

EFFECT OF LABOR CONDITIONS ON QUALITY OF LIFE AND DEGREE OF DYSPHONIA AMONG TEACHERS. HYGIENIC REQUIREMENTS TO THEIR PREVENTION


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The purpose of our research was to provide a general hygienic assessment of an effect produced by labor conditions on quality of life dependent on the prevalence rate of parameters that form the voice pathology, and to develop prevention recommendations. The interrelation between objective complaints and diagnosed voice pathologies was examined. 224 teachers aged ≥ 38 y. o. who participated in the study were selected based on subjective complaints and objective data. Two examined groups of teachers were formed during the preliminary survey. The first control group consisted of 30 healthy non-smoking men and 70 women. The second group included 26 men and 98 women with different voice disorders. 79% of those surveyed had voice disorders (dysphonia), and 28% had aphonia, which occurred in those surveyed 2–5 times during the academic year. Over 70% of teachers from the second group lost their voice strength, 61% complained of periodically occurring hoarse and husky voice, one third (32%) had dry cough, every fourth person (24%) complained of decreased voice pitch. The extraordinary majority of teachers (77%) associated their voice distortion with a great professional vocal load. Remote results obtained at six months after the therapeutic and preventive course of Homeovox in teachers of higher educational institutions with a voice pathology significantly confirmed life quality improvement.

Key words: voice pathology, teachers, survey, hygienic assessment of working conditions, prevention

Compliance with ethical standards: the study was approved by the Local Ethics Committee of Pirogov Russian National Research Medical University (Protocol No. 159 as of November 21, 2016). Informed consent was obtained for every participant. The conducted study carries no risk to the participants and corresponds to the requirements of biomedical ethics.

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ВЛИЯНИЕ УСЛОВИЙ ТРУДА НА КАЧЕСТВО ЖИЗНИ И СТЕПЕНЬ ДИСФОНИИ У ПЕДАГОГОВ. ГИГИЕНИЧЕСКИЕ РЕКОМЕНДАЦИИ ПО ИХ ПРОФИЛАКТИКЕ


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Целью нашего исследования было дать обобщенную гигиеническую оценку влияния условий труда на качество жизни, обусловленное уровнем распространенности параметров, формирующих патологии голоса, а также разработать рекомендации по их профилактике. Исследовались взаимосвязь наличия объективных жалоб, диагностированных патологий голоса. На основе субъективных жалоб и объективных данных о диагностированных патологиях голоса были отобраны 224 педагога в возрасте ≥ 38 лет, принявшие участие в исследовании. Предварительный опрос респондентов сформировал две обследуемые группы педагогов. Первую — контрольную, состоящую из здоровых некурящих 30 мужчин и 70 женщин. Вторая группа состояла из 26 мужчин и 98 женщин с различными заболеваниями голосового аппарата. В процессе опроса 79% респондентов группы отмечали нарушения голоса (дисфонию), а 28% — его полную афонию, возникающие у опрашиваемых от 2 до 5 раз в течение учебного года. Более 70% педагогов второй группы отмечали потерю силы голоса, 61% жаловались на периодически возникающий осиплый, охриплый голос, треть (32%) — на сухой кашель, каждый четвертый (24%) — на недостаточную высоту голоса. Подавляющее большинство педагогов (77%) связывали искажение голоса с большой профессиональной голосовой нагрузкой. Отдаленные результаты, полученные через шесть месяцев после проведенного курса лечебно-профилактического использования препарата «Гомеовокс» у педагогов высших учебных заведений с наличием патологии голоса, достоверно свидетельствовали об улучшении КЖ.

Ключевые слова: патология голоса, педагоги, опрос, гигиеническая оценка условий труда, профилактика

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A human voice does not only express personified information, social status, personal traits and emotional state of an individual, but is also a socially significant instrument of communication including upbringing and education which is playing an important role in daily domestic and labor life of a human. Voice disturbances belong to a frequent pathology in professional voice users.

Based on literature data, about 60% of teachers, 6–24% of adolescents during voice mutation and 41% of people with

speech problems suffer from voice disturbances. In its turn, voice disturbances prevent healthy development of speech and communication, worsen mental health, restrict career choices [1–5].

Mechanical forcing of voice, loud speech during the process of teaching should be selected among the reasons leading to the pathology of the larynx and vocal cords. Unfavorable factors that influence the larynx include physical factors such as cold or hot dry air, taking icy drinks, general hypothermia.

The voice can become hoarse, with altered tone, voice pitch and strength due to smoking, alcohol intake, excessive use of hot and very cold or very spicy food. However, the most frequent reasons of voice disorders are infectious inflammation of the larynx and vocal cords resulting in laryngitis, pharyngitis, tonsillitis, etc.

Benign and malignant tumors leading to fatigue, voice hoarseness, throat irritation and pain occupy a certain place in the structure of laryngeal pathological conditions [6–12].

Diseases of the vocal apparatus decrease the working capacity, and create the risk of professional impropriety in some cases.

Significant speech loads demand higher standards of the vocal apparatus. This makes it necessary to develop preventive measures to preserve a healthy voice and search for the ways of its restoration in case of disturbance [13–18].

The research purpose was to estimate the LQ by the rate of dysphonia in teachers of higher educational institutions considering the load on the vocal apparatus that forms the class of labor conditions.

MATERIALS AND METHODS

The research was conducted from 2020 to 2021 in a number of some higher educational institutions of Moscow. 224 teachers aged 38 and elder were preliminary surveyed to find dysphonia of different degrees (vocalization disturbance) when the quality and functional adequacy of voice is violated (pitch, strength, tone, hoarseness, huskiness, etc.) until aphonia was developed or those with objective medical data about diagnosed nosologies of voice pathology [9, 19].

VHI-10 (Voice Handicap Index) was used to assess acoustic vocal characteristics and life quality (LQ) in teachers. The questions of VHI-10 questionnaire are based on the subjective acoustic analysis of questionnaire-based study of vocal function certain disturbances. Every one of the three VHI-10 questionnaires included 10 questions corresponding to one of the three dysphonia aspects: F (Functional); P (Physical); E (Emotional).

For each of 10 questions, the surveyed one selected the most suitable answer evaluated based on five-point score (0–4): 'never' — 0 points; 'almost never' — 1 point; 'occasionally' — 2 points; 'almost always' — 3; 'always' — 4 points. Thus, the common result could be as follows: minimum (0 points and above) or maximum (up to 120 points). Considering the number of obtained points, three rates of dysphonia were distinguished such as mild (up to 30 points); moderate (from 31 to 60 points); and severe (from 61 to 120 points) [20].

Hygienic assessment of labor severity and intensity considering the load on the vocal apparatus due to labor activity of teachers was done based on provisions of Guidance R 2.2.2006–05 'Hygienic classification of labor taking into account the values of harm and danger'. Optimal work (class 1) (judged by labor intensity) meant that the load on the vocal apparatus due to labor activity was less than 16 hours per week. Acceptable work (class 2) by labor intensity meant that the load on the voice apparatus was less than 20 hours. Judged by labor intensity, work can also be harmful (class 3 degree 1) with load on the vocal apparatus of 20 to 25 hours per week and harmful (class 3 degree 2) with load on the vocal apparatus of over 25 hours per week.

Hygienic assessment of microclimate for workplace environment (classrooms and lecture halls) was performed based on academic environment measured parameters and comparison with sanitary standards and norms of SanPiN

1.2.3685–21 'Hygienic standards and requirements to safety and (or) harmlessness of habitat factors for a human being'.

Treatment-and-prophylactic course aimed at preservation or restoration of a healthy voice included the use of Homeovox recommended by experts of the Ministry of Health of the Russian Federation [7].

Statistical data processing was done with widely acceptable methods handed using IBM PC, MS Excel and Statistica 6.0. During mathematical processing of research results the methods of parametric statistics were utilized. To estimate statistically significant differences, Student's t-test was applied.

In international and Russian practice, voice handicap index (VHI-10) developed by B. Jacobson et al. (1997) was used to study the intensity of vocal disturbances and life quality (LQ) in dysphonia. According to recommendations of the questionnaire's authors, the intensity of vocal disturbances was determined using the aggregate of points (VHI aggregate) consisting of three categories of dysphonia reasons: P (Physical), F (Functional), and E (Emotional).

When the sum exceeds 60 points, the LQ index corresponds to severe dysphonia, when the sum is 30–60 points, the LQ level determined a moderate voice disturbance, when the sum was less than 30 points, the LQ index corresponded to mild dysphonia. VHI values typical of professional voice adult users in Russia presented in literature sources are very limited. However, it's reliably known that VHI values for adults have no gender differences [21]. Careful interrogation enabled pooled collection of 224 respondents and formation of two examined groups of teachers. The first control group consisted of 30 male and 70 female healthy non-smokers. At baseline, they had no acute oropharyngeal diseases (pharyngitis, tonsillitis), pharyngeal and laryngeal abnormalities, and exacerbations of chronic inflammatory diseases of internal organs. The second group consisted of 26 men and 98 women with various diseases of the vocal apparatus. During the review, 79% of those surveyed had a voice disorder (dysphonia), whereas 28% of them lost their voice completely (aphonia) 2 to 5 times during an academic year. Over 70% of teachers from the second group lost the strength of the voice, 61% complained of periodically occurring hoarse and husky voice, one third part (32%) of patients complained of dry cough, every fourth patient (24%) had an insufficient voice pitch.

In teachers, such voice disturbances lasted from several minutes or hours to several days and weeks. The majority of teachers (77%) believed there was an association between voice distortion and professional vocal load. The patients usually had medical conclusions that confirmed the results of a complex examination (traditional instrumental examination of ENT-organs) to detect the presence of pathological abnormalities in the larynx. 20% of them reported chronic laryngitis or laryngotracheitis.

RESEARCH RESULTS AND THEIR DISCUSSION

Results of the conducted comparative analysis of LQ assessment for those surveyed from the control group and group of teachers with a voice pathology by the beginning of the academic year in higher educational institutions are presented in table 1.

The conducted studies showed a significant difference ($p < 0.05$) for all examined parameters of dysphonia reasons characterizing the LQ of those surveyed from the control group and from the group with a voice pathology presented in VHI-10 questionnaire.

On the contrary, the results of LQ comparative assessment in teachers from the control group demonstrated no significant

difference for all the examined parameters of dysphonia reasons and aggregate VHI considering the labor process severity and intensity at four months after the beginning of an academic process at higher institutions presented in table 2 ($p > 0.05$).

A more significant difference for all the examined parameters of dysphonia reasons and VHI aggregate was established at 4 months based on LQ comparative assessment results in teachers with a voice pathology depending on labor class (see table 3). However, no significant differences were found in this group as well for any studied parameter of VHI questionnaire ($p > 0.05$). It is interesting to note that the leading parameter with the largest value in the group of teachers with a voice pathology was represented by the value associated with physical disturbances (P) caused by dysphonia.

Considering the known data demonstrating that the majority of professional voice users with a durative vocal load who didn't

undergo therapeutic and preventive activities have an abnormally intensified voice distortion, we suggested the following activities aimed at restoration of vocal function in teachers.

For this purpose, every one of the four groups of teachers with different classes of labor intensity who suffered from a voice pathology was divided into two parts. This resulted in formation of two groups with 62 teachers each. Every group consisted of four subgroups: 9 people for an optimal class; 14 people for an acceptable class; 19 people for a harmful class (class 3 degree 1) and 20 people for a harmful class (class 3 degree 2). Considering the recommendations of experts from the Russian Association of Phoniatriests and Phonopaedists and Association of ENT Specialists, one group (62 people) received Homeovox for treatment and prevention purposes (two tablets 5 times a day or more for 6 days) depending on the severity of the voice apparatus lesion.

Table 1. Aggregate results of life quality comparative assessment in those surveyed from the control group and a group of teachers with a voice pathology by the beginning of the academic year ($M \pm m$), points

Parameters of VHI dysphonia reasons	LQ assessment among groups of those surveyed		
	control ($n = 100$)	Teachers with a voice pathology ($n = 124$)	p
physical P	5.8 ± 0.27	27.4 ± 0.85	< 0.05
functional F	3.8 ± 0.19	22.7 ± 0.68	< 0.05
emotional E	2.3 ± 0.19	13.7 ± 0.59	< 0.05
VHI aggregate	11.9 ± 0.63	63.8 ± 2.0	< 0.05

Table 2. Life quality comparative assessment results in teachers from the control group considering the severity and intensity of a labor process at four months from the beginning of the academic process at a higher institution ($M \pm m$), points

Parameters of VHI dysphonia reasons	LQ assessment among teachers of the control group depending on a labor class			
	Optimal (class 1) ($n = 16$)	Acceptable (class 2) ($n = 18$)	Harmful (class 3 degree 1) ($n = 28$)	Harmful (class 3 degree 2) ($n = 38$)
physical P	4.8 ± 0.5	5.3 ± 0.6	6.4 ± 0.4	6.9 ± 0.4
functional F	3.3 ± 0.3	3.7 ± 0.5	3.8 ± 0.2	4.7 ± 0.2
emotional E	1.4 ± 0.4	1.8 ± 0.3	2.3 ± 0.2	2.7 ± 0.2
VHI aggregate	9.5 ± 1.1	10.8 ± 1.3	12.5 ± 0.8	14.3 ± 0.9

Table 3. Life quality comparative assessment results in teachers with a voice pathology considering the labor process severity and intensity at four months from the beginning of the academic process at a higher institution ($M \pm m$), points

Parameters of VHI dysphonia reasons	LQ assessment among teachers with a voice pathology depending on a labor class			
	Optimal (class 1) ($n = 18$)	Acceptable (class 2) ($n = 28$)	Harmful (class 3 degree 1) ($n = 38$)	Harmful (class 3 degree 2) ($n = 40$)
physical P	20.8 ± 1.6	26.6 ± 1.4	31.6 ± 1.4	36.7 ± 1.5
functional F	16.7 ± 1.0	17.7 ± 1.0	21.9 ± 1.5	22.8 ± 1.3
emotional E	11.9 ± 0.5	11.9 ± 0.8	18.9 ± 1.2	18.7 ± 1.3
VHI aggregate	49.4 ± 3.1	56.2 ± 3.2	72.4 ± 3.8	78.2 ± 4.1

Table 4. Life quality comparative assessment results in teachers with a voice pathology considering the labor process severity and intensity at six months after the therapeutic and preventive effect of Homeovox ($M \pm m$), points

Parameters of VHI dysphonia reasons in subgroups of those who received Homeovox (numerator) and those who didn't receive Homeovox (denominator)	LQ assessment among teachers with a voice pathology depending on the class of labor intensity after therapeutic and preventive effect (numerator) and without such an effect (denominator)			
	Optimal (class 1) ($n = 9$; $n = 9$)	Acceptable (class 2) ($n = 14$; $n = 14$)	Harmful (class 3 degree 1) ($n = 19$; $n = 19$)	Harmful (class 3 degree 2) ($n = 20$; $n = 20$)
physical P	$10.4 \pm 1.3^*$ 22.6 ± 2.5	$12.3 \pm 1.3^*$ 27.6 ± 1.7	$17.8 \pm 1.3^*$ 36.6 ± 1.7	$18.5 \pm 1.5^*$ 39.6 ± 2.1
functional F	$7.6 \pm 0.7^*$ 17.8 ± 1.3	$8.5 \pm 0.9^*$ 18.6 ± 1.7	$11.3 \pm 1.0^*$ 23.7 ± 1.9	$12.7 \pm 1.2^*$ 24.9 ± 1.4
emotional E	$4.2 \pm 0.4^*$ 12.2 ± 0.6	$4.8 \pm 0.5^*$ 12.8 ± 0.6	$6.4 \pm 0.6^*$ 19.8 ± 1.0	$6.6 \pm 0.5^*$ 20.6 ± 1.2
VHI aggregate	$22.2 \pm 2.4^*$ 52.6 ± 2.4	$25.6 \pm 2.6^*$ 59.0 ± 2.5	$35.5 \pm 2.9^*$ 80.1 ± 2.6	$38.1 \pm 3.1^*$ 85.1 ± 2.7

Note: * significant result $p < 0.05$.

Assessment results of VHI-10 values obtained at six months after the therapeutic and preventive effect of Homeovox on the subgroups of teachers with a voice pathology are presented in table 4.

The presented results of life quality comparative assessment in subgroups of teachers with a voice pathology demonstrate its stable effectiveness considering the rate of labor process severity and intensity at six months after the therapeutic and preventive effect of Homeovox and in those who didn't receive the medicinal agent. Thus, life quality comparative assessment with VHI-10 questionnaire shows a significant difference ($p < 0.05$) for all the examined parameters of dysphonia reasons, including VHI aggregate, in teachers with a voice pathology who took Homeovox in all labor class subgroups at 6 months.

Similar positive results were previously obtained by way of comparative assessment of life quality with VHI-10 questionnaire when examining effectiveness of the course of a therapeutic and preventive effect aimed at preservation of a healthy voice or its restoration in case of inflammatory abnormal processes in the nasopharynx. The course included sevenfold irrigation with 0.05% chlorhexidine bigluconate aqueous solution every alternate day and subsequent lubrication with Lugol's solution.

The use of VHI-10 questionnaire is currently widely applied in foreign practice not only for LQ research in voice disorders, but also to determine the effectiveness of new methods of dysphonia prevention and treatment [22–30].

At the same time, Homeovox has a number of significant advantages consisting in high effectiveness irrespective of dysphonia reasons, as well accelerated and stable restoration of a professional vocal function.

CONCLUSIONS

1. Based on VHI-10 questionnaire result assessment, by the beginning of the academic year, teachers of higher educational institutions with a voice pathology had significantly worse LQ values ($p < 0.05$) for all dysphonia reason parameters (P, F, E), including VHI aggregate, as compared with healthy teachers.
2. According to VHI-10, labor process severity and intensity produced no significant effect on dysphonia reason parameters (P, F, E) that characterized LQ of teachers without a voice pathology. Similar, more pronounced, but insignificant results were obtained in the examination of the effect produced by labor conditions of different classes on LQ of teachers with the vocal apparatus pathology.
3. According to VHI-10, remote results obtained at six months after the course of therapeutic and preventive use of Homeovox in teachers of higher educational institutions with a voice pathology significantly ($p < 0.05$) demonstrated LQ improvement for all parameters that characterized both dysphonia reasons (P, F, E), and VHI aggregate parameters.

References

1. Vasilenko Yu S. Golos. Foniatricheskie aspekty. Infopoligraf. 2013; 390 s. Russian.
2. Pal'chuna VT, redaktor. Natsional'noe rukovodstvo. Otorinolaringologiya. Geotar-Media. 2016; 800 s. Russian.
3. Osipenko EV. Opyt ispol'zovaniya komp'yuternogo spektral'nogo analiza v obsledovanii lits s narusheniyami golosa. Novosti otorinolaringologii. 2002; 3 (31): 42–44. Russian.
4. Pavlikhin OG, Meshcherkin AP. Diagnosticheskoe znachenie komp'yuternogo spektral'nogo analiza golosa u vokalistov. Sb. nauch. tr. I mezhdunar. mezhdistsip. kongressa «Golos». 2007; 252 s. Russian.
5. Pleshkov IV, Anikeeva ZI. Zabolevanie golosovogo apparata u vokalistov i predstaviteley rechevykh professiy. 2003; 166 s. Russian.
6. Berbon X, Kashke O. Bolezni ukha, gorla i nosa: per. s angl. 2-e izd. M.: MEDpress-inform. 2016; 549–590. Russian.
7. Radtsig EYu, Varavkina MA, Radtsig AN, Angelkova VV. Narusheniya golosa ulits gosorechevykh professiy: prichiny i sposoby korrektsii. Farmateka. 2018; 8 (361): 79–83. Russian.
8. Stepanova YuE, Koren' EE, Gotovyakhina TV. Kliniko-diagnosticheskiy algoritm raboty vracha-otorinolaringologa s professionalami golosa. Rossiyskaya otorinolaringologiya. 2019; (98); 116–123. Russian.
9. Rapoport IK, Milushkina OYu. Rekomendatsii po profilaktike i lecheniyu narusheniy golosa pri bol'shikh professional'nykh nagruzkakh na gosorechevoy apparat. Metodicheskie rekomendatsii. M., 2021; 30. Russian.
10. Svistushkin VM, Starostina SV, Avetisyan EYe. Changes in the acoustic characteristics of the voice after conservative and surgical treatment of chronic tonsillitis. The New Armenian Medical Journal. 2017; 11(3): 43–56.
11. Zagólski O, Stręk P, Gajda M. Adult tonsillectomy: anatomical differences affect postoperative transient hypernasality. Folia Phoniatri Logop. 2014; 66: 95–99.
12. Vahabzadeh-Hagh AM, Zhang Z, Chhetri DK. Hirano's cover-body model and its unique laryngeal postures revisited. Laryngoscope. 2018; 128(6): 1412–1418.
13. Svistushkin VM, Starostina SV, Rakunova EB, Ereemeeva LV, Avetisyan EE. Nauchnye i klinicheskie issledovaniya v oblasti laringologii i foniatрии na kafedre bolezney ukha, gorla i nosa Pervogo MGIMU imeni IM Sechenova: preemstvennost' pokoleniy. Sechenovskiy vestnik. 2016; 4(26): 25–30. Russian.
14. Starostina SV, Avetisyan EE. Izmenenie akusticheskikh kharakteristik golosa posle tonzillektomii. Materialy V Peterburgskogo foruma otorinolaringologov Rossii. 2016; 345 s. Russian.
15. Avetisyan EE, Gordeev LS. Vliyaniye khronicheskogo vospaleniya nebnnykh mindalin i tonzillektomii na akusticheskie parametry golosa. Elektronnoe nauchnoe izdanie Al'manakh «Prostranstvo i Vremya». 2017; 15(1). URL: <https://cyberleninka.ru/article/n/vliyaniye-hronicheskogo-vospaleniya-nyobnyh-mindalin-tonzillektomii-na-akusticheskie-parametry-golosa>; Russian.
16. Starostina SV, Avetisyan EE, Borisov OV, Shebunina AB. Funktsional'noe sostoyaniye gortani i ego dinamika na fone konservativnogo lecheniya patsientov vokal'no-rechevykh professiy s khronicheskimi tonzillitami. Meditsinskiy sovet. 2018; 8: 58–62. Russian.
17. Svistushkin VM, Starostina SV, Avetisyan EE. Funktsional'noe sostoyaniye gortani u patsientov s khronicheskimi tonzillitami (analiticheskiy obzor). Folia Otorhinolaryngologiae et Pathologiae Respiratoriae (Zhurnal otorinolaringologii i respiratornoy patologii). 2018; 24 (1): 13–24. Russian.
18. Fomina MV. Profilaktika i lechenie narusheniy golosa u lits gosorechevykh professiy: Metodicheskie ukazaniya. Orenburg. 2004; 19. Russian.
19. Belyakova MV. Profilaktika narusheniy golosa u lits gosorechevykh professiy. Nauchnyy aspekt. 2020; 10 (2): 1296–1304. Russian.
20. Jacobson BH, Johnson A, Grywalski C, et al. The Voice Handicap Index (VHI): development and validation. Am J Speech Lang Pathol. 1997; 6: 66–70. Russian.
21. Filatova EA. Kachestvo zhizni pri narusheniyakh golosa u vzroslykh. Rossiyskaya otorinolaringologiya. 2012; 1 (56): 174–178. Russian.
22. Verdonck-de-Leeuw VaM et al. Ildation of the Voice Handicap Index by assessing equivalence of European translations. Folia Phoniatri. 2008; 60 (4): 173–178.
23. Rosen CA, et al. Voice Handicap Index change following treatment of voice disorders. J Voice. 2000; 14 (4): 619–623.

24. Schuster M et al. Voice handicap of laryngectomees with tracheoesophageal speech. *Folia Phoniatri Logop.* 2004; 56 (1): 62–67.
25. Batalla FN, et al. Voice quality after endoscopic laser surgery and radiotherapy for early glottic cancer: objective measurements emphasizing the Voice Handicap Index. *Eur Arch Otorhinolaryngol.* 2008; 265: 543–548.
26. van Lierde KM, et al. Long-term outcome of hyperfunctional voice disorders based on a multiparameter approach. *J Voice.* 2007; 21 (2): 179–188.
27. Maertens K, de Jong F I. The voice handicap index as a tool for assessment of the biopsychosocial impact of voice problems. *B-ENT.* 2007; 3 (3): 7.
28. Woisard V, et al. The Voice Handicap Index: correlation between subjective patient response and quantitative assessment of voice. *J Voice.* 2007; 21 (5): 623–631.
29. Jacobson B, et al. The voice handicap index: Development and validation. *Am J of Speech-Language Pathology.* 1997; 6 (3): 66–70.
30. Kasama ST, Brasolotto AG. Vocal perception and quality of life. *Pró-Fono Revista de Atualização.* 2007; 19 (1): 19–28.

Литература

1. Василенко Ю. С. Голос. Фоноатрические аспекты. Инфополиграф. 2013; 390 с.
2. Пальчуна В. Т., редактор. Национальное руководство. Оториноларингология. Гэотар-Медиа. 2016; 800 с.
3. Осипенко Е. В. Опыт использования компьютерного спектрального анализа в обследовании лиц с нарушениями голоса. *Новости оторинолар. и логопатол.* 2002; 3 (31): 42–44.
4. Павлихин О. Г., Мещеркин А. П. Диагностическое значение компьютерного спектрального анализа голоса у вокалистов. Сб. науч. тр. I междунар. междисциплинар. конгресса «Голос». 2007; 252 с.
5. Плешков И. В., Аникеева З. И. Заболевания голосового аппарата у вокалистов и представителей речевых профессий. 2003; 166 с.
6. Бербом Х., Кашке О. Болезни уха, горла и носа: пер. с англ. 2-е изд. М.: МЕДпресс-информ. 2016; 549–590 с.
7. Радциг Е. Ю., Варавкина М. А., Радциг А. Н., Ангелкова В. В. Нарушения голоса у лиц голосоречевых профессий: причины и способы коррекции. *Фарматека.* 2018; 8 (361): 79–83.
8. Степанова Ю. Е., Корень Е. Е., Готовыхина Т. В. Клинико-диагностический алгоритм работы врача-оториноларинголога с профессионалами голоса. *Российская оториноларингология.* 2019; 1 (98): 116–123.
9. Рапопорт И. К., Милушкина О. Ю. Рекомендации по профилактике и лечению нарушений голоса при больших профессиональных нагрузках на голосоречевой аппарат. *Методические рекомендации.* М. 2021; 30 с.
10. Svistushkin VM, Starostina SV, Avetisyan EYe. Changes in the acoustic characteristics of the voice after conservative and surgical treatment of chronic tonsillitis. *The New Armenian Medical Journal.* 2017; 11(3): 43–56.
11. Zagólski O, Stręk P, Gajda M. Adult tonsillectomy: anatomical differences affect postoperative transient hypernasality. *Folia Phoniatri Logop.* 2014; 66: 95–99.
12. Vahabzadeh-Hagh AM, Zhang Z, Chhetri DK. Hirano's cover-body model and its unique laryngeal postures revisited. *Laryngoscope.* 2018; 128(6): 1412–1418.
13. Свиштушкин В. М., Старостина С. В., Ракунова Е. Б., Еремеева Л. В., Аветисян Э. Е. Научные и клинические исследования в области ларингологии и фоноатрии на кафедре болезней уха, горла и носа Первого МГМУ имени И. М. Сеченова: преемственность поколений. *Сеченовский вестник.* 2016; 4(26): 25–30.
14. Старостина С. В., Аветисян Э. Е. Изменение акустических характеристик голоса после тонзиллэктомии. *Материалы V Петербургского форума оториноларингологов России.* 2016; 345 с.
15. Аветисян Э. Е., Гордеев Л. С. Влияние хронического воспаления небных миндалин и тонзиллэктомии на акустические параметры голоса. *Электронное научное издание Альманах «Пространство и Время».* 2017;15:(1) URL: <https://cyberleninka.ru/article/n/vliyanie-hronicheskogo-vospaleniya-nyobnyh-mindalini-tonzillektomii-na-akusticheskie-parametry-golosa>
16. Старостина С. В., Аветисян Э. Е., Борисов О. В., Шебунина А. Б. Функциональное состояние гортани и его динамика на фоне консервативного лечения пациентов вокально-речевых профессий с хроническим тонзиллитом. *Медицинский совет.* 2018; 8: 58–62.
17. Свиштушкин В. М., Старостина С. В., Аветисян Э. Е. Функциональное состояние гортани у пациентов с хроническим тонзиллитом (аналитический обзор). *Folia Otorhinolaryngologiae et Pathologiae Respiratoriae (Журнал оториноларингологии и респираторной патологии).* 2018; 24 (1): 13–24.
18. Фомина М. В. Профилактика и лечение нарушений голоса у лиц голосоречевых профессий: Методические указания. Оренбург. 2004; 19 с.
19. Белякова М. В. Профилактика нарушений голоса у лиц голосоречевых профессий. *Научный аспект.* 2020; 10 (2): 1296–1304.
20. Jacobson BH, Johnson A, Grywalski C, et al. The Voice Handicap Index (VHI): development and validation. *Am J Speech Lang Pathol.* 1997; 6: 66–70.
21. Филатова Е. А. Качество жизни при нарушениях голоса у взрослых. *Российская оториноларингология.* 2012; 1 (56): 174–178.
22. Verdonck-de-Leeuw VaM, et al. Validation of the Voice Handicap Index by assessing equivalence of European translations. *Folia Phoniatri.* 2008; 60 (4): 173–178.
23. Rosen CA, et al. Voice Handicap Index change following treatment of voice disorders. *J Voice.* 2000; 14 (4): 619–623.
24. Schuster M, et al. Voice handicap of laryngectomees with tracheoesophageal speech. *Folia Phoniatri Logop.* 2004; 56 (1): 62–67.
25. Batalla FN, et al. Voice quality after endoscopic laser surgery and radiotherapy for early glottic cancer: objective measurements emphasizing the Voice Handicap Index. *Eur Arch Otorhinolaryngol.* 2008; 265: 543–548.
26. Van Lierde KM, et al. Long-term outcome of hyperfunctional voice disorders based on a multiparameter approach. *J Voice.* 2007; 21 (2): 179–188.
27. Maertens K, de Jong FI. The voice handicap index as a tool for assessment of the biopsychosocial impact of voice problems. *B-ENT.* 2007; 3 (3): 7.
28. Woisard V, et al. The Voice Handicap Index: correlation between subjective patient response and quantitative assessment of voice. *J Voice.* 2007; 21 (5): 623–631.
29. Jacobson B, et al. The voice handicap index: Development and validation. *Am J of Speech-Language Pathology.* 1997; 6 (3): 66–70.
30. Kasama ST, Brasolotto AG. Vocal perception and quality of life. *Pró-Fono Revista de Atualização.* 2007; 19 (1): 19–28.