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ORIGINAL ARTICLE Head and Neck Cancer

The epidemiology, treatment, and determinants of outcome of primary head and neck cancers at the Jos University Teaching Hospital

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Abstract

Introduction: This study aims to evaluate the epidemiology, treatment, and factors that determine the outcomes of head and neck cancers (HNC). **Patients and Methods:** Retrospective analytical review of HNC managed at the Jos University Teaching Hospital between May 2007 and April 2017 using the International Classification of Diseases version 10. **Results**: Of 487 head and neck neoplasms, 129 (26.5%) were malignant and 122 health records met the criteria for analysis consisting of 83 (68.0%) males and 39 (32.0%) females aged 13 years to 85 years (mean = 51 years; standard deviation = ±16.0 years). The most common presenting feature was nasal obstruction (n = 47; 38.5%). The most common tumor site was the nasopharynx (n = 34; 27.9%). Mean duration of symptoms was 13.3 months. Alcohol (P = 0.02), cigarette smoking (P = 0.01), and cooking wood smoke (P = 0.01) were associated with advanced tumor stage. Squamous cell carcinoma was the most common histological type. Posttreatment complication rate was 47.5%. Lost to follow-up rate was 55.7%. The lungs were the most common distant metastatic site. The case fatality rate was 18.0%. **Conclusion:** HNC constitutes almost a quarter of head and neck tumors affecting twice the number of males in their sixth decade with nasopharyngeal cancers being the most common in both genders. Several modifiable variables are noted to target appropriate future cancer education for lifestyle modification, screening for early detection and treatment.

Key words: Determinants, epidemiology, head and neck cancer, Jos-Nigeria, outcomes

Introduction

Head and neck cancers (HNC) continue to ravage patients in developing countries aided by poverty and abysmal health-care policies in places like Nigeria.

They are a heterogeneous group of malignancies with different tumor biology, prognosis, and therapeutic response involving the oral and nasal cavities, the pharynx, larynx, paranasal sinuses, the thyroid and salivary glands.[1]

It is reported that two-thirds of the cases of HNC worldwide occur in developing countries and they constitute the fifth most common cancers globally, i.e. accounting for more than 550,000 new cases and 380,000 mortalities annually.[2]

They have several implicated risk factors such as the use of tobacco, ingestion of alcohol, and infection with viruses such as Epstein Barr and human papilloma viruses (EBV and HPV). Other risk factors for HNC are radiation and occupational exposures, socioeconomic status, periodontal disease, vitamin deficiencies, and dietary habits.[3] However, there are variations in the geographical distribution of HNC.

The epidemiologic characteristics and burden of HNC in Nigeria are largely unknown as most available studies on this globally significant health challenge have been hospital based. Previous studies done in Ibadan, Nigeria report 62 cases per year with a preponderance in males.[4]

The primary treatment for most HNC is surgery with or without lymph node dissection depending on the stage of the disease at patient presentation. In some occasions, reconstructive surgery may be a part of the treatment modality. Adjuvant radiotherapy is given postsurgical resection to reduce the risk of locoregional recurrence and improve survival, especially in patients with unfavorable pathological features.[3] Chemotherapy may be used postsurgical resection or in combination with radiotherapy as an adjuvant in radical treatments or as palliative treatment for advanced or recurrent cancers. The treatment of HNCs poses social and psychological challenges to patients as it leaves them disfigured and stigmatized.[3]

As a result of the numerous anatomic sites and subsites from which HNC can arise and the diverse histologic types of tumors in the head and neck region, precise and dependable stratification of these tumors for the purpose of prediction of outcomes has been challenging.[5] However, the outcome of HNC in Nigeria is usually poor due to noted surmountable factors such as poverty, ignorance, late patient presentation, inaccessible and limited health facilities.[4]

Studies have shown that improved knowledge of the epidemiology of different cancers plays a key role in health-care planning and can positively influence policymakers to improve their country's health policy.[6] This study therefore aims to review the epidemiologic features, the treatment and help us to understand the factors responsible for the outcome of treatment of our patients with HNC. It is hoped that the findings from this study will provide information to health policymakers in improving the management outcomes for our patients.

Patients and Methods

Study design and setting

This is a retrospective study of health records of patients with histologically confirmed HNC managed at the Jos University Teaching Hospital from May 1, 2007, to April 30, 2017.

Approval for this study was sought and provided by the Institutional Health Resource Ethics Committee of the hospital.

Procedure

Health records of patients that met the inclusion criteria for HNC in the study period were retrieved manually using standardized codes in the International Classification of Diseases

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10th revision 10. These records were studied for age, gender, occupation, duration of symptoms, exposure to risk factors, diagnosis and stage at presentation, site, histology, treatment, and outcomes of treatment in which the cure and case fatality rates, locoregional, and distant recurrence were studied.

Patients with incomplete health records who refuse admission at time of presentation and those who sought discharge against medical advice were excluded from the study.

A predesigned structured format was used to collect the data.

Statistical analysis

Data generated were analyzed using EPI Info statistical software version 7.2.2.1 (EPI Info, Center for Disease Control, Atlanta, Georgia, 2017).

Descriptive analysis of means and standard deviations was used to summarize the data.

The associations between variables were modeled using logistic regression analysis which was used to calculate odds ratios (OR) and 95% confidence intervals (CIs) after adjusting for multiple potential confounders. $P \leq 0.05$ was considered statistically significant. We present the results in simple descriptive forms.

Results

Demographic characteristics

In the study period, a total of 487 cases of head and neck tumors were managed, of which 129 (26.5%) were malignant. There were 122 health records that met the criteria for analysis. This consisted of 83 (68.0%) males and 39 (32.0%) females giving a male to female ratio of 2.1:1. Patients were aged between 13 years and 85 years (mean = 51.0 years; Standard deviation = ±16.0 years). The peak age incidence was in the sixth decade followed closely by the seventh decade of life [Table 1].

Farming (n = 45; 36.9%) was the most common occupation, especially among males [Table 1].

Table 1: Sociodemographic characteristics of patients (n=122)

	Gender		
	Male	Female	Total (%)
Age group (years)			
10-19	2	0	2 (1.6)
20-29	8	6	14 (11.5)
30-39	7	8	15 (12.3)
40-49	11	6	17 (14.0)
50-59	22	9	31 (25.4)
60-69	20	7	27 (22.1)
70-79	11	2	13 (10.6)
80-89	2	1	3 (2.5)
Total	83	39	122 (100)
Occupation			
Business	13	6	19 (15.6)
Carpenter	1	0	1 (0.8)
Clergy	1	0	1 (0.8)
Civil servant	9	5	14 (11.5)
Farmer	43	2	45 (36.9)
Homemaker	0	24	24 (19.7)
Industrial wood worker	1	0	1 (0.8)
Retired civil servant	6	0	6 (4.9)
Student	8	1	9 (7.4)
Tailor	1	1	2 (1.6)
Total	83	39	122 (100)
Mean		50.9590	
SD		15.9919	
Median		52.0000	
Mode		60.0000	
Minimum		13.0000	
Maximum		85.0000	

SD=Standard deviation

Clinical presentation and site

The most common presenting features were nasal obstruction (n = 47; 38.5%), neck mass (n = 29; 23.8%), hoarseness (n = 25; 20.5%), upper airway obstruction (n = 21; 17.2%), muffled voice (n = 10; 8.2%), and dysphagia (n = 6; 4.9%). Cervical lymphadenopathy with lymph node diameter >6 cm was seen in 17 (14%) patients.

There were 58 (47.5%) Stage II disease presentations and 56 (46.0%) patients in Stage III disease [Figure 1].

The most common tumor sites were the nasopharynx (n = 34; 27.9%), larynx (n = 25; 20.5%), sinonasal (n = 15; 12.3%), and oropharynx (n = 15; 12.3%). The other sites are shown in Table 2.

Table 2: Tumor site distribution by gender

Tumor site	Gender		Total (%)
	Male	Female	
Facial skin	1	0	1 (0.8)
Parotid	10	3	13 (10.7)
Hypopharynx	2	0	2 (1.6)
Larynx	18	7	25 (20.5)
Ear	1	1	2 (1.6)
Maxilla	9	4	13 (10.7)
Sinonasal	9	6	15 (12.3)
Nasopharynx	24	10	34 (27.9)
Oropharynx	8	7	15 (12.3)
Parapharyngeal space	0	1	1 (0.8)
Temporoparietal region	1	0	1 (0.8)
Total	83	39	122 (100)

The most common tumor in both gender was nasopharyngeal cancer followed by laryngeal cancer which had the highest incidence in farmers.

The duration of symptoms ranged from 8 months to 24 months (mean = 13.3 months; standard deviation = ±4.9).

Four (3.3%) patients were seropositive to the human immunodeficiency virus (HIV).

Risk factors

Alcohol was consumed by 49 (40.2%) patients, and 27 (22.1%) were exposed to tobacco, of which 19 (15.6%) smoked cigarettes and 6 (4.9%) inhaled snuff and 2 (1.6%) chewed tobacco. Nineteen (15.6%) patients consumed alcohol and tobacco concomitantly. The duration of alcohol consumption was 4 years to 17 years (mean = 8.1 years; Standard deviation = ±11.7). The duration of cigarette smoking was 3 years to 42 years (mean = 3.4 years; Standard deviation = ±9.0). The cigarette pack-years ranged from 2.25 to 31.5 (mean = 14.7 years; standard deviation = ±8.4).

After adjustment, logistic regression analysis revealed that alcohol consumption alone was associated with advanced tumor stage at presentation (odds ratio [OR] = 1.99; 95% confidence interval [CI] = 1.08–3.69; P = 0.02). Increased

cigarette pack-years was associated with advanced tumor stage (OR = 3.07; 95% CI = 1.32–7.16; $P = 0.01$). In addition, concomitant alcohol and cigarette smoke exposure was also significantly associated with advanced tumor stage at presentation (OR = 1.48; 95% CI = 0.70-3.14; $P < 0.0001$). Alcohol and cigarette smoking were more associated with the development of laryngeal cancers in both males.

There was positive family history of cancer in 9 (7.4%) patients, six of which were unrelated to the primary tumor. A positive family history had no statistical correlation with the stage of tumor at presentation (OR = 0.39; 95% CI = 0.10–1.28; $P = 0.11$).

Periodontal disease occurred in 31 (25.4%) patients and 2 (1.6%) patients were exposed to wood dust, of which one presented with sinonasal cancer. This however did not confer an association with tumor stage (OR = 0.92; 95% CI = 0.47–1.78; $P = 0.8$). Exposure to smoke from cooking wood was noted in 17 (13.9%) patients, but the duration of exposure could not be established. There was a significant statistical correlation between this type of exposure in patients with advanced stage of tumor at presentation (OR = 3.39; 95% CI = 1.29–6.85; $P = 0.01$).

Serological tests for antigens to viruses such as EBV and HPV and tests for tumor biomarkers were not carried out as facilities for analysis are lacking in our hospital.

Histological types

Carcinomas ($n = 113$; 92.6%) were the most common type of malignancies, of which squamous cell carcinoma (SCC) was the most common histological type in 69 (56.6%) patients followed by adenoid cystic carcinoma in 30 (24.6%). Other histological types were lymphoma in 7 (5.7%) patients with non-Hodgkin lymphoma occurring in 4 (3.8%) and sarcoma in 2 (1.6%) patients- [Figure 2].

Treatment and complications

All patients had multimodality treatment consisting of examination under anesthesia and biopsy for histological diagnosis, tracheostomy, surgical excisions with cosmetic repair, and postoperative radiotherapy and/or chemotherapy. A total of 102 (83.6%) patients had surgical procedures of various kinds with maxillectomy (total and medial) being the most common [Table 3]; 21 (17.2%) patients had emergency tracheostomy on account of presenting in upper airway obstruction while 5 (4.1%) had elective tracheostomy in consideration for airway access intraoperatively and also impending upper airway obstruction on commencement of radiotherapy. A posttreatment complication rate of 47.5% was recorded with the most common complication being mucositis in 29 (23.8%). Other complications are shown in Table 4.

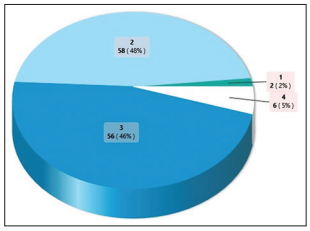

Figure 1: Stage of disease at presentation

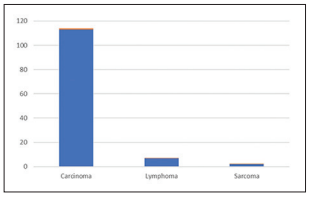

Figure 2: Distribution of histological type

Follow-up

A total of 68 (55.7%) patients never showed up following initial treatment. Those who presented for follow-up were seen between 5 months and 68 months (mean = 22.1 months; Standard deviation = +14.1).

Recurrence was witnessed in 23 (18.9%) patients, of which 17 (14%) were distant spread and 6 (5%) were locoregional. Recurrence was noted in patients who presented with Stages III and IV diseases. The most common site of distant metastasis was the lungs in 11 patients mostly from sinonasal cancers in 4 patients.

A total of 22 (18.0%) deaths were recorded in the study period – 2 (1.6%) from complications of retroviral disease and the others were not recorded.

Discussion

Studies have revealed an increase in the prevalence and overall burden of cancer often referred to as the hidden epidemic, especially in developing countries,[4] with this increase attributable to lifestyle changes as a result of rapid industrialization. The prevalence rate obtained in this study is comparatively lower than reports from other major head and neck institutional studies in Nigeria.[7] A male preponderance is noted in our study which is similar to the findings in Nigeria and other parts of the world.[3,4] This may be explained by the higher rate of alcohol consumption and tobacco exposure in males than females recorded in our study. Smoking and tobacco use with consumption of alcohol is more prevalent in males than females in the Nigerian society.[7] Most studies in Nigeria reveal a peak age incidence in the fourth and fifth decades of life signifying that HNC occurs at a younger age in Africans than the Caucasians,[8] but we report a peak age incidence in the sixth decade. These disparities occur because the studies in this part of the world have been largely hospital based and not community based set to determine national figures.

Farmers are the most affected group in this study. Low socioeconomic status is a known risk factor for HNC[8] as

Table 3: Distribution of type of surgical procedures performed

Surgical procedure	Frequency (%)
Biopsies (excisional/incisional)	7 (6.9)
Laryngectomy	22 (21.6)
Maxillectomy (medial/total)	27 (26.5)
Parotidectomy	13 (12.7)
Pharyngectomy	1 (0.9)
Tracheostomy	26 (25.5)
Tumor excision	6 (5.9)

Table 4: Distribution of posttreatment complications

Complication	Frequency (%)
Alopecia	1 (0.8)
Anemia	10 (8.2)
Facial nerve palsy	2 (1.6)
Facial nerve paresis	1 (0.8)
Fistulae	7 (5.7)
Marginal mand*. Nerve injury	8 (6.6)
Mucositis	29 (23.8)
Nasal synechiae	5 (4.1)
Xerostomia	11 (9.0)

*Mandibular

shown in this study whereby subsistent farmers from the rural areas where health-care facilities are almost nonexistent were the largest group of patients seen. This inaccessible health facility in the rural areas may explain the mean long duration of symptoms before hospital presentation.

Most patients in this study presented relatively in the early stages of disease which is at variance with other studies in which late presentation is a significant factor attributable to poverty, ignorance, inaccessible healthcare, and unwholesome traditional practices.[4,7] However, the time between patient presentation and the commencement of treatment in our study was significantly long enough to warrant tumor spread and advancement in disease stage in some of our patients.

The nasopharynx was the most common affected site irrespective of gender in our study with the oropharynx accounting for a significant number of cancers in females. Other studies report the nasal cavities, paranasal sinuses, and the larynx.[4,9] These inconsistencies in the anatomic sites are however unclear. Differences in cultural practices and exposure to carcinogens among others may be the reasons.

The HIV prevalence rate of 3.3% obtained in our study is lower than other studies.[7] Nonetheless, it reflects the importance HIV plays in the clinical course of HNC.

Negri *et al* in their study stated that family history confers a 1.68-fold increased risk for HNC.[10] This association was not established by our study. Majority of the HNC in our study were of epithelial origin with SCC being the most common followed by adenoid cystic carcinoma. This agrees with most studies from other parts of the country[4,7,8] but contrasts with same in that lymphoma and sarcomas were the second most common type of malignancy whereas adenoid cystic carcinoma was in our study. A large number of the cases of parotid cancers were histologically adenoid cystic carcinoma. This contrasts with a previous study from our center in which mucoepidermoid carcinoma was reported as the most common histological type.[11] This change in pattern is unclear but noted and can be as a result of sociocultural practice changes that may have occurred among the people in our region.

Majority of our patients presented in Stages II and III disease. This is relatively early presentation compared to other reports from Ghana where late-stage presentation was a prominent feature.[4,7,8] However, the delay in acquiring histopathological results in our center is a feature which contributes in worsening patients' disease stage and prognosis. All our patients had surgery following histological confirmation with 75.4% referred for radiotherapy as we do not have a radiotherapy unit in our center of which only three are presently functional in the entire country with the nearest being over 800 km away by road. Most of the patients we lost to follow-up could have fallen into the category sent for radiotherapy and we cannot confirm if they had radiotherapy following referral. Therefore, the case fatality rate of 18.0% may be more than we recorded. The establishment of more functional radiotherapy centers especially for each tertiary hospital in the country is therefore mandatory to improve the treatment of patients with HNC.

The most common reported complication of treatment in our study is mucositis which is keeping with the report of Bentzen and Trotti.[12] It is pertinent to note that there is an increase in the toxic death rates in patients receiving combination chemoradiotherapy.[12] The death rate we recorded could have been as a result of this even though they were not obtained from the patients' health records, a drawback with this retrospective review.

This large lost to follow-up rate in this study is significant enough to skew our obtained results. The true reason for this poor follow-up attitude in our environment requires further study.

Like other retrospective studies, our study is limited by the poor patient health record documentation which might have introduced selection, recall, and miscalculation biases. A community-based prospective study is once again highly recommended in order to obtain national records. Despite the limitations, this study has been able to demonstrate the epidemiological characteristics, treatment, and outcomes of HNC on a regional level and provide information for future similar regional multicenter studies whose findings could increase power for rational generalizability.

Conclusion

HNCs constitute almost a quarter of head and neck tumors affecting twice the number of males in their sixth decade with nasopharyngeal cancers being the most common in both gender. Several modifiable variables are noted to target appropriate future cancer education for lifestyle modification, screening for early detection and treatment.

Prospective community-based studies are encouraged to provide national figures to enable effective planning and execution of a national strategy for cancer management.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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