

# Epidemiology of Voice Disorders in Latvian School Teachers

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**Summary: Objectives.** The prevalence of voice disorders in the teacher population in Latvia has not been studied so far and this is the first epidemiological study whose goal is to investigate the prevalence of voice disorders and their risk factors in this professional group.

**Methods.** A wide cross-sectional study using stratified sampling methodology was implemented in the general education schools of Latvia. The self-administered voice risk factor questionnaire and the Voice Handicap Index were completed by 522 teachers. Two teachers groups were formed: the voice disorders group which included 235 teachers with actual voice problems or problems during the last 9 months; and the control group which included 174 teachers without voice disorders.

**Results.** Sixty-six percent of teachers gave a positive answer to the following question: Have you ever had problems with your voice? Voice problems are more often found in female than male teachers (68.2% vs 48.8%). Music teachers suffer from voice disorders more often than teachers of other subjects. Eighty-two percent of teachers first faced voice problems in their professional carrier. The odds of voice disorders increase if the following risk factors exist: extra vocal load, shouting, throat clearing, neglecting of personal health, background noise, chronic illnesses of the upper respiratory tract, allergy, job dissatisfaction, and regular stress in the working place.

**Conclusions.** The study findings indicated a high risk of voice disorders among Latvian teachers. The study confirmed data concerning the multifactorial etiology of voice disorders.

**Key Words:** Voice disorders—Teachers—Epidemiology—Prevalence—Risk factors.

The teaching profession is vocally demanding, and consequently voice disorders are a common problem in this profession. Teachers have a higher risk for occupation-related voice disorders than the general population. The prevalence of voice disorders in teachers during their lifetime is 57.7% compared with non-teachers, where the lifetime prevalence is 28.8%.<sup>1</sup> More than half of teachers report voice problems during their career.<sup>2</sup>

Objective and subjective methods are used in the study of voice disorders' epidemiology: questionnaires/interviews, instrumental assessment, auditory perceptual assessment of voice function, and acoustic measurements. In addition, different time periods of interest are discussed in these studies: point prevalence, year prevalence, and career prevalence or lifetime prevalence. In different studies, the number of participants varies from several hundreds up to more than three thousand. These factors explain the heterogeneity and wide range of voice disorder prevalence data (from 9% up to 69%) in teachers' populations. The point prevalence of voice disorders in teachers ranges from 9% to 57% (9% in Smith et al, 11% in Roy et al, 11.6% in Behlau et al, 13% in Lyberg Ahlander et al, 37% in Thomas et al, and 57% in Preciado-Lopez et al).<sup>1,3-7</sup> The year prevalence of voice problems in school teachers ranges from 15% to 41% (15% in De Medeiros et al, 34% in De Jong et al, and 41% in Preciado-López et al).<sup>2,7,8</sup> The lifetime prevalence of voice disorders in teachers is high, with more than 50% of teachers reporting having

experienced voice problems at some point during their lifetime (58% in Roy et al, 59% in Bermúdez de Alvear et al, 63% in Behlau et al, and 69% in Sliwinska-Kowalska et al).<sup>1,4,9,10,11</sup>

Teachers have a higher perception of voice handicap than non-teachers.<sup>12,13</sup> In teachers with voice disorders, the total Voice Handicap Index (VHI) score was higher than in teachers without voice disorders.<sup>6,14</sup>

Voice problems accompany teachers throughout their lifetime. Eighteen percent of teachers have had episodes of dysphonia during their infancy, adolescence, puberty, and first years of adulthood.<sup>7</sup> A recent study concerning the prevalence of voice problems among student teachers showed that more than 20% had a voice disorder.<sup>15</sup> Also, De Jong et al reported that more than 12% of teachers had experienced voice problems during their training.<sup>2</sup> On the other hand, the prevalence of voice problems increases with age. Voice problems are more frequent in teachers over 50 years old.<sup>16</sup> Usually, teachers' professional careers are long, and there may be a cumulative effect of vocal use and tissue injury that, when combined with biological aging factors, is likely to contribute to significant adverse effects over time in predisposed individuals.<sup>1</sup> The number of teaching years reinforces voice problems.<sup>17</sup> Mattiske et al indicated that voice disorders are most often observed in experienced teachers with long years of service.<sup>18</sup>

Music and sports teachers have a higher risk of voice disorders.<sup>19-22</sup> Also, chemistry teachers are at significantly greater risk of having voice disorders.<sup>3,19</sup> Irritants in the classroom are among the environmental factors in the development of voice complaints.<sup>14</sup>

Women working in the teaching profession compared with their male counterparts have a higher prevalence of voice disorders (46.3% vs 36.9% in Roy et al; 38% vs 26% in Smith et al; 22% vs 12.9% in Russel et al; and 46% vs 30% in Smolander and Huttunen).<sup>1,3,16,23</sup>

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A voice disorder is a multidimensional phenomenon that can be considered from the perspective of a cause as well as its consequences. The causes of voice disorders are multifactorial.<sup>18,24</sup> Voice overloading,<sup>7,8,10</sup> neglect of voice ergonomics,<sup>23</sup> inappropriate room acoustics<sup>7,14,25</sup> and air quality,<sup>6,10,25,26</sup> stress,<sup>14</sup> and health problems<sup>1,6,7,10,11,27,28</sup> are main groups of risk factors promoting occupational voice disorders in the teaching profession. Sometimes a voice disorder may have a single, very powerful etiologic factor, yet in most cases the cause may be found in a number of harmful factors.<sup>18</sup> Most often, teachers have functional voice disorders conditioned by continuous, loud speaking in stressful situations, in classrooms where the physical environment (acoustics, air quality) is very disadvantageous for the voice.<sup>29</sup> Sala et al pointed out that when seeking for risk factors of voice disorders, one should be familiar with the type of work and how the subject is performing it, as well as how she or he is using voice while working.<sup>30</sup>

Latvia is one of the Baltic countries and has about two million inhabitants. Twenty-three thousand teachers, most of them are women (88%), are working in schools. The mean teacher work load is 21–30 lessons per week and 6 lessons per day. The teacher-centered approach dominates in Latvian teachers' work practice, as the main methods used are lectures, discussions, and questions and answers. Teachers prefer frontal instructions instead of group work and individual consultations in their daily practice. The mean number of pupils in the class is 25; however, rural school classes have a smaller number of pupils. A course in voice ergonomics is not included in the curricula of teachers' education programs, and teachers' general knowledge about voice is unsatisfactory.

The objectives of our study were to investigate the prevalence of voice disorders in the teachers' population of Latvia and to identify factors affecting teachers' voice quality.

## METHODS

A wide cross-sectional study using stratified sampling methodology was organized in the general education schools of Latvia. Strata correspond to the five geographic regions of Latvia, urbanization (urban and rural schools), as well as to the school type (primary and secondary schools). Twenty-four schools (650 teachers) were selected according to stratified categories. All teachers of every selected school were asked to complete the questionnaire in order to ensure representativeness in all teaching subjects, genders, and ages, and to avoid self-selection bias. The response ratio was 87.9%, of which 522 questionnaires or 80.3% were acknowledged as valid, and the respondents of these questionnaires were included in the study sample. The representatives of school administration and librarians were excluded from the study because their everyday duties did not include teaching lessons; furthermore, incomplete or inaccurate questionnaires were excluded.

All teachers filled out the standardized Voice Risk Factor Questionnaire,<sup>31</sup> where all items were grouped into five sections—(1) voice problems prevalence and onset, (2) vocal load and voice use habits, (3) environmental risk factors, (4) medical risk factors, and (5) psychosocial risk factors—as well as the section of demographic data. The questionnaire consisted of 37 items. Additionally, all respondents were requested to fill in the VHI Latvian version.

The study had two stages. The objective of the first stage was to investigate the prevalence of voice disorders in the teachers' population of Latvia and the relationship of voice disorders with age, gender, and teaching subjects. The analysis of obtained data was based on demographic information and on subjects' responses to two questions from the Voice Risk Factor Questionnaire: "Have you ever had problems with your voice?" with possible responses—*yes/no*, and "Are you suffering from voice problems?" with possible response options—*at present, during the last nine months, during the teaching career*. Before filling in the questionnaires, the respondents were introduced to the concept of voice problems within the purpose of this study: "we consider a voice problem to be any time your voice does not work, perform, or sound as you feel it normally should, so that it interferes with your communication."<sup>1</sup>

Five hundred twenty-two teachers (479 women, 43 men) participated in the first stage of the study. The mean age was 43.9 years (standard deviation [SD] = 10.04 years, range: 21–74 years), and the mean age of teaching career was 20.45 years (SD = 10.28 years, range: 1–53 years). One hundred six (20.3%) of all participants were smokers. The distribution of the teachers according to the teaching subject was as follows: 22.8% taught all subjects in elementary school, 30.5% language teachers, 2.7% chemistry teachers, 6.3% sports teachers, 3.4% visual art teachers, 5.2% music teachers, and 29.1% teachers of other subjects (mathematics, biology, informatics, physics, geography, history, etc). Prior studies have indicated that chemistry teachers have a higher risk of developing a voice disorder, and because of this chemistry teachers were singled out as a particular subgroup.

The second stage of the study was devoted to finding out the risk factors affecting teachers' voices and therefore their responses concerning vocal load and voice use habits, as well as analyzing the environmental, medical, and psychosocial risk factors. According to the analysis of the data acquired from the voice problems prevalence and onset section of the questionnaire, two groups of teachers were formed. The voice disorder group included teachers who had voice problems at the time of questionnaire completion or have had voice problems during the last 9 months (ie, they had actual voice problems or problems during the preceding school year). Two hundred thirty-five teachers with a mean age of 44 years (SD = 10 years) and mean number of 20 years of teaching (SD = 10 years), as well as 54 (23%) smokers, were included in the voice disorder group. The control group included teachers who had never had any voice problems. There were 174 teachers in this group with a mean age of 42 years (SD = 10 years) and mean number of 19 years of teaching (SD = 10 years), and 32 (18.4%) were smokers. Teachers who responded that they have had voice problems at some point during their teaching career but did not have current voice problems or during the last 9 months were excluded from the second stage of the study because they were not able to give reliable answers about risk factors that impacted their voices for over 1 year. A well-defined recall period was adopted, which should not exceed 12 months in order to avoid recall bias.<sup>32</sup> It has been found that replies about a voice problem are affected by the respondent's recall especially in the case of self-report.<sup>33</sup>

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