proved to be risk factors for frequent voice problems in professional singers. Professional singers and actors should have additional information on the risk factors that impair their voice quality as well as occasional phoniatric or speech and language therapist examinations.

Speech and language therapists can play a crucial role in lifelong learning and monitoring elite voice users, thereby effectively preventing voice problems that might render them unable to pursue their profession.

## CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

## FUNDING

The study was financed through the tertiary research project of the University Medical Centre Ljubljana No. 20150104 Incidence of voice problems in professional singers and actors.

## ETHICAL APPROVAL

This study was approved by the Republic of Slovenia National Medical Ethics Committee (document No. 0120-334/2015-2).

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