

Main Article

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Hoarseness: its spectrum, associations and management in a tertiary care centre in India

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Abstract

Objective. To determine the demographic, aetiopathological and diagnostic profiles of patients presenting with hoarseness to a laryngology unit of a tertiary care centre in India.

Methods. A retrospective observational study was conducted.

Results. The 1033 patients who presented with dysphonia showed a male predominance (70 per cent), high rates of malignancy (18 per cent), late presentation (mean, 24 months) and poor follow-up trends (53 per cent with 3 months' follow up), which contrasts with data from developed countries. The patient population hailed from different states in India and neighbouring countries around India, serving as a good sample for the subcontinent. The majority (67 per cent) were managed conservatively; however, surgical management was the preferred choice for those who presented with airway stenosis (91 per cent) and laryngeal trauma (75 per cent). Significant associations between vocal professionalism level and comorbidities and dysphonia aetiopathologies are discussed.

Conclusion. These findings give insight into the trends of hoarseness in the developing Indian subcontinent, which can aid understanding and management.

Introduction

The voice is vital for effective communication. A sharp rise in advances in technology and instrumentation has aided our understanding of the physiology of voice, airway and swallowing. Around a third of the total population depend on their voice as a primary work tool, and 1 per cent of the world's population suffer from hoarseness or dysphonia at least once in their lifetime.^{1,2} Data on hoarseness as a symptom are available in the literature, with excellent guidelines being laid down regarding its patterns, triaging and management in the developed countries.³ Patterns of dysphonia in the developing and underdeveloped world are varied, as optimal voice drops down in the priority list of health concerns.

Our study aimed to determine the epidemiology and the general management methods undertaken for common laryngology problems at our institute in India. The large sample size of this study, covering a population from a wide geographical region, gives us an idea about the pattern of hoarseness as a symptom and the scope of laryngology in the developing countries of the Indian subcontinent.

Materials and methods

Patients

Between January 2017 and December 2017, all patients with hoarseness who presented to the laryngology out-patient clinic and who underwent rigid or flexible laryngoscopy to diagnose the underlying cause were included in the study. There were no exclusion criteria. This retrospective observational study was conducted at a tertiary care teaching hospital in South India after approval by the institutional review board and the ethics committee (institutional review board number: 12587).

Methodology

Data for this retrospective observational study were retrieved from the computerised hospital information processing system. A detailed information profile was prepared for each individual, which included demographic and clinical information. Voice users were classified as level 1 users – elite voice performers or professionals (singers, theatre artists and performers), level 2 users – vocal professionals (e.g. clergy, radio jockeys, presenters, teachers), level 3 users – non-vocal professionals (e.g. doctors, lawyers, nurses, pharmacists) and level 4 users – non-vocal non-professionals.

Statistical analysis

The data were entered using EpiData software, version 3.1. All analyses were performed using SPSS statistical software, version 21.0 (IBM, Armonk, New York, USA). For continuous data, descriptive statistics of mean (standard deviation) and range were presented.

For categorical data, numbers of patients and percentages were presented. The chi-square and Fisher’s exact test (less cell count) were applied to find associations between categorical variables. All tests were two-sided at the $\alpha=0.05$ level of significance.

Results

Epidemiology

Of a total of 8320 new patients who attended the laryngology unit, 1033 presented with a change in voice and underwent laryngoscopy. The incidence of hoarseness in the patients seen at our unit was 12.4 per cent.

Among these patients with hoarseness, 70 per cent were males and 30 per cent females. The patients’ mean age was 46 ± 14.3 years (range, 10–91 years). The mean duration of hoarseness was 23 months, ranging from immediate onset of hoarseness (1 day) to 40 years.

The geographical distribution of the patients was wide, although the majority were from East India and Bangladesh. Other countries included neighbouring Myanmar, Sri Lanka, Bhutan and Nepal (Figure 1). Over a third of these patients (36.4 per cent) had a documented history of treatment or opinion from elsewhere before coming to our centre.

Risk factors and co-morbidities

Use of tobacco was recorded in 35.24 per cent, whereas only 7.6 per cent of patients admitted to consuming alcohol. The systemic illnesses documented were hypertension (16.2 per cent), diabetes (15.4 per cent), pulmonary pathology (12.9 per cent) and concomitant thyroid abnormalities (11.4 per cent).

Voice user levels

The majority of patients (50.73 per cent) were non-vocal non-professional voice users; only 3.2 per cent were level 1 voice users (elite voice performers) (Table 1).

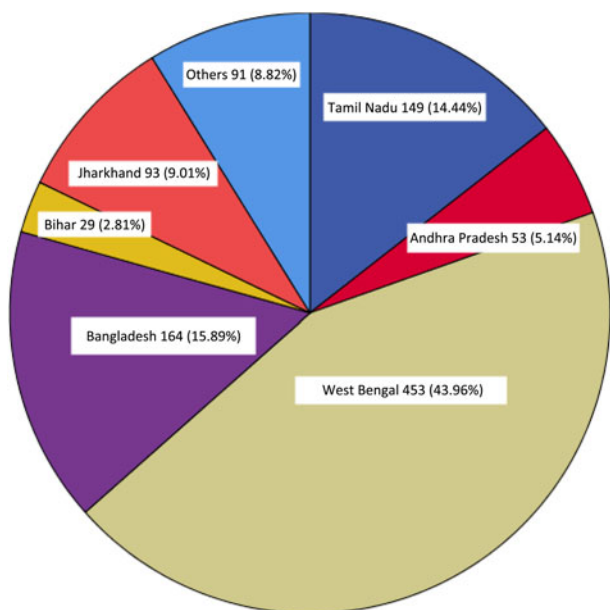


Fig. 1. Geographical distribution of patients with hoarseness.

Diagnosis

On histopathology, the majority of cases (82 per cent) were non-malignant (Table 1). Of the malignancies, squamous cell carcinoma was the most common ($n = 177$); two were variants of squamous cell carcinoma and the other eight were non-squamous.

The non-malignant conditions included benign mucosal lesions (e.g. polyps, nodules, cysts, scars or sulci, granulomas) (Figure 2), which accounted for the majority of cases (50.7 per cent, $n = 473$). The precise percentage distribution for each of these conditions was difficult to obtain, as there were many with more than one condition. For example, a large number of patients with laryngopharyngeal reflux, chronic laryngitis, polyps and scars had co-existing keratosis too.

A significant number of patients were diagnosed with vocal fold palsy ($n = 105$), with iatrogenic causes (32 per cent) being most common (Figure 3). Sixty-nine patients had pre-malignant leucoplakia or keratotic lesions; along with malignancies, such lesions contributed around 25 per cent of the total case load with hoarseness. The benign tumours ($n = 11$) seen were laryngeal papilloma, haemangiomas and nerve sheath tumours.

Table 1. Study population demographics and baseline characteristics*

Parameter	Value(s)
Age (mean \pm SD; years)	46 \pm 14.3
Gender (n (%))	
– Male	728 (70)
– Female	305 (30)
Level of voice user (n (%))	
– Level 1	33 (3.2)
– Level 2	172 (16.7)
– Level 3	304 (29.4)
– Level 4	524 (50.7)
Duration of hoarseness (range)	1 day to 40 years
Malignant cause of dysphonia (n (%))	187 (18)
Non-malignant cause of dysphonia (n (%))	932 (82)
– Benign mucosal lesions [†]	473
– Vocal fold palsy or immobility	105
– Pre-malignant, keratoses, leucoplakia	69
– Laryngopharyngeal reflux	66
– Functional dysphonia [‡]	40
– Trauma	35
– Neurological	33
– Stenosis	33
– Post RT	31
– Infections ^{**}	25
– Benign tumours [§]	11
– Immune-mediated	7
– Congenital	4

*Total $n = 1033$. [†]Polyps, nodules, cysts, scars and sulci, arytenoid granuloma, Reinke’s oedema, ectasia. [‡]Puberphonia, muscle tension dysphonia, psychogenic. ^{**}Bacterial, viral, fungal laryngitis. [§]Haemangioma, papillomas, nerve sheath tumours. SD = standard deviation; RT = radiotherapy

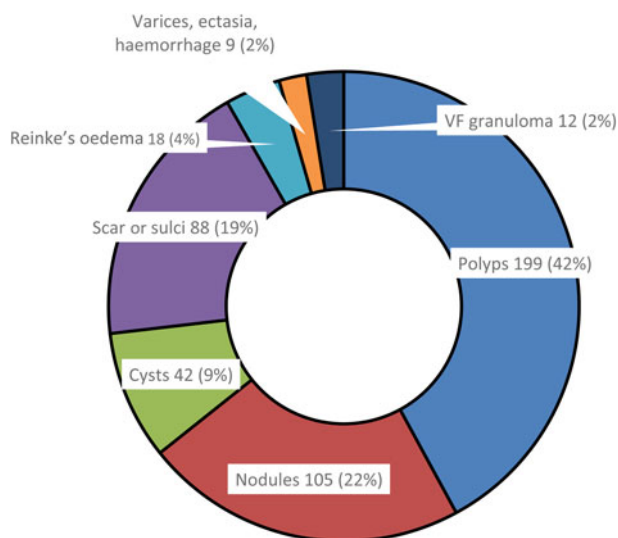


Fig. 2. Distribution of benign vocal fold mucosal lesions. VF = vocal fold

Of the 33 patients with neurogenic dysphonia, 10 had spasmodic dysphonia; the remaining cases were caused by Parkinson's disease, myasthenia gravis, amyotrophic lateral sclerosis, motor neurone disease, tremor and stroke. Muscle tension dysphonia ($n = 20$) and puberphonia ($n = 12$) were the most common functional voice disorders ($n = 40$). Regarding infective causes, 10 patients had laryngeal tuberculosis (TB) and 11 had fungal laryngitis.

Management

A total of 337 patients (33 per cent) were managed surgically, while 696 (67 per cent) were managed conservatively, with 565 patients requiring voice therapy. Only 39 per cent of patients with keratosis ($n = 27$) underwent a surgical procedure. A large proportion of patients with laryngeal squamous cell carcinoma (71 per cent, $n = 125$) opted for non-surgical management in the form of radiation or chemotherapy (organ preservation protocol). The majority of those with laryngeal trauma (75 per cent, $n = 9$), and 91 per cent of those with stenosis ($n = 31$), needed surgical intervention; only 18 per cent

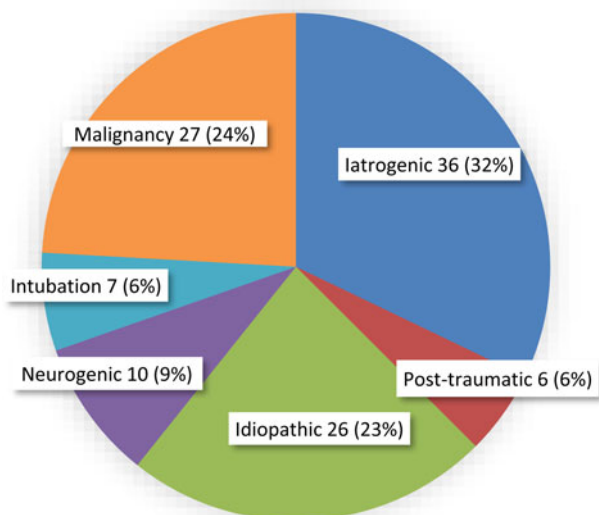


Fig. 3. Aetiology of vocal fold palsy or immobility.

($n = 19$) with nerve palsy opted for any form of surgical intervention.

Associations

In this study, we attempted to look for associations between risks and co-morbidities, voice user levels and diagnoses. We found significant associations between: level 3 and 4 voice users and polyps ($p < 0.001$) as well as keratotic pre-malignant lesion formation ($p < 0.025$); voice user level 1 and 2 and nodules ($p < 0.004$); voice user level 2 and 4 and scars and sulci ($p < 0.009$); and voice user level 2 and cysts ($p < 0.034$) (Table 2).

We also observed a significant association between pulmonary co-morbidities and the presence of keratotic laryngeal lesions ($p = 0.008$). In most cases (80 per cent), laryngeal TB was secondary to pulmonary TB. As expected, there was a significant association between tobacco use (92.5 per cent were smokers) and laryngeal malignancies ($p < 0.001$). Smoking was also significantly associated with the formation of pre-malignant lesions ($p = 0.02$) and scars ($p < 0.005$).

In our population, we found significant associations between hypertension and the presence of nodules ($p = 0.002$) and polyps ($p = 0.03$), and between autoimmune disease and the presence of airway stenosis ($p = 0.01$). The presence of thyroid disorders and diabetes did not show an association with any voice pathology.

After the initial consultation, 42 per cent of patients ($n = 434$) required cross-referrals for optimal management, and 565 underwent speech therapy. Only 53 per cent ($n = 547$) of the study patients had a minimum follow up of three months.

Discussion

Hoarseness may result from a wide variety of causes. Laryngologists have to work with other medical sub-specialties as well as speech and language pathologists, whose contribution is indispensable for optimal management in most cases of dysphonia, making treatment a multidisciplinary team effort.

Epidemiological differences

Data show that dysphonia has a point prevalence of around 1 per cent among patients seeking treatment, with a female predominance (63.4 per cent).^{2,4} Indian reports of smaller study groups (100–110 patients) showed lower incidence rates of hoarseness (less than 0.5 per cent) and a male predominance (51–89 per cent).^{5–9} The majority of our patient population was male (70 per cent), and the incidence of hoarseness in our study was 12.4 per cent. While the high incidence is probably a result of having a specialised laryngology sub-specialty unit, it also highlights the scope for laryngology in this country. The male predominance, as against the literature in Western, more developed countries, may point towards the perceived lack of importance and limited attention given to non-emergent medical issues in women, regardless of whether the conditions affect quality of life.

Among 80 per cent of Indian patients, the average duration of hoarseness as a presenting complaint has been reported to be around 12 months,⁵ as compared with 1–3 months in more than 60 per cent of patients in Western literature.^{3,10} In our study, we found the mean duration of presenting complaints

Table 2. Aetiology and voice user level associations

Aetiopathology for dysphonia	Cases (n (% of total))	Voice user level							
		Level 1		Level 2		Level 3		Level 4	
		(n (%))	P-value	(n (%))	P-value	(n (%))	P-value	(n (%))	P-value
Malignant conditions	187 (18)	01 (0.5)		10 (5.3)		43 (22.9)		133 (71.1)	
Non-malignant conditions	932 (82)								
– Benign mucosal lesions	473 (45.8)								
– Polyps	199 (19.2)	10 (5)	0.10	36 (18)	0.54	100 (50.3)	<0.001*	53 (26.6)	<0.001*
– Nodules	105 (10.1)	09 (8.6)	0.004*	30 (28.6)	0.001*	31 (29.5)	0.98	35 (33.5)	<0.10
– Cysts	42 (4)	01 (2.4)	1.00	12 (28.6)	0.034*	10 (23.8)	0.41	19 (45.2)	0.46
– Scar or sulci	88 (8.5)	02 (2.3)	1.00	33 (37.5)	<0.001*	20 (22.7)	0.14	33 (37.5)	0.009*
– Pre-malignant, keratoses, leucoplakia	69 (6.6)	0	0.16	11 (15.9)	0.87	32 (46.4)	0.001*	26 (37.7)	0.025*

Voice user categories: level 1 – elite voice performers or professionals, level 2 – vocal professionals, level 3 users – non-vocal professionals, and level 4 users – non-vocal non-professionals. *Indicates statistical significance ($p < 0.05$)

to be 24 months, clearly indicating a delay in seeking medical attention for hoarseness in the Indian subcontinent and a lack of awareness about the need to seek medical attention.

Diagnostic differences

Indian studies report a much lower rate of acute laryngitis (11–23 per cent *vs* around 40 per cent) and a much higher rate of malignant conditions (8–74 per cent *vs* around 2–3 per cent),^{5–9} with similar percentages of vocal fold palsy (3–10 per cent) and chronic laryngitis (9–10 per cent), compared with international data.^{2,4} Benign vocal fold lesions reported in Indian literature range from 8 to 60 per cent,^{5–9} compared with 10–31 per cent in Western literature.^{2,4} Our study showed the incidence of malignancy, vocal fold palsy and benign vocal fold lesions to be around 18 per cent, 10.5 per cent and 45 per cent, respectively.

Indian data indicate a 1–5 per cent incidence of laryngeal TB.^{5–7} Up to 14.5 per cent of head and neck TB cases have been reported to have laryngeal involvement.¹¹ While all 32 cases of laryngeal TB reported by Bhat *et al.*¹² had pulmonary involvement, only 20 per cent of laryngeal TB patients reported by Gandhi *et al.*¹³ showed systemic involvement. With 8 out of 10 cases of laryngeal TB (80 per cent) being secondary to pulmonary TB, our findings were similar to those of Lim *et al.*, where the majority had secondary laryngeal TB.¹⁴

Voice user level data

Voice professionals, such as teachers, broadcasters and musicians, whose professions are reliant on their voice, appear to be most at risk of developing a voice disorder.^{15–17} Although level 1 voice users are typically well-qualified voice users, others often have insufficient or no voice use and vocal hygiene training, making them more likely to adopt inappropriate voice production techniques. Indian studies have reported that most dysphonic patients can be categorised as a level 4 voice user.^{7–9} That was also seen in this study, clearly illustrating the need for voice and vocal hygiene education in the general population. In a Belgian study, functional voice disorders (41 per cent), vocal fold nodules or hypertrophy (15 per cent), and reflux, laryngitis or inflammation (11 per cent) were found to be the most common pathologies among professional voice users.¹⁸

No studies correlating voice user levels or co-morbidities with pathology were found in the Indian literature search. We observed some interesting, statistically significant associations. First, vocal nodules among both level 1 and 2 voice users suggest that overuse with a lack of adequate rest could be a contributing factor among trained individuals. Second, among level 3 and 4 voice users, vocal polyps were more common, suggesting that sudden phonotrauma causes hoarseness in untrained voice users. Third, vocal cysts were seen more frequently in level 2 voice users.

Co-morbidities, habit-forming substances and dysphonia

Apart from well-proven correlations between tobacco use and laryngeal malignancies,^{19–22} there are few significant associations between systemic co-morbidities and laryngeal pathologies in South Asian literature. In our patients, tobacco use was significantly associated not only with the presence of laryngeal malignancies, but also with pre-malignant or keratotic lesions, scars and nodules.

Chronic cough has been postulated to be related to an increased prevalence of benign vocal fold lesions.²³ The phonotrauma caused by the classical smoker's cough because of the chemical and thermal irritation, or because of underlying pulmonary co-morbidities, leads to increased keratinisation of delicate vocal fold epithelium, which could be the reason for these lesions.²³ This could explain why we found not only smoking but also pulmonary co-morbidities to be significantly associated with the presence of keratotic lesions on the vocal folds.

- This study, with a large sample and wide geographical distribution, provides a good overview of hoarseness in the Indian subcontinent
- Compared to Western literature, the data show large delays and male predominance in seeking medical attention
- This indicates that optimal voice is low on the list of health priorities in the subcontinent
- Significant associations were found between vocal professionalism level and co-morbidities and dysphonia aetiopathologies
- These associations might not imply clinical causation, but could be important for clinical management

The association of personality types with the formation of nodules and polyps has been extensively discussed in literature.^{24–29} In our cohort, the association of hypertension

with vocal nodules as well as polyps could be the result of voice abuse and misuse in these individuals who are more subject to stress and tend to become anxious or angry.

Systemic TB was seen in 80 per cent of our patients with laryngeal TB, supporting the data indicating that isolated or primary laryngeal TB is uncommon.^{14,30}

An association between airway stenosis and autoimmune conditions has also been described in the literature (e.g. granulomatosis with polyangiitis, Churg–Strauss syndrome, immunoglobulin G4 disease, and idiopathic subglottic stenosis).^{31–36} Patients present with hoarseness, cough or breathing difficulty either to the otolaryngologist or to the rheumatologist. After the initial management, the patients often need to be monitored every three to six months, as they tend to relapse.

Conclusion

This study, with its large sample size and the inclusion of patients from a wide geographical area, provides a good overview of hoarseness as a symptom in the developing Indian subcontinent. The hoarseness seen in our tertiary care referral centre was predominantly chronic, with acute-onset dysphonia being largely iatrogenic or traumatic in nature. An optimal voice seems to be lower on the list of health concerns in the subcontinent, especially among women. Polyps, nodules, malignancies and vocal fold palsies remain the major diagnoses, with scars and keratosis contributing a considerable number. A multidisciplinary approach to voice problems is often needed.

In addition to the commonly known associations between professional voice users and vocal fold nodules, and between tobacco use and malignancy and pre-malignant lesions, there appear to be interesting associations between hypertension and phonotraumatic lesions, between pulmonary co-morbidities and keratotic lesions, and between non-vocal professionals and non-professionals (voice user levels 3 and 4) and polyp formation. Even though these associations do not necessarily imply causation, exploring them further may provide useful information for management of these conditions. We hope that larger, multi-centre studies of hoarseness will be conducted in the future to understand this largely under-reported and under-emphasised symptom in our subcontinent.

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Competing interests. None declared

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