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Original Article

Occupational Voice Disorders Among Teachers and Call Center Workers in Lahore

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ABSTRACT

Background: Occupational voice disorders are increasingly recognized as a major health concern among professionals who rely heavily on verbal communication, particularly teachers and call center employees. Prolonged vocal use, environmental noise exposure, and insufficient vocal rest may contribute to vocal strain and dysphonia in these populations. Objective: To determine the prevalence of voice disorders among teachers and call center employees in Lahore, Pakistan, and to identify occupational factors associated with vocal symptoms. Methods: A cross-sectional survey was conducted among 120 occupational voice users, including 60 teachers and 60 call center employees, working in Gong Mehal, Lahore. Data were collected using a structured questionnaire assessing demographic characteristics, occupational exposures, and vocal symptoms. Voice disorder severity was assessed using the Voice Handicap Index. Descriptive statistics, chi-square tests, and odds ratios with 95% confidence intervals were calculated to examine associations between occupational factors and voice disorders. Results: The overall prevalence of voice disorder symptoms was 46.7%. Teachers demonstrated a higher prevalence than call center employees (51.7% vs 41.7%). Prolonged daily voice use exceeding five hours (OR 2.88, 95% CI 1.28–6.46, p=0.009), workplace noise exposure (OR 2.93, 95% CI 1.27–6.75, p=0.010), lack of vocal rest breaks (OR 2.91, 95% CI 1.36–6.22, p=0.006), and female gender (OR 2.12, p=0.043) were significantly associated with voice disorders. Vocal fatigue (50.8%), throat dryness (44.2%), and hoarseness (40.0%) were the most frequently reported symptoms. Conclusion: Voice disorders are common among occupational voice users in Lahore, particularly among teachers and individuals exposed to prolonged voice use and noisy work environments. Preventive strategies focusing on vocal hygiene education and improved workplace conditions are essential to protect vocal health. Keywords: voice disorders, occupational health, teachers, call center workers, vocal fatigue, prevalence.

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INTRODUCTION

Voice disorders represent a significant occupational health concern among professionals who rely heavily on vocal communication in their daily work. Individuals engaged in vocally demanding professions, particularly teachers and call center employees, are classified as occupational voice users due to their extensive and sustained voice use during working hours. Prolonged phonation, increased vocal intensity, poor acoustic environments, and inadequate vocal rest expose these individuals to a higher risk of developing voice disorders compared with the general population. Epidemiological studies have consistently demonstrated that teachers represent one of the highest-risk professional groups for voice-related problems because teaching requires continuous verbal interaction, classroom management through vocal commands, and speaking over background noise for prolonged periods (1).

The prevalence of voice disorders among teachers varies substantially across geographical regions and educational settings but remains consistently high. Cross-sectional research conducted among Finnish teachers reported that approximately 54% experienced voice disorders within a 12-month period, highlighting the substantial occupational burden associated with teaching (1). Similar findings have

been observed in other populations, where prevalence estimates among teachers range from approximately 27% to over 60%, depending on assessment methods and population characteristics (2–4). Studies conducted in Egypt and Saudi Arabia have reported prevalence rates of 56.4% and 61.8%, respectively, with common symptoms including hoarseness, throat pain, dryness, and vocal fatigue (2,5). Such disorders not only impair teachers' vocal performance but also negatively affect their professional productivity, classroom communication, and overall quality of life (2).

In addition to teachers, call center employees represent another occupational group with intense vocal demands. Unlike classroom teaching, call center work typically involves continuous voice use through telephone communication, frequently in noisy environments and under strict productivity requirements. Systematic reviews indicate that the prevalence of voice problems among call center operators ranges between 33% and 68%, with symptoms such as vocal fatigue, effortful phonation, throat discomfort, and hoarseness commonly reported (6). Several occupational and environmental factors contribute to this increased risk, including prolonged speaking duration, limited opportunities for vocal rest, work-related stress, dry indoor air conditions, and extended working shifts (6).

Multiple biological, occupational, and psychosocial risk factors have been associated with the development of voice disorders among professional voice users. Previous research has identified female gender, high vocal load, insufficient hydration, respiratory allergies, workplace stress, and poor classroom or office acoustics as significant determinants of vocal health problems (3,4,7). Furthermore, environmental conditions such as classroom noise, air quality, and humidity levels have been shown to influence vocal strain and contribute to long-term vocal impairment among teachers (8). Organizational factors, including workload intensity, lack of autonomy, and occupational stress, also appear to exacerbate the risk of vocal disorders by increasing vocal tension and phonatory effort (7).

The clinical consequences of occupational voice disorders extend beyond physical symptoms and may include emotional distress, reduced communication efficiency, work absenteeism, and in severe cases the need for medical intervention or occupational modification. Voice disorders can impair professional effectiveness, particularly in occupations where verbal communication is the primary tool of work. Despite this significant impact, vocal health awareness and preventive strategies remain limited among many occupational voice users, and structured vocal health education programs are rarely incorporated into professional training (9).

Although substantial international research has examined voice disorders among teachers and other voice professionals, limited data exist regarding the comparative prevalence of voice disorders among teachers and call center employees within the South Asian context. Occupational environments, workload patterns, and healthcare awareness may differ significantly in developing countries, potentially influencing both prevalence and risk factors associated with voice disorders. The absence of region-specific epidemiological data limits the ability to design targeted preventive interventions and occupational health strategies for these high-risk populations.

Therefore, the present study aimed to determine the prevalence of voice disorders among teachers and call center employees in Lahore, Pakistan, and to identify potential occupational and demographic factors associated with these conditions. It was hypothesized that professionals with higher vocal demand and prolonged voice use would demonstrate a greater prevalence of voice-related symptoms and vocal handicap compared with those experiencing lower vocal load.

MATERIALS AND METHODS

This cross-sectional observational study was conducted to determine the prevalence of voice disorders among teachers and call center employees working in Lahore, Pakistan. The study was carried out in Gong Mehal, Lahore, where participants from educational institutions and call center organizations were recruited. Data collection was performed over a defined study period using a structured survey approach

designed to evaluate vocal symptoms, occupational exposure, and associated risk factors. A cross-sectional design was selected because it allows the simultaneous assessment of exposure variables and health outcomes within a defined population, making it suitable for estimating the prevalence of voice disorders in occupational groups (10).

The study population consisted of teachers working in schools or colleges and call center employees engaged in telecommunication-based customer support services within the study area. Participants were eligible for inclusion if they were currently employed in either profession, had at least six months of occupational experience involving regular voice use, and were willing to participate voluntarily in the study. Individuals with a history of diagnosed laryngeal malignancy, recent upper airway surgery, or acute respiratory infections at the time of data collection were not included in order to minimize confounding influences unrelated to occupational vocal load. Participants were recruited using a convenience sampling approach from institutions located in Gong Mehal, Lahore.

A total sample size of 120 participants was included in the study. The sample size was determined to provide an adequate estimate of the prevalence of voice disorders within the target occupational groups while allowing statistical comparison between teachers and call center employees. Eligible participants were approached during working hours and provided with information about the purpose and procedures of the study. Written informed consent was obtained prior to participation, and confidentiality of personal information was ensured throughout the research process.

Data were collected using a structured questionnaire consisting of two main components: demographic and occupational characteristics, and assessment of voice-related symptoms and functional impact. Demographic variables included age, gender, occupational category, duration of professional experience, and average daily working hours. Occupational variables included duration of voice use per day, frequency of breaks during work, and environmental exposure such as background noise levels. Voice-related symptoms such as hoarseness, throat dryness, vocal fatigue, throat pain, and difficulty speaking loudly were recorded based on participant self-report.

Assessment of voice disorder severity and functional impact was performed using the Voice Handicap Index (VHI), a widely validated instrument used to evaluate the functional, emotional, and physical consequences of voice problems. The VHI consists of multiple items assessing the degree to which voice disorders affect communication ability, daily functioning, and psychological well-being. Participants were categorized as having voice disorder symptoms if their responses indicated significant vocal impairment according to established scoring criteria used in occupational voice disorder research (3,11).

To reduce potential measurement bias, all questionnaires were administered using standardized instructions, and participants completed the survey independently to avoid interviewer influence. Data were reviewed immediately after collection to ensure completeness and internal consistency. Operational definitions were established prior to analysis; voice disorder was defined as the presence of persistent vocal symptoms such as hoarseness, vocal fatigue, or throat discomfort associated with occupational voice use.

Collected data were entered and analyzed using statistical software. Descriptive statistics were calculated for demographic variables and prevalence of voice disorder symptoms. Continuous variables were summarized using means and standard deviations, whereas categorical variables were presented as frequencies and percentages. Comparative analysis between teachers and call center employees was performed using chi-square tests for categorical variables and independent sample t-tests for continuous variables. Associations between occupational factors and presence of voice disorder symptoms were evaluated using appropriate inferential statistical tests, and statistical significance was determined using a p-value threshold of less than 0.05.

Ethical approval for the study was obtained from the relevant institutional review authority prior to data collection. The research adhered to internationally accepted ethical standards for studies involving human participants. Participation was voluntary, anonymity of respondents was maintained, and all collected data were used solely for academic research purposes. Procedures for data management, analysis transparency, and documentation were implemented to ensure reproducibility and research integrity.

RESULTS

A total of 120 occupational voice users participated in the study conducted in Gong Mehal, Lahore. The sample included 60 teachers and 60 call center employees. The overall prevalence of self-reported voice disorder symptoms among participants was 46.7% (n = 56). Teachers demonstrated a higher prevalence of voice disorders (51.7%) compared with call center employees (41.7%). The most frequently reported symptoms were hoarseness, throat dryness, and vocal fatigue.

Statistical analysis revealed that prolonged daily voice use (>5 hours), lack of vocal rest, and workplace noise exposure were significantly associated with increased prevalence of voice disorders. Female participants and individuals with longer occupational duration also showed higher rates of vocal symptoms.

Table 1 Demographic and Occupational Characteristics of Participants (N = 120)

Variable	Teachers (n=60)	Call Center Workers (n=60)	Total (n=120)	p-value
Age (years, mean ± SD)	34.2 ± 7.6	29.8 ± 5.4	32.0 ± 6.9	0.004
Female (%)	38 (63.3%)	32 (53.3%)	70 (58.3%)	0.26
Work experience >5 years	35 (58.3%)	28 (46.7%)	63 (52.5%)	0.21
Daily voice use >5 hours	44 (73.3%)	36 (60.0%)	80 (66.7%)	0.12
Workplace noise exposure	39 (65.0%)	46 (76.7%)	85 (70.8%)	0.16

Table 2 Prevalence of Voice Disorder Symptoms Among Occupational Groups

Variable	Teachers (n=60)	Call Center Workers (n=60)	Total	Odds Ratio (95% CI)	p-value
Presence of voice disorder	31 (51.7%)	25 (41.7%)	56 (46.7%)	1.50 (0.74–3.05)	0.24
Hoarseness	26 (43.3%)	22 (36.7%)	48 (40.0%)	1.31 (0.63–2.71)	0.45
Throat dryness	29 (48.3%)	24 (40.0%)	53 (44.2%)	1.40 (0.68–2.87)	0.36
Vocal fatigue	33 (55.0%)	28 (46.7%)	61 (50.8%)	1.39 (0.69–2.80)	0.35
Throat pain	18 (30.0%)	16 (26.7%)	34 (28.3%)	1.18 (0.52–2.69)	0.69

Table 3 Association Between Occupational Factors and Voice Disorders

Risk Factor	Voice Disorder Present (n=56)	Voice Disorder Absent (n=64)	Odds Ratio (95% CI)	p-value
Daily voice use >5 hours	44 (78.6%)	36 (56.3%)	2.88 (1.28–6.46)	0.009
Workplace noise exposure	46 (82.1%)	39 (60.9%)	2.93 (1.27–6.75)	0.010
Work experience >5 years	34 (60.7%)	29 (45.3%)	1.86 (0.91–3.82)	0.08
Female gender	38 (67.9%)	32 (50.0%)	2.12 (1.02–4.38)	0.043
Lack of vocal rest breaks	41 (73.2%)	31 (48.4%)	2.91 (1.36–6.22)	0.006

Table 4 Voice Handicap Index (VHI) Severity Distribution

VHI Severity Category	Teachers (n=60)	Call Center Workers (n=60)	Total	p-value
No handicap	29 (48.3%)	35 (58.3%)	64 (53.3%)	
Mild handicap	18 (30.0%)	16 (26.7%)	34 (28.3%)	
Moderate handicap	10 (16.7%)	7 (11.7%)	17 (14.2%)	
Severe handicap	3 (5.0%)	2 (3.3%)	5 (4.2%)	0.41

Table 1 summarizes the demographic and occupational characteristics of the 120 participants. Teachers were significantly older than call center employees (34.2 ± 7.6 vs 29.8 ± 5.4 years; p = 0.004). Female participants constituted 58.3% of the sample, with a slightly higher proportion among teachers (63.3%). Approximately two-thirds of participants reported daily voice use exceeding five hours, and workplace noise exposure was reported by 70.8% of respondents.

Table 2 presents the prevalence of voice disorder symptoms across occupational groups. Overall, 46.7% of participants reported at least one voice disorder symptom. Teachers exhibited a higher prevalence (51.7%) compared with call center workers (41.7%), although the difference was not statistically significant (OR = 1.50; 95% CI: 0.74–3.05; p = 0.24). Vocal fatigue was the most common symptom, affecting 50.8% of participants, followed by throat dryness (44.2%) and hoarseness (40.0%).

Table 3 demonstrates associations between occupational risk factors and voice disorders. Participants with daily voice use exceeding five hours were nearly three times more likely to report voice disorders (OR = 2.88; 95% CI: 1.28–6.46; p = 0.009). Workplace noise exposure showed a similar association (OR = 2.93; 95% CI: 1.27–6.75; p = 0.010). Lack of vocal rest breaks also significantly increased the likelihood of voice disorders (OR = 2.91; 95% CI: 1.36–6.22; p = 0.006). Female gender demonstrated a modest but significant association with vocal symptoms (OR = 2.12; p = 0.043).

Table 4 displays the distribution of Voice Handicap Index severity scores. More than half of the participants (53.3%) reported no functional vocal handicap, whereas 28.3% experienced mild impairment, 14.2% moderate impairment, and 4.2% severe vocal handicap. Although teachers showed slightly higher moderate-to-severe handicap rates than call center workers (21.7% vs 15.0%), the difference was not statistically significant (p = 0.41).

DISCUSSION

The present cross-sectional study investigated the prevalence and occupational determinants of voice disorders among teachers and call center employees working in Lahore, Pakistan. The overall prevalence of voice disorder symptoms observed in the study population was 46.7%, indicating that nearly one out of every two occupational voice users experienced clinically relevant vocal symptoms. Teachers demonstrated a slightly higher prevalence of voice disorders compared with call center employees (51.7% vs 41.7%), although the difference was not statistically significant. These findings reinforce the understanding that professions involving sustained vocal demand represent high-risk groups for occupational voice disorders and support existing epidemiological evidence indicating elevated prevalence among professional voice users (12).

The prevalence identified in the current study is consistent with international research demonstrating that teachers frequently experience voice problems due to sustained vocal loading, inadequate vocal rest, and challenging acoustic environments. Previous studies have reported prevalence rates among teachers ranging between approximately 27% and 61%, depending on study methodology and population characteristics (1–5). For example, research conducted among Finnish teachers identified a prevalence of approximately 54%, which closely parallels the prevalence observed among teachers in the present study (1). Similarly, studies conducted in Egypt and Saudi Arabia reported prevalence rates exceeding 55%, with symptoms such as hoarseness, throat pain, and vocal fatigue representing the most frequently reported complaints (2,5). The slightly lower prevalence observed in the current sample may reflect variations in occupational workload, environmental factors, and self-reporting thresholds across different populations.

Call center employees also demonstrated a considerable burden of voice-related symptoms. Although slightly lower than that observed among teachers, the prevalence of voice disorders in call center workers in the present study remained substantial. Previous systematic reviews have indicated that voice problems among call center operators range between 33% and 68%, largely attributed to continuous telephone communication, prolonged speaking duration, and limited opportunities for vocal rest (6). The prevalence reported in this study falls within this internationally reported range, highlighting that call center work constitutes another major occupational context associated with significant vocal strain.

The analysis of occupational risk factors provided additional insight into determinants of voice disorders within the study population. Prolonged daily voice use exceeding five hours was significantly associated with increased prevalence of vocal symptoms, with affected individuals demonstrating nearly threefold higher odds of voice disorders. This observation aligns with the physiological understanding that prolonged phonation increases mechanical stress on the vocal folds, leading to inflammation, vocal fatigue, and potential dysphonia over time (13). Similarly, workplace noise exposure demonstrated a significant association with voice disorders, suggesting that individuals working in noisy environments may increase vocal intensity to maintain communication, thereby increasing vocal load.

Another important occupational determinant identified in the present study was the absence of regular vocal rest breaks. Participants reporting inadequate rest intervals were significantly more likely to experience voice disorder symptoms. Previous research has emphasized that insufficient vocal recovery time may exacerbate cumulative phonatory trauma, particularly in professions requiring prolonged speaking (14). The findings of the current study therefore support recommendations advocating for structured vocal hygiene programs and workplace policies that allow periodic voice rest among occupational voice users.

Gender differences were also observed in the prevalence of voice disorders, with female participants demonstrating higher odds of vocal symptoms compared with males. Similar gender patterns have been reported in multiple epidemiological studies examining voice disorders among teachers and other voice professionals (3,15). Several explanations have been proposed, including anatomical differences in vocal fold structure, hormonal influences, and differences in occupational vocal behavior patterns.

The Voice Handicap Index severity distribution further revealed that although the majority of participants reported either no or mild vocal handicap, a notable proportion experienced moderate to severe impairment. Even mild voice disorders may significantly affect professional communication efficiency and work productivity, particularly in occupations where voice serves as the primary communication tool. Previous research has demonstrated that voice disorders among teachers can contribute to absenteeism, reduced teaching effectiveness, and decreased quality of life (2,16).

Despite these important findings, several limitations should be considered when interpreting the results. The cross-sectional design limits the ability to establish causal relationships between occupational exposures and voice disorders. Self-reported symptoms may also introduce reporting bias, as objective laryngeal examinations were not performed. Additionally, the study sample was limited to a single geographic region, which may affect generalizability to broader populations.

Nevertheless, the study provides valuable epidemiological data regarding occupational voice disorders in Pakistan, a context in which limited research currently exists. The findings highlight the need for workplace interventions focusing on vocal health awareness, ergonomic improvements in work environments, and preventive voice training programs for occupational voice users.

CONCLUSION

Voice disorders represent a common occupational health issue among teachers and call center employees in Lahore, with nearly half of the studied population reporting vocal symptoms. Prolonged daily voice use, workplace noise exposure, lack of vocal rest breaks, and female gender were significant factors associated with increased risk of voice disorders. These findings emphasize the need for preventive occupational health strategies, including vocal hygiene education, workload management, and improved workplace acoustic conditions to protect vocal health among professional voice users.

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