Original Research Article

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Laryngeal malignancy: epidemiology and staging at the time of presentation in a rural population

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ABSTRACT

Background: Laryngeal cancer is one of the 10 leading causes of cancer in Indian men. Late presentation of the disease may worsen management outcomes. Consumption of tobacco and alcohol is associated with the development of laryngeal malignancy.

Methods: A cross-sectional study was conducted in the Department of ENT, at Chamarajanagar Institute of Medical Sciences and Hospital, Chamarajanagar, India, for a period of 2 years 6 months from October 2014 to March 2017. During the study period, all cases that were diagnosed as Laryngeal malignancy by histopathology were included in the study group. The aim of this study is to determine the epidemiology, anatomical location of the tumor at presentation, clinical presentation and the stage of the tumor at the time of presentation.

Results: Majority of patients were elderly male from lower socio-economic strata. The most common clinical presentations were change in voice, pain in throat, difficulty in swallowing, lump in neck and difficulty in breathing. Supraglottis (82%) was the most common anatomic location of tumor. 60% of the patients presented in stage III of the disease. All the cases were squamous cell carcinoma.

Conclusions: Laryngeal malignancy is a relatively uncommon malignancy in general population but is more common in rural population especially in people belonging to lower socio-economic strata. Supraglottic malignancy is the most common anatomic location of laryngeal malignancy. Majority of the cases from rural population presented in an advanced stage of the disease.

Keywords: Laryngeal malignancy, Carcinoma of larynx, Supraglottic malignancy, Glottic malignancy, Squamous cell carcinoma, Tobacco

INTRODUCTION

The larynx is located in the anterior aspect of the neck, suspended from the hyoid bone, and spans between C3 and C6 vertebrae. It is connected superiorly to the pharynx and is continuous inferiorly with the trachea. The larynx is formed by a cartilaginous skeleton, which is held together by ligaments and membranes. The external and internal laryngeal muscles act to move the larynx and it's parts for phonation and breathing. Anatomically, the internal cavity of the larynx can be divided into three

sections namely the Supraglottis, which extends from the epiglottis to the ventricular bands. Glottis, which contains vocal cords and extends about 1cm below them. The opening between the vocal cords is known as rima glottidis, the size of which is altered by the muscles of phonation, Subglottis extends from the inferior border of glottis to the inferior border of cricoid cartilage. ¹

The larynx is an essential organ and performs vital functions such as maintaining an open air way, vocalization, protection of lungs from aspiration of solids

and liquids, allowing leverage by closing the glottis during a Valsalva maneuver to increase upper-body strength and to ease defecation.²

Both benign and malignant tumors occur in the larynx. Benign tumors constitute less than 5% of laryngeal tumors. Laryngeal cancer is the ninth and seventh most common cause of cancer in males in Asia and India respectively. In India, the incidence of laryngeal cancer has been reported to be 1.26-8.18 per 100,000 population, in different regions in the country.³

The most important risk factor for cancer larynx appears to be the use of tobacco. National Cancer Registry Program enlists laryngeal cancer as one of the tobaccorelated cancer. Other causes that have been implicated in it's aetiology are alcohol consumption, occupational exposure to certain carcinogens, radiation exposure and genetic factors.

Malignant tumors of the larynx may affect laryngeal physiology depending on tumor location and size leading to various clinical presentations. The main treatments for laryngeal malignancy are radiotherapy, surgery and chemotherapy depending on the stage of the disease.

The present study was conducted to establish the epidemiological profile of the patients who were diagnosed as having laryngeal malignancy, to analyse anatomical site-wise distribution of laryngeal malignancy and the staging of laryngeal tumor at the time of presentation in people from rural areas.

METHODS

A cross-sectional study was conducted in the department of ENT of Chamarajanagar Institute of Medical Sciences and Hospital, Chamarajanagar, India, for a period of 2 years 6 months from October 2014 to March 2017. A total of 50 patients were included in our study. During the study period, all cases that were diagnosed as Carcinoma Larynx by histopathology were included in the study group. A detailed history was taken and clinical examination including ENT, general and systemic examination was carried out in all patients suspected to be affected by laryngeal malignancy. Routine blood renal and liver function examination ultrasonography of abdomen and pelvis, chest x-ray was carried out. FNAC (Fine Needle Aspiration Cytology) of neck masses if present was carried out. Specialized investigations like upper gastro-intestinal endoscopy, computerized tomography (CT), MRI (Magnetic Resonance Imaging) of the head and neck region, chest and abdomen was carried out if required. Direct laryngoscopy was carried out and Tissue specimen obtained from biopsy of the growth in the larynx was sent for histopathological examination which was done using hematoxylin and eosin staining to establish the diagnosis of carcinoma and it's grade.

RESULTS

Data was collected from the patients included in the study and included personal details of the patient, socioeconomic details, habits of the patients. All the data was collected using a proforma and standard statistical analysis was done and the data was represented in number and percentages.

Table 1: Age and sex incidence.

Age group in years	Male	Female	Total	Percentage (%)
0-10	-	-	-	-
11-20	-	-	-	-
21-30	-	-	-	-
31-40	1	-	1	2
41-50	10	-	10	20
51-60	18	1	19	38
61-70	13	2	15	30
71-80	3	-	3	6
Above 80	2	-	2	4
Total	47	3	50	100

Majority of the patients (38%) were in the 6th decade of life. Other cases presented predominantly in 7th and 5th decade (Table 1).

Table 2: Socio- economic status.

Socioeconomic status	No. of cases	Percentage (%)
Upper class	2	4
Middle class	13	26
Lower class	35	70
Total	50	100

Majority of the patients (70%) belonged to the lower socio-economic strata (Table 2).

Table 3: Occupation.

Occupation	No. of cases	Percentage (%)
Agricultural worker	26	52
Laborer/daily wage worker	14	28
Office worker	2	4
Factory worker	5	10
House wives	3	6
Total cases	50	100

Majority of the patients (52%) were agricultural workers (Table 3).

All the patients were exposed to tobacco either by smoking or chewing. Majority of the patients had the habit of alcohol consumption (Table 4).

Table 4: Personal habits.

Personal habits	No. of cases
Non-vegetarian	34
Vegetarian	16
Alcoholic	32
Non-alcoholic	18
Smoker	44
Non-smoker	6
Tobacco chewing	14
Solid fuel for cooking	35

Table 5: Symptomatology.

Symptoms	Duration in Months				Total no of	Domantaga (0/)
Symptoms	0-3	4-6	7-12	>12	cases	Percentage (%)
Change in Voice	39	7	3	-	49	98
Pain in throat	28	5	1	-	34	68
Difficulty in Swallowing	23	5	2	-	30	60
Lump in neck	20	3	2	1	26	52
Difficulty in breathing	19	5	1	-	25	50
Cough	21	3	1	-	25	50
Weight Loss	16	4	3	-	23	46
Stridor	14	-	-	-	14	28
Ear ache	6	3	2	-	11	22

Table 6: T-Staging.

Staging	No of cases	Percentage (%)
T1	7	14
T2	7	14
T3	30	60
T4	6	12
Total	50	100

Table 7: Lymph node metastasis.

Cervical Lymph nodes	No. of cases	Percentage (%)
Ipsilateral single node (≤3 cm) - N1	25	50
Ipsilateral single node (>3 and ≤6 cms) - N2a	2	4
Ipsilateral multiple nodes (≤6 cms) - N2b	1	2
Bilateral/Contralateral ≤6cm - N2c	0	0
Lymph node > 6cms - N3	1	2
Neck nodes (Total No. of cases)	29	58

Table 8: TNM staging of laryngeal tumors.

Stage			Number	Percentage (%)	Percentage (%)
I (T1N0M	[0)		7	14	14
II (T2N0N	10)		7	14	14
TTT	T3N0M0		5	10	60
111	T1-3 N1M0		25	50	00
IVA IVB	T4a N0-N1 M0	2	4		
	T1-4a N2 M0	3	6		
	T Any N3 M0	1	2	12	
	T4b N Any M0	0	-		
	IVC	T Any N Any M1	0	-	

Tumor location	Stage	Number	Total	Percentage (%)
	I	2		
Cumuaglattia	II	6	41	82
Supraglottis	III	27		82
	IV	6		
Glottis	I	5		
	II	1	9	18
	III	3		18
	IV	0		
Subglottis	I, II, III, IV	0	0	0

Table 9: Anatomical site-wise distribution of laryngeal malignancy.

Majority of the patients (98%) presented with history of change in voice (Table 5).

Maximum number of patients presented in T3 stage of the tumor to the hospital (Table 6).

Majority of the patients had lymph node metastasis at the time of presentation (Table 7).

60% of the laryngeal malignancy patients were presented in stage III, 14% of the patients presented in stage I and stage II each, 12% of the patients presented in stage IV (Table 8).

82% of the cases had supraglottic malignancy (Table 9).

All the 50 patients had squamous cell carcinoma on histopathological examination of the biopsy specimen of the tumor.

DISCUSSION

Head and neck cancer constitute about 5 to 50% of all the cancers found in the world. In India, head and neck cancer constitutes about 30% of all the cancers, and laryngeal cancer is the second most comon amongst all the head and neck cancers. Laryngeal cancer is the second most common respiratory cancer after lung cancer. 10

Various risk factors have been suggested for the development of laryngeal cancer such as tobacco use, excessive ethanol use, male sex, infection with human papillomavirus, increasing age, diets low in green leafy vegetables, diets rich in salt preserved meats and dietary fats, occupational exposure to metal, plastic, paint, asbestos, radiation, fumes from fossil fuel combustion and laryngopharyngeal reflux.

Majority of the patients in our study were male (94%), this was similar to the studies conducted by Bhattacharjee et al, Vartanian et al. ^{11,12} Various factors could contribute to the higher incidence of laryngeal malignancy in males such as the use of tobacco and alcohol consumption being higher in males and being uncommon in females as the

consumption of these by females is considered a taboo in Indian population, especially in the rural areas. However, all the female patients in our study had the habit of tobacco chewing. Laryngeal cancer contributes to approximately 3-6% of all cancer in males and only about 0.2-1% of all cancer in females. ¹³ The data obtained from Indian Cancer Registries indicates that in India, cancer larynx is far more common in males as compared to females.

Most of the laryngeal malignancy patients presented in the 5th to 7th decades of their life in our study. Majority of the patients (38%) belonged to 51-60 years of age, this was similar to the study conducted by Cattaruzza et al where the maximum incidence of laryngeal cancer was between 5th and 7th decades of life. ¹⁰ Parkin et al reported that laryngeal cancer is generally a disease of the elderly, with a peak incidence in the 50s and 60s. ¹⁴ Laryngeal malignancy presented in advanced age groups and none of the cases in our study were in the first three decades of life. Incidence of laryngeal malignancy increased with increasing age, the reason for this could be, the effect tobacco, alcohol and other carcinogens had on the individual due to prolonged exposure over several years.

Majority of the patients (70%) in our study were from lower socio-economic strata. Though, socioeconomic status being a function of income, education and occupation, by itself does not result in cancer or poor outcome from the disease. Rather, it is a marker for underlying physical and social factors that cause the disease. Majority of the people in a rural population belong to lower socio-economic strata. In addition to this the lower educational qualification in this population leads to ignorance and neglect about health and they have relatively poor access to health care and health education. This could also be the reason for late presentation of laryngeal malignancy cases in our study.

Majority of the patients in our study were agricultural workers and only a small group were educated office goers as the population in our study was from rural background where majority of people practiced agriculture as the main occupation. Most of the agriculturists and daily wage laborers had the habit of

tobacco and alcohol consumption along with ignorance about one's own health, poor and imbalanced nutrition.

The International Agency for Research on Cancer (IARC) monograph classifies tobacco use as carcinogenic to humans based on an overwhelming epidemiological evidence. 16 In India, tobacco is both chewed and smoked in several forms. Common form of smoking tobacco in rural population apart from cigarette is "beedi" an Indian cigarette, containing 0.2-0.3 gram of tobacco rolled in a leaf, usually temburni leaf mylanoxylon).¹⁷ Laryngeal cancer is strongly related to beedi and cigarette smoking as well as the number smoked per day and duration of smoking. Beedi smoking is found to have higher risk than cigarette smoking. Chewing of tobacco in the form of khaini, zarda, mawa, pan, etc. is also prevalent in India. Alcohol consumption has also been implicated as a risk factor in the development of laryngeal carcinoma.¹⁷

44 patients were smokers in our study with the exception of only 6 patients being non-smokers.

However, all the non-smokers had the habit of tobacco chewing, such that all the cases in our study had exposure to tobacco. 32 patients were alcoholic. Female population in our study had the habit of tobacco chewing. 12 patients had the habit of consumption of both tobacco and alcohol and 5 of these patients presented in stage IV of the disease. A study by Almadori et al showed that 95% or more have a history of smoking, which increases risk in a dose-dependent way. 18

Incidence of laryngeal malignancy was more common amongst non-vegetarians in our study. Several studies also reported reduced laryngeal cancer risk with consumption of fruits and vegetables. ¹⁹⁻²¹

Long duration of coal usage was found to be a risk with duration-dependent increase in risk for laryngeal cancer. The rural population (70%) in our study used firewood and coal as source of fuel for cooking, similar to several studies where the risk associated with laryngeal cancers was greater in populations using solid fuels especially coal-specific exposures. All the female patients in our study used solid fuel at home for the purpose of cooking and were exposed to smoke from the solid fuel.

Change in voice was the most common symptom followed by pain in throat and difficulty in swallowing. A large number of patients (90%) presented with a combination of symptoms. 98% patients presented with change in voice which was similar to the study conducted by Peter M, where the incidence of change in voice was 93%. 25 Hoarseness is common and an early symptom in glottic cancers but is a late symptom in supraglottic and subglottic cancers. Majority of patients in our study presented in an advanced stage of the disease, hence, hoarseness was the most common symptom. 60% of the patients had symptoms of difficulty in swallowing which

was seen in 50.95% of the patients in a study by Verma et al. 26 26 patients also complained of a lump in neck whereas 29 patients had enlarged neck nodes on clinical examination. All these 29 patients had metastatic carcinoma on FNAC of enlarged neck nodes.

Majority of the patients in our study had supraglottic malignancy (82%), followed by glottic malignancy. There were no cases of subglottic malignancy in our study. The malignant tumours of the larynx occur more commonly in the supraglottis as found in the studies by Bakshi et al and Datti et al. ^{27,28} In a study by Akmansu et al, 66.7% had supraglottic malignancy and 26.5% patients had glottic malignancy. ²⁹

Epithelial tumors are classified according to the guidelines set by the International Union Against Cancer (UICC). Staging considers three criteria: the extent of the primary tumor (T), size of regional nodal metastases (N) and distant metastases from primary tumor (M). Majority of the patients in our study presented in T3 stage of the tumor (54%), similar to a study by Mishra and Panda.³⁰

58% of the patients had regional lymph node metastases at the time of presentation. 50% of the patients had N1 node at the time of presentation, indicating that most of the patients in our study presented with cervical nodal metastases. In a study by Chauhan et al 58% cases had cervical lymph node metastases.³¹ The incidence of lymph node metastasis varies with the location of primary tumor. The high incidence of metastasis in supraglottic malignancy is due to rich lymphatic supply in the supraglottic region. 28 patients (56%) with supraglottic malignancy had lymph node metastases whereas only one glottic malignancy patient had neck metastasis in our study.

About 60% of the patients presented in stage III of the disease. A total of 72% of the patients presented in stage III and IV of the disease this was similar to a study by Chauhan et al.³¹

All the cases in our study were squamous cell carcinoma which was similar to the study by Kelly and Cross. ³² According to Wang et al 99% of all Laryngeal carcinomas are squamous cell carcinoma. ³³ The vast majority of laryngeal cancers are squamous cell carcinoma. Other varieties of malignancy found in larynx are verrucous carcinoma, spindle cell carcinoma, neuroendocrine tumors, lymphoepitheliomatous carcinoma, adenocarcinoma, and rare tumors (including sarcoma, lymphoma, adenocarcinoma and metastases). ³⁴

Malignancy of larynx is a disease found more commonly in people from lower socio-economic class who are addicted to smoking and they being not conscious about health, present quite late to the hospital leading to poor treatment outcome in them. Therefore, it is desirable to educate them about this disease so that early diagnosis and treatment can make a difference in the morbidity and mortality of this disease. Primary prevention of a large number of laryngeal cancers can be achieved by elimination of tobacco use, reduction of consumption of alcohol and encouraging people to adopt a diet rich in fruits and vegetables. All patients who have hoarseness for more than 2 to 3 weeks should have their larynx examined by an Otorhinolaryngologist and head and neck specialist.

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REFERENCES

- Sasaki CT, Isaacson G. Functional Anatomy of the Larynx. J Voice. 1997;11(3):345-55.
- 2. Seikel JA, King DW, Drumright DG. Non-speech laryngeal function. In Anatomy and Physiology for Speech, Language and Hearing. 4th ed. Delmar, NY: Cengage Learning; 2010: 23-26.
- ICMR. Individual registry-wise annexure. In: Threeyear Report of Population Based Cancer Registries 2009-2011. Bangalore: National Cancer Registry Program; 2013: 92–150.
- 4. ICMR. Sites of cancer associated with use of tobacco. In: Three-year Report of Population Based Cancer Registries 2009-2011. Bangalore: National Cancer Registry Program. 2013:23–6.
- Garden SA, Beadle BM, Morrison WH. Larynx and Hypopharynx Cancer. In: Gunderson LL, Tepper JE, eds. Clinical Radiation Oncology. 4th ed. Elsevier; 2016: 649-672.
- Medenhall WM, Riggs CE Jr, Cassini NJ. Treatment of Head and Neck Cancers. In: De Vita Jr, Hellman S, Rosenberg SA, eds. Cancer: Principles and Practice of Oncology. 7th ed. Philadelphia, PA: Lippincot Williams and Wilkins; 2005: 662-732.
- 7. Stafford EM, Farrag TY, Tuffanao RP. Early treatment of the larynx. In Koch WM, ed. Early Diagnosis and Treatment of Cancer Series: Head and Neck Cancers. Elsevier; 2010: 95-114.
- 8. Garffinkel L. Perspective on cancer prevention. Cancer J Clin. 1995;45(1):5-7.
- 9. Chu EA, Kim YJ. Laryngeal cancer: diagnosis and pre-operative work-up. Otolaryngol Clin North Am. 2008;41(4):673-95.
- 10. Cattaruzza MS, Maisonneuve P, Boyle. Epidemiology of laryngeal cancer. Eur J Cancer. 1996;32B(5):293-305.

- 11. Bhattacharjee A, Chakraborty A, Purkaystha P. Prevalence of Head and Neck cancer in the North East: an Institutional Study. Ind J Otolaryngol Head Neck Surg. 2006;58(1):5–19.
- Vartanian JG, Carvalho AL, Toyota J, Kowalski ISG, Kowalski LP: Socioeconomic effects of and risk factors for disability in long term survivors of Head and Neck cancer. Arch Otolaryngol Head Neck Surg. 2006;132:32-5.
- 13. ICMR. Individual registry-wise annexure. In: Three-year Report of Population Based Cancer Registries 2009-2011. Bangalore: National Cancer Registry Program (ICMR). 2013:92-150.
- 14. Parkin DM, Bray F, Ferlay J, Pisani P. Global cancer statistics. CA Cancer J Clin. 2005;55:74–108.
- 15. Freeman HP. Cancer in the economically disadvantaged. Cancer. 1989;64:324-34.
- 16. International Agency for Research on Cancer. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Tobacco Smoke and Involuntary Smoking. Lyon, France: International Agency for Research on Cancer. 2004; 83.
- 17. Bobdey S, Jain A, Balasubramanium G. Epidemiological review of laryngeal cancer: An Indian perspective. Indian J Med Paed Oncol. 2015;36(3):154-60.
- 18. Almadori G, Bussu F, Gadoni G, Galli J, Paludetti G, Maurizi M. Molecular markers in laryngeal Squamous cell carcinoma: Towards an integrated clinicobiological approach, Eur J Cancer. 2005;41:683-93.
- 19. Pelucchi C, Talamini R, Levi F, Bosetti C, La Vecchia C, Negri E, et al. Fibre intake and laryngeal cancer risk. Ann Oncol. 2003;14:162-7.
- 20. Bosetti C, La Vecchia C, Talamini R, Negri E, Levi F, Dal Maso L, et al. Food groups and laryngeal cancer risk: A case-control study from Italy and Switzerland. Int J Cancer. 2002;100:355-60.
- 21. De Stefani E, Boffetta P, Oreggia F, Brennan P, Ronco A, Deneo-Pellegrini H, et al. Plant foods and risk of laryngeal cancer: A case-control study in Uruguay. Int J Cancer. 2000;87:129-32.
- 22. Sapkota A, Gajalakshmi V, Jetly DH, Roychowdhury S, Dikshit RP, Brennan P, et al. Indoor air pollution from solid fuels and risk of hypopharyngeal/laryngeal and lung cancers: A multicentric case-control study from India. Int J Epidemiol. 2008;37:321-8.
- 23. Josyula S, Lin J, Xue X, Rothman N, Lan Q, Rohan TE, et al. Household air pollution and cancers other than lung: a meta-analysis. Environ Health. 2015;15:14-24.
- 24. Sapkota A, Gajalakshmi V, Jetly DH, Roychowdhury S, Dikshit RP, Brennan P, et al. Indoor air pollution from solid fuels and risk of hypopharyngeal/laryngeal and lung cancers: A multicentric case-control study from India. Int J Epidemiol. 2008;37:321-8.

- 25. Peter M, Mathew D, Mrema A. Profile and Treatment outcome of Laryngeal Cancer Patients attended at Orci from 2008 to 2011. Can Ther Oncol Int J. 2017;5(4):1-7.
- 26. 26.Verma A, Mehta S, Panda NK. Presentation of carcinoma larynx and laryngopharynx an analysis of 840 cases. Indian J Otolaryngol. 1990;42:50-3.
- 27. Bakshi J, Panda NK, Sharma S, Gupta AK, Mann SBS. Survival pattern in treated cases of carcinoma larynx in north India: a 10 year follow up study. Ind J Otolaryngol Head Neck Surg. 2004;56(2):99-103.
- 28. Datti PV, Patel CB, Sayed BA. The incidence of laryngeal cancer in Baroda. Ind J Otolaryngol. 1971;23:152-62.
- 29. Akmansu SH, Korkmaz H, Dursun E, Erbek SS, Gocmen H, Unal T, et al. clinical and histopathological indicators of neck metastasis in laryngeal carcinoma. Tr J Med Sci. 1999;29:313-7.
- 30. Mishra S, Panda S. Profile of carcinoma larynx patients attending a tertiary care hospital in Western Odisha. J Evol Med Dent Sci. 2013;2(7):683-8.

- Chauhan JPS, Bharti B, Bhadouriya SS, Kumar A, Narain P, Singh J. Laryngeal cancer: a clinicopathological study of 65 cases. Int J Otorhinolaryngol Head Neck Surg. 2018;4(1):163-8.
- 32. Kelly WD, Cross FH: Cancer of the Larynx. J Laryng.1968;82:537.
- 33. Wang M, Liu C, Li W, Chang S, Chu P. Salivary gland carcinoma of the larynx. J Chin Med Assoc. 2006;69(7):322–5.
- 34. Angouridakis N, Goudakos J, Karayannopoulou G, Triaridis S, Nikolaou A, Markou K. Primary neuroendocrine neoplasms of the larynx. A series of 4 cases reported and a review of the literature. Head Neck. 2013;35(6):187-93.

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