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Laryngeal Carcinoma: Topographical Distribution

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Abstract **Original Research Article**

Background: Head and neck cancer is the eighth most common cancer (1-2%) as estimated from worldwide data. Laryngeal malignancy is the second most common malignancy in head neck region worldwide. There are variety of malignant tumour arising in larynx. Carcinoma of the larynx interferes with most vital functions in the sufferers like voice, respiration and swallowing by virtue of its anatomical location, local infiltration and direct extension. ***Objectives:*** The aim of the study was to evaluate the laryngeal carcinoma: topographical distribution. ***Methods:*** This cross-sectional observational study was carried out in the Department of Otolaryngology & Head-Neck Surgery, Dhaka Medical College Hospital during January 2019 to July 2020. Purposive consecutive sampling method was used to collect data. After taking detailed history, clinical examination including indirect laryngoscopy, fiber optic laryngoscopy CT scan of neck & direct laryngoscopic evaluation under general aneasthesia was done. Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24). ***Results:*** Total 93 patients of different age, sex, socioeconomic status was taken. Hoarseness of voice (87.1%), dysphagia (58.1%), difficulties in breathing (57%) and neck lump (50.5%) were the common presenting complaints. 87.1% patients were smoker. Most of patients were attended with stage-III disease. Supraglottis (63.4%) was the most common site of laryngeal cancer followed by glottic (34.4%) and subglottic (2.2%). Aryepiglottic fold (23.73%) and epiglottis (20.74%) are commonly involved in supraglottic carcinoma. Single vocal cord commonly involved in glottic carcinoma. Most supraglottic carcinoma involved more than one sub site (52.34%). Supraglottic carcinoma is the most common site of laryngeal carcinoma. Combined sub site is more involved in supraglottic carcinoma. ***Conclusion:*** The topographical distribution of laryngeal carcinoma plays a crucial role in the diagnosis, treatment, and prognosis of the disease. Laryngeal carcinoma, a malignancy of the larynx, is primarily classified based on its location within the larynx, which includes the supraglottic, glottic, and subglottic regions. The combined subsite is more implicated in supraglottic cancer.

Keywords: Laryngeal malignancy, Carcinoma, Larynx, Laryngoscopy, Aneasthesia.

INTRODUCTION

Carcinoma of the larynx is the most common site for primary malignant tumour among men in head and neck region in Bangladesh [1]. It represents worldwide approximately 1-2% of all cancers. It has been estimated that worldwide about 177422 new cases of laryngeal cancer develop each year, 94771 of these are died [2]. Laryngeal Cancer is diagnosed in nearly 10000 men and women in the United States annually [3]. In our subcontinent laryngeal cancer is more prevalent than western. In the western Asia and India, laryngeal cancer account for more than 6% of all cancers among men [4]. Another study in Bangladesh shows laryngeal carcinoma is about 6.5% among all other carcinoma [5].

Carcinoma of larynx differs from male and female but commonly occurs in low socioeconomic group. Smoking, alcohol consumption, industrial pollutants (asbestsos, wood dust. coal dust, nickel, mustard gas, sulphuric acid and hydrocloric acid exposure) are the main risk factors. In our subcontinent chewing habit is also seems to be associated with laryngeal carcinoma. Presenting symptoms of laryngeal carcinoma are varies site to site. Change of voice, globus or difficulty in diglutation, respiratory difficulty, neck lump, cough and hemoptysis are the main presenting features of carcinoma larynx. Almost all patients present with more than one symptom. The commonest presenting symptoms is voice change (92%), followed dysphagia (75%), respiratory distress (52%), cough (41%), neck swelling (20%) and hemoptysis (5%) in one study in Bangladesh [6]. Local neck node metastasis is more common than distant. Most of laryngeal carcinoma are squamous cell carcinoma [7].

Site distribution of carcinoma of the larynx varies worldwide. In this subcontinent, supraglottic carcinoma is more frequent. It was found 56.9%, 69.38%, 74% supraglottic carcinoma. Incidence of supraglottic carcinoma is also higher in European countries like Finland, France, Italy whereas glottic carcinoma is more prevalent in UK and also in North America 50% and 60% respectively [8]. Sub glottic involvement is very rare worldwide. Glottic tumours have a more favorable prognosis than supraglottic or subglottic carcinoma. However, in UK 5-year survival rate is still 65%.

Carcinoma of the larynx interferes with most vital functions in the sufferers like voice, respiration and swallowing. Tumours that involve the larynx may impair this function in a variable degree depending on location, size and depth of invasion [7]. Clinically glottic carcinoma presents in early stage where as supraglottic carcinoma presents in advanced stage. The earlier detection of the glottic carcinoma has been partly attributed to the rapid onset of symptoms like hoarseness of voice but the incidence of lymph node metastasis in supraglottic carcinoma is more common than glottis one [9].

Appropriate knowledge for proper site and subsite is very essential. Proper management and prognosis of laryngeal cancer varies with site to site. Such as in supraglottic carcinoma epiglottis and ventricular bands have better prognosis than aryepiglottic fold and ventricle. Previous study in our country showed that supraglottic carcinoma topped the list among all types of carcinomas of the larynx [6]. Although numerous studies on carcinoma of the larynx have been done in different countries, a limited data are available on topographical distribution in our population.

Our present prospective observational study is intended to outline the distribution of laryngeal carcinoma in different anatomical regions and sites according to frequency. The results of this study will provide some knowledge that may help in the early diagnosis and choice of treatment modalities. It may also have some prognostic values.

METHODOLOGY

This cross-sectional observational study was carried out in the Department of Otolaryngology & Head-Neck Surgery, Dhaka Medical College Hospital during January 2019 to July 2020. A total of 93 patients were participated in the study. All cases of Laryngeal carcinoma admitted in the Otolaryngology & Head-Neck Surgery Department of Dhaka Medical College Hospital, Dhaka was selected. Among them 59 were Supra glottis, 32 were Glottis and 2 were Sub glottis. After taking consent and matching eligibility criteria, data were collected from patients on variables of interest using the predesigned structured questionnaire by interview, observation. Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-24).

RESULTS

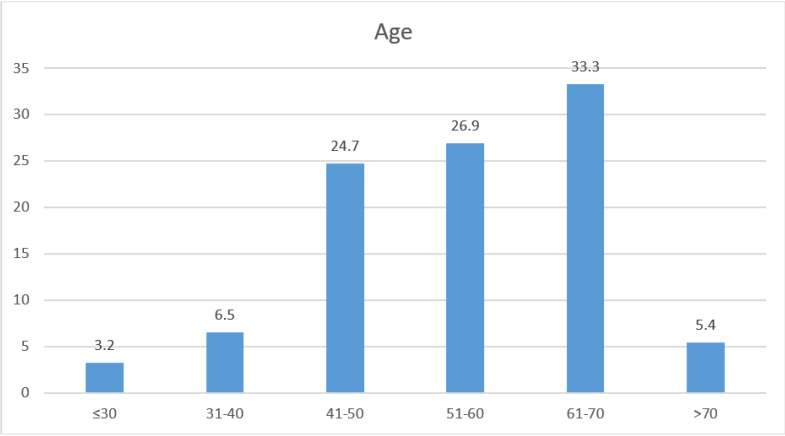

Figure I: Age distribution of the study population (N=93)

Figure 1 shows age distribution of the study population, it was observed that 3(3.2%) patients were belonged to age ≤30 years, 6(6.5%) patients were belonged to age 31 – 40 years, 23(24.7%) patients were belonged to age 41 – 50 years, 25(26.9%) patients were belonged to age 51 – 60 years, 31(33.3%) patients were belonged to age 61 – 70 years and 5(5.4%) patients were belonged to age >70 years.

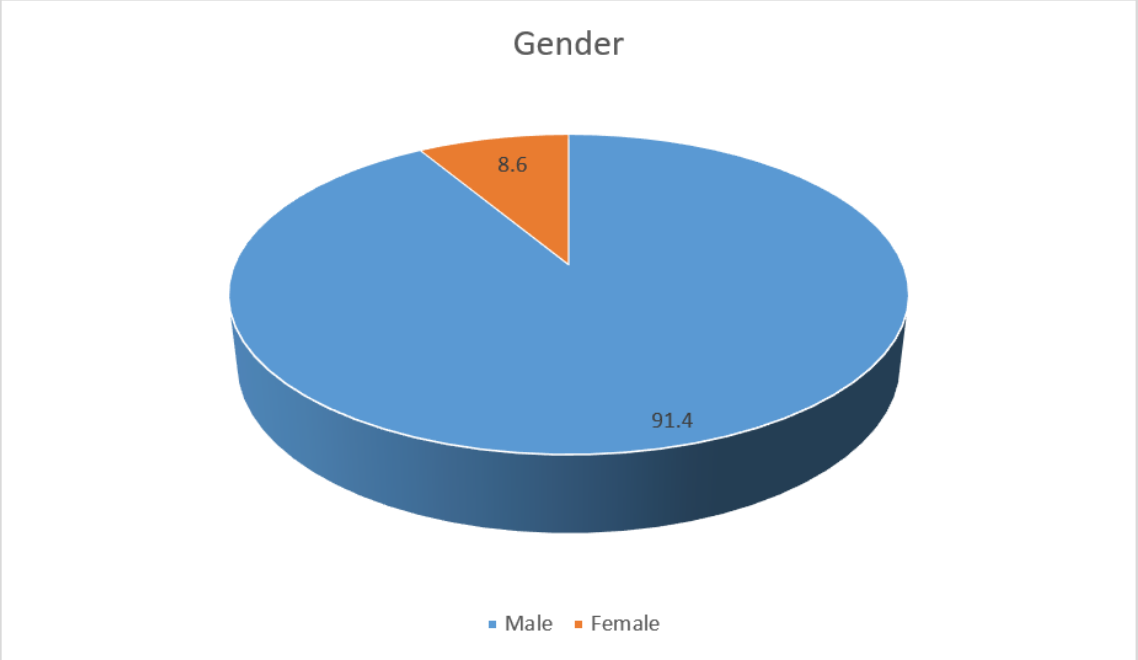

Figure II: Sex distribution of the study population (N=93)

Figure II show sex distribution of the study population, it was observed that majority 85(91.4%) patients were male and 8(8.6%) were female.

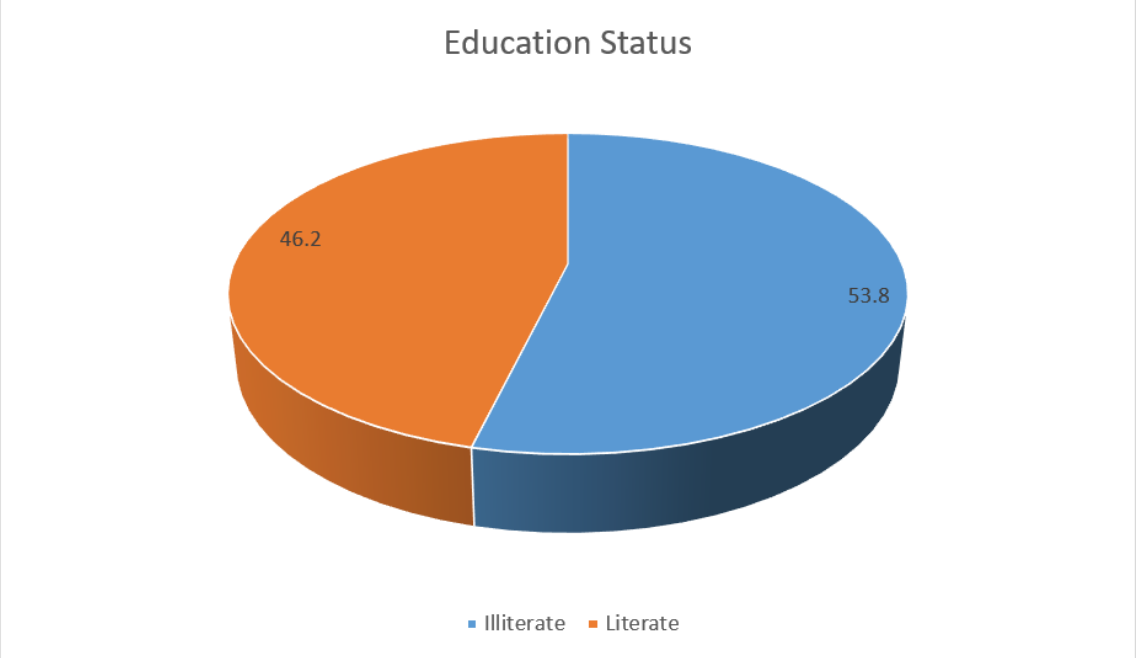

Figure III: Education distribution of the study population (N=93)

Figure III show education distribution of the study population, it was observed that 50(53.8%) patients were illiterate and 43(46.2%) were literate.

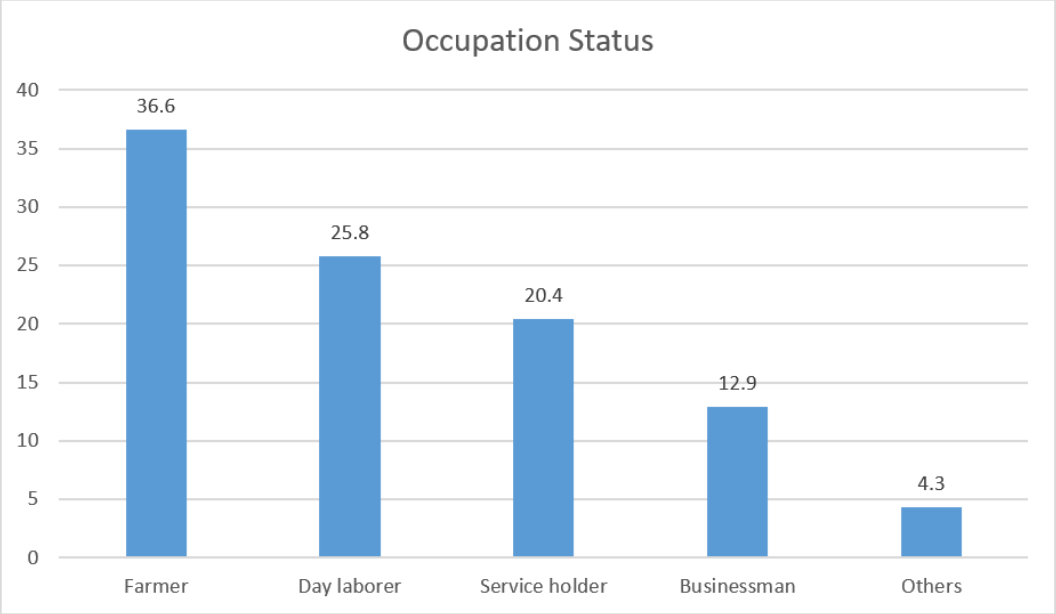

Figure IV: Occupation status distribution of the study population (N=93)

Figure IV shows occupational status of the study population, it was observed that 34(36.6%) patients were farmer, 24(25.8%) were day laborer, 19(20.4%) were farmer and 12(12.9%) were businessman. And others had 4(4.3%).

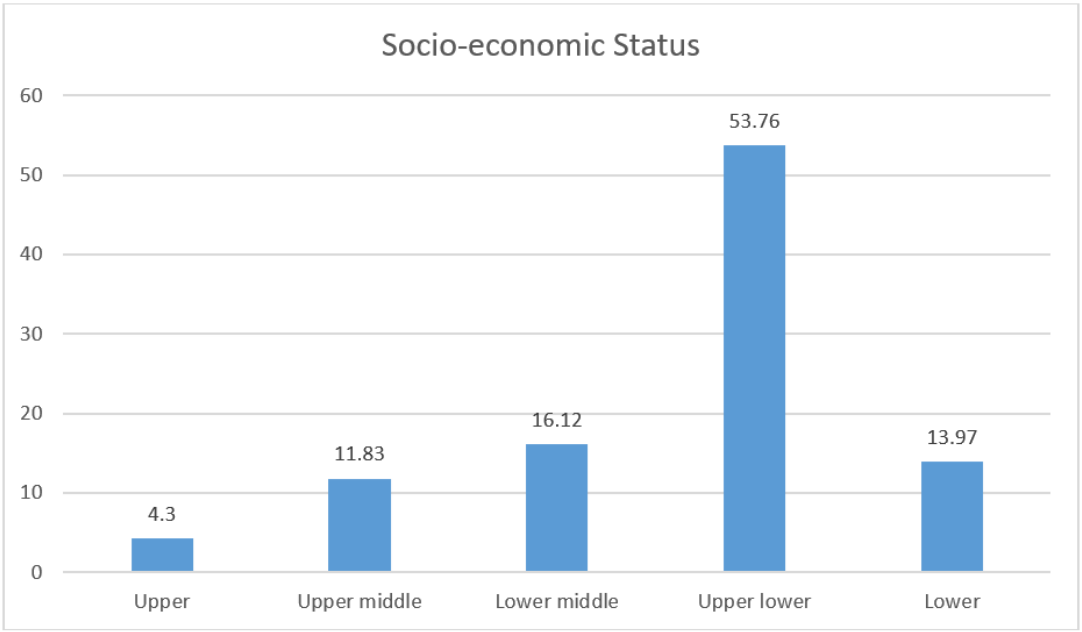

Figure V: Socio-economic status distribution of the study population (N=93)

Figure V shows socio-economic status of the study population, it was observed that 4(4.3%) of the patients come from upper class family, 11(11.83%) were upper middle class, 15(16.12%) were Lower middle class, 50(53.76%) were Upper lower class and 13(13.97%) were Lower class.

Table I: Topographical distribution carcinoma larynx (N=93)

Sub site	Frequency (n)	Percentage (%)
Supraglottis	59	63.4
Glottis	32	34.4
Subglottis	2	2.2

Table I shows supraglottic carcinoma 59(63.4%) is the most common site of laryngeal carcinoma followed by gottic carcinoma 29 (34.4%) and sublglottic carcinoma 2 (2.2%).

Table II: Risk factors related to site distribution of carcinoma larynx (N=93)

Risk factors	Sub site			p-value
	Supraglottis (n=59) n(%)	Glottis (n=32) n(%)	Subglottis (n=02) n(%)	
Smoking	49 (83.1)	30 (93.8)	2 (100.0)	0.396
Chewing habit	28 (47.5)	15 (46.9)	0 (0.0)	0.634
Alcoholic	3 (5.1)	3 (9.3)	0 (0.0)	0.703
Both Smoking and chewing habit	20 (34)	12 (37.2)	0 (0.0)	0.689

Table II shows most glottic carcinoma patients were smoker (93.8%).

Table III: Symptoms related to different site of carcinoma larynx (N=93)

Presenting symptoms	Site			p-value
	Supraglottis (n=59) n(%)	Glottis (n=32) n(%)	Subglottis (n=02) n(%)	
Voice change	48 (81.4)	32 (100.0)	1 (50.0)	0.004
Dysphagia /Globus	48 (81.4)	6 (18.8)	0 (0.0)	<0.001
Difficulties in Breathing	35 (59.3)	18 (56.3)	0 (0.0)	0.328
Neck lump	42 (71.2)	4 (12.5)	1 (50.0)	<0.001
Stridor	3(5.08)	5(15.62)	0(0.0)	0.268
Cough	3 (5.08)	7 (21.87)	0 (0.0)	0.046
Earache	5 (8.47)	0 (0.0)	0 (0.0)	0.598

Table III shows 100% glottic carcinoma present with voice change. Other hand most of supraglottic carcinoma present with combined features; voice change 48(81.4%) & dysphagia 48(81.4%).

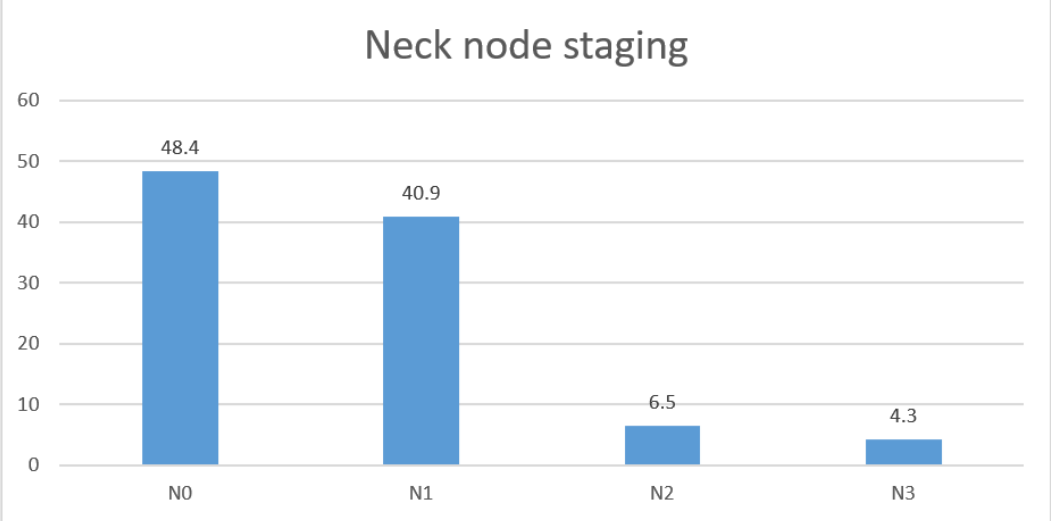

Figure VI: Distribution of the patients with carcinoma larynx according to neck node staging (N=93)

Figure VI shows most of patients were present with N0 45(48.4%) stage followed by N1 38(40.9%), N2 6(6.5%) and N3 4(4.3%).

Table IV: Clinical TNM staging of different subsite of carcinoma larynx (N=93)

Clinical TNM Staging	Sub site			p-value
	Supraglottis (n=59) n(%)	Glottis (n=32) n(%)	Subglottis (n=02) n(%)	
Stage I	8 (13.6)	10 (31.3)	0 (0.0)	0.121
Stage II	8 (13.6)	17 (53.1)	0 (0.0)	<0.001
Stage III	37 (62.7)	5 (15.6)	2 (100.0)	<0.001
Stage IV	6 (10.2)	0 (0.0)	0 (0.0)	0.201

Table IV shows most supraglottic carcinoma were at advanced stage (III&IV) 43(72.9%) and glottic carcinoma were at early stage (I&II) 27(84.4%).

Table V: Sub site involvement of carcinoma larynx (N=93)

Site	Sub-site	Frequency (n)	Percentage (%)
Supraglottic (n=59)	Aryepiglottic fold	14	23.73
	Epiglottis	12	20.34
	Aryepiglottic fold extends to epiglottis	4	6.78
	Aryepiglottic fold and arytenoid	7	11.86
	Aryepiglottic fold and vestibular fold	2	3.38
	Aryepiglottic fold vestibular fold and vocal cord	1	1.69
	Aryepiglottic fold and epiglottis extend to vallecula	1	1.69
	Arytenoid and vestibular fold	1	1.69
	Arytenoid	0	0
	Vestibular fold	1	1.69
	Aryepiglottic fold which extends to medial wall of pyriform fossa	8	13.56
	Epiglottis which extends to base of tongue or vallecula	8	13.56
Glottic (n=29)	Vocal cord	19	65.51
	Ant. commissure	7	24.14
	Post commissure	3	10.35
	Both Vocal Cord	2	6.89
	Both Vocal Cord	1	3.44
Subglottic (n=02)		2	100

Table V shows aryepiglottic fold 38(40.9%), epiglottis 24(25.8%) are the most common subsite of supraglottic carcinoma. Any vocal cord 32(34.4%) is the most common for glottic carcinoma. Most supraglottic carcinoma involved more than one subsite 31(52.54%).

DISCUSSION

The age of the patients ranged from 26 to 95 years, and the mean age was 57.11 (±12.06) years in this study. Two previous studies in Bangladesh also found similar age distribution. [6] Here the peak incidence of laryngeal carcinoma was at sixth (33.3%) decades. Other studies also support that the peak incidence of laryngeal carcinoma is at the 5th or 6th. [10] In this study, 91.4% were male whereas female was 8.6%. The overall male to female ratio was 10.6:1. Review of literature reveals that there is wide geographical variation in sex distribution of laryngeal carcinoma. The ratio was described as 2:1 in Scotland and 3:1 to 4:1 in UK and 9:1 in France [11]. Previous studies in Bangladesh and India Male: Female ratio was 15.6:1, 5.4:1, 28.4:1 respectively [8]. The male female ratio in this series is dissimilar with findings in UK and Scotland, but consistent with other studies in Bangladesh, India and Western countries. Analysis of the occupational group of patients of laryngeal carcinoma revealed that majority of them were related to cultivation (36.6%). This result is consistent with the finding of Hossain [10].

In this study, 87.1% of the patients had the habit of smoking. Other personal habits were chewing habit (46.2%) and alcohol consumption (2.2%). It has been described in different studies that tobacco and alcohol are clearly associated with laryngeal carcinoma [7]. In different studies in this subcontinent, the relative frequencies of smoking among the patients of laryngeal and laryngopharyngeal cancer were found to be 67%, 87.7% and 94% [12]. The result of the study is consistent with these findings.

This study also revealed that chewing habit of betel leaves with other ingredients (Shada, Jarda, Lime, Khaini, Betel nut, Pan) in different combination of proportion was 46.2%. A large proportion of patient had chewing habit along with smoking (34.04%). There is a strong association of smoking and tobacco chewing habit with the development of laryngeal cancer [8]. Most of the patients (84.7%) presented with more than one symptom. The number of symptoms were more in case of supraglottic carcinoma than glottic carcinoma. It is supported by the result of previous study, which revealed that supraglottic tumour had significantly more symptoms than glottic tumours [7]. The commonest symptom was hoarseness of voice (87.1%). Although it was the commonest symptoms of both supraglottic and glottic carcinoma, there is a significant difference between the frequencies of its occurrence in the lesions of the two sites. Hoarseness was more common among the patients of glottic tumour, but it was also the leading symptom in supraglottic tumour [13]. Their findings are similar to the findings of current study. In a previous study in Bangladesh, hoarseness was the commonest symptoms being 65.62%, 98.3% of all patients which is clearly similar to the findings of this study [14].

Cervical lymphadenopathy due to neck metastasis is common for supraglottic carcinoma. 50.0%

of total patient had cervical Iymphadenopathy. Other study in our Bangladesh neck metastasis for laryngeal carcinoma found 58.6%, 47.77%, and 58% respectively [15]. Commonest stage of Iymphadenopathy was N1 (40%). Relative frequency of N2 and N3 stage were 6.5% and 4.3% respectively among the cases of lymphadenopathies. In this study incidence of supraglottic carcinoma was found in 63.4% of cases which clearly predominate over glottic carcinoma (34.4%). Two cases of subglottic carcinoma were found (2.2%). It is very much similar with the studies done in this subcontinent. In this subcontinent, supraglottic carcinoma is more common [8]. The incidence of supraglottic carcinoma is also higher in European countries like France, Italy. Whereas glottic carcinoma is more prevalent in U.K. and also'in North America (50% and 60% respectively) [16]. Incidence of subglottic carcinoma is very insignificant worldwide. Our study is also consistent with this finding.

In our study, subsites involvement of supraglottic carcinoma showed that involvement of epiglottis (25.8%), aryepiglottic fold (40.9%), arytenoids (7.5%), venticular band (10.8%). Involvement of the combined site is also significant (52.54%). This finding is consistent with the study in Bangladesh but differ from western world where epiglottis is the common subsite involved in supraglottic carcinoma of larynx [17]. In fact supraglottic carcinoma presents late. Moreover, in our country, most of the cases of laryngeal carcinoma presents at an advanced stage. So, it is not possible in most cases to get the patients with only one subsite involvement. For this reason, it is difficult to conclude which subsite of supraglottic of larynx is involved more in the prospect of our country.

In supraglottic carcinoma larynx, tumour stages at presentation were stage-1(13.6%), stage-II (13.6%), stage- III (62.7%) and stage- IV (10.2%). This result is consistent with study performed in our country but differs from studies in western countries [10]. In glottic carcinoma, the result was stage-I (31.3%), stage-II (53.6%), stage-III (15.6%). These findings are also similar with the result of Hossain (2011). Our result differs from the studies done abroad as our patients seek medical advice late for various factors. Regarding staging, our study revealed that most of the patients presents at stage III (47.3%), followed by stage II (26.9%), stage I (19.4%) and stage IV (6.5%). So, most of the patients present at advanced stage (53.8%). This result consistent with other study in our subcontinent but dissimilar for developed country [16].

Limitations of the study

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study.

CONCLUSION

Supraglottic carcinoma is the most common site of laryngeal carcinoma. Combined sub site is more involved in supraglottic carcinoma. Most of patients comes from rural, illiterate and low socioeconomic status. Voice change, dysphagia, neck lump & difficulties in breathing is commonest presenting complains. Smoking and chewing habit are the common risk factors.

RECOMMENDATION

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

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