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ORIGINAL RESEARCH

REACTIVE LESIONS OF THE ORAL CAVITY: RETROSPECTIVE STUDY OF 5 YEARS IN A SINGLE CENTRE

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Abstract

Background: Reactive lesions (RL) are commonly occurring non-neoplastic growths that occur due to chronic low-grade irritations of the oral cavity. Although cheek and tongue bite are common in occurrence and is reactive in nature, they do not require biopsy. The commonly occurring RLs are pyogenic granuloma (PG), peripheral giant cell granuloma (PGCG), peripheral ossifying fibroma (POF) peripheral cemento-ossifying fibroma (PCOF), giant cell fibroma (GCF), inflammatory fibrous hyperplasia/fibrous hyperplasia (IFH/FH), inflammatory fibroepithelial hyperplasia (IFEH), fibroma and mucocele.
The study serves a resource for oral pathology residents and practitioners by providing understanding of the prevalence and characteristics of these lesions. Knowledge of RLs can aid in early diagnosis, differential diagnosis, and treatment planning.
Objectives: To evaluate the prevalence and the types of reactive lesions, to analyze the demographic data and to assess the common location of presentation.
Materials and Methods: Data was collected from the archives of the department, of the past 5 years and reactive lesions were analyzed namely, PG, PGCG, POF, GCF, IFH/FH, IFEH, fibroma, mucocele. Data was stored and analyzed using the Microsoft excel application.
Results: In our study RLs constituted about 17.75% of the total biopsies received in our department. Of these, the reactive hyperplasias (IFEH, IFH, FH) constituted the majority of the reactive lesions approximately 50% followed by mucocele 21%, PG 15%, POF & PCOF 9%, and reactive giant cell lesion at 4% Gingiva was common site followed by buccal mucosa. For mucocele, lip was the most affected site.
Conclusions: The reactive lesions are more commonly occurring lesions in the oral cavity. Although the lesions may show clinical similarities they show histopathological differences. A complete removal of local irritants is necessary for the treatment.

Key words: Reactive lesions, reactive hyperplasia, inflammatory fibrous hyperplasia, gingival hyperplasia, pyogenic granuloma, peripheral ossifying fibroma

INTRODUCTION

The oral cavity is continuously exposed to various forms of recurrent trauma, including mechanical, chemical, and thermal insults [1]. This trauma can lead to a range of clinical diseases. Reactive lesions are frequently reported and typically arise in response to low-grade persistent irritation or injury. [2,3]
Parafunctional habits have also been attributed to the development of oral lesions such as frictional keratosis (morsicatio buccarum, morsicatio linguarum),

stomatitis, linea alba, etc.[4] These lesions are also reactive in nature; however, they typically do not require biopsy. Some other lesions that are reactive in nature include traumatic neuroma, mucocele, necrotizing sialometaplasia, giant cell fibroma, inflammatory papillary hyperplasia.[5] Among these, pyogenic granuloma, peripheral giant cell granuloma, peripheral ossifying fibroma, traumatic fibroma, and epulis fissuratum are the most commonly occurring reactive lesions of the oral cavity[4].

Reactive lesions may exhibit a reddish to violaceous clinical appearance, or they could correspond to the colour of the normal oral mucosa, presenting as either sessile or pedunculated. The common site of occurrence is on the gingiva, because it is the most exposed to the trauma or irritation from calculus, prosthesis etc. However, it can occur in any intraoral sites. The consistency of the growths can range from fibrous to flaccid. The symptoms may range from none at all to that of mild pain which could be associated with bleeding. Radiographic findings are mostly absent. [6]

Eversole and Rovin postulated that although the clinical presentation of these reactive lesions overlap, histologically they have a distinct presentation which may be due to the nature of irritation [7]

Our study focuses on reactive lesions, cases histopathologically diagnosed cases as pyogenic granuloma (PG), fibro-epithelial hyperplasia (FEH) , inflammatory fibro-epithelial hyperplasia (IFEH), fibrous hyperplasia (FH), Peripheral ossifying fibroma (POF) and Peripheral cemento-ossifying fibroma (PCOF), peripheral giant cell granuloma (PGCG), mucocele, giant cell fibroma (GCF), as these lesions represent the most commonly occurring oral reactive lesions excluding caries, periapical inflammatory lesions. [6,8]

Although there are a lot of studies published in regards to reactive lesions, there are many studies where inadequate data is reported. However, such studies help to understand the incidence and prevalence of RL across nations. It can better help us understand the changing trends if any, in relation to the incidence of RL as it can be useful for diagnosing patients.

The aim of our study was to evaluate the prevalence and the types of reactive lesions. We also aimed to analyze the demographic data and to assess the common location of presentation. We were able to achieve our aims through this study

MATERIALS AND METHODS

After obtaining the institutional ethical clearance, the study retrospectively evaluated the data from past 5 years i.e. from 2020 to 2025 from the department of oral pathology and microbiology at KLE VK Institute of Dental Sciences, Belagavi, Karnataka. Patients of all age groups and both genders were included, provided they had an adequate case history. Cases with incomplete demographic data such as missing age or gender information were excluded from the study.

Out of 1020 biopsied cases, a total of 181 met the inclusion criteria and were identified as reactive lesions; these were included in the study.

The data was collected, sorted and stored into an excel sheet and analysed using Microsoft Excel software.

The lesions included for the present study were PG, POF, Mucocele, PGCG, GCF, IFH, FH, fibroma, IFEH. PGCG and GCF were further combined into reactive giant cell lesions and IFH, IFEH, FH and fibromas were collated into reactive hyperplasias. The categorized data is mentioned in Table 1.

Apart from this, a literature review was also conducted to identify studies conducted on reactive lesions (RL). The search was performed using PubMed and Google. Studies that reported large datasets similar to our own were included, while case reports and case series were excluded. A total of 29 studies analysing retrospective data on reactive lesions were identified and tabulated in a chronological order. However, this may not represent an exhaustive list. The included studies have been mentioned in Table 2 (Results).

RESULTS

During these 5 years, a total of 1020 biopsies were received and out of those 181 cases were diagnosed as reactive lesions with an incidence of 17.75%.

Among the reactive lesions, reactive hyperplasias, which encompassed Fibroepithelial hyperplasias (FEH, IFEH) and Fibrous hyperplasia (FH, fibromas) constituted around 50%. This was followed by mucoceles at 22%, pyogenic granulomas (PG) at 15% POF and PCOF at 9% and reactive giant cell lesions at 4%. The detailed breakdown of the number of instances and their corresponding percentages is presented in Table 1 and Figure 1 below.

Table 1. Distribution of the reactive lesions

	Reactive lesions	Total Number
	PG	28
	POF & PCOF	16

	Mucocele	39
Reactive Giant cell lesions	PGCG	3
	GCF	4
Reactive Hyperplasias	Fibrous hyperplasia	42
	Fibroepithelial hyperplasia	49
Total		181

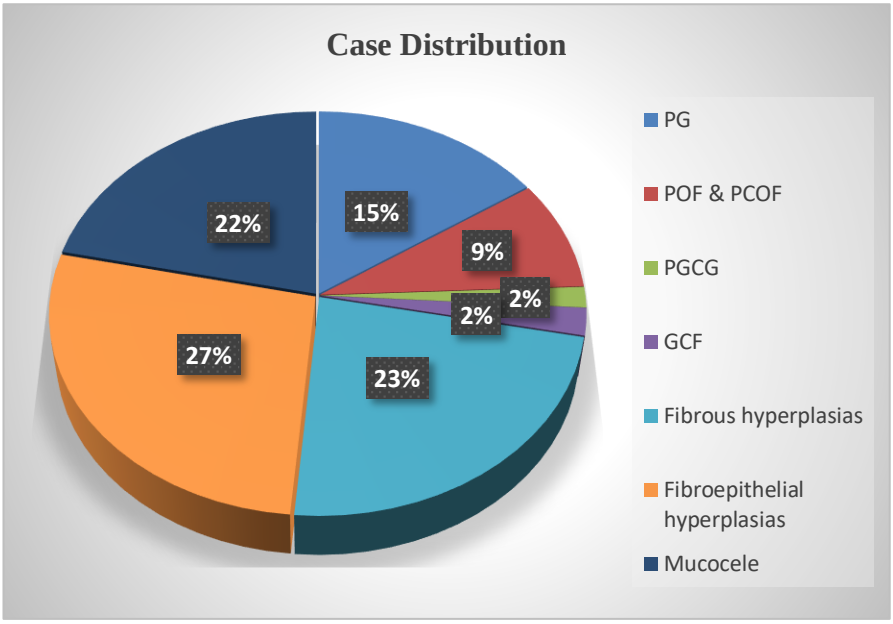

Figure 1. Percentage distribution of cases
Figure 1depicts the case wise distribution of reactive lesions.

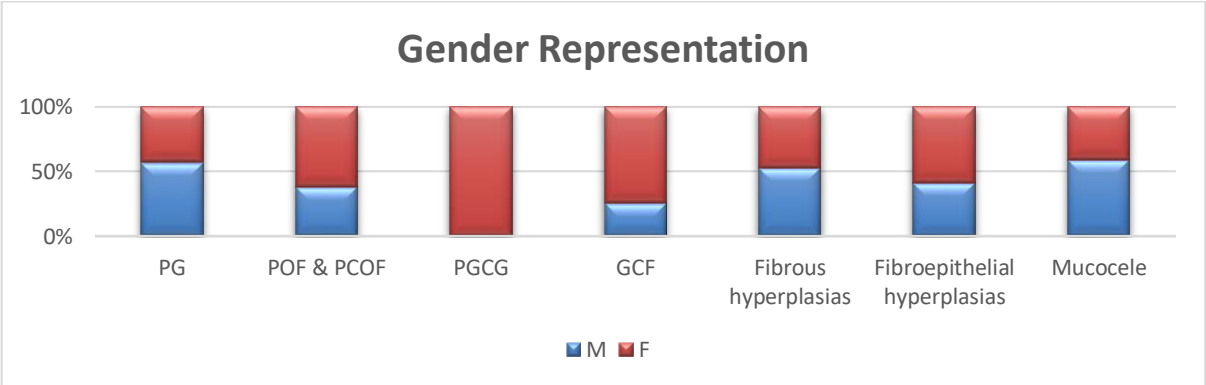

Figure 2. Gender representation within the cases
Figure 2 illustrates the distribution of males and females. In our study population of reactive lesions, there were 88 males and 93 females, indicating a slight female predominance. In PG and mucocele, the incidence of males affected was somewhat higher than that of females. In POF & PCOF, and in PGCG and GCF (reactive giant cell lesions), the proportion of affected females was higher. A similar observation was noted in reactive hyperplasias.

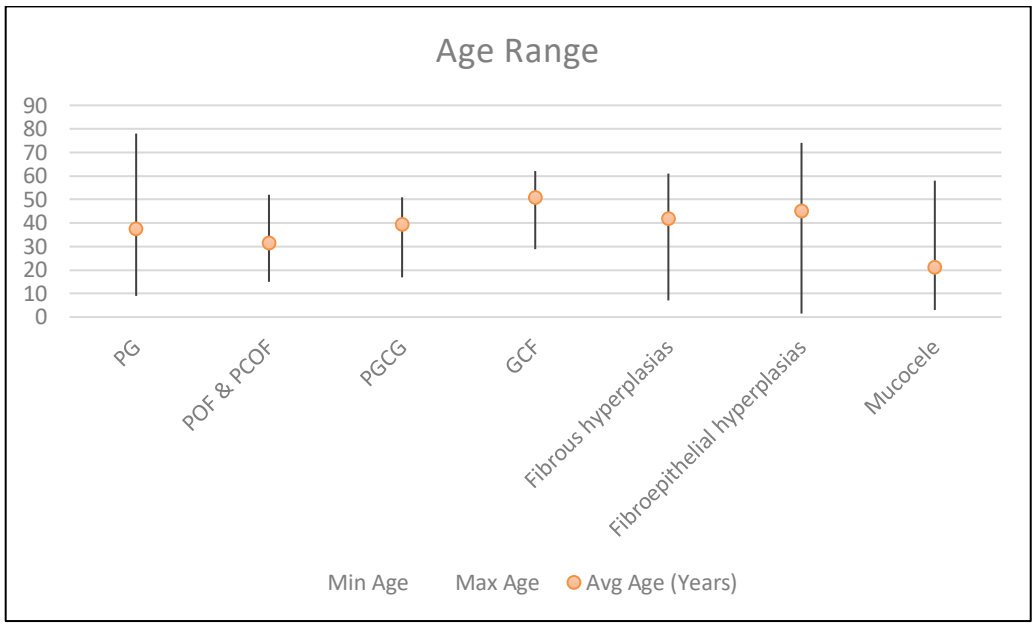

Figure 3. Age range and the mean age distribution

Figure 3 illustrates the age distribution. For PG the mean age was found to be around 37.43 years with age ranging from 9-78 years. POF & PCOF with mean age of 31.38 years and ages ranging from 15-52 years. The average age for mucocele was 21.23 years with age ranging from 3-58 years. The mean age of reactive giant cell lesions (PGCG, GCF) was 45.86 years with age ranging of 17- 62 years. Reactive hyperplasias (including IFEH, FEH, IFH, FH, fibroma) mean age was 43. 6 years with age ranging from 1.5 years to 74 years.

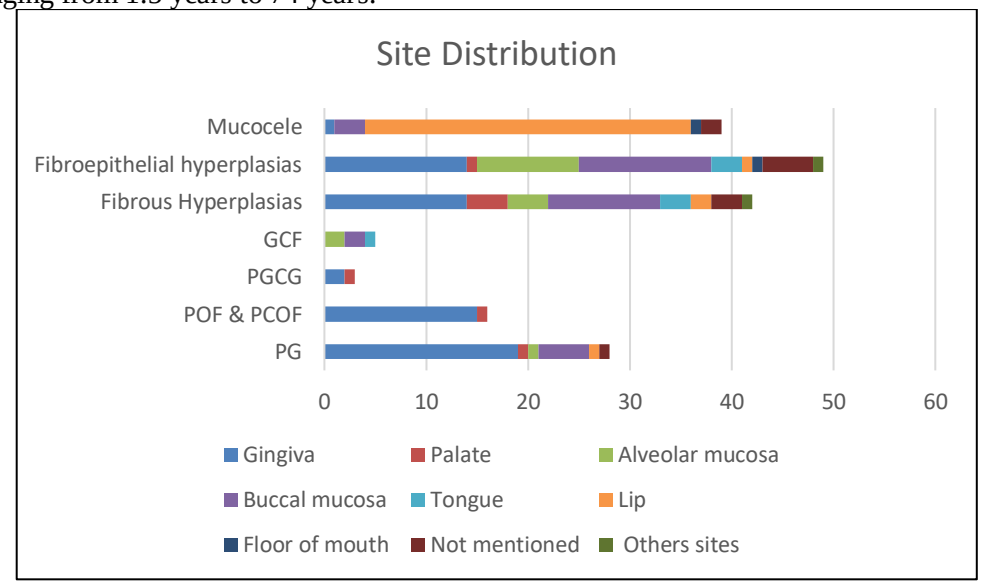

Figure 4. Site distributions of the lesions

Figure 4 depicts the distribution of the lesions according to the site. The most commonly affected area was the gingiva followed by the lip (mucocele), buccal mucosa and palate. For PG, gingiva (19/28) was the most common site followed by buccal mucosa (5/28) and lip and alveolar mucosa (1/28) each). For POF & PCOF) (15/16) cases were observed on the gingiva and one on the palate 32/39 cases of mucoceles were present on the lip, 3/39 on the buccal mucosa and 1 case each in gingiva and floor of mouth. Gingiva was the most commonly affected region for reactive hyperplasias (28/91) followed by buccal mucosa (24/91). Other sites that had reactive hyperplasias were palate, lip, tongue, floor of mouth, alveolar mucosa. For reactive giant cell lesion 2 cases each were present on the gingiva and alveolar mucosa and 1 case each on palate, buccal mucosa and tongue. For some cases the site was not mentioned and 2 other cases had other locations that were affected than the ones mentioned above.

Table 2. Highlights the studies on reactive lesions conducted so far around the world. A total of 28 studies were identified and tabulated in a chronological order. This table may not represent an exhaustive list.

Sl No	No of years of data included in the study	Total records gone through	records that are RHL	Author	Place, year	% RHL
1	1963-1970	NP	279	Eversole	Kentucky, 1972	NA
2	Jan 1968 - Dec 1978(11 years)	NP	741	Kfir et al	San Fransico, 1980	NA
3	15 years	NP	175	Goran Anneroth and Ake Sigurdson	Sweden, 1983	NA
4	5 years(March 2000-March 2005)	NP	172	Zarei et al.	Iran., 2007	NA
5	Jan 1951 to July 2005	NP	2439	Zhang et al	China, 2007	NA
6	12 years (1982-1994)	4027	636	N Al-Rawi	Iraq, 2008	15.79%
7	4 years(Sep 2004 - Sep 2008)	NP	123	Amirchaghmaghi et al	Iran, 2011	NA
8	2000-2011	6369	1149	Maturana-Ramírez et al.	Chile, 2011	18.04%
9	Jan 1970- Dec 2008	5572	314	Effiom et al	Nigeria, 2011	5.63%
10	1.5 years	240	100	Kashyap et al	India, 2012	41.66%
11	20 years	NP	427	R Krishnapillai et al	India, 2012	NA
12	1988-2005	NP	2068	Noushin J Naderi et al	Iran, 2012	NA
13	10 years (2001-2010)	1634	209	Reddy et al	India, 2013	12.79%
14	10 years(1999 – 2009)	938	328	Palmeira et al	Brazil, 2013	34.96%
15	Jan 2007 to Dec 2011 5 years	2753	295	Vidyanath et al	India, 2015	10.71%
16	5 years (2010 – 2015)	402	88	Mandeep aur et al	India, 2016	21.89%
17	(2006 – 2015)	NP	460	Hunasgi et al	India, 2017	NA
18	10 years July 2006 to July 2016	5000	659	Babu et al	India, 2017	13.18%
19	10 years 2006 to 2016	2400	534	Kamile Leonardi Dutra	Brazil, 2018	22.25%
20	1 year (2016-2017)	NP	60	Gurvinder Kaur	India, 2018	NA
21	10 years (2006 and 2015)	390	78	Soyele	Nigeria, 2019	20%
22	2 years	NP	112	Samrina Mohammad	Pakistan, 2020	NA
23	2011-2017	NP	243	Karuma C et al	Johannesburg, 2021	NA
24	10 years	501	73	Efetobo Victor Orikpete	Nigeria, 2021	14.57%
25	22 years (1996 - 2017)	5284	1000	Montazer Lotf-Elah	Iran, 2022	18.92%
26	2018-2020 (3 years)	2254	73	Vandana Gupta	India, 2022	3.23%
27	5 years (Jan 2019 to May 2024)	577	67	Vaddadi Sindhuja	India, 2024	11.61%
28	10 years (2011 - 2020)	21420	2142	Ahmed Metwally	Egypt, 2024	10 %

NP : Not published. The data hasn't been published by the authors.

NA: Not applicable, as the % of RHL hasn't been mentioned by the authors nor can it be calculated as the total number of biopsies gone through has not been published.

DISCUSSION

Oral Pyogenic Granuloma is a RL that most commonly occurs on the gingiva and may present as a painless growth or with slight pain and tendency to bleed on probing.[9] It presents as a reddish growth in the initial stages and it appears more pink in the mature lesions. [10] It usually has a female predilection. However, in our present study, the number of males affected were more than number of females which is in contrast to many of the studies published. The mean age of presentation in our study was 37. 42 yrs similar to other studies and those conducted by Krishnapillai et al [9] . The age of presentation ranged in our study from 9-78 yrs. The most commonly affected site was the gingiva, followed by the buccal mucosa and lip. Additionally, within these 5 years 3 cases from our study reported recurrence. Histopathologically, PG are entirely or partially covered with epithelium with underlying connective tissue consisting of abundant vascularity, budding capillaries and acute or chronic inflammatory cells.

Peripheral ossifying fibromas and peripheral cemento-ossifying fibromas usually occurs in the younger age group peaking the 3rd decade. This is similar to our study where the mean was 31.37 yrs with a age range of 15-52 years. [10] In our study except for 1 case all of the lesions were seen on the gingiva, which may support its supposed etiopathogenesis where it is thought to arise from gingiva, periosteum or PDL [11]. There is a female predilection and we found the same in our study [11]. Radiographically these lesions may show flecks of calcifications which can be corroborated histopathologically by the presence of osseous or cementum-like structures in the connective tissue. Mucocele was included in the study because it is a very commonly occurring reactive lesion. In fact, it amounted up to 22 % of all RHL reported in our study. It is usually seen on the lip and is purported to arise due to lip biting. However, in almost all studies it hasn't been considered under the umbrella of reactive lesion as it affects the salivary gland or because it doesn't occur on the gingiva as most of the studies focuses on reactive gingival lesions. In our study 32/39 cases of mucoceles were present on the lip, 3/39 on the buccal mucosa and 1 case each in gingiva and floor of mouth. It showed a slight male predilection similar to the study by Teggmani et al and the mean age at the time of presentation was 21.23 yrs with ages ranging from 3yrs to 58 yrs. [12]

We grouped peripheral giant cell fibroma and giant cell fibroma under a wider umbrella of reactive giant cell lesions. Concerning PGCG, in our study 17-51 yrs was the age range and the mean age of the patients were 39.3 yrs. We found a slight female tendency. This is in contrast to the study by Zarei et al where he reported the mean age for PGCG was 26 years with a slight male tendency [13]. Histopathologically, PGCG has a overlying epithelium with numerous multinucleated giant cells in the connective tissue surrounded by a fibrovascular stroma. Oral GCF is a reactive lesion characterised histopathologically by the presence of giant fibroblast in the subepithelial region which may may not be multinucleated.[14]. Clinically it is an asymptomatic mass that is seen commonly on the gingiva however, it can occur on other areas such as the buccal mucosa, palate, lip etc. [15]It can occur at any age however, most commonly seen in 2nd to 4th decade of life. [16] In our study the mean age of presentation was 50.75 with ages ranging from 29 to 62 years. Two cases were reported on the buccal mucosa and alveolar mucosa and 1 case on the tongue Similar to PGCG, GCF showed a female predilection too.

Reactive hyperplasias such as Irritation Fibroma/ Fibrous Hyperplasia (IFH/FH) and Inflammatory Fibroepithelial Hyperplasia (IFEH/FEH) are commonly encountered intraoral lesions. Among these, IFH/FH is considered the most prevalent reactive lesion in the oral cavity, primarily affecting adult females. Clinically, it typically presents as a mucosal lesion of normal coloration, which may be either sessile or pedunculated. Its pathogenesis is often linked to low-grade, chronic irritants such as fractured teeth, parafunctional habits, and similar factors. In our cases, the gingiva was the most commonly affected site, aligning with the findings of Zarei et al. However, this differs from the observations of Santos et al., who reported the buccal mucosa as the predominant site. [17] The mean age of presentation was 43.6 yrs 1 case showed recurrence. Fibroepithelial hyperplasia which is also grouped under reactive hyperplasis in our study is a reactive inflammatory condition that typically arises in the gingiva and can present as various lesion types depending on the clinical context. [18] Histopathologically, FEH/IFEH exhibits hyperplasia of both the surface epithelium and the underlying fibrous connective tissue with in contrast to IFH/FH which demonstrated hyperplasia limited to the connective tissue. Prominent inflammation may or may not be present. It is important to distinguish fibroepithelial hyperplasia from focal epithelial hyperplasia, the latter being a viral infection caused by the human papillomavirus (HPV). Unlike fibroepithelial hyperplasia, which involves both the epithelium and connective tissue, focal epithelial hyperplasia affects only the epithelial layer of the oral mucosa [19]. In our study the mean age was around 44.19 yrs. 3 cases were also reported to have recurrences in our study.

The RLs can be a differential diagnosis for each other. However apart from the other RLs few other differential

diagnosis that can be considered are as follows:

Clinically, as PG, PGCG can present with a slight reddish to violaceous hue, hemangiomas, lymphangioma, and Kaposi sarcoma can be considered. However, sometimes aggressive PGs can be encountered which may be misdiagnosed as a malignant lesion. Therefore, histopathological diagnosis is of utmost importance. Another entity one must keep in mind while diagnosing PGCG is Browne's tumor as it could be present due to hormonal imbalance ie. Hyperparathyroidism. Therefore, it is pertinent that a good medical history be taken. The reccurence rate (RR) for PG is 3- 15% and PGCG is 10-18% [20,21]

A note to remember while diagnosing POF is that one should not confuse it with peripheral odontogenic fibroma as POF represents a reactive process whereas peripheral odontogenic fibroma represents a neoplastic entity. The RR for POF is 8-16%. [20]

The recurrence for TF and GCF is rare. GCF can resemble retrocuspid papilla which is a normal anatomical variation seen bilaterally on the lingual gingiva. So, one should keep this in mind while diagnosing this especially in children as it has around 25-99% prevalence. Hence it should not be excised. GCF can have papillary projections and hence papilloma can also be considered into the diagnosis. However the cause of papilloma is by *Human Papilloma Virus*. [20,22]

The differential diagnosis of mucocele include lipoma, hemangioma, lymphangioma. One must also think of salivary gland neoplasm if it presents itself on the upper lip as mucoceles are very rare on the upper lip which is in contrast to salivary gland neoplasm. [23]

The management of RLs can be achieved by elimination of causative factors or the source of irritation which can achieved by good plaque control and oral hygiene. Additionally, proper excision using conventional scalpel or laser removal is done so that recurrence may be kept at bay. Other methods of management include curettage, cryotherapy, electrosurgery. Literature also suggests injection of sclerosing agent or corticosteroid for the management of mucocele. [9,16,24]

Our analysis is based on 5 years data from a single centre, however conducting a multicentric study would provide a more robust understanding of the prevalence and distribution of lesions across the nation or globe.

CONCLUSION

The reactive lesions are of the commonly occurring lesions in the oral cavity. Although the lesions may show clinical similarities they show histopathological differences. This study gives an updated look on the prevalence, demographic trends and site distribution of reactive lesions diagnosed at our institution in the past 5 years. 17.75% of all cases reported during the duration were reactive in nature. The most common location was the gingiva and hence RLs are differentials for gingival growths. These results highlight the predominance of low-grade irritation as an etiological factor. A complete removal of local irritants is necessary for the treatment. Larger sample sizes in future multicentric studies are advised in order to confirm these trends and advance our understanding regarding epidemiology.

DECLARATIONS

Data availability: The datasets generated and analyzed during the current study will be available from the first author upon reasonable request.

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Competing Interests: The authors have no competing interests to declare.

Ethical Approval: Ethical approval has been taken for the study from the concerned intuitional ethical board.

Informed Consent: Not applicable.

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