

Original Research Article

Clinical, Radiological and Histological Characteristics of Benign Non-Odontogenic Tumours

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Abstract: The aim of this study is to determine the sociodemographic characteristics, as well as the clinical, radiological, histopathological, therapeutic and prognostic aspects of benign non-odontogenic tumours (BNOTs) in the Chadian context. This was a descriptive and analytical cross-sectional study with prospective data collection, conducted between 2023 and 2025 (3 years) in the Department of Dentistry, Oral and Maxillofacial Surgery at the Renaissance University Hospital in N'Djamena for specimen collection and data gathering, and at the Department of Pathological Anatomy and Cytology at Cheikh Anta Diop University in Dakar for the histological analysis of surgical specimens. The study included patients presenting with a benign non-odontogenic tumour confirmed by histopathological examination and who had received treatment. The variables studied were sociodemographic, clinical, radiological, histopathological, therapeutic and prognostic. Benign non-odontogenic tumours accounted for 26% of all benign maxillomandibular tumours. The mean age was 36.32 ± 21.55 years, with a sex ratio of 1.5. The majority of patients resided in the province of N'Djamena (64%). The middle socio-economic class was affected in 64% of cases. Painless swelling was the predominant symptom (100%). The maxilla was affected in 44% of cases. Mixed forms accounted for 40% of the lesions observed based on radiographic characteristics. Surgical excision of the tumour mass was performed in 56% of patients. Ossifying fibroma was the most common histological type (20%). The outcome was favourable in 92% of cases. One case of death and one case of oro-sinus communication were recorded. The mean follow-up period was 8 ± 5 months. The correlation between clinical and radiological characteristics and histological findings was statistically significant ($p=0$). This study shows that benign non-odontogenic tumours are relatively common. They are diverse and varied. The diagnostic approach requires a correlation between clinical, radiological and histological data. Management is focused on surgery.

Keywords: Benign Non-Odontogenic Tumours, Surgery, Chad.

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INTRODUCTION

Non-odontogenic benign tumours (NOBTs) develop in the maxilla and/or mandible, the oromaxillofacial soft tissues, or the salivary glands (Faure A. *et al.*, 2021). They account for just over 13% of all maxillomandibular lesions (Brygo A. *et al.*, 2006). These lesions are classified according to their origin (osseous, cartilaginous, fibrous, vascular, lipomatous, nervous, lymphoid, muscular, teratoma) and their

maxillomandibular specificity (cemento-ossifying, giant cell-rich, histiocytosis) (Brygo A *et al.*, 2006).

Their aetiologies, like those of tumours in general, remain undefined. However, a family history of tumours, advanced age, human papillomavirus infection, poor oral hygiene, and tobacco and alcohol consumption are the most frequently identified risk factors (Coppola N. *et al.*, 2022, Smail K. 2022).

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Management is surgical (Colnot N. *et al.*, 2024, Wang D.C. *et al.*, 2021). In Chad, lack of access to healthcare, a shortage of technical facilities and qualified specialists make these tumours a real public health problem.

The aim of this study is to determine the sociodemographic characteristics, as well as the clinical, radiological, histopathological, therapeutic and prognostic aspects of non-odontogenic lesions in the Chadian context.

PATIENTS AND METHODS

This was a descriptive and analytical cross-sectional study involving prospective data collection, carried out from 2023 to 2025 (3 years) at the Department of Dentistry, Oral and Maxillofacial Surgery at the La Renaissance University Hospital in N'Djamena for specimen collection and data gathering, and at the Laboratory of Pathological Anatomy and Cytology at Cheikh Anta Diop University in Dakar for the histological analysis of surgical specimens. The study targeted patients with a benign non-odontogenic tumour confirmed by a pathological examination. Those who agreed to participate in the study by providing their written and signed consent were included.

Surgical specimens were obtained using two procedures:

- **Biopsy:** the choice of sampling site is determined by the topography of the tumour lesion. The sample is taken from an area straddling the tumour and the presumed healthy tissue. The incision is superficial or deep, depending on the nature of the tumour, the anatomical site chosen and the objective. The direction of the thread depends on the practitioner's choice.
- **Equipment:** No. 15 scalpel blade, dental syringe, haemostatic forceps, bipolar forceps for electrocoagulation, Faraboeuf retractors, Gilis hooks, needle-holding forceps, dissection scissors, suture scissors.
- **Supplies:** Sterile gloves, suture thread, specimen bottle with fixative (formalin), sterile swab, cartridge of anaesthetic solution with vasoconstrictor for local infiltration.
- **The surgical specimen from the excision:** The specimen is obtained from the total excision of the tumour lesion.

The histological examination is carried out by pathologists, who examine:

- **Macroscopic Features:** The surgical specimens are divided into fragments and placed in cassettes.
- **Microscopic Findings:** The histological slides prepared from the paraffin blocks are stained and examined under a microscope to identify diagnostic features.

To ensure the reliability of histological examination results, and given the distance between N'Djamena and Dakar, surgical specimens are sent to the Department of Anatomical and Cytopathology at the Faculty of Medicine of Cheikh Anta DIOP University in Dakar for analysis in accordance with the following procedure: the surgical specimen is placed in a box designed for preservation with a fixative solution (formalin).

A form is completed containing clinical and anatomical details, as well as the nature of the specimen (surgical specimen).

The researcher is responsible for fixing the tissue sample, completing the data collection form, and transporting the specimens to the laboratory.

A separate survey form was completed by the department staff for each patient. This form included socio-demographic data (frequency, sex, age, socio-economic status), clinical data (reason for consultation, site, age of the tumour prior to the first consultation, clinical characteristics), paraclinical data (type of imaging, characteristics of radiological images, results of the histopathological examination), therapeutic data (surgical procedure), data on disease progression (course of the disease, duration of medical follow-up), and analytical data (correlation between clinical and radiological characteristics and histological findings).

Quantitative variables were described using their mean and standard deviation, and then converted into qualitative variables by grouping them into clearly defined intervals.

Ethics: Patients were informed of the purpose of this study so that they could make their own independent decision. Written and signed consent was obtained from each patient in accordance with the recommendations of the ethics committees of the Centre Hospitalier Universitaire la Renaissance and Cheikh Anta Diop University. Data collection was carried out anonymously and the strict confidentiality of all information obtained was ensured.

RESULTS

During the study period, 96 benign maxillomandibular tumours were identified and confirmed by histological examination, of which 25 were non-odontogenic, representing a prevalence of 26%. The population comprised 15 men (60%) and 10 women (40%), giving a sex ratio (M/F) of 1.5. The mean age of the population was 36.32 ± 21.55 years, with a median of 45 years. The minimum age was 1 year and the maximum 67 years. The peak frequency was in the 46–50 age group (16%).

Sixteen of the 25 patients studied resided in the province of N'Djamena (64%) [Table I].

Table I: Distribution of patients by place of residence

Place of residence	Frequency	Percentages
N'Djamena	16	64
Western Logone	3	12
Eastern Logone	2	8
Ouaddai	1	4
Kanem	1	4
Lac	1	4
Neighbouring Countries	1	4
Total	25	100

Sixty-four per cent of the sample were from the middle class [Figure 1].

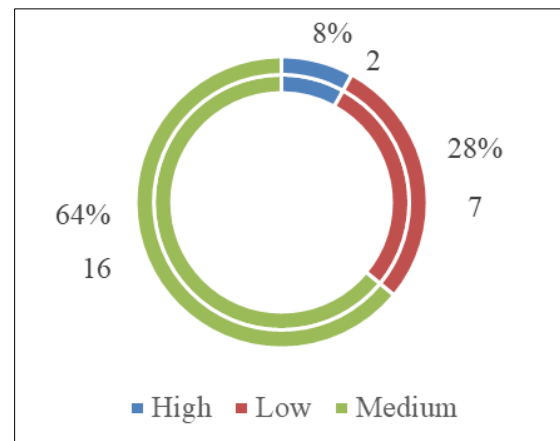


Figure 1: Distribution of the population by socio-economic status

A painless swelling was the reason for consultation in all 25 patients studied (100%).

Forty-four per cent of the lesions were located in the maxilla, with 24% in the right maxilla [Table II].

Table II: Distribution of NOBTs by site

Seats	Frequencies		Percentages	
Right jaw	6	11	24	44
Left jaw	4		16	
Both sides of the upper jaw	1		4	
Left side of the lower jaw	3		12	
Right cheek	1		4	
Left cheek	1		4	
Right side of the face	1		4	
Forehead, jaw and nose	1		4	
Right parotid gland	1		4	
Upper lip	1		4	
Palate	1		4	
Oral floor	2		4	
Right submandibular	1		4	
Bilateral mandibular	1		4	
Total	25		100	

The tumours were aged one year or more but less than three years in 44 per cent of cases, and aged

three years or more but less than five years in 28 per cent of patients [Table III].

Table III: Distribution of TBNO patients by age at first consultation

The age of the tumour at the first consultation	Frequency	Percentages
< 1 year	6	24
[1-3 years [	11	44
[3-5 years [	7	28
≥ 5 years	1	4

No diagnostic hypothesis was established in 52 per cent of patients seen for TBNO [Table IV].

Table IV: Distribution of patients according to their clinical characteristics

Characteristics of radiological images of TBNO	Frequency	Percentages
Mixed	10	40
Hypodense, smooth, well-defined mass	5	20
Lytic	3	12
Mass: T1 (intermediate signal) / T2 (hyperintense signal)	3	12
Benign bone growth	2	8
Nodular lesion with sharp margins	1	4
No imaging planned	1	4
Total	25	100

A facial CT scan was performed in 44 per cent of patients (n=11), followed by a panoramic dental X-ray in 20 per cent (n=5). Ultrasound and MRI were each

performed in 12% of cases (n=3), dental CT in 8% (n=2), and in 4% of cases (n=1), no imaging was considered.

Radiologically, mixed forms accounted for 40% of the lesions observed [Table V / Figure 2].

Table V: Distribution of radiographic characteristics of TBNO

Clinical features (Diagnostic criteria)	Frequency	Percentages
Unspecified diagnostic hypotheses	13	52
Dermoid cyst	3	12
Pleomorphic adenoma of the right parotid gland	2	8
Epulis	2	8
Pleomorphic adenoma of the right submandibular gland	1	4
Lipoma	1	4
Odontoma	2	8
Cherubism	1	4
Total	25	100

Table VI: Breakdown of patients by surgical procedures performed

Surgical procedure	Frequencies	Percentages
Surgery to remove the tumour mass	14	56
Enucleation	6	24
Total parotidectomy with preservation of the facial nerve	2	8
Enucleation of the tumour followed by Bichat's pad plasty	1	4
Osteotomy with resection of the coronoid process and the outer cortical bone	1	4
Osteotomy and bone remodelling of the fronto-naso-maxillary bones, plus harvesting of a parietal bone graft, plus grafting of the external wall of the frontal sinus	1	4
Total	25	100

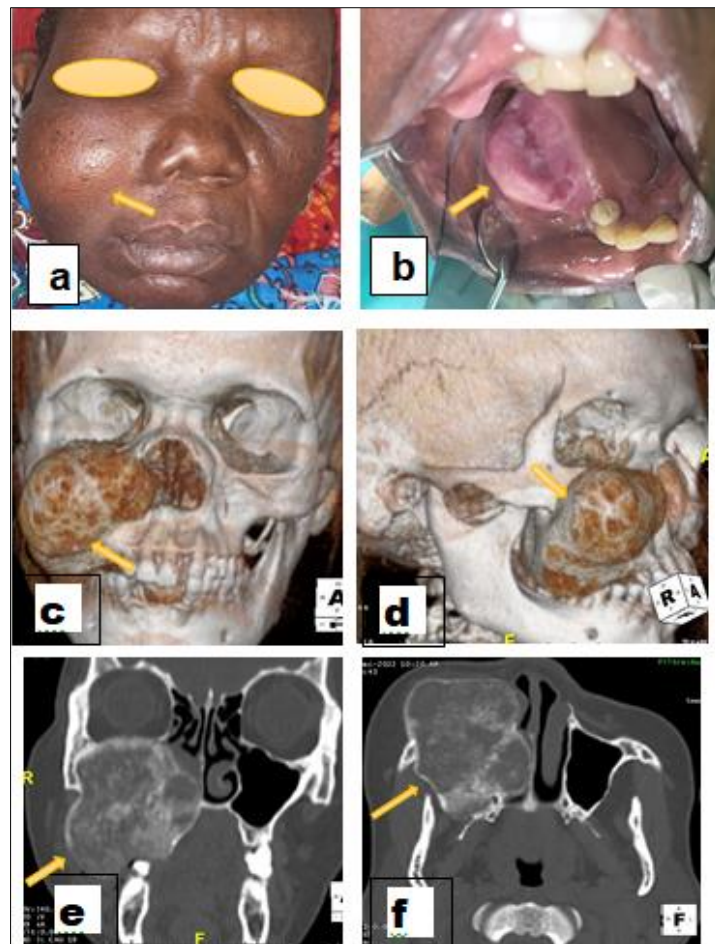


Figure 2: Ossifying fibroma of the right maxilla in a 47-year-old woman. a – Exobuccal view; b – Endobuccal view; c-d-e-f (CT scan): c-d-3D reconstruction (anterior-posterior and 15 o'clock views), e-coronal section; f-axial section

Surgery to remove the tumour mass was performed in 56 per cent of patients (n=14), followed by enucleation in 24 per cent (n=6) [Table VI/Figure 3].

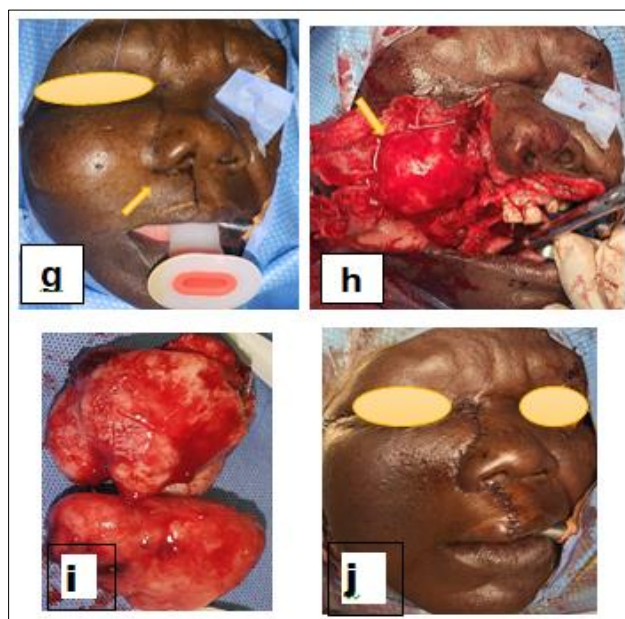


Figure 3: Ossifying fibroma of the right maxilla in a 47-year-old woman (pre- and post-operative images) g-Marking out the paranasal incision; h-intraoperative excision; i-surgical specimen; j-immediate post-operative period

Ossifying fibroma accounted for 20 per cent of the tumours recorded [Table VII / Figure 4].

Table VII: Distribution of patients by histological type

	No. Histological types	Frequencies	Percentages
1	Ossifying fibroma	5	20
2	Dermoid cyst	3	12
3	Pleomorphic adenoma of the right parotid gland	2	8
4	Epilus (1 inflammatory, ulcerated epulis and 1 inflammatory epulis with a regenerative blastema)	2	8
5	Conventional lipoma	2	8
6	Cystic lymphangioma	2	8
7	Pleomorphic adenoma of the right submandibular gland	1	4
8	Fibrous dysplasia	1	4
9	Hamartoma	1	4
10	Naso-palatal cyst	1	4
11	Pseudotumourous abscess	1	4
12	Osteochondroma	1	4
13	Eccrine poroma	1	4
14	Benign giant cell tumour of bone	1	4
15	Abnormal bone tissue associated with a reactive lymph node	1	4
Total		25	100

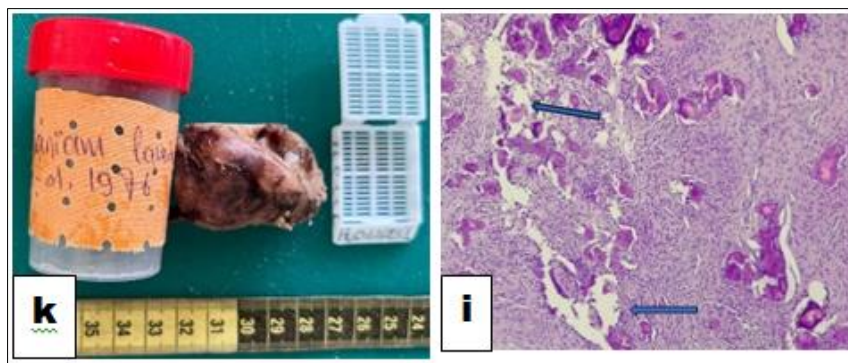


Figure 4: Ossifying fibroma in a 47-year-old female patient (histological analysis); k-Macroscopy: Specimens included in three cassettes at the laboratory; i-Microscopy: Benign tumour proliferation well circumscribed by a fibrous capsule, consisting of non-atypical fibroblasts intermingled with calcified structures composed of varying amounts of osteoid or bone and cement-like calcifications

The post-operative course was uneventful for 23 subjects (92 per cent). One case of oro-sinus communication (OSC) (4 per cent) and one case of death (4 per cent) were recorded.

The mean follow-up period was 8 ± 5 months. The peak frequency was observed in the 12–15-month interval (64%), followed by the 0–3-month interval (24%) [Figure 5].

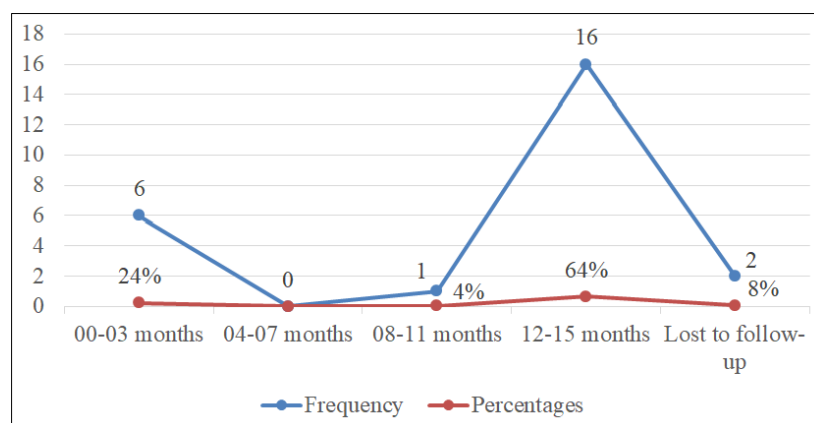


Figure 5: Distribution of the population by duration of post-operative follow-up

The correlation between clinical and radiological characteristics and histological types: Chi-squared = 194.7917; $P = 0$. The probability value $P = 0$ is less than 0.05.

DISCUSSION

The prevalence of benign non-odontogenic tumours (BNOTs) amongst the total of 96 benign maxillomandibular tumours recorded during the study period (26%), is not representative of the Chadian population in terms of non-odontogenic tumour lesions, but nevertheless highlights the increasing prevalence of this condition in hospital consultations, as it is approximately double the rates reported in the literature (13%) (Brygo A. *et al.*, 2006). However, Hassanein AG and al. found different results (66.7 per cent non-odontogenic tumours and 33.3 per cent odontogenic tumours) (Hassanein AG *et al.*, 2022). The sex ratio of 1.5 favours males, even though TBNOs do not have a gender preference. The patients' ages range from 1 to 67 years, with a mean of 36.32 ± 21.55 years. The median age of 45 explains the peak in incidence in the 46–50 age group. This finding contradicts those of Kouamé AP *et al.*, who reported a 62.50 per cent prevalence in females and a mean age of $30.72 \text{ years} \pm 12.73$ (Kouamé AP *et al.*, 2023). This difference shows that these lesions can occur at any age, with no gender preference. The majority of patients live in N'Djamena Province (64 per cent). Proximity, a lack of financial resources and a lack of information are factors that explain this high figure for N'Djamena province. The middle socio-economic class accounts for the majority of the population studied (64 per cent), followed by the lower classes and the upper socio-economic class, respectively. The middle class, comprising mainly employees and their families, benefits from appropriate healthcare provision, whilst other sections of the population face very different realities. Disadvantaged social classes struggle to access curative care, whilst the wealthy enjoy privileged and seamless access to preventive care.

The absence of clinical symptoms in all patients (100 per cent), compared with the extent of the radiographic findings, would explain why they sought medical attention for a painless swelling.

The maxilla is the most common site for TBNOs (44 per cent), with a preference for the right side (24 per cent). Histologically, the maxilla is a less dense bone with a thin cortical layer compared with the mandible, which is a denser bone with a thick cortical layer and greater vascularisation; this would explain why the maxilla is more vulnerable to tumour-related conditions than the mandible. The high tumour age index at the first appointment in the age groups aged one year or over but under three years (44 per cent) and 3 years or more but less than 5 years (28 per cent) is linked to the financial difficulties and socio-cultural barriers faced by most families. More than half of the patients were not given a provisional diagnosis before undergoing further

investigations. TBNOs develop in various tissues of the oral, maxillary and mandibular regions (bone, cartilage, dental tissue, mesenchymal tissue, nervous tissue, vascular tissue, etc.) (Faure A. *et al.*, 2021). This variability in tissue components leads to a wide range of tumour lesions, which may explain the diagnostic challenges faced by clinicians. All patients underwent imaging, with the exception of one case of an eccrine poroma, which enabled the non-odontogenic tumours to be distinguished from those of dental origin. CT (44%) is the gold standard for imaging studies because it captures details that reveal which teeth are causative and which are not, particularly in its Dentascanner version. According to the radiographic features described in this series, mixed-type lesions are the most commonly observed, accounting for 40 per cent of cases. This finding differs from that of Kouamé *et al.*, (Kouamé *et al.*, 2023), who reported 84.4 per cent lytic lesions compared with only 12.5 per cent mixed-type lesions, although their series included both non-odontogenic benign tumours (NOBTs) and lesions of dental origin. The majority of patients underwent surgery to remove the tumour (56 per cent) and enucleation (24 per cent). Our findings are consistent with those reported in the literature (Ruslin M. and al. 2022, Djemi E.M. 2023). This high rate of surgical excision followed by enucleation is due to the benign nature of these lesions, for which complete surgical removal of the tumour is often preferable to a biopsy. Ossifying fibroma is the most commonly reported histological type (20 per cent). A Nigerian study from 2022 reported that 13.5 per cent of all orofacial lesions were ossifying fibromas (Okwuosa C.U. *et al.*, 2022). In our view, the incidence of these tumours varies from one study to another. The complete resolution of the majority of the tumours treated (92%) supports the findings of Hassanein AG *et al.*, (Hassanein A.G. *et al.*, 2022), who reported good functional and cosmetic outcomes in 100 per cent of cases. However, one complication and one death were recorded. The first case involved an oro-sinus fistula that developed during the excision of an ossifying fibroma, caused by the tumour extending into the sinus; management of this required closure using a buccinator muscle flap. The second case concerns a death resulting from a post-operative anaesthetic complication, which occurred in a patient being treated for a recurrent hamartoma. The average follow-up period of 8 ± 5 months revealed that there were no recurrences in almost all cases, with the exception of one hamartoma. Analysis of the correlation between clinical and radiological data and histological findings revealed a statistically significant relationship ($p < 0.05$). This test demonstrates that a properly conducted clinical and radiological diagnostic approach can serve as a diagnostic guide, enabling treatment to be initiated before a positive diagnosis is confirmed by the results of the histopathological examination.

CONCLUSION

This study shows that the hospital admission rate for TBNO is relatively high, at 26 per cent.

The heterogeneity of clinical and radiological features complicates diagnosis. Radiodiagnosis makes it possible to distinguish these benign non-odontogenic tumours from those of dental origin. The diagnostic approach is based on the correlation of clinical, radiological and histological data. The treatment strategy is based on surgery.

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