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Primary malignant head and neck tumours in Ghana: a survey of histopathological charts over two decades

Abdulai A.E[1*], Nuamah I.K[1], Avogo D[1], Gyasi R.K[2], Dakora T.K[3]

[1]Department of Oral and Maxillofacial Surgery,[2]Department of Pathology,[3]Department of Surgery, University of Ghana Medical School, Korle Bu Teaching Hospital, Accra, Ghana.

*Corresponding author: aemilabdulai@yahoo.com

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ABSTRACT

Background: Head and neck cancers are among the top ten malignancies worldwide. Their true extent is lacking in Ghana. There is no known published data covering the subject among Ghanaians. **Aim:** To determine the incidence of primary head and neck cancers seen at Korle Bu Teaching hospital, Ghana. **Methods:** A retrospective study of histopathological records of diagnosed head and neck cancers from 1989-2008. **Results:** 2,041 of 4,546 reports were malignant. 1342 were primary cancers. These were studied further in detail. The male: female ratio was 1.84:1. The oldest patient was 95 years and the youngest less than 1 year. The mean age was 45.08 years with a peak age-group of 51 to 60. The incidence of tumours in female exceeded that of male in only one age-group (81-90), with a ratio of 0.62:1. There were 59 different tumours. 45 of these occurred less than 5 times. Of those diagnosed, more than 5 times adenocystic carcinoma, osteosarcoma, chondrosarcoma and rhabdomyosarcoma occurred more frequently in females than males. 23 occurred only once. Squamous cell carcinoma (n=624) was the commonest pathology, followed by non-Hodgkin's lymphoma (n=256), nasopharyngeal carcinoma (n=100), Hodgkin's lymphoma (n=97) and adenocystic carcinoma (n=55). **Conclusion:** We observed a rising incidence of head and neck cancer. Squamous cell carcinoma is the commonest, occurring more commonly in men than women. The gender ratio is similar to that seen in most countries. This study offers a benchmark for future studies, planning resources and monitoring the efficiency of efforts to manage the different pathologies.

Key words: Malignant, head and neck tumours, histopathology, Ghana

INTRODUCTION

Malignant neoplasms of the head and neck [ICD-10 (International Classification of Diseases 10th Revision) categories C00-C14 (cancer of the lip, oral cavity and pharynx) and C32 (larynx)][1] are a cause of mortality and morbidity in several parts of the world.[2] Globally, the incidence continues to rise though in some countries the trend is downwards.[3,4] Whilst these pathologies still occupy the attention of most head and neck surgeons and other health workers, the aetiology up till now has not been clearly established though there are well known risk factors.[4,5] The concept of

field cancerisation which was initially suggested by Slaughter to explain the presence of multiple primary tumours affecting mucosa of the upper aero digestive tract (UADT) exposed to similar mutagens is still respected.[6,7] The changes in the mucosa is said to follow a multi-step path from normal epithelium through other transitional stages before becoming malignant. These changes may affect any part of the mucosa of the UADT.[8] Several genes have been implicated as playing a role. These include tumour suppressors like the cyclin-dependent kinase inhibitors, TP53 and RB1 and oncogenes like the cyclin family, EGFR and ras.[9,10]

In the present literature, suggested possible risk factors include betel quid, alcohol and or, tobacco use; viral infections which include human papillomavirus (HPV) infection (for oropharyngeal cancer),[4,11,12] epstein-Barr virus (EBV) infection (for nasopharyngeal cancer),[13] and others which include immune suppression, sunlight, asbestos, wood dust, paint fumes, diet and nutrition.[2] There is a wide geographical and ethnic variation in the incidence, presentation and prognosis of these pathologies.[2] The importance of some of these in the aetiology is still being debated. In the USA there is a reported variation in the incidence and behaviour of these tumours in different races.[2] In the UK 25% of these tumours have no known associated risk factors.[14] Whilst the concept of field cancerisation offers a possible explanation for multiple mucosal malignancies it does not attempt to explain the aetiology for the other malignancies in the head and neck region.

In developing strategies and planning resour**c**es to manage this group of pathologies in any population one needs to have a comprehensive and accurate data with respect to incidence, trends, common sites and histological type. To the best of our knowledge, there is no published study in the present literature on this subject among Ghanaians. We studied pathology charts over two decades in the tertiary health institution in Ghana, to describe the histopathological aspects and determine the incidence of primary head and neck malignant tumours to contribute to the knowledge and understanding on this subject.

METHODOLOGY

Histopathological charts seen at the Department of Pathology of a tertiary hospital over a twenty year period were used in the study. The charts which met our selection criteria of primary malignant tumour were selected for further study after excluding recurrent tumours, intracranial tumours, tumours affecting the globe (retinoblastoma), inflammatory swellings mimicking neoplasms, reactive cervical lymphadenitis and metastasis to the head and neck areas. The age, gender, site of pathology, receipt date of sample and the histological diagnoses were noted and recorded. The data had previously been the source of information for a previous study. All patients had either been seen initially at the ENT department, Maxillo-facial or paediatric unit. Senior clinicians carried out the biopsies which were then presented to the Department of Pathology and prepared for the pathologist. Specimen records were kept in the department and original reports sent to the referring clinician.

Statistical analysis

Data were analysed using Microsoft Excel spread sheet after they were scrutinised and cleaned.

RESULTS

There were 4,546 reports of head and neck tumours over the study period. 2,041 were malignant. 1,342 met our selection criteria of primary malignant tumour. 869 were male and 473 female giving a male to female ratio of 1.84:1. The average age was 45.55 for male, 44.21 for female and 45.08years for both sexes. The oldest was 95 years and youngest less than a year old (2 months). The incidence rose with increasing age until it peaked in the age group 51-60 years for both the whole group (n=249) and the male group (n=186). That for the female (n=80) group was higher, 61-70 years. The lowest incidence was in the age group 91-100 (n=6). The incidence of tumours in females exceeded that of men in only one age group (81-90) with a ratio of 8:13, (Tables 1 and 2).

Table 1: Age and sex distribution of the study sample

AGE	FEMALE	MALE	M:F RATIO
0-10	27	51	1.89
11-20	60	95	1.58
21-30	57	73	1.28
31-40	67	99	1.48
41-50	72	147	2.04
51-60	63	186	2.95
61-70	80	136	1.70
71-80	31	71	2.29
81-90	13	8	0.62
91-100	3	3	1.00
All Ages	473	869	1.84

There were 33 pathologies that affected one sex and not the other. 221 histologically confirmed malignant tumours were recorded over the first 5 years (1989-1993), with an average of 44 cases annually. The incidence of head and neck tumours when averaged over five years was observed to have systematically risen annually over the 20 year period (Table 3, Figure 1).

Table 2: Incidence of tumour occurrence by age-group in the study sample

Age group	Female	Male	Total	Percentage
0-10	27	51	78	5.81
11-20	60	95	155	11.55
21-30	57	73	130	9.69
31-40	67	99	166	12.37
41-50	72	147	219	16.32
51-60	63	186	249	18.55
61-70	80	136	216	16.10
71-80	31	71	102	7.60
81-90	13	8	21	1.56
91-100	3	3	6	0.45

Table 3: Incidence of tumours and annual rates over the study period

5-yr period	Incidence of tumours	Yearly average
1989-1993	221	44
1994-1998	312	62
1998-2003	382	76
2004-2008	427	85
Total	1342	

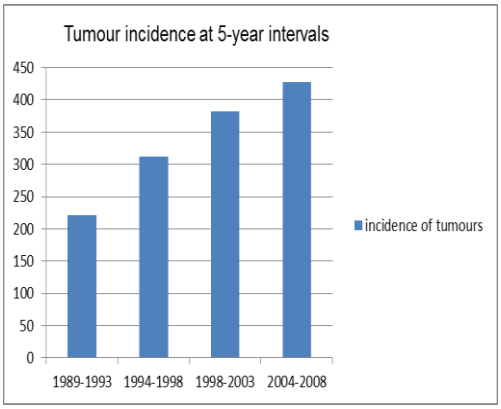

Figure 1: Incidence of Head and neck cancer
at 5-year intervals over the study period

There were 57 different malignant pathologies. 14 of these occurred 5 times or more (Table 4a). 43 occurred less than 5 times with 21 of them more than once, (Table 4b), and 22 occurring only once (Table 4c). The commonest histopathological type was squamous cell carcinoma (n=624) which constituted 46.5% of all the primary head and neck tumours with a male to female ratio of 2.63:1. As a group, the lymphomas (n=374), were the next in frequency, with the non-Hodgkin's lymphoma (n=258), the commonest. Nasopharyngeal carcinoma (n=100) was the third commonest with a male to female ratio of 3:2. This was followed in order of frequency, by, adenocystic carcinoma and rhabdomyosarcoma. Of the tumours with incidence of 5 and above, a female preponderance was seen in adenocystic carcinoma (0.93:1), osteosarcoma (0.25:1), chondrosarcoma and rhabdomyosarcoma (0.5:1). In general however, there was a gender preference for males with respect to most of the pathologies.

The most common site of malignant tumours was the cervical lymph nodes with a male: female ratio of 1.76:1, followed by the larynx, nose, maxilla and antrum and tongue, (Table 5, Figure 2). When added together, the oral cavity, oropharynx, lips, gingivae, the upper and lower jaws (ICD-10: C00-C06 and C10) which consist of the oral region had the highest incidence (n=335) with a male: female ratio of 1.86:1 (Table 6).

DISCUSSION

Head and neck cancers are amongst the top ten malignancies globally and continue to pose challenges for all health workers in this area of care.[2,15-17] Research into cancers in

this area is not as rampant as in other areas of the body, and the incidence continues to rise in some societies especially in the third world.[15,16] The search for their aetiology continues, however there are well known risk factors which contribute to the persistence and cause of these pathologies.[8-11] Geographic variations exist especially with respect to sub-sites and this tends to be associated with the various risk factors found in different areas.[16] Most world regions show an increasing incidence of head and neck cancers, with a few exceptions.[18] Whilst the incidence rates show a declining trend in both sexes in India, Hong Kong, Brazil and US whites, an increasing trend is observed in most other populations, particularly in Central and Eastern Europe, Scandinavia, Canada, Japan and Australia.[17] Studies on this subject from Africa are few[19,20] and tumour selection criteria employed differently, making it difficult to compare. One such study from Jos, Nigeria, reported a rising trend in head and neck cancers.[19] In this study however, rather than trend, a rising incidence of head and neck cancer has been observed. As seen in figure 1 and table 1, the average annual incidence of head and neck cancer rose from 44 cases in the first 5 years (1989-1993) to 85 cases in the last 5 years (2004-2008) of the study period. Several reasons, perhaps including increasing awareness could account for this and requires further studies to establish an incidence trend. The Italian Network of Cancer Registries (pool AIRT) during the period 1986-1997, showed diverging trends between sexes; rates decreased significantly among males and increased among females. Decreasing trends were observed for pharynx, statistically significant only among males.[11] Laryngeal cancers showed a significant decreasing trend among males; trends were stable among females.[11]

Table 4a: Pathologies occurring five or more times over the study period

PATHOLOGY	FEMALE	MALE	TOTAL	% TOTAL	M:F Ratio
Squamous cell carcinoma (SCC)	172	452	624	46.50	2.63
Non-Hodgkin's lymphoma (NHL)	96	162	258	19.23	1.69
Nasopharyngeal carcinoma	40	60	100	7.45	1.50
Hodgkin's lymphoma	40	57	97	7.23	1.43
Adenoid cystic carcinoma	29	28	57	4.25	0.97
Rhabdomyosarcoma	23	12	35	2.61	0.52
Mucoepidermoid carcinoma	12	14	26	1.94	1.17
Basal cell carcinoma	9	12	21	1.56	1.33
Burkitt's Lymphoma	3	16	19	1.42	5.33
Acinic cell carcinoma	3	6	9	0.67	2.00
Chondrosarcoma	4	2	6	0.45	0.50
Malignant fibrous histiocytoma (MFH)	2	3	5	0.37	1.50
Osteogenic sarcoma	4	1	5	0.37	0.25
Spindle cell carcinoma	2	3	5	0.37	1.50

Table 4b: Pathologies occurring less than 5 times but more than once over the study period

PATHOLOGY	FEMALE	MALE	TOTAL	% TOTAL
Paraganglioma	3	1	4	0.30
Plasmacytoma	2	2	4	0.30
Sinonasal adenocarcinoma	2	2	4	0.30
Anaplastic carcinoma	3	0	3	0.22
Leiomyosarcoma	2	1	3	0.22
Sebacceous carcinoma	2	1	3	0.22
Malignant epithelial/myoepithelial tumor	3		3	0.22
Malignant nerve sheath tumour		3	3	0.22
Angiosarcoma	1	1	2	0.15
Carcinoma in pleomorphic adenoma		2	2	0.15
Chemodectoma	2		2	0.15
Cylindric cell carcinoma	1	1	2	0.15
Dermatofibrosarcoma protuberans	2		2	0.15
Haemangioendothelioma	2		2	0.15
Haemangiopericytoma	1	1	2	0.15
Kerathoacanthoma		2	2	0.15
Terminal duct carcinoma (salivary)	1	1	2	0.15
Verrucous carcinoma		2	2	0.15
Neuroendocrine tumour		2	2	0.15
Neuroectodermal tumour		2	2	0.15
Transitional cell carcinoma (tcc)		2	2	0.15

Table 4c: Pathologies occurring only once over the study period

PATHOLOGY	FEMALE	MALE
Ameloblastic carcinoma		1
Carcinosarcoma		1
Clear cell tumour	0	1
Cutaneous lymphoma	1	
Ewing's sarcoma	1	
Fibrosarcoma	1	
Kaposi's sarcoma	1	
Lymphoepithelial carcinoma	1	
Malignant chondroid tumour		1
Malignant cylindroma		1
Malignant histiocytosis		1
Malignant teratoma		1
Melanoma	1	
Merkel cell carcinoma		1
Mesenchymal chondrosarcoma		1
Basal cell carcinoma		1
Neuroendocrine carcinoma		1
Onchocytoma		1
Polymorphous low grade carcinoma	1	
Salivary gland carcinoma	1	
Synovial sarcoma	1	

The average age in our study for all categories of head and neck cancer was 45.08, (males 45.5, females 44.8). This is lower than the findings in Pakistan[18] where it was 53 years and much lower than that found in the UK, Italy and USA where it was above 60 years. The peak age was 51-60 for men, and for the group as a whole. It was however higher (61-70) for the women. In the UK the peak age is 60-69 for men and above 80 in women.[14] In Pakistan the peak age group was 64-69. The reason for these differences is not clear though there is the possibility of different lifestyle effects which tends to vary in different societies on different continents. Also while our data included all primary tumours including lymphomas, some of the studies such as from the UK did not.[14]

The male to female ratio was 1.84:1 in our study. In all age groups male dominance was maintained and peaked in the age group 51-60 (2.95:1). The gender ratio was reversed in the age group 81-90 but was at par in the age group 90-100. This is consistent with most studies which tend to suggest a higher incidence in men.[17-21] Sankaranarayanan *et al.* in 1998 had reported a high incidence in males in regions of France, Hong Kong, the Indian sub-continent, Central and Eastern Europe, Spain, Italy, Brazil, and among US blacks.[17] High rates were reported in females of the Indian sub-continent, Hong Kong and Philippines.[17] The highest incidence rate reported in males was 63.58/100,000 (France, Bas-Rhin) and in females it was 15.97/100,000 (India, Madras).[17]

The commonest lesion was squamous cell carcinoma (n=624). It represented 46.5% of all the primary head and neck malignancies (table 3a). 172 women and 452 men were affected with a male to female ratio of 2.62. The oldest was a 98 year old woman and the average age was 55.2. The commonest sub-site was the larynx (ICD-10 C32)[1][n=173], however, when considered together, the lip, the oral cavity, the tongue, gingivae, upper and lower jaws and oropharynx (ICD-10 C00-C06 and C10) constituted a higher incidence of squamous cell carcinoma (n= 242).

Mucosa cheek was the most common site for oral cancer (55.9%) in Karachi followed by the tongue (28.4%), palate (6.8%), gum (4.4%), lip (3.1%) and floor of mouth (1.4%).[18] According to the National Cancer

Institute's Surveillance, Epidemiology, and Ends Results (SEER) program, 30 percent of oral cancers originate in the tongue, 17% in the lip, and 14% in the floor of the mouth (NCI, 2001).[22] Bhugri *et al.* suggested that the difference in the sub site of involvement in the two geographical areas is probably indicative of the difference in risk factors.[18]

Table 5: Distribution of pathologies by site and sex in the study sample

SITE OF PATHOLOGY	FEMALE	MALE	TOTAL	% TOTAL
Cervical lymph nodes	88	155	243	18.11
Larynx	24	152	176	13.11
Nose	62	75	137	10.21
Maxilla	32	65	97	7.23
Tongue	23	47	70	5.22
Neck	31	31	62	4.62
Mandible	30	31	61	4.55
Parotid	21	38	59	4.40
Palate	22	34	56	4.17
Tonsil	15	34	49	3.65
Nasopharynx	16	31	47	3.50
Scalp	21	24	45	3.35
Oral	9	33	42	3.13
Pharynx(unspecified)	17	23	40	2.98
Ear	13	10	23	1.71
Face	9	14	23	1.71
Vocal cord	3	18	21	1.56
Cheek	9	8	17	1.27
Lip	4	9	13	0.97
Forehead	2	10	12	0.89
Submandibular	6	6	12	0.89
Hypopharynx	1	7	8	0.60
Oropharynx	1	6	7	0.52
Eyelid	2	3	5	0.37
Occipital scalp	3		3	0.22
Skull bone	3		3	0.22
Chin	1	1	2	0.15
Gingivae		2	2	0.15
Post auricular	2		2	0.15
Ethmoid	1	0	1	0.07
Lacrimal	1		1	0.07
Mastoid	1		1	0.07
Piriform fossa		1	1	0.07
Sinus maxilla		1	1	0.07
Head and neck	473	869	1342	100

Table 6: Distribution of oral tumours in the study sample by sub site

ORAL REGION	FEMALE	MALE	TOTAL	% TOTAL
maxilla	32	65	97	28.95522388
Tongue	23	47	70	20.89552239
mandible	30	31	61	18.20895522
Palate	22	34	56	16.71641791
oral cavity	9	33	42	12.53731343
oropharynx	1	6	7	2.089552239
gingivae		2	2	0.597014925
Oral Cancer	117	218	335	100

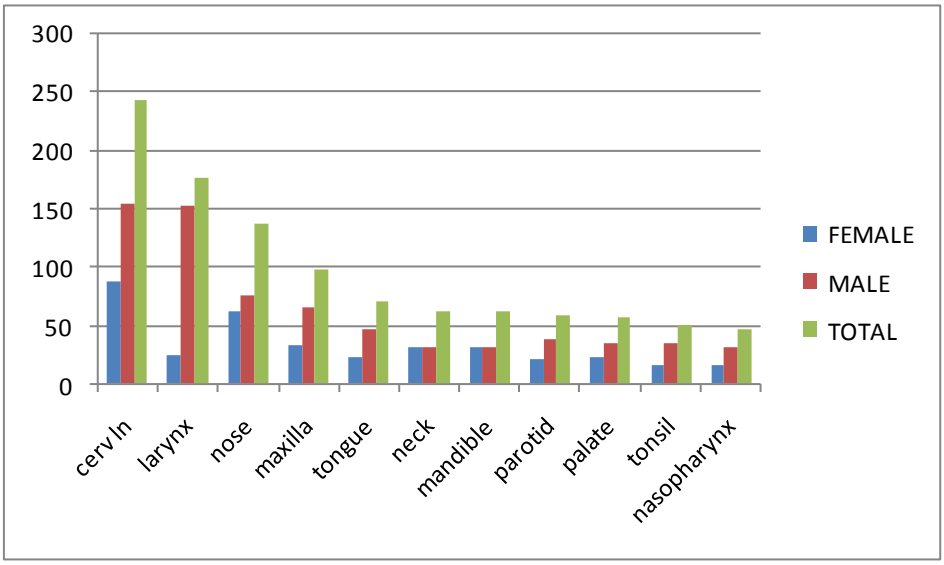

Figure 2: Distribution of tumours in the study sample by site and sex

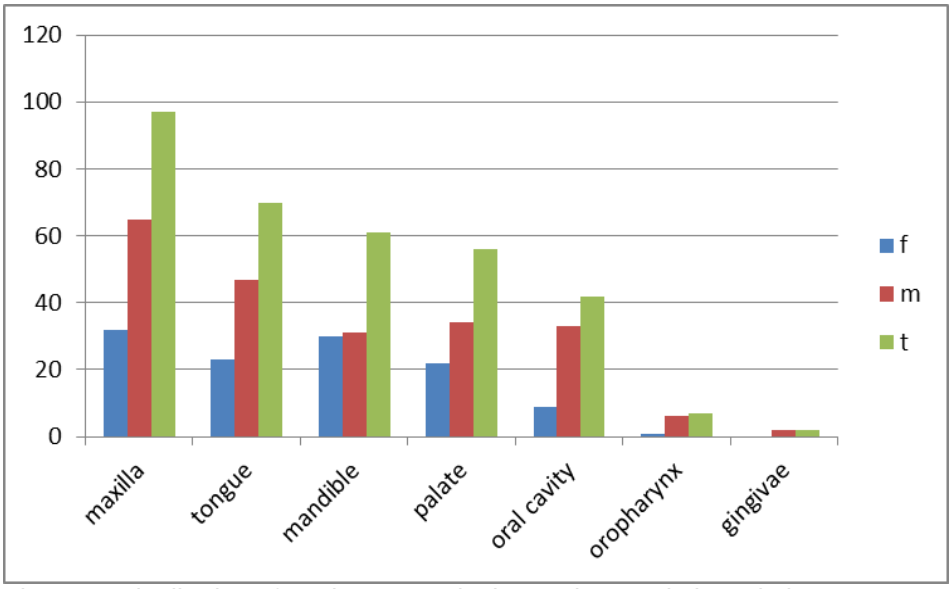

Figure 3: Distribution of Oral Tumours in the study sample by subsite (f=female, m=male, t=total)

Though there is a possibility that there could be some degree of misclassification by sub sites, giving the close anatomical proximity of component head and neck cancer topographic sites.[18]

The next commonest lesion was non-Hodgkin lymphoma (NHL) (n=255) which made up 19% of the total with a male to female ratio of 1.68. Of these70.63% arose from lymph nodes of the head and neck. The average age was 39 but the oldest patient was a 98 year old man. The age group with the highest incidence was 41-50. 60% occurred between the ages 15 and 55 years. This preponderance in men is consistent with several other studies.[21,22] Nasopharyngeal carcinoma was the third commonest lesion (n=100), with a male to female ratio of 1.5:1. The peak age group was 41-50 and the average age was 33.55. This pathology tends to occur in slightly younger age group is consistent with studies in Pakistan where approximately a third of oral cancer and nasopharyngeal cancer cases occurred in patients 40 years and younger,[18] and similar to studies conducted in Europe, USA and Asia.[22]

Next was Hodgkin's lymphoma (n=97) which constituted 7.23% of the selected sample. The male to female ratio was 1.42. All samples were obtained from cervical lymph nodes. The next two commonest tumours (5th and 6th) had a
reversed gender distribution. These were adenocystic carcinoma and rhabdomyosarcoma. The male to female ratio were 1:1.03 and 1:1.92 and they constituted 4.1% and 2.62% respectively. These two pathologies tend to have a higher incidence in women in most studies.

The incidence of the rest of the pathologies analysed confirms how rare some of them are. 23 out of the 59 different recorded histological types occurred once (Table 4c), and 14 occurred twice (Table 4b). The incidence rates of these pathologies may be due to the different risk factors that prevail in their society compared to other geographical locations, according to Bhugri.[18]

In terms of location, the cervical lymph node was the commonest (n=243) with a male: female ratio of 1.76:1. This was followed by the larynx (n=176) then the nose (n=137). These together with the incidence of the rest of the pathologies analysed can be seen in table 4. However, the oral cavity, oropharynx, lips, gingivae, the upper and upper jaws (ICD-10: C00-C06 and C10) when added together, had the highest incidence (n=335) with a male: female ratio of 2.4:1 (Table 6, Figure 3).

Most of the pathologies occurred less than 5 times, including others that only occurred once over the 20 years (Tables 4b and 4c). This may demonstrate rarity or it may be that some patients never avail themselves to the institutions or clinics from where our data is recorded. Public education may be helpful if the latter is the case to help capture a complete picture.

Comparison to other regions of the world/globe is difficult. We included in our study for example lymphomas which were first clinically detected in the head and neck area. These tumours are important in discussion of head and neck neoplasms in the Ghana society because of the differentiation of Burkitt's lymphoma which is endemic.

CONCLUSION

This study provides data on the incidence of head and neck tumours in the Ghanaian society. It confirms as in most other studies that head and neck neoplasms are mostly squamous cell carcinoma (SCC), and also lays credence to a rising incidence trend. The peak age incidence is however lower compared to most other studies. Except for the sarcomas and adenocystic carcinomas, there is a male preponderance in all cases generally. This study offers a benchmark for future studies, planning resources and monitoring the efficiency of efforts to manage the different pathologies. Whilst it offers some baseline level on the incidence of these pathologies, to arrive at a true national picture, there is the need for more extensive study involving collecting data from many more areas of the country.

REFERENCES

1. International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) Version for 2010. http:\\www.who.int\classifications\icd\en\ Access: 17th Aug, 2012.
2. Sankaranarayanan R, Masuyer E, Swaminathan R, Ferlay J, Whelan S. Head and neck cancer: a global perspective on epidemiology and prognosis. Anticancer Res 1998;18:4779.
3. Lambert R, Sauvaget C, de Camargo C. M, Sankaranarayanan R. Epidemiology of cancer from the oral cavity and oropharynx. Eur J Gastroenterol Hepatol 2011;23:633-641.
4. Ernster J.A, Sciotto C.G, O'Brien M.M, Finch J.L, Robinson L.J, Wilson T, Mathews M. Rising incidence of oropharyngeal cancer and the

role of oncogenic human papilloma virus. Laryngoscope 2007;117:2115-2128.
5. Brown L.M, Check D.P, Devesa S.S. Oral cavity and pharynx cancer incidence trends by subsite in the United States: Changing gender patterns. Journal of Oncology 2012;2012:10.
6. Slaughter DP, Southwick HW, Smejkal W. Field cancerization in oral stratified squamous epithelium; clinical implications of multicentric origin. Cancer 1953;6:963-8.
7. Hitt R, Echarri MJ. Molecular biology in head and neck cancer. Clin Transl Oncol 2006;8:776-9.
8. Califano J, van der Riet P, Westra W, Nawroz H, Clayman G,Piantadosi S. Genetic progression model for head andneck cancer: implications for field cancerization. Cancer Res 1996;56:2488-92.
9. Arora S, Aggarwal P, Pathak A, Bhandari R, Duffoo F, Gulati SC. Molecular genetics of head and neck cancer (Review). Mol Med Report 2012;6:19-22.
10. Matta A, Ralhan R. Overview of current and future biologically based targeted therapies in head and neck squamous cell carcinoma. Head and Neck Oncology 2009;1:1-6.
11. Tumino R, Vicario G. Head and neck cancers: oral cavity, pharynx, and larynx. Epidemiol Prev 2004;28:28-33.
12. D'Souza G, Kreimer A, Viscidi R, Pawlita M, Fakhry C, Koch W, Westra W, Gillison M. Case-control study of human papillomavirus and oropharyngeal cancer. N Engl J Med 2007;356:1944-1956.
13. Lu JH, Tang YL, Yu HB, Zhou JH, Fu CY, Zeng X, Yu ZY, Yin HL, Wu MH, Zhang JY, Li XL, Li GY. Epstein–barr virus facilitates the malignant potential of immortalized epithelial cells: from latent genome to viral production and maintenance. Laboratory Investigation 2010;90:196-209.
14. Info.cancerresearchuk.org/cancerstats/types/oral/incidence/uk-oral-cancer
2012.
15. Dobrossy L. Epidemiology of head and neck cancer: magnitude of the problem. Cancer Metastasis Rev 2005;24:9-17.
16. Ferlay J, Bray F, Pisani P and Parkin DM. Globocan 2002: Cancer Incidence, Mortality and Prevalence Worldwide IARC Cancer Base 2004;No. 5. version 2.0, IARC Press, Lyon.
17. Sankaranarayanan R, Masuyer E, Swaminathan R, Ferlay J, Whelan S. Head and neck cancer: a global perspective on epidemiology and prognosis. Anticancer Res 1998;18:4779-86.
18. Bhurgri Y, Bhurgri A, Usman A, Pervez S, Kayani N, Bashir I, Ahmed R, Sheema H. Epidemiological review of head and neck cancers in Karachi. Asian Pacific J Cancer Prev 2006;7:195-200.
19. Otoh EC, Johnson NW, Mandong BM, Danfillo IS. Primary head and neck cancers in Jos, Nigeria: a re-visit. J West Afr J Med 2006;25:92-100.
20. Adeyemi BF, Adekunle LV, Kolude BM, Akang EE, Lawoyin JO. Head and neck cancer: a clinicopathological study in a tertiary care center. J Natl Med Assoc 2008;100:690-7.
21. Howlader N, Noone AM, Krapcho M, Neyman N, Aminou R, Altekruse SF, Kosary CL, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Eisner MP, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2009 (Vintage 2009 Populations), National Cancer Institute. Bethesda, MD. ,http://seer.cancer.gov/csr/1975_2009_pops09/, based on November 2011 SEER data submission, posted to the SEER web site, April 2012.
22. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Cancer incidence and mortality worldwide: GLOBOCAN IARC Cancer Base No.10. 2008 v1.2. http://www-dep.iarc.fr/

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