Oral Diseases (2005) 11, 386–391. doi:10.1111/j.1601-0825.2005.01137.x

http://www.blackwellmunksgaard.com

ORIGINAL ARTICLE

Salivary gland neoplasms in Maiduguri, north-eastern Nigeria

EC Otoh[1], NW Johnson[2], H Olasoji[3], IS Danfillo[1], OA Adeleke[1]

[1]*Regional Centre for Oral Health Research and Training Initiatives (RCORTI) for Africa, Jos, Nigeria;* [2]*WHO Collaborating Centre for Oral Cancer and Precancer, GKT Dental Institute, King's College, London, UK;* [3]*Department of Oral and Maxillofacial Surgery, UMTH, Maiduguri, Nigeria*

OBJECTIVE: To document the pattern of salivary gland neoplasia in Maiduguri, Nigeria.
DESIGN AND SETTING: A retrospective clinical and histopathological review (January 1987–December 2002) of cases diagnosed at a tertiary care hospital.
MATERIALS AND METHODS: Information on demographics, diagnosis and cancer management in the hospital were retrieved from biopsy reports and case notes of patients.
RESULTS: The palatal (71.9%) and parotid (78.3%) glands were the most common minor and major salivary glands involved, with a benign–malignant ratio of 1:1 and 1.4:1, respectively.Pleomorphic adenoma (44.3%) was the most common salivary gland neoplasm recorded. It was commonly reported in the third decade (mean 30.4 years) and among males (M:F, 1.4:1). Ectopic lesions (17.1%) were reported in the neck, nose and cervical nodes. Mucoepidermoid carcinoma (10.1%) was the most common salivary gland malignancy, occurring in the second and sixth decades; of equal gender distribution and predominantly in the palate (50%). The squamous cell carcinoma (10.9%) and adenoidcystic carcinoma (21.9%) were the most common malignancies in the major and minor glands respectively. There was a higher prevalence of malignancies of the parotid than previously reported for northern Nigeria ($P = 0.036$).
CONCLUSION: Pleomorphic adenoma and mucoepidermoid carcinoma were the most commonly reported benign and malignant neoplasia in this series. The prevalence of mucoepidermoid carcinoma contrasts with reported findings in other African studies.
Oral Diseases (2005) **11**, 386–391

Keywords: salivary glands; Nigerians; neoplasms

Correspondence: Dr Emmanuel Chukwuka Otoh, Basic Science and Research Division, Regional Centre for Oral Health Research and Training Initiatives (RCORTI) for Africa, 3, CBN Road, PMB 2067 Jos, Plateau State, Nigeria. Tel: +234-73-463859/+234-73-612750, Fax: +234-73-462901, E-mail: ecotoh@yahoo.co.uk
Received 26 February 2004; revised 8 February 2005; accepted 25 February 2005

Introduction

Geographical variations in the prevalent site and type of salivary gland tumours have been reported in the literature (Arotiba, 1996; Kolude *et al*, 2001; Sousa and De Sa, 2001; Jansisyanont *et al*, 2002; Masanja *et al*, 2003; Hyam *et al*, 2004). The commonly involved sites include the parotid and submandibular glands and the minor salivary glands of the palate, with the sublingual gland being the least affected (Kolude *et al*, 2001; Sousa and De Sa, 2001; Masanja *et al*, 2003; Hyam *et al*, 2004).

The commonly reported benign and malignant neoplasms include pleomorphic adenomas, mucoepidermoid carcinoma, adenoidcystic carcinoma, carcinoma ex pleomorphic adenoma and adenocarcinoma (Batsakis, 2003). The most commonly reported malignant neoplasms vary between adenoidcystic carcinoma (Adekeye and Robertson, 1979; Onyango *et al*, 1995; Masanja *et al*, 2003), mucoepidermoid carcinoma (Ezeanolue, 1999; Kolude *et al*, 2001; Jansisyanont *et al*, 2002). Certain risk factors, like radiation exposure, have been associated with the development of malignant salivary gland tumours (Beal *et al*, 2003).

Studies in Nigeria and Africa showed that salivary gland neoplasia constitute between 2.8 and 10% of all head and neck malignancies (Arotiba, 1996; Kolude *et al*, 2001; Masanja *et al*, 2003).

Most studies in Africa showed a delay by patients in reporting to the hospital, with most presenting with the late stage disease (stage III/IV), whereas early reporting in developed countries has greatly improved the survival of patients diagnosed of these tumours (Arotiba, 1996; Ezeanolue, 1999; Olasoji *et al*, 1999; Masanja *et al*, 2003; Hyam *et al*, 2004; Kokemueller *et al*, 2004). An earlier study of salivary gland tumours in northern Nigeria decried the poor record of the natural history of tumours in northern Nigeria because of the long distances patients had to travel for treatment and loss of patients to follow up (Adekeye and Robertson, 1979). A previous study of tumours of the minor salivary glands (Olasoji *et al*, 1999) also

reported on the pooled data from two referral centres in diametrically opposite ends of Nigeria, Ile-Ife (south-west) and Maiduguri (north-east).

The establishment of the University of Maiduguri Teaching Hospital (UMTH), Maiduguri in 1986 has considerably improved the number of patients from the north-eastern states reporting for treatment. This study was carried out to document a more representative pattern of salivary gland neoplasia in the areas served by the hospital.

Materials and methods

The north-eastern region comprises six states with a total population of about 11.9 million (as at the 1991 census). Each state has health institutions serving the various levels of health care. The UMTH, Maiduguri is the only referral tertiary health institution for histopathology and receives biopsy samples principally from hospitals in the zone.

The ethical clearance required to access data for the study was obtained from the Chief Medical Director of the hospital.

Socio-demographic information and history of patient management (age, sex, occupation, ethnic group, history of habits; history of symptoms, dates of referral and first appointment, pretreatment and histological tumour, node, metastasis (TNM) staging of lesion (Carey *et al*, 2003), clinical and histological diagnoses, dates of biopsy and dates of biopsy report; definitive treatments and date of discharge) were retrieved from pathology records and medical records of patients histologically diagnosed with reportable benign and malignant neoplasia of the salivary glands and extra-salivary gland sites (Fritz *et al*, 2000) at the UMTH, Maiduguri for the period between the start of histopathology services in January 1987 and December 2002. This was entered into data entry forms designed and modified according to the pattern developed for the BAHNO minimum data set (Wight, 1999).

The information was analysed statistically using SPSS 8+ and the STATCALC[R] statistical package of EPI INFO Version 6.0 (1993). The Student's *t*-test, Yates corrected and Fisher's exact tests were used to compare mean values and determine areas of significant associations between nominal variables-like prevalence rate, duration of symptoms in this study with reported findings from previous studies. A *P*-value of 0.05 or less was considered significant.

Results

General overview

A total of 79 neoplasia were reported over a 16-year period, of which 44 (55.7%) were benign and 35 (44.3%) malignant (Table 1). The malignancies constitute 9.4% of all head and neck cancers.

The malignant–benign ratio, for both major and minor salivary glands are 1.6:1 and 1:1.1 respectively. The major salivary glands (58.2%), especially the parotid gland (45.6%) were the most commonly affected sites.

Types of neoplasia

Pleomorphic adenoma (44.3%) and mucoepidermoid carcinoma (10.1%) were the commonest tumours reported.

Site distribution

The major salivary glands were all affected, but the parotid was the only reported site for malignant neoplasia (Table 1). The most commonly affected minor salivary gland site for benign and malignant neoplasia is the palate (52.9%, 87.5% respectively).

Table 1 Distribution of benign and malignant salivary gland neoplasms by site of occurrence

	Major salivary glands			*Minor salivary glands*						
Lesion	*Parotid*	*Submandibular*	*Sublingual*	*Palate*	*Lip*	*Ectopic sites*	*Retromolar*	*Tonsils*	*Unspecified site*	*Total (%)*
Pleomorphic adenoma	14	8	0	7	0	6	0	0	0	35 (44.3)
Monomorphic adenoma	1	0	0	1	0		0	0	1	3 (3.8)
Warthin's tumour	2	0	0	0	0		0	0	0	2 (2.5)
Cavernous haemangioma	0	0	2	0	0		0	0	0	2 (2.5)
Salivary adenoma	0	0	0	1	0		1	0	0	2 (2.5)
Mucoepidermoid carcinoma	3	0	0	4	1		0	0	0	8 (10.1)
Adenoidcystic carcinoma	0	0	0	7	0		0	0	0	7 (8.9)
Squamous cell carcinoma	5	0	0	0	0		0	0	0	5 (6.3)
Acinic cell carcinoma	2	0	0	0	0		0	0	0	2 (2.5)
Terminal duct carcinoma	1	0	0	2	0		0	0	0	3 (3.8)
Malignant oncocytoma	1	0	0	0	0		0	0	0	1 (134)
Carcinoma ex pleomorphic adenoma	3	0	0	0	0		0	1	0	4 (5.1)
Adenocarcinoma	1	0	0	1	0		0	0	0	2 (2.5)
Burkitt's lymphoma	1	0	0	0	0		0	0	0	1 (1.3)
Anaplastic carcinoma	1	0	0	0	0		0	0	0	1 (1.4)
Unspecified malignant lesion	1	0	0	0	0		0	0	0	1 (1.3)
Total (%)	36 (45.6)	8 (10.1)	2 (2.5)	23 (29.1)	1 (1.3)	6 (7.6)	1 (1.3)	1 (1.3)	1 (1.3)	79 (100)

Table 2 Percentage prevalence of common benign salivary gland neoplasms in different studies in Nigeria

Author	*Location of study*	*Benign salivary gland neoplasms*		
		Pleomorphic adenoma (%)	*Monomorphic adenoma (%)*	*Warthin's tumour (%)*
Edington and Sheiham (1966)	Ibadan, Nigeria	71.2	6.8	–
Onuigbo (1978)	Enugu, Nigeria	6.3	0	–
Adekeye and Robertson (1979)	Kaduna, Nigeria	57	0	–
Abiose *et al* (1990)	Ibadan, Nigeria	58.3	3.0	0.7
Odukoya (1990)	Lagos, Nigeria	40.2	–	–
Arotiba (1996)	Lagos, Nigeria	48.5	2.5	1.3
Ezeanolue (1999)	Enugu, Nigeria	43.9	7.3	–
Olasoji *et al* (1999)[a]	Maiduguri, Nigeria	32.7	0	–
Kolude *et al* (2001)	Ibadan, Nigeria	48.6	2.9	0.04
Sousa and De Sa (2001)	Goa, India	54.8	–	0.8
Onyango *et al* (1995)	Kenya	61.6	6.9	–
Masanja *et al* (2003)	Tanzania	44.4	2.0	1.3
This study	Maiduguri	44.3	3.8	2.5

[a]Study in minor salivary glands of the palate.

Pleomorphic adenoma, the most common salivary gland neoplasm, was also recorded in ectopic salivary gland sites - the nose, neck and cervical lymph nodes.

The lesions of the neck constituted 11.4% of all cases of pleomorphic adenoma. The other recorded ectopic sites for pleomorphic adenoma were the nose and cervical lymph nodes, with each constituting 2.8% of all cases of pleomorphic adenoma.

Mucoepidermoid carcinoma was the most commonly reported malignancy, with the palate as the most commonly affected site (50%).

Age and gender distribution

Salivary gland neoplasms were reported commonly in the third decade of life (benign and malignant neoplasms were reported in the third and sixth decades respectively) (Figure 1 and Table 4).

Pleomorphic adenoma was commonly reported in the third decade, with the pooled mean age of occurrence for all sites being 30.4 years and a pooled male–female ratio of 1.4:1.

The lesions of the neck were commonly reported in the second and third decades, with a mean age of occurrence of 21 years and a male–female ratio of 1:3.

Mucoepidermoid carcinoma was commonly reported in the second and sixth decades, with a pooled mean age of occurrence of 31.4 ± 15.7 years and an equal gender distribution (M:F, 1:1). The sites commonly affected include the parotid, and the minor glands in the palate and lip. The parotid gland is affected in 37.5% of the cases of the neoplasm diagnosed at this hospital and it was reported only in males, with a mean age of occurrence of 38.3 ± 20.8 years (range: 15–85). The palatal lesion was reported in the 18–55 years age bracket, with a mean age of occurrence of 26.3 ± 10.9 years and a male–female ratio of 1:3.

Duration of symptoms

The mean duration of symptoms for all malignant neoplasia was 72.4 ± 95.9 months with a range of 12–240 (Table 5).

Discussion

General overview

The proportion of salivary gland malignancies relative to head and neck cancers (9.4%), in this study, approximates the 7.6% reported for major salivary glands in Lagos, but higher than the 3.8% reported for Ibadan (Nwawolo *et al*, 2001; Kolude *et al*, 2001; Otoh *et al*, 2004).

Benign neoplasia constituted 47.2% of parotid neoplasia. This is lower than the (54–80%) reports in previous studies worldwide (Adekeye and Robertson, 1979; Onyango *et al*, 1995; Kolude *et al*, 2001; Astor *et al*, 2002; Masanja *et al*, 2003) (Table 2).

Benign neoplasia

The prevalence of pleomorphic adenoma reported in this study is consistent with previously reported studies worldwide

Fourteen cases of pleomorphic adenoma were reported in the parotid gland, representing 38.9% of tumours occurring in this site. This figure is similar to findings in Kenya but lower than previously reported in Nigeria and Tanzania (Adekeye and Robertson, 1979; Abiose *et al*, 1990; Onyango *et al*, 1995; Arotiba, 1996; Masanja *et al*, 2003). The lower prevalence in this study than observed in previous studies in Kaduna and Lagos could be because these hospitals were the sole referral centres for maxillofacial surgery in the north- and south-west zones of Nigeria respectively up till the late-1980s. Similarly, the long distances (10–15 h by road) which the patients from the north-east had to travel to Kaduna could have affected the number of cases seen at the hospital.

The observed higher prevalence in males (M:F ratio, 3:1) agrees with the reported findings in Nigeria (Edington and Sheiham 1966; Adekeye and Robertson, 1979; Arotiba, 1996) but contrasts with the reported predominance in females in Brazil (Alves *et al*, 2002).

The palate was the only minor salivary gland site recorded for pleomorphic adenoma. The seven cases

Table 3 Relative proportion of different malignancies to salivary gland neoplasms in different studies in Nigeria

Author	*Location of study*	*Malignant salivary gland neoplasms*					
		Mucoepidermoid carcinoma (%)	*Adenoidcystic carcinoma (%)*	*Squamous cell carcinoma (%)*	*Adenocarcinoma (%)*	*Carcinoma ex pleomorphic adenoma (%)*	*Acinic cell carcinoma (%)*
Edington and Sheiham (1966)	Ibadan, Nigeria	1.7	5.1	5.1	0	10.2	0
Adekeye and Robertson (1979)	Kaduna, Nigeria	7.0	13.9	3.5	12.8	4.6	1.2
Abiose *et al* (1990)	Ibadan, Nigeria	12.5	7.1	6.1	5.4	2.7	1.6
Aroriba (1996)	Lagos, Nigeria	13.1	11.4	3.8	13.5	1.7	0.8
Ezeanolue (1999)	Enugu, Nigeria	12.2	0	12.2	0	2.4	0
Olasoji *et al* (1999)[a]	Maiduguri, Nigeria	7.7	17.3	26.9	0	0	0
Kolude *et al* (2001)	Ibadan, Nigeria	14	11.9	7.4	4.5	1.2	2.9
Sousa and De Sa (2001)	Goa, India	17.7	8.1	–	–	4.8	–
Onyango *et al* (1995)	Kenya	3.1	12.6	–	4.9	–	3.6
Masanja *et al* (2003)	Tanzania	9.8	24.8	–	6.5	–	3.3
Kokemueller *et al* (2004)	Hannover, Germany	–		–	–	–	–
Hyam *et al* (2004)[a]	Sydney, Australia	30	40	–	20	–	–
This study	Maiduguri, Nigeria	10.9	9.6	6.8	2.7	5.5	2.7

[a]Study in minor salivary glands.

Table 4 Overall age distribution of benign and malignant neoplasms

Age groups	*Neoplasms*	
	Benign	*Malignant*
0–10	0	1
11–20	6	4
21–30	18	3
31–40	11	6
41–50	7	7
51–60	1	8
61–70	0	2
Unspecified age	1	4
Total	44	35

Table 5 Duration of symptoms for salivary gland neoplasms in University of Maiduguri Teaching Hospital (UMTH)

Neoplasms	*Duration of symptoms in months (±s.d.)*
Overall malignancies ($n = 5$)	72.2 (±95.9)
Squamous cell carcinoma	37.0
Mucoepidermoid carcinoma	36.0
Terminal duct carcinoma	240.0
Carcinoma ex pleomorphic adenoma	12.0

Figure 1 Age distribution of salivary gland neoplasms

reported constitute 30.4% of all neoplasms of the palate, is as reported for northern Nigeria; but is much lower than reported in studies in other parts of Nigeria (Edington and Sheiham, 1966; Adekeye and Robertson, 1979; Abiose *et al*, 1990; Ezeanolue, 1999). This difference could possibly be associated with dietary practices that are common to both southern zones but uncommon in northern Nigeria. Cassava (tapioca) is the base for most meals in southern Nigeria while grains, like millet and guinea corn, form the base for meals in northern Nigeria, but there is no International Agency for Research of Cancers (IARC) report of its role in carcinogenesis. There is a need for further research into this possibility.

Palatal pleomorphic adenoma also constitutes 20% of all salivary gland pleomorphic adenoma. This value

approximates recent findings in Tanzania, but varies with other previously reported studies (Adekeye and Robertson, 1979; Odukoya, 1990; Onyango *et al*, 1995; Cwalina *et al*, 2002; Masanja *et al*, 2003).

Pleomorphic adenoma was also recorded in ectopic salivary gland sites, such as the neck, nose and cervical lymph nodes. This agrees with the findings by Nardone *et al* (2002), Tanigaki *et al* (2002) and Noda *et al* (2002). Other reported ectopic sites of pleomorphic adenoma in Nigeria were the lacrimal gland, the nasolacrimal duct and external nose (Ezeanolue, 1999; Kolude *et al*, 2001).

Three cases of monomorphic adenoma were recorded, constituting 3.8% of all salivary gland lesions. This compares with the previously reported findings in Nigeria and Tanzania, but lower than the 6.9% reported for Kenya (Onyango *et al*, 1995; Kolude *et al*, 2001; Masanja *et al*, 2003).

Warthin's tumour (adenolymphoma) was reported only in the parotid gland and constitutes 2.5% of all salivary gland lesions. This is significantly higher than the findings of 0.4–1.9% previously reported in Nigeria and Tanzania (Olasoji *et al*, 1999; Kolude *et al*, 2001; Masanja *et al*, 2003). The relatively higher figure than in the study by Olasoji *et al* (1999) could be as a result of the pooled figures from studies in Ile-Ife (south-west) and Maiduguri (north-east). Its relative percentage occurrence in the parotid gland agrees with the findings of Batsakis & Regezi (Sawyer *et al*, 1985).

Malignant neoplasia

The reported percentage occurrence of malignancies in the parotid gland in this study is higher than the 29.7% ($P = 0.036$) previously reported by Adekeye and Robertson (1979); but lower than the 56.3% ($P = 0.84$) and 84.2% ($P = 0.029$) reported for Ibadan and Enugu respectively (Abiose *et al*, 1990; Ezeanolue, 1999). The higher percentage occurrence of malignant neoplasms in the parotid gland in this study than previously reported for northern Nigeria could be attributed to the increased reporting of these neoplasms from the area. The 40% occurrence of malignancies in under 40 year olds is higher than reported for some African and Western countries (Onyango *et al*, 1995; Masanja *et al*, 2003; Hyam *et al*, 2004).

The prevalence of mucoepidermoid carcinoma in this study agrees with previously reported findings in Nigeria, but contrasts with the findings in East Africa that reported a prevalence of adenoidcystic carcinoma (Onyango *et al*, 1995; Kolude *et al*, 2001; Masanja *et al*, 2003) (Table 3). A recent study, to establish a relationship between radiation exposure and salivary gland tumours, suggested an increased risk for developing malignant (*vs* benign) salivary gland tumour after radiation exposure, with the mucoepidermoid carcinoma being the most implicated malignancy (Beal *et al*, 2003). There is the need for a similar study in Nigeria.

Adenoidcystic carcinoma constitutes 9.6% of the total salivary gland neoplasms. This is lower than the previously reported findings in northern Nigeria and East Africa (Adekeye and Robertson, 1979; Onyango *et al*, 1995; Masanja *et al*, 2003), but agrees with the 10%, 11.4% reported by van der Wal *et al* (2002) and Arotiba (1996) respectively.

The mean age of occurrence is slightly higher than the reported findings of 43.3 years by Arotiba (1996), lower than the 54.3 years previously reported by van der Wal *et al* (2002) and higher than the finding of 35 years by Adekeye and Robertson (1979). The predominance in males agrees with the findings in Tanzania, although a higher occurrence in females was reported in Kenya (Onyango *et al*, 1995; Masanja *et al*, 2003).

The palate is the only site affected. The non-involvement of the submandibular gland agrees with the reported findings of Adekeye and Robertson (1979), but contrasts with the findings of Arotiba (1996) who reported a predominance of the neoplasm in the submandibular gland. The reported prevalent sites in Kenya and Tanzania are the palatine and the parotid glands, respectively (Onyango *et al*, 1995; Masanja *et al*, 2003).

Squamous cell carcinoma is the most common malignancy of the major salivary glands (26.3%) and constitutes 6.8% of the total salivary gland neoplasia. This approximates the recent finding in south-west Nigeria, but varies with other previously reported findings in Nigeria (Ezeanolue, 1999; Kolude *et al*, 2001). It was not reported in studies in East Africa (Onyango *et al*, 1995; Masanja *et al*, 2003). Squamous cell carcinoma also constitutes 14.3% of all malignant salivary gland neoplasms. This is higher ($P > 0.05$) than previously reported for northern Nigeria (Adekeye and Robertson, 1979).

The higher occurrence in males agrees with the reported findings in south-west Nigeria, but contrasts with the reported higher occurrence in females in northern Nigeria (Adekeye and Robertson, 1979; Abiose *et al*, 1990; Arotiba, 1996).

Site distribution: duration of symptoms

The mean duration of symptoms for malignant neoplasms was 72.4 ± 95.9 months.

Conclusions

Pleomorphic adenoma and mucoepidermoid carcinoma were the most commonly reported benign and malignant neoplasia in this series. The prevalence of mucoepidermoid carcinoma contrasts with reported findings in other African studies.

Acknowledgements

This study was carried out by a grant from the Regional Centre for Oral Health Research and Training Initiatives (RCORTI) for Africa (in collaboration with the World Health Organization), Jos, Nigeria.

Authors sincere appreciation goes to Prof. Cyril Enwonwu for his encouragement and guidance in the course of the study.

Also would like to thank the Chief Medical Director, the Heads of the Departments of Histopathology, Medical Records; and the Cancer Registry Manager of UMTH, Maiduguri for their immense support in the course of the study.

References

Abiose BO, Oyejide O, Ogunniyi J (1990). Salivary gland tumours in Ibadan, Nigeria: a study of 295 cases. *Afr J Med Med Sci* **19:** 195–199.

Adekeye EO, Robertson JM (1979). Salivary gland tumours in northern Nigeria. *Trop Doct* **9:** 168–174.

Alves FA, Perez DE, Almeida OP, Lopes MA, Kowalski LP (2002). Pleomorphic adenoma of the submandibular gland: clinicopathological and immunohistochemical feature of 60 cases in Brazil. *Arch Otolaryngol Head Neck Surg* **128:** 1400–1403.

Arotiba GT (1996). Salivary gland neoplasms in Lagos, Nigeria. *West Afr J Med* **15:** 11–17.

Astor FC, Ackerman EB, Hanft KL, Sheth SN (2002). Surgical treatment of parotid tumours in the general community hospital. *South Med J* **95:** 1404–1407.

Batsakis JG (2003). Clinical pathology of oral cancer. In: Shah JP, Johnson NW, Batsakis JG, eds. *Oral cancer*. Martin Dunitz Publication: London, UK, pp. 77–129.

Beal KP, Singh B, Kraus D, Yahalom J, Portlock C, Wolden SL (2003). Radiation-induced salivary gland tumours: a report of 18 cases and a review of the literature. *Cancer J* **9:** 467–471.

Carey JF, Singh B, Shah JP (2003). Workup and staging. In: Shah JP, Johnson NW, Batsakis JG, eds. *Oral Cancer*. Martin Dunitz Publications: London, pp. 205–206.

Cwalina P, Skorek A, Narozny W, Stakiewicz C (2002). Pleomorphic adenoma of minor salivary glands. *Otolaryngol Pol* **56:** 737–740.

Edington GM, Sheiham A (1966). Salivary gland tumours and tumours of the oral cavity in western Nigeria. *Br J Cancer* **10:** 425–433.

Ezeanolue BE (1999). Salivary gland neoplasms: a descriptive analysis of the pattern in Enugu. *West Afr J Med* **18:** 179–182.

Fritz A, Percy C, Jack A *et al* (2000). *International classification of diseases for oncology*, 3rd edn. WHO: Geneva, Switzerland.

Hyam DM, Veness MJ, Morgan GJ (2004). Minor salivary gland carcinoma involving the oral cavity or oropharynx. *Aust Dent J* **49:** 16–19.

Jansisyanont P, Blanchaert RH, Ord RA (2002). Intraoral minor salivary gland neoplasms: a single institution experience of 80 cases. *Int J Oral Maxillofac Surg* **31:** 257–261.

Kokemueller H, Eckardt A, Brachvogel P, Hausaman JE (2004). Adenoidcystic carcinoma of the head and neck – a 20 years experience. *Int J Oral Maxillofac Surg* **33:** 25–31.

Kolude B, Lawoyin JO, Akang EE (2001). Salivary gland neoplasms: a 21-year review of cases seen at the University College Hospital, Ibadan. *Afr J Med Med Sci* **30:** 95–98.

Masanja MI, Kalyanyama BM, Simon EN (2003). Salivary gland tumours in Tanzania. *East Afr Med J* **80:** 429–434.

Nardone M, Ferrara G, Nappi O, Di Maria D, Villari G (2002). Pleomorphic adenoma in unusual anatomical sites: case reports and review of literature. *Acta Otolaryngol Ital* **22:** 158–163.

Noda M, Tabata T, Yamane Y (2002). Pleomorphic adenoma of the lungs: report of a case. *Kyobu Geka* **55:** 1073–1076.

Nwawolo CC, Ajekigbe AT, Oyeneyin JO, Nwankwo KC, Okeowo PA (2001). Pattern of head and neck cancers among Nigerians in Lagos. *WAJM* **9:** 304–310.

Odukoya O (1990). Pleomorphic adenoma of the salivary glands in Lagos, Nigeria: clinicopathological analysis of 45 cases. *Cent Afr J Med* **36:** 251–256.

Olasoji HO, Pindiga UH, Ugboko VI, Arotiba GT (1999). A clinicopathologic study of soft tissue tumours of the palate in Nigerians. *Natl Postgrad Med J* **6:** 130–134.

Onuigbo WIB (1978). Lip lesions in Nigerian Igbos. *Int J Oral Surg* **7:** 73–75.

Onyango JF, Awange DO, Wakiaga JM (1995). Oral tumours and tumour-like conditions in Kenya: age, sex and site distribution. *East Afr Med J* **72:** 568–576.

Otoh EC, Johnson NW, Danfillo IS, Adeleke OA, Olasoji HO (2004). Primary head and neck cancers in north-eastern Nigeria. *WAJM* **23:** 305–313.

Sawyer DR, Taiwo EO, Mosadomi O (1985). Papillary cystadenoma lymphomatosum (adenolymphoma) in Nigeria, West Africa. *Cent Afr J Med* **31:** 25–27.

Sousa J, De Sa O (2001). Salivary gland tumours: an analysis of 62 cases. *Indian J Cancer* **38:** 38–45.

Tanigaki T, Shoyama Y, Iwasaki M, Abe Y, Nasamura M, Inoue H (2002). Pleomorphic adenoma in the lung. *Monaldi Arch Chest Dis* **57:** 30–32.

van der Wal JE, Becking AG, Snow GB, van der Waal I (2002). Distant metastases of adenoidcystic carcinoma of the salivary glands and the value of diagnostic examinations during follow-up. *Head Neck* **24:** 779–783.

Wight R, Johnson NW, Giles A (1999). *BAHNO national minimum and advisory head and neck data sets*. Version 1.0, London, UK.