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Original Research Article

Risk stratification of hoarseness of voice: impact of lifestyle factors, symptom duration, and occupation on malignancy

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ABSTRACT

Background: Hoarseness of voice is a common clinical presentation with causes ranging from benign conditions to laryngeal malignancy. Early identification of high-risk patients is essential for timely diagnosis and improved outcomes. This study evaluated occupational and lifestyle predictors of malignancy in patients presenting with hoarseness of voice.
Methods: A retrospective analytical study was conducted on 60 patients presenting with hoarseness of voice over a two-year period. Clinical and demographic variables including age, sex, residence, occupation, symptom duration, and addictive habits were analysed. Patients were categorized into malignant and non-malignant groups. Associations were assessed using Chi-square test and logistic regression analysis.
Results: Among 60 patients, 21 (35%) had malignant lesions. Malignancy was more common in males, patients above 40 years, and those from rural areas. Combined addictive habits (smoking with alcohol consumption) showed a strong association with malignancy (OR 8.9, $p<0.001$). Symptoms lasting more than 3 months were also significantly associated with malignancy (OR 7.0, $p=0.006$). Multivariate analysis identified combined addictive habits (AOR 7.8, $p=0.001$) and prolonged symptom duration (AOR 6.2, $p=0.004$) as independent predictors.
Conclusions: Malignancy in patients with hoarseness of voice is strongly associated with combined addictive habits and delayed presentation. Early evaluation of persistent hoarseness, especially in high-risk individuals, is essential for timely diagnosis and improved outcomes.

Keywords: Alcohol, Hoarseness of voice, Laryngeal malignancy, Occupation, Retrospective study, Risk factors, Smoking

INTRODUCTION

Hoarseness of voice is a common presenting complaint in otolaryngology practice, defined as an abnormal change in voice quality, pitch, or volume that interferes with communication.[1] It may arise from a wide spectrum of aetiologies ranging from benign inflammatory conditions and vocal cord lesions to serious pathologies such as laryngeal malignancy.[2] Although most cases are self-limiting or benign, persistent hoarseness warrants thorough evaluation to exclude underlying malignancy.[3]

Early identification of malignant causes of hoarseness remains a clinical challenge, particularly in resource-limited settings where patients often present late in the course of disease. Delay in seeking medical attention,

lack of awareness, and limited access to healthcare facilities contribute to advanced-stage presentation, especially among rural populations.[4] Recognizing patients at higher risk for malignancy is therefore crucial for timely diagnosis and improved clinical outcomes.

Several risk factors have been implicated in the development of laryngeal malignancy, including advancing age, male gender, and addictive habits such as smoking and alcohol consumption.[5-9] In addition to these established factors, occupational exposure and lifestyle patterns may play a significant role in influencing disease occurrence. Individuals engaged in labour-intensive occupations are often associated with higher prevalence of substance use and reduced healthcare access, whereas those with increased vocal demand are more prone to benign vocal cord pathologies.[6,10]

Despite the known associations, there is limited literature focusing on the combined impact of occupational and lifestyle factors in identifying high-risk patients presenting with hoarseness of voice, particularly in the context of rural-urban disparities.[11] Understanding these relationships can aid clinicians in stratifying patients based on risk and prioritizing early diagnostic interventions.

The present study was undertaken to identify high-risk patients among individuals presenting with hoarseness of voice by analysing occupational and lifestyle predictors of malignancy. By evaluating clinicodemographic characteristics along with patterns of addictive habits and occupational profiles, this study aimed to provide clinically relevant insights that may facilitate early detection and management of malignant conditions.

METHODS

This retrospective analytical study was conducted in the department of otorhinolaryngology at a tertiary care centre in Telangana. Medical records of patients presenting with hoarseness of voice between January 2021 and December 2022 were reviewed. A total of 60 patients with a primary complaint of hoarseness of voice were included in the study. Patients of all age groups and both sexes were considered. Patients with incomplete medical records or unclear diagnosis were excluded from the study. Relevant clinical and demographic data were obtained from hospital records, including age, sex, residence (urban or rural), occupation, duration of symptoms, and history of addictive habits such as smoking, alcohol consumption and tobacco chewing. Occupational categories were grouped for analysis into labourers, farmers, housewives, students and professional voice users.

Outcome measures

Patients were categorized into two groups based on final diagnosis: malignant and non-malignant causes of hoarseness. Diagnosis was established through clinical evaluation, laryngoscopic examination, and histopathological confirmation wherever indicated.

Variable definitions

Age was categorized into three groups: <40 years, 40-60 years, and >60 years. Duration of symptoms was classified as <3 months, 3-6 months, and >6 months. Addictive habits were grouped as smoking, alcohol, combined habits of smoking and alcohol and tobacco chewers. Residence was classified as urban or rural.

Statistical analysis

Descriptive statistics were used to summarize demographic and clinical characteristics. Associations between categorical variables and malignancy were assessed using the Chi-square test. Odds ratios (OR) with corresponding confidence intervals were calculated to estimate the strength of association between risk factors and malignancy.

Variables showing significant association on univariate analysis were included in a multivariate logistic regression model to identify independent predictors of malignancy. A p value of <0.05 was considered statistically significant.

Ethical consideration

Institutional approval was obtained prior to data collection. Patient confidentiality was maintained throughout the study, and no identifiable personal information was disclosed.

RESULTS

A total of 60 patients presenting with hoarseness of voice were included in the study. The majority were males (43, 71.7%), with females accounting for 17 cases (28.3%). The age of patients ranged widely, with a higher proportion of malignancy observed in individuals above 40 years of age.

Out of the total study population, 21 patients (35%) were diagnosed with malignancy, while 39 patients (65%) had non-malignant aetiologies. Among malignant cases, a marked male predominance was noted (19 males and 2 females).

With respect to residence, a significantly higher proportion of malignant cases were observed among patients from rural areas (17 out of 21, 81%) compared to urban areas (4 out of 21, 19%). In contrast, non-malignant cases were more evenly distributed between rural (20 cases) and urban (19 cases) populations.

Table 1: Demographic and clinical profile of study population (n=60).

Variables	Category	Number	Percentage
Age group (in years)	<40	13	21.7
	40-60	35	58.3
	Above 60	12	20.0
Gender	Male	43	71.7
	Female	17	28.3
Residence	Rural	37	61.7
	Urban	23	38.3
Occupation	Labourer	26	43.3
	Farmers	11	18.3
	Housewives	6	10.0
	Students	5	8.3
	professional voice users	12	20.0
Addictive habits	Smoking	6	10.0
	Alcohol	13	21.7
	Smoking + Alcohol	18	30.0
	Tobacco chewing	6	10.0
	No habits	17	28.3
Duration of symptoms	<3 months	24	40.0
	3-6 months	21	35.0
	>6 months	15	25.0

Table 2: Etiological spectrum of laryngeal lesions in study population (n=60).

Diagnosis	Number	Percentage
Malignant lesions		
Malignant growth (biopsy proven)	21	35
Benign lesions		
Laryngopharyngeal reflux disease (LPRD)	20	33.3
Vocal cord nodules	8	13.3
Vocal cord paralysis	4	6.7
Vocal polyp	5	8.3
Vocal cord papilloma	1	1.7
Vocal cord cyst	1	1.7
Total	60	100

Table 3: Association of clinical variables with malignancy (chi-square test).

Variables	Malignant (n=21)	Non-malignant (n=39)	P value
Smoking	3	3	0.718
Alcohol use	4	9	0.974
Smoking + alcohol	13	6	0.001*
Residence			0.048*
Rural	17	20	
Urban	4	19	
Duration of symptoms			0.006*
<3 months	3	21	
3-6 months	12	9	
>6 months	6	9	
Occupation			0.012*
Labour-intensive (farmers and labourers)	17	20	
Voice users (housewives+ professional voice users and students)	0	18	
Others	4	1	

*Statistically significant (p<0.05).

Table 4: Odds ratios for significant factors associated with malignancy.

Variables	Odds ratio (OR)	Interpretation
Smoking + Alcohol	8.9	Strong positive association with malignancy
Duration >3 months	7.0	Increased odds of malignancy with delayed presentation

Table 5: Multivariate logistic regression analysis for predictors of malignancy.

Variables	Adjusted odds ratio (AOR)	P value	95% confidence interval (CI)	Interpretation
Smoking + alcohol	7.8	0.001*	2.2-27.1	Independent predictor of malignancy
Duration >3 months	6.2	0.004*	1.5-24.8	Independent predictor of malignancy

*Statistically significant ($p<0.05$).

Analysis of addictive habits revealed a strong association with malignancy. Combined habits, particularly smoking along with alcohol consumption, were most frequently observed among malignant cases (13 patients), followed by alcohol use alone (4 patients) and smoking alone (3 patients). Notably, no malignancy was observed among patients without addictive habits, whereas a higher proportion of non-malignant cases had no associated habits.

Occupational distribution demonstrated that labour-intensive occupations were associated with a higher prevalence of malignancy. Among malignant cases, the majority were labourers (14 patients), followed by farmers (3 patients), while no malignancy was observed among housewives or students. In contrast, benign aetiologies were more commonly seen among housewives, students and professional voice users, indicating a possible association with voice-use patterns.

Duration of symptoms showed a significant association with malignancy ($p=0.006$), with patients presenting longer duration of symptoms were more likely to have malignant pathology.

On univariate analysis using the Chi-square test, factors such as residence, addictive habits, occupation, and duration of symptoms showed significant association with malignancy ($p<0.05$). Odds ratio analysis demonstrated increased risk of malignancy among patients with combined addictive habits, labour-intensive occupations, and rural residence.

On multivariate analysis, combined addictive habits (AOR 7.8, 95% CI: 2.2-27.1, $p=0.001$) and duration of symptoms >3 months (AOR 6.2, 95% CI: 1.5-24.8, $p=0.004$) emerged as independent predictors of malignancy.

Overall, the findings indicate that malignancy in patients presenting with hoarseness of voice is strongly associated with modifiable lifestyle factors and delayed presentation, with certain occupational groups demonstrating higher vulnerability.

DISCUSSION

Hoarseness of voice is a frequently encountered symptom in otolaryngology practice, with aetiologies ranging from benign inflammatory conditions to malignant lesions of the larynx.[1,2] Early identification of high-risk patients is essential, as delayed diagnosis of laryngeal malignancy significantly impacts prognosis. The present study was undertaken to evaluate the etiological spectrum and to identify clinical, occupational, and lifestyle predictors of malignancy among patients presenting with hoarseness of voice.

In the present study, benign lesions constituted the majority (65%), with laryngopharyngeal reflux disease (LPRD) being the most common aetiology, followed by vocal cord nodules and polyps. These findings are consistent with previous studies that have reported inflammatory and functional disorders as the leading causes of hoarseness in clinical practice.[1,6,13] Malignancy accounted for 35% of cases, which is relatively higher compared to some studies, likely reflecting the tertiary care setting and referral bias.

A marked male predominance was observed among malignant cases, consistent with existing literature attributing this to higher exposure to risk factors such as tobacco and alcohol use.[3,5] Additionally, a greater proportion of malignancy was noted in patients above 40 years of age, supporting the well-established association between advancing age and increased risk of laryngeal carcinoma.[8]

Residence was found to have a borderline significant association with malignancy, with a higher proportion of cases among rural patients. This may be attributed to delayed healthcare-seeking behaviour, limited access to specialized care, and lower awareness levels in rural populations.[14] Such delays often result in advanced disease at presentation, highlighting the need for improved awareness and early referral systems in these settings.

Lifestyle factors, particularly addictive habits, demonstrated a strong association with malignancy. While smoking and alcohol consumption individually did not show statistically significant association, their combined use was significantly associated with malignancy, with nearly nine-fold increased odds. This finding supports the well-established synergistic carcinogenic effect of tobacco and alcohol in the development of laryngeal cancer.[9,12] The absence of malignancy among individuals without such habits further reinforces the importance of lifestyle modification in prevention.

Occupational distribution revealed that labour-intensive occupations were associated with a higher burden of malignancy. The increased risk of malignancy may be attributed to a greater prevalence of combined addictive habits in these groups, particularly chronic alcohol consumption, smoking, and, in some cases, tobacco chewing- factors well established in the aetiology of laryngeal malignancy. Although tobacco chewing is not directly linked to laryngeal malignancy but its concurrent use along with smoking and alcohol may exert synergistic effect, further increasing the malignancy risk. In contrast, benign lesions were more commonly observed among housewives and students, possibly due to increased vocal usage and functional voice disorders.[15] These findings highlight the relevance of occupational profiling in clinical risk stratification.

Another important observation in the present study was the significant association between duration of symptoms and malignancy. Patients presenting with hoarseness for more than 3 months had significantly higher odds of malignancy compared to early presenters. Although current clinical guidelines recommend evaluation of hoarseness persisting beyond 2-3 weeks, our findings highlight a gap between guideline recommendations and actual patient presentation patterns.[2] The observed association likely reflects delayed healthcare-seeking behaviour and progression of disease rather than a direct causal relationship. Similar observations have been reported in head and neck oncology literature, where delayed presentation is associated with advanced-stage disease and poorer outcomes.[3,4]

On multivariate analysis, combined smoking and alcohol use and prolonged duration of symptoms emerged as independent predictors of malignancy. This underscores the importance of considering both behavioural risk factors and clinical presentation in the early identification of high-risk patients. Occupation and residence, although contributory, did not retain independent significance after adjustment.

The findings of this study have important clinical implications. Identification of high-risk groups- particularly individuals with combined addictive habits and prolonged symptoms- can aid clinicians in prioritizing early diagnostic evaluation. In resource-limited settings, such risk stratification may be especially valuable in guiding timely referral and management. These findings reinforce the need for early screening strategies and public health awareness, particularly in high-risk populations.

However, the present study has certain limitations. The retrospective design and relatively small sample size may limit the generalizability of the findings. Additionally, as a single-centre study, regional variations may not be fully represented. Despite these limitations, the study provides clinically relevant insights into the etiological spectrum and risk factors associated with malignancy in patients presenting with hoarseness of voice. Further large-scale prospective studies are recommended to validate these findings and to better understand the interplay of occupational and lifestyle factors in the development of laryngeal malignancy.

CONCLUSION

Hoarseness of voice is a clinically significant symptom that requires prompt and systematic evaluation to exclude underlying malignancy. The present study demonstrates that a substantial proportion of patients presenting with hoarseness harbour malignant pathology, particularly among males and individuals above 40 years of age.

Combined addictive habits, especially smoking with alcohol consumption, and prolonged duration of symptoms emerged as significant independent predictors of malignancy. Labour-intensive occupations and rural background were associated with increased risk, likely reflecting higher exposure to risk factors and delays in seeking medical care.

These findings highlight the importance of early identification of high-risk patients using simple clinical parameters. Persistent hoarseness beyond 2-3 weeks, particularly in individuals with combined addictive habits, should prompt early laryngoscopic evaluation to facilitate timely diagnosis and improve outcomes.

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REFERENCES

1. Rosen CA, Anderson D, Murry T. Evaluating hoarseness: keeping your patient's voice healthy. Am Fam Phys. 1998;57(11):2775-82.
2. Schwartz SR, Cohen SM, Dailey SH, Rosenfeld RM, Deutsch ES, Gillespie MB, et al. Clinical practice guideline: hoarseness (dysphonia). Otolaryngol Head Neck Surg. 2009;141(3 Suppl 2):S1-31.
3. Baitha S, Raizada RM, Kennedy Singh AK, Puttewar MP, Chaturvedi VN. Clinical profile of

hoarseness of voice. Indian J Otolaryngol Head Neck Surg. 2002;54(1):14-8.
4. Parikh NP. Aetiological study of 100 cases of hoarseness of voice. Indian J Otolaryngol Head Neck Surg. 1991;43(2):71-3.
5. Banjara H, Varshney S, Singh D, Gupta A. Hoarseness of voice: a retrospective study of 251 cases. Int J Phonosurg Laryngol. 2011;1(1):21-7.
6. Koufman JA, Isaacson G. The spectrum of vocal dysfunction. Otolaryngol Clin North Am. 1991;24(5):985-8.
7. Sapkota R, Bhandari S, Shrestha BL. Aetiological factors of hoarseness of voice: a study of 100 cases. Kathmandu Univ Med J. 2017;15(57):15-8.
8. Dedivitis RA, França CM, Mafra AC, Guimarães AV. Clinical and epidemiological characteristics in patients with laryngeal cancer. Rev Bras Otorrinolaringol. 2002;68(6):789-93.
9. Hashibe M, Brennan P, Chuang SC, Boccia S, Castellsague X, Chen C, et al. Interaction between tobacco and alcohol use and the risk of head and neck cancer: pooled analysis in the International Head and Neck Cancer Epidemiology Consortium. Cancer Epidemiol Biomark Prevent. 2009;18(2):541-50.
10. World Health Organization. Global status report on alcohol and health. Geneva: WHO; 2018.
11. National Cancer Institute. Smoking and cancer. Bethesda (MD): National Institutes of Health; 2020.
12. Gupta B, Johnson NW. Systematic review and meta-analysis of association of smokeless tobacco and head and neck cancer. Oral Oncol. 2014;50(12):1080-91.
13. Prasad KC, Sreedharan S, Prasad SC. Hoarseness of voice: an etiological study. J Indian Med Assoc. 2009;107(6):345-8.
14. Altman KW, Atkinson C, Lazarus C. Current and emerging concepts in muscle tension dysphonia: a 30-month review. J Voice. 2005;19(2):261-7.
15. Johns MM. Update on the etiology, diagnosis, and treatment of vocal fold nodules, polyps, and cysts. Curr Opin Otolaryngol Head Neck Surg. 2003;11(6):456-61.

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