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VOICE DISORDERS AMONG SCHOOL TEACHERS AND ITS ASSOCIATION TO WORK-RELATED STRESS AND INDOOR AIR QUALITY: A CROSS-SECTIONAL STUDY

BY

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Abstract

Introduction: Voice disorders are common occupational hazards that affect teachers due to prolonged vocal demands. Recent studies suggest a strong link to environmental irritants and occupational stress. **Aim of Work:** To measure the prevalence of voice disorders among schoolteachers in Cairo, to identify possible risk factors, and to examine their association with perceived indoor air quality and work-related stress. **Materials and Methods:** An analytical cross-sectional study was conducted among 170 teachers chosen by convenience sampling from different schools located in Cairo Governorate. Participants completed a well-structured, standardized online questionnaire covering sociodemographic data, indoor air quality (Orebro-MM040), vocal symptoms, the Arabic Voice Handicap Index (VHI), and the job stress scale. **Results:** Mild and moderate voice disorders were reported by 55.3% and 11.8% of participants respectively. Throat discomfort (50.6%), vocal fatigue (49.4%) and morning hoarseness (36.5%) were a frequently complains. Various significant sociodemographic and occupational variables were detected, such as number of children, smoking status, history of allergies, educational stage taught, years of experience, and frequency of sessions per week. Additionally, poor indoor air quality was a significant factor ($p < 0.05$). Despite high average stress scores (mean 43.5 ± 6.6), no significant association was found with voice disorders. **Conclusion and Recommendations:** Voice disorders were prevalent among the studied group. Suboptimal working conditions and poor indoor air quality were significant contributing factors, highlighting the need for targeted interventions focusing on environmental improvements in schools to reduce the burden of vocal health problems among educators.

Keywords: Voice disorders, Teachers, Indoor air quality, Job stress and Voice handicap index

Introduction

Voice disorders are common conditions that impair one's ability to produce sound clearly and effectively. These disorders are often characterized by symptoms such as morning hoarseness, foreign body sensation, vocal fatigue, coughing, and dysphonia, which can result from various etiological factors such as vocal strain, respiratory infections, dry air, and other environmental conditions (Hunter et al., 2020). In occupational settings where verbal communication is fundamental, such as teaching professionals, voice disorders represent a significant public health concern due to the demands placed on educators' voices. The prevalence of voice disorders is specifically high among teachers, according to Menon et al., 2021; between 30% to 54% of schoolteachers experienced some vocal symptoms during their careers. In addition, Greis et al., 2020 reported that 54% of primary and secondary education teachers in Finland suffered from voice disorders. In Egypt, prevalence is estimated to range from 30% to 56.4%, with a considerable burden on teachers' well-being and job performance (Abdel-Hamid et al., 2020 and Zaky et al., 2021;). Voice disorders among teachers can lead to significant complications, including long-term vocal damage such as vocal cord nodules or polyps. Beyond the physical health implications, these disorders can alter teachers' professional performance, leading to increased sickness absenteeism and reduced teaching efficacy (Moreno et al., 2022). According to Niebudek et al., 2013, at least one in three teachers claimed that teaching has a detrimental effect on their voice. Furthermore, the psychological toll of chronic voice troubles, including stress and frustration, can worsen the overall impact on teachers' well-being and quality of life (Al Awaji et al., 2023). Greis et al., 2020 declared that excessive voice use and high levels of work-related stress were significant contributors. Another study emphasized the role of poor indoor air quality (IAQ), such as elevated levels of dust, mold, and air pollution, in deteriorating vocal symptoms among schoolteachers in Finland (Greis et al., 2023). In Egypt, Abdel-Hamid et al., 2020 found a strong association between indoor air pollution and the high prevalence of voice disorders among Egyptian school teachers, where inadequate ventilation and exposure to environmental pollutants are

common. Given the distinctive poor environmental conditions in Egyptian schools, particularly in public ones, such as classroom overcrowding, poor acoustic conditions, bad housekeeping, and inadequate ventilation, there is a crucial need to understand if these factors contributed to vocal health problems among them, the present work aimed to fill this gap.

Aim of Work

To measure the prevalence of voice disorders among schoolteachers in Cairo, to identify possible risk factors, and to examine their association with perceived indoor air quality and work-related stress.

Materials and Methods

Study design: An analytical cross-sectional study was conducted.

Study subjects, place, and duration:

Participants were recruited from different public and private schools located in Cairo governorate through an online questionnaire linked via Google Forms. **Inclusion criteria**: Active schoolteachers of both sexes and all age groups who were involved in teaching profession for at least one year experience was eligible for the study. **Exclusion criteria**: Individuals with prior thyroid or neck surgery, pre-existing diagnosed vocal cord pathologies, and those with incomplete responses were excluded. The study took place from January to April 2025.

Study sample: A total of 170 participants were recruited via a convenient sampling technique. Sample size was determined using the PASS 15 program, assuming a 95% confidence level, two-sided confidence interval at 0.15, and an expected voice disorders prevalence of 56.4%, based on a previous study (Abdel-Hamid et al., 2020).

Study Methods:

A well-structured, predesigned self-administered **questionnaire** was employed for data collection. The questionnaire was written in Arabic and dispersed among participants via an online Google Forms link. The questionnaire consists of four sections:

1- **First section** used to collect data about sociodemographic characteristics and occupational history, such as age, gender, marital status, working hours, and years of experience, etc.

2- **Second section** aimed to

investigate perceived indoor air quality; 11 questions adopted from the standardized Orebro-questionnaire (MM040) were employed. The questionnaire was developed by the Department of Occupational and Environmental Medicine, Sweden, and widely used in indoor air research and validated earlier (Andersson et al., 2008). Participants were questioned if they had been bothered during the last six months by any of the following: students' noise, classroom echo, other noises out of the classroom, stuffy air, humidity, irritating smell, need to shout because of the noise or outdoor activity, visible moisture spots, and dust or dirt.

3-Third section used to assess voice disorders and their impact on quality of life, we utilized a screening questionnaire consisting of questions about the occurrence of different vocal symptoms such as morning hoarseness, foreign body sensation, coughing, swallowing difficulty…. etc., voice-related diseases such as reflux, asthma, eczema etc., and their impact on professional life including sickness absenteeism, adjustment of teaching methods and decreased work ability. This questionnaire was validated and used in a previous study (Alva et al., 2017). Also, the Arabic version of Voice Handicap Index (VHI- Arab) was used to evaluate the effect of voice disorders on individual quality of life. The survey was developed and validated by Jacobson et al.,1997 and has been translated into diverse languages, including Arabic (Saleem et al., 2010). It is a 30-item self-administered questionnaire that is grouped into 3 subscales to assess the functional, emotional, and physical aspects of voice disorders. Each subscale consists of 10 statements. The answers for each statement are scored on a five-point scale as follows: 0 (never); 1 (rarely); 2 (sometimes); 3 (almost always); and 4 (always). The scores are expressed in sub-scores (0-40) and a total score (0-120), with the higher the score, the more serious the voice disorder. Based on this score, a classification system has been described to grade the severity of the voice handicap, accordingly, 0–30 is taken as the normal, 31–60 is taken as the mild, 61–90 is taken as the moderate, and 91–120 is taken as the severe handicap (Menon et al., 2018).

4-Fourth section aimed to evaluate job stress; the standardized short version of the" job stress scale" was employed. This measure was developed by Jamal

and Baba., 1992 and has been used in a previous study (Said et al., 2023). It uses 9 items to measure job stress along two dimensions. One dimension is time stress (feelings of being under constant pressure), and the second dimension is anxiety (job-related feelings of anxiety). The reliability of the scale in terms of Cronbach's α has been reported to be 0.83.

A pilot study was carried out among 15 participants to check the feasibility and relevance of the prepared questionnaire; they found the questionnaire easy to read, clear, and filled out in approximately 20 minutes. Those 15 participants were not included in the current work.

Consent

Consent was taken from all participants electronically after informing them about the study objectives and assuring that all information collected would be treated confidentially for statistical interest only.

Ethical Approval

The study was approved by the Faculty of Medicine, Ain Shams University Research Ethics Committee (Approval number: FMASU R66/2025).

Data Management

Data were collected, coded, and entered on the personal computer and analyzed using the SPSS (Statistical Package for Social Science) program version 25. Quantitative data were presented as mean and standard deviation. Qualitative data were presented as numbers and percentages. Suitable statistical tests as chi-square and independent t tests, were used according to the type of data obtained. A two-sided p-value ≤ 0.05 was considered statistically significant.

Results

Table 1: Prevalence of voice disorders and vocal symptoms among the studied group, No=170.

Vocal symptoms		Number	Percentage (%)
Voice disorders	**NO**	56	32.9
	Mild	94	55.3
	Moderate	20	11.8
Morning hoarseness	**NO**	108	63.5
	Yes	62	36.5
The voice gets strained or tired	**NO**	86	50.6
	Yes	84	49.4
The voice gets low or hoarse while talking	**NO**	108	63.5
	Yes	62	36.5
Voice breaks while talking	**NO**	107	62.9
	Yes	63	37.1
Difficulty in being heard	**NO**	94	55.3
	Yes	76	44.7
Throat clearing or coughing while talking	**NO**	129	75.9
	Yes	41	24.1
Pain, tension, or a lump in the throat	**NO**	84	49.4
	Yes	86	50.6

Table 1 showed that more than half of the participants (55.3%) suffered from mild voice disorders, and 11.8% were moderately affected. More than one-third of teachers complained of morning hoarseness or experienced hoarseness while talking, necessitating breaks during teaching. Almost half of the teachers reported voice tiredness, difficulty being heard in class, and pain or tension in the throat.

Table 2: Sociodemographic characteristics, chronic comorbidities, and their associations with voice disorders among the studied group, No=170.

Sociodemographic characteristics		Number (%)	NO voice disorders	Voice disorders	χ^2	p
Age	**Mean ±SD**	35.46 ± 7.3	36.48±8.2	34.12±6.7	1.9#	0.06
Gender	**Males**	121 (71.2)	39(32.2)	82(67.8)	0.1	0.8
	Females	49 (28.8)	17(34.7)	32(65.3)		
Marital status	**Single**	41 (24.1)	12(29.3)	29(70.7)	1.1	0.8
	Married	120 (70.6)	42(35)	78(65)		
	Divorced	8 (4.7)	2(25)	6(75)		
	Widowed	1 (0.6)	-	1(100)		
Number of children	**Mean ±SD**	2.19 ± 1.7	1.6 ±1.2	2.5 ± 1.8	-3.5#	**<0.001***
Smoking status	**Never smoke**	126 (74.1)	53(42.1)	73(57.9)	18.4	**<0.001***
	Ex-smoker	22 (12.9)	2(9.1)	20(90.9)		
	Current smoker	22 (12.9)	1(4.5)	21(95.5)		
Pets at home	**Yes**	54 (31.8)	18(33.3)	36(66.7)	0.006	0.9
Chronic comorbidities						
Asthma	**Yes**	10 (5.9)	1 (10)	9 (90)	##	0.2
Allergic rhinitis	**Yes**	23 (13.5)	4 (17.4)	19 (82.6)	2.9	0.08
Any type of allergy	**Yes**	55 (32.4)	8 (14.5)	47 (85.5)	12.5	**<0.001***
Atopic eczema	**Yes**	8 (4.7)	1 (12.5)	7 (87.5)	##	0.3
Reflux disease	**Yes**	21 (12.4)	3 (13.4)	18 (85.7)	3.8	0.05
Anxiety disorders	**Yes**	46 (27.1)	2 (4.3)	44 (95.7)	23.3	**<0.001***
Laryngitis	**Yes**	24 (14.1)	5 (20.8)	19 (79.2)	1.9	0.2

*: Statistically significant #:t independent test ##: fisher exact test

Table 2 revealed that the mean age of studied participants was 35.46 ± 7.3. The majority was males (71.2%), married (70.6%), and had never smoked (74.1%). Additionally, there were significant associations between the number of children, smoking status, positive history of allergies, anxiety disorders, and experience of voice disorders.

Table 3: Profession characteristics of the studied sample and its association with voice disorders, No=170.

Professional characteristics		Number (%)	NO voice disorders	Voice disorders	χ^2	p
Educational stage	**Lower grades**	51 (30)	9 (17.6)	42 (82.4)	7.7	**0.005***
	Higher grades	119 (70)	47 (39.5)	72 (60.5)		
Teaching experience /years	**≤ 10**	115 (67.6)	27 (23.5)	88 (76.5)	14.4	**<0.001***
	More than ten	55 (32.4)	29 (52.7)	26 (47.3)		
Working hours/ week	**Mean ±SD**	28.27 ± 7.7	29.1± 8.5	27.9 ±7.2	1.02#	0.3
Employment status	**Part-time**	128 (75.3)	78 (60.9)	50 (39.1)	8.8	**0.003***
	Full time	42 (24.7)	6 (14.3)	36 (85.7)		
Teaching subject	**Math**	30 (17.6)	10(33.3)	20(66.7)	1.6	0.8
	Science	40 (23.5)	11(27.5)	29(72.5)		
	Arabic & Religion	51 (30)	17(33.3)	34(66.7)		
	English	41 (24.1)	14(34.1)	27(65.9)		
	Others	8 (4.7)	4(50)	4(50)		
Number of consecutive lessons per day	**None**	17 (10)	2(11.8)	15(88.2)	3.5	0.06
	Two lessons	71 (41.8)	23(32.4)	48(67.6)		
	≥ 3lessons	82 (48.2)	31(37.8)	51(62.2)		
Number of sessions per week	**≤10**	51 (30)	46(90.2)	5(9.8)	17.6	**<0.001***
	> 10	119 (70)	51(42.9)	68(57.1)		
Number of students in the class	**>20**	26 (15.3)	5(19.2)	21(80.8)	5.7	0.06
	20-40	76 (44.7)	22(28.9)	54(71.1)		
	More than 40	68 (40)	29(42.6)	39(57.4)		
Your voice level in class	**Low**	58 (34.1)	30(51.7)	28(48.3)	10.5	**0.001***
	Moderate	86 (50.6)	24(27.9)	62(72.1)		
	High	26 (15.3)	4(15.4)	22(84.6)		
Vocal rest after a school day	**Yes**	162 (95.3)	56 (34.6)	106 (65.4)	##	0.05

*: Statistically significant #:t independent test ##: fisher exact test

Table 3 illustrated that approximately three-quarters of teachers taught at higher stages, part-time workers, and utilized both multimedia and boards as teaching methods (70%, 75.3%, and 85.3%, respectively). More than half of the teachers had ten years of teaching experience or less. Most participants conducted from ten to twenty sessions per week, and half of them maintained moderate voice levels in class. Furthermore, statistically significant associations were found between voice disorders and various occupational factors, including educational stage, years of experience, employment status, frequency of sessions per week, and voice level in class.

Table 4: Indoor air quality, total stress score, and their associations with voice disorders among the studied group, No=170.

Indoor air quality parameters		Number (%)	NO voice disorders	Voice disorders	χ^2	p
Students noise	**Yes**	53 (31.2)	15(28.3)	38 (71.7)	0.8	0.4
Classroom echo	**Yes**	34 (20)	8 (23.5)	26 (76.5)	1.7	0.2
Other noises out of the class	**Yes**	65 (38.2)	19 (29.2)	46 (70.8)	0.7	0.4
Bad stuffy air	**Yes**	88 (51.8)	42 (47.7)	46 (52.3)	18.1	**<0.001***
Classroom humidity	**Yes**	84 (49.4)	34 (40.5)	50 (59.5)	4.3	**0.04***
Irritating smell in the classroom	**Yes**	97 (57.1)	46 (47.4)	51 (52.6)	21.4	**<0.001***
Shout to be heard (due to noise)	**Yes**	41 (24.1)	9 (22)	32 (78)	2.95	0.09
Need to shout due to an extensive outdoor activity	**Yes**	49 (28.8)	10 (20.4)	39 (79.6)	4.9	**0.03***
Insufficient ventilation	**Yes**	102 (60)	42 (41.2)	60 (58.8)	7.8	**0.005***
Visible moisture spots	**Yes**	87 (51.2)	41 (47.1)	46 (52.9)	16.2	**<0.001***
Dust or dirt	**Yes**	91 (53.5)	43 (47.3)	48 (52.7)	18.2	**<0.001***
Total stress score	**Mean ± SD**	**Min – Max**	**NO voice disorders**	**Voice disorders**	**t**	**p**
	43.5 ± 6.6	13-61	45.6 ± 6.2	42.5 ± 6.5	3	0.3

*: Statistically significant

As shown in Table 4, about one-third of participants reported noise disturbances both inside (31.2%) and outside (38.2%) the classroom. Nearly half of them expressed concerns about poor air quality, including humidity, irritating smell, insufficient ventilation, visible moisture, and dust. Around a quarter reported experiencing classroom echo and the need to raise their voices to be heard. Additionally, statistically significant associations were found between voice disorders and poor air quality parameters such as humidity, irritating smell, insufficient ventilation, visible moisture, and dust in classes ($p < 0.05$). Despite the high mean scores for total stress (43.5 ± 6.6) among participants, it wasn't significantly associated with voice disorders.

Table 5: Impact of voice disorders on professional life among the studied sample, No=170.

Teacher's professional life		NO voice disorders	Voice disorders	χ^2	p	OR (95%CI)
Absenteeism from work	**Yes**	3(17.6)	14 (82.4)	2	0.2	2.5 (0.9-8.9)
Adjustment of teaching methods	**Yes**	51 (37.5)	85 (62.5)	6.4	**0.01***	0.3 (0.1-0.8)
Job dissatisfaction	**Yes**	7 (20.6)	27 (79.4)	2.9	0.09	2.2 (0.9-5.4)
Decreased workability	**Yes**	9 (22.5)	31 (77.5)	2.6	0.1	1.9 (0.9-4.4)

*: Statistically significant

Table 5 revealed a significant association between voice disorders and the need to adjust teaching methods (p = 0.01). Although participants with voice disorders reported a higher percentage of work absenteeism, job dissatisfaction, and decreased work ability, it did not reach a significant level.

Discussion

This cross-sectional study offers valuable insights into voice disorders among Egyptian schoolteachers, addressing three key objectives: prevalence measurement, demographic and professional associations, and the impact of job stress and indoor air quality (IAQ). The findings of the current study, as shown in Table 1, revealed a substantial burden of voice disorders among studied participants, with 55.3% reporting mild symptoms and 11.8% experiencing moderate manifestations. A cross-sectional study done by Abdel-Hamid et al., 2020 involving 225 primary school teachers in Egypt supported these results. About 56% of the studied teachers experienced vocal problems throughout their careers, with 55.1% facing issues annually and 31.1% reporting problems at a particular point in time. These rates aligned as well with international studies, including those from China (47.9%) and Spain (59%) (Lingyu et al., 2019; Bermúdez de Alvear et al., 2011),

although they surpassed Iran's lower prevalence rate (27.2%) (Ghayoumi-Anaraki et al., 2020). Additionally, a recent study conducted among teachers in Saudi Arabia reported a high prevalence of voice disorders, with 57.1% of participants experienced symptoms based on the Vocal Handicap Index (VHI) questionnaire, further underscoring the global occupational challenge faced by teachers (Alharbi et al., 2024).

A concerning proportion of teachers (over one-third) reported morning hoarseness or vocal fatigue severe enough to necessitate teaching interruptions Moreover, approximately half of them reported work-related vocal challenges, including persistent vocal exhaustion, difficulty being heard, and throat discomfort (Table 2). These findings demonstrated notable parallels with international research on teacher vocal health. Chinese teachers mostly reported hoarseness as their primary complaint, despite clinical diagnoses typically revealing chronic laryngitis or vocal cord lesions (Lingyu et al., 2019). Spanish teaching professionals showed comparable patterns, with 60% experiencing end-of-day vocal exhaustion and 55% reporting hoarseness (Bermúdez de Alvear et al., 2011). Indian studies detected similar symptom profiles, highlighting dry throat, vocal fatigue, musculoskeletal tension, and voice projection difficulties as predominant concerns (Devadas et al., 2017). Moreover, a study conducted in Saudi Arabia identified hoarseness, throat dryness, and pharyngeal pain as primary complaints, reinforcing this global pattern of occupation-related vocal pathology among teachers (Alharbi et al., 2024).

No significant association between gender and voice disorders as shown among the studied group (Table 2), aligning with the results of Munier and Kinsella., 2008. In contrast, other studies reported a greater vulnerability among female teachers (de Jong et al., 2006; Trinite, 2017). This was explained by physiological factors, such as women's naturally shorter vocal folds, which produce higher-pitched voices, making them more prone to vocal strain (Abdel-Hamid et al., 2020). It is worth noting, however, that the predominance of male participants in our sample (71.2%) might explain this contrast, especially when compared to female-dominated teaching populations.

The present study identified

several key risk factors, including the number of children, teachers with voice disorders had significantly higher numbers compared to those without voice disorders (2.5 ± 1.8 vs. 1.6 ± 1.2, $t = -3.5$, $p < 0.001$), as illustrated in Table 2. This suggests that having more children might be associated with an increased risk of developing voice disorders, possibly due to higher vocal demand or stress at home. While this study, along with the work of Alrahim et al., 2018 and Malki, 2010 identified smoking as a risk factor (Table 2), the contradictory findings by Byeon, 2019 suggested that this relationship warranted further investigation. The current results also aligned with a comprehensive systematic review and meta-analysis of 23 studies (No=73,609 teachers across 14 countries) smoking (OR=1.31) as a significant risk factor (Jiang et al.,2024). Furthermore, teachers with allergic conditions faced significantly higher risks of developing voice disorders, as confirmed by our findings and prior studies by Roy et al., 2005 and Devadas et al., 2017. These medical conditions, when combined with the vocal demands of teaching, often lead to laryngitis, vocal cord inflammation, and progressive voice deterioration, resulting in increased vocal fatigue (Abdel-Hamid et al.,2020). The present work revealed a significant anxiety-voice disorder connection in teachers, echoing Shoeib et al., (2012) findings of heightened anxiety among dysphonic female educators. The strong relationship between self-reported voice problems and anxiety symptoms underscores the necessity for dual-focus interventions combining voice therapy and psychological support services to manage concurrent anxiety. Voice disorders and anxiety are often linked because the stress of vocal strain can exacerbate feelings of anxiety, while anxiety can worsen voice problems through tension and strain in the vocal cords.

There was a significant association between voice disorders and multiple occupational factors among the studied group (Table 3). This included educational stage taught, years of experience, employment status, weekly session frequency, and vocal intensity during instruction. Study participants of lower grades had a significantly higher prevalence of voice disorders compared to those teaching higher grades. This was consistent with previous research showing that elementary school teachers, especially those teaching

grade four or below, faced a greater risk of voice problems compared to their secondary-level counterparts (Leão et al., 2015; da Rocha et al., 2017). The increased vocal strain required to manage younger students contributed to this heightened vulnerability. Moreover, these findings resonated with previous research by Byeon, 2019 and de Sousa et al., 2019 confirming that occupational factors, including high weekly teaching loads and extended teaching durations, substantially increase vocal strain. Notably, prolonged teaching experience emerged as a strong predictor of voice problems, this contrasted with the present study findings and Alharbi et al., 2024**.** The difference might stem from less experienced teachers struggling with workload and vocal stress, lacking coping mechanisms, and overusing their voices due to enthusiasm without proper vocal care. In line with previous studies reporting an association between hoarseness and exposure to intolerable outdoor air pollution in large urban environments (Korn et al., 2019), the present work added further evidence to the growing body of literature highlighting the role of indoor environmental factors in the development of voice disorders (Table 4). This was consistent with the findings of Kallvik et al., 2016, and Putus et al., 2024; who did a study on voice disorders among teachers and indoor air quality in schools and pupils in Finland. They demonstrated a significant association between the occurrence of voice symptoms and poor indoor air quality, including humidity, irritating smells, insufficient ventilation, visible moisture, and dust. These findings suggested that indoor air contaminants, such as visible signs of moisture damage, mold growth, or mold odor, might contribute to hoarseness in educational settings.

The absence of a statistically significant association between total stress levels and voice disorders among the studied group, despite a relatively high mean stress score (43.5 ± 6.6), warrants careful interpretation. While stress is widely recognized as a contributing factor to voice problems (Greis et al., 2020), its impact could be more indirect or context-dependent, as stress is a multifaceted factor that interacts with other factors such as workload, work environment, and personal coping mechanisms, making it a complex factor that may require a comprehensive approach to investigate its full impact. A significant association

was found between voice disorders among the studied group and the need to modify teaching methods (Table 5), indicating that voice problems could interfere with teachers' ability to deliver lessons effectively. Similar results were reported by Abdel-Hamid et al. 2020. It's worth mentioning that while participants with voice disorders reported higher absenteeism, job dissatisfaction, and reduced work ability, these differences were not statistically significant. Alva et al.,2017 confirmed a strong association between voice disorders and sickness absenteeism, with many teachers taking days off work being those with voice problems. This aligned with the present study's trend, where teachers with voice disorders were more likely to report absenteeism, although the association in our sample did not reach statistical significance. This suggests that while voice issues impacted teachers' teaching methods, the effects on absenteeism, work ability, and job performance might be influenced by other factors such as coping strategies and organizational support.

Conclusion and Recommendations:

Voice disorders were prevalent among study participants, with poor indoor air quality emerging as a key contributing factor. This underscores the need for targeted interventions aimed at enhancing school environmental conditions to help alleviate vocal health problems in educators. To prevent voice disorders among teachers, schools should enhance classroom conditions. Regular voice check-ups and vocal hygiene training should be part of teacher wellness programs. Additionally, voice care education should be incorporated into teacher preparation courses to foster early prevention.

Study limitations: While this study offers valuable insights regards voice disorders among schoolteacher in Cairo, Egypt, a few limitations should be considered. The cross-sectional design limits causal inferences. Also, relying on convenient sampling might potentially affect the generalization of results.

Conflicts of interest

The authors declared that they have no conflicts of interest.

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References

1. Abdel-Hamid MA, Fahmy VF, Momen MA and Elokda EE (2020): Risk Factors and Impact of Voice Disorders. EJCM; 38(1):33-41.
2. Al Awaji N, Alghamdi K, Alfaris A, Alzamil R, Alhijji L, et al. (2023): Measuring Perceived Voice Disorders and Quality of Life among Female University Teaching Faculty. J Pers Med; 13(11):1568. DOI: 10.3390/ jpm13111568.
3. Alharbi N, Alotaibi S, Alnughaythir A, Abohelaibah F, Alruways A et al. (2024): Prevalence and Risk Factors of Voice Disorders Among Teachers in Saudi Arabia. Cureus; 16(3):e56540. https:// doi.org/10.7759/ CUREUS.56540.
4. Alrahim A, Alanazi R and Al-Bar M (2018): Hoarseness among schoolteachers: A cross-sectional study from Dammam, JFCM; 25(3):205–10. https://doi.org/10.4103/JFCM. JFCM_152_17.
5. Alva A, Machado M, Bhojwani K and Sreedharan S (2017): Study of Risk Factors for Development of Voice Disorders and its Impact on the Quality of Life of School Teachers in India. JCDR; 11(1):MC01–MC05.https:// doi. org/10.7860/JCDR/2017/17313.9234.
6. Andersson K, Stridh G, Fagerlund I and Aslaksen W (2008): The MM-questionnaires – A tool when solving indoor climate problems. Department of Occupational and Environmental Medicine, http://www.orebroll.se/upload/USO/ YMK/Dokument/Reference3eng.pdf.
7. Bermúdez de Alvear RM, Barón FJ and Martínez AG (2011): School teachers' vocal use, risk factors, and voice disorder prevalence: guidelines to detect teachers with current voice problems. Folia Phoniatr Logop; 63(4):209–15. https:// doi.org/10.1159/000316310.
8. Byeon H (2019): The Risk Factors Related to Voice Disorder in Teachers: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health; 16(19):3675. https:// doi. org/10.3390/IJERPH16193675.
9. da Rocha LM, de Lima Bach S, do Amaral PL and Behlau M (2017): Risk Factors for the Incidence of Perceived Voice Disorders in Elementary and Middle School Teachers. J Voice; 31(2): 258.e7-e12. https:// doi. org/10.1016/J.JVOICE.2016.05.018.
10. de Jong FICRS, Kooijman PGC, Thomas G, Huinck WJ, Graamans K, Schutte HK (2006): Epidemiology of voice problems in Dutch teachers. Folia Phoniatr Logop; 58(3):186–198. https://doi.org/10.1159/000091732.
11. de Sousa E, Goel H and Fernandes V (2019): Study of Voice Disorders Among School Teachers in Goa. Indian J Otolaryngol; 71(Suppl 1):679.https://doi.org/10.1007/S12070-018-1479-0.
12. Devadas U, Bellur R and Maruthy S (2017): Prevalence and Risk Factors of Voice Problems Among Primary School Teachers in India. J Voice; 31(1): 117.e1-.e10. https://doi. org/10.1016/J.JVOICE.2016.03.006.
13. Ghayoumi-Anaraki Z, Heidarian-Miri H, Zainaee S, Rahmani S, Haresabadi F and Hosseini SZ (2020): Prevalence and Risk Factors of Voice Disorders in University Teaching Faculty Members: A Pilot Study. JRSR; 7(4):173–7. https://doi.org/10.30476/ JRSR.2020.84361.1107.
14. Greis H, Löyttyniemi E and Uitti J (2020): Voice Disorders are Associated with Stress Among Teachers: A Cross-Sectional Study in Finland. J Voice; 34(3): 488.e1-.e8. DOI: 10.1016/j.jvoice.2018.08.021.
15. Greis H, Löyttyniemi E, Uitti J and Putus T (2023): Self-reported voice disorders of teachers and indoor air quality in schools: a cross-sectional study in Finland.

Logoped Phoniatr Vocol; 48(1):1-11. DOI: 10.1080/14015439.2021.1953132.

16. Hunter E, Leer C, Mersbergen M, Sandage M and Whitling S (2020): Toward a consensus description of vocal effort, vocal load, vocal loading, and vocal fatigue. J Speech Lang Hear Res; 63(2):509-32. DOI: 10.1044/2019_JSLHR-19-00057.
17. Jacobson B, Johnson A, Grywalski C, Silbergleit A and Jacobson G (1997): The Voice Handicap Index (VHI): development and validation. Am J Speech Lang Pathol; 6:66–70.
18. Jamal M and Baba VV (1992): Shiftwork and department type related to job stress, work attitudes and behavioral intentions: A study of nurses. J Organ Behav; 13:449–64. http://dx.doi.org/10.1002/(ISSN)1099-1379.
19. Jiang G, Xu X, Yu K, Tang G, Yang R et al. (2024): The Risk Factors of Voice Disorders in Non-University Teachers: A Systematic Review and Meta-Analysis. J Voice. https://doi.org/10.1016/J.JVOICE.2024.10.023.
20. Kallvik E, Putus T and Simberg S (2016): Indoor Air Problems and Hoarseness in Children. J Voice; 30:109–13. https:// doi.org/10.1016/j.jvoice.2015.02.012.
21. Korn GP, Villar AC and Azevedo RR (2019): Hoarseness and vocal tract discomfort and associated risk factors in air traffic controllers. Braz J Otorhinolaryngol; 85(3):329–36. https://doi.org/10.1016/J.BJORL.2018.02.009.
22. Leão SH, Oates JM, Purdy SC, Scott D and Morton RP (2015): Voice Problems in New Zealand Teachers: A National Survey. J Voice; 29(5): 645.e1-.e13. https:// doi.org/10.1016/J.JVOICE.2014.11.004.
23. Lingyu Yu, Dan Lu, Hui Yang, Jian Zou, Haiyang Wang et al. (2019): A comparative and correlative study of the Voice-Related Quality of Life (V-RQOL) and the Voice Activity and Participation Profile (VAPP) for voice-related quality of life among teachers with and without voice disorders. Medicine; 98(9):e14491. https://doi.org/10.1097/MD.0000000000014491.
24. Malki K (2010): Voice disorders among Saudi teachers in Riyadh City. Saudi J Otorhinolaryngol Head Neck Surg; 12(2):31.
25. Menon U, Venugopal S, Chirayil D and Bhaskaran R (2018): Voice Handicap Index Severity Grading: Do We Need to Recalibrate it for the Indian Population? IJOPL; 8(2): 71-3. https://doi.org/10.5005/jp-journals-10023-1160.
26. Menon UK, Raj M, Antony L, Soman S and Bhaskaran R (2021): Prevalence of Voice Disorders in School Teachers in a District in South India. J Voice; 35(1):1-8. DOI: 10.1016/j.jvoice.2019.07.005.
27. Moreno M, Calvache C and Cantor-Cutiva LC (2022): Systematic review of literature on prevalence of vocal fatigue among teachers. J Voice. In press. http://doi.org/10.1016/j.jvoice.2022.07.029. PMid:36137877.
28. Munier C and Kinsella R (2008): The prevalence and impact of voice problems in primary school teachers. Occup Med; 58(1):74–6. https://doi.org/10.1093/OCCMED/KQM104.
29. Niebudek-Bogusz E and Sliwinska-Kowalska M (2013): An overview of occupational voice disorders in Poland. IJOMEH; 26(5):659–69. DOI: 10.2478/s13382-013-0146-7.
30. Putus T, Vilén L and Atosuo J (2024): The Association Between Work-related Stress, Indoor Air Quality and Voice Problems Among Teachers - Is There a Trend? J Voice; 38(2): 541.e21-.e29. https:// doi.org/10.1016/j.jvoice.2021.09.007.
31. Roy N, Merrill RM, Gray SD and Smith EM (2005): Voice Disorders in the General Population: Prevalence, Risk Factors, and Occupational Impact. The Laryngoscope; 115(11):1988–95. https://doi.org/10.1097/01.MLG.0000179174.32345.41.
32. Said DS, Agarwal S, Alzoubi YI, Momin MM and Naqvi A (2023): Occupational stress among Generation-Y employees in the era of

COVID-19: cases from universities in India. ICT; 55(2):234-52.https://doi.org/10.1108/ICT-03-2022-0017.

33. Saleem AF and Natour YS (2010): Standardization of the Arabic version of the Voice Handicap Index: an investigation of validity and reliability. Logoped Phoniatr Vocol; 35:183–8.
34. Shoeib RM, Nassar JF and Ghandour HH (2012): Anxiety in female teachers with dysphonia: correlation between the voice handicap index and anxiety state. EJO; 28:142–8. https:/doi.org/10.7123/01.EJO.0000413577.72909.80.
35. Trinite B (2017): Epidemiology of Voice Disorders in Latvian School Teachers. J Voice; 31(4): 508.e1-508.e9. https://doi.org/10.1016/J.JVOICE.2016.10.014.
36. Zaky E, Mamdouh H, Maher A and Khalaf Z (2021): Comparison between male and female teachers in Egyptian primary schools regarding the effect of teaching on their voice. EJO; 36:1-10.