

## Pattern of Histologic Variants of Ameloblastoma in a Secondary Health Care Facility in Lagos State: A 5-Year Retrospective Study

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### Abstract

**Background:** Ameloblastoma is a benign epithelial odontogenic neoplasm which is common among the dwellers of sub-Saharan Africa. The various histologic types have been elucidated.

**Aim:** This study aimed to assess the prevalent histologic types of ameloblastoma in a Lagos secondary health care facility.

**Materials and methods:** A five-year retrospective review of histopathologically diagnosed slides was done. Data extracted include the age, gender, location, ethnicity, and histologic variants, which were analysed with SPSS version 26. Percentages, ratio, mean, standard deviation were determined, and  $p$ -value  $\leq 0.05$  was considered significant.

**Result:** A total of 77 histopathologically diagnosed ameloblastoma slides were included in this study. Males were more affected than females in ratio 1.2:1 with the mean age  $33.61 \pm 13.3$ . Ameloblastoma was commonest in the third decade of life and more in the mandible than maxilla. The commonest histologic type was the conventional/follicular type which occurred more in males and this was followed by the unicystic/intraluminal type.

**Conclusion:** The commonest histologic variant was the follicular (conventional) and occurred more in males. This was followed by the intraluminal (unicystic) histologic variant that was commoner in females in this Lagos State secondary health care facility.

**Key words:** ameloblastoma, histologic variants, secondary health facility, Lagos

### Introduction

Ameloblastoma is a benign epithelial odontogenic neoplasm of the jaws, which slowly grows but aggressively invades the contiguous tooth-bearing tissues<sup>1,2</sup>. Its rate of recurrence may be

high after therapeutic surgical intervention. It was first described by Cusack in 1827, designated as adamantinoma by Louis-Charles Malassez in 1885, and finally named ameloblastoma by Ivey and Churchill in 1925<sup>3</sup>.

Ameloblastoma is more prevalent in the black population than in Caucasians, with propensity for male gender and peak incidence at the third decade of life<sup>2,4</sup>. It is the commonest odontogenic tumour in the sub-Saharan Africa<sup>2,5,6</sup>. The distribution in Nigeria was reported to be 63% in South-west, 73% in Northwest, and 80.3% in South-south of all odontogenic tumors, and has one of its hotspots in Lagos<sup>2,7</sup>.

Ameloblastoma is classified by World Health Organisation into four clinical categories which are conventional, extraosseous/peripheral; unicystic and metastasizing ameloblastoma<sup>8</sup>. This lesion presents histologically as proliferating odontogenic epithelial cells of palisading peripheral tall columnar to cuboidal cells and loose central stellate reticulum like cells in a fibrous stroma background<sup>9</sup>. The histologic variants of conventional are follicular, plexiform, acanthomatous, desmoplastic, basal cells, mixed-cell and granular cells types, while those of unicystic are intraluminal, luminal and mural. However, the follicular cell type is the commonest histologic type from literature<sup>1,4,9,10</sup>. Generally, conventional (follicular variant) ameloblastoma is opined to be the most aggressive unlike the unicystic type which is the least aggressive.<sup>9</sup> Besides, studies have shown that the recurrence rate is high amongst follicular, granular, and acanthomatous variants whereas desmoplastic, plexiform and unicystic types have relatively low recurrence rate<sup>9,11</sup>. However, this observation, may not be helpful in

predicting the clinical characteristics of this lesion from histologic perspective<sup>9,12</sup>.

This study aims to determine the prevalent histologic type of ameloblastoma from a secondary health care facility because of paucity of data in literature in Nigeria, and to compare this with the results from tertiary institutions in Nigeria and other parts of the world.

### Materials and methods

This was a retrospective review of histopathologically diagnosed slides and records of ameloblastoma retrieved from the Department of Oral and Maxillofacial Pathology of the Dental Centre of General hospital, Lagos Island from June, 2017 to May, 2022. All slides and records which were diagnosed as ameloblastoma were included and analyzed. Parameters retrieved include age, gender, location (Mandible and Maxilla), ethnicity, and histologic variants of the ameloblastoma. Data was analysed using Statistical Package for Social Sciences (SPSS) version 26. Percentages, ratios, mean and standard deviation were determined and p-value  $\leq 0.05$  was considered statistically significant. Administrative approval to access the archives of histopathological slides and records of diagnosed ameloblastoma was obtained from Lagos State Health Commission.

### Result:

A total of seventy-seven (77) cases were reviewed. The descriptive statistics revealed that 42 (54.5%) of the cases were males while 35 (42.5%) were females, in ratio 1.2:1. The mean

age was  $33.61 \pm 13.3$ ; the lesion was most common in the third (20-29 years) and fifth decade (40-49 years) and least common in the sixth ( $\geq 50$ ) decade of life ( $p=0.207$ ). The mandible was the commonest site of occurrence of ameloblastoma (Table 1)

**Table 1:** Distribution of patients diagnosed with Ameloblastoma by Age and site

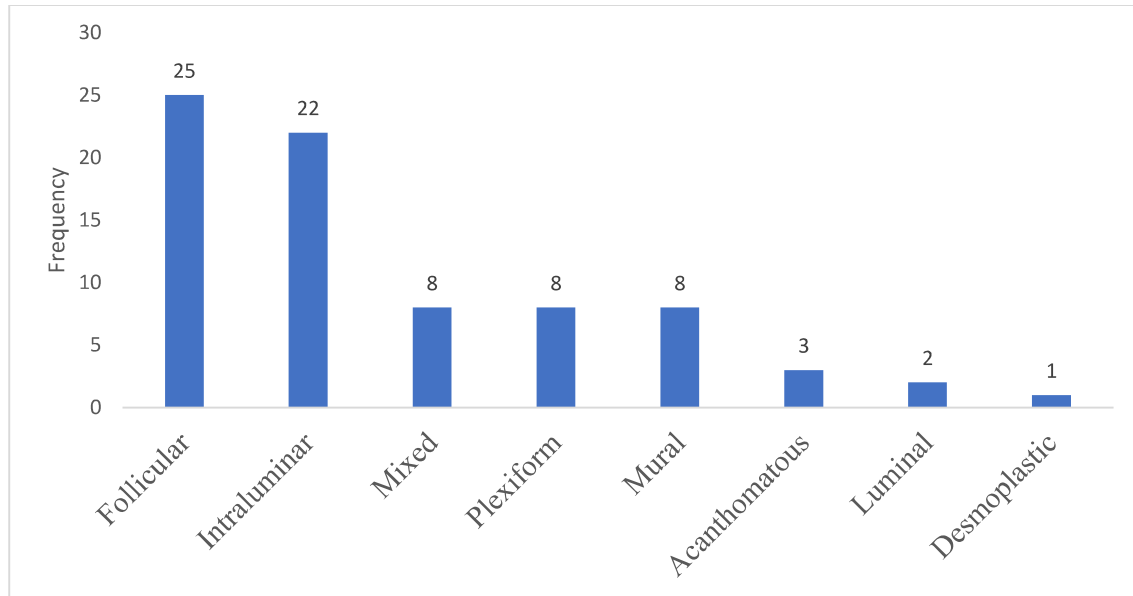
	<b>Male (n=42)</b>	<b>Female (n=35)</b>	<b>Total</b>	<b>p-value</b>
<b>Age group (Years)</b>				
10-19	8(19.0)	1(2.9)	9(11.7)	0.207
20-29	11(26.2)	14(40.0)	35(35.2)	
30-39	9(21.4)	8(22.9)	17(22.1)	
40-49	11(26.2)	8(22.9)	19(24.7)	
$\geq 50$	3(7.1)	4(11.4)	7(9.1)	
<b>Mean<math>\pm</math>SD</b>	<b>32.00<math>\pm</math>13.5</b>	<b>35.54<math>\pm</math>13.1</b>	<b>33.61<math>\pm</math>13.3</b>	<b>0.248</b>
<b>Jaw (Site)</b>				
Mandible	40(95.2)	33(94.3)	73(94.8)	0.851
Maxilla	2(4.8)	2(5.7)	4(5.2)	

**Male female ratio=1.2: 1**

Expectedly, the Yorubas constituted 61.0% of the ethnic group affected by this disease, followed by the Igbo with 20.7%, and others with 18.2%.

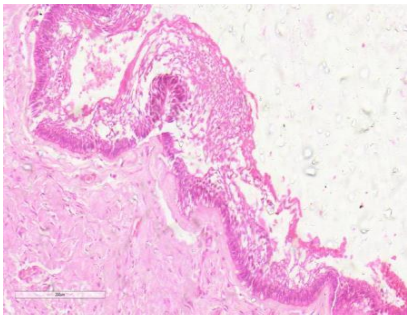
The conventional type constituted 45 (58.4%), occurring more in males, while unicystic ameloblastoma type was 32 (41.6%), occurring more in females. This was statistically significant (Table 2,  $p=0.047$ ).

In the shares of the conventional clinical type, the follicular type was the commonest {25(32.5%)} and was the most prevalent of all the histologic types. The intraluminal type (68.8%) was the most prevalent of the unicystic clinical type. (Figures 1, A<sub>1</sub>, A<sub>2</sub>, B, C).

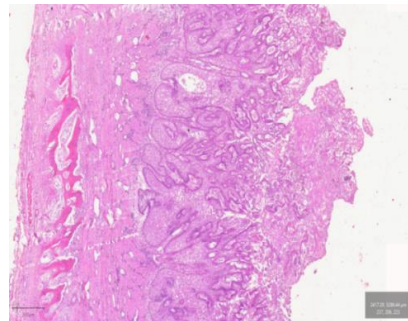


**Figure 1:** The distribution of the various histologic variants of ameloblastoma. The follicular was the most prevalent.

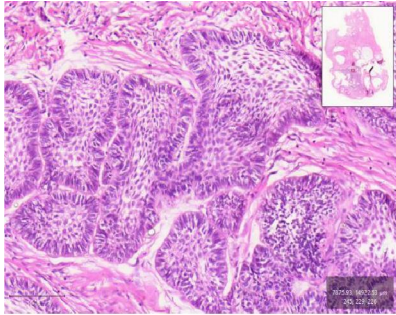
#### Histologic variants of ameloblastoma



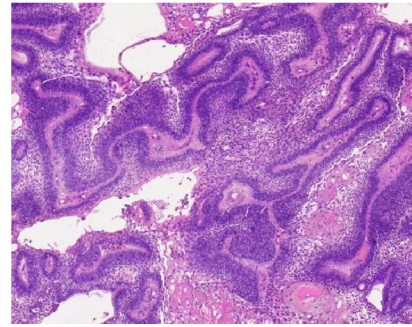
**Figure A1:** Photomicrograph of unicystic ameloblastoma showing the intraluminal ameloblast-like cell extending into cystic lumen (H&E original magnification x 10)



**Figure A2:** Photomicrograph of unicystic ameloblastoma showing ameloblast-like cells infiltrating the connective tissue (H & E original magnification x 4)



**Figure B:** Photomicrograph of follicular ameloblastoma showing islands of proliferating odontogenic epithelial cells with peripheral tall columnar cells and central stellate reticulum-like cells (H & E original magnification x 40)



**Figure C:** Photomicrograph of plexiform ameloblastoma showing interconnecting strands of benign odontogenic epithelial cells presenting ameloblastomatous formation consisting of peripheral tall columnar cells and stellate reticulum like cells (H & E original magnification x 40)

Table 2: Gender distribution of Clinical types of ameloblastoma

<b>Clinical types</b>	<b>Male (n=42)</b>	<b>Female (n=35)</b>	<b>X<sup>2</sup></b>	<b>p-value</b>
Conventional	29 (69.0)	16 (45.7)	4.28	0.047*
Unicystic	13 (30.9)	19 (54.3)		

\* p-value  $\leq$  0.05 is considered significant

### Discussion

Ameloblastoma is the most common benign epithelial odontogenic neoplasm in Nigeria, and recent studies have shown that molecular gene dysregulation in its aetiopathogenesis among other factors may be responsible for the observation<sup>2,13</sup>. In this present study, third decade of life was mostly affected by this lesion

which is consistent with several studies<sup>4,10,14,15</sup> done in Nigeria. A male to female ratio was 1.2:1 and the mean age  $33.61 \pm 13.3$ . This in agreement with observations from previous studies<sup>1,2,4</sup>. The predilection of the disease for mandible confirmed the reports by other researchers<sup>1,4,10,14</sup>. This may be related to the denser amount of the collagen fibres which

constitute the larger portion of the ground substance in which mandible ossifies as compared to the maxilla which is porous and less dense. In the light of this, Effiom et al<sup>13</sup> elucidated that recent gene molecular studies have shown some over-expression genes like collagen type VIII alpha 1 (COL8A1), matrix metalloproteinase 12 (macrophage elastase, MMP12), matrix metalloproteinase 13 (collagenase3), and also fibroblast growth factor receptor 2 (FGFR2), a membrane-bound activator of mitogen-activated protein kinase (MAPK) signalling which has been identified in aetiopathogenesis of ameloblastoma. This may seem to explain the predilection of the mandible by this lesion.

The Yoruba ethnic group seemed to be mostly affected by this disease in this present study. This may be due to the location of the study, the observation by Adisa et al<sup>2</sup> on the geographic spatial correlation that Lagos is one of the hotspots for ameloblastoma in Nigeria, and also the report by Okoh et al<sup>15</sup> that prevalence of ameloblastoma is high in Lagos. Besides, the seventy-seven (77) cases of ameloblastoma were diagnosed within five-year review in this secondary health care facility located in this hotspot compared to eighty-seven (87) diagnosed by Ademola & Omoregie<sup>14</sup> in their ten-year review in University of Benin Teaching Hospital, Benin City, sixty-seven (67) cases diagnosed by Ibikunle et al<sup>1</sup> in seven-year review in Usmanu Danfodio University Teaching Hospital, Sokoto, and seventy-nine (79) cases by

Adebiyi et al<sup>10</sup> in his fourteen-year review in Obafemi Awolowo University Teaching Hospital, Ile-Ife. Hence, this alludes to the observation by Adisa et al<sup>2</sup> that Lagos is one of the hotspots for ameloblastoma in Nigeria. A plausible explanation may be the health-seeking behaviour of an average Lagos city dweller and the dysregulation of the molecular genes for ameloblastoma {i. Mitogen Kinase Activating Pathway (MAPK) responsible for BRAF, KRAS, NRAS and HRAS activation, ii. HEDGEHOG pathway activation, and iii. Rare mutations (PIK3CA, SMARCB1, CTNNB1)}<sup>12</sup> may be more preponderantly expressed in this hotspot region.

The male gender was predominantly affected than female, which may result from the combination of the higher activities of the molecular gene dysregulation and the collagenases (FGFR2, MMP-12 & 13; COL8A1) in male than female. It may then be deduced from the findings by Effiom et al<sup>13</sup> that the abundant collagen fibres in the male mandible make more ground substance available for the collagenases to act upon thereby up-regulating the MAPK and down-regulating sonic HEDGEHOG and tumour necrosis factor receptor-associated factor-3 (TRAF3), thus resulting in this observation.

The commonest histologic type in this present study was the follicular variant (Figure 1). This confirms findings from previous studies<sup>1,4,10</sup>, stating that follicular cell-type was the

commonest. This histologic variant was commoner in males and may be due to the ameloblastic transformation of the cells of the remnant of dental lamina, epithelial rest cells of Malassez, and reduced enamel epithelium<sup>16</sup> infiltrating into the dense collagenous trabeculae of the mandibular bone<sup>17</sup>, thus forming the conventional variant.

On the other hand, the unicystic variant was, however, commoner in females. Plausible reasons may be related to the demography of patients reporting in this secondary health facility and from the ameloblastic transformation of the epithelial lining of dentigerous cysts surrounding the crown of unerupted teeth, which is commoner in the younger age group. This is in agreement with Iyogun et al<sup>18</sup> that the unicystic type occurs more in the younger age group. It is then noteworthy that the highest prevalence of ameloblastoma in this present study was in the younger age group (20-29 years). It may then be expected that the recurrence of ameloblastoma in this secondary health care facility should have been minimal because of the postulated biologic behaviour of ameloblastoma which has been predicated on its histologic variant<sup>9,12</sup>.

### Conclusion

The commonest histologic variant was the follicular. The intraluminal histologic variant was the next most prevalent. The observation in this secondary health care facility is not essentially at variance with results from other

tertiary institutions in Nigeria and other part of the world.

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