Voice Disorders and Impact of Voice Handicap in Norwegian Student Teachers

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Summary: Objectives: The primary objectives of the present study were to determine the prevalence of voice disorders in students studying to become elementary school teachers and to investigate the presence of potential risk factors for voice disorders. The amount of voice training offered during the students' education and the connection between voice disorders were also explored.

Method: A web-based questionnaire was distributed to all elementary school student teachers throughout Norway. In total, 968 answers were received. The questionnaire consisted of questions on background, education, and risk factors; the Norwegian translation of the Voice Handicap Index (VHI-30(N)); and voice symptoms (Screen6).

Results: The results showed that 14.1% of the students had voice disorders, defined as experiencing two or more voice symptoms weekly or more often in Screen6. The most common symptoms were throat clearing, followed by strained or tired voice and sensation of pain or lump in the throat. The data showed a significant association between the scores of VHI-30(N) and results of Screen6. The amount of voice training within teacher education was not found to significantly reduce voice disorders. Results showed no significant differences in prevalence of voice disorders between female and male students.

Conclusions: According to the answers given by the students participating in this study, voice problems appear to be common in student teachers. As they are to embark on a voice-demanding occupation, regular screening is paramount. More voice training is needed than offered in their education.

Key Words: Student teacher−Symptoms−Voice disorders−Risk factors−Voice training.

INTRODUCTION

The voice is the most important tool for a large number of persons working in voice-demanding occupations.[1] Priests, sport coaches, singers, actors, and call-center employees are considered professional voice users, and voice disorders seem to be common in these occupations.[2−6] The teaching profession has received the most attention and has been the focus of an increasing number of studies investigating the prevalence and etiology of voice disorders.[7−14] Voice disorders among teachers have been found to occur frequently. The exact prevalence, however, is not easily understood because of methodological differences, definitions of the voice disorder term, and the populations studied. Hence, estimates of voice disorders among teachers have ranged from 11% to 81%.[8,15−20] Nevertheless, teachers seem to be at high risk of developing voice disorders compared not only to general population[10,18] but also to other professions.[18,21−24] Teachers were also found to be the largest help-seeking group at voice clinics out of 20 different occupational categories,[25] and Yiu[26] estimated that teachers constitute 16%−18% of all voice-related referrals to speech language pathologists. The most common voice symptoms have been found to be tired or strained voice, hoarseness, and sore or painful throat.[9,10,13,23,27] In studies where the participants underwent perceptual evaluation and clinical examinations, the most common organic conditions were acute laryngitis, vocal nodules, polyps, and edema.[25,28,29]

Several aspects of work environment of teachers have been found to increase the risk of voice disorders. Speaking for long periods of time,[30] speaking loudly,[28,31] speaking over background noise,[23] lack of opportunity for vocal rest, poor acoustic environments,[20,21,32] poor air quality, dry air,[33] and frequent exposure to upper respiratory infections[23,28] have all been shown to have negative effect on vocal health. In addition, personal factors such as being female,[9] having inhalant allergies,[34] use of certain asthma medications,[35,36] participation in voice-demanding extracurricular activities,[19] and smoking[37] are all considered to increase the individuals risk of developing voice disorders. Ohlsson et al[17] found a significant association between number of risk factors and number of voice symptoms. Whether personal or environmental risk factors pose the greatest risk to vocal health has been debated.[17,34] Simberg et al[38] studied the effect of genetic and environmental factor on the etiology of voice disorders. The results showed that environmental factors played a key role, especially for persons with a voice-demanding occupation.

In a study by de Jong et al,[15] 12% of teachers with voice disorders had experienced vocal problems during their education. The same group had a significantly higher incidence of voice disorders, as well as number of days absent from work, compared with their colleagues without voice problems during their time of study. In spite of being at risk of developing voice disorders, student teachers seem unaware of vocal challenges of their future profession.[17] Studies have further shown that student teachers are incognizant of potential risk factors for their vocal health.[39]

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Simberg et al[40] studied the prevalence of voice disorders among student teachers and found that 24% had a voice disorder, as defined by having two or more symptoms weekly or based on the results of a perceptual evaluation. Ohlsson et al[17] investigated voice disorders among student teachers in their first year of study. They found the prevalence of voice disorders to be 17%. A significant association between number of vocal risk factors and voice disorders was observed. The student teachers with voice disorders in the study of Ohlsson et al[17] had a significantly higher VHI than the student teachers without voice disorders. Simberg et al[41] compared student teachers with other university students and found that the student teachers had a significantly higher prevalence of voice disorders than that of their student peers. A study by Thomas et al[42] found that not only did the student teachers have a higher risk of developing voice disorders than other students, they also experienced a higher degree of voice handicap than their student peers.

The purpose of the study was to conduct an epidemiological study of the prevalence of voice disorders among students studying to become elementary school teachers of grade 1 through grade 7. Additional aims were to investigate the presence of potential risk factors for voice disorders and the amount of voice training offered during the student's education.

METHOD

The purpose of the study was to conduct an epidemiological study of the prevalence of voice disorders among students studying to become elementary school teachers of grade 1 through grade 7. The teacher education program in Norway is a 4-year college degree and students from all 4 years were included. In total, 968 student teachers participated in this study, approximately 21% of the total population of 4592 student teachers. A self-report web-based questionnaire was developed consisting of the following: (1) demographic details (gender, age, place, and year of study); (2) amount of voice training received; (3) participation in extracurricular activities and work alongside studying; and (4) health-related factors (allergy, use of asthma medication, occurrence of heartburn or reflux, and smoking). Further, the students completed the Norwegian translation of the Voice Handicap Index (VHI-30(N)), which has been validated for Norwegian conditions.[43] VHI-30(N) contains 30 statements describing the impact of voice-related problems on functional, physical, and emotional aspects of daily living.[44] Answers are given along a five-point Likert scale from never, almost never, sometimes, almost always, and always.[44] Participants choose the answer that most accurately describes the degree to which their own experience matches that of statements such as, "My voice makes it difficult for people to hear me" (F); "I feel as though I have to strain to produce voice" (P); and "I am ashamed of my voice problem" (E).[44] The VHI-30(N) is scored from 0 to 120, with 120 being the highest possible negative impact on daily life because of voice problems.

The final section of the questionnaire assessed occurrence of vocal symptoms using Screen6. Screen6 is a screening instrument by Ohlsson et al[17] based on a questionnaire by Simberg et al.[45] Screen6 consists of six vocal symptoms regarded as reliable indicators of voice disorders: (1) Does your voice become strained or tired? (2) Does your voice become low or hoarse? (3) Does your voice break? (4) Do you have difficulties in being heard? (5) Do you need to clear your voice or cough? (6) Do you have a sensation of pain or lump in your throat?[45] Answers are given along a four-point Likert scale from never, more seldom than every week, weekly, and daily. In accordance with Simberg et al[41,45] and Ohlsson et al,[17] two or more symptoms experienced weekly or daily were considered to constitute a functional voice disorder. The results of this study are exclusively based on the perceived vocal symptoms of student teachers. The student teachers were not evaluated perceptually, nor examined by an Ear, nose and throat specialist (ENT) and given a diagnosis as such. Previous studies that combined similar questionnaires with an ENT examination have, however, found that participants experiencing frequently occurring vocal symptoms also were found to have visible changes on their vocal folds.[22,45]

Precontact was made with all 14 educational institutions offering Teacher Education Programs in Norway. Thirteen of 14 institutions agreed to forward information about the study and link to the web-based survey to their respective students. As the response rate from the web-based survey was low, 72 answers in total after 2 weeks, the decision was made to contact participants in person. The questionnaire was adapted to paper and seven campuses were visited. The choice of institutional campuses was made to ensure that the population was representative of possible variations due to geographical location. Institutions with a large student mass, attracting students from several parts of the country, were also prioritized. Teachers were contacted and appointments for classroom visits were made. The students were informed about the study verbally and completed the questionnaire at their desks. The questionnaires were collected and the data were entered manually. A total of 968 completed surveys were collected. One hundred twelve surveys were disregarded because of multiple answers and skipped pages. In total, data from 856 participants were analyzed.

Statistical Analysis

IBM *SPSS Statistics* 21 software (IMB, Armonk, NY) was used for the statistical analyses of data. The prevalence of different vocal symptoms in Screen6 was dichotomized into two categories: "occurring seldom or never" and "occurring weekly or more often." These categories correspond to scores of 0 and 1, and 2 and 3, respectively, and have been used in earlier studies investigating voice disorders.[2,13,17,20,22,38,46] The VHI-30(N) scores of students were also divided into two categories. Scores of 19 or higher were classified as "moderate impact of voice-related problems on aspects of daily living," whereas scores below 19 were categorized as "low impact of voice-related problems on aspects

of daily living." Karlsen et al[43] found this to be an appropriate dichotomy in their study that was conducted in conjunction with translating VHI into Norwegian.

Chi-square tests were performed and displayed in cross tabulations to determine possible significant relationships between nominal variables. Further, semicontinuous variables were analyzed with Student *t* tests, such as VHI-30(N) scores. Significance level was set at $P = 0.05$ in all tests.

RESULTS

The participants comprised 703 women and 153 men. Most of the participants were between the age of 18 and 29, whereas only 2% (n = 17) of the participants were over the age of 40. Students from all 4 years of the course participated in the study. The largest group consisted of second year students, followed by first year, fourth year, and third year students.

The results show that 14.1% (n = 121) of the students experienced two or more symptoms weekly or more often. Hence, they were defined as having a voice disorder in accordance with Screen6. A total of 18.2% (n = 156) reported having experienced one symptom weekly or more often, whereas 67.6% (n = 579) of the students reported having no voice symptoms weekly or more often.

Among first year students, 16.6% (n = 48) reported experiencing two or more symptoms weekly or more often, compared with 12.6% (n = 43) of second year students, 12.6% (n = 12) of third year students, and 13.3% (n = 17) of fourth year students. The difference, however, was not significant. The prevalence of voice disorders according to Screen6 was 14.8% in female students and slightly lower at 11.2% in the male student population. This was not a significant result.

The most commonly reported voice symptom was the need to clear ones' throat or cough (26.6%, n = 228), followed by strained or tired voice (8.0%, n = 68) and a feeling of pain or lump in ones' throat (7.7%, n = 66) (Chart 1).

The student teachers had a VHI-30(N) mean score of 12.82. VHI-30(N) subscale means were 4.01 (Functional), 6.04 (Physical), and 2.77 (Emotional) (Table 1) Female students reported a VHI-30(N) mean score of 13.30, whereas male students reported a VHI-30(N) mean score of 10.62. The difference was significant (Table 2).

TABLE 1.
VHI-30(N) Mean Scores for Male and Female Students (N = 856)

	N	Mean	Std. Dev.
Female	703	13.30	9.943
Male	153	10.61	8.740

t = 3.094, df = 854, N = 856, $P = 0.012$.

TABLE 2.
Voice Disorders and VHI-30(N), Mean (N = 856)

	Voice Disorder	N	Mean
VHI score	No	735	10.67
	Yes	121	25.93

t = −18,920, df = 854, N = 856, $P = 0.000$.

The *t* tests revealed a significant difference in VHI-30(N) mean scores between the voice disorder group (as defined by having two symptoms weekly or more often) and the group without voice disorders, 25.93 and 10.67, respectively.

As many as 94.9% (n = 812) of the students reported to have received between 0 and 5 hours of voice training. No significant differences were found, however, between amount of voice training and occurrence of voice disorders.

The results showed that 71.6% (n = 613) of the students worked or volunteered in addition to being full-time students. Out of these students, 22.5% (n = 138) held two jobs or more. Type of employment and volunteer work was categorized as being voice demanding or not based on assumed amount of vocal loading associated with various jobs. Working in retail or as a substitute or kindergarten teacher and volunteering as a scout leader were considered to be voice-demanding activities. Working as a cleaner, at a cemetery or in a mail room, was considered not to be vocally taxing. A total of 78.2% (n = 669) of students working alongside studying had jobs defined as voice demanding. Statistical analysis did not, however, find any significant association between occurrence of voice disorders and type of employment. The association between the occurrence of voice disorders and working multiple jobs was also found to be statistically insignificant.

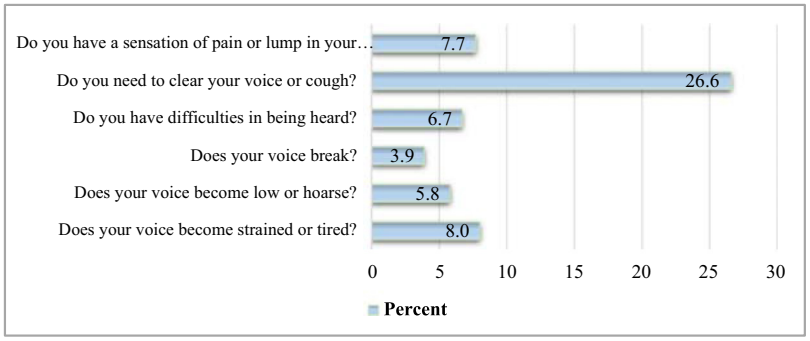

CHART 1. Frequency of Screen6 symptoms occurring weekly or more often (N = 856).

The results revealed that 30.2% (n = 258) of the students had been diagnosed with airborne allergies. No significant differences in relation to vocal symptoms were found between the students suffering from allergies and those not. A total of 9.0% (n = 77) of the students were taking asthma medication prescribed by a medical doctor. Students taking medication for asthma had significantly more voice disorders than students not taking medication (Table 3). Only 3.4% (n = 29) of the student teachers reported that they smoked and 2% (n = 17) of the students had been diagnosed with gastroesophageal reflux.

The present study collected data both via a web-based survey (72 surveys) and by visiting schools in person (784 surveys). Results from the two collection methods were compared and no significant differences were found. Analysis of the data collected from the web-based survey showed that 12.5% (n = 9) of the students experienced two or more symptoms weekly or more often. Data from the classroom visits showed a slightly higher occurrence of 12.3% (n = 112); however, the difference was not significant.

DISCUSSION

Voice disorders among Norwegian student teachers

The present study shows that 14.1% of student teachers in Norway have a voice disorder. A voice disorder in this study was defined as *two or more symptoms experienced weekly or daily* in accordance with Screen6. The collected data are based exclusively on the individual's experience of symptoms and hence yields no information as to the type of voice disorder or cause. The present study shows that 17.9% of the students have a VHI-30(N) score of 19 or higher. These figures are in accordance with those found by Ohlsson et al[17] among the Swedish student teachers. These results confirm that student teachers as a group have a higher prevalence of voice disorders, in addition to being at risk of voice disorders as they embark on a teaching profession.

Voice Handicap Index

The VHI measures the functional, physical, and emotional impact of voice disorders on activities of daily living.[44] The point along the scale at which a healthy voice is separated from a voice disorder is far from clear-cut. Subjects in the study of Jacobsen et al[44] who rated their voices as normal or having a mild voice disorder had an average VHI mean of 33.69. In the validation of the Swedish version of the VHI, Ohlsson and Dotevall[47] found that women diagnosed with a voice disorder had an average VHI score of 33. The women without voice disorders had an average VHI score of 10. However, Ohlsson et al[17] found that scores of 20 and above were significantly associated with voice disorders. During the development of the Norwegian translation of VHI, Karlsen et al[43] reported that a cut-off score of 19 identified 95% of participants with voice disorders and 10% of controls.[43] A further study by Karlsen et al[48] also found that differing VHI-30(N) scores seemed to be dependent on the nature of the voice disorder. In the interpretation of VHI-30(N), it is crucial to bear in mind the population of study. Student teachers are about to embark on a profession that places heavy demands on their voices. Any self-rated limitations on their functional, physical, or emotional aspects of life should be acknowledged and measures should be taken to treat existing problems and reduce risk factors.

Association between Screen6 and VHI-30(N)

The self-rating instruments used in the present study show a significant association, whereby students with a voice disorder according to Screen6 had higher VHI-30(N) mean scores than students without a voice disorder. This is in accordance with Ohlsson et al[17] who found that students reporting two or more symptoms had a VHI mean score of 23.1, compared with 7.8 for the students without a voice disorder according to Screen6. The data in the present study reveal, however, that the students reporting multiple voice symptoms are not necessarily the same students with VHI-30(N) scores of 19 or above. As presented in Table 4, 39.7% of the students reporting two symptoms or more weekly or more often had a VHI-30(N) score of less than 19. 6.2% of the students who reported no symptoms had a VHI-30(N) score of 19 or above. This indicates that Screen6 and VHI-30(N) tap different experiences of voice symptoms and limitations as a result of voice disorders. To ensure a thorough screening for voice disorders and impact of voice problems on daily living, participants should complete both Screen6 and VHI-30(N). It is important to bear in mind that student

TABLE 3.
Voice Disorders in Relation to Use of Asthma Medication (N = 121)

	2 or More Symptoms	
	N	%
Use of asthma medication		
Yes	14	18.2
No	107	13.7

χ^2 (2) = 6.926, P = 0.031.

TABLE 4.
Number of Symptoms in Relation to High and Low VHI-30(N) Scores (N = 856)

	VHI-30(N)			
	Less Than 19		19 and Above	
	N	%	N	%
No symptoms	543	93.8	36	6.2
One symptoms	112	77.2	44	28.2
Two or more symptoms	48	39.7	73	60.3

χ^2 (2) = 213.521, P = 0.000.

teachers are a healthy population. This will affect the outcome scores of the VHI-30(N). As they are not a help-seeking population, students may have vocal symptoms but at the same time may not experience these as a limitation on their daily lives. Further, 39.7% of the students who reported experiencing two or more symptoms weekly or more often achieved a VHI of less than 19. The remaining 60.3% of the students who reported experiencing two or more symptoms weekly or more often, however, achieved a VHI score of 19 or more. This indicated that the experience of vocal symptoms and voice handicap are strongly associated (Table 4).

Voice disorders and gender

The percentage of male and female students in the studied sample (17.8%) is consistent with the student population as a whole (16.7%) according to the numbers from the Norwegian Centre for Research Data (NSD) (2016). The present study did not find any significant differences between genders in the prevalence of voice disorders as defined by having two or more symptoms weekly or more often. Most studies have found a higher occurrence of voice disorders in women.[14,18,21,23,28,37,49] The variance has, to some extent, been explained by anatomical differences in the larynx of women and men.[37] Simberg et al[41] found no gender differences, however, in their study on voice disorders among student teachers and other university students. Devadas et al[9] similarly reported prevalence figures for voice disorders among female and male participants at 20.4 and 19.2, respectively. In the Simberg et al[13] study of teachers over a 12-year period, the difference between prevalence of voice disorders according to gender in 1988 was significant. In 2001, however, there was no significant difference between genders in relation to frequency of symptoms.

Simberg et al[13] discussed that the possible reason behind the high prevalence of voice disorders among male participants could be that males who experienced vocal symptoms were more eager to answer the questionnaire. In the present study, however, because of the collection of answers from classes as a whole, this cannot be the case. Studies on both soccer coaches[3] and priests[2] have reported high prevalence figures for male participants. The results of these studies, in addition to the results of the present study, may imply a trend of increasing voice disorders among men.

The present study did find that the female students scored significantly higher on the VHI-30(N) (13.30) than their male peers (10.62). A heightened awareness has been associated with an increase in the impact of voice problems on functional aspects of daily living.[50] Marçal and Peres[37] also mentioned the potentially demanding social role of women, which could contribute to more pronounced voice problems. Fritzell[25] also posed the question whether men are less concerned about the quality of their voices and any changes that occur. This could explain the contrasting results of frequent voice disorders in combination with lower VHI-30(N) scores among male students in the present study. According to Thomas et al,[42] persons aware of the psychosocial impact of their voice problems were more motivated to eliminate factors conducive to their voice problems. Da Costa et al[8] found that men in addition were less likely to seek help for the voice problems compared with women. This, combined with a possible lower degree of concern and awareness of vocal health, may result in voice problems remaining untreated and thereby becoming more serious in nature.

Voice training

The present study reveals that in spite of educating students for a voice-demanding profession, voice ergonomics and voice training are given very little priority in the curriculum. Voice training is not mentioned in the most recent elementary school teacher guidelines, nor in the National Curriculum for Knowledge Promotion in Primary and Secondary Education and Training (LK 06). Providing voice training to student teachers is therefore entirely up to each educational institution. There are no requirements that student teachers receive this voice training, let alone during which year of study it should take place. The music subject curriculum states that the student teachers should be able to sing and use their voices in various ways. It does say anything about knowledge of vocal hygiene to sustain a healthy voice and prevent voice problems. The results of this study show that 50.5% of the students reported that they had received no voice training at all, and 44.4% stated they had received 5 hours or less during their education. The authors' impression from their visits to the various educational institutions is that the voice training offered to the student teachers is somewhat coincidental. At some institutions, it is included in the drama lessons with a focus on vocal projection and diction. At other institutions, it is part of the music lessons with a focus on melody and pitch.

A study investigating voice disorders among priests has shown that in order for voice training and education in voice ergonomics to have a positive effect on the voice, it must consist of more than 5 hours.[2] This could explain the nonsignificant difference in prevalence of voice disorders between students who had received voice training and those who had not received voice training. One cannot eliminate the possibility that the student teachers in the present study simply have not practiced what they have been taught. The authors would argue, however, that such a small amount of training would make it challenging for the student teachers to implement what they have learned into everyday practice. The present study yields no information as to the competence of the person teaching vocal ergonomics or voice training. This could result in great variation in what is taught to the student teachers.

In the present study, the students in the first and second years reported more voice training than the third and fourth year students. This may be a reflection of a raised awareness among the educational institutions of the vocal challenges of the teaching profession and a sign of possible changes to come. It may also, however, be due to the memory factor. If

voice training is offered at the beginning of the students' education, first and second year students may have a fresher recollection of the training compared with the third and fourth year students. As there is no present information on when the training was given, it is not possible to draw any conclusions. Whether or not the voice training was mandatory may also explain the low percentage of voice training among the students. Studies have implied that student teachers have low awareness of voice use and vocal risk factors,[17,39] which could mean that voice training classes, unless mandatory, may not be prioritized by the student teachers.

Voice disorders and work practice

Voice disorders in teachers have been related to several aspects of their work environment and the vocal demands that teaching places on the voice. The students' voices, however, have not yet been exposed to the demands of full-time teaching. Simberg et al[41] linked the higher prevalence of voice disorders in certain years of study to the organization of the practical experience of student.[41] In that study, however, all the participants were studying at the same university. The present study did not find a significant difference between grade 1 and grade 4. When investigating the organization of the practical work experience included in the Teacher Education curriculum, it was observed that there are national guidelines as to the minimum number of hours of work practice. Each educational institution, however, is at liberty to organize these hours as they see fit.[51] This means that the students in the present sample would have had their practical work experience at different times of the year, as well as during different years of study. Hence, it is not possible to investigate the effect periods of practical work experience may have had on the student's voices in this study.

Extracurricular activities and part-time work

Having part-time work, holding multiple jobs, or having work considered vocally demanding was not associated with an increase in the prevalence of voice disorders. Further, the present study did not find any association between voice demanding extracurricular activities and the occurrence of voice disorders. This is in compliance with the results of the study of Simberg et al[41] of first to fourth year students. Åhlander et al[20] found that 25% of the teachers reported engaging in voice-demanding activities. This did not, however, result in significant higher occurrences of voice disorders. Ohlsson et al[17] found a significant association between number of risk factors and number of voice symptoms, which included voice-demanding hobbies and voice-demanding work. When considering each risk factor individually, the association between voice-demanding hobbies or work and voice symptoms was less clear.[20] The present study collected information regarding whether or not the students worked or had hobbies, in addition to what kind of work and hobby. The questionnaire did not allow for students to share information as to how much they worked or the extent of their involvement or time spent singing in a band or choir, working out with manuals, playing team sports, or other voice-demanding leisure activities. Therefore, vital information is missing to draw any conclusions as to the possible effects of the various jobs or leisure activities on vocal health.

Allergies

Several studies have associated allergies with an increased risk of voice disorders.[13,18,34,37,40,41,49] In the present study, however, no significant differences in the occurrence of voice disorders were found between students suffering from allergies and those not even if 30.2% reported that they had been diagnosed with allergies. These results may be explained by seasonal factors. Data for this study were collected from the end of January to mid-March, a time when inhalant allergens such as pollen from birch and grass are virtually nonexistent. Da Costa et al[8] points to the fact that their study took place during springtime and therefore may have contributed to the high prevalence of dysphonia of 22%. Ohlsson et al[17] conducted their data collection during the fall of 2009 and spring of 2010 and found a significant relationship between allergies and voice disorders, and a prevalence of 17%. Large epidemiological studies of the prevalence of allergy among the general population in Norway are lacking. Based on cross-sectional studies of a smaller scale, however, the prevalence of allergies seems to be high and figures have increased during the last 20–30 years.[52] The results of the present study may be a reflection of an increase in the prevalence of allergies in the general population as a whole. Effective treatment of allergy symptoms is important, particularly for persons working in or training to work in voice-demanding professions.

Asthma medication

In the present study, 9% of the students reported taking asthma medication prescribed by a physician. Use of inhaled corticosteroids, aimed at treating the bronchi smooth muscle contraction and the airway mucosal inflammation, has shown to significantly increase voice disorders in patients with asthma.[35] The results of the present study also show a significant positive correlation between use of asthma medication and prevalence of voice disorders. Hence, student teachers diagnosed with asthma and who use inhalant medication need to be paid particular attention in terms of preventative care.

Smoking

The Statistical Central Agency in Norway (SSB) report that the number of people who smoke cigarettes on a daily basis has been steadily decreasing, especially among people between 16 and 24 years of age. Results from the present study confirm these findings. Only 3.4% of the students reported that they smoked. SSB reports, however, that while

the number of people smoking is decreasing, the number of people using snuff has increased, especially among young women.[53] Compared with cigarettes, the long-term effects of snuff are not well known and more studies are needed. Snuff use has, however, been linked to cancer of the pancreas, esophagus, and mouth, in addition to changes of the mucosal lining of the mouth and throat.[54] These results make it difficult to rule out possible negative effects that snuff may have on the voice.

CONCLUSIONS

The results of the present study emphasize the need for an increase in focus and time spent on voice training and voice ergonomics education for student teachers in Norway. The limited amount of voice ergonomics offered to student teachers also seems to be the case outside of Norway. Studies conducted in the Netherlands, United Kingdom, Sweden, and Finland indicate that voice ergonomics have not been prioritized in the teacher education programs.[55–58] More recent studies, however, are needed to investigate the amount of voice training offered to student teachers at the present time. To ensure a positive effect of such measures, more research is also needed to investigate the content of the voice ergonomics offered to the student teachers.

Both questionnaires and perceptual evaluations have been found lacking in their ability to identify all participants with voice disorders.[59,60] The results from the present study also reveal that in spite of significant correlations between Screen6 and VHI-30(N), only 60.3% of the students with voice disorders either based on reporting two or more symptoms weekly or more often, or having a VHI-30(N) score of 19 or above, were identified by both instruments. This is crucial information in terms of screening and supports the argument that screening for voice disorders should consist of more than one instrument or method.

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