

Research Article

Burden of head and neck cancers in Kamrup urban district cancer registry of Assam, India: a retrospective study

Jagannath Dev Sharma¹, Debanjana Barman^{2*}, Mridul Kumar Sarma³,
Arpita Sharma⁴, Manoj Kalita⁵, Amal Chandra Kataki⁶,
Jamil Ahmed Barbhuiya⁷, Ranjan Lahon⁷, Barsha Roy Deka⁷

¹Department of Pathology, Principal Investigator, Population Based Cancer Registry (ICMR), Dr. B. Borooah Cancer Institute, Guwahati, Assam, India

²Research Scientist, Population Based Cancer Registry (ICMR), Dr. B. Borooah Cancer Institute, Guwahati, Assam, India

³Department of Oncology, Gauhati Medical College, Guwahati-781032, Assam, India

⁴Computer Programmer, Population Based Cancer Registry (Kamrup Urban District), ICMR, Dr. B. Borooah Cancer Institute, Guwahati, Assam, India

⁵Statistician, Population Based Cancer Registry (ICMR), Dr. B. Borooah Cancer Institute, Guwahati, Assam, India

⁶Director, Dr. B. Borooah Cancer Institute, Guwahati, Assam, India

⁷Social Investigator, Population Based Cancer Registry (ICMR), Dr. B. Borooah Cancer Institute, Guwahati, Assam, India

Received: 30 July 2014

Accepted: 10 August 2014

*Correspondence:

Dr. Debanjana Barman,

E-mail: debanjanaguha@rediffmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Head and Neck cancers are basically squamous cell carcinomas. It is the fifth most common cancer and the sixth most common cause of cancer mortality in the world. Incidence of cancer as a whole for all sites is fourth highest in Kamrup Urban District (KUD) in males (AAR 185.2) and second highest (AAR 156.3) in females out of all Population Based Cancer Registries (PBCR) in India. Incidence of head and neck cancers in KUD is quite high both nationally and internationally. This retrospective study was carried out to assess the incidence pattern of head and neck cancers in Kamrup Urban District of Assam, India for the period of 2009-2011.

Methods: Cancer is not notifiable in India, so method of collecting information on cancer was active in PBCR Guwahati. A total of 4416 cases were registered during the three years (1st January 2009- 31st December 2011) of which 2508 were male and 1908 female. Statistical analysis used: Age Adjusted Rate (AAR), Crude Rate (CR) and Population pyramids are provided by NCRP-ICMR.

Results: The relative proportion of head and neck cancers of total cancer cases registered in KUD constitutes 26% (654/2508) and 12% (225/1908) in male and female respectively. In males cancer of hypopharynx (AAR 14.7) was most common followed by tongue (AAR 9.4) and mouth (AAR 7.7). In females cancer of mouth (AAR 7.6) is most common followed by cancer of tongue (AAR 3.2).

Conclusion: The pattern and incidence of various head and neck cancers is of utmost importance for primary prevention and early detection to adequately manage these cancers comprehensively in the community.

Keywords: HDSCC, KUD, AAR, CR, Carcinoma

INTRODUCTION

Head and neck cancers for the purpose of descriptive epidemiology are basically squamous cell carcinomas of the upper aero digestive tract and refers to a group of cancers that start in the lip, oral cavity (mouth), nasal cavity, paranasal sinuses, pharynx, and larynx. 90% of head and neck cancers are Squamous Cell Carcinomas (SCC)¹ originating from the mucosal lining of these regions.²

According to GLOBOCAN 2012, an estimated 14.1 million new cancer cases and 8.2 million cancer related deaths occurred in 2012. Globally head and neck cancer cases are estimated to be 686328 of which 57.5% (excluding oesophageal cancer) occur in Asia. Head and neck cancers in India accounted for 30% of all cancers.³ The incidence of Head And Neck Squamous Cell Carcinoma (HNSCC) has been gradually increasing over the last three decades. HNSCC represents the fifth most common cancer by incidence¹² and the sixth leading cause of cancer mortality in the world. Head and neck cancer is strongly associated with certain environmental and lifestyle risk factors, including tobacco smoking, alcohol consumption, UV light, chemicals used in certain workplaces, and certain strains of viruses, such as human papillomavirus.⁵

The Indian Council of Medical Research (ICMR) launched the National Cancer Registry Programme (NCRP) in 1982 to record the burden of cancer in India. However, till 2001 no data on cancer were available from the North-Eastern region of India. In 2001, a WHO-sponsored ICMR project called 'Development of an Atlas of Cancer in India' was initiated.⁶ The relatively high frequency of microscopically diagnosed cancer cases observed in this project prompted the ICMR to start a Population-Based Cancer Registry (PBCR) in the Kamrup Urban District (KUD) of the North-Eastern region of India from 2003. Except for sporadic hospital-based reports on the prevalence of cancer, no population-based registry data were available and cancer control activities had been negligible in the region.

Guwahati is the capital of Assam and is the headquarters of the Kamrup district. It is located at 26.11 degree North latitude and 96.46 degree East longitude, approximately 200 metres (656 feet) above the mean sea level. The PBCR at Guwahati was established in the department of pathology of Dr B. Borooah Cancer Institute (BBCI), the Regional Cancer Centre (RCC). It has been collecting data on the pattern of cancer of the local population since January 2003. Cancer registration in this registry is as active as in the other PBCRs in India. Staff of the PBCR visits various sources of registration to record information on cancer cases in a common format. Data collection is for both incidence cases and mortality. The data collected over the three year period of 2009 to 2011 are presented here with special reference to head and

neck cancers of KUD. Cancer oesophagus is excluded in this study.

METHODS

PBCR-Guwahati covers Kamrup Urban District (KUD) with a population (annual average) of 1233264 of which 652692 are males and 580572 are females for the year 2011. Kamrup Urban District covers an area of 267.1 sq.km.⁷

Cancer is not notifiable in India, so method of collecting information on cancer is active with voluntary participation of different sources including 40 major hospitals, 31 diagnostic centers, one state referral board and 18 numbers of birth and death registration centers within registry area. BBCI, a regional cancer center is the main source of registration where all the patients are directly interviewed. In other centers direct interview with patients/relatives are also possible in 40-45% of cases. For rest of the cases information are retrieved from case files. Coding is done as per the International classification of diseases for oncology, 3rd edition⁷ and all neoplasms with a morphological behaviour of '3' (invasive carcinoma) are included in the registry. Quality checks on the data are done through the specialized software PBCRDM 2.1 provided by the Coordinating Unit of NCRP, Bengaluru, India.^{8,9} All checks specified by the International Agency for Research on Cancer (IARC) are included in this software.⁹ Potential lists of duplicate cases as well as potential matches for mortality and incidence are carried out through this software. The population of the registry area by age group and census was estimated using the 1991-2001.^{7,11} Crude rate during this interval was calculated using the population estimate derived from the difference distribution method.¹⁰ The crude, age-adjusted and truncated incidence rates per 100000 population were calculated by the direct method using the world standard population.⁸ In this study the head and neck cancers group consists of C00-14, C73.

RESULTS

Total population at risk for the period of 2009-11 was estimated as 3699793 out of which 1958077 is male and 1741716 is female. A total of 4416 cases were registered during the 3-year period (1 January 2009 - 31 December 2011) which included 2508 men and 1908 women. The ratio of cancer cases in male and female is 1.31:1. The annual average crude rate in men for all sites of cancer was 128.1 and for women 109.5 per 100000 population. The corresponding AARs were 185.2 for men and 156.3 for women.

Table 1 and 2 shows that relative proportion (%), average annual Crude Incidence Rates (CRs) and age-standardized incidence rates (AARs) by site among men and women respectively in the KUD, 2009-11. From Table 1 it has been observed that in males five out of ten leading sites are head and neck cancers. From Table 2 it

is seen that in female one out of ten leading sites are head and neck cancers in KUD.

According to the three years report of PBCR: 2009-2011 published by National Cancer Registry Programme (NCRP), in KUD of NE India, Relative Proportion (RP) of head and neck cancer of total cancer cases, male and

female are 26% (654/2508) and 12% (225/1908) respectively. In males, cancer of hypopharynx (RP: 8.3% and AAR 14.7) was most common followed by tongue (RP: 5.4% and AAR 9.4) and mouth (RP: 4.3% and AAR 7.7). In females cancer of mouth (RP: 4.25% and AAR 7.6) is most common followed by cancer of tongue (RP: 1.99% and AAR 3.2).

Table 1: Relative proportion, crude rates and age-standardized incidence rates by site among men in KUD, 2009-11.

ICD-10	Site	Total	RP (%)	CR	AAR	TR
C15	Oesophagus	363	14.5	18.5	27.0	42.8
C12-13	Hypopharynx	207	8.3	10.6	14.7	28.2
C33-34	Lung, etc.	183	7.3	9.3	15.0	19.2
C16	Stomach	170	6.8	8.7	13.3	16.9
C01-02	Tongue	136	5.4	6.9	9.4	19.1
C61	Prostate	116	4.6	5.9	11.1	4.9
C03-06	Mouth	107	4.3	5.5	7.7	14.7
C32	Larynx	104	4.1	5.3	8.2	12.1
C23-24	Gall bladder	99	3.9	5.1	7.4	11.5
C09	Tonsil	94	3.7	4.8	6.6	12.1
Z	All sites	2508	100	128.1	185.2	279.6

Table 2: Relative proportion, crude rates and age-standardized incidence rates by site among women in KUD, 2009-11.

ICD-10	Site	Total	RP (%)	CR	AAR	TR
C50	Breast	324	17.0	18.6	22.8	54.5
C15	Oesophagus	199	10.4	11.4	18.3	34.8
C53	Cervix uteri	176	9.2	10.1	13.9	31.6
C23-24	Gallbladder	162	8.5	9.3	14.0	24.7
C56	Ovary, etc.	154	8.1	8.8	10.7	22.6
C16	Stomach	85	4.5	4.9	7.5	13.2
C33-34	Lung, etc.	83	4.4	4.8	7.6	12.6
C03-06	Mouth	81	4.2	4.7	7.6	11.3
C54	Corpus uteri	49	2.6	2.8	4.0	8.6
C19-20	Rectum	41	2.1	2.4	3.7	5.9
Z	All sites	1908	100	109.5	156.3	96.9

DISCUSSION

Incidence of cancer (AAR) as a whole for all sites is fourth highest in KUD in male (AAR 185.2) and second highest (AAR 156.3) in female out of all PBCRs in India. Head and neck cancers are 26% in male and 12% in female. Incidence of frequently encountered head and neck cancers in KUD is quite high both nationally and internationally.

Tongue cancer in KUD showed second highest incidence (AAR 9.4) both nationally and internationally in male. Ahmedabad urban registry only has incidence higher than KUD (AAR 12.2). In females KUD (AAR 3.2),

Ahmedabad (AAR 3.2), East Khasi hills (AAR 3.2) have higher incidence nationally and internationally. Highest incidence is seen in South Karachi in Pakistan (AAR 6.6).

In case of mouth cancer KUD has AAR of 7.7 in males which is at tenth position nationally, Ahmedabad urban registry is number one with AAR 17.1. In case of female KUD has incidence 7.6 which is highest AAR in India. In KUD incidence of mouth cancer is almost similar in both male and female.

In case of hypopharynx in male the AAR of East Khasi hill district of Meghalaya (21.5) and the state of

Meghalaya as a whole (17.4) are higher followed by Aizwal district (15.4) and KUD (14.7). In female KUD showed the highest AAR (3.6) followed by Cachar (2.6), East Khasi hills (2.5) and Dibrugarh (2.0). Internationally KUD has AAR which is fourth highest in male and highest in female.

For larynx, in male, three registries in north east showed higher AAR than other registries in India. i.e. East Khasi Hill showed AAR 11.1, Aizawl 9.5 and KUD 8.2. Only Delhi registry has comparable AAR of 7.6.

In case of nasopharyngeal carcinoma, for both male and female incidence is higher in north east registries except KUD, Dibrugarh, Tripura, Cachar. Nagaland has AAR of 21 in male which is highest in India and third highest in world preceded by registry of China. In female Aizwal district has AAR of 5.2 which is highest in India and third highest internationally. KUD has AAR (0.9 in male and 0.5 in female) which is similar to other registries of India.

Most head and neck cancer cases and deaths are due to both genetic predisposition and lifestyle behavior which exposes to certain chemical carcinogens.¹³ The most important risk factors for developing HNSCC are tobacco smoking and alcohol consumption, which have a synergistic effect. Smoking habits that increase the risk of developing HNSCC are smoking black tobacco (compared to blond tobacco), smoking at a young age, long duration, high number of cigarettes per day, and deep smoke inhalation.¹⁴ Avoiding could prevent about 90% of HNSCCs especially laryngeal and hypopharyngeal tumors by quitting cigarettes and alcohol.

Tobacco chewing is a major cause of oral and oropharyngeal SCC in the Indian subcontinent, parts of South-East Asia, China and Taiwan, especially when consumed in betel quid containing areca nut.¹⁵ In India, chewing tobacco accounts for nearly 50% of oral and oropharyngeal tumors in men and over 90% in women.¹⁶ Besides tobacco consumption, lower intake of fresh foods, green vegetables and high cooking temperature in Indian dishes are responsible for cancer of mouth and pharyngeal cancer.³⁶ Cancer of oral, oro and hypopharynx share some similarities in their epidemiology, treatment and prognosis. Geographic pattern and trends in incidence vary depending upon anatomical subsites & related to risk factors like tobacco & alcohol. Incidence of carcinoma mouth & oral 2/3 of tongue are high in developing countries while carcinoma of pharynx are high in developed countries like Central & Eastern Europe. High incidence is seen in India, Australia, France, Sweden, America, Brazil and South Africa. Oral cancer the most common cancer of Head & Neck ranks 11th worldwide (390000 new cases per year). India accounts for a quarter of the world burden of oral cancer.²¹ Pattern of cancer in adolescent and young adults by male to female ratio was found to be 1:2 and cancer of mouth was the leading site in both sexes.²² A national

cancer mortality through nationally representative survey²³ revealed oral (lip and pharynx) cancer to be the most leading cause of death amongst males in the age group of 30-69 years. Human Papilloma Virus (HPV) particularly HPV-16 is involved in a subset of squamous cell carcinoma of head and neck cancer. The smokeless tobacco and betel quid chewing even (with or without tobacco) increases the risk of oral pre-cancers, as reflected by the dose response relationships for both frequency and duration.²⁴ Tongue is the most common intra-oral site of cancer in most countries. The epidemiology shows a significant geographic distribution.¹⁹ The incidence in India is much higher than the other countries when compared globally. Although a remarkably high incidence of tongue cancer in India is appreciated at global level amongst both sexes but there seems to be a remarkable difference in sex incidence not only in India but across worldwide. A high prevalence of tongue cancer confirmed a strong link between bidi smoking and central papillary atrophy of the tongue in India.²⁰

The cancer of oropharynx is very common in India. Tobacco smoking, ionizing radiations, dental carries and poor oral hygiene have all been linked to oropharyngeal cancers. The association with alcohol consumption is well known.²⁵ Chronic alcoholism may also be another factor associated with the development of carcinoma lip.¹⁸ Tobacco smoking is well established as a dominant risk factor for HNSCC, and this risk is correlated with the intensity and duration of smoking habit.¹⁷ The cigarette contains nitrosamines and polycyclic hydrocarbons carcinogens elements that have genotoxic effects and therefore may increase the risk of disease. These elements can change the molecular profile of the individuals and cause mutations. Recent data confirms that infection with HPV16 is an independent risk factor for HNSCC, mainly for oropharyngeal squamous cell carcinoma.¹⁸ In addition, high-risk HPV types (HR HPV) are a risk factors in about 25% of HNSCC, independent of other known risk factors, such as alcohol and tobacco.¹²

Pharyngeal cancer is less common, ranking 20th most common cancer worldwide. Oral & pharyngeal cancers in most countries are stable or increasing in last four decades. Sharp increase in incidence reported in Germany, Denmark, Scotland, Central and Eastern Europe, Japan, Australia, New Zealand & in USA among non-whites.³⁵

Nasopharyngeal carcinoma (NPC) in India has a low incidence except in some ethnic groups in North-Eastern (NE) regions particularly Nagaland, Manipur and Mizoram. Some significant ethnic and geographical variables within the country predispose the population of NE India for high incidence of nasopharyngeal carcinoma. It may be possible that environmental factors modulate the viral infections in a genetically predisposed individual resulting into a cancer of nasopharynx by a synergistic effect of all the factors. Other causative

factors as seen in NE states are chronic rhino-sinusitis, poor ventilation, inhalation of smoke, and ingestion of salted fish containing dimethylnitrosamine,²⁶ smoked meat, use of herbal nasal medicine,²⁷ and preserved foodstuff.²⁸

The dietary factors might contribute to high risk of hypopharyngeal cancer in India.²⁹ In addition to tobacco and alcohol, dietary deficiency particularly vitamin A and iron are implicated in the etiology³⁰ have implicated the daily use of Kalakhar for increasing the risk of hypopharyngeal cancer. Kalakhar is a highly alkaline material obtained from charred false stem or from the outer layer of a special variety of banana that is used in the preparation of curry or commonly called as 'dal'. The majority of laryngeal SCCs originate from the supraglottic and glottic regions. Cigarette smoking is a well-known and recognized predisposing factor for laryngeal cancer but in the absence of tobacco use, the alcohol as such was not found to increase the risk for laryngeal malignancy that otherwise would synergistically enhance the risk for cancer.²¹

CONCLUSION

Trend in incidence of head and neck cancers is on rise in India and North-East region in particular. Overall head neck cancers are mostly tobacco related and are encountered in a relatively advanced stage. Understanding Pattern and incidence of various head neck cancers is of utmost importance for primary prevention and early detection to adequately manage these cancers comprehensively in the community.

ACKNOWLEDGEMENTS

The authors would like to thank Dr. A Nandakumar, director in charge of national centre for disease informatics and research (ICMR) for providing the necessary support towards the establishment of population based cancer registry at our institute. The authors are also thankful to Mr. Kamal Deka (Data entry operator, PBCR-Guwahati) for his help.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

- Rousseau A, Badoual C. Head and neck: squamous cell carcinoma: an overview. *Atlas Genet Cytogenet Oncol Haematol*. 2012;16:145-55.
- Macmillan Cancer Support. Types of head and neck cancer, 2014. Available at: <http://www.macmillan.org.uk/Cancerinformation/Cancer/types/Headneck/Aboutheadneckcancers/Typesofheadneckcancer.aspx>. Accessed 17 June 2014.
- Kulkarni MR, Head and neck cancer burden in India. *Int J Head Neck Surg*. 2013;4:29-35.
- Price G, Roche M, Wight R, Crowther R. Profile of head and neck cancers in England: secular and geographical trends in the incidence, mortality and survival of laryngeal and oropharyngeal cancers, 2010. Available at: www.ncin.org.uk/view?rid=799.
- National Cancer Institute (NCI). Fact sheet: head and neck cancer, 2014. Available at: <http://www.cancer.gov/cancertopics/factsheet/Sites-Types/head-and-neck>. Accessed 13 June 2014.
- National Cancer Registry, Indian Council of Medical Research. Development of an atlas of cancer in India. First All India Report 2001-2002. Vol. I and II. Bangalore: National Cancer Registry Programme (ICMR), 2004. Available at: www.canceratlasindia.org.
- National Center for Disease Informatics and Research (NCDIR). Consolidated report of Population based cancer registries of India 2009-2011. In: V. M. Katoch, eds. NCDIR Report. Bangalore: ICMR; 2013: 1-150.
- Sharma JD, Katak AC, Vijay CR. Population Based Incidence and Patterns of cancer in Kamrup Urban Cancer Registry, India. *National Med J India* 2013;26:147-55.
- Indian Council of Medical Research. National cancer registry programme, 2014. Available at: www.ncrpindia.org. Accessed 13 June 2014.
- Parkin DM, Chen VW, Ferlay J, Galceran J, Storm HH, Whelan SL. Comparability and quality control in cancer registration. In: Parkin DM, Chen VW, Ferlay J, Galceran J, Storm HH, Whelan SL, eds. IARC Technical Report No. 19. Lyon: International Agency for Research on Cancer; 1994: 67-94.
- Directorate of Census Operation, Assam. Census of India 2001: primary census abstract, 2004. Available at: www.censusindia.gov.in.
- Galbiatti ALS, Padovani JA, Maniglia JV, Rodrigues CDS, Pavarino EC, Bertollo EMG. Head and neck cancer: causes, prevention and treatment. *Braz J Otorhinolaryngol*. 2013;79:239-47.
- Petti S. Lifestyle risk factors for oral cancer. *Oral Oncol*. 2009;45:340-50.
- Benhamou CA, Laraqui N, Touhami M, Chekkoury A, Benchakroun Y, Samlali R, et al. Tobacco and cancer of the larynx: a prospective survey of 58 patients. *Rev Laryngol Otol Rhinol (Bord)*. 1992;113:285-8.
- Znaor A, Brennan P, Gajalakshmi V, Mathew A, Shanta V, Varghese C, et al. Independent and combined effects of tobacco smoking, chewing and alcohol drinking on the risk of oral, pharyngeal and esophageal cancers in Indian men. *Int J Cancer*. 2003;105:681-6.
- Barnes L, Eveson JW, Reichart P, Sidransky D. Pathology and genetics of head and neck tumours. In: Barnes L, Eveson JW, Reichart P, Sidransky D, eds. World Health Organization Classification of Tumours. 1st ed. Lyon: IARC Press; 2005: 1-430.

17. Torrente MC, Rodrigo JP, Haigentz M Jr, Dikkers FG, Rinaldo A, Takes RP, et al. Human papillomavirus infections in laryngeal cancer. *Head Neck.* 2011;33:581-6.
18. Molnar L, Ronay P, Tapolcsanyi L. Carcinoma of the lip: analysis of the materials of 25 years. *Oncology.* 1974;29:101-21.
19. Moore SR, Johnson NW, Pierce AM, Wilson DF. The epidemiology of mouth cancer: a review of global incidence. *Oral Dis.* 2000;6:65-74.
20. Mehta FS, Bhonsle RB, Murti PR, Daftary DK, Gupta PC, Pindborg JJ. Central papillary atrophy of the tongue among bidi smokers in India: a 10 years study of 182 lesions. *J Oral Pathol Med.* 1989;18:475-80.
21. Mishra A, Meherotra R. Head and neck cancer: global burden and regional trends in India. *Asian Pac J Cancer Prev.* 2014;15:537-50.
22. Kalyani R, Das S, Kumar MLH. Pattern of cancer in adolescent and young adults: a ten year study in India. *Asian Pac J Cancer Prev.* 2010;11:655-9.
23. Dikshit R, Gupta PC, Ramasundarahettige C, Gajalakshmi V, Aleksandrowicz L, Badwe R, et al. Million death study collaborators. Cancer mortality in India: a nationally representative survey. *Lancet.* 2012;379:1807-16.
24. Jacob BJ, Straif K, Thomas G, Ramadas K, Mathew B, Zhang ZF, et al. Betel quid without tobacco as a risk factor for oral precancers. *Oral Oncol.* 2004;40:697-704.
25. Kissin B, Kaley MM, Su WH, Lerner R. Head and neck cancer in alcoholics. The relationship to drinking, smoking and dietary patterns. *JAMA.* 1973;224:1174.
26. Armstrong RW, Armstrong MJ, Yu MC, Henderson BE. Salted fish and inhalants as risk factors for nasopharyngeal carcinoma in Malaysian Chinese. *Cancer Res.* 1983;43:2967-70.
27. Challeng PK, Narain K, Das HK, Chetia M, Mahanta J. Risk factors for nasopharyngeal carcinoma: a case control study from Nagaland India. *Natl Med J India.* 2000;13:6-8.
28. Yu MC. Nasopharyngeal carcinoma: epidemiology and dietary factors. IARC Sci Publication. 1991;105:39-47.
29. Heck JE, Sapkota A, Vendhan G, Roychowdhury S, Dikshit RP, Jetly DH. Dietary risk factors for hypopharyngeal cancer in India. *Cancer Causes Control.* 2008;19:1329-37.
30. Phukan RK, Ali MS, Chetia CK, Mahanta J. Betel nut and tobacco chewing; potential risk factors of cancer of oesophagus in Assam, India. *Br J Cancer.* 2001;85:661-7.
31. Katz AD, Preston-Martin S. Salivary gland tumours and previous radiotherapy to head and neck: report of a clinical series. *Am J Surg.* 1984;147:345-8.
32. Klitenberg C, Olofson J, Hellquist H, Sokjer H. Adenocarcinoma of ethmoid sinuses: a review of 28 cases with special reference to wood dust exposure. *Cancer.* 1984;54:482-8.
33. Zheng W, Shu XO, Ji BT, Gao YT. Diet and other risk factors for cancer of the salivary glands: a population based case control study, *Int J Cancer.* 1996;67:194-8.
34. Pinkston JA, Cole P. Cigarette smoking and Warthin's tumour. *Am J Epidemiol.* 1996;144:183-7.
35. Poul Erik Petersen. Tobacco and oral health: the role of the World Health Organization. *Oral Health Prev Dent.* 2003;1:309-15.
36. Sharma JD, Barman D, Sharma A, Kataki AC. Tobacco related cancers in Kamrup Urban District: pattern and incidence (Report from population based cancer registry Guwahati). *Asian Acad Res J Multidiscipl.* 2014;1:517-35.

DOI: 10.5455/2320-6012.ijrms20141126

Cite this article as: Sharma JD, Barman D, Sarma MK, Sharma A, Kalita M, Kataki AC, Barbhuiya JA, Lahon R, Deka BR. Burden of head and neck cancers in Kamrup urban district cancer registry of Assam, India: a retrospective study. *Int J Res Med Sci* 2014;2:1382-7.