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Evaluation of voice disorders among school teachers: A cross-sectional hospital-based observational study.

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Abstract

Background:
Teachers constitute one of the most voice-dependent professional groups, frequently exposed to vocal strain and suboptimal acoustic environments. Voice disorders among teachers not only affect occupational performance but also overall quality of life. Early identification and preventive measures are essential to mitigate long-term morbidity.

Objectives:
To evaluate the prevalence, clinical profile, and occupational determinants of voice disorders among school teachers attending the ENT department of a tertiary care hospital.

Methods:
A hospital-based observational study was conducted among 50 school teachers presenting with or without vocal complaints. Detailed demographic, occupational, and clinical data were collected using a structured questionnaire. Laryngoscopic examination was performed to confirm the diagnosis. The relationship between occupational factors and voice disorders was analyzed using the Chi-square test, with $p < 0.05$ considered statistically significant.

Results:
The mean age of participants was 38.4 ± 8.6 years, with a predominance of females (74%). Most teachers (62%) had teaching experience exceeding 10 years. Vocal symptoms were reported by 64% of participants, while 56% had confirmed voice disorders. The most common complaints included hoarseness (40%), vocal fatigue (32%), and throat dryness (28%). Laryngoscopy revealed vocal nodules (32.1%), vocal cord edema (21.4%), and chronic laryngitis (17.9%) as the leading findings. Significant associations were observed between voice disorders and teaching more than 5 hours per day ($p = 0.002$), lack of microphone use ($p = 0.01$), and noisy classroom environments ($p = 0.03$).

Conclusion:
Voice disorders are highly prevalent among school teachers, largely influenced by occupational load and adverse vocal hygiene practices. Regular screening, vocal health education, and ergonomic modifications in classrooms are essential for prevention and early intervention.

Recommendations:
Implement routine voice screening, promote vocal hygiene awareness, encourage microphone use, and ensure acoustically optimized classrooms to reduce vocal strain.

Keywords: *Voice disorders, Teachers, Hoarseness, Vocal nodules, Occupational risk factors, Laryngoscopy, Vocal hygiene, Vocal fatigue, School environment, Voice care*
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Introduction

The human voice is a fundamental instrument of communication, and for teachers, it represents the core medium of professional expression and instruction. Teaching is universally acknowledged as a voice-intensive occupation, with educators frequently speaking for prolonged durations in suboptimal acoustic conditions. Such constant vocal demands predispose them to phonotrauma and a broad spectrum of voice disorders, ultimately affecting both occupational efficiency and overall quality of life [1,2].

Globally, the burden of voice disorders among teachers has been well documented. A recent meta-analysis reported a pooled worldwide prevalence of approximately 50%, underscoring the magnitude of this occupational health issue [1]. Studies from South Asia and Latin America have similarly highlighted high prevalence rates ranging between 30% and 80%, depending on population demographics and diagnostic methods employed [2–4]. This elevated frequency is largely attributed to sustained vocal strain, poor classroom acoustics, lack of amplification devices, and limited awareness of vocal hygiene [3–5].

Teachers often overlook early symptoms such as hoarseness, vocal fatigue, or throat discomfort, attributing them to normal occupational strain rather than early signs of pathology [4,5]. Prolonged neglect may lead to chronic inflammatory or structural changes in the vocal folds, resulting in disorders such as vocal nodules, edema, and chronic laryngitis. Such conditions are known to impair teaching quality, contribute to absenteeism, and in severe cases, necessitate early retirement [3,5].

Given the substantial professional reliance on vocal function and the under-recognized nature of this problem, particularly in developing countries, there is a pressing need for systematic evaluation. Therefore, the present hospital-based observational study was designed to assess the prevalence, clinical profile, and occupational risk factors associated with voice disorders among school teachers.

Methodology

Study Design and Setting:

This study followed a cross-sectional, hospital-based observational design, aimed at assessing the prevalence and clinical profile of voice disorders among school teachers. The research was conducted in the Department of ENT, Malla Reddy Medical College for Women (MRMCW), Hyderabad, a large tertiary-care teaching institution that caters to a wide urban and semi-urban population. The college hosts a busy outpatient ENT service equipped with diagnostic laryngoscopy facilities, allowing systematic evaluation of teachers presenting with voice-related concerns. The study period extended from April 2024 to March 2025.

Malla Reddy Medical College for Women is a 750-bed tertiary-level teaching hospital affiliated with the Kaloji Narayana Rao University of Health Sciences. The institution provides comprehensive medical and surgical services and functions as a major referral center in northern Hyderabad. Its ENT department includes dedicated voice clinics, fiberoptic laryngoscopy units, and trained faculty, making it a suitable setting for evaluating occupational voice disorders among teachers.

Study Population:

The study included 50 school teachers who attended the ENT outpatient department, either with voice-related complaints or for general evaluation. Participants represented both government and private schools within the Hyderabad region.

Inclusion Criteria:

School teachers aged between 21 and 60 years.
Minimum teaching experience of one year.
Willingness to participate and provide informed consent.

Exclusion Criteria:

History of recent upper respiratory tract infection (within two weeks).
Previous laryngeal surgery, trauma, or known vocal cord paralysis.
Neurological or systemic diseases affecting voice (e.g., Parkinsonism, hypothyroidism).
Current smokers or individuals with significant alcohol intake.

Data Collection Procedure:

After obtaining institutional ethical clearance, participants were evaluated using a structured proforma that included demographic details, occupational history, duration of teaching, daily teaching hours, classroom environment, use of microphones, and hydration habits. A detailed history of vocal symptoms such as hoarseness, vocal fatigue, throat pain, dryness, and pitch changes was documented.

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Clinical and Laryngoscopic Evaluation:

All participants underwent a thorough ENT examination, including indirect laryngoscopy or rigid/flexible fiberoptic laryngoscopy, to assess vocal fold morphology and function. Findings were categorized into conditions such as vocal nodules, edema, laryngitis, muscle tension dysphonia, or normal functional disorders.

Bias-Identification and Mitigation

Several steps were taken to minimize potential bias during data collection and analysis.

Selection bias was reduced by including all eligible teachers who attended the ENT outpatient department during the study period, regardless of whether they had voice symptoms.

Recall bias related to occupational habits was addressed by using a structured questionnaire with simple, time-anchored questions about daily teaching hours, hydration, and microphone use.

Observer bias during laryngoscopic assessment was minimized by ensuring that all examinations were performed by the same experienced ENT specialist using standardized evaluation criteria.

Information bias was reduced by verifying clinical symptoms with objective laryngoscopic findings rather than relying solely on self-reported complaints.

Together, these measures helped improve the reliability and internal validity of the study findings.

Statistical Analysis:

Data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Descriptive statistics were expressed as mean ± standard deviation and percentages. The Chi-square test was applied to assess associations between occupational risk factors and the presence of voice disorders. A p-value < 0.05 was considered statistically significant.

Ethical Considerations:

Ethical approval was obtained from the Institutional Ethics Committee, Malla Reddy Medical College for Women, Hyderabad. Written informed consent was obtained from all participants before inclusion, ensuring confidentiality and voluntary participation.

Results

Participant Flow

A total of 62 school teachers attended the ENT outpatient department during the study period and were initially assessed for potential eligibility. Among them, 56 teachers met the basic inclusion criteria. After applying the exclusion criteria, 6 teachers were excluded (3 with recent upper respiratory infections, 2 with a history of prior laryngeal surgery, and 1 with a known neurological disease affecting voice). Thus, 50 teachers were confirmed eligible and were included in the final analysis. No participants withdrew after enrollment, and all provided complete clinical and laryngoscopic data for statistical evaluation (**Figure 1)**.

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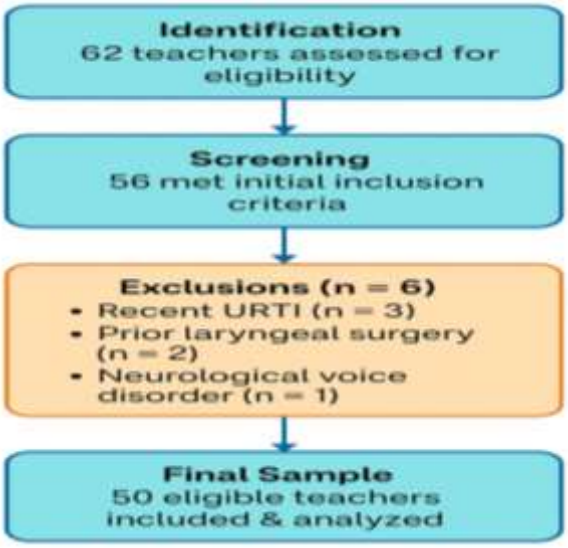

Figure 1. Participant Flow Diagram

A total of 50 school teachers participated in the present hospital-based observational study. The sociodemographic profile of the participants is presented in Table 1. The mean age of the study population was 38.4 ± 8.6 years, with the majority belonging to the 31–40 years age group (36%), followed by the 41–50 years age group (28%). Females predominated, accounting for nearly three-fourths of the participants (74%). Most teachers had 5–20 years of teaching experience, and the largest subgroup was engaged in primary-level education (44%).

Table 1. Sociodemographic Characteristics of Study Participants (n = 50)

Parameter	Category	n (%)
Age (years)	21–30	10 (20.0)
	31–40	18 (36.0)
	41–50	14 (28.0)
	> 50	8 (16.0)
Gender	Female	37 (74.0)
	Male	13 (26.0)
Teaching Experience (years)	< 5	9 (18.0)
	5–10	16 (32.0)
	11–20	15 (30.0)
	> 20	10 (20.0)
Teaching Level	Primary	22 (44.0)
	Secondary	18 (36.0)
	Higher Secondary	10 (20.0)

The prevalence and clinical presentation of voice-related symptoms are summarized in Table 2. Vocal symptoms were reported by 64% of participants, whereas 56% had clinically confirmed voice disorders. The most frequently reported symptoms were hoarseness (40%), vocal fatigue (32%), and throat pain or dryness (28%), with 20% of teachers experiencing symptoms for more than three months, suggestive of chronicity.

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Table 2. Prevalence and Clinical Spectrum of Voice Disorders

Variable	n (%)
Teachers reporting any vocal symptoms	32 (64.0)
Clinically confirmed voice disorder	28 (56.0)
Common presenting symptoms	
Hoarseness	20 (40.0)
Vocal fatigue	16 (32.0)
Throat pain/dryness	14 (28.0)
Pitch breaks	6 (12.0)
Duration of symptoms > 3 months	10 (20.0)

Among the 28 teachers diagnosed with voice disorders, laryngoscopic evaluation revealed a spectrum of lesions as detailed in Figure 1. Vocal nodules were the predominant finding (32.1%), followed by vocal cord edema (21.4%) and chronic laryngitis (17.9%). Muscle tension dysphonia was observed in 14.3% of affected teachers, while 7.1% each presented with either vocal cord polyp/cyst or functional dysphonia with normal laryngeal morphology (Figure 2).

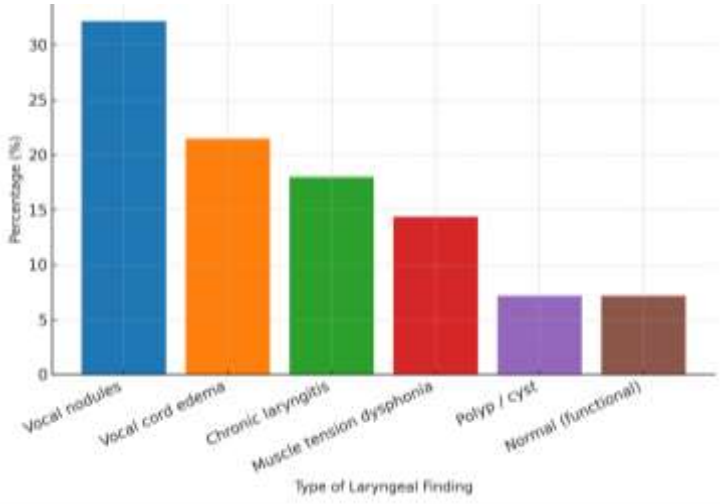

Figure 2: Laryngoscopic Findings among Teachers with Voice Disorders

An analysis of occupational risk factors associated with the occurrence of voice disorders is shown in Table 3. Teachers with prolonged daily teaching hours (> 5 hours) had a significantly higher prevalence of voice disorders (82.1%) compared to those teaching for fewer hours (p = 0.002). Similarly, the absence of microphone use (p = 0.01) and exposure to noisy classrooms (p = 0.03) were significantly associated with the presence of voice disorders. Other variables, such as a history of upper respiratory infection and inadequate hydration, showed a higher prevalence among affected teachers but did not reach statistical significance.

Table 3. Association of Voice Disorders with Occupational Risk Factors

Risk Factor	Affected (n = 28)	Not Affected (n = 22)	*p*-value
Daily teaching hours > 5	23 (82.1)	8 (36.4)	0.002 **
No microphone use	19 (67.9)	7 (31.8)	0.01 *

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Exposure to noisy classrooms	21 (75.0)	10 (45.5)	0.03 *
History of upper respiratory infection	11 (39.3)	5 (22.7)	0.19
Inadequate hydration (< 1 L/day)	16 (57.1)	7 (31.8)	0.08

**Chi-square test used; * p < 0.05 significant; ** p < 0.01 highly significant.*

The chi-square (χ^2) test was used to examine the relationship between each occupational variable and the presence of voice disorders. A higher χ^2 value indicates a stronger deviation from expected frequencies. Statistical significance was observed for daily teaching hours exceeding 5 hours (χ^2 = 10.14, df = 1, p = 0.002), absence of microphone use (χ^2 = 6.45, df = 1, p = 0.01), and exposure to noisy classrooms (χ^2 = 4.71, df = 1, p = 0.03). Values with p < 0.05 were considered statistically significant (Table 4).

Table 4. Association of Occupational Factors with Voice Disorders among School Teachers

Occupational Factor	χ^2 Value	df	p-value
Daily teaching hours > 5 hrs	χ^2 = 10.14	1	p = 0.002
No microphone use	χ^2 = 6.45	1	p = 0.01
Noisy classroom exposure	χ^2 = 4.71	1	p = 0.03

Discussion

The present study evaluated the prevalence, clinical profile, and occupational determinants of voice disorders among school teachers, showing that 56% of participants had clinically confirmed vocal pathology. This observation is consistent with earlier reports highlighting the high vocal load and occupational vulnerability associated with teaching [6,7].

The mean age of 38.4 years and the predominance of females (74%) align with previous evidence indicating that middle-aged female teachers represent a high-risk demographic for developing voice-related symptoms [8,9]. Anatomical features, hormonal influences, and greater phonatory collision forces contribute to this pattern.

Hoarseness (40%), vocal fatigue (32%), and throat dryness (28%) emerged as the most common symptoms, reflecting trends described in comparable literature [8,9]. Approximately one-fifth of teachers experienced symptoms persisting beyond three months, suggestive of chronic vocal strain or unaddressed mucosal inflammation.

Laryngoscopic evaluation demonstrated that vocal nodules (32.1%), vocal cord edema (21.4%), and chronic laryngitis (17.9%) were the predominant findings. These benign lesions reflect cumulative phonotrauma and are widely recognized as common outcomes of prolonged, unmodulated voice use among teachers [8–10].

The analysis of occupational factors revealed strong associations between teaching for more than five hours per day (p = 0.002), lack of microphone use (p = 0.01), and exposure to noisy classrooms (p = 0.03). These results parallel earlier studies that identified poor classroom acoustics and high vocal demand as independent predictors of vocal fold injury [10,11]. Objective voice-use studies have shown that teachers spend nearly one-quarter of their working hours phonating at higher sound pressure levels than conversational speech, thereby increasing the likelihood of chronic strain [6].

Preventive and rehabilitative measures such as vocal hygiene instruction and structured voice training have demonstrated measurable improvement in vocal quality and symptom reduction among teachers [7]. These observations reinforce the relevance of proactive voice-care strategies within educational institutions.

The findings of the present study further support the conclusions of earlier meta-analytical evidence, which identified prolonged teaching duration, inadequate classroom acoustics, and insufficient voice rest as major modifiable contributors to teacher dysphonia [12]. Routine voice screening, acoustic improvements, and collaboration between ENT specialists and speech-language pathologists are essential to strengthen long-term vocal health among teachers.

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Generalizability

The findings of this hospital-based study offer useful insights into the vocal health of school teachers working in similar urban and semi-urban educational environments. The patterns observed—such as the high frequency of hoarseness, the predominance of benign phonotraumatic lesions, and the influence of prolonged teaching hours—closely resemble trends reported in other teacher populations. Therefore, the results are reasonably applicable to schools with comparable workload, classroom acoustics, and teaching practices.

However, variations in institutional infrastructure, class size, cultural expectations regarding voice use, and access to amplification devices may influence how broadly these findings extend to other regions. Teachers working in rural settings, multilingual classrooms, or schools with higher student–teacher ratios may face different vocal demands. Hence, the generalizability is best suited for similar tertiary-care, urban teacher populations rather than all teachers at the national level.

Conclusion

The present study highlights that voice disorders are a significant occupational concern among school teachers, predominantly affecting middle-aged females with prolonged teaching hours and suboptimal working environments. Hoarseness, vocal fatigue, and throat dryness were the most common complaints, with laryngoscopic findings revealing vocal nodules and edema as frequent pathologies. Occupational factors such as excessive voice use, noisy classrooms, and lack of amplification were strongly associated with these disorders. The findings underscore the need for regular voice screening, awareness of vocal hygiene, and implementation of preventive measures, including microphone use and acoustic classroom modification, to safeguard teachers' vocal health and professional efficiency.

Limitations:

This study has certain limitations that must be acknowledged. The sample size was relatively small, and all participants were drawn from a single tertiary-care center, which restricts the breadth of representation. Because several occupational factors and vocal habits were self-reported, the possibility of recall bias cannot be excluded. Laryngoscopic assessment captured structural and functional changes at a single point in time, without follow-up to track the progression or response to interventions. Additionally, objective voice measurements such as acoustic analysis or airflow studies were not included, limiting a more detailed physiological interpretation. Future studies using larger, multi-center cohorts and incorporating objective voice evaluation tools would provide a more comprehensive understanding.

Recommendations

Teachers should undergo periodic voice screening as part of occupational health assessments to enable early detection of vocal strain and pathology. Vocal hygiene education must be incorporated into teacher training programs, emphasizing adequate hydration, voice rest, and avoidance of throat clearing or shouting. Schools should ensure acoustically optimized classrooms and provide microphones or amplifiers to reduce vocal load. Incorporating brief voice warm-up exercises before teaching and scheduled vocal rest breaks can further prevent phonotrauma. Collaboration between ENT specialists, speech-language pathologists, and educational administrators is essential to promote sustained vocal health and enhance professional longevity among teachers.

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Abbreviations

ENT – Ear, Nose, and Throat
SPSS – Statistical Package for the Social Sciences
LPR – Laryngopharyngeal Reflux
URTI – Upper Respiratory Tract Infection
VD – Voice Disorder
VHI – Voice Handicap Index
VFE – Vocal Function Exercises
dB – Decibel
p-value – Probability Value

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Conflict of interest

The Author declares no conflict of interest.

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Author Contributions

GAK-Concept and design of the study, results interpretation, review of literature, and preparing the first draft of the manuscript. Statistical analysis and interpretation, revision of manuscript.**BRR** -Concept and design of the study, results interpretation, review of literature, preparing the first draft of the manuscript, and revision of the manuscript.**GDS-**Review of literature and preparing the first draft of the manuscript. Statistical analysis and interpretation.

Data availability

Data available on request

Author Biography

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