Distribution of biopsied gingival lesions according to the proceedings from the 2017 World Workshop classification: A three-year retrospective study

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Abstract

Background. The gingiva is a common site for neoplastic or non-neoplastic lesions. Neoplasms refer to progressive autonomous growth that can have either a benign or a malignant course. On the other hand, non-neoplastic lesions are mainly inflammatory, or occur as a reaction to some kind of irritation or low-grade injury.

Objectives. Assessing the frequency distribution of gingival lesions is important to optimize oral health care services. The present study retrospectively analyzed the frequency distribution of gingival lesions on the basis of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. The secondary objective was to compare this system with the 1999 International Workshop classification system.

Material and methods. The hematoxylin and eosin (H&E)-stained histopathological slides of the gingival lesions reported over the last 3 years (2018–2020) were retrieved from the archive of the Division of Oral Pathology and Microbiology at a tertiary care hospital in New Delhi, India. Correlating clinical, radiological and pathological details enabled the categorization of lesions according to the new classification system.

Results. In total, 73 gingival lesions were analyzed. Among these, reactive processes were the most frequent (39.73%), followed by inflammatory and immune conditions and lesions (26.03%), malignant tumors (21.92%), benign epithelial lesions (5.48%), and oral potentially malignant disorders (OPMDs) (5.48%). Genetic/developmental disorders were the least frequent (1.37%). However, as per the 1999 American Academy of Periodontology (AAP) system, the majority of lesions belonged to a non-specified category.

Conclusions. The frequency distribution of biopsied gingival lesions according to the 2017 World Workshop classification in comparison with the previous classification system showed that differences between the 2 systems could be attributed to heterogeneous terminology rather than to real geographical variations.

Keywords: distribution, inflammatory, frequency, non-neoplastic, benign epithelial

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Introduction

The gingiva is part of the oral mucosa that covers the alveolar processes of the jaws and surrounds the necks of the teeth. Human gingiva as well as other mucosal tissues may exhibit various non-plaque-induced pathological lesions, which can indicate systemic diseases or conditions.[1] These lesions are not caused by plaque and usually do not disappear after its removal. The severity of their clinical manifestation depends on the interaction with the underlying bacterial plaque.[2] Initially, the classification of non-plaque-induced gingival lesions, established by the American Academy of Periodontology (AAP), included gingival diseases of specific microbial origin, of genetic origin, manifestations of systemic conditions, traumatic lesions, foreign body reactions, and some lesions "not otherwise specified".[3] However, there are several non-neoplastic and neoplastic lesions that give rise to a unique set of lesions.[4] Neoplastic lesions can be benign or malignant, depending on their progressive autonomous growth. Non-neoplastic lesions may be inflammatory in origin, or can arise as a reaction to some kind of irritation or low-grade injury.[5] In the majority of cases, the clinical presentation of localized overgrowth is considered to be reactive and non-neoplastic in nature.[6] Hence an incisional or excisional biopsy for microscopic analysis is mandatory to prepare a definitive treatment plan. Periodontists, along with oral pathologists, make a collaborative team in terms of final accurate diagnosis, management and referral for treatment of gingival lesions.[7] Although a few studies in the literature have discussed the epidemiology of gingival lesions,[4,8,9] no study to date has reported the frequency distribution of these lesions according to the proceedings of the 2017 World Workshop on Periodontal and Peri-Implant Diseases and Conditions.[1]

The aim of the present study was to report the frequency distribution of the gingival lesions biopsied at a tertiary care referral center during the last 3 years as per the new classification scheme and to compare it with the 1999 International Workshop classification system.

Material and methods

This retrospective study was conducted at a tertiary care referral center at the Division of Oral Pathology and Microbiology, All India Institute of Medical Sciences, New Delhi, India. Ethical clearance was obtained from the institutional ethics committee (IEC-720/04.10.2019, RP-31/2019).

The histological slides of the gingival lesions biopsied in the years 2018–2020 were retrieved. The following criteria were used to analyze the records:

– inclusion criteria: clinically and histopathologically confirmed cases of gingival lesions irrespective of age and gender, where all demographic, clinical and other pertinent details were available;
– exclusion criteria: patients with reported systemic diseases, edentulous patients, those with drug-induced gingival enlargement, or those with missing clinical data.

The demographic details (age, gender), medical history (to determine the presence or absence of any systemic disease or long-term drug therapy) and dental records (history of any previous biopsy or radiographic findings, if any) of the patients who underwent a gingival biopsy were reviewed thoroughly by 2 independent examiners (DM, VSY). The histopathological examination was used as the gold standard to confirm the diagnosis in all cases. Fresh sections were taken from paraffin blocks, whenever required. The hematoxylin and eosin (H&E)-stained histopathological slides were evaluated by 3 pathologists (HK, DM, SK) to ascertain the final diagnosis, further categorizing it on the basis of the new classification of gingival lesions according to the 2017 World Workshop.[1]

Statistical analysis

The frequency distribution of the gingival lesions was determined using the Microsoft Office Excel spreadsheet (v. 2019; Microsoft, Redmond, USA).

Results

Among the 2,254 records retrieved from the archive of the Division of Oral Pathology and Microbiology, 73 records fulfilled the eligibility criteria and were included for further analysis (Fig. 1). The mean age of the patients was 39.1 years (age range: 7–69 years) (Fig. 2). The present study comprised 47 male patients and 26 female patients, with a male to female ratio of 1.8:1 (Fig. 3).

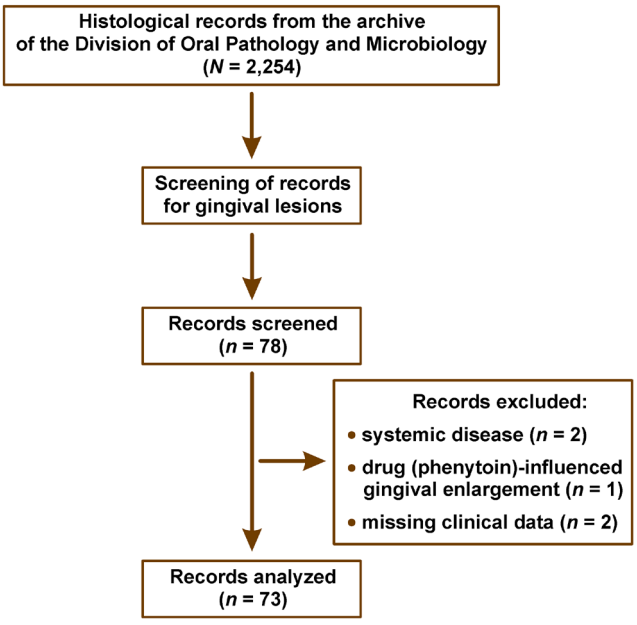

Fig. 1. Screening process for the identification of gingival lesions

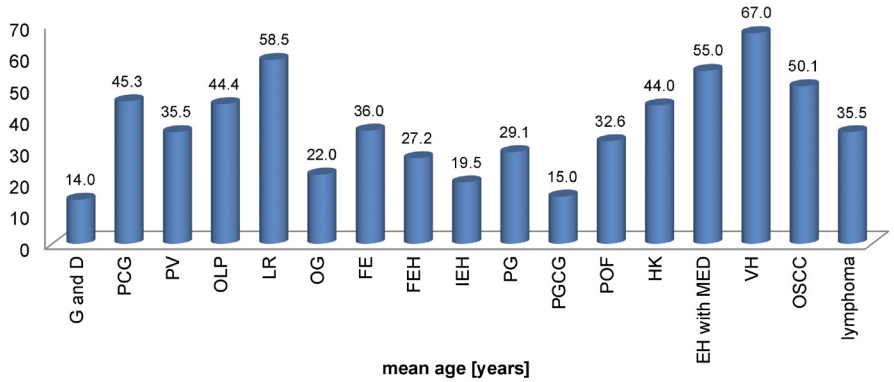

Fig. 2. Age distribution of the gingival lesions

G and D – genetic and developmental disorders; PCG – plasma cell gingivitis; PV – pemphigus vulgaris; OLP – oral lichen planus; LR – lichenoid reaction; OG – orofacial granulomatosis; FE – fibrous epulis; FEH – fibroepithelial hyperplasia; IEH – inflammatory epithelial hyperplasia; PG – pyogenic granuloma; PGCG – peripheral giant cell granuloma; POF – peripheral ossifying fibroma; HK – hyperkeratosis; EH with MED – epithelial hyperplasia with moderate epithelial dysplasia; VH – verrucous hyperplasia; OSCC – oral squamous cell carcinoma.

The most common histopathological categories, age and gender distribution, as well as comparisons between the 2 systems of classification (2018 vs. 1999) are summarized in Table 1.

As per the previous classification from 1999,[3] the majority of the non-plaque-induced gingival lesions were described under the "not otherwise specified" category (72.60%). However, according to the new classification system (Holmstrup et al., 2018),[1] the lesions were classified into 6 types (Fig. 4), with reactive processes being the most frequent (39.73%), followed by inflammatory and immune conditions and lesions (26.03%), malignant tumors (21.92%), benign epithelial lesions (5.48%), oral potentially malignant disorders (OPMDs) (5.48%), and genetic/developmental disorders (1.37%).

Reactive lesions were further categorized into 6 subtypes, with fibrous epulis and pyogenic granuloma most frequently reported. This was followed by fibroepithelial hyperplasia, peripheral ossifying fibroma, inflammatory epithelial hyperplasia, and peripheral giant cell granuloma. Inflammatory and immune conditions and lesions were divided into 3 subtypes, with a preponderance of plasma cell gingivitis under the category of hypersensitivity reactions, followed by lichen planus, lichenoid reactions and pemphigus vulgaris under the category of autoimmune diseases of skin and mucous membranes. Granulomatous inflammatory conditions were the least frequent. Among malignant tumors, oral squamous cell carcinoma (OSCC) showed a predominance, followed by lymphoma. Hyperkeratosis was reported as a benign epithelial lesion. Among OPMDs, epithelial hyperplasia with epithelial moderate dysplasia and verrucous hyperplasia were observed in gingival locations (Fig. 5).

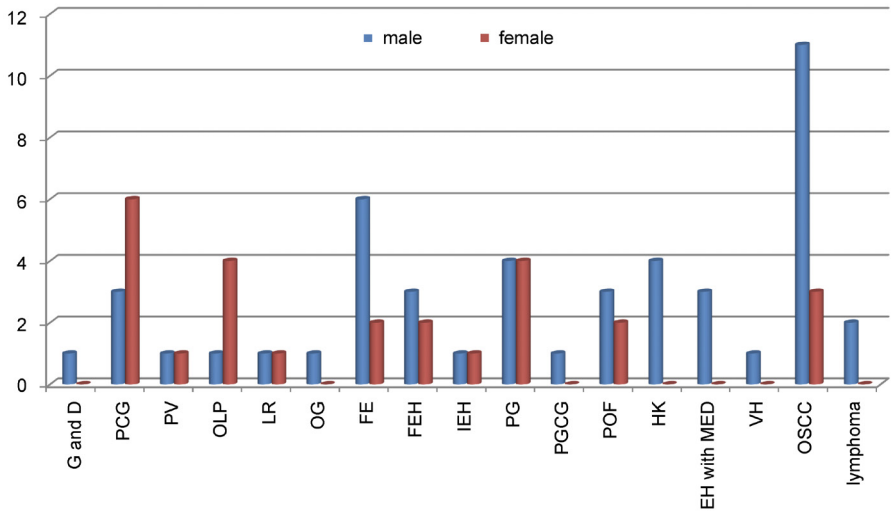

Fig. 3. Gender distribution of the gingival lesions

Table 1. Gingival lesions and conditions (working classification based on Holmstrup et al., 2018, compared with the American Academy of Periodontology (AAP) 1999 classification)

Classification	Category *n* (%)	Subcategory		Frequency distribution *n*	M:F ratio	Mean age [years]
Holmstrup et al., 2018	1. Genetic/developmental disorders 1 (1.37)	2 possibilities are considered in preferential order: (1) gingival fibromatosis; (2) atypical gingivitis		1	1:0	14.0
	2. Inflammatory and immune conditions and lesions 19 (26.03)	a. hypersensitivity reactions	plasma cell gingivitis	9	1:2	45.3
		b. autoimmune diseases of skin and mucous membranes	pemphigus vulgaris	2	1:1	35.5
			oral lichen planus	5	1:4	44.4
			lichenoid reaction	2	1:1	58.5
		c. granulomatous inflammatory conditions (orofacial granulomatosis)		1	1:0	22.0
	3. Reactive processes 29 (39.73)	fibrous epulis		8	3:1	36.0
		fibroepithelial hyperplasia		5	3:2	27.2
		inflammatory epithelial hyperplasia		2	1:1	19.5
		pyogenic granuloma		8	1:1	29.1
		peripheral giant cell granuloma		1	1:0	15.0
		peripheral ossifying fibroma		5	3:2	32.6
	4. Benign epithelial lesions 4 (5.48)	hyperkeratosis		4	4:0	44.0
	5. Oral potentially malignant disorders 4 (5.48)	epithelial hyperplasia with moderate epithelial dysplasia		3	3:0	55.0
		verrucous hyperplasia		1	1:0	67.0
	6. Malignant tumors 16 (21.92)	oral squamous cell carcinoma		14	11:3	50.1
		lymphoma		2	2:0	35.5
		total cases *n* (%)		73 (100)	1.8:1	39.1
AAP, 1999	specific bacterial, viral or fungal origin			–	–	–
	genetic origin 1 (1.37)			1	1:0	14.0
	gingival manifestation of a systemic condition 19 (26.03)			19	7:12	45.9
	traumatic lesion			–	–	–
	foreign body reaction			–	–	–
	not otherwise specified 53 (72.60)			53	2.8:1	36.6
	total cases			73	1.8:1	39.1

M – male; F – female.

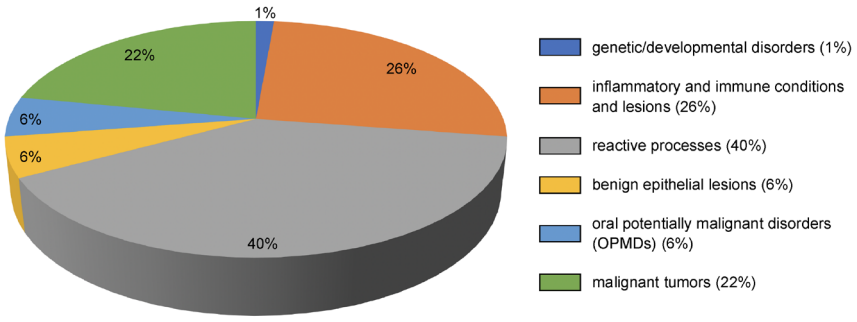

Fig. 4. Frequency distribution of the gingival lesions (the 2018 classification system)

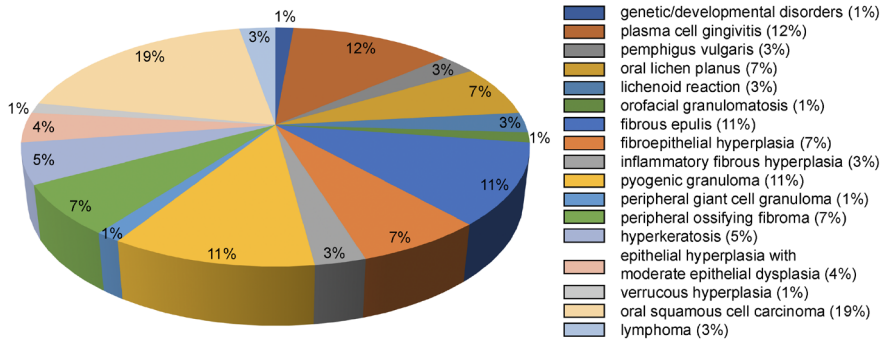

Fig. 5. Frequency distribution of the individual groups of gingival lesions (the 2018 classification system)

Discussion

To the best of our knowledge, the present study is the first to report biopsied gingival lesions based on the proceedings from the 2017 World Workshop presented by AAP and the European Federation of Periodontology (EFP).[1] Furthermore, a comparison with the AAP 1999 classification was an important hallmark of this study (Table 1). Non-plaque-induced gingival lesions were grouped into 6 categories. The most prevalent gingival lesions were reactive processes (39.73%), which is in accordance with a study by Kamath et al., who reported the prevalence to be 51%.[10] Among reactive processes, fibrous epulis and pyogenic granuloma were the most frequently reported lesions. The peak incidence of pyogenic granuloma was at 29.1 years, which is similar to the data reported in earlier studies.[11] In contrast to other studies in the literature, which reported a female predominance,[12] equal gender distribution was observed. Peripheral giant cell granuloma and peripheral ossifying fibroma were grouped together as reactive processes in this study, whereas previously they were reported under non-neoplastic lesions.[13,14] The current study suggests male predilection for peripheral giant cell granuloma and peripheral ossifying fibroma, which is consistent with the results provided by daSilva et al.[15]

The second most common non-plaque-induced gingival lesion category included inflammatory and immune conditions and lesions (26.03%), in which plasma cell gingivitis had the highest frequency in the age range of 14–82 years, with a female predominance. Recently, a similar study included plasma cell gingivitis under the category of inflammatory conditions as affecting primarily females with a mean age of 33.5 years.[16] In this study, lichen planus had the second highest frequency within autoimmune diseases of skin and mucous membranes, with a female predominance (M:F = 1:4). This is in agreement with some previous studies, where lichen planus was classified under non-neoplastic lesions affecting females significantly[14]; however, individual studies showed equal numbers for both genders, with a mean age of 47.5 years.[16]

Malignant tumors, including OSCC and lymphoma, represented the third most frequent non-plaque-induced gingival lesions (21.92%), with OSCC prevailing over lymphoma, which is similar to the previously reported findings.[4,17] Oral squamous cell carcinoma has been proven to be the most common type of cancer, reaching a frequency of 3.85% among all non-plaque-induced gingival lesions.[18] In addition, the gingiva is the third most common site for OSCC after carcinoma of the floor of the mouth and carcinoma of the tongue.[19,20] In the present study, its occurrence rate was higher in males as compared to females (M:F = 11:3) for those aged 35–65 years.

Oral potentially malignant disorders categorizing verrucous hyperplasia, followed by epithelial hyperplasia with moderate epithelial dysplasia, as well as benign epithelial lesions grouping hyperkeratosis accounted for 5.48% of all lesions, with a male predominance. These figures, along with the prevalence rate for epithelial lesions, were smaller as compared to those presented by Alblowi and Binmadi.[16] This might reflect geographical variations in heterogeneous populations.

Limitations

One of the limitations of the present study is a small sample size. In addition, the retrospective nature of the study might confine the risk assessment for different types of gingival lesions due to the lack of data from the patients' records. Further multicenter, prospective studies with larger sample sizes are needed to better understand the characteristics, frequency distribution and risk indicators of gingival lesions.

Conclusions

Inadequate or unclear classification criteria complicate the clinician diagnosis, treatment and referral. Hence, comprehensive diagnostic codes are important tools for the clinician to be specific in categorizing the disease. Within the limitations of the present study, reactive processes were the most frequent, while genetic/developmental disorders

were the least prevalent. The implementation of the current classification in diagnostic settings provides a more holistic approach by categorizing gingival lesions into 6 different types and further subtypes in comparison with the older classification system, which included the majority of lesions under the "not otherwise specified" category.

Ethics approval and consent to participate

Ethical clearance was obtained from the institutional ethics committee at All India Institute of Medical Sciences, New Delhi, India (IEC-720/04.10.2019, RP-31/2019).

Data availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Not applicable.

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