

Original Article

An Observational Study to Analyze Risk Factors for Benign Laryngeal Pathology in Hoarseness of Voice

Nishit Gupta¹, Maharshi Patel², Tapan Nagpal³, Pruthvi Modi⁴, Aarjav Shah²

Abstract

Aim : To study the correlation of risk factors with various benign laryngeal pathologies (chronic laryngitis) in patients with hoarseness.

Objectives : To study the correlation of risk factors with various different benign laryngeal pathologies in patients with hoarseness of voice.

Materials and Methods : A cross sectional study was conducted among 50 patients who came to ENT OPD with complains of hoarseness of voice. They were evaluated for presence of various known risk factors. History specifically for smoking, tobacco chewing, vocal abuse/misuse, allergies & recurrent URTI due to septic foci in nose/throat was taken. GERD was evaluated with Frequency Scale for Symptoms of GERD (FSSG) questions.

Conclusion : GERD in our study emerged as a very significant risk factor aside from the established risk factors (vocal abuse & smoking) in published literature. Contrary to published literature, Rinke oedema (chronic hypertrophic laryngitis) in our study emerged as the most common laryngeal pathology observed. Smoking and vocal abuse had additive effects on vocal cord pathologies like Reinke's oedema (100%). Vocal cord nodules were significantly associated with vocal abuse. GERD is significantly associated with vocal cord nodules.

Key words : Hoarseness, GERD, Smoking.

Voice serves as a person's identity and powerful method of communication in addition to being a source of sound. The larynx is made of a cartilaginous framework with muscles attached to it. The vocal folds produces the voice when speaking. The pharynx, palate, tongue, and lips alter the tone produced by the vocal folds to create various speech sounds. The larynx's primary roles include providing access to the lower respiratory tract, preventing aspiration during deglutition, and producing voice¹.

Changes in the larynx's anatomical structure can result in functional issues, which can severely impact voice production and lead to vocal disorders with a high recurrence rate².

Two types of laryngeal diseases result in speech disorders: temperamental diseases and functional diseases. In clinical practice, speech disorders brought on by benign lesions in the vocal cord mucosa are most frequently seen. The signs and symptoms of benign laryngeal lesions range from throat pain

Editor's Comment :

- GERD and vocal abuse are the most significant and prevalent risk factors for benign laryngeal pathologies causing hoarseness, with smoking further amplifying the severity of lesions such as Reinke's oedema and leukoplakia.
- Reinke's oedema and vocal cord nodules are the most common benign lesions, with clear associations: Reinke's oedema strongly correlated with combined smoking and vocal abuse, while nodules, cysts, and polyps predominantly correlated with vocal abuse.
- Early identification of risk factors through detailed history and laryngoscopic evaluation enables timely diagnosis and improves patient outcomes, highlighting the importance of lifestyle modification and voice conservation strategies in prevention.

and discomfort to voice changes and stridor.

"Hoarseness" means an alteration in a person's regular voice. Hoarseness is often the first symptom. The most frequent causes are Upper Respiratory Infections (URI) and short-term vocal abuse³. A lifetime prevalence of hoarseness is 30 per cent⁴. A prevalent complaint in today's high-stress life is hoarseness⁵. Hoarseness is more common in India and other developing nations because of factors including low economic status, poor nutrition, poor overall health, varied dietary habits, vocal habits, smoking & drinking habits⁴. Microlaryngoscopy and endolaryngeal microsurgery have already caused a significant improvement in the field of laryngology⁴.

Department of ENT, Smt BK Shah Medical Institute & Research Centre, Sumandeep Vidyapeeth Campus, Gujarat 391760

¹MS (ENT), Associate Professor

²MS (ENT), Junior Resident

³MS (ENT), Professor and Head

⁴MS (ENT), Assistant Professor and Corresponding Author

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The larynx is susceptible to benign and malignant lesions, including infective, inflammatory, traumatic, Neurogenic, Congenital, Functional and benign Neoplasms⁷.

MATERIALS AND METHODS

Study Setting : The study is conducted in the Department of Otorhinolaryngology, Dhiraj Hospital, SBKS Medical Institute and Research Centre, Piparia, Waghodia, Vadodara.

Study Type : An observational study.

Study Duration : One and half years.

Study Participants : Participants who came to ENT OPD of Dhiraj Hospital with complaints of hoarseness of voice were evaluated for the inclusion criteria. A hoarseness of voice questionnaire was used for this purpose.

Inclusion Criteria :

Patients with hoarseness of voice with benign pathology of the larynx.

Exclusion Criteria :

Patients have malignant laryngeal pathology.

Patients who did not give informed consent.

Sample size : The minimal sample size required for the present study was obtained by using the hypothesis testing method based on the following formula –

$$n = \frac{Z^2 p (1 - p)}{L^2}$$

Where –

Z = Z value at 95% confidence intervals = 1.96

p = the proportion of hoarseness of voice in benign pathology of larynx = 90% ; 1-p = 10%

L = Margin of error = 10%

The calculated minimum sample was 35, inflated by 10% for anticipated subject non-response. Finally, 50 Individuals were included in the analysis.

Sampling Technique : Eligible participants were acquired purposively for the present study.

Study Tools : Information about the study participants was collected in predesigned proforma (annexure I)

The proforma includes the following details.

Socio-demographic information of study participants

Patient ID, age, gender, occupation, marital status and contact details.

History : A comprehensive present, past, personal and family history for the presence of various known risk factors.

History specifically for smoking, tobacco chewing, vocal abuse/misuse, allergies & recurrent URTI due to septic foci in nose/throat.

GERD was evaluated with Frequency Scale for Symptoms of GERD (FSSG) questions.

Examination : General examination, Vitals, Systemic examination

ENT Examination : The laryngoscopic examination was done using a 90°storz rigid laryngoscope under local anaesthesia.

Examination of oral cavity and oropharynx. Examination of Ear, Nose.

Ethical Issues : All participants were given a Participant Information Sheet (PIS) in their native language. Participants were told about the research's nature and aim and the advantages and risks that might be incurred during the study. If participants accepted to participate in the research, they signed an informed consent form. The confidentiality and privacy of the participants were and will be maintained at every level. The Ethics Committee has approved the research at the institution.

Data Collection Procedure : After ethical approval from Institutional Ethical Committee (IEC), the data collection was started. Eligible participants were enrolled purposively in the study. All selected patients were provided participant's information sheet in the language they understand before they consented. Patients with hoarseness of voice with benign laryngeal lesions coming to ENT OPD at Dhiraj Hospital were enrolled. Data were collected on predesigned proforma for this study (Annexure I). They were evaluated for the presence of various known risk factors, namely, GERD, Vocal abuse, Smoking etc.

DISCUSSION

With increasing stress in day-to-day life, changing habits and lifestyle & rising levels of pollution hoarseness and voice disorders are becoming more and more prevalent. Laryngeal pathologies present are due to many causes and risk factors; so proper evaluation of history and correct diagnosis is key to

treating the voice disorders.

Gender : In the present study, 72% of males and 28% of females presented with hoarseness of voice. According to Srirangprasad K, *et al*⁹ 63% of the participants were male, and 37% were female. In the study by Rathi A, *et al*¹¹ 62.69% of patients with hoarseness of voice were males. According to the research conducted by Singh D, *et al*¹⁰ the female-to-male ratio is 2.1:1. They suggested that the requirement for women to use louder voices at home.

Occupation : In the present study, 70% of the study participants were engaged in the occupations with history of vocal abuse while 30% patients had less use of voice in their occupation. Among vocal abusers, maximum – about 1/3rd of the study participants was Vegetable Vendors & about 1/5th (20%) each were Housewives & Teachers.

In the research conducted by Rathi A, *et al*¹¹ the majority of cases (42.06%) were of Labourers or Farmers, followed by 31.74% of Homemakers.

Risk Factors : In our study, Vocal abuse was seen among 70% of the patients with hoarseness of voice. A gastroesophageal reflux score of more than eight was also observed as a very common risk factor among 70% of the study participants. While only 40% of the study participants had a history of Smoking. This concurs with the study by Pal KS, *et al*⁸ wherein Vocal abuse (40%) was the most common predisposing factor.

Vocal Cord Pathologies :

Vocal Nodules : In the present study, 26% of the cases of hoarseness had vocal nodules. Vocal nodules are frequently seen at the middle of the membrane vocal fold, where the mucosal wave has its most significant amplitude and experiences the most phono-traumatic force due to vocal abuse. Similar to the present study, the proportion of vocal nodules seen in the study done by Banjara H, *et al*¹² and Srirangprasad K, *et al*⁹ was most common being 11.95% & 12% respectively.

Vocal Cord Polyps : Voice fold polyps are the other most common benign laryngeal lesion, affecting the vocal output and Quality of Life of people afflicted. The proportion of vocal cord polyps was 16% in the present study. Banjara H, *et al*¹² and Srirangprasad K, *et al*⁹ reported 3.59% and 5% of the cases with vocal cord polyps, which are pretty low, compared to the present study implying that many vocal abusers in our study presented late.

Vocal Cysts : Vocal cysts are also benign laryngeal lesions which can cause hoarseness and dysphonia.

Banjara H, *et al*¹² and Srirangprasad K, *et al*⁹ reported 5.58% and 10% of the cases respectively with vocal cord cysts while this study saw a slightly higher proportion of vocal cord cysts among 14% of the patients.

Reinke's Oedema : Reinke's oedema is a benign vocal fold condition with diffuse polypoid degeneration of one or, more often, both vocal folds. Reinke's oedema was the most common laryngeal pathology observed among 34% of our study participants.

In the study by Srirangprasad K, *et al*⁹ & Banjara H, *et al*¹² chronic laryngitis, a precursor to Reinke's oedema was a common aetiology in 22% & 9.35% cases respectively

In present study 18% of patients (9 patients) had history of both vocal abuse & smoking all 100% which patients had Reinke's oedema, which shows additive effect of both risk factors in development of Reinke's oedema.

Leukoplakia : In the present study proportion 6% of the study participants had leukoplakia. Banjara H, *et al*¹² reported 1.20% of the cases in his study with leukoplakia of the vocal cords.

Vocal Cord Palsy : This study saw the proportion of vocal cord palsy in 4% of the patients with hoarseness of voice. Banjara H, *et al*¹² and Ahmmed SU, *et al*¹⁴ reported that 11.16 % and 6.92% of the cases with hoarseness of voice had vocal cord palsy.

Smoking and Hoarseness of Voice : Several negative consequences on the larynx, including a change in voice quality, are well-documented when smoking is involved.

In the research by Krecicki, *et al*¹⁵ 86% of individuals with VF oedema were smokers.

Effat KG, *et al*¹⁶ reported that smokers had more significant vocal fold polypoidal change than non-smokers

In the present study, out of 17 cases of Reinke's oedema, 11 cases (65%) were smokers. Smoking, in our study was significantly related to leucoplakia and Reinke's oedema.

In present study 18% of patients (9 patients) had history of both vocal abuse & smoking all 100% which patients had Reinke's oedema. A combination of smoking with vocal abuse has additive effects.

Vocal Abuse : In the present study, vocal cord nodules were found in significantly high proportions (p-value 0.003) among people with vocal abuse as a predominant risk factor. Vocal cord cysts and polyps also positively correlated with vocal abuse as a risk factor.

In the study by Srirangprasad K, *et al*⁸ out of 12 cases of vocal nodules, 11 cases had a history of vocal abuse, while in the case of vocal polyp, out of 5 cases, three patients had a history of vocal abuse.

Milovanovic J¹⁷ reported that. nodule patients were more likely to be lecturers, singers, and actors than polyp patients (p = 0.006), and they had greater occupational voice demands (significant and enormous) than polyp patients.

GERD : Gastroesophageal reflux is an inflammatory illness of the upper aerodigestive tract tissues, Long believed to have a pivotal role in developing benign lesions of the vocal folds like nodules, polyps, Reinke's oedema, sulcus vocalis, and cysts.

Kuhn J, *et al*¹⁸ found that the incidence of pharyngeal acid reflux episodes is much greater in patients with vocal cord nodules than in normal controls, indicating that gastro-esophageopharyngeal acid reflux plays a role in the aetiology of specific vocal cord nodules.

In the study by Koufman, *et al*¹⁹ among the patients with vocal cord nodules, 40% had positive reflux.

RESULTS

The present study of 50 cases was conducted at the Department of Otorhinolaryngology, Dhiraj Hospital, Vadodara. The study included subjects with deviated nasal septum with chronic rhinosinusitis. Observations made from the study are as follows :

Results : 72% of males and 28% of females had hoarseness of voice (Table 1).

Results : 70% of the study participants were engaged in the occupations with history of vocal abuse while 30% patients had less use of voice in their occupation. In present study, among vocal abusers, maximum – about 1/3rd of the study participants was vegetable vendors & about 1/5th (20%) each were housewives & teachers (Table 2).

Results : among 20 smokers 9 (45%) study participants had history of vocal abuse (Table 3).

A gastroesophageal reflux score of more than 8 was observed in the majority - 70% of the study

Table 1 — Gender distribution among study participants (n=50)

Gender	Number of Participants	Percentage (%)
Male	36	72%
Female	14	28%

participants. Vocal abuse as a risk factor was present in 70% of the patients with hoarseness of voice. 40% of the study participants had an addiction to smoking.

Results : Reinke's oedema and vocal cord nodules were the most common laryngeal pathologies observed in among 34% and 26% of the study participants. Vocal cord polyps and vocal cord cysts were seen in 16% and 14%, respectively, of the patients with hoarseness of voice. The proportion of vocal cord palsy and leucoplakia was seen among 4% and 6% of the patients, respectively (Fig 1).

Results : vocal cord nodule was found in significantly high proportions (p value 0.003) among patients with vocal abuse as a predominant risk factor. Vocal cord cyst and polyp also had a positive correlation with vocal abuse as a risk factor. Rest of the vocal cord pathologies had no significant association with vocal abuse (Fig 2).

CONCLUSION

The mean age of the patients with hoarseness was 45.38 years

Table 2 — Occupation among study participants

Occupation	Number	Percentages
Patients with significant vocal abuse	35	70
Vegetable vendor	11	22
Housewife	7	14
Teacher	6	12
Lawyer	2	04
Vendor	4	08
Pandit	2	04
Singer	1	02
Shopkeeper	1	02
Traffic policeman	1	02
Patients without significant vocal abuse	15	30
Carpenter	3	06
Student	2	04
Labourer	5	10
Nurse	1	02
Plumber	1	02
Police	1	02
Electrician	2	04

Table 3 — Simultaneous history of vocal abuse and smoking among study participants

Smoking	Vocal abuse		Total
	Not present	Present	
No	04	26	30
Yes	11	09	20

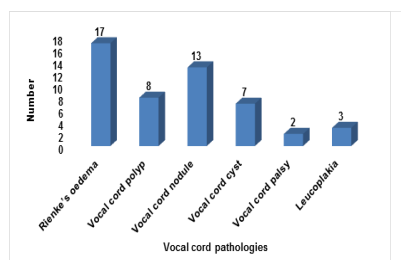


Fig 1 — vocal cord pathologies among study participants.

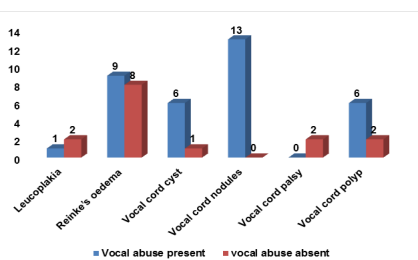


Fig 2 — Relation of vocal abuse to vocal cord pathologies among study participants elation of vocal abuse to vocal cord pathologies among study participants.

72% of males and 28% of females have hoarseness of voice & half of the female study participants were housewives (14%).

70% of the study participants were engaged in the occupations with history of vocal abuse, while 30% of patients had less use of voice. A gastroesophageal reflux score of more than eight was observed in the majority - 70% of the study participants.

Vocal abuse & GERD as a risk factor was present in 70% of the patients with hoarseness of voice. 40% of the study participants had a history of smoking.

Reinke's oedema and vocal cord nodules were the most common laryngeal pathologies observed among 34% and 26% of the study participants respectively.

Leucoplakia (100%) ie, all patients with leucoplakia were smokers and Reinke's oedema (64.7%) are significantly higher in smokers.

Smoking and vocal abuse had additive effects on vocal cord pathologies like Reinke's oedema (100%).

Vocal cord Nodules (100%), vocal cord Cysts (85.7%) and vocal cord Polyps (75%) were significantly associated with vocal abuse.

GERD is significantly associated with vocal cord nodules (92.3%).

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Conflict of Interest : None.

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