

Clinicopathological Spectrum of Pyogenic Granuloma in patients presenting at Ayub Teaching Hospital, Abbottabad

SHABANA NAZ¹, SHAGUFTA NAEEM¹, ABDUR REHMAN², ZAINAB JADOON², NAVEED KHAN², AMMAR BIN SAAD¹

¹Department of Pathology, Ayub Medical College, Abbottabad-Pakistan

²Department of Dentistry, Ayub Medical College, Abbottabad-Pakistan

Correspondence to Dr Shagufta Naeem, E-mail: drshaguftanaeem@yahoo.com, Tel+92-333-5154745

ABSTRACT

Background: Oral Pyogenic Granuloma (OPG) is a type of oral mucosal lesion that is distinguished by its rapid development, friable nature, and vascular proliferation.

Aim: To examine the demographic and histopathological features of patients diagnosed with oral pyogenic granuloma.

Study design: The cross-sectional study.

Methodology: This study was conducted in the Dentistry Department of Ayub Medical College, Abbottabad following the acquisition of a comprehensive medical history through a pre-established form, pertinent clinical information pertaining to the patients, including age and lesion location, was collected. All excisional biopsy specimens were collected. Following preservation in 10% neutral buffered formalin, the gathered specimens underwent preparation for paraffin embedding. The histopathological findings that were assessed and documented included the observation of ulceration, inflammatory cell infiltration, vascular proliferation, fibrosis, and epithelial alterations. Data was analyzed in SPSS.

Results: The 51 patients who were a part of the research had a mean age of 31.14+SD and were all female. The bulk of the patients were between the ages of 26 and 35. Lesion diameters varied from 0.5 to 3 cm, with 1.1 to 2 cm being the most common size range. 78% of the cases involved pregnant females. The most common site was the gum mucosa, lips, tongue, and palate were the next most typical locations for OPG. The majority of patients had pseudoepitheliomatous hyperplasia, mild chronic inflammation, and fibrosis, in addition to lobules of capillary sized blood vessels according to histopathological examination.

Conclusion: Oral Pyogenic Granuloma is predominantly seen in young females, and is mostly associated with pregnancy and most common site is gum mucosa. The histopathological findings demonstrate characteristic features such as pseudoepitheliomatous hyperplasia, chronic inflammation, and fibrosis. Understanding these features contributes to accurate diagnosis and management of this lesion.

Keywords: Oral Pyogenic Granuloma, lobular capillary hemangioma, pseudoepitheliomatous hyperplasia.

INTRODUCTION

Oral Pyogenic Granuloma (OPG) is a type of oral mucosal lesion that is distinguished by its rapid development, friable nature, and vascular proliferation. It is also referred to as lobular capillary hemangioma¹. Nevertheless, the gingiva, buccal mucosa, tongue, and lips are also vulnerable. The present lesion is not attributable to an infectious or granulomatous etiology. The aforementioned statement denotes an excessive response to a specific area of physical discomfort or harm. Young women in their twenties experience a disproportionate impact^{2,3}.

The histopathological examination of OPG reveals the presence of blood vessels exhibiting a lobular pattern and characterized by thin walls. The endothelial cells lining the walls of blood vessels are notably thick, and the adjacent inflammatory infiltrate is comprised of various immune cells such as lymphocytes, plasma cells, and neutrophils. The present lesion exhibits a lack of encapsulation and the presence of ulceration. The unique histological appearance of the tissue is attributed to the presence of granulation tissue and fibroblastic growth. In most cases, the visual characteristics of OPG^{4,5} entail a reddish, gelatinous, exophytic growth that exhibits a surface that is either smooth or lobulated. The dimensions of the lesion exhibit significant variation, spanning from a few millimeters to multiple centimeters. Numerous risk factors have been identified in scholarly literature, however, the exact etiology of OPG remains elusive. The development of OPG has been associated with chronic local irritation and trauma, which can be attributed to various factors including poor oral hygiene, dental plaque, calculus, ill-fitting dental appliances, and abrasive restorative materials. These factors elicit an inflammatory response and facilitate the process of angiogenesis, ultimately culminating in the development of the lesion. There is a hypothesized association

between chronic oral infections, including periodontal disease and dental caries, and inflammation, which may contribute to the development of OPG^{4,5}.

The initiation of an inflammatory cascade and subsequent tissue proliferation resulting in the development of a lesion is a common consequence of a persistent infection⁶. Recent findings indicate that estrogen and progesterone, with estrogen being the more prominent of the two, possess a mitogenic impact on blood vessels, thereby implying their potential to stimulate vascular proliferation^{6,7}.

The prevalence of OPG during pregnancy and its apparent preference for pregnant women have led to the hypothesis that hormonal variables may contribute to its development. The condition wherein the intraoral mucosa is impacted during pregnancy is commonly known as granuloma gravidarum, granuloma of pregnancy, or epulis gravidarum⁸.

During pregnancy, there is an increase in the levels of both estrogen and progesterone, which may potentially contribute to the onset of this lesion. After pregnancy when the hormone levels drop to normal, some of these pyogenic granulomas resolve without treatment. According to Studies, there exists a correlation between hormone replacement therapy, specifically estrogen, and an elevated likelihood of OPG development. The perturbation of the intricate vascular equilibrium induced by the hormonal imbalance of this treatment could have potentially played a role in the formation of the lesion⁹.

In the presence of oral pyogenic granuloma (OPG), a prevalent benign vascular lesion, the oral mucosa exhibits a heightened propensity to hemorrhage upon minimal trauma. A comprehensive comprehension of the causative factors is crucial for accurate diagnosis, effective treatment, and recurrence prevention¹⁰.

OPG is the condition that is observed in young pregnant ladies. This publication will help in better understanding of histopathological features which will help in accurate diagnosis and disease management.

Received on 14-05-2023

Accepted on 27-07-2023

METHODOLOGY

This was a cross-sectional study of cases of OPG received from the Dentistry Department of Ayub Medical College, Abbottabad, from May 2019 to April 2021. Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Ayub Medical College, Abbottabad. During the period spanning May 2019 to April 2021, all biopsy specimens that were procured as suspected cases of OPG and subsequently submitted to the Histopathology department of Ayub Medical College Abbottabad for confirmation were assessed in accordance with the study's prescribed inclusion criteria. Inclusion criteria for the study required patients to have received both a clinical diagnosis and a biopsy-confirmed diagnosis of OPG. Any additional oral lesions or systemic illnesses were excluded from the patient's condition. Following the acquisition of a comprehensive medical history through a pre-established form, pertinent clinical information pertaining to the patients, including age and lesion location, was collected. All excisional biopsy specimens were collected. Following preservation in 10% neutral buffered formalin, the gathered specimens underwent preparation for paraffin embedding. To facilitate microscopic examination, thin sections measuring 4-5 micrometer in thickness were prepared and subjected to staining using hematoxylin and eosin (H&E). The histopathological findings that were assessed and documented included the observation of ulceration, inflammatory cell infiltration, vascular proliferation, fibrosis, and epithelial alterations.

Statistical Analysis: Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were utilized to depict the demographic and clinical characteristics of the patients. The study reported the frequencies and percentages of the histopathological findings.

RESULTS

The study exclusively comprised female patients. The sample's average age was 31.14 years, with a standard deviation of 4.99 years. Table-1 presented an analysis of the age distribution within the study cohort, as indicated by the frequency and percentage values. The age range of 31-35 years had the highest proportion of patients (31.37%), while the age range of 26-30 years had the second highest proportion (29.41%). The patient population was divided into two age groups, namely 21-25 years and 36-40 years, which constituted 15.69% and 23.53% of the sample, respectively.

Table 1: Age composition of the study participants

Age (21-40years)	Frequency	Percentage
21-25	8	15.69%
26-30	15	29.41%
31-35	16	31.37%
36-40	12	23.53%

The size of the lesions is provided in Table-2. The category of lesion size that occurred most frequently was 1.1 to 2cm, which constituted 54.90% of the cases. The subsequent prevalent size range observed was 0.5 to 1.5cm, accounting for 25.49% of the instances. The lesion sizes ranging from 2.1 to 3cm constituted the least proportion of cases, accounting for 19.61% of the total.

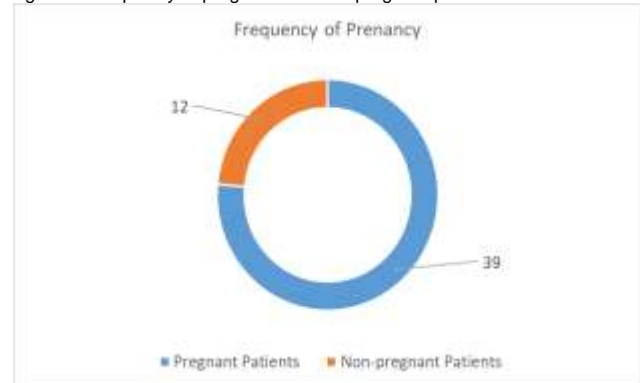
Table 2: Segregation of patients on the basis of lesion size

Size of lesion	Frequency	Percentage
0.5 to 1.5cm	13 cases	25.49%
1.1 to 2cm	28 cases	54.90%
2.1 to 3cm	10 cases	19.61%

The pie chart depicted in Figure 1 displays the relative occurrence of patients diagnosed with OPG, categorized by their pregnancy status. The pregnant population is represented by a slice that constitutes 39 out of 51, accounting for 78% of the total population. The subset denoting individuals who are not pregnant comprises a proportion of 12/51, equivalent to 22% of the total sample.

According to our data, the incidence of OPG appears to be higher among pregnant females.

Figure 1: Frequency of pregnant and non-pregnant patients



The bar chart depicted in Figure 2 displays the distribution of lesions across various oral sites. The gingiva is the predominant location for lesions, accounting for 21 instances or 41% of the overall occurrences. The oral mucosa is identified as the second most prevalent site, accounting for 12 lesions or 23% of the overall total. The lip, tongue, and palate account for 19.6%, 14% and 1.96% of the total cases, respectively.

Figure 2: Bar chart representing percentage of occurrence of lesion at various sites in the oral cavity

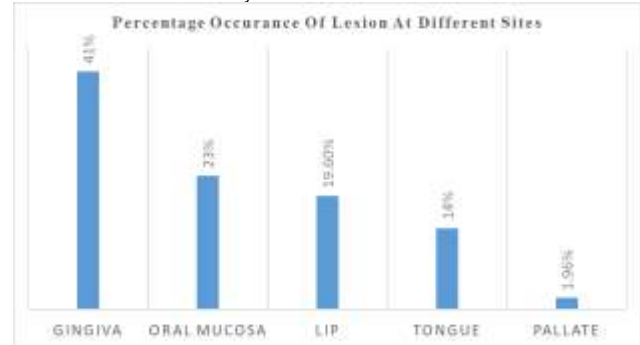


Table 3 depicts the results of the histopathological analysis conducted on the specimen. The findings indicate that the histopathological alterations under investigation encompassed modifications in the Mucosal Epithelium, persistent inflammation, and fibrosis. The majority of cases displayed a mucosal epithelial change characterized by pseudoepitheliomatous hyperplasia, which was observed in 60.78% of the cases. The study revealed the presence of chronic inflammation, with a higher incidence of moderate severity cases (49.02% of the total cases). Furthermore, a considerable proportion of cases (58.82%) exhibited the presence of fibrosis.

Table 3: Histopathology features of the OPG under the microscope

Microscopic Features	Frequency	%age
Mucosal Epithelial changes		
Pseudoepitheliomatous hyperplasia	31	60.78%
Ulceration	4	7.84%
Atrophy	16	31.37%
Severity of Chronic Inflammation		
Mild	15	29.41%
Moderate	25	49.02%
Severe	11	21.57%
Fibrosis		
Present	30	58.82%
Absent	21	41.18%

DISCUSSION

The objective of this investigation was to examine the histopathological features of OPG within a tertiary healthcare facility located in Abbottabad, Pakistan. The results of this study offer significant contributions to the understanding of the demographic variables, lesion attributes, and microscopic characteristics of this prevalent oral anomaly. The study's sample exhibited a mean age of 31.14 years, accompanied by a standard deviation of 4.99 years. The observed age distribution is in accordance with prior research conducted in diverse populations^{11,12}. The findings suggest that individuals between the ages of 26 and 35 are more prone to OPG, as they constituted the largest proportion of patients. The increased prevalence of this lesion in the specified age group may be attributed to hormonal fluctuations, oral hygiene habits, and local factors. The available literature indicates that OPG primarily affects individuals in their early adulthood, with the second and third decades of life being the most prevalent age groups for OPG incidence^{13,14}. Bhat S et al. conducted a study which revealed that the median age of individuals diagnosed with OPG was 25 years, with a higher prevalence among the female demographic¹⁵. Alam and colleagues reported that the median age of individuals diagnosed with OPG was 23 years, with a higher prevalence of the lesion observed in females¹⁶.

The results of the lesion size analysis indicate that the size category with the highest frequency was 1.1 to 2 cm, which was followed by the categories of 0.5 to 1.5 cm and 2.1 to 3 cm, respectively. The present findings are consistent with prior research that has reported analogous size distributions¹⁷. The heterogeneity in the size of the lesion can be ascribed to variables such as the lesion's duration, its anatomical site, and the fundamental etiology. Additional research is necessary to examine the correlation between the size of the lesion and the resulting clinical outcomes.

This study aimed to evaluate the impact of pregnancy on the incidence of OPG. The data indicated a greater prevalence of OPG in pregnant females in comparison to those who are not pregnant. This discovery aligns with the current body of literature¹⁸. The physiological changes that occur during pregnancy, such as hormonal fluctuations, heightened vascularity, and immune modulation, are believed to be responsible for this phenomenon^{19,20}. It is imperative to inform expectant mothers of the heightened susceptibility to osteoporotic bone fractures and the significance of upholding proper oral hygiene practices throughout gestation.

The present study evaluated the distribution of oral cavity lesions across various sites. The results indicated that the gingiva exhibited the highest frequency of lesions, followed by the oral mucosa, lip, tongue, and palate. The present distribution of the site is consistent with prior research, suggesting that regions that experience irritation and trauma are at a higher risk of developing oral pyogenic granuloma (OPG)¹⁸. The high vascularity of the gingiva renders it prone to reactive hyperplastic responses, which can be attributed to the predominance of lesions in this area.

The observed lesions were subject to microscopic examination, which revealed that mucosal epithelial changes were a prevalent occurrence. The microscopic feature that was most commonly observed in the cases studied was pseudoepitheliomatous hyperplasia, which accounted for 60.78% of the cases. Pseudoepitheliomatous hyperplasia denotes the anomalous hypertrophy of the mucosal epithelium. The present discovery is in line with prior accounts and offers understanding into the development of OPG¹³. The occurrence of ulceration, characterized by the development of exposed lesions or disruptions in the mucosal epithelium, was observed in 7.84% of the cases. The term "atrophy" pertains to the diminution or degeneration of the customary tissue architecture in the mucosal epithelium, as observed in 31.37% of the instances.

In 29.41% of the cases, there was evidence of mild chronic inflammation. The findings of the study revealed that a considerable proportion of cases, specifically 49.02%, exhibited moderate chronic inflammation, which suggests a higher level of inflammation in comparison to cases with mild inflammation. The findings indicate that a significant proportion of cases, specifically 21.57%, exhibited severe chronic inflammation, which was observed to be the most elevated level of inflammation compared to the other two categories. The study revealed that fibrosis was observed in 58.82% of the cases, signifying the development of an excessive amount of fibrous connective tissue in the affected region. The indication of fibrosis in a considerable percentage of instances implies the engagement of tissue remodeling mechanisms. Surgical excision is the customary approach for managing OPGs. Laser therapy or cryotherapy may be employed in certain instances. The outlook for individuals diagnosed with OPGs is highly favorable. The lesions exhibit a high rate of responsiveness to treatment and display infrequent recurrence^{13,14}.

The congruence between the current investigation and prior scholarly works underscores the uniformity of clinical and histopathological characteristics among diverse cohorts. The statement suggests a common pathogenesis and underlying mechanisms that contribute to the occurrence of OPG in various populations. Nevertheless, it is crucial to recognize the constraints of this research.

Limitations of study: The findings of this study may have limited due to the fact that it was conducted at a single center. Furthermore, it is recommended that future studies increase the sample size in order to improve statistical power along with use of immunohistochemical markers and more comprehensively investigate potential associations.

CONCLUSION

Pyogenic granuloma primarily affects young females and is commonly linked to pregnancy and mucosal locations. The histopathological observations exhibit distinctive characteristics such as pseudoepitheliomatous hyperplasia, chronic inflammation, and fibrosis. Comprehending these characteristics aids in precise identification and treatment of OPG.

Conflict of interest: None

Funding: None

Authorship and contribution Declaration: Each author of this article fulfilled following Criteria of Authorship:

SN&SN: Overall supervision and Write up and literature review.

AR&ZJ: Statistics application, analysis literature review, help in write up.

NK&ABS: Literature review help in write-up.

All authors agree to be responsible for all aspects of their research work.

Acknowledgements: I am thankful to Allah and all my colleagues for their help.

REFERENCES

1. Mills SE, Cooper PH, Fechner RE. Lobular capillary hemangioma: the underlying lesion of pyogenic granuloma. A study of 73 cases from the oral and nasal mucous membranes. *Am J Surg Pathol.* 1980 Oct;4(5):470-9.
2. Newadkar UR, Khairnar S, Dodamani A. Pyogenic granuloma: A clinicopathological analysis of fifty cases. *J Oral Maxillofac Res.* 2018;10(1):7-10.
3. 5. Walsh TM. Pyogenic granuloma. In: Walsh Medical Media, editor. *Oral and maxillofacial pathology.* Cham, Switzerland: Springer International Publishing; 2016. p. 106-107.
4. Neville BW, Damm DD, Allen CM, Chi AC. *Oral and Maxillofacial Pathology.* 4th ed. St. Louis, MO: Elsevier; 2016.
5. Al-Otaibi D, Al-Masoud N, Al-Zahrani A. Pyogenic granuloma in Saudi Arabia: a retrospective analysis of 427 cases. *Saudi Dent J.* 2013;25(4):149-154.
6. Gupta R, Gupta S. Pyogenic granuloma: A review of literature. *Indian J Dermatol Venereol Leprol.* 2022;88(1):1-7.

7. Reddy V, Reddy V, Reddy V. Pyogenic granuloma: A review of literature. *J Oral Maxillofac Surg.* 2022;80(2):364-373.
8. Andrikopoulou M, Chatzistamou I, Gkilas H, Vilaras G, Sklavounou A. Assessment of angiogenic markers and female sex hormone receptors in pregnancy tumor of the gingiva. *J Oral Maxillofac Surg.* 2013 Aug;71(8):1376-1381.
9. Gurgan CA, Horasan S, Cinar C, et al. The effects of a hormonal contraceptive on gingiva: a histopathological study. *J Periodontol.* 2008;79(11):2144-2149.
10. Bodner L, Peist M, Gatot A, Fliss DM. Clinical and histopathological analysis of gingival pyogenic granuloma: a retrospective study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2007;103(5):e32-e37
11. Smitha T, Mohanty R, Singhal P, Das S, Babu G, Patil A. OPG: A clinicopathological study. *J Dent Res Dent Clin Dent Prospects.* 2018;12(1):20-23.
12. Sangeetha R, Uma G, Lavanya G, Sarumathi T, Gayathri V, Priya T. Evaluation of OPG Using AgNOR Stain – A Clinicopathological Study. *J Clin Diagn Res.* 2016;10(5):ZC81-ZC84.
13. Bhatia S, Gupta A. OPG: A review of literature with a case report. *J Oral Maxillofac Pathol.* 2016;22(2):175-181
14. Neville BW, Damm DD, Allen CM, Bouquot JE. *Oral and maxillofacial pathology.* 4th ed. Philadelphia, PA: Saunders; 2016.
15. Bhat S, Patel V, Gupta P, Patel K. Pyogenic granuloma: A clinical and histopathological study of 100 cases. *J Oral Maxillofac Pathol.* 2020;24(1):105-110
16. Alam S, Alam M, Rahman M. Pyogenic granuloma: A clinicopathological study of 100 cases. *Bangladesh J Dermatol.* 2021;36(1):1-6.
17. Varshney N, Kaur N, Malhotra R, Gill N. OPG - An Evaluation of 215 Cases in a Northern Indian Population. *Cureus.* 2019;11(8):e5419.
18. Arora M, Saxeena S, Kaur A, et al. Pyogenic Granuloma: A Clinico-Pathological Study. *JK Science.* 2017;19(2):75-78.
19. Scully C, Ferguson M. *Oral and maxillofacial pathology.* 6th ed. Edinburgh, UK: Churchill Livingstone; 2017.
20. Regezi JA, Sciubba JJ, Jordan RC. *Oral pathology: Clinical pathologic correlations.* 7th ed. Philadelphia, PA: Saunders; 2018.

This article may be cited as: Naz S, Naeem S, Rehman A, Jadoon Z, Khan N, Saad AB: Clinico-pathological Spectrum of Pyogenic Granuloma in Patients Presenting at Ayub Teaching Hospital, Abbottabad. *Pak J Med Health Sci,* 2023;17(8):29-32.