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ORIGINAL ARTICLE

Frequency of benign vocal cord lesions in patients presenting with hoarseness of voice.

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ABSTRACT… Objective: To determine the prevalence and associations of benign vocal cord lesions with demographic, clinical, and lifestyle factors. **Study Design:** Cross-sectional study. **Setting:** Department of ENT, Hayatabad Medical Complex, Peshawar. **Period:** April 4, 2023, to October 4, 2023. **Methods:** A total of 245 patients aged 40–60 years with hoarseness of voice were included. Patients with malignant vocal cord neoplasms or recent surgical interventions were excluded. Clinical, radiological, and endoscopic evaluations were performed to diagnose BVCLs. Data on demographic and clinical factors were collected and analyzed using SPSS version 23.0, with $p \leq 0.05$ considered significant. **Results:** The mean age of participants was 42.38 ± 12.79 years, with an average disease duration of 4.39 ± 1.84 months. BVCLs were present in 41.6% of patients. Males had a higher prevalence (43.4%) compared to females (35.7%). Among social classes, prevalence was 41.2% in poor, 40.8% in middle-class, and 43.1% in rich individuals. Diabetes mellitus showed a significant association with BVCLs ($p = 0.044$), while other factors such as age, hypertension, smoking, and tobacco usage were not significantly associated ($p > 0.05$). **Conclusion:** Benign vocal cord lesions are prevalent, with significant associations observed with diabetes mellitus. Routine screening for BVCLs in high-risk populations and interventions to address modifiable risk factors are recommended.

Key words: Benign Vocal Cord Lesions, Diabetes Mellitus, Endoscopy, Hoarseness, Smoking.

INTRODUCTION

The vocal folds are the primary structures responsible for voice production. These membranous structures are attached to the arytenoid and thyroid cartilages, extending across the larynx. Airflow from the lungs vibrates the epithelium of the vocal cords, and the resultant changes in air pressure generate sound waves.[1] Common benign lesions of the vocal folds include vocal polyps, solitary nodules, cystic lesions, leukoplakia, Reinke's edema, and respiratory papillomatosis. Such lesions can affect voice quality and, if large, may lead to respiratory distress. Respiratory papillomatosis, a benign lesion of the larynx caused by the human papillomavirus (HPV), typically manifests as a single papilloma in adults.[2]

The incidence of benign vocal cord lesions is approximately 0.15%, with prevalence highest in the third, fourth, and fifth decades of life. Risk factors include smoking, allergies, gastroesophageal reflux, vocal misuse, and chronic airway infections.[3]

Human papillomavirus is the primary causative agent, with HPV types 6, 11, 16, and 18 being the most significant. Laryngoscopic findings include scarring of the sulcus between the vocal fold epithelium, fine tremors of the cords, and incomplete glottic closure.[4]

Hoarseness should not be ignored, as it may indicate serious laryngeal diseases. According to Chevalier Jackson, "Hoarseness is a symptom of extreme significance and requires proper consideration due to its frequent occurrence as a signal of malignancy and other non-neoplastic conditions".[5] Hoarseness reflects underlying structural or functional abnormalities of the larynx, with vocal abuse being a significant contributing factor.[6]

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Advancements in non-invasive diagnostic methods, including laryngeal physiology and semiology studies, along with histopathological analyses, now facilitate the evaluation of phonatory function and vocal fold lesions. Diagnosis primarily relies on a detailed history, clinical symptoms, and thorough examination via indirect laryngoscopy, direct laryngoscopy, or videostroboscopy.[7]

Among the general population, 10% present with voice disorders, with prevalence rising to 50% in professional voice users. Vocal cysts, which affect both children and adults, may be epidermal or mucosal in origin.[8] Benign vocal fold lesions are managed using various approaches, including surgery, voice therapy, and adjunctive treatments such as intralesional steroid injections.[9]

Leukoplakia of the vocal folds is another prevalent cause of hoarseness. Laryngoscopic examination reveals white plaques on the surface of the vocal folds, which are often challenging to remove.[10,11]

In one study, vocal cord lesions were more common in males (64.58%) aged 21–40 years. The most common presenting symptom was voice change (100%), and vocal abuse was identified as the leading etiological factor (83.33%). Students were the most affected group (27.08%), with vocal cord nodules comprising the majority of cases (39.58%). Except for papillomas, all lesions showed good recovery without recurrence.[12]

Despite advancements in surgical technology and medical science, complications during total thyroidectomy persist. Common complications include bleeding, hypoparathyroidism, and vocal cord paralysis, with recurrent laryngeal nerve (RLN) injury accounting for nearly half of these complications.[3]

Vocal cord paralysis is one of the most serious complications of thyroid surgery and is associated with hoarseness, dysphonia, dysphagia, and aspiration. It remains a leading cause of medicolegal claims against surgeons. Many cases of vocal cord palsy are unexpected and unrecognized intraoperatively, even when RLN integrity is visually confirmed. Studies report that only 10% of RLN injuries are identified intraoperatively, and 75% of transient RLN palsies occur without visible nerve damage.[5,6]

Risk factors for RLN injury during thyroidectomy include revision surgeries, malignancy, Graves' disease, recurrent or substernal goiters, hematoma exploration, and low surgeon volume. Surgeons with lower case volumes experience higher complication rates and longer hospital stays. For instance, the odds of complications decrease significantly as surgeon experience increases, with rates ranging from 87% higher for one case per year to just 3% for 21–25 cases per year.[9]

A prospective study of 301 patients undergoing total thyroidectomy for multinodular goiters reported a vocal cord palsy incidence of 8.6%, predominantly affecting the right side (62%), with no cases of bilateral paralysis.[10] In a retrospective study by Joliat et al., 451 post-thyroidectomy patients revealed vocal cord palsies in 14% of cases, of which six were permanent and 57 transient.[7]

To determine the prevalence and associations of benign vocal cord lesions with demographic, clinical, and lifestyle factors.

METHODS

A descriptive cross-sectional study was conducted in the Department of ENT, Hayatabad Medical Complex (HMC), Peshawar, from April 4, 2023, to October 4, 2023, after obtaining approval from the Hospital's Ethical Committee and Research Evaluation Unit (REU) CPSP Karachi (HMC-QAD-F-00-6/9/22). With a 95% confidence level and a 6% margin of error, the total sample size of 245 participants was calculated using the WHO calculator. It was projected that 64.58% of benign vocal cord lesions would occur.[7] The sampling method used was consecutive (non-probability sampling). After taking informed consent detailed histories were taken and recorded on a predesigned proforma, followed by physical examinations and necessary investigations conducted on an outpatient basis. The diagnosis

of benign vocal cord lesions was based on clinical, radiological, and endoscopic evaluations performed under the supervision of a consultant ENT specialist with at least seven years of post-fellowship experience. All patients were managed as per standard protocols.

Inclusion Criteria

- Patients aged 40–60 years.
- Both genders.
- All patients presenting with hoarseness of voice.

Exclusion Criteria

- Patients with malignant neoplasms of the vocal cord.
- Patients with previous surgical approaches within three months prior to the study.

The collected data were entered into SPSS Version 23.0. Frequencies and percentages were computed for categorical variables such as gender, social class, hypertension, diabetes mellitus, educational status, smoking history, tobacco chewing, snuff usage, and gutka usage, while means and standard deviations (SDs) were calculated for continuous variables like age and duration of disease. Benign vocal cord lesions were stratified by age, gender, social class, hypertension, diabetes mellitus, educational status, smoking history, tobacco chewing, snuff usage, and gutka usage to identify effect modifiers. The post-stratification analysis was performed using the chi-square test, with a significance level of $p \leq 0.05$. All results were presented in tables and graphs.

RESULTS

The study included a total of 245 participants, with a mean age of 42.38 ± 12.79 years. The average duration of the disease was 4.39 ± 1.84 months. Stratification of participants based on age revealed that the majority were above 30 years n=190 (77.6%), while only n= 55 (22.4%) were younger than 30 years.

The gender distribution showed a predominance of males 189(77.1%) compared to females (56, 22.9%). Regarding socioeconomic class, most participants belonged to the poor category (131, 53.5%), followed by the rich (65, 26.5%) and middle class (49, 20.0%). Hypertension was prevalent in 154 (62.9%) participants, while 91 (37.1%) were non-hypertensive. Similarly, diabetes mellitus was observed in 148 (60.4%) of the participants, while 97 (39.6%) were non-diabetic. The educational status of the sample revealed that 155 (63.3%) participants were illiterate, whereas 90 (36.7%) had completed at least primary education. Smoking history was reported by 188 (76.7%) participants, while 57 (23.3%) were non-smokers. Tobacco chewing was common, with 179 (73.1%) participants reporting its use, compared to 66 (26.9%) who did not chew tobacco. Snuff usage was highly prevalent, with 191 (78.0%) participants reporting its use, compared to 54 (22.0%) who did not use snuff. Gutka usage was observed in 179 (73.1%) participants, while 66 (26.9%) did not use gutka (Table-I).

The prevalence of benign vocal cord lesions (BVCLs) was 102 (41.6%), while 143 (58.4%) did not have BVCLs (Table-I).

Clinicodemographic Variables	Category	n (%)
Age	< 30 Years	55 (22.4%)
	> 30 Years	190 (77.6%)
Gender	Male	189 (77.1%)
	Female	56 (22.9%)
Social Class	Poor	131 (53.5%)
	Middle Class	49 (20.0%)
	Rich	65 (26.5%)
Hypertension	Yes	154 (62.9%)
	No	91 (37.1%)
Diabetes Mellitus	Yes	148 (60.4%)
	No	97 (39.6%)
Educational Status	Illiterate	155 (63.3%)
	Primary & Above	90 (36.7%)
Smoking History	Yes	188 (76.7%)
	No	57 (23.3%)
Tobacco Chewing	Yes	179 (73.1%)
	No	66 (26.9%)
Snuff Usage	Yes	191 (78.0%)
	No	54 (22.0%)
Gutka Usage	Yes	179 (73.1%)
	No	66 (26.9%)
Benign Vocal Cord Lesions	Yes	102 (41.6%)
	No	143 (58.4%)

Table-I. Demographic and clinical characteristics (n=245)

According to Table-II, Benign vocal cord lesions (BVCLs) were present in 24 (43.6%) participants under 30 years and 78 (41.1%) above 30 years, with no significant association (P = 0.732). BVCLs were more common among males (82, 43.4%) than females (20, 35.7%), but this difference was also not significant (P = 0.306). Regarding social class, the prevalence was similar across groups: 54 (41.2%) in the poor, 20 (40.8%) in the middle class, and 28 (43.1%) in the rich category (P = 0.962). Among participants with hypertension, 57 (37.0%) had BVCLs compared to 45 (49.5%) of non-hypertensive individuals, nearing statistical significance (P = 0.056). A significant association was observed with diabetes mellitus, where BVCLs were less frequent among diabetics (54, 36.5%) compared to non-diabetics (48, 49.5%) (P = 0.044). Educational status revealed 66 (42.6%) BVCLs in illiterate participants versus 36 (40.0%) in those with primary education or higher (P = 0.693). BVCLs were observed in 75 (39.9%) smokers compared to 27 (47.4%) non-smokers (P = 0.316), while tobacco chewing showed 76 (42.5%) prevalence among users and 26 (39.4%) among non-users (P = 0.666). Snuff usage had BVCLs in 77 (40.3%) users compared to 25 (46.3%) non-users (P = 0.431). Gutka users exhibited 70 (39.1%) BVCL prevalence versus 32 (48.5%) in non-users (P = 0.186). None of these lifestyle factors showed statistically significant associations with BVCLs.

DISCUSSION

The current study analyzed the prevalence and associations of benign vocal cord lesions (BVCLs) with various demographic, clinical, and lifestyle factors among 245 patients at the Department of ENT, MTI-HMC, Peshawar.

The mean age of the study population was 42.38 years (standard deviation: 12.786 years), with the mean disease duration being 4.39 months. Age stratification revealed that 43.6% of individuals under 30 years and 41.1% over 30 years were diagnosed with BVCLs. No statistically significant association was observed between age and the prevalence of BVCLs (P = 0.732), suggesting that these lesions are equally prevalent across age groups. This finding aligns with those reported by Zhukhovitskaya et al. (2015), who identified similar age-related patterns (13).

Variable	Subgroup	BVCL		Total (%)	P-Value
		Yes	No		
Age Group	< 30 Years	24 (43.6%)	31 (56.4%)	55 (100%)	0.732
	> 30 Years	78 (41.1%)	112 (58.9%)	190 (100%)	
Gender	Male	82 (43.4%)	107 (56.6%)	189 (100%)	0.306
	Female	20 (35.7%)	36 (64.3%)	56 (100%)	
Social Class	Poor	54 (41.2%)	77 (58.8%)	131 (100%)	0.962
	Middle Class	20 (40.8%)	29 (59.2%)	49 (100%)	
	Rich	28 (43.1%)	37 (56.9%)	65 (100%)	
Hypertension	Yes	57 (37.0%)	97 (63.0%)	154 (100%)	0.056
	No	45 (49.5%)	46 (50.5%)	91 (100%)	
Diabetes Mellitus	Yes	54 (36.5%)	94 (63.5%)	148 (100%)	0.044
	No	48 (49.5%)	49 (50.5%)	97 (100%)	
Educational Status	Illiterate	66 (42.6%)	89 (57.4%)	155 (100%)	0.693
	Primary & Above	36 (40.0%)	54 (60.0%)	90 (100%)	
Smoking History	Yes	75 (39.9%)	113 (60.1%)	188 (100%)	0.316
	No	27 (47.4%)	30 (52.6%)	57 (100%)	
Tobacco Chewing	Yes	76 (42.5%)	103 (57.5%)	179 (100%)	0.666
	No	26 (39.4%)	40 (60.6%)	66 (100%)	
Snuff Usage	Yes	77 (40.3%)	114 (59.7%)	191 (100%)	0.431
	No	25 (46.3%)	29 (53.7%)	54 (100%)	
Gutka Usage	Yes	70 (39.1%)	109 (60.9%)	179 (100%)	0.186
	No	32 (48.5%)	34 (51.5%)	66 (100%)	

Table-II. Stratification of benign vocal cord lesions with various factors

Chi Square test was used to find out significance

However, Vidya et al. (2016) reported a peak incidence of BVCLs among individuals aged 31–40 years.[14]

Gender distribution indicated a male predominance, with 43.4% of males and 35.7% of females presenting with BVCLs. While males had a higher prevalence, the association was not statistically significant (P = 0.306). This trend could be attributed to higher vocal demands, occupational exposure, and habits such as smoking, as noted by Sharma et al. (2015) and Rudra et al. (2017).[15,16]

An analysis of socioeconomic status revealed that BVCLs were present in 41.2% of individuals classified as poor, 40.8% of the middle class, and 43.1% of the rich group, with no significant association (P = 0.962). This suggests that socioeconomic factors may not directly influence the prevalence of BVCLs, though access to healthcare and occupation-related factors might play indirect roles. Similar findings were reported by Rudra et al. (2017).[16]

Hypertension was observed in 62.9% of the sample, with 37.0% of hypertensive individuals and 49.5% of non-hypertensive individuals presenting with BVCLs. While this association approached statistical significance (P = 0.056), the results suggest that hypertension may contribute to the pathogenesis or persistence of BVCLs, warranting further research. These findings are consistent with those reported by Saraniti et al.[17]

A statistically significant association was found between diabetes mellitus and BVCLs, with 36.5% of diabetic patients having BVCLs compared to 49.5% of non-diabetic individuals (P = 0.044). This aligns with the findings of Hamdan et al. (2012), who suggested that systemic metabolic changes in diabetes can result in tissue damage, including vocal cord pathologies.[18]

Educational status showed no significant association with BVCLs. Among illiterate individuals, 42.6% had BVCLs, compared to 40.0% of individuals with primary education or higher (P = 0.693). However, low literacy rates may influence awareness of preventive measures and access to timely medical care. These findings align with those reported by Hosoya et al. (2018).[19]

Lifestyle factors, including smoking, tobacco chewing, snuff usage, and gutka consumption, were also assessed. The prevalence of BVCLs was 39.9% in smokers, 42.5% in tobacco chewers, 40.3% in snuff users, and 39.1% in gutka consumers. None of these associations reached statistical significance (P > 0.05). While studies such as those by Kim et al. (2022) and Bosso et al. (2021) have reported strong links between tobacco-related habits and vocal cord lesions, the lack of significance in this study may be due to sample size limitations or underreporting of these habits.[20,21]

This study has several limitations, including its single-center design and relatively small sample size, which may limit the generalizability and statistical power. Self-reported data on lifestyle habits may be subject to recall bias, and the cross-sectional nature precludes causal inferences. Additionally, potential confounding factors, such as occupational strain and access to healthcare, were not fully explored. Diagnostic precision may also be limited due to the reliance on clinical evaluations without advanced imaging or histopathological confirmation. Future studies should address these issues with larger, multi-center cohorts and prospective designs.

CONCLUSION

Benign vocal cord lesions are prevalent, with significant associations observed with diabetes mellitus. Routine screening for BVCLs in high-risk populations and interventions to address modifiable risk factors are recommended.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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2	**Midrarullah:** Data collection, proof reading, critical analysis.
3	**Saeed Khan:** Data collection, data analysis, final drafting.
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