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TRENDS IN THE INCIDENCE OF HEAD AND NECK CANCER IN NORTHEAST INDIA: FIVE YEAR SINGLE CENTER STUDY

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ABSTRACT

Background: The incidence of head and neck cancer (HNC) is higher in the north-eastern states than the rest of India. There has been a recent decrease in incidence of HNC in some parts of India. Aim: To study the epidemiology of HNC over a five-year period in the northeastern state of Assam.

Setting and Design: Retrospective observational study conducted at a single regional cancer center in Guwahati, Assam.

Methods and Materials: We reviewed and analyzed the medical records of all HNC patients registered at the hospital during 2008-2012. The demographic data of patients was correlated with the diagnosis. We specifically included the oral cancers, i.e., cancers of the lip, oral cavity, oropharynx, hypopharynx, nasopharynx, and larynx in our study.

Results: 1047 patients had been diagnosed with HNC during the study period. Of these, 80.71% were male. Most common cancers were those of the hypopharynx (29%), oropharynx (28.56%), and oral cavity (26.65%). Hypopharyngeal cancer (32.4%) was the most common HNC among males and oral cancer (40.63%), among females. In both genders, highest incidence of oral cancers was in the 60-69-year-old age group.

Conclusion: Results suggest a need to increase HNC awareness, early screening programs, and lifestyle counseling in Assam and neighboring states.

KEYWORDS : Head and neck cancer Cancer epidemiology in India Oral cancer Hypopharyngeal cancer Nasopharyngeal cancer

Introduction

Head and neck cancers (HNCs) are malignancies of the upper aerodigestive tract – oral cavity, pharynx, and larynx. These exclude melanomas and tumors of the brain and thyroid.1 In India, approximately 30-40% of all cancers are HNCs. The incidence in the northeast states of Assam, Manipur, Mizoram, Tripura, and Nagaland is higher (54.48%).2 We studied the epidemiology of HNC among patients registered at a cancer hospital in Assam over a five-year period.

Materials and Methods

A single center, retrospective, observational study in HNC patients was conducted at the north East Cancer Hospital and Research Institute (NECHRI), Guwahati, Assam, India. Data was retrieved from the medical records department of the hospital and analyzed for HNC cases registered over a period of five years, from 2008 to 2012. The study adhered to the principles of the Declaration of Helsinki with appropriate safeguards for patient confidentiality.

Patients with previous diagnosis or newly diagnosed with HNC and registered with the hospital, irrespective of age and gender, were included in our study. Patients with non-malignant conditions registered at the hospital were excluded. We analyzed the demographic data of patients and correlated it with diagnosis. We specifically included the oral cancers, i.e., cancers of the lip, oral cavity, oropharynx, hypopharynx, nasopharynx, and larynx in our study.

All collected data were analyzed using Microsoft Excel 2010. Descriptive statistics are reported in terms of incidences and percentages.

Results

Data for malignant cases registered at NECHRI between 2008 and 2012 revealed the total number of patients diagnosed with various HNCs (lip, oral cavity, oropharynx, hypopharynx, nasopharynx, and larynx) to be 1047. Among these, 845 were male (80.71%) and 202 were female (19.29%).

A summary of baseline data collected from 2008 to 2012 and statistics on different types of HNC are provided in **Table 1.** Data with respect to T-stages and sublocalizations are cumulative of both male and female patients. The following data is presented for the reported HNCs: gender-wise incidence rate at different age groups between 2008 and 2012 and for each study year, T-stage data, and sublocalization data.

Based on our data analysis, hypopharyngeal cancer has been the most commonly reported type of HNC in Assam with an incidence rate of approximately 29% during the years mentioned. This is followed by cancer of oropharynx (28.56%), oral cavity (26.65%), larynx (8.21%), nasopharynx (7.35%), and lip (0.29%) **(Figure 1)**

Hypopharyngeal cancer

Hypopharyngeal cancer was the most commonly diagnosed HNC at NECHRI. Of the total 1047 patients, 303 patients were diagnosed with hypopharyngeal cancer **(Table 1)**. Of these, 277 were men and 26 were women, with an average of 55 men and 5 women diagnosed every year between 2008 and 2012. The average male:female ratio for cancer incidence here was found to be 11:1. A gender-wise incidence rate at different age groups for each year is not available for hypopharyngeal cancer. An increase in incidence of hypopharyngeal cancer was observed both in male and female patients over the study period **(Figure 2)**. The highest percentage of hypopharyngeal cancer was seen in patients aged 50-59 years in both genders accounting to approximately 30% (81/277) in men and 35% (9/26) in women, respectively **(Figure 3)**. The percentage of hypopharyngeal cancer in the age group of 30-59 years was reported to be higher in women (65.38%) compared to men (54.15%).

Among hypopharyngeal cancer cases, cancer of pyriform sinus (PFS) (72.94%, 221/303) was the most commonly diagnosed sublocalization. This was followed by cancers of aryepiglottic folds (AEF) (17.16%, 52/303), posterior pharyngeal wall (PPW) (9.24%, 28/303), and post cricoid pharynx (0.66%, 2/303).

Analysis of data for T-stage distribution, considering only tumor sites belonging to strict TNM classification, showed T3 and T4 stages to be most commonly diagnosed, both making up together for approximately 73% of HNC. The percentage distribution of T-stages is as follows - T3 (46.86%, 142/303), T4 (26.07%, 79/303), T2 (24.1%, 73/303), unknown (1.65%, 5/303), and T1 (1.32%, 4/303).

Oropharyngeal cancer

Oropharyngeal cancer has been the second most commonly diagnosed HNC in our study center. A total of 299 patients were diagnosed with oropharyngeal cancers during 2008-2012 at NECHRI – 233 men and 66 women **(Table 1)**. An average of 46 cases in men and 13 cases in women were reported every year. Age and gender based distribution of incidences during the study period are represented in **Table 2**.

There was an increase in the incidence of oropharyngeal cancer in both men and women, with a high incidence reported in the age group of 50-59 and 60-69 in both genders (Figures 4 and 5). The highest incidence rate in both men and women was reported in the age group 30-79 years, with 57% of cases diagnosed in patients above the age of 50 years. The percentage of oropharyngeal cancer reported in women (86.36%) was more when compared to men (71.24%) in the age range 50-79 years.

Among the oropharyngeal cancer cases registered, cancers in the base of tongue (BOT) topped the list of sublocalizations with 46.82% incidence (140/299 patients), followed by cancers of the tonsil (38.13%, 114/299), posterior pharyngeal wall (PPW) (11.04%, 33/299), and soft palate (4.01%, 12/299).

T-stage analysis showed T3 and T4 stages to be most commonly reported, both accounting to approximately 71.9%. The percentage distribution of each of the T-stage was found to be as follows: T3 (38.46%, 115/299), T4 (33.44%, 100/299), T2 (20.06%, 60/299), unknown (4.7%, 14/299), and T1 (3.34%, 10/299).

Cancers of oral cavity

During the period 2008-2012, 279 cases diagnosed with cancers of the oral cavity were registered at NECHRI **(Table 1)**. Age and gender based incidence rate during the study period is represented in **Table 3**. Among the registered cases, 23.51% (201/855) and 40.63% (78/192) were oral cancers reported in men and women, respectively, with an average of 40 men and 16 women diagnosed every year. The increase in incidence of oral cancer in men and women during the five-year study is represented in **figure 6.** It was mostly seen in the 60-69 years age group (Figure 7) in case of both the genders.

Buccal mucosal cancer was the most common sublocalization (44.09%, 123/279) diagnosed. This was followed by cancers of the alveolus (20.07%, 56/279), tongue (19%, 53/279), hard palate (6.81%, 19/279), floor of mouth (3.94%, 11/279), retromolar trigone (RMT) (3.94%, 11/279), and angle of mouth (2.15%, 6/279).

T-stage analysis revealed T2 and T4 stages to be most commonly diagnosed accounting for approximately 53% of the total reported cases. The percentages of oral cancer cases based on the T-stage were T2 (29.39%, 82/279), T4 (24.37%, 68/279), unknown (21.5%, 60/279), T3 (14%, 39/279), and T1 (10.75%, 30/279).

Laryngeal cancer

Laryngeal cancer was the fourth most commonly diagnosed cancer at NECHRI between 2008 and 2012. A total of 86 cases with laryngeal cancer were registered at the cancer center, 77 (9.11%) of them being male and nine (4.46%), female **(Table 1)**. There was a high male preponderance across different age groups. Most cases were registered in the ages ranging from 30 to 70 years of age (Figure 8). Though the incidence of laryngeal cancer increased in both the genders during five-year study period, the increase in incidence was much higher among males as compared to females (Figure 9). It had more than doubled from 10 in 2008 to 23 in 2012.

Among the total number of laryngeal cancer cases registered, supraglottis sublocalization (46.51%, 40/86) was the most commonly diagnosed. This was followed by sublocalizations at the glottis (17.44%, 15/86), subglottis (12.79%, 11/86), laryngopharynx (9.3%, 8/86), vocal cord (8.14%, 7/86), and epiglottis (5.81%, 5/86).

Analysis of data pertaining to T-stage categorization showed T4 and T3 to be the first and second most commonly diagnosed stages, accounting for approximately 76% together. The percentage of laryngeal cancer cases based on T-stage distribution are T4 (43%, 37/86), T3 (32.55%, 28/86), T2 (14%, 12/86), unknown (5.8%, 5/86), and T1 (4.65%, 4/86).

Nasopharyngeal cancer

Seventy seven cases of nasopharyngeal cancer were diagnosed at NECHRI during 2008-2012, with 56 cases registered in men and 21 cases registered in women **(Table 1)**. An average of 11 men and four women were diagnosed each year during the study period. As with other cancers, a summary of age and gender based incidences has been presented in **Table 5**.

Age-wise distribution of the cases showed that the highest incidence was in the 30-49 year age group (Figure 10). In both males and females, there was an increase in incidence over the five-year study period (Figure 11) with most cases being detected in stages T3 and T4 (Figure 12).

Lip cancer

Lip cancer was the least common cancer diagnosed at NECHRI, with only three cases registered during the five years of the study period **(Table 1)**. Of these, one was a man aged 60 years, and two were women aged above 80 years. No other data was available, except the T-stage diagnosis which showed that two patients were diagnosed at stage T3 and one was diagnosed at stage T4.

Discussion

Cancer has been ranked highest among the top ten medical conditions causing death in India. As per the national urban registry, cancer incidence has increased by 55.8% in India in the last two decades,3 with the lip and oral cavity being among the most commonly affected sites.4 India ranks ninth, globally, in the incidence of oral cancers,5 with a higher incidence in males compared to females.6 HNC is emerging as a major health problem due to its long latent period and the changing lifestyle of people.2 It is rated sixth among most cancers globally, with geriatric patients making up a large portion of HNC patient population. Nearly 24% of head and neck squamous cell carcinoma (HNSCC) occurs in geriatric patients.––6,7

HNC is more frequently reported in north eastern states of India such as Assam, Manipur, Mizoram, Tripura, and Nagaland. Men in Aizawl in Mizoram show the world's highest incidence of cancers of the lower pharynx (11.5 per 100,000 people) and the tongue (7.6 per 100,000 people).6 Kohima in Nagaland has the world's highest incidence of nasopharyngeal cancers.6 East Khasi Hills in Meghalaya has India's highest incidence of oral cancer among females.8

As with other studies, our study revealed the incidence of HNC to be much more in men (81.67% versus 18.33%) than in women. In men, cancers of the hypopharynx (32.39%), oropharynx (28.42%), and oral cavity (23.5%) were the most commonly diagnosed, accounting for nearly 84.31% of all HNC registered at our study center. Similarly, in women, cancers of the oral cavity (40.62%), oropharynx (29.16%), and hypopharynx (13.54%) were most commonly diagnosed, summing up to 83.32% of all HNC cases.

The overall male:female ratio of HNC in the urban population is 2:1 and in rural population is 5:1, as per a poster presentation made at the European Society for Medical Oncology (ESMO) Asia 2016 Congress.9 This data was based on an urban and a rural cancer registry in South India. Our study based on the northeastern registry shows an overall male:female ratio of 4.5:1. We did not analyze the urban and rural incidences separately.

Oral cancer is the third most commonly reported cancer in India, with northeast India accounting for nearly 33% of tobacco-related

oral cancers.––5,10 Use of tobacco, and chewing betel quid (betel leaf, areca nut along with sweeteners) are primarily responsible for the increasing numbers.5 Infections by Human Papillomavirus (HPV), Epstein-Barr virus (EBV), alcohol consumption, and genetic polymorphisms are the other risk factors.––––––[1113]

HNC incidences have been reported from various districts of Assam. In Cachar district, cancers of the hypopharynx, mouth, and larynx were ranked 2nd, 4th, and 5th respectively based on occurrence in men and women. Cancers of the mouth were ranked 6th in the district. In Dibrugarh district, cancers of the hypopharynx, mouth, and tongue were ranked 2nd, 4th, and 6th respectively. Cancers of the mouth were rated 7th in Dibrugarh. Cancers of the hypopharynx, mouth, and larynx were rated 2nd, 5th, and 8th among men and women, while cancers of the mouth was rated at 8th position in Kamrup district.14

The risk factors for all studied HNC are several with use of betel quid (paan) and tobacco chewing being common to almost all cancers. Other factors that increase the risk of HNC include age, gender, race, smoking, alcohol, family history of head and neck cancer, poor oral hygiene, HPV, and EBV infections, and occupational exposure to sulfuric acid mist, nickel, or asbestos. Regular use of mouthwash with high alcohol content is another possible risk factor, but has not been proved.15

The highest incidence of HNC is generally reported during the sixth decade ––10 in the age group 50-59, a trend observed in our study as well. Most cancers reported were in T3 and T4 stages, which emphasize the fact that early and frequent screening and detection programs should be implemented on priority in the state. Frequent screening programs for men and women in their early 30s would be of help in early detection, management and cure for cancer, thereby enhancing prognosis.3 Oral cancer screening once every three years is recommended in high risk populations (people who use tobacco, betel nut, alcohol) aged 30-60 years.5

World Health Organization estimates that one in two young people who start smoking and continue to smoke throughout their lives develop tobacco-related cancers (TRC). A recent analysis of published reports of 25 population-based cancer registries from India showed the incidence of TRC was highest in the northeast region.––16 Of all TRC sites, the most common are the esophagus, lung, hypopharynx, and mouth. A recent decline in trend of TRCs is reported. Whether there is a similar declining trend in Assam and neighboring areas can be ascertained by analyzing the prevalence of smoking and use of other forms of tobacco among the patients.

The currently high incidences of HNC in Assam also highlight the need for increasing awareness among the population, particularly in the young generation. There is also a need to increase awareness among the doctors on identifying possible signs of cancer, which can improve the rate of early cancer detection.3 Identifying gene markers for polymorphisms is the need of the hour as genetic factors have been found to play a vital role in the onset and development of HNC.––––––1720 Genetic testing could help identify patients at high risk of developing HNC and provide them guidance to prevent the malignancy.

Authorities need to take effective measures in counseling high risk population or cancer patients on maintaining proper lifestyle including diet and exercise. Improving nutritional intake and daily physical activity play an important role in cancer control and prevention.2,13 Patients need to be made aware of the risks associated with tobacco and alcohol overuse. Increased use of tobacco and alcohol consumption has also been found to increase the risk of HPV infection, another risk factor for the onset, and development of HNC.–'–––11,2123

Our study was based on the patient registration records of a single cancer center. Though NECHRI is a leading cancer hospital in north East India, it is quite likely that all cancer patients in this area do not visit this hospital. Many may be reaching out to cancer hospitals in other states of the country. The results of this study, therefore, may be underscoring the true incidence of HNCs in the northeast.

Gender based data on T-stage classification and sublocalization for all cancers discussed were not available. Data pertaining to incidence of hypopharyngeal cancer in men and women at different age groups during 2008-2012 were not available. Patient registration records in the hospital may need to be maintained in a more systematic and detailed way.

Table 1: Epidemiology of head and neck cancer during 2008-2012 at NECHRI

Characteristics	Category	Hypopharynx	Oropharynx	Oral cavity	Larynx	Nasopharynx	Lip
Gender	Male (%)	277 (32.78)	233 (27.57)	201 (23.79)	77 (9.11)	56 (6.63)	1 (0.12)
	Female (%)	26 (12.87)	66 (32.67)	78 (38.61)	9 (4.46)	21 (10.40)	2 (0.99)
Age group with highest incidence (y)	Male	50-59	50-59	60-69	60-69	30-49	60-69
	Female	50-59	50-59	60-69	60-69	30-49	80+
T-staging (%)	T1	4 (1.32)	10 (3.34)	30 (10.75)	4 (4.65)	9 (11.68)	0
	T2	73 (24.09)	60 (20.06)	82 (29.39)	12 (13.95)	15 (19.48)	0
	T3	142 (46.86)	115 (38.46)	39 (13.97)	28 (32.55)	22 (28.57)	2 (66.66)
	T4	79 (26.07)	100 (33.44)	68 (24.37)	37 (43.02)	25 (32.46)	1 (33.33)
	Unknown	5 (1.65)	14 (4.68)	60 (21.50)	5 (5.81)	6 (7.79)	0
Table 1: Epidemiology of head and neck cancer during 2008-2012 at NECHRI (contd.)							
Total (1047)	Incidence, n (%)	303 (29)	299 (28.56)	279 (26.65)	86 (8.21)	77 (7.35)	3 (0.29)

NECHRI: Northeast Cancer Hospital and Research Institute; y: year

Table 2: Age- and gender-based incidence of oropharyngeal cancer during 2008-2012

Age group	2008	2009	2010	2011	2012	Total
Males (= 233)						
0-29	0	0	1	1	1	3
30-49	0	12	12	15	17	56
50-59	0	10	14	19	22	65
60-69	7	8	11	15	22	63
70-79	5	6	8	9	10	38
80+	1	1	2	2	2	8
Total	13	37	48	61	74	233
Females (= 66)						
0-29	0	0	0	0	0	0
30-49	0	1	1	2	4	8
50-59	1	2	4	6	9	22
60-69	2	2	3	5	7	19
70-79	1	2	2	5	6	16
80+	0	0	0	0	1	1
Table 2: Age- and gender-based incidence of oropharyngeal cancer during 2008-2012 (contd.)						
Total	4	7	10	18	27	66

Table 3: Age- and gender-specific incidence of oral cancer during 2008-2012

Age group	2008	2009	2010	2011	2012	Total
Males (= 201)						
0-29	0	1	1	2	2	6
30-49	5	7	8	10	15	45
50-59	6	8	9	12	15	50
60-69	7	9	11	12	16	55
70-79	2	5	6	8	10	31
80+	0	1	3	4	6	14
Total	20	31	38	48	64	201
Females (= 78)						
0-29	0	0	0	1	1	2
30-49	1	2	4	5	7	19
50-59	1	3	3	5	8	20
60-69	2	3	4	7	9	25
70-79	1	1	2	2	4	10
80+	0	0	0	1	1	2
Total	5	9	13	21	30	78

Table 4: Summary of incidence of laryngeal cancer during 2008-2012

Age group	2008	2009	2010	2011	2012	Total
Males (= 77)						
0-29	0	0	0	0	1	1
30-49	2	4	3	4	6	19
50-59	3	3	4	4	6	20
60-69	3	3	5	6	6	23
70-79	1	1	2	2	2	8
80+	1	1	1	1	2	6
Total	10	12	15	17	23	77
Females (= 9)						
0-29	0	0	0	0	0	0
30-49	0	0	0	0	1	1
50-59	1	0	0	1	1	3
60-69	0	1	0	1	1	3
70-79	0	0	0	0	1	1
80+	0	0	1	0	0	1

Table 4: Summary of incidence of laryngeal cancer during 2008-2012 (contd.)

Total	1	1	1	2	4	9

Table 5: Age- and gender-specific incidence of nasopharyngeal cancer during 2008-2012

Age group	2008	2009	2010	2011	2012	Total
Males (= 56)						
0-29	0	0	0	1	1	2
30-49	4	5	6	8	11	34
50-59	2	2	2	2	3	11
60-69	0	1	1	1	1	4
70-79	0	0	1	1	1	3
80+	0	0	0	1	1	2
Total	6	8	10	14	18	56
Females (= 21)						
0-29	0	0	0	0	1	1
30-49	1	2	3	2	2	10
50-59	0	1	1	2	2	6
60-69	0	0	0	1	1	2
70-79	0	0	0	1	0	1

Table 5: Age- and gender-specific incidence of nasopharyngeal cancer during 2008-2012 (contd.)

80+	0	0	0	0	1	1
Total	1	3	4	6	7	21

Figure 1. Head and neck cancer cases registered during 2008-2012 (n=1047)

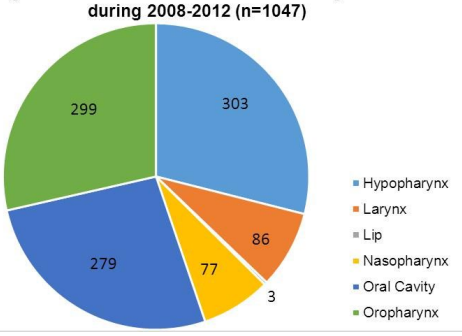


Figure 2. Trend in incidence of hypopharyngeal cancer over five years

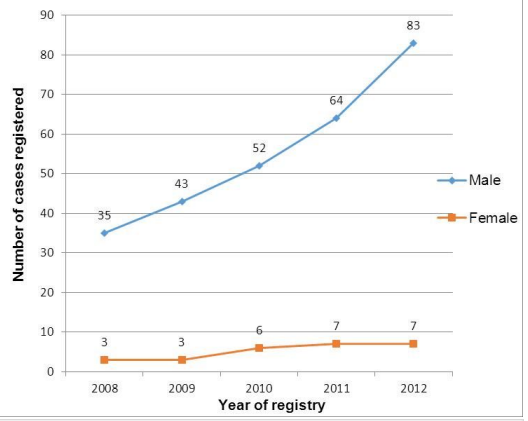


Figure 3. Age-wise distribution of incidence of hypopharyngeal cancer

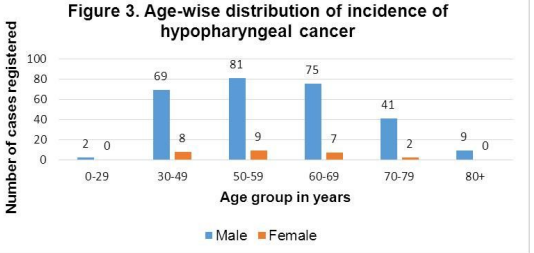


Figure 4. Trend in incidence of oropharyngeal cancer over five years

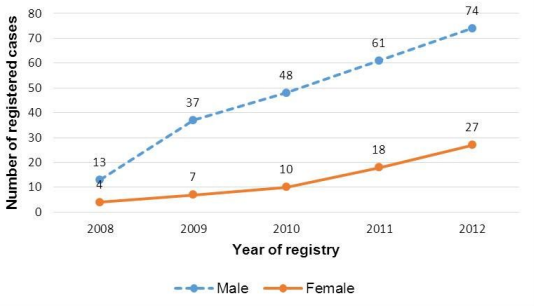
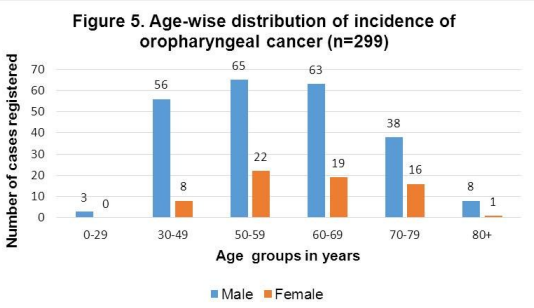
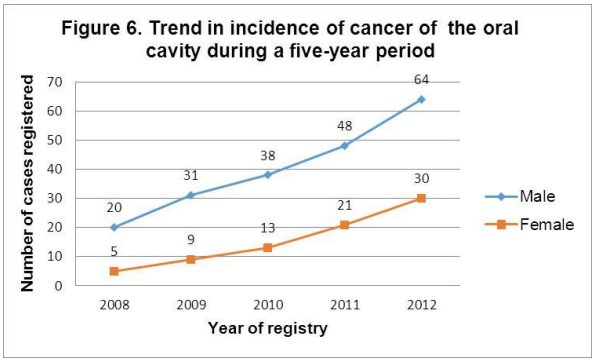
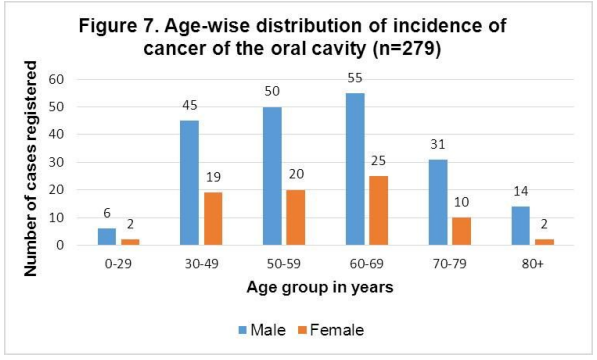
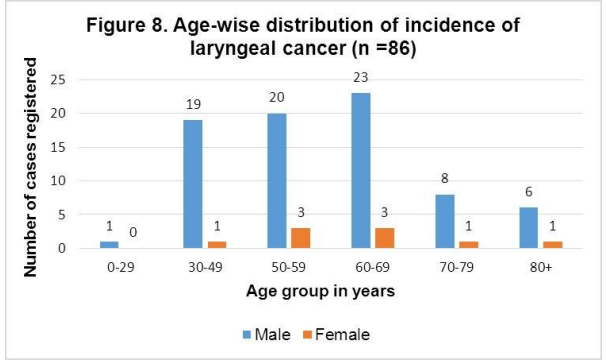


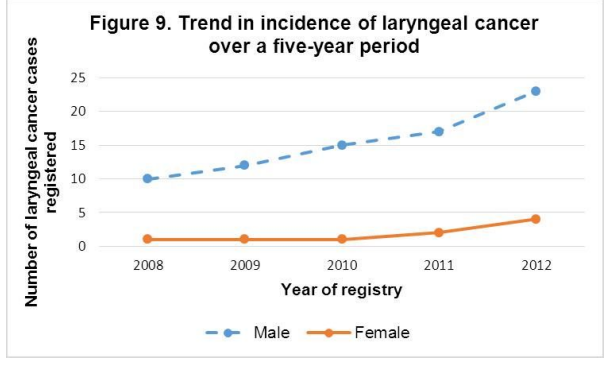
Figure 5. Age-wise distribution of incidence of oropharyngeal cancer (n=299)

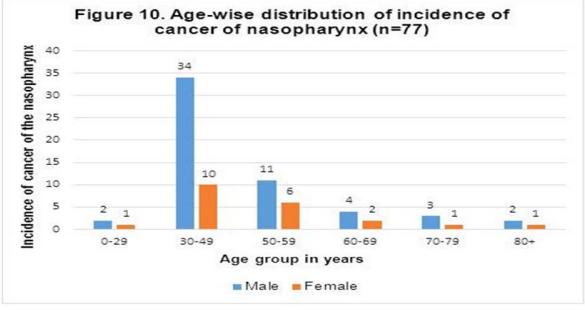


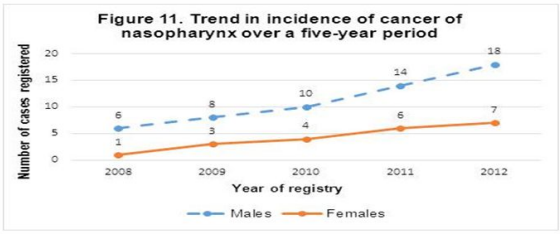


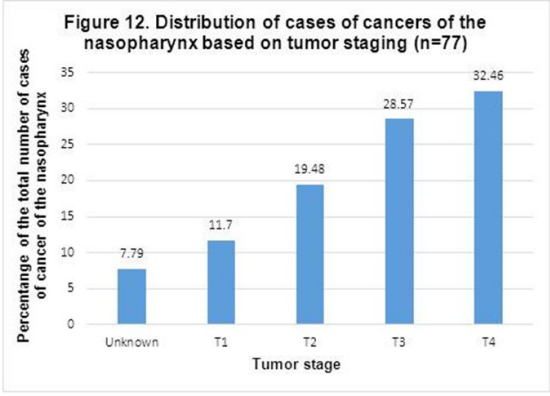












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