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Prevention of functional disorders of the voice organ in the context of the specific work of an elementary education teacher

Profilaktyka zaburzeń czynnościowych narządu głosu w kontekście specyfiki pracy nauczyciela edukacji elementarnej

Abstract

Aim. The human voice, both spoken (oral) and sung (vocal), plays a key role in interpersonal communication and the transmission of artistic expression. In the work of an early childhood education and preschool teacher, the spoken voice is a tool that influences, among other things, the effectiveness of the message, classroom management, and the building of teacher-student relationships. The singing voice, on the other hand, is used for presenting songs, singing with the class, as well as games and exercises in which the teacher presents single phrases or entire songs with the vocal voice. The purpose of the paper is to present a subject literature review and analysis of a sample study indicating the relationship between the incidence of occupational diseases and disorders of the vocal appa-

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ratus, and the specialty represented by the teachers studied. The aim of the study is also to present the influence of the application of voice hygiene and correct emission exercises on the prevention of functional disorders of the voice organ.

Methods and materials. The method of data collection was a search of sources on the topic of prevention of functional disorders of the voice organ in the context of the specific work of an elementary education teacher. The article analysed the literature of Polish scholars and referred to the international literature.

Results and conclusion. The analysis of the literature on the subject shows that the consolidation of the teacher's knowledge of the conditions for correct voice emission and systematic breathing, phonation, and articulation, exercises are necessary for the development of good phonation habits, which determine the decrease in the incidence of chronic occupational diseases. In the didactic activity of teachers, prophylactic interactions in the field of voice hygiene will also play an important role, minimizing the risk of the buildup of health problems and the occurrence of dangerous diseases, including cancers in the vocal tract.

Keywords: voice emission, voice hygiene, early childhood education and preschool teacher, prevention of functional disorders of the voice organ.

Abstrakt

Cel. Głos ludzki, zarówno mówiony (oralny), jak i śpiewany (wokalny), odgrywa kluczową rolę w komunikacji międzyludzkiej oraz w przekazie ekspresji artystycznej. W pracy nauczyciela edukacji wczesnoszkolnej i wychowania przedszkolnego głos mówiony jest narzędziem, które wpływa m.in. na efektywność przekazu, zarządzanie klasą oraz budowanie relacji nauczyciela z uczniami. Głos śpiewany natomiast jest wykorzystywany do prezentowania piosenek, śpiewu z klasą oraz zabaw i ćwiczeń, w których nauczyciel prezentuje głosem wokalnym pojedyncze frazy czy całe utwory. Celem artykułu było przedstawienie przeglądu literaturowego oraz analizy badań wycinkowych wskazujących na zależność pomiędzy występowaniem chorób zawodowych i zaburzeń w obrębie aparatu głosowego a specjalnością, jaką reprezentują badani nauczyciele, a także zaprezentowanie wpływu zastosowania higieny głosu oraz poprawnych ćwiczeń emisyjnych na zapobieganie zaburzeniom czynnościowym narządu głosu.

Metody i materiały. Metodę zbierania danych stanowiło przeszukiwanie źródeł dotyczących tematu profilaktyki zaburzeń czynnościowych narządu głosu w kontekście specyfiki pracy nauczyciela edukacji elementarnej. W artykule przeanalizowano literaturę polskich uczonych oraz odniesiono się do literatury światowej.

Wyniki i wnioski. Analiza literatury przedmiotu wykazała, że ugruntowanie przez nauczyciela wiedzy na temat warunków poprawnej emisji głosu oraz systematyczne ćwiczenia oddechowe, fonacyjne i artykulacyjne są konieczne do wypracowania dobrych

nawyków fonacyjnych, które determinują spadek zapadalności na przewlekłe choroby zawodowe. W aktywności dydaktycznej nauczycieli istotną rolę odgrywać będą również oddziaływania profilaktyczne w zakresie higieny głosu, minimalizujące ryzyko nawarstwiania się problemów zdrowotnych i wystąpienia groźnych chorób z nowotworami w obrębie narządu głosu włącznie.

Słowa kluczowe: emisja głosu, higiena głosu, nauczyciel edukacji wczesnoszkolnej i wychowania przedszkolnego, profilaktyka zaburzeń czynnościowych narządu głosu.

Introduction

The human voice, both spoken (oral) and sung (vocal), plays a crucial role in interpersonal communication and the transmission of artistic expression. In the work of the early childhood education and preschool teacher, the spoken voice is a tool that influences, among other things, the effectiveness of knowledge transfer, classroom management, and the building of teacher-pupil relationships. Appropriate use of the voice (modulation, change of timbre, ability to change the volume of speech, etc.) can increase students' involvement in the learning process and facilitate their understanding of the material being conveyed, as well as support the teacher in the process of teaching and building his or her authority. In the process of teaching music at the elementary education level, the teacher also makes use of the vocal voice, which, according to researchers, is an extension of the oral voice, and the differences marked between speech and singing, according to some scholars, are only quantitative and concern particular sound characteristics related to the acoustics of the voice, such as: "[...] pitch, intensity, duration and timbre" (Pawłowski, 2008, p. 8). Other researchers also mention qualitative differences, emphasising that during singing, a voice scale with a significantly higher ambitus is used, its intensity is also higher, and the exhalation phase of the singer is prolonged. An important aspect of singing voice emission is also the fuller use of resonance, which makes the voice clear, carrying and good-sounding (Radwańska, 2014; Majzner, 2016). The voice of the early childhood education and preschool teacher should therefore be "placed"* both in speaking and singing, because abnormalities in phonation, also vocal, can generate disorders within the vocal apparatus. The prerequisite for correct vocal posture is first and foremost the correct functioning of the vocal and auditory organs, good

* Voice impostation - correct voice posture is the involvement of all means, aimed at achieving maximum action of the organs involved in voice emission. Voice impostation aims to achieve natural emission, to expand the vocal scale, to increase the strength of the voice, to develop its timbre (Tarasiewicz, 2003).

psychophysical condition and the interaction of the respiratory, phonatory, articulatory and resonant apparatuses (Majzner, 2016). In practice, teachers mostly show interest in issues of correct voice emission and voice hygiene only after they have experienced voice failure due to various types of pathologies. A substrate for this behaviour may be the fact that discomfort when speaking, or a change in the timbre of the teacher's voice, does not always affect the teacher's inability to teach. Prophylactic negligence, specific working conditions of the teacher, non-compliance with the rules of voice hygiene and lack of independent work on speech and singing technique may influence the appearance of chronic pathological conditions within the speech apparatus and constitute a factor causing the risk of occupational disease.

Risk factors for the voice organ in the context of the specific work of an elementary education teacher

In *Foniatria kliniczna* [Clinical phoniatrics] (1992), Antoni Pruszewicz presents the results of the work of a committee of European Union experts, who classified occupations according to the demands placed on the voice organ. The first category they identified are occupations requiring a special quality of voice, e.g. singers, actors, radio and television announcers. The second category is occupations that place significant demands on the voice, such as teachers and professional speakers, which include, for example, politicians. The third category identified by the experts is occupations requiring a higher than-average vocal capacity and occupations in noisy environments, such as lawyers, judges, doctors and salespeople.

The voice demands placed on teachers are mainly due to significant voice strain and other factors that adversely affect the performance of their vocal apparatus. Zygmunt Pawłowski (2008) counts among them: excessive number of pupils in the classroom, poor acoustic conditions and inadequate temperature and humidity of school rooms, inhalation of chalk dust, speaking at high volume in changing atmospheric conditions during physical education lessons and in a room with noise. The scholar also touches on the subject of teachers singing in the wrong ambitus of voice for them, which is a significant and growing problem. An unadopted voice scale of the singing teacher (who does not show natural vocal ability) can cause what is known as "clenching" during singing, which results from the singing teacher's failure to control the subcutaneous air pressure produced during the phonation of higher notes. A. Pruszewicz (1992) specifies etiological risk factors predisposing to the development of occupational voice disorders, dividing them into internal factors, including changes in the central and autonomic nervous system, body structure, age, hearing and vocal tract condition, hormonal factors, disposition, emotional behaviour and ability to es-

tablish contacts. On the other hand, external factors include years of employment, gaps in professional and pedagogical qualifications, teaching specialisation, working conditions, habits and addictions, upper respiratory tract conditions, serious general illnesses, hypersensitivity of the mucous membrane to mechanical and chemical agents, predisposition to swelling and intraepithelial bleeding, life conflicts, rhythm of life and work, nervousness, overload and exhaustion.

Therefore, when considering the choice of teaching profession, one should also take into account the vocal conditions available to us. Mariola Śliwińska-Kowalska categorises suitable voice conditions as:

- [...] a properly developed vocal organ and the absence of anatomical developmental defects;
- absence of chronic lesions of the vocal tract, pharynx and nasal cavity, including, but not limited to: chronic dry and atrophic inflammation of the mucous membranes of the upper respiratory tract, defects causing impaired nasal patency, defects causing respiratory insufficiency, allergies manifested by impaired nasal patency, disorders of the use of resonators;
- a voice scale within the normal range for an untrained human voice;
- efficient respiratory system;
- correct respiratory-phonatory coordination;
- correct phonation time;
- established stereotype of correct articulation and good diction;
- normal hearing (Śliwińska-Kowalska, Niebudek-Bogusz, 2009, p. 6).

A candidate for the teaching profession should also consider whether they have any contraindications to voice work, which Andrzej Obrębowski and Antoni Pruszewicz (1996) divide into contraindications:

1. relative: recurrent respiratory tract infections, inflammation of the palatal tonsils and unilateral deafness;
2. absolute: retrobulbar laryngeal nerve palsy, laryngeal papillomas, vocal fold nodules and polyps, advanced inflammatory lesions of the airways, severe allergic conditions, palatopharyngeal insufficiency, and moderate to profound hearing loss.

Significant voice strain for teachers defines the prevalence of disorders related to the speech apparatus in this profession, as confirmed by studies conducted in Poland (Śliwińska-Kowalska, Fiszer, Niebudek-Bogusz, Kotyło, & Rzadzińska, 2000; Szeszenia-Dąbrowska, Wilczyńska, & Sobala, 2014) and worldwide (Bermudez de Alvear, Baron, & Martinez-Arquero, 2011). In 2023, 353 cases of chronic voice diseases were registered in the Central Register of Occupational Diseases in Poland, which

ranks third among all occupational diseases in Poland. It should be emphasised that, compared to 2022, when 309 cases were recorded, the incidence increased by 44 cases. In the education section, 361 occupational diseases were noted, among which chronic vocal organ diseases caused by excessive voice exertion predominated (347 cases, representing 96.1% of this group). Among all chronic diseases of the vocal tract in Poland, the largest number of recorded cases (227) was laryngeal intrinsic muscle paresis with glottal phonation and permanent dysphonia. Second, in terms of numbers are secondary hypertrophic changes of the vocal folds (113 cases), and third is hard voice nodules (13 cases) (Świątkowska, Hanke, 2023).

The incidence of both vocal disorders and related occupational diseases depends, in the case of teachers, on the speciality they represent. According to Iwona Polak (1990), teachers of preschool education are most likely to suffer from occupational diseases of the vocal tract, while Ewa Gacka and Alicja Wypych (2005) and Mirosław Kisiel (2020) emphasise the impact of working conditions for teachers of early childhood education and pre-school education, such as noise, work in a gym, corridor, in the open air, and the specificity of work, i.e., speaking and singing with a high volume of voice, on experiencing increased disorders of the speech apparatus. This is confirmed by research, in which complaints such as coughing, hoarseness and voicelessness were more frequently reported by elementary education teachers (Jałowska, 2012).

Research also indicates that problems with the functioning of the vocal apparatus are noted from the second year of working in the teaching profession, which is caused, among other things, by the emergence of a significant vocal load and the failure of future teachers to develop correct emission habits to cope with the vocal demands placed on them. The next increase in the incidence occurs in the tenth year of service, when significant voice strain is noted due to excessive vocal effort and untreated, underestimated diseases in the vocal tract. Another increase is recorded after 20 years of service, and scholars associate it with menopause and a general weakening of the body in women, which, combined with the feminisation of the teaching profession, has an impact on the overall number of illnesses (Rzepa, 2010).

Prevention of vocal disorders in the teaching profession

The teaching profession, especially in early childhood education and preschool education, places considerable demands and specific conditions on the vocal apparatus. Even meeting these, however, does not guarantee freedom from occupational illnesses. The most important preventive measure in the context in question is to work on voice technique and to follow the rules of voice hygiene (Preciado, Perez, Calzada, & Preciado, 2005; Lee, Lao, & Yu, 2010). Scholars show that teachers lack adequate knowledge

of the functioning of the vocal apparatus and its hygiene, as well as the principles of correct voice emission (Behlau, Oliveira, 2009; Sosulska, Sambor, & Jekiełek, 2021). They also draw attention to the need for constant work on voice technique (Dobinson, Kendrick, 1993), emphasising that only focusing on aspects of hygiene is insufficient and does not lead to an improvement in the spoken and singing voice in the technical aspect (Śliwińska-Kowalska, Fiszer et al., 2000). Failure to make an effort in this aspect results already in the initial period of intensive voice work in voice disorders that require support, rehabilitation and even a decision to change the profession (Kataryńczuk-Mania, 2020). Ewa Niebudek-Bogusz and Mariola Śliwińska-Kowalska (2013) estimate that up to 40% of teachers are forced to stop working in their profession due to voice problems.

Working on correct voice emission is a key element in preventing problems related to the speech apparatus, such as dysphonia, vocal nodules (singing nodules), vocal fold paresis, as well as hypertrophic changes and many others. The effectiveness of work on spoken and singing voice emission is conditioned by the setting of goals that should accompany the teacher's voice training, which include the following:

- Cognitive goal: acquiring knowledge of the structure of the vocal apparatus, physiological phenomena related to voice formation, its emission, disorders, reception, and hygiene.
- Educational goal: mastering the skill of correctly handling the voice, and its positioning and acquiring natural habits of phonation, articulation, and diction.
- Pedagogic goal: to develop a certain model of behaviour based on the care and promotion of the euphonic voice, care for correct pronunciation and the purity of the Polish language, and to consolidate pro-healthy attitudes in the field of voice hygiene.
- Preventive goal: to raise awareness of the need to care for the voice, to develop the habit and ability to work on one's voice and to keep it functioning in a good condition.
- Rehabilitation goal: recognition and removal of voice disorders, application of methods effective in the correction of voice emission and return to optimal voice functioning (Kisiel, 2012, pp. 217–218).

Work on correct vocal emission includes, e.g., supplementing or acquiring theoretical knowledge about the functioning of the vocal apparatus and voice hygiene. Another element that cannot be omitted is the correction of posture, analysed by Christian Elssner (1994), who claims that it has a significant impact on the sound produced, its freedom, quality and timbre. The most important aspect leading to the preservation of correct vocal emission by the teacher is the formation of correct habits of breathing, phonation and articulation, as well as correct vocal stance. The basic

element conditioning correct vocal emission is also a form of dynamic breathing – respiratory support (Italian: *appoggio*), which Aleksandra Mitrinowicz-Modrzejewska (1963) defines as a conscious slowing down of the respiratory phase using controlled tension in the respiratory muscles. With it, the scientist determines the prolongation of the expiratory phase through the simultaneous action of antagonistic muscles – inspiratory and expiratory, pointing out that achieving strength and flexibility in the respiratory muscles prevents functional voice disorders. The process of correct respiratory support is conditioned by the use of an appropriate type (track) of breathing. Bogumiła Tarasiewicz (2003) distinguishes four types of breathing depending on the activity of the respiratory muscles:

1. peak (clavicular-rib) – the work of the upper rib muscles and sternal muscles predominates. This respiratory type is unfavourable (defective) for phonation in both speech and singing;
2. pectoral (ribcage) – the work of the lower rib muscles predominates. During this track, the ribs rise upwards, while when the muscle contraction stops – they fall and exhalation takes place. This type of breathing is also incorrect for phonation in speech and singing;
3. abdominal (diaphragmatic) – diaphragmatic work predominates. During this track, the chest enlarges and the diaphragmatic work is made visible by the movements of the abdomen. When the abdominal muscles contract, the diaphragm relaxes and returns to its original position. This type of breathing is also not correct for phonation;
4. rib-abdominal (rib-diaphragm-abdominal, total) – all respiratory muscles are involved, making the chest as large as possible. This type of breathing is best for phonation in both speech and singing.

Barbara Bielaczyc (2005) emphasises that:

> [...] without the ability to breathe holistically, involving the abdominal and diaphragm muscles, it is impossible to relax the pharyngeal and laryngeal muscles during exercise. This relaxation is necessary to activate the entire epiglottis, the resonant spaces that give the voice the right timbre and power (p. 68).

The correlation between breathing and the correct position of the larynx is also demonstrated by Monica Thomasson and Jahan Sundberg (2001), who emphasise that the movements of the abdominal muscles imply the position of the larynx, and Jenna Iwarsson (2001), who associates the lowering of the diaphragm during inspiration with a lowering of the position of the larynx, noting that its position depends on respiratory support.

It should be mentioned, however, that during the initial period of breathwork, it is advisable to maintain natural breathing reflexes, and to start learning to breathe with short phrases, gradually building up to a fully efficient breath (Elssner, 1993, 1996). C. Elssner refers to Franziska Martienssen-Lohmann, who states: "The development of respiratory power is a process that starts with small sound combinations (consonants and vowels) with a small amount of breathing and leads very gradually to full respiratory capacity" (Elssner, 1993, p. 109).

Correct respiratory support and the associated position of the larynx will have a fundamental effect on the function of the vocal folds, which generate the so-called "laryngeal sound," which is later amplified in the resonators (Tarasiewicz, 2003). The correct functioning of the vocal cords will be determined by the teacher's use of the correct vocal stance during vocal and oral phonation, known as the soft attack on sound. It is the most physiological, allowing the vocal folds to be not too tightly closed and to vibrate freely (Majzner, 2013). As Hervé Pata (2009) emphasises: "The ideal laryngeal behaviour occurs during a mild attack, as this is when synchronisation takes place between the increase in subcricoid pressure and the shortening of the vocal cords" (p. 153).

Another important aspect of the teacher's correct vocal emission is articulation, which involves transforming the sounds produced during phonation in the larynx into intelligible speech by changing the shape of the articulatory organs. Correct articulation is a guarantee of good sound impostation through conscious control of the position of the articulated sounds (Danel, 2014). The basis of articulation is the consonant, which is the carrier of the vowel; it is the consonant that brings it into the correct position and resonance. The vowel, in turn: "[...] plays a sound-forming role in the word, giving it strength, support, volume and brilliance. On the vowel rests the whole impostation, i.e., the setting of the voice, and for this reason the vowel is the reflection and test of correct emission" (Sobierajska, 1972, p. 74). Scholars point out that disorders or abnormalities in the articulatory apparatus can negatively affect vocal emission in speech and singing (Haniszewska, Kazmierczak, 2019).

A second important preventive measure in the context of the incidence of occupational diseases among early childhood education and preschool teachers is maintaining a voice in proper hygiene, which is defined as the influence of the environment on human health and human reactions and attitudes towards this influence. By maintaining hygiene, scholars understand raising the level of knowledge in the context of the scope in question, organisation of the workplace, prevention of diseases, implementation of preventive measures and rehabilitation methods (Rokitianska, Laskowska, 2003).

External factors prevailing in the workplace of an early childhood education and preschool teacher significantly influence the maintenance of his/her voice hygiene. These

include the size of the room and the possibility of ventilating it, the temperature and humidity of the air, and the number of students participating in the lesson. The teacher's voice is negatively affected by inadequate acoustics in the rooms where lessons are held. The use of a sound system and the soundproofing of over-acoustic rooms can have a positive effect on voice hygiene in this subject.

An important aspect of voice hygiene is the prevention of upper respiratory tract infections and laryngeal infections, and undertaking treatment when these occur, as their complications can be a contributor to long-term occupational illness. Another of the contexts of voice hygiene is the performance of medical check-ups in laryngological, phoniatric or otolaryngological examinations. The essence of these examinations is to detect diseases in their early stages when symptoms have not yet appeared. The appearance of symptoms such as hoarseness, a change in the timbre of the voice, a decrease or increase in the pitch of the oral voice, and a feeling of obstruction in the throat that is prolonged should be a reason to visit a specialist (Walencik-Topiłko, 2012). During infections, especially laryngitis, professional use of the voice by the teacher is unacceptable, and the consequence of not doing so may lead to glottis insufficiency.

The impact of early childhood education teachers' dietary habits on their voice emission has also been demonstrated. Eating habits imply the way the vocal apparatus functions, and poor diet and the intake of stimulants can lead to temporary voice insufficiency. The consequence of anti-healthy behaviours can be the development of cancers, also within the vocal apparatus (Majzner, 2020).

Conclusion

A review of the literature and an analysis of case-control studies aimed to demonstrate that the incidence of vocal disorders and related occupational diseases depends, in the case of teachers, on the speciality they represent. Vocal requirements and conditions, as well as risk factors and contraindications for work in an occupation involving considerable vocal effort, were presented, and the relationship between the use of breathing, emission and articulation exercises and the application of principles of voice hygiene and prevention of functional disorders of the vocal tract among early childhood education and pre-school teachers was shown.

The considerable voice requirements and conditions placed on the voice organ of early childhood education and preschool teachers are often not met in practice already when choosing this profession. The teacher's knowledge of the conditions for correct voice emission and systematic breathing, phonation and articulation exercises are necessary to develop the best possible phonation habits, which will result

in a decrease in the incidence of chronic occupational diseases. Prophylactic voice hygiene measures will also play an important role in the teaching activity of teachers, minimising the risk of the accumulation of health problems and the onset of serious diseases, including tumours in the vocal tract.

Awareness of the importance of prophylaxis in voice work in the context of its correct emission and hygiene will determine the early childhood education and preschool teacher's ability to have a free voice with a wide range with the possibility of changing its intensity, correct articulation and intonation both in speech and singing. This will improve the teacher's communication with the students and will also influence good didactics, classroom management and the building of the teacher's authority. It will also allow for the correct presentation of songs to pupils, singing with the class and numerous games and exercises in which the teacher presents phrases or whole songs with the vocal voice. As Lidia Kataryńczuk-Mania (2016) points out:

> Voice competence, like the well-being of the whole organism, should be cared for constantly. [...] The issue of awareness of the importance of voice care among teachers calls for in-depth empirical studies, theoretical and practical research, the development of effective preventive programmes, organisation of more workshops, and seminars on voice emission (p. 176).

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