Clinicopathologic Profile of Sinonasal Neoplasia in Kano, Northwestern Nigeria: A 10-Year Single-Institution Experience

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Abstract

Background: Sinonasal neoplasia comprises approximately 3% of all head-and-neck tumors. However, the incidence of these tumors may be greater in some parts of the world including Asia and Africa. Aim and Objective: The study aimed to review the clinical and histopathological pattern of sinonasal neoplasms in Kano, Nigeria. Materials and Methods: The records of patients managed for sinonasal neoplasia at the Department of Otorhinolaryngology, Aminu Kano Teaching Hospital, Kano, Nigeria, over a period of 10 years were reviewed. Information obtained from the case files included demographic characteristics, tumor characteristics, and clinical information. The data obtained were analyzed using SPSS version 23. Results: A total of 245 patients were reviewed with sinonasal neoplasms. Among these, 168 (68.57%) were males, with a sex ratio (M:F) of 2.18:1. The mean age was 40.2 ± 18.9 years. Malignant sinonasal neoplasm constituted 55.92% of the sinonasal neoplasia, with peak age at the fifth decade. Squamous cell carcinoma was the most common histological subtypes seen in 50.36% of the patients. Inverted papilloma was the most common benign sinonasal neoplasia (42.59%). The most common symptom presented by the patients was nasal obstruction (77.55%), mostly presented within 6 months of onset of symptoms (63.67%), and farmers were the predominant (27.76%). The most common treatment modality was surgical extirpation (54%), and most of the patients presented with Stage IV disease (88%). The site of tumor was found to statistically correlate with the type of tumor among the patients (P ≤ 0.0001), whereas the type of tumor and site of tumor correlated significantly with the duration of symptoms before the presentation. Conclusion: Malignant sinonasal disease is the predominant sinonasal neoplasm in this environment, and most of the patients presented with advanced disease.

Keywords: Duration of symptoms, histology, outcome, sinonasal neoplasia

Résumé

Contexte: La néoplasie des muqueuses nasales représente environ 3% de toutes les tumeurs de la tête et du cou. Cependant, l’incidence de ces tumeurs peut être plus importante dans certaines régions du monde, notamment en Asie et en Afrique. But et Objectif: L’étude visait à examiner le schéma clinique et histopathologique des néoplasmes sinonasaux à Kano, au Nigéria. Matériels et Méthodes: Les dossiers des patients pris en charge pour une néoplasie sinon nasale au département d’otorhinolaryngologie de l’hôpital universitaire Aminu Kano de Kano, au Nigéria, ont été examinés pendant 10 ans. Les informations obtenues à partir des dossiers incluent les caractéristiques démographiques, les caractéristiques de la tumeur et les informations cliniques. Les données obtenues ont été analysées avec SPSS version 18. Résultats: Un total de 245 patients ont été examinés avec des néoplasmes sinonasaux. Parmi eux, 168 (68,57%) étaient des hommes avec un sex-ratio (M:F) de 2,18: 1. L’âge moyen était de 40.2 ± 18.9 ans. La tumeur maligne nasale est la plus fréquente avec 55,92%, un âge maximum à la 5ème décennie et le carcinome épidermoïde étant le sous-type histologique le plus commun (50,36%). Le symptôme le plus souvent présenté par les patients étant une obstruction nasale (77,55%), présentée le plus souvent dans les six mois suivant l’apparition des symptômes (63,67%) et les agriculteurs prédominants (27,76%). La modalité de traitement la plus courante était la disparition chirurgicale (54%) et la plupart des patients présentaient une maladie de stade IV (88%). Il a été constaté que le site de la tumeur était statistiquement corrélé avec le type de...
tumeur chez les patients (valeur $P \leq 0.0001$), tandis que le type de tumeur et le site de la tumeur étaient en corrélation significative avec la durée des symptômes avant la présentation. **Conclusion:** la néoplasie maligne nasale prédominante était prédominante dans cet environnement et, même si nos patients présentaient relativement tôt une maladie, la maladie avancée était la principale constatation.

**Mots-clés:** Néoplasie sinon nasale, durée des symptômes, issue, histologie

**INTRODUCTION**

Sinonasal region is associated with histological diversity and rarity of individual tumor types. The nose and paranasal sinuses though occupying a relatively small anatomical space are the sites of origin of some of the more complex, histologically diverse group of tumors in the entire human body. The region contains different kinds of tissues such as the epithelial (squamous, neuroendocrine, and olfactory) and the mesenchymal (bone, cartilage, muscle, and vascular) ones, and all of these may carry the risk for a variety of tumoral differentiation.

Sinonasal disease is one of the most common clinical head-and-neck pathologies. However, majority of sinonasal lesions are inflammatory with neoplasms comprising approximately 3% of all head-and-neck tumors.\(^1\) Benign neoplasia of the nose and paranasal sinuses is relatively common.\(^2\) Malignancy of the sinonasal region is rare, with an annual incidence of 1/200,000.\(^3\) However, the incidence of these tumors may be greater in some parts of the world including Asia and Africa and especially Japan.\(^4\)

Most of the sinonasal tumors arise from the maxillary sinus and are predominantly squamous cell carcinoma (SCC).\(^5-7\) However, every form of malignant tumor can be encountered in the nose and sinuses, each with a distinct natural history and range of behavior, with malignant melanoma having the worst outcome, whereas esthesioneuroblastoma and chondrosarcoma have the best prognosis.\(^8-11\) On the other hand, patients with the two most common histologic types, adenocarcinoma and SCC, have an intermediate survival rate, patients with adenocarcinoma having a better disease-specific survival than those with SCC.\(^12\)

Nasal obstruction is the most common symptom of sinonasal tumors. Other symptoms include nasal discharge, epistaxis, and disturbance of smell.\(^13\) Malignant sinonasal tumors usually present as an advanced disease because early diagnosis is difficult. Surgical extirpation remains the mainstay of treatment, but its relative therapeutic value compared with alternative treatments is controversial.\(^14\)

Like in other parts of the world, sinonasal tumors are a rare occurrence in Nigeria.\(^15-17\) However, several studies in the country have reported the nose and paranasal sinuses as the most commonly reported sites of head-and-neck cancer after nasopharynx.\(^18-21\)

There is a dearth of literature on sinonasal tumors in Kano, being the most populated state in Nigeria. This study aims to describe the clinical and histopathological pattern of sinonasal neoplasms in this environment and to report possible changes in epidemiological trends.

**MATERIALS AND METHODS**

This was a retrospective descriptive study of patients managed for sinonasal neoplasia at the Department of Otorhinolaryngology, Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria, over a 10-year period between January 2007 and December 2017. Ethical approval was sought and obtained from the Ethical Review Committee of AKTH, Kano, Nigeria.

All the patients included had clinical and histopathological confirmation of the disease. Patients who were excluded from this study included those whose case records were either not found or do not have complete clinical and histological information. Patient data were collected from the case files and records of the Department of Histopathology, AKTH, Kano.

Information obtained from the case files included demographic characteristics such as age, sex, and occupation. Clinical information included presenting symptoms, duration of symptoms, examination findings at presentation, tumor characteristics (site, stage, and histological subtype), radiological investigations done, interval between diagnosis and intervention, and type of intervention.

Data were entered into spreadsheet and analyzed using SPSS version 23 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were summarized as frequencies and percentages and presented as tables.

**RESULTS**

A total of 263 patients with sinonasal neoplasia were seen and managed in the Otorhinolaryngology Department of AKTH over a 10-year period between 2007 and 2017. Of the 263, 245 were reviewed and included in the study.

There were 168 males (68.57%) and 77 females (31.43%), with a male: female sex ratio of 2.18:1. The age ranged from 1 year 6 months to 92 years, with a mean age of 40.2 years, median age of 38 years, and standard deviation of ± 18.9 years. The peak age of occurrence of sinonasal neoplasia is in the third to fourth decade, followed by in the fifth to sixth decade. The least age of occurrence is in those aged 80 years and above.

Malignant sinonasal neoplasia constituted 55.92% of all the sinonasal neoplasia seen within the period under review. The right nasal cavity was the most affected by sinonasal neoplasia (60.82%), with bilateral affectation of the nasal cavities constituting only 1.22% of all the patients.
Majority of sinonasal neoplasia were restricted to the nasal cavity (38.78%); however, the most common paranasal sinus affected was the maxillary sinus (22.04%), with more than one sinus been involved in up to 26.94% of the patients [Table 1].

The most common symptom presented by the patients with sinonasal neoplasia was nasal obstruction (77.55%), followed by epistaxis (34.69%). On physical examination, the most common finding was nasal mass (91.84%), followed by proptosis (26.53%) [Table 2]. The duration of symptom at presentation of patients with sinonasal neoplasia was mostly 6 months and below (63.67%), and also, 73.19% of the patients with malignant sinonasal neoplasia presented 6 months and below from the onset of their symptoms.

Inverted papilloma was the most common benign sinonasal neoplasia (42.59%), followed by hemangioma (12.96%). The mean age of occurrence of benign sinonasal neoplasia is 38.19 years, with the peak occurrence in the third decade [Table 3]. SCC accounted for 50.36% of malignant sinonasal neoplasia, the mean age of occurrence of malignant sinonasal neoplasia is 41.69 years, and its peak age of occurrence is in the fifth decade [Table 4].

Type of tumor (malignant or benign) and tumor site were found to be statistically associated with duration of symptoms before the presentation of our patients with sinonasal neoplasia ($P \leq 0.0001$ and 0.032, respectively). However, age, sex, and occupation had weak associations [Table 5]. Furthermore, site of tumor was found to have a statistically significant association with the type of tumor (benign or malignant) among our patients with sinonasal neoplasia ($P \leq 0.0001$) [Table 6]. Multivariate logistic regression analysis done revealed none of the selected factors to be a statistically significant determinant of poor outcome among our patients with malignant sinonasal tumors [Table 7].

Surgical excision was the modality of treatment adopted for 54% of our patients with sinonasal neoplasia, with up to 13% having chemoradiotherapy as the stand-alone treatment [Figure 1]. Plain radiograph was the only radiological investigation done by most of the patients in this series (61.53%), and up to 19.59% had no radiological examination of their disease [Figure 2]. Majority of our patients with sinonasal neoplasia were farmers (27.76%) [Figure 3]. Our patients with sinonasal neoplasia mostly presented with Stage IV disease (88%), with no single patients presenting with Stage 1 disease [Figure 4]. One hundred and eight (44.08%) of our patients with sinonasal neoplasia were still on follow-up as at the time of this study, and 90 (36.73%) of them were successfully treated and discharged [Figure 5].

### DISCUSSION

Neoplasms of the nose and paranasal sinuses are rare, usually seen at advanced stage and involve epithelial and nonepithelial tissues of the nose and paranasal sinuses. The mean age of occurrence of these neoplasms in our patients agrees with that reported by Chukwuezi and Nwosu in Owerri, Nigeria.\[15\] Reports from similar studies in Asia and Nigeria showed a preponderance of male patients with sinonasal neoplasm in alignment with our finding.\[15,22-24\] The youngest patient in our series was 1 year 6 months having embryonal

### Table 1: General characteristics of the study population ($n=245$)

| Age group (years) | Number of patients (%) |
|------------------|------------------------|
| 0-9              | 7 (2.86)               |
| 10-19            | 25 (10.20)             |
| 20-39            | 92 (37.55)             |
| 40-59            | 65 (26.53)             |
| 60-79            | 51 (20.82)             |
| 80 and above     | 5 (2.04)               |

| Sex              | Number of patients (%) |
|------------------|------------------------|
| Male             | 168 (68.57)            |
| Female           | 77 (31.43)             |

| Type of tumor     | Number of patients (%) |
|-------------------|------------------------|
| Benign            | 107 (43.67)            |
| Malignant         | 138 (56.33)            |

| Side of tumor     | Number of patients (%) |
|-------------------|------------------------|
| Right             | 149 (60.82)            |
| Left              | 86 (35.10)             |
| Bilateral         | 3 (1.22)               |
| Midline           | 7 (2.86)               |

| Site of tumor     | Number of patients (%) |
|-------------------|------------------------|
| Nasal             | 95 (38.78)             |
| Maxillary         | 54 (22.04)             |
| Ethmoidal         | 29 (11.84)             |
| Sphenoidal        | 1 (0.41)               |
| Multiple          | 66 (26.94)             |

Mean=40.2, Median=38, SD=±18.9, Male:female=2.18:1. SD=Standard deviation

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### Table 2: Symptoms and signs of sinonasal neoplasia

| Symptom           | Number of patients (%) |
|-------------------|------------------------|
| Nasal obstruction | 190 (77.55)            |
| Epistaxis         | 85 (34.69)             |
| Nasal growth      | 83 (33.88)             |
| Nasal discharge   | 76 (31.02)             |
| Facial swelling   | 47 (19.18)             |
| Orbital protrusion| 32 (13.06)             |
| Headache          | 20 (8.16)              |
| Facial pain       | 16 (6.53)              |
| Epiphora          | 13 (5.31)              |
| Loss of vision    | 11 (4.49)              |
| Others            | 49 (20.01)             |

| Physical sign     | Number of patients (%) |
|-------------------|------------------------|
| Nasal mass        | 225 (91.84)            |
| Proptosis         | 65 (26.53)             |
| Cheek swelling    | 31 (12.65)             |
| Blindness         | 15 (6.12)              |
| Neck node         | 13 (5.31)              |
| Others            | 29 (11.85)             |

Mean=40.2, Median=38, SD=±18.9, Male:female=2.18:1. SD=Standard deviation
rhabdomyosarcoma, similar to what Wang et al. reported in their series from China. [25] Malignant sinonasal tumors are more common in our review, similar to earlier reports by Fasunla and Lasisi in Ibadan, Nigeria, and Bist et al. in India. [7, 26] However, most other series across the globe with Nigeria inclusive reported a preponderance of benign neoplasm. [15, 22, 25, 27-31]

This could be explained by the fact that majority of the series included nonneoplastic sinonasal masses as benign lesions. The right nasal cavity was most involved in our study, similar to other studies in the country. [7, 15, 22, 24, 29-31] However, Bakari et al. [27] in Kaduna, Nigeria, reported mostly bilateral affection in their review. This is because inflammatory polyp, which is commonly bilateral, formed a major part of their series. Wang et al. reported the most common site of tumor in their study to be nasal and the most frequent sinus involved to be maxillary sinus similar to what was obtained in our study. [25] Similarly, maxillary sinus has been severally reported as the most common sinus affected in many other studies. [22, 24, 29, 31-33] As mostly reported by studies, nasal obstruction was the most common presenting symptom among our patients. [7, 15, 22, 26-29, 35]
On the contrary, however, Poursadegh et al. in Iran reported facial swelling as the most common symptom in their series.[32] The most common physical finding of nasal mass among our patients is similar to reports by other studies.[26,33] Majority of our patients reported early after the onset of the symptoms. This is Contrary to the reports by Fasunla and Lasisi in Ibadan, Nigeria, and Bist et al. in India whose patients presented between 8 months to 1 year from the onset of the symptoms.[7,26] This could mean an improved awareness among our patients or aggressiveness of their disease necessitating early presentation.

Inverted papilloma was the most common benign tumor among our patients, similar to the findings by Wang et al. and Iseh and Aliyu.[23,25] However, many studies from the Indian subcontinent reported hemangioma as the most common benign sinonasal tumor.[28-30,35] Sivalingam et al. in India reported extranasopharyngeal angiofibroma as most common, whereas Chukwuezi and Nwosu in Owerri, Nigeria, reported hemangioma.[15,22] The peak age of occurrence of benign sinonasal tumor in our review was in the third decade of life. Singh et al., Shirazi et al., and Iseh and Aliyu reported similar findings.[23,29,31]

Studies worldwide are in agreement on SCC being the most common malignant sinonasal tumor, and the finding of our study is not different.[5,7,15,22-25,28-30,32-35] The sinonasal SCC can be classified into keratinizing SCC (more common comprising more than 60%), nonkeratinizing SCC, and atypical variants
such as basaloid, verrucous, and papillary. Majority of our patients had keratinizing, followed by nonkeratinizing SCC. However, variants such as verrucous, papillary, and spindle cell carcinomas were observed in very few patients, and only one case of undifferentiated carcinoma was noted in our series. All our patients with variant of SCC were treated with radiotherapy. The peak age of occurrence for malignant sinonasal tumors in our study was in the fifth decade of life similar to other reviews. However, some other studies reported slightly higher peak ages. This could be explained by the relatively lower life expectancy in Nigeria, which is currently put at 55.2 years according to the United Nations Population Fund.

Most of our patients had only surgical excision of their tumor, similar to what Lathi et al. and Agarwal et al. reported. On the contrary, the most common modality of treatment reported by others was combined modality. This could be because their series involved only patients with malignant sinonasal disease with better availability and affordability of other modalities of treatment, for example, radiotherapy in their study area.

Various types of surgeries were offered to our patients depending on whether it was benign or malignant. Most cases of benign lesions were excised through intranasal or lateral rhinotomy approaches and occasionally endoscopic excision for amenable tumors. Partial maxillectomy via lateral rhinotomy, total maxillectomy via Weber-Fergusson incision and postoperative radiotherapy were the treatment modalities used for most malignant cases. Majority of our patients with inverted papilloma had bulky lesions and thus had lateral rhinotomy and medial maxillectomy to ensure complete resection of the lesion. However, few patients with inverted papilloma having small lesions had endoscopic medial maxillectomy. Most of our patients with malignant sinonasal diseases had tumor excision through lateral rhinotomy, with four patients having total maxillectomy, all with postoperative radiotherapy. Even though many of the patients would have benefited from total maxillectomy, majority objected due to functional and cosmetic reasons. All the patients who had total maxillectomy had rehabilitation with prosthesis in collaboration with the maxillofacial surgeons. Only two of our patients had orbital exenteration due to tumor extension to the orbit and consequent loss of vision.

Plain radiograph was the only radiologic investigation in the majority of our patients, contrary to what was reported by Bist et al. in India where computed tomography scan was the predominant investigation in their series. This is because the gold standard radiological tool for assessing sinonasal neoplasm, i.e., computed tomography with or without magnetic resonance imaging even though available, is not readily affordable for most of our patients in the subregion. Majority of our patients were farmers, as similarly reported by Lathi et al. in India. The use of pesticides and other chemicals on the farm could be a predisposing factor; however, factors that predispose our patients to the disease were yet to be identified as also explained by Fasunla and Lasisi in their series.

Advanced disease was the most common presentation among our patients, as similarly reported worldwide. Even though majority of our patients are still on follow-up, the overall 5-year survival of the patients cannot be ascertained due to the retrospective nature of the review. However, based on our current data, the mortality rate per 1000 of patients with sinonasal neoplasia was 32.

The type and site of tumor among our patients were found to be significantly related to how early or late our patients present to the hospital. Patients with malignant disease who naturally were more aggressive often present earlier. In the same note, site of tumor was found to correlate well with the type of tumor among our patients. Malignant tumors more often affect multiple sinuses. The use of pesticides and other chemicals on the farm could be a predisposing factor; however, their multivariate analysis revealed local tumor control and tumor stage to have significant prognostic value. Other similar studies that did multivariate analysis revealed sex, age, and tumor stage to impact on survival of patients. The retrospective design of our study, incomplete tumor staging, poor follow-up, and poor documentation might be responsible for our findings.

**Conclusion**

Malignant sinonasal disease is the predominant sinonasal neoplasm in this environment, and most of the patients presented with advanced disease. Sinonasal neoplasm is relatively common among farmers in our study, whether there is a causal relationship between farming and sinonasal neoplasm will require a longitudinal study, as this retrospective research cannot establish that. Proper documentation, accurate clinical and radiologic staging of cancers, proper follow-up, and provision of adequate investigative and treatment facilities in our hospitals will go a long way in assessing 5-year overall and disease-free survival of our patients and ultimately improved outcome of management among our patients with sinonasal neoplasm, especially malignant.
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Conflicts of interest
There are no conflicts of interest.

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