

## Hoarseness of Voice: Analysis of Aetiopathological Factors and Clinical Correlations

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### Abstract

**Background and Objectives:** Hoarseness typically represents an initial indicator of both localized and systemic ailments. It is characterized by a voice that is perceived as rough, harsh, or breathy. The underlying pathophysiological mechanisms involve disruptions in vocal cord oscillation due to hypertonic dysphonia, which results from either incomplete glottal closure during phonation or increased vocal cord mass, potentially caused by tumors.

**Methods:** This was a prospective study that included 89 patients chosen via a simple random sampling method. Participants ranged in age from 2 to 70 years and presented with a history of hoarse voice. They were assessed at the E.N.T. outpatient department of a tertiary care medical college and hospital in India.

**Results:** The study identified vocal cord congestion as the most prevalent lesion. Vocal cord nodules was the second most common condition followed by vocal cord polyps. Each of the conditions including supraglottic malignancy and vocal cord growth was found in few patients. Hypopharyngeal malignancies and tonsillar malignancies were also identified in few patients. Also, cases of epiglottic cysts, vocal cord palsy, subglottic malignancy, laryngeal papilloma, vocal cord haemangioma, vocal cord hemorrhage, Reinke's edema, and vocal cord edema were found.

**Conclusion:** The investigation found that vocal cord congestion were the most common pathological finding, followed by vocal cord nodules then vocal cord polyps. Vocal cord palsy and malignancy related to vocal cord are very rare causes of hoarseness of voice. Factors contributing to these conditions included voice abuse, smoking, and the use of tobacco and betel nuts.

**Keywords:** Hoarseness of voice, malignancy, smoking, tobacco, vocal abuse.

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### Introduction

Alterations in vocal characteristics commonly referred to as "hoarseness," manifest through variations in breathiness, raspiness, strain, and changes in volume or pitch. These vocal changes are associated with pathologies affecting the vocal folds within the larynx. Under normal conditions, the vocal folds are separated during respiration and converge during phonation, vibrating as air passes from the lungs to generate sound. Pathological changes, such as swelling or nodules on the vocal folds, can impair their vibration, subsequently affecting the quality, volume, and pitch of the voice [1-3]. Hoarseness can stem from a multitude of factors. The complete absence of voice, known as aphonia, often points to a neurologic or

psychogenic cause rather than an organic lesion. Lesions on the vocal folds typically lead to vocal symptoms that initially appear intermittently and may progress to more constant and severe manifestations. Such conditions can hinder the ability to project the voice due to the lesion itself or paralysis affecting glottic closure. When vocal intensity challenges occur despite a normal laryngeal examination, the underlying issues might include inadequate respiratory support stemming from primary pulmonary disease, reduced conditioning post-illness, neurological conditions, or incorrect vocal techniques. Producing a clear voice demands a finely tuned coordination among respiratory, phonatory, and articulatory systems.

Faulty techniques, such as speaking while holding breath or using excessive neck muscle strain, can lead to dysphonia [4].

Furthermore, singers might report limitations in their singing voice, particularly in the upper ranges, despite having a normal speaking voice. These issues necessitate professional assessment due to the critical role of the voice in communication and occupation, and its impact on personal identity [5]. The manifestation of symptoms from benign or malignant neoplasms of the vocal folds largely depends on the size and location of the lesion in relation to voice production and airway management. Commonly, changes in voice and stridor are reported, and occasionally, sensations of a throat mass or visible swelling may occur, which are significantly influenced by the lesion's location [6].

Gastrointestinal issues are frequently implicated in vocal complaints [4–7]. Signs of laryngotracheal reflux, such as morning hoarseness, increased phlegm, heartburn, and frequent throat clearing, are indicative of this condition.

Hormonal imbalances can lead to fluid retention in the superficial lamina propria, altering the vibrational properties of the vocal folds. Individuals with hypothyroidism may exhibit notably low-pitched voices. Women may face transient vocal challenges related to menstruation due to fluid retention, lowering pitch as a result of slower vocal fold vibrations. Increased consumption of nonsteroidal anti-inflammatory drugs during menstruation can also increase the risk of acute vocal fold hemorrhage. Vocal changes during puberty and menopause are attributed to hormonal adjustments affecting pitch [4].

Psychological factors often manifest through vocal characteristics and may be primary contributors to vocal disturbances. The voices of individuals with depression, for instance, typically exhibit reduced loudness and prosody. Stress, while a common exacerbator of various conditions, should not be universally considered the primary etiological factor but is recognized for its potential to aggravate existing voice disorders [4]. This study was done to analyse the aetiopathological factors and clinical correlations of cases of hoarseness of voice.

### Materials and Methods

The study involved patients who attended the ENT outpatient department of a tertiary care medical college and hospital in India. All individuals presenting with symptoms indicative of laryngeal disorders, such as dysphonia/hoarseness, stridor, globus sensation, or dysphagia, were assessed. This evaluation included a detailed history, a comprehensive ENT and head and neck

examination, followed by direct/micro laryngoscopy and biopsy for histopathological analysis, after securing consent from the patients.

The study delineated specific inclusion and exclusion criteria for participants. The inclusion criteria encompassed patients ranging in age from 2 to 70 years who presented with hoarseness of voice. Additionally, individuals who exhibited symptoms indicative of laryngeal lesions, such as hoarseness, stridor, neck swelling, or dysphagia, were considered for inclusion following a thorough documentation of their medical history and examinations, which were recorded on both outpatient and inpatient proformas. Conversely, the exclusion criteria excluded patients younger than 2 years or older than 70 years, those who did not return for follow-up, individuals who withheld consent for the procedure, and patients who expressed reluctance to participate in the study.

Each patient underwent detailed history taking and a thorough clinical examination. Data were collected and recorded using a specially designed case record form. Qualitative data were presented as frequencies and percentages. Statistical analysis was conducted to explore the associations between variables using the Chi-Square test. Fisher's Exact test was applied in cases of small cell counts. Continuous variables were expressed as means and standard deviations. A P-value of less than 0.05 was considered statistically significant. The statistical analyses were performed using IBM SPSS Version 21 for Windows.

### Results

Among the participants who were alcoholics, 37 (41.57%) were male patients, with an average duration of consumption of 413 months and an average quantity of less than 100ml per consumption (51.6%). The Fisher's exact T test yielded a P value of less than 0.001, indicating a highly significant correlation with the disease (Table 1). Tobacco use was observed in 44 patients (49.43%), primarily among 42 males and 2 females, with a Fisher's exact T test resulting in a P value of less than 0.001, also highly significant (Table 1). Beetel nut chewing was reported in 45 patients, with 36 males (40.44%) and 9 females (10.11%), and the Chi-square test showed a highly significant P value of less than 0.001 (Table 1).

In our study, the hoarse type of voice was the most common among 52 (58.43%) patients, followed by muffled in 18 (20.22%) patients, breathy in 14 (15.73%) patients, and husky in 5 (5.62%) patients.

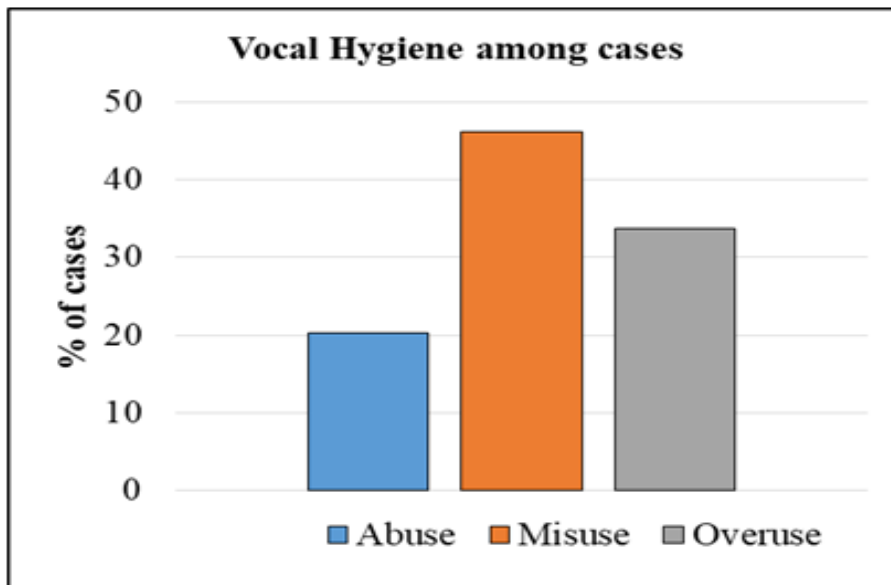
Regarding the status of vocal hygiene, vocal misuse was noted in the majority of patients at 41 (46.07%), followed by voice overuse in 30 (33.71%) patients, and abuse in 18 (20.22%) patients (Figure 1).

The study identified vocal cord congestion as the most prevalent lesion. Vocal cord nodules was the second most common condition, followed by vocal cord polyps. Additionally, there were a few cases of supraglottic malignancy, vocal cord palsy, vocal

cord growths, hypopharyngeal malignancies, tonsillar malignancies, epiglottic cysts, subglottic malignancies, laryngeal papilloma, vocal cord haemangioma, vocal cord hemorrhage, Reinke's edema, and vocal cord edema (Table 2).

**Table 1: Gender wise distribution of risk factors in cases of hoarseness**

Alcohol Use	Male	Female	Total	P Value
Yes	37	0	37	<0.05
No	29	23	52	
Total	66	23	89	
<b>Tobacco</b>				
Yes	42	2	44	<0.05
No	24	21	45	
Total	66	23	89	
<b>Beetel Nut Chewing</b>				
Yes	36	9	45	<0.05
No	30	14	44	
Total	66	23	89	



**Figure 1: Vocal Hygiene among cases of hoarseness**

**Table 2: Type of vocal cord lesions in patients with hoarseness**

Condition	n=89	%
Vocal Cord Congestion	19	21.35
Vocal Cord Nodule	17	19.1
Vocal Cord Polyp	12	13.48
Supraglottic Malignancy	2	2.25
Vocal Cord Growth	9	10.11
Hypopharyngeal Malignancy	5	5.61
Tonsillar Malignancy	4	4.49
Laryngeal Papilloma	2	2.25
Vocal Cord Haemangioma	2	2.25
Vocal Cord Haemorrhage	2	2.25
Reinke's Oedema	2	2.25
Vocal Cord Oedema	7	7.86
Subglottic Growth	2	2.25
Epiglottic Cyst	2	2.25
Vocal Cord Palsy	2	2.25

## Discussion

Cigarette smoking contributes significantly to a spectrum of vocal pathologies, spanning from thickened mucosal secretions to the onset of malignant conditions. These changes can progress from leukoplakic dysplasia to squamous cell carcinoma of the vocal folds, often manifesting with dysphonia as a primary symptom.

Alcohol consumption can lead to dry mucous membranes and, when combined with smoking, may enhance the risk of developing laryngeal malignancies. Additionally, low water intake and high caffeine consumption can exacerbate mucosal drying. Our study focused on the impact of tobacco smoking, tobacco chewing, betel nut chewing, and alcohol consumption on vocal health [7].

Baitha et al. reported findings indicating chronic laryngitis in 43.63%, acute laryngitis in 23.63%, vocal cord paralysis in 9.09%, TB laryngitis in 5.40%, carcinoma in 14.54%, and senile laryngitis in 1.8% of cases [7]. Baitha S et al. mentioned chronic laryngitis in 42.50% and vocal cord paralysis in 9.16% of cases [8]. Parikh NP documented chronic laryngitis in 48%, acute laryngitis in 9%, vocal cord paralysis in 3%, TB laryngitis in 23%, and carcinoma in 12% of cases [9].

In our investigation, vocal cord congestion were the most prevalent, followed by vocal cord nodules and vocal cord polyps. Some patients presented with supraglottic malignancies, vocal cord growths, hypopharyngeal malignancies, and tonsillar malignancies. Additionally, cases of epiglottic cysts, subglottic malignancies, vocal cord palsy, laryngeal papillomas, vocal cord hemangiomas, hemorrhages, reinkesoedema, and edema were noted.

Our study focused on laryngeal malignancies, with squamous cell carcinoma being the most common histopathological diagnosis, alongside vocal cord congestion and other pathologies like vocal cord papilloma, nodules, reinkesoedema, and epiglottic cysts, collectively representing 4% of cases. Dinesh Kumar Sharma et al. found that out of 30 cases of squamous cell carcinoma, 50% were well differentiated, 26.6% were moderately differentiated, and 10% were poorly differentiated [10]. Similar results were reported by previous studies [11-15].

Our study involved comprehensive investigations, including routine blood tests and imaging such as digital X-rays of the neck and chest, as well as contrast-enhanced CT scans of the neck and thorax based on clinical indications. Treatment strategies were tailored to the specific pathology, with conservative approaches for most benign lesions and procedures like microscopy biopsy, direct

laryngoscopy, and tracheostomy as needed in some cases.

## Conclusion

The etiology of hoarseness encompasses a spectrum from minor infections to severe malignancies. In this study, the most frequently encountered condition was vocal cord congestion followed by vocal cord nodules and vocal cord polyps. Conditions such as malignancy and vocal cord palsy were present in few patients. Regarding risk factors, improper voice hygiene was the most significant, followed by vocal misuse, voice overuse and voice abuse. Additional risk factors included smoking, which was more prevalent in males, betel nut usage, tobacco use, and alcohol consumption. Through a comprehensive approach, that includes a detailed history, physical examination, and targeted investigations, an accurate diagnosis can be achieved.

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