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Original Research

Prevalence of hoarseness of voice and associated symptoms among primary school teachers in Ilala Municipal, Tanzania

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Abstract

Background: School teachers are at risk of developing hoarseness of voice due to excessive vocal use. The estimated global prevalence of hoarseness of voice is between 11% and 81% with an incidence rate of about 4 new cases per 1000 teachers per year. Most of the contributing lifestyle and work-related factors include years of teaching, grade being taught, and the number of teaching hours. The study aimed to determine the prevalence of hoarseness of voice and associated symptoms among primary school teachers in Ilala Municipal, Tanzania.

Methodology: A cross-sectional descriptive study that was conducted among primary school teachers in Ilala Municipal, Tanzania, using a quantitative approach. The study sample included 268 primary school teachers from 10 primary schools that were selected using two-stage cluster random sampling. Data were collected using self-administered questionnaire. The SPSS computer software version 20 was used for data entry and analysis.

Results: The prevalence of hoarseness of voice in the recruited participants was 42.9%. The risk of developing hoarseness of voice increased with increasing age of a teacher and with the duration of teaching ($p < 0.01$). The common symptoms associated with hoarseness of voice were vocal straining (85.8%), voice loss (58.9%), and vocal fatigue (55.3%) while the least associated symptoms were swallowing (17.4%) and breathing difficulties (21.6%).

Conclusion: The prevalence of hoarseness of voice among primary school teachers is high; implying the need for interventions to prevent and manage this occupational-related problem.

Key words: Hoarseness of voice, Primary school teachers, Tanzania

Introduction

Hoarseness of voice or dysphonia is one of the serious occupational hazards for professional voice users such as teachers, singers, preachers, bus conductors, and public speakers. School teachers in particular are at risk of developing hoarseness of voice since the voice is the main tool for delivering lessons to the students, with an annual incidence rate of 3.87 new cases per 1000 teachers (1-6). Teachers are obliged to use loud voices more frequently due to occupational factors like a large number of students in a class, increased teaching hours, and increased number of classes to teach especially in public schools (7–9). A review of voice disorders in 2014 concluded that teachers experience such problems 2 to 3 times more compared to the general population (10). In Tanzania, the average student-to-teacher ratio in 2018 was 50 students to 1 teacher at the primary school level. In addition, the average number of students per class was 70 pupils, which is about 3 times compared to the SDG target of 27 to 28 students per class. In urban schools noise pollution is another factor, as a result, teachers are at higher risk of developing hoarseness of voice (11–13).

Previous studies have reported a prevalence of voice problems among school teachers to range between

11% and 81% worldwide. The wide variation of prevalence was attributed to voice hygiene, the degree of awareness of teachers regarding voice care, the stage of the school as well as environmental, social, and behavioral factors in different parts of the world. Environmental factors contributing to the hoarseness of voice include noise within the class or around the areas of teaching. In addition to vocal loading, medical factors such as hormonal disturbances, gastrointestinal reflux diseases, recurrent upper respiratory tract infections, and hearing problems contribute to this problem. Others include psychological influences like working stress and anxiety. Also, behavioral and lifestyle factors include alcohol consumption, smoking, and drinking caffeinated drinks. Other correlated factors are female sex, age between 40 to 59 years, and family history of voice problems (7;8;14–16).

The onset of hoarseness of voice causes negative impacts on teachers like reduced job performance, absenteeism from work if voice issues persist, reduced quality of life, and restriction in social interactions (16). However despite the impacts, studies reveal that a minority of teachers have treatment-seeking behavior, few teachers have ever consulted an ENT specialist and only a small number of teachers have received information about voice care during their education (17).

Voice is produced by the movement of the vocal folds (vocal cords) which are membranous structures attached within the arytenoid and thyroid cartilages of the larynx. The vocal cords produce sound when they come together and then vibrate as air passes through them during the exhalation of air from the lungs. The vibrations cause the production of sound waves, which are perceived as voice. For the voice to be clear and normal, the vocal folds must vibrate together both systematically and regularly (1;18). Hoarseness of voice is an abnormal change to the voice affecting the volume (how loud can someone talk), and the quality and/or pitch of the voice (how high or low the voice sounds). The hoarse voice can be described as rough, raspy, breathy, strained, higher or lower in pitch, often making it harder to talk. Hoarse voice is not a disease, but rather a symptom depicting vocal cord problems (1).

Several conditions can lead to hoarseness of voice such as pathologic changes from inflammatory processes including allergies and irritants like alcohol and tobacco, infections of the upper respiratory tract like laryngitis, trauma, and vocal abuse. Neoplastic conditions like laryngeal cancer. Neuromuscular and psychiatric conditions that include nerve injury (vagus and recurrent laryngeal nerve injury), myasthenia gravis, and psychogenic aphonia. Other conditions are associated with systemic diseases like hypothyroidism and inflammatory arthritis (1;19;20). Prolonged overuse and misuse of vocal mechanisms can lead to physiological changes in the vocal folds. The changes include multiple vocal fold trauma, which commonly results in vocal fold tissue damage, tension, and fatigued muscles as well as pathologies like vocal nodules (7;20).

Hoarseness of voice can be associated with several symptoms such as throat dryness, Globus sensation, low-pitched voice, vocal fatigue, throat pain, and voice weakness (7;8). Evaluation of hoarseness of voice is done starting from proper history, and self-reported hoarseness of voice according to the individual's perception. Followed by a physical examination to assess the patient's vocal quality as well as general physical well-being (21). When hoarseness of voice is chronic (lasting more than 2 weeks) evaluation of the larynx by direct or indirect laryngoscopy is often indicated. If there is a suspicious lesion, a biopsy should be taken. Treatment for hoarseness of voice caused by vocal abuse is mainly by voice therapy or training, aiming to modify vocal behaviors to reduce laryngeal trauma. Other treatment options depend on the cause of the hoarseness of voice, for example, anti-reflux drugs for those having laryngeal reflux disease (1;6;18).

This study assessed the prevalence of hoarseness of voice in primary school teachers, other symptoms reported by the teachers with hoarseness of voice, and ascertained the relationship between the length of a teaching career and the development of hoarseness of voice.

The findings from this study will support intervention strategies such as increasing teachers' training on vocal hygiene and care as part of curricula and/or through seminars. In addition, this study will serve as the

source of evidence which may set the policies in the Ministry of Education about the number of students in the classroom, the location of the schools, and the use of public addressing systems by the primary school teachers.

Materials and methods

Study design

It was a descriptive cross-sectional study that was carried out in 10 primary schools of Ilala Municipal in Tanzania. The data were collected from February to June, 2023.

Study area, setting, and Data Analysis

The study was conducted in one of the five Municipals in Dar es Salaam, Tanzania. The area was selected because the schools are in urban populated areas with noisy environments and a high number of students which contribute to high vocal demand for teachers. The study population was teachers in public-owned primary schools.

Sample size estimation and sampling strategy

We estimated a sample size of 252 study participants. The estimate was calculated based on the formula: $n = Z^2p(1-p)/E^2$, where Z corresponds to the critical value of the normal distribution for a 95% confidence level, p is a 25% estimate of the prevalence of hoarseness of voice (7) and 8% for E, an estimated margin of error around p. We also adjusted for possible sampling errors within the clusters by the design effect of 2. We further adjusted for a 10% possibility of non-response. We used a two-stage cluster sampling to select eligible study participant. Clusters were primary schools. We selected 10 schools using systematic sampling. In the second stage, we stratified teachers by sex in order to have a representative sample of males and females. A proportionate sample of females and of males was applied.

Data collection and analysis

Data were collected using self-administered questionnaires. The questionnaire contained closed-ended questions that extracted information on the prevalence of hoarseness of voice, symptoms as well as other teaching experience related with hoarseness of voice. Data was analyzed by the SPSS version 20 software program. The relationship between the prevalence of hoarseness of voice and selected background information of teachers was assessed using the chi-square for dependence and linear trend tests.

Ethical clearance

Ethical clearance was requested from the MUHAS Institutional Review Board (IRB). Permission to conduct the study was obtained from the City council, District Education officer, and school administration officers. Informed consent was obtained from all participants. Confidentiality and privacy were observed. Participants' identities were not included in the questionnaire.

Results

Demographic characteristics of the study participants

The study had a total of 268 participants, from 10 public primary schools in Ilala municipal. Females constituted a large portion of the study participants, 189 (70.5%). The age of participants ranged from 21 to 60 years with a mean age of 39.27 (standard deviation of 9.2).

Prevalence of hoarseness of voice

Among the study participants, 115 (42.9%) teachers reported having hoarseness of voice at the time of the study.

Hoarseness of voice by characteristics of study participants

Although more females reported the hoarseness of voice 139 (73.15%), this prevalence did not differ among male study participants. Older teachers 41-60 years had a significantly higher prevalence of hoarseness of voice as compared to younger ones (p-value < 0.01). The prevalence of hoarseness of voice significantly increased with increasing years of teaching experience (16.808; $p<0.001$) (Table 1).

Table 1: The prevalence of hoarseness of voice by background characteristics of teachers **(N=268)**

Characteristics	Total	Hoarseness of voice n (%)	p-value
Respondent's age (years)			
21 - 30	57	32 (56.1)	
31 - 40	100	66 (66.0)	
41 – 50	75	65 (86.7)	
51 – 60	36	27 (75.0)	0.001[a]
Respondent's sex			
Male	79	51 (64.6)	
Female	189	139 (73.5)	0.139
Teaching experience (years)			
< 6	53	26 (49.1)	
6 – 10	54	34 (63.0)	
11 – 20	102	84 (82.4)	
21+	59	46 (78.0)	<0.001[a]
Grade taught			
1 – 3	102	67 (65.7)	
4 – 5	87	67 (77.0)	
6 – 7	76	54 (71.1)	0.366 [a]
Teaching hours per day			
< 2	64	41 (64.1)	
2 – 4	63	45 (71.4)	
5 – 6	52	40 (76.9)	
7 – 8	60	43 (71.7)	
9+	27	19 (70.4)	0.392 [a]

[a]Based on Ordinal Chi-square test

Symptoms related to hoarseness of voice

The commonest reported symptoms related to hoarseness of voice were vocal straining 163 (85.8%), voice loss 112 (58.9%), swallowing difficulties 33 (17.4%) and breathing difficulties 41 (21.6%) (Table 2).

Table 2: Reported symptoms associated with hoarseness of voice among study participants **(N=190)**

Reported symptom	n (%)
Vocal straining	163 (85.8)
Vocal fatigue	105 (55.3)
Voice loss	112 (58.9)
Acid or bitter taste in the mouth	46 (24.2)
Frequent throat clearing	94 (49.5)
Throat pain	104 (54.7)
Swallowing difficulties	33 (17.4)
Cough	103 (54.2)
Breathing difficulties	41 (21.6)

Discussion

The study showed a high prevalence of hoarseness of voice (42.9%) among primary school teachers. This prevalence is within the reported range of 10% to 80% (2;4). Similar higher prevalence, 42%, was found in Nigeria (14;22).The higher prevalence of hoarseness of voice can be ascribed to the fact that talking is one of the essential tool in this profession (7–9;21;22). The study done in Nairobi, Kenya in 2020 showed the lower prevalence (25%) of hoarseness of voice (7) and yet a lower prevalence (20%) in Egypt (7; 9). The wide variation of prevalence can be due to several reasons such as differences in study populations, methodology used, awareness regarding voice care and the definition of voice disorders (8;22).

We found the prevalence of hoarseness of voice significantly increasing with increasing age of teachers. This phenomena has been reported earlier

(20;29;30). The weakening of vocal fold muscles with age is one of the contributing factors (23-28).

The study found a statistically significant relationship between teaching years and hoarseness of voice with a p-value of <0.001, having more than 11 years of teaching was a risk factor for developing hoarseness of voice. A study done in Belgium and in Utah provinces in the United States on hoarseness of voice among teachers showed the duration of teaching as the risk factor due to cumulative voice use for several years and because as number of years increases the age of an individual also increases (17;20;30).

In this study, among symptoms related to hoarseness of voice, the commonest symptom was vocal straining (86%), followed by voice loss (5.9%), and vocal fatigue (55%). Similar previous studies like that of Nairobi, Kenya showed the commonest symptoms being throat discomfort (92%), vocal straining (60%), and vocal fatigue (50%) (7). The high prevalence of vocal straining and voice loss among teachers with hoarseness of voice could be explained by the fact that they are often required to use their voice for extended periods and project their voice to be heard by their students. This can cause strain on the vocal cords and lead to vocal fatigue, which can then result in hoarseness of voice, vocal straining, and voice loss (5 ;15;24).

The last reported symptom was swallowing difficulties (17%) and breathing difficulties (22%). The low prevalence of swallowing and breathing difficulties among teachers with hoarseness of voice could be attributed to the fact that these symptoms are less specific to voice problems and may be indicative of other health conditions. In addition, hoarseness of voice may not always be severe enough to cause significant swallowing or breathing difficulties (29). It is also possible that some teachers may not have reported these symptoms even if they were experiencing them, as they may not have been aware of the association between hoarseness of voice and swallowing or breathing difficulties (20;26).

This study has some limitations that include recall bias when reporting hoarseness of voice and associated symptoms. In addition, reported symptoms may also be associated with other ill health conditions that are not solely due to the hoarseness of voice. Furthermore, we cannot rule out desirability bias because study participants knew well the data collection team.

Conclusion

The prevalence of hoarseness of voice among primary school teachers in Ilala Municipal, Tanzania was 43%. The prevalence of hoarseness of voice was increasing with age of teachers and with advancing duration of teaching experience. The common reported symptoms of hoarseness of voice were vocal straining, voice loss, and vocal fatigue and the least associated symptoms were swallowing and breathing difficulties. More studies in Tanzania with robust design are recommended to find out the primary causes and predictors of the hoarseness of voice.

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No funding was received for the study.

Author contribution:

ERM conceived the study, administered the project, conducted a formal analysis, and wrote the first draft of the manuscript. AHM contributed to the methodology, formal analysis, writing the original draft, reviewing, and editing of the manuscript.

Consent:

Study objectives were explained and informed consent was taken from all the participants before the data collection.

Declaration of competing interest:

Authors have no conflict of interest to declare.

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