Central Giant Cell Granuloma in the Libyan Population- A 30 Year Retrospective Study

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Abstract:

Central giant cell granuloma (CGCG) is a benign, uncommon intraosseous lesion typically found in the jawbones and characterized by having multinucleated giant cells in their histopathology. The etiology of this lesion is not clear, but it may be reactive, developmental, or neoplastic. It has a clinical and radiographic presentation that is similar to benign tumors. However, the World health organization (WHO) classifies it as a bone-related lesion rather than a true tumor. Although several studies have investigated both demographic and anatomical characteristics of CGCG in different populations, there is a lack of data regarding the Libyan population. It is essential to identify demographic and anatomical patterns to reach an accurate diagnosis and effective management. This retrospective cross-sectional study fills a significant gap in the literature by adding population-specific data. In this study we reviewed cases of CGCG diagnosed at the Faculty of Dentistry, Benghazi University, over a 30-year period from 1990 to 2021. Patient data—including age, gender, and lesion site—were collected and analyzed using descriptive statistics. Out of 2036 histopathological specimens, 33 cases (1.6%) were diagnosed as CGCG. The lesions showed female predominance (66.6%), with a mean age of 32.7 ± 18.6 years (range: 8–67 years). The mandible was more frequently affected (74.2%) than the maxilla, particularly in the posterior region. CGCG in the Libyan population exhibits a demographic and anatomical distribution consistent with findings in other populations, including a female predominance and a mandibular predilection. These results highlight the importance of population-specific data in guiding diagnosis and treatment.

Keywords: Age Distribution, Anatomical Distribution, Central Giant Cell Granuloma (CGCG), Gender Distribution, Libyan Population.

الورم الحبيبى المركزي لدي سكان ليبيا ــ دراسة استعادية لمدة 30 سنة

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الملخص

الورم الحبيبي الخلوي العملاق المركزي (CGCG) هو آفة حميدة نادرة داخل العظم، توجد عادةً في عظام الفك، وتتميز بوجود خلايا عملاقة متعددة النوى في نسيجها المرضي. لم يتضح بعد سبب هذه الآفة، ولكنها قد تكون تفاعلية أو نمائية أو ورمية. وتشبه صورتها السريرية والشعاعية الأورام الحميدة. ومع ذلك، تصنفها منظمة الصحة العالمية (WHO) على أنها آفة مرتبطة بالعظام وليست ورمًا حقيقيًا. على الرغم من أن العديد من الدراسات قد بحثت في الخصائص الديموغرافية والتشريحية لـ CGCG في مختلف السكان، إلا أن هناك نقصًا في البيانات المتعلقة بالسكان الليبيين. من الضروري تحديد الأنماط الديموغرافية والتشريحية للوصول إلى تشخيص دقيق وإدارة فعالة. تملأ هذه الدراسة المقطعية الاسترجاعية فجوة كبيرة في الأدبيات من خلال إضافة بيانات خاصة بالسكان. في هذه الدراسة، راجعنا حالات CGCG التي تم تشخيصها في كلية طب الأسنان بجامعة بنغازي، على مدى فترة 30 عامًا من عام 1990 إلى عام 2021. تم جمع بيانات المرضى - بما في ذلك العمر والجنس وموقع الآفة - وتحليلها باستخدام الإحصاءات الوصفية. من بين 2036 عينة نسيجية مرضية، تم تشخيص 33 حالة (1.6٪) على أنها CGCG. أظهرت الآفات هيمنة الإناث (66.6٪)، بمتوسط عمر 32.7 ± 18.6 سنة

(المدى: 8-67 سنة). كان الفك السفلي أكثر تأثرًا (74.2٪) من الفك العلوي، وخاصة في المنطقة الخلفية. يُظهر CGCG في السكان الليبيين توزيعًا ديموغرافيًا وتشريحيًا يتوافق مع النتائج في السكان الآخرين، بما في ذلك هيمنة الإناث وميل الفك السفلي. تسلط هذه النتائج الضوء على أهمية البيانات الخاصة بالسكان في توجيه التشخيص والعلاج.

الكلمات المفتاحية: توزيع الأعما، التوزيع التشريحي، الورم الحبيبي العملاق المركزي(CGCG) ، توزيع الجنس، السكان الليبيون.

Introduction

Central giant cell granuloma (CGCG) is a benign, uncommon intraosseous lesion that has multinucleated giant cells. It is mostly found in the jawbones (1,2,3,4). Although it has a common presentation in terms of the histopathology, the nature and the cause of this lesion are not fully understood (1,2). Several theories have been suggested regarding its etiology; some of them proposed that it might be a reactive lesion or a developmental anomaly, while others even consider it a benign neoplasm (2). Although it usually mimics benign tumours in terms of its clinical and radiographic presentation. However, it was classified by the World Health Organization (WHO) as a bone-related lesion rather than a true tumor (2). Gaining insight into its demographic, radiographic, and clinical patterns across different populations is essential for proper diagnosis and treatment (5,6).

Most giant cell granulomas in the jaws are asymptomatic and are typically discovered on routine radiographs by chance or due to a painless growth of the bone involved. In some cases, however, the lesion may cause pain, numbness, or cortical bone perforation, leading to the ulceration of the overlying mucosa. Several researchers have suggested, based on clinical and radiographic characteristics, that central giant cell lesions of the jaws can be classified into two types. The first type, nonaggressive lesions, represents the majority of the cases; these lesions exhibit slow growth, causing slight or no symptoms, and typically do not lead to cortical perforation or resorption of tooth roots. The second type, aggressive lesions, is associated with pain, rapid expansion, cortical bone perforation, and root resorption. These lesions have a significantly higher likelihood of recurrence following treatment compared to nonaggressive forms (7).

Although several studies have investigated both demographic and anatomical characteristics of CGCG in different populations, there is a lack of data regarding the Libyan population. Without such population-based data, it is challenging to determine whether the patterns of occurrence, anatomical distribution, and demographic features align with global trends or exhibit unique characteristics, which could impact diagnosis and treatment strategies in Libya.

This study is the first to provide a comprehensive overview of CGCG cases in the Libyan population over a 30-year period. It fills a significant gap in the literature by adding population-specific data regarding the prevalence, demographic profile, and anatomical distribution of CGCG in Libya. By correlating its findings with studies from other populations, this study provides new insights into the geographic variability and population differences in the presentation of CGCG, aiding in the global understanding of this lesion's behavior.

Methods

This study employed a retrospective cross-sectional design. The data were obtained from the archives of the Department of Oral Medicine, Pathology, Diagnosis, and Radiology -Faculty of Dentistry, Benghazi University. Patient records diagnosed with CGCG between 1990 and 2021 were assessed and selected for inclusion. Information collected for each patient included age, gender, and the affected site.

For the CGCG location, the following scheme was employed: the involved region was defined as either anterior (anterior to the first molar) or posterior (posterior to the first molar) or as simultaneous involvement of both anterior and posterior regions. The diagnosis of CGCG was based on histological examination. Data were collected and prepared in Microsoft Excel spreadsheets 2017, and simple statistical procedures were carried out, including the calculation of mean age, standard deviation, percentage, and charts.

Inclusion Criteria:
1- Patients whose biopsy specimens were submitted to the Department of Oral Medicine, Pathology, Diagnosis, and Radiology at the Faculty of Dentistry, Benghazi University between 1990 and 2021.
2- Cases that received a definitive histopathological diagnosis of central giant cell granuloma (CGCG).

Exclusion Criteria:
1- Cases with incomplete histopathological records.
2- Specimens diagnosed as other types of giant cell lesions (such as peripheral giant cell granuloma) or other jaw lesions that could mimic CGCG histologically.

Results
The results were expressed through descriptive statistics.
Over a 30-year period, a total of 2036 specimens were histopathologically evaluated, with 33 (1.6%) diagnosed as CGCG. Gender-based analysis indicated that females were more affected, accounting for 66.6% of cases compared to 33.3% in males (11 males, 22 females), resulting in a male-to-female ratio of 1:2. The mean age at incidence of CGCG was 32.7 years ± 18.6, with only 25% (n=8) of cases occurring in patients below the age of 17. The minimum age recorded was 8 years, while the maximum was 67 years (Table 1) (Figure 1).

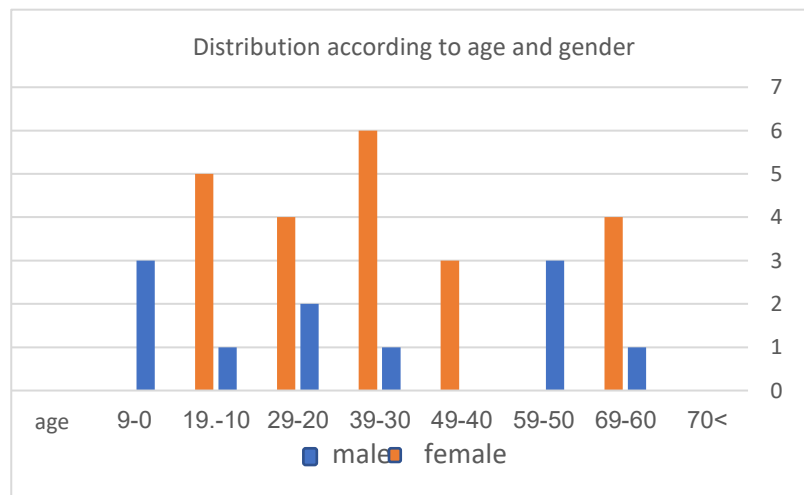**Table 1**. Distribution of CGCG according to age and gender

Age	Male	Female	Total
0-9	3	0	3
10-19	1	5	6
20-29	2	4	6
30-39	1	6	7
40-49	0	3	3
50-59	3	0	3
60-69	1	4	5
≥70	0	0	0
Total	11	22	33

Regarding the anatomical sites, the mandible was predominantly affected, accounting for 74.2% (n=23) of the cases, particularly in the posterior region. In comparison, the maxilla accounted for 25.8% (n=8) of the cases, with the anterior maxilla identified as the most affected area in the upper jaw (Table 2).

Table 2. Distribution of CGCG according to the affected site

Jaw	Anterior		Posterior		Both		Unknown	
	N	%	N	%	N	%	N	%
Mandible	8	25%	9	28.1%	6	18.7%	1	3.03%
Maxilla	5	15.6%	3	9.4%	0	0	0	0

In one case, the site is unknown.

Figure 1. Distribution of CGCG according to age and gender

Discussion
In this study, CGCG accounted for 1.6% of the histopathologically evaluated specimens over the 30-year period. While prevalence figures vary based on the type of study, in a large Iranian study over 38 years, among 9,485 patients, 435 were diagnosed with central giant cell granuloma, representing 4.6% of the cases. This finding suggests that CGCG constitutes a noteworthy proportion of cases and reflects a slightly higher frequency compared to reports from other studies (5). For example, another study identified 31 cases of CGCG, representing 0.1% of 29,134 biopsies conducted between 1970 and 1990 (8). Similarly, research carried out at Indiana

University reported 38 CGCG cases, accounting for only 0.16% of the 22,000 specimens examined in their laboratory (9).

In this Libyan cohort, we found that females were affected more than males; there were 22 female cases and 11 male cases, giving a male-to-female ratio of 1:2. This gender distribution we found in this Libyan cohort matches the findings from other populations, pointing to the higher incidence of CGCG in females (7,10,11,12,13).

It was found that the mean age for CGCG incidence in the Libyan population was 32.7 years ±18.6. The ages of patients ranged between 8 and 67 years. A percentage of 25% (8 out of 33) of the cases were found in patients under the age of 17. However, other populations showed different age distributions. For example, a study conducted in Brazil found that the third decade of life was the most common age for CGCG occurrence, with a mean age of 27 years (6). Similarly, an Iranian study reported the highest frequency of CGCG cases during the third decade of life (5). A systematic review further supported these findings, indicating an average age at diagnosis of 27.5 years (11). However, a similar study conducted in India reported a lower mean age of 19.8 years (10). In comparison, the mean age observed in this study appears slightly higher than some of the reported averages. However, this can be attributed to a combination of reactive processes, delayed presentation and diagnosis due to less aggressive lesion behavior or reduced access to dental care, leading to the identification of CGCG at a later age. Additionally, lesions in older patients might be discovered incidentally during evaluations for other conditions.

In terms of anatomical location, this study showed that the mandible was affected more frequently than the maxilla, with 23 cases (74.2%) in the mandible and 8 cases (25.8%) in the maxilla. This predilection for the mandible is also widely reported in studies of other populations (10,12). The Iranian study identified a mandible predominance (58.7%) for all giant cell lesions and noted that the upper jaw location influenced the type of lesion (central or peripheral) (5).

In this study, it was found that the posterior region of the mandible exhibited a greater degree of involvement, whereas the anterior region of the maxilla was more significantly affected. This pattern aligns partially with findings from previous research. For instance, an Iranian study reported the posterior mandible as the most frequent site for both central giant cell granuloma (CGCG) and peripheral giant cell granuloma (PGCG), supporting the current study's observation of predominant posterior mandibular involvement (5). Conversely, several case reports have documented the presence of central giant cell granuloma in the anterior region of the mandible, which contrasts with the findings of the present study (14,15,16,17). Additionally, while CGCG commonly involves the mandible, its occurrence in the mandibular condyle has been reported as a rare presentation (2), emphasizing the variability in anatomical distribution among cases.

As with other retrospective studies, this research is subject to certain limitations. Despite efforts to include all cases of oral central giant cell granuloma (CGCG) among the Libyan population in Benghazi—including those biopsied in the private sector—some cases may have been missed. These potentially include patients diagnosed abroad, those treated in private hospitals, and cases in which biopsy specimens were not submitted for histopathological examination. Additionally, the data utilized in this study were obtained from archived patient records, and the completeness of these records varied, which may have limited the availability of information regarding clinical signs and symptoms, detailed radiographic features, and long-term follow-up outcomes.

Conclusion

Based on the retrospective analysis of histopathology specimens from the Libyan population, central giant cell granuloma was diagnosed in 1.6% of evaluated cases. The study found that CGCG in this population demonstrates a clear female predominance, affects the mandible more frequently than the maxilla, and occurs across a wide age range with a mean age of 32.7 years. These findings generally align with demographic characteristics reported for CGCG in other populations, particularly the higher incidence in females and mandibular predilection (7,10,11,12,13). While the mean age appears slightly higher compared to some reported averages focusing on younger cohorts (5,10,11), this indicates the diversity of age ranges affected by this lesion. Due to its varied clinical, radiological, and biological behavior, as well as the need for accurate differentiation from other entities, understanding the specific characteristics of CGCG within different populations remains crucial for appropriate diagnosis and management (1,5,6).

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

Ethical Approval

This retrospective study was approved by the Research Ethics Committee of the Faculty of Dentistry, Benghazi University (Approval NO 0315). The confidentiality of patient data was maintained throughout the research, and

all procedures were performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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