RESEARCH ARTICLE

EPIDEMIOLOGY OF VOICE DISORDERS AMONG MALE SCHOOL TEACHERS IN KHAMIS MUSHAYT CITY, SAUDI ARABIA

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ABSTRACT

Background: A teacher with voice disorders is displaying a form of limitation in the teaching activity.

Aims & Objective: To assess the magnitude of voice disorders among teachers and to identify the possible risk factors associated with voice disorders.

Material and Methods: A total of 380 teachers were included. The researcher developed a questionnaire for data collection which comprised personal characteristics and symptoms of voice complaints during the last scholastic year. The Voice Handicap Index was used for assessment of voice and its effects on the life of a teacher.

Results: Most teachers experienced voice related symptoms during the last year (80.9%). Some had 1-2 symptoms (43.2%) while others had more than two symptoms (37.6%). The most frequent voice-related symptoms were dry throat (42.1%), sore throat (33.5%) and hoarseness of voice (32.9%). More than one third of teachers consulted a physician for their voice-related problems (35%). Moderate to serious severity of voice handicap index were reported by 8.2% of the teachers. There was an increasing prevalence of moderate to severe grade of voice handicap according to age group ($p=0.004$). Practice of non-healthy habits (e.g., smoking of cigarette, sheesha or moaassal and qat chewing) was associated with significantly higher prevalence of moderate to severe grade of voice handicap ($p<0.001$ for each). There was an increasing prevalence of moderate to severe grade of voice handicap according to experience in teaching ($p=0.013$). Teachers' workload was significantly associated with grade of voice handicap ($p=0.047$). There was a higher prevalence of moderate to severe grade of voice handicap with depression and anxiety ($p=0.009$ and $p<0.001$, respectively).

Conclusion: Most teachers have voice related symptoms. The most frequently reported voice-related symptoms are dry throat, sore throat and hoarseness of voice. More than one third of the teachers consult a physician for their voice-related problems. Moderate to severe voice handicap index are experienced by 8.2% of teachers. Risk factors associated with moderate to severe grade of voice handicap are old age, practice of non-healthy habits (e.g., smoking of cigarette, sheesha or moaassal and qat chewing), longer experience in teaching, higher teachers' workload and presence of psychological disorders.

KEY-WORDS: Voice Disorders; Occupational Exposure; Teachers; Voice Handicap Index

Introduction

Voice is the sound produced by using the vocal organs, especially the sound used in speech. Voices are everywhere around us, from physically present individuals, from virtual sources such as radios, TVs, etc., and we spend a large part of our time listening to these voices.[1] Human speech is a unique human adaptation to transmit symbolic information in a highly efficient manner.[2]

Excessive use or abuse of the voice at work can lead to the development of symptoms like soreness, hoarseness, weak voice, sore throat and aphonia. It has been suggested that some groups such as teachers and singers are more at risk of developing vocal disorders than others.[3] A job can be classified based on its demand regarding both voice quality and vocal load.[4] For example, school teachers need moderate quality and high vocal load.[5]

Voice professionals make intensive use of their voice, frequently under environmental and organizational constraints.[6] In the occupation of teachers, the voice assumes an outstanding importance, influencing their relationship with students and among their colleagues. Teachers' voice is an important resource to gain respect, attention and make work more interesting. Voice quality and teachers' way of expression can influence students' receptivity to lessons. Among

other factors, noise, the number of students in the classroom, working schedule, dust, chalk use, classroom lighting and ventilation, years of teaching, difficult relationship with colleagues, students and authorities, tend to impose an intense vocal load.[5]

Voice problems may include difficulties in phonation, deviant voice qualities, and/or physical pain or sensation related to voice use.[7]

Because voice disorder results from an underlying alteration in the structures or in the work of the vocal trait: breathing, vocalization or resonance, it may be expressed by several symptoms. The most common include tiredness or effort when speaking, throat clearing or persistent coughing, sensation of tightness or weight in the throat, voice breaks, breathlessness when speaking, aphonia, soreness or burning in the throat, hoarseness, etc.[8,9]

The problem of professional voice users seems considerable, especially because most of them do not receive voice training before beginning their professional career as a preventive measure for the ailing voice later. Another important point is that some professional voice users are not yet convinced of the value of medical care of voice. They do not prefer ‘‘exercises’’ to treat their voice problem but rather seek for surgery or pharmacotherapy. For that reason, the number of patients attending the phoniatric clinic with voice problems and, more specifically, those completing a regular therapy or preventive program is small compared to the expected size of the problem with such a unique multicultural nature.[10]

Yiu[8] emphasized the impact of voice problems on teachers’ communication, social life, personal emotions, and occupation. Moreover, voice symptoms, described as tired, effortful or difficulties in phonation, and deviant voice qualities are very often associated with physical discomfort and disability, a health problem that has an impact on the teachers’ personality, profession, and carries significant work-related and economic effects.[11]

Occupational voice health is becoming increasingly important, as more people rely on their voices for their work. Teachers are at higher risk of developing “voice disorders” than non-teachers. The prevalence rates of voice disorders vary markedly from around 5%, as reported by expert judges to as high as 81%, as self-reported.[11]

In Switzerland, Munier and Kinsella[12] stated that primary school teachers are particularly at risk as they have little opportunity for voice rest during the working day. The results of their study suggested that 27% of primary school teachers suffered from a voice problem, 53% an 'intermittent' voice problem, while only 20% had no voice problem. Teachers of the junior classes were more vulnerable to developing a voice problem than those of senior classes. The most common symptoms were 'dry throat' and 'vocal fatigue'.

In Paris, Nerrière et al.[13] stated that teachers, as professional voice users, are at particular risk of voice disorders. They reported that one in two female teachers reported voice disorders (50.0%) compared to one in four males (26.0%).

In Italy, Angelillo et al.[14] stated that the prevalence of reporting a current voice problem was significantly greater in teachers compared with not-teachers (8.7% vs. 2.9%), as the prevalence of voice disorders during their lifetime too (51.4% vs. 25.9% $p<0.001$).

Restriction in participation (i.e., handicap) can be interpreted as a reduction or avoidance of voice activities by the individual, which results in an occupational or economic consequence. A teacher with a vocal polyp, who cannot speak loudly when teaching is displaying, a form of limitation in the teaching activity. If the teacher has to change careers due to the inability to speak loudly, this restriction in participating in the teaching position brings about economic consequences. Generally, teachers are more likely to perceive their voice problems negatively affecting their current job performance. Approximately 20% of teachers may miss working days due to their voice problems. This raised the need to develop preventive voice care programs, educational and therapeutic, in order to reduce the incidence of vocal dysfunction in this group of professional voice users.[15]

This study aimed at studying the magnitude of voice disorders, its possible risk factors among male teachers in order to recommend preventive measures.

Materials and Methods

This is a cross-sectional study conducted at schools of Khamis Mushayt, Aseer Region, which lies in the southwestern part of Saudi Arabia, about 2500 m above sea level. In 2009, The total number of schools for boys in Khamis Mushayt was 49, having a total of 1113 male teachers.[48]

A total of 15 schools were selected using a simple random sampling technique. All male teachers working at chosen schools and consented to participate in the study were included. We excluded all these teachers who had a teaching experience less than one year and who were not engaged in teaching e.g.: administrators.

A questionnaire based was developed on the recommendations of Yiu[8] and Smith et al.[49], which were modified and translated into Arabic to suit the local conditions. It comprised the following points: Personal characteristics: Age, nationality, smoking habits, duration of teaching experience (in years), subjects taught, teaching load. Symptoms of voice complaints during the last scholastic year, frequency of each symptom, duration of sick leave/s (if any) due to voice complaints, type of management of complaints and the treatment received (if any). In addition, the Voice Handicap Index[50] was used for assessment of voice and its effects on the life of a teacher.

A pilot study was conducted in one randomly selected school which was excluded from the main study sample to test the wording, validity and reliability of the data collection tool. The necessary modifications were carried out whenever needed.

The study tools were distributed to participating teachers. The objectives of the study were clearly and briefly explained to them and they were asked to respond to the questions. Anonymity of respondents was secured and they were assured of the confidentiality of the collected data.

All the necessary official permissions were obtained before data collection. Collected data was kept strictly confidential and was used only for research purposes.

Data Management and Statistical Analysis

The Statistical Package for Social Sciences (SPSS version 16.0) was used for data entry and analysis. Descriptive statistics (i.e., frequency and percentage) were calculated and the appropriate test of significance (i.e., χ^2-test) was applied. Differences were considered as statistically significant when the p-value was less than 0.05.

Results

A total of 340 male teachers participated in this study from 15 schools, out of a total teachers of 380 included in the sample, giving a response rate of 89.47%.

More than half of participants (54.4%) were aged 30-39 years, and the majority were Saudis (97.6%). Regarding non-healthy habits, cigarette and sheesha smoking were common among teachers (17.4% for each), followed by moaassal smoking (2.9%) and qat chewing (6.5%).as show as in table 1.

Table-1: Personal Characteristics of Teachers

Variables		No.	%
Age Groups (in years)	<30	33	9.7
	30-39	185	54.4
	40-49	95	27.9
	50+	27	7.9
Nationality	Saudi	332	97.6
	Non-Saudi	8	2.4
Practice of Non-Healthy Habits	Cigarette smoking	59	17.4
	Sheesha smoking	59	17.4
	Moaassal smoking	10	2.9
	Qat chewing	22	6.5

Table 2 shows that most of the teachers (58.5%) had an experience of teaching for 10-20 years. Almost one third of the participants were teaching at primary, intermediate or secondary school levels (36.2%, 27.9% and 35.9%, respectively). The highest frequency for taught subjects were those for science (22.9%), Islamic subjects (17.6%), Arabic (15.3% and mathematics (12.6%). About half of the participants were scheduled to teach 10-20 classes per week

(50.6%), and half of them used to teach 20-30 students per class (51.2%).

Table-2: Participants' Characteristics Regarding their Teaching Practices

Variables		No.	%
Years of Experience in Teaching	<10 years	76	22.4
	10-20 years	199	58.5
	>20 years	65	19.1
Level of Teaching	Primary	123	36.2
	Intermediate	95	27.9
	Secondary	122	35.9
Specialty (Taught Subject)	Science	78	22.9
	Islamic Subjects	60	17.6
	Arabic	52	15.3
	Mathematics	43	12.6
	Humanities & Social Sciences	28	8.2
	Elementary Teacher	26	7.6
	English	21	6.2
	Others	32	9.4
No. of Classes/Week	<10	55	16.2
	10-20	172	50.6
	>20	113	33.2
No. of Students/Class	<20	118	34.7
	20-30	174	51.2
	>30	48	14.1

Table 3 shows that most of the teachers were usually exposed to hot/cold air conditioners (82.4%). Almost one third of the teachers had chronic allergic rhinitis (31.5%). Chronic diseases (like, diabetes, bronchial asthma and hypertension) were minimally prevalent (8.2%, 5% and 4.4%, respectively). Central nervous diseases affected 3.5% of teachers, while 6.2% had anxiety and 1.5% had depression. They had past history of polypectomy among 4.1%, tonsillectomy among 3.5% and intubation in 2.4% of the participants.

Table-3: Patterns of Morbidities among Participants

Variables		No.	%
Exposure to hot/cold air conditioners		280	82.4
Associated Diseases	Chronic allergic rhinitis	107	31.5
	Diabetes	28	8.2
	Bronchial asthma	17	5.0
	Hypertension	15	4.4
	CNS problems	12	3.5
	Anxiety	21	6.2
	Depression	5	1.5
Past Relevant Surgical History	Polypectomy	14	4.1
	Tonsillectomy	12	3.5
Past history of intubation		8	2.4

Table 4 shows that most of the teachers experienced voice related symptoms during the last year (80.9%). Some of them had 1-2 symptoms (43.2%) while others had more than two symptoms (37.6%). The most frequently reported voice-related symptoms were dry throat (42.1%), sore throat (33.5%) and hoarseness of voice (32.9%), while the least reported symptoms were loss of voice (10.6%) and shortness of breath (10%). More than one third of teachers consulted a physician for their voice-related problems (35%). Moderate to serious severity of voice handicap index were reported by 8.2% of the teachers.

Table-4: Frequency and Prevalence of Voice Related Symptoms among Participants

Voice Related Symptoms			No.	%
Voice Related Symptoms during the Last Year	Absent		65	19.1
	Present	Total	275	80.9
		1-2 symptoms	147	43.2
		>2 symptoms	128	37.6
	Dry throat		143	42.1
	Sore throat		114	33.5
	Hoarseness of voice		112	32.9
	Heartburn		106	31.2
	Clearing throat		86	25.3
	Difficulty in continuing speech		60	17.6
	Itching throat		57	16.8
	Low voice		53	15.6
	Loss of voice		36	10.6
	Shortness of breath		34	10.0
Consulting a physician for voice problems			119	35.0
Voice Handicap Index (VHI)	Minimal (score ≤30)		312	91.8
	Moderate to serious (score >30)		28	8.2

Table 5 shows a significant trend in increasing prevalence of moderate to severe grade of voice handicap according to age group, with the least prevalence among younger groups and highest prevalence among the eldest (p=0.004). The non-Saudi teachers had a higher prevalence of voice handicap moderate to severe grade than Saudi teachers (12.5% vs. 8.1%, respectively). However difference was not statistically significant (p=0.657). Practice of non-healthy habits (e.g., smoking of cigarette, sheesha or moaassal and qat chewing) was associated with significantly higher prevalence of moderate to severe grade of voice handicap (p<0.001 for all of unhealthy habits).

Table 6 shows a significant trend in increasing prevalence of moderate to severe grade of voice handicap according to experience in teaching, with least prevalence among teachers with least experience and highest prevalence among

teachers with highest experience (p=0.013). Grade of voice handicap was not significantly affected by level of teaching, subjects taught or number of students per class. The teachers' workload (number of classes per week) was significantly associated with grade of voice handicap, with the highest prevalence of voice handicap being among those with highest workload (p=0.047).

Table-5: Association between Degrees of Voice Handicap Grade and Teachers' Personal Characteristics

Personal Characteristics		Minimal		Moderate/ Serious		p-value
		No.	%	No.	%	
Age Group	<30 years	32	97.0	1	3.0	0.004
	30-39	170	91.9	15	8.1	
	40-49	90	94.7	5	5.3	
	50+	20	74.1	7	25.9	
Nationality	Saudi	305	91.9	27	8.1	0.657
	Non-Saudi	7	87.5	1	12.5	
Cigarette Smoking	No	267	95.0	14	5.0	<0.001
	Yes	45	76.3	14	23.7	
Sheesha Smoking	No	304	93.3	22	6.7	<0.001
	Yes	8	57.1	6	42.9	
Moaassal Smoking	No	308	93.3	22	6.7	<0.001
	Yes	4	40.0	6	60.0	
Qat Chewing	No	297	93.4	21	6.6	<0.001
	Yes	15	68.2	7	31.8	

Table-6: Association between Voice Handicap Grade and Teachers' Professional Characteristics

Professional Characteristics		Minimal		Moderate/ Serious		p Value
		No.	%	No.	%	
Years of Experience in Teaching	<10 years	73	96.1	3	3.9	0.013
	10-20 years	185	93.0	14	7.0	
	>20 years	54	83.1	11	16.9	
Level of Teaching	Primary	116	94.3	7	5.7	0.367
	Intermediate	87	91.6	8	8.4	
	Secondary	109	89.3	13	10.7	
Specialty (Taught Subject)	Science	68	87.2	10	12.8	0.494
	Islamic Subjects	57	95.0	3	5.0	
	Arabic	49	94.2	3	5.8	
	Mathematics	40	93.0	3	7.0	
	Humanities & Social Sciences	25	89.3	3	10.7	
	Elementary Teacher	24	92.3	2	7.7	
	English	21	100.0	0	0.0	
	Others	28	87.5	4	12.5	
No. of Classes/ Week	<10	53	96.4	2	3.6	0.047
	10-20	161	93.6	11	6.4	
	>20	98	86.7	15	13.3	
No. of Students/ Class	<20	109	92.4	9	7.6	0.955
	20-30	159	91.4	15	8.6	
	>30	44	91.7	4	8.3	

Table 7 shows that teachers who had frequent exposure to hot/cold air conditioners had higher prevalence of had moderate to severe grade of voice handicap than those who were not exposed to hot/cold air conditioners (9.3% vs. 3.3%, respectively). However, difference was not statistically significant (p=0.128). No significant differences were observed in prevalence of moderate to severe grade of voice handicap according to the presence of chronic diseases (diabetes, hypertension, CNS diseases, and bronchial asthma), allergic rhinitis or positive history of surgical operations (i.e., tonsillectomy, polypectomy) or intubation. However, significantly higher prevalence of moderate to severe grade of voice handicap was associated with psychological disorders (i.e., depression and anxiety), p=0.009 and p<0.001, respectively.

Table-7: Association between Voice Handicap Grade and Participant Co-Morbidities

Variables		Minimal		Moderate/ Serious		p Value
		No.	%	No.	%	
Exposure to Hot/ Cold Air Condition	No	58	96.7	2	3.3	0.128
	Yes	254	90.7	26	9.3	
Diabetes Mellitus	No	26	92.9	2	7.1	0.826
	Yes	286	91.7	26	8.3	
Hypertension	No	12	80.0	3	20.0	0.090
	Yes	300	92.3	25	7.7	
Bronchial Asthma	No	14	82.4	3	17.6	0.148
	Yes	298	92.3	25	7.7	
Allergic Rhinitis	No	96	89.7	11	10.3	0.353
	Yes	216	92.7	17	7.3	
Depression	No	3	60.0	2	40.0	0.009
	Yes	309	92.2	26	7.8	
Anxiety	No	14	66.7	7	33.3	<0.001
	Yes	298	93.4	21	6.6	
Tonsillectomy	No	12	100.0	0	0.0	0.291
	Yes	300	91.5	28	8.5	

Discussion

The "voice" is an increasingly important tool at work. A clear voice is a prerequisite for a success in communication. Approximately one third of the labor force relies on voice as their primary work tool. [36]. Teachers have been identified as being specifically at increased risk of developing an occupational voice disorder because of the demands put on their voices.[3,8]

This study aimed to assess the magnitude of voice disorders among teachers and to identify the possible risk factors associated with the voice disorders.

Moderate to serious severity of voice handicap index was reported by 8.2% of teachers who participated in the present study. This figure was relatively small when compared with those reported in literature. Rammage[46] stated that the prevalence rates for voice-disorders among teachers range from 20% to 80%. Smith et al.[49] found that teachers were more than twice as likely as a non-teacher control group to report current problems, with hoarseness being the most commonly reported voice symptom. Vilkman[4] noted that occupational voice disorders might be the result of the repetitive movement or "collision" of the vocal folds.

Jones et al.[36] added that vocal attrition can be described as the 'wear and tear' of the vocal mechanism and the overall reduction in vocal capabilities associated with acute or chronic abuse of the phonatory system. There is an association between voice problems and vocally demanding jobs such as teaching. Most teachers (80.9%) who participated in this study had voice related symptoms within the last year. The most frequently reported voice-related symptoms were dry throat (42.1%), sore throat (33.5%) and hoarseness of voice (32.9%). In spite of the fact that these voice-related symptoms are usually mild, more than one third of teachers consulted a physician for their symptoms. Hamdan et al. [11] in Beirut, Lebanon, who reported that most common voice-related symptoms among teachers were the feeling of a dry throat (33.2%), vocal fatigue (32.7%), pain in the throat (24%), frequent throat clearing (20.3%), and hoarseness (18.4%).

The prevalence of voice related symptoms varies with the methodology used and the population surveyed. In studies where data were collected through questionnaire similar to the one used in our study, the prevalence ranged from 12-26%.[51]

Russel et al.[52] reported that the most common symptom among teachers was a dry throat followed by vocal fatigue. The most common symptoms in the study reported by Simberg et al.[9] were "voice tires easily" and "hoarseness".

Yiu[8] reported that 37% of practicing teachers consulted laryngologists for their voice problems. On the other hand, Hamdan et al.[11] reported that 21% of teachers had consulted a physician for voice problem. Symptoms those were significantly associated with likelihood of consulting a specialist included a dry throat, voice loss, vocal fatigue, itchy sensation, shortness of breath, hoarseness, and feelings of pain in the throat

Differences in proportions of reported voice-related symptoms in different studies are due to different methodologies and characteristics of study sample. Moreover, Hamdan et al.[11] stated that the prevalence rates varied markedly from around 5% when auditory and perceptual judgment was used for identification to 81% when self-reported surveys are used.

The relatively high proportion of physicians' consultations made by teachers has been explained by Smith et al.[53], who noted that although vocal symptoms in teachers were invariably of benign origin, yet their impact on their daily activities such as occupational and social had been reported to be similar to those experienced by subjects with life threatening conditions.

The present study showed a significant trend in increasing prevalence of moderate to severe grade of voice handicap according to age group, with least prevalence among younger groups and highest prevalence among the eldest. This finding is in line with several studies. The prevalence of voice disorders has been reported to increase with age.[54,55] Roy et al.[40] showed that voice disorders systematically increased with age and were the most frequent in the age group of 50-59 years.

Cigarette and sheesha smoking was practiced by 17.4% of teachers in the present study in addition to the practice of other bad habits, including moaassal smoking and qat chewing. Practice of non-healthy habits (e.g., smoking of cigarette, sheesha or moaassal and qat chewing) by participant teachers in the present study was associated with significantly higher prevalence of moderate to severe grade of voice handicap.

Hamdan et al.[11] reported that the most common bad vocal habit among teachers was cigarette smoking (38.7%) which was more than the present study (17.4%). However, Yiu[8] reported

0% smoking among teachers in his study. The positive association between bad vocal habits practices and prevalence of voice-related problems has been reported by several authors. Jones et al.[36] noted that smoking shows a significant association with vocal attrition. Feierabend and Malik[20] stressed that smoking and chronic voice abuse are the most common causes of chronic laryngitis.

This study showed a significant trend in increased prevalence of moderate to severe grade of voice handicap according to experience in teaching, with least prevalence among teachers with least experience and highest prevalence among teachers with highest experience. Teachers' workload was significantly associated with grade of voice handicap, with the highest prevalence of voice handicap being among those with highest workload.

This finding is in line with the results of other studies in which teaching experience showed correlation with the prevalence of voice problems among teachers.[52,56,57] The discrepancies in the results between the different studies might be due to the different methods used and to the differences in the sizes of the study populations.[9]

The present study showed that grade of voice handicap was not significantly affected by the number of students per class, level of teaching or teacher's specialty. These findings were not in agreement with those reported by Munier and Kinsella[12], who noted that primary school teachers were particularly at risk as they have little opportunity for vocal rest during the working day. Rammage[46] added that teachers working with younger students who rely heavily on oral rather than written communication may be at higher risk for voice problems. However, others had refuted this argument.[52] Moreover, several investigators had demonstrated differences in the prevalence of voice problems based on teacher's specialty area. There is some evidence that teachers of languages or physical education are more likely to have voice problems, due to higher vocal loading factors.[49]

The present study showed significantly higher prevalence of moderate to severe grade of voice handicap which was significantly associated with psychological disorders (i.e., depression and anxiety).

These findings describe the role that psychological state play in the development of occupational voice problems. Gotaas and Starr[58] indicated psychological states as one of the factors that contributed to vocal fatigue and voice problems among teachers. Morrison et al.[59] suggested a relationship between psychological stress and patients with muscle tension dysphonia, the most common diagnosis ascribed to occupational voice users. Psychiatric interviews confirm that individuals experiencing muscle misuse voice problems often have personality features that contribute to anxiety states.[60]

The mental health implications of enduring a vocal disability are enormous. Teachers, who continue to work while suffering a vocal disability, and those who are forced to take disability leave or early retirement from their chosen profession, often suffer anxiety and depressive equivalent symptoms that require medical intervention.[61]

Conclusion

In conclusion, most teachers have voice related symptoms. The most frequently reported voice-related symptoms are dry throat, sore throat and hoarseness of voice. More than one third of the teachers consult a physician for their voice-related problems. Moderate to severe voice handicap index are experienced by 8.2% of teachers. Risk factors associated with moderate to severe grade of voice handicap are old age, practice of non-healthy habits (e.g., smoking of cigarette, sheesha or moaassal and qat chewing), longer experience in teaching, higher teachers' workload (number of classes per week), and presence of psychological disorders (i.e., depression and anxiety).

Based on the results of the present study, the following may be recommended:

- Bad vocal habits which affect vocal cords such smoking should be strictly avoided by teachers.
- Teachers should be educated regarding the prevention of voice-related morbidities.

- Teachers need to be trained and encouraged to use electronic voice amplification devices (e.g., microphones) for teaching.

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