Histopathologic Analysis of Gingival Lesions: A 10-Year Retrospective Study

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ABSTRACT

Background: Lesions of the gingiva account for a significant portion of the diagnostic workload of any oral pathology practice. Biopsy is important in establishing a definitive diagnosis. The aim of this study was to determine the relative frequency and distribution of biopsied gingival lesions in a Nigerian population.

Methods: This was a retrospective study of all gingival biopsies performed over a 10-year period. Data on age, gender, site (maxillary or mandibular) and histopathological diagnosis were recorded. The lesions were categorized into two groups: non-neoplastic and neoplastic, with the neoplastic lesions further divided into benign and malignant lesions. Data analysis was done using SPSS version 23.

Results: There were a total of 501 orofacial biopsies during the period under review, with gingival biopsies accounting for 73 (14.6%) cases. The mean age of subjects was 29.6 ± 20.1 years. There were 48 (65.8%) females and 25 (34.2%) males. Non-neoplastic lesions were 50 (68.5%), while neoplastic lesions were 23 (31.5%).

The non-neoplastic lesions had an average age of 25.9 ± 17.7 years, and were encountered most frequently in the 10-19 years age group. Eighteen (36.0%) cases occurred in males, while 32 (64.0%) cases were seen in females. The maxillary gingiva (56.0%) was affected more often than the mandibular gingiva (44.0%). Pyogenic granuloma was the most frequent non-neoplastic lesion, accounting for 35 (70%) cases, followed by peripheral ossifying fibroma (n=6; 12%).

The neoplastic lesions had a mean age of 37.1 ± 22.9 years, and consisted of 20 (87%) benign and 3 (13%) malignant lesions. The mean age for benign lesions was 35.3 ± 21.6 years, with a peak occurrence between 20 – 49 years. Females were almost twice more frequently affected than males. The mandibular gingiva accounted for 55% of the benign lesions. The most common benign lesion was fibroma (n=8; 40%) followed by ameloblastoma (n=3; 15%). Malignant lesions accounted for 4.1 % of the biopsied gingival lesions, with a mean age 48.7 ± 33.2 years. There was one case each of Kaposi's sarcoma, polymorphous low-grade adenocarcinoma and mucosa-associated lymphoma.

Conclusion: There is need for histologic examination of all excised gingival swellings.

Introduction

The gingiva is the part of the oral mucosa that surrounds the necks of the teeth and covers the alveolar bone. The gingiva, periodontal ligament, cementum and alveolar bone together form the periodontium or tooth-supporting structures [1]. Lesions of the gingiva account for a significant portion of the diagnostic workload of any oral pathology practice [2]. They can be classified as non-neoplastic or neoplastic. The non-neoplastic lesions are usually inflammatory (the result of an inflammatory response to plaque/calculus) or reactive (representing a reaction to a number of localized irritants). The neoplastic lesions represent autonomous progressive growths, and can either be benign or malignant [3-5]. Although gingivitis has been reported to be the most common pathologic condition affecting the gingiva, a number of other common and uncommon, localized or systemic pathologic conditions may also involve the gingiva [6,7]. The majority of localized gingival growths are thought to be non-neoplastic and reactive in nature [2,3,8].

Reports in the literature that have analyzed biopsied gingival lesions show that non-neoplastic lesions are more common than neoplastic lesions, ranging from 51% to 91% [3,9-12], with pyogenic granuloma being the most frequently encountered non-neoplastic lesion. [9,10,12].

Oral pyogenic granuloma is a reactive vascular lesion seen most frequently on the gingiva, especially the anterior portions of the maxillary gingivae. Females are mostly affected, and it presents clinically as a painless, soft, bright red/purple-red, swelling that bleeds easily on provocation [2,13,14].

Changes in colour, size and consistency of the gingiva are often used in reaching a clinical diagnosis, but a good knowledge of the frequency and distribution of gingival lesions without doubt will put clinicians in better stead when faced with such clinical scenarios [3,7]. While a good number of gingival diseases/lesions can be diagnosed clinically, biopsy is often required to establish a definitive diagnosis [3,5]. More so, a gingival biopsy can help detect more sinister lesions with seemingly innocuous clinical appearance.

The distribution of gingival lesions may be affected by geographical location as well as race. Not many epidemiological studies on biopsied gingival lesions have been reported in the literature, and there is a paucity of such reports from Nigerian and other African populations. The aim of this study was to determine the relative frequency and distribution of biopsied gingival lesions in a Nigerian population.

Materials and Method

This was a retrospective study that reviewed the histopathology records of all biopsies performed at the Department of Oral Pathology and Oral Biology, University of Port Harcourt Teaching Hospital over a 10-year period (January 2010 to December 2019). The histopathology reports of all cases in which the site of biopsy was the gingiva were extracted, and data on age, gender, site (maxillary or mandibular) and histopathological diagnosis were recorded as stated in the reports. The lesions were categorized into two groups: non-neoplastic and neoplastic, with the neoplastic lesions further divided into benign and malignant lesions. Data analysis was done using SPSS software for windows, version 23. Chi Square test was used to determine significance of results, while an independent sample's T-test was used to compare the mean age of non-neoplastic and neoplastic lesions, and that of benign and malignant lesions. $p \leq 0.05$ considered statistically significant.

Results

There were a total of 501 orofacial biopsies during the period under review, with gingival biopsies accounting for 73 (14.6%) cases. The subject's age ranged from 4 months to 87 years, with an average age of 29.6 ± 20.1 years. Peak occurrence was in the second decade of life. There were 48 (65.8%) females and 25 (34.2%) males, giving a male: female ratio of 1:1.9. Non-neoplastic were 50 (68.5%), while neoplastic lesions were 23 (31.5%).

The non-neoplastic lesions had an average age of 25.9 ± 17.7 years, and were encountered most frequently in the 10-19 years age grouping (second decade). Eighteen (36.0%) cases occurred in males, while 32 (64.0%) cases were seen in females. The maxillary gingiva (56.0%) was affected more often than the mandibular gingiva (44.0%). Pyogenic granuloma was the most frequent non-neoplastic lesion, accounting for 35 (70%) cases, followed by peripheral ossifying fibroma (n=6; 12%). Pyogenic granuloma was more common in females (65.7%), with a mean age of 23.5 ± 16.7 years and a peak in the 2nd decade of life. The maxillary gingiva (57.1%) was affected more frequently than the mandibular gingiva.

The neoplastic lesions had a mean age of 37.1 ± 22.9 years, and consisted of 20 (87%) benign and 3 (13%) malignant lesions. The benign lesions comprised 27.4% of all the gingival lesions. The mean age was 35.3 ± 21.6 years, with a peak occurrence between 20 – 49 years. Females were almost twice more frequently affected than males, with a female to male ratio of 1.9: 1. The mandibular gingiva accounted for 55% of the benign lesions. The most common benign lesion was fibroma (n=8; 40%) followed by ameloblastoma (n=3; 15%). Fibroma occurred most frequently in the 3rd decade, with a mean age of 32.9 ± 16.0 years. Females were three times more frequently affected than males, and there was equal distribution between the maxillary and mandibular gingivae.

Malignant lesions accounted for 4.1 % of the biopsied gingival lesions, with a mean age 48.7 ± 33.2 years. There was one case each of Kaposi's sarcoma, polymorphous low-grade adenocarcinoma and mucosa-associated lymphoma. All 3 cases occurred in females, and the mandibular gingiva (66.7%) was more commonly involved.

An independent samples T-test showed a statistically significant difference (p = 0.029) between the mean age of non-neoplastic and neoplastic gingival lesions. There was no such difference when the mean ages of benign and malignant lesions were compared.
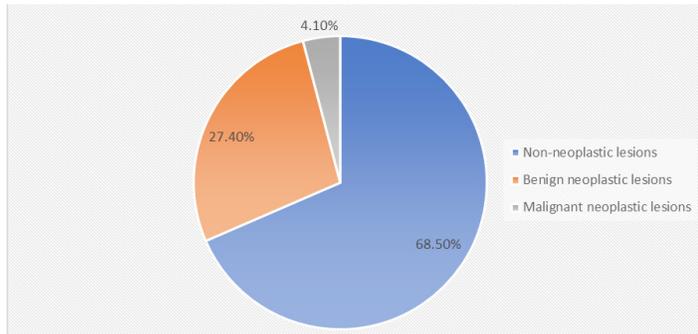

Figure 1: Pie chart showing the frequency of all biopsied gingival lesions.

Table 1: Age and gender distribution of biopsied non-neoplastic gingival lesions.

| Age group (years) | Gender | | Total (%) |
	Male	Female	p = 0.202
0 – 9	4	3	7 (14.0)
10 – 19	8	8	16 (32.0
20 – 29	0	9	9 (18.0)
30 – 39	3	5	8 (16)
40 – 49	1	1	2 (4.0)
50 – 59	1	4	5 (10.0)
60 – 69	1	2	3 (6.0)
Total	18	32	50 (100)

Table 2: Frequency and site distribution of the histologic types of non-neoplastic gingival lesions.

| Histologic diagnosis | Frequency | Site | |
		Maxillary	Mandibular
Pyogenic granuloma	35	20	15
Peripheral ossifying fibroma	6	3	3
Epithelial hyperplasia	3	1	2
Granulation tissue	2	2	0
Chronic inflammation	1	0	1
Fibrous hyperplasia	1	1	0
Fibroepithelial hyperplasia	1	0	1
Periapical granuloma	1	1	0
Total	50	28	22

p = 0.492

Table 3: Age and gender distribution of biopsied neoplastic gingival lesions.

| Age group (years) | Frequency | Gender | | Type of Neoplasm | |
		Male	Female	Benign	Malignant
0 – 9	2	2	0	2	0
10 – 19	2	1	1	2	0
20 – 29	5	0	5	4	1
30 – 39	5	2	3	4	1
40 – 49	4	1	3	4	0
50 – 59	1	1	0	1	0
60 – 69	2	0	2	2	0
70 – 79	0	0	0	0	0
80 – 89	2	0	2	1	1
Total	23	7	16	20	3
		p = 0.121		p = 0.723	

Table 4: Frequency and site distribution of benign and malignant gingival lesions.

| Histologic diagnosis | Site | | | |
	Frequency	Maxillary	Mandibular	
Benign lesions				p = 0.272
Fibroma	8	4	4	
Ameloblastoma	3	0	3	
Haemangioma	2	1	1	
Peripheral odontogenic fibroma	2	2	0	
Lipoma	1	1	0	
Neurofibroma	1	0	1	
Basal cell adenoma	1	1	0	
Monomorphic adenoma	1	0	1	
Granular cell tumour	1	0	1	
Malignant lesions				p = 0.223
Kaposi's sarcoma	1	1	0	
Polymorphous low-grade adenocarcinoma	1	0	1	
Maltoma	1	0	1	
Total	23	10	13	

Discussion

In the present study, gingival biopsies accounted for 14.6% of all orofacial biopsies. This is slightly higher than the 12.8% reported by Layfield et al. in a U.S. population [11]. Alblowi et al. [6] on the other hand found gingival biopsies to represent 9.5% of all oral and maxillofacial biopsies in Saudi Arabia.

Non-neoplastic lesions in this study accounted for 68.5% of the lesions, while neoplastic (benign = 27.4%; malignant = 4.1%) constituted 31.5%. Higher proportions of non-neoplastic lesions were reported by Ababneh et al. [12] (91%) in Jordan, Layfield et al. [11] (84.5%) in U.S.A and Shamim et al. [10] (75.5%) in Indai. Kamath et al. [9] on the other hand reported a much lower figure also in an Indian population, with non-neoplastic lesions accounting for only 51% of the biopsied gingival lesions in their study. Neoplastic gingival lesions have been shown to constitute between 9% and 26.4% by most studies [3,6,10-12,15] except that of Kamath et al. [9] who reported neoplastic lesions to constitute 49% of gingival lesions. The reason for this is that in their study Kamath et al. [9] categorized peripheral ossifying fibroma as a benign neoplasm, whereas in this study and other similar studies, it was categorized as a reactive lesion.

The peak age for gingival lesions in this study was 10 -19 years. This is lower than the 20 -29 years [9] and 30 -39 years [11] reported by other authors. Whereas, non-neoplastic lesions had a peak in the 10-19 years age group, with an average age of 25.9 years, neoplastic lesions were mostly encountered between 20-39 years, with an average age of 37.1 years. This difference was statistically significant. Manjunatha et al. [3] also found non-neoplastic gingival lesions to peak in the 10-19 years age group. In other studies, Shamim et al. [10] and Kamath et al. [9] both found non-neoplastic gingival lesions to peak between 20-29 years, whereas Carbone et al. [4] found a peak between 30-39 years. Benign neoplasms in this study were distributed equally between

the third, fourth and fifth decades of life. Ababneh et al. [12] and Kamath et al. [9] reported a peak in the third and fourth decade respectively. The significantly higher mean age of neoplastic lesions in this study can be explained by the fact that cells accumulate more mutations with age, increasing the possibility of neoplastic transformation [16]. Consequently, neoplasms should be considered in the differential diagnosis of gingival swellings especially in older individuals.

Females accounted for the bulk (63.8%) of individuals with biopsied gingival lesions, similar to the trend in the literature [9-11]. When the different types of lesions were considered, all groups of lesions were more common in females, with the proportion of females affected increasing from non-neoplastic to benign to malignant lesions. This was however not statistically significant. Most similar studies have also found a female predilection for non-neoplastic, benign and malignant gingival lesions [3,10,15]. Kamath et al. [10] and Alblowi et al. [6] both found malignant gingival lesions to be more common in males. Carbone et al. [4] found more cases of benign lesions in males. These differences may be attributed to geographical location as well as health seeking behaviour, as females have been shown to have a better health seeking behaviour than males [17].

In this study, non-neoplastic lesions were more frequent in the maxillary gingiva, whereas neoplastic (both benign and malignant) lesions were seen more often in the mandibular gingiva. This difference was however not statistically significant. Neoplastic lesions were also seen more frequently in the mandibular gingiva in some studies [9,10]. Benign neoplasms have been reported more frequently in the mandibular gingiva by some similar studies [3,4], although other studies have found them more often in the maxillary gingiva [9,10]. Malignant gingival lesions have been shown to be more frequent in the mandible by several studies [3,4,9,10].

Pyogenic granuloma was the most common non-neoplastic gingival lesion in this study. It was more common in females, with a peak between 10-19 years, and the maxillary gingiva was more frequently affected. These findings largely corroborate most reports in the literature [3,8-10,12,14]. Buchner et al. [18] found more cases of fibrous hyperplasia than pyogenic granuloma, while Carbone et al. [4] reported Giant cell epulis as the most common non-neoplastic gingival lesion. Shamim et al. [10] and Kamath et al. [9] found a peak for pyogenic granuloma in the 20-29 years age group. One study found more cases of pyogenic granuloma in males [6].

This study found the most common benign neoplastic gingival lesion to be fibroma. While some authors have reported a similar finding [3,6,9], others have reported peripheral ossifying fibroma [10,12] and squamous papilloma [4] to be more common. Cases of fibroma in this study were more common in females, similar to the findings of Manjunatha et al. [3], although Alblowi et al. [6] reported an equal gender predilection, while Kamath et al. [9] found more cases in males. The peak age was in the 20-29 years age group, similar to the report of Manjunatha et al. [3]. There

was an equal distribution between the mandible and maxilla. Some authors have found more cases of fibroma in the maxilla [3,9], while others have seen more cases in the mandible.

This study described the frequency and distribution of biopsied gingival lesions from just one centre in the south-south zone of Nigeria. Further Nigerian studies from other zones, as well as multicenter studies are encouraged in order to give a better representation of the distribution of biopsied gingival lesions in Nigeria.

Conclusion

Even though the majority of gingival swellings encountered are benign and innocuous, occasional cases of malignancies may present in the gingiva. Hence, there is need for histologic examination of all excised gingival swellings.

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