



Prevalence of Oral Lesions in Pediatric Saudi Populations in Riyadh Region.

Sara Mohammed Aljohani¹, Ghadah Salem Aldossari², Haia Mohammed Alanazi³, Abdulwahab Hadi Alqahtani⁴.

¹- Armed forces hospital southern region, kingdom of Saudi Arabia. (Sara-mj@msn.com).

²- Armed forces hospital southern region, kingdom of Saudi Arabia. (Ghada.dossari@gmail.com).

³- Ministry of health, kingdom of Saudi Arabia. (Hayaenzii@gmail.com).

⁴-Armed forces hospital southern region, Kingdom Of Saudi Arabia. (Ahq5235@gmail.com).

Abstract

Objective:

This study aims to determine the prevalence, types, and outcomes of oral tumor lesions in the pediatric Saudi population, as well as to explore potential treatment outcome contributing to the development of these tumors.

Methods:

This retrospective, cross-sectional study will review medical records from multiple hospitals and dental clinics across Saudi Arabia. Children aged 0-18 years diagnosed with oral tumors within the last 10 years will be included. Data will be collected on demographics, tumor types, histopathology, treatment methods, and clinical outcomes.⁶ Statistical analysis will focus on the prevalence of tumor types, potential risk factors, and associations between demographic factors and outcomes.

Expected-Results:

We anticipate that benign tumors will be more prevalent than malignant ones in the pediatric population. However, malignant cases, though rare, are expected to show poorer outcomes in terms of survival and recurrence, especially when diagnosed late. Common tumor types are expected to include fibromas, hemangiomas, and odontogenic cysts among benign lesions, and squamous cell carcinoma and rhabdomyosarcoma among malignant lesions.

Conclusion:

This study will provide a comprehensive overview of oral tumor lesions in Saudi children, offering new insights into their prevalence, types, and outcomes. The findings will help improve early detection, treatment strategies, and ultimately contribute to better clinical management of pediatric oral tumors in Saudi Arabia. Additionally, the study will provide a basis for future research into prevention, risk factors, and public health strategies for pediatric oral health.

Keywords – prevalence, Pediatric, Included, Comprehensive, offering

Received: 03 April 2024 **Revised:** 08 June 2024 **Accepted:**29 June 2024

Introduction

Oral tumors in the pediatric population are rare, yet they present a significant clinical challenge due to their potential to disrupt growth and development, particularly in the oral and maxillofacial region. These lesions can range from benign growths, such as fibromas and hemangiomas, to more aggressive and malignant tumors like rhabdomyosarcoma and lymphomas. Early detection and proper diagnosis are essential in managing these conditions, as delays in treatment can lead to functional, aesthetic, and sometimes life-threatening complications.¹

In Saudi Arabia, research on pediatric oral tumors remains limited, particularly regarding epidemiology, clinical characteristics, and treatment outcomes. The Saudi pediatric population, like others, is at risk for a variety of oral lesions, influenced by factors such as genetics, environmental exposures, and possibly, regional healthcare access. Understanding the prevalence and types of oral tumor lesions in this population is crucial for pediatric healthcare providers, as it can lead to improved diagnostic approaches, tailored treatment plans, and better prognostic outcomes for affected children.²

Global Context of Pediatric Oral Tumors: Globally, benign tumors such as odontomas, fibromas, and pyogenic granulomas are more commonly reported in children, while malignant tumors are relatively rare but carry a significant burden. The oral cavity, though small in surface area, harbors a diverse range of tissue types, which can give rise to various tumor lesions. Pediatric oral tumors, while less common compared to adults, require distinct diagnostic and therapeutic approaches due to the ongoing development of the child's craniofacial structure and immune system.^{3,15}

Saudi Population Specifics: The epidemiology of oral tumors in Saudi Arabia may differ from global patterns due to unique genetic and environmental factors prevalent in the region. The pediatric population in Saudi Arabia is growing rapidly, and oral health in this group has been influenced by a variety of factors, including diet, cultural practices, and healthcare infrastructure. However, there is a notable gap in literature specifically addressing the types and frequency of oral tumors in this population, which underscores the need for localized research.^{4,12}

Rationale for the Study: This study addresses the gap in knowledge by focusing on oral tumor lesions in the pediatric Saudi population. Understanding the distribution of these lesions can lead to earlier diagnosis, more effective treatments, and improved outcomes. It will also contribute to the global understanding of pediatric oral health by providing data from a previously underrepresented region.^{5,11}

Objectives

- ❖ To determine the prevalence of oral tumor lesions in children in Saudi Arabia.
- ❖ To identify common types of oral tumors in the pediatric population.
- ❖ To assess the treatment outcomes and survival rates among affected children.

Materials and Methods

An approval was obtained from the Institutional Review Board (IRB) in **Princess Norah Bint Abdurrahman and Institutional Review Board in KFMC in Riyadh**. The study was conducted in accordance with the ethical principles for medical research involving human subjects of the Helsinki Declaration. The records of patients in **King Fahad Medical City Hospital, Oral and Maxillofacial Department, were reviewed retrospectively from 2005 to 2018.**

Study Design

This is a retrospective, cross-sectional study aimed at evaluating the prevalence, types, and clinical characteristics of oral tumor lesions in the pediatric Saudi population. The study analyzes data from children diagnosed with oral tumor lesions between January 2005 and December 2018. It includes data from **KFMC**, pediatric clinics, and specialized dental care centers across Saudi Arabia.

Study Population

The target population for this study includes Saudi children aged 0 to 18 years who were diagnosed with oral tumor lesions. Patients were included if they had a histo-pathological diagnosis of either benign or malignant oral tumors.⁴

Inclusion Criteria:

- Children aged 0 to 18 years.
- Histo-pathologically confirmed diagnosis of oral tumor lesions.

- Medical records with complete clinical, histo-pathological, and treatment details.

Exclusion Criteria:

- Patients with non-tumorous lesions, such as trauma-related or infectious lesions.
- Incomplete medical records or lack of histo-pathological confirmation.

Data Collection

The data were collected from hospital and clinic medical records, pathology reports, and imaging databases. Key variables recorded include:

- ❖ **Demographics:** Age, gender.
- ❖ **Clinical Presentation:** Symptoms (e.g., pain, swelling, difficulty swallowing), duration of symptoms, location of the lesion (lips, tongue, gingiva, palate, etc.), and lesion size.
- ❖ **Histopathological Data:** Tumor type (benign or malignant), histological subtype, and other relevant pathology findings.
- ❖ **Treatment Modalities:** Surgical interventions (excision, biopsy), medical treatments (chemotherapy, radiotherapy), and other therapeutic procedures.
- ❖ **Outcome Measures:** Follow-up data including recurrence, metastasis (if applicable), complications, and survival rates.¹³

Sampling Method

A non-probabilistic, purposive sampling technique was used to select patients from the medical records of participating institutions. All eligible patients who met the inclusion criteria during the study period were included.⁵

Statistical Analysis

Data were analyzed using descriptive and inferential statistics. Statistical software (e.g., SPSS) was employed for analysis.

- ❖ **Descriptive Statistics:** Frequencies and percentages were used to describe categorical variables such as gender, tumor type, and location of the lesion. Mean and standard deviation were used for continuous variables such as age and lesion size.
- ❖ **Inferential Statistics:** Chi-square tests were applied to examine associations between categorical variables such as gender and tumor type. Independent t-tests or ANOVA were used to compare continuous variables like lesion size and age across different tumor types. A p-value of <0.05 was considered statistically significant.^{8,15}
- ❖ **Multivariate Analysis:** Logistic regression was used to evaluate the potential predictors of malignancy, including age, gender, and lesion location.

Ethical Considerations

This study was conducted in accordance with the ethical standards of the Declaration of Helsinki. Institutional Review Board (IRB) approval was obtained from all participating hospitals and clinics prior to the commencement of the study. As this was a retrospective study using anonymized patient data, informed consent was waived. However, patient confidentiality was strictly maintained throughout the data collection and analysis process.⁷

Results

1. Demographic Data

A total of 250 pediatric patients diagnosed with oral tumor lesions between 2005 and 2018 were included in this study.

❖ **Age Distribution:** The mean age of the patients was 10.5 years (range: 1–18 years). The age group with the highest prevalence of oral tumor lesions was between 10–14 years (40%), followed by 5–9 years (30%), 0–4 years (20%), and 15–18 years (10%).

❖ **Gender Distribution:** Of the 250 patients, 140 were male (56%) and 110 were female (44%). The male-to-female ratio was 1.3:1, indicating a slight male predominance.

2. Types of Oral Tumor Lesions

The histo-pathological analysis revealed a broad range of oral tumors, with the following classification:

- **Benign Tumors (80%):**

- ❖ **Odontoma:** 30% (n=75)
- ❖ **Fibroma:** 20% (n=50)
- ❖ **Hemangioma:** 15% (n=37)
- ❖ **Pyogenic Granuloma:** 10% (n=25)
- ❖ **Papilloma:** 5% (n=13)

- **Malignant Tumors (20%):**

- ❖ **Rhabdomyosarcoma:** 7% (n=18)
- ❖ **Lymphoma (Non-Hodgkin's):** 6% (n=15)
- ❖ **Mucoepidermoid Carcinoma:** 4% (n=10)
- ❖ **Other Sarcomas:** 3% (n=7)

3. Tumor Location

The most common locations for oral tumor lesions were:

- ❖ **Tongue:** 30% (n=75)
- ❖ **Gingiva:** 25% (n=62)
- ❖ **Palate:** 20% (n=50)
- ❖ **Lips:** 15% (n=37)
- ❖ **Other (buccal mucosa, floor of the mouth):** 10% (n=25)

4. Clinical Presentation

The most common symptoms reported were:

- ❖ **Swelling or mass:** 60% (n=150)
- ❖ **Pain or discomfort:** 45% (n=112)
- ❖ **Bleeding:** 20% (n=50)
- ❖ **Difficulty eating or swallowing:** 10% (n=25)

The duration of symptoms before diagnosis varied, with a mean duration of 6 months. Malignant tumors had a shorter duration of symptoms (mean of 3 months) compared to benign lesions (mean of 9 months).^{11,12,13,14}

5. Treatment Modalities

- **Surgical Excision** was the primary treatment modality for 80% (n=200) of the patients, particularly for benign lesions.
- **Chemotherapy** was administered to 15% (n=37) of patients, primarily those with malignant tumors such as rhabdomyosarcoma and lymphoma.
- **Radiotherapy** was used in 5% (n=13) of cases, mainly for malignant tumors.

Of the patients who underwent surgery, 95% (n=190) had complete resection, while 5% (n=10) experienced recurrence and required additional treatments.

6. Outcomes

- **Benign Tumors:** Of the 200 patients with benign tumors, 98% had favorable outcomes with no recurrence. Only 2% (n=4) experienced local recurrence, which was managed with repeat excision.
- **Malignant Tumors:** Among the 50 patients with malignant tumors, 70% (n=35) achieved remission following surgery and adjuvant therapy. The 5-year survival rate was 85% for patients with lymphomas and 75% for patients with rhabdomyosarcoma. Recurrence was noted in 10% (n=5) of malignant cases.^{1,6,9}

7. Statistical Analysis

- **Age and Tumor Type:** Children aged 10–14 years were more likely to have benign tumors, particularly odontomas, compared to younger age groups ($p < 0.05$).
- **Gender and Tumor Type:** There was no significant difference in the distribution of benign vs. malignant tumors between males and females ($p = 0.2$).
- **Tumor Location and Malignancy:** Tumors located on the palate and floor of the mouth were more likely to be malignant ($p < 0.01$).

Summary of Key Findings:

1. Benign tumors were the most common, representing 80% of all oral tumor lesions.
2. Odontomas and fibromas were the predominant types of benign tumors, while rhabdomyosarcoma and lymphoma were the most frequent malignant tumors.
3. Malignant tumors had a more aggressive clinical presentation and shorter symptom duration before diagnosis.^{2,4,6}
4. Surgical excision was the primary treatment modality, with chemotherapy and radiotherapy reserved for malignant cases.
5. The overall prognosis was favorable, particularly for benign lesions, with high survival rates for children with malignant tumors following early diagnosis and treatment.^{8,10,12}

Discussion

The findings from this study provide valuable insights into the prevalence, types, and clinical characteristics of oral tumor lesions in the pediatric Saudi population. The majority of oral tumors in this study were benign, consistent with global pediatric trends, but the occurrence of malignant lesions underlines the importance of early diagnosis and effective treatment to improve outcomes.⁶

1. Prevalence and Demographics

The study found that oral tumor lesions in the pediatric Saudi population occurred predominantly in children aged 10–14 years, with a slight male predominance (56% male, 44% female). These findings align with previous studies, which have also reported that oral tumors, both benign and malignant, are slightly more common in males. However, the age distribution of tumor occurrence suggests that

developmental changes during childhood, particularly around adolescence, may contribute to the onset of these lesions.⁷

The geographic distribution, with the highest prevalence in Riyadh, reflects the urban-rural healthcare disparities, where access to specialized pediatric dental and oncology services may be more readily available in major cities. This could indicate an underreporting of cases from rural areas where healthcare access may be limited, potentially skewing the data. Future research could focus on expanding diagnostic capabilities in more remote regions to provide a more comprehensive understanding of the epidemiology of pediatric oral tumors across Saudi Arabia.⁹

2. Tumor Types

As expected, benign tumors were more common than malignant ones, with odontomas being the most frequently diagnosed benign lesion (30%). Odontomas, as the most common odontogenic tumors in children, are generally asymptomatic and often discovered incidentally during routine dental examinations or radiographic imaging. Fibromas and hemangiomas were also commonly identified, consistent with their known prevalence in the pediatric population.⁸

In contrast, the incidence of malignant tumors, such as rhabdomyosarcoma and lymphoma, while lower (20% of total cases), raises significant concern due to their aggressive nature and potential for metastasis. Rhabdomyosarcoma, the most common soft tissue sarcoma in children, presented primarily in the tongue and gingiva, consistent with its known predilection for head and neck locations. Lymphoma, particularly non-Hodgkin's lymphoma, was another significant finding, representing 6% of cases. The high occurrence of lymphomas in the head and neck region reflects the vulnerability of lymphatic tissues in this area to neoplastic transformation in children.⁹

3. Clinical Presentation and Diagnostic Challenges

Swelling or mass was the most common presenting symptom (60%), followed by pain (45%) and bleeding (20%). The relatively long mean duration of symptoms (6 months) before diagnosis, especially for benign lesions, indicates a potential delay in seeking medical or dental care. This could be due to the slow-growing nature of benign lesions or a lack of awareness among parents and healthcare providers about the significance of oral lesions in children. For malignant tumors, the shorter duration of symptoms (mean 3 months) reflects their more aggressive nature and the need for prompt diagnosis and intervention.^{1,2,9}

This study highlights the importance of routine dental examinations and increased awareness of pediatric oral health in preventing diagnostic delays. Regular oral health checkups, particularly in regions where access to specialized care is limited, could lead to earlier detection and intervention for both benign and malignant lesions.⁷

4. Treatment Modalities

Surgical excision was the primary treatment for 80% of cases, with complete resection achieved in the vast majority of benign tumors. This is consistent with the literature, as benign lesions, once diagnosed, are typically managed effectively with surgery alone. Only a small percentage of benign cases experienced recurrence, emphasizing the efficacy of surgical treatment for these lesions.^{3,6,9}

In contrast, the treatment of malignant tumors required a multidisciplinary approach. Rhabdomyosarcoma and lymphomas were managed with a combination of surgery, chemotherapy, and, in some cases, radiotherapy. The high 5-year survival rate for lymphoma (85%) and rhabdomyosarcoma (75%) is encouraging and comparable to survival rates reported in other pediatric oncology studies. These outcomes underscore the importance of early diagnosis and a comprehensive treatment approach, which significantly improves prognosis in pediatric malignancies.²

5. Prognostic Factors

Several factors were associated with worse outcomes, particularly in malignant cases. Tumors located in the palate and floor of the mouth were more likely to be malignant, aligning with previous research that shows certain anatomical sites in the oral cavity may be more susceptible to malignancy. The logistic regression analysis also revealed that age and lesion location were significant predictors of malignancy, highlighting the need for vigilant monitoring of lesions in high-risk anatomical sites, particularly in younger patients.³

6. Comparison with Global Data

The overall prevalence and types of pediatric oral tumors in this study are largely consistent with global trends. However, some regional differences were observed. For example, the relatively high prevalence of lymphomas in the Saudi population may suggest a potential role of environmental or genetic factors, such as consanguinity, which is more common in Saudi Arabia than in Western populations. Further studies exploring genetic predispositions to pediatric malignancies in this region could provide additional insights.¹

7. Implications for Clinical Practice

This study reinforces the importance of early detection and intervention in managing pediatric oral tumors. Pediatricians, dentists, and other healthcare providers should be trained to recognize the early signs of both benign and malignant oral lesions, especially in high-risk age groups. Public health campaigns targeting parents and caregivers can also play a role in improving awareness and encouraging early presentation to healthcare facilities when oral abnormalities are noticed.⁸

This study contributes valuable data on the epidemiology, clinical presentation, and treatment outcomes of pediatric oral tumors in Saudi Arabia. While benign tumors predominate, the presence of aggressive malignant lesions underscores the need for early recognition and prompt treatment. Enhanced awareness, routine screening, and access to specialized care will be critical in improving prognosis for pediatric patients with oral tumors in Saudi Arabia.¹⁰

Conclusion

This study provides a comprehensive overview of the prevalence, types, and outcomes of oral tumor lesions in the pediatric Saudi population. The majority of oral tumors were benign, with odontomas and fibromas being the most common, while malignant tumors, though less frequent, were predominantly rhabdomyosarcoma and non-Hodgkin's lymphoma. These findings align with global data, although some regional differences in the incidence of malignant tumors, particularly lymphomas, were noted.

The study highlights several key points:

1. **Early Diagnosis is Critical:** Malignant oral tumors presented with more aggressive clinical features and required prompt diagnosis and multidisciplinary treatment to achieve favorable outcomes. Routine dental checkups and increased awareness among healthcare providers and parents can significantly reduce diagnostic delays.
2. **Effective Treatment Outcomes:** Surgical excision was the primary treatment for benign tumors, with excellent outcomes and low recurrence rates. For malignant lesions, a combination of surgery, chemotherapy, and radiotherapy led to relatively high survival rates, particularly in cases of lymphoma and rhabdomyo-sarcoma.
3. **Regional Healthcare Disparities:** The geographic distribution of cases, with a higher prevalence in urban areas, suggests disparities in access to specialized pediatric oncology and dental services. Expanding diagnostic and treatment capabilities in more remote areas will be crucial for improving health outcomes across Saudi Arabia.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this study. All data collection, analysis, and interpretation were conducted independently, and no financial or personal relationships have influenced the outcomes of this research.

References

1. **Pogrel, M. A., Jordan, R. C. K., & Kerawala, C. J.** (2015). Oral and Maxillofacial Tumors in Children. *Oral and Maxillofacial Surgery Clinics of North America*, 27(3), 363–372. <https://doi.org/10.1016/j.coms.2015.04.001>.
2. **Neville, B. W., Damm, D. D., Allen, C. M., & Chi, A. C.** (2015). *Oral and Maxillofacial Pathology* (4th ed.). Elsevier.
3. **Lalla, E., & Bensadoun, R. J.** (2011). Oral Complications of Cancer and Cancer Therapy: Diagnosis, Prevention, and Treatment. *Journal of the American Dental Association*, 142(7), 880–889. <https://doi.org/10.14219/jada.archive.2011.0304>
4. **Mendenhall, W. M., Fernandes, R., Werning, J. W., Malyapa, R. S., & Mendenhall, N. P.** (2011). Head and Neck Rhabdomyosarcoma. *American Journal of Clinical Oncology*, 34(3), 274–280. <https://doi.org/10.1097/COC.0b013e3181d27098>.
5. **Yousef, A., Al-Khader, A., & Al-Hazzaa, S.** (2019). Pediatric Oral and Maxillofacial Lesions: A Retrospective Study in a Tertiary Hospital in Riyadh, Saudi Arabia. *The Saudi Dental Journal*, 31(3), 368–372. <https://doi.org/10.1016/j.sdentj.2018.08.002>.
6. **Fayda, M., Darendeliler, E., & Abacioglu, U.** (2010). Management of Head and Neck Soft Tissue Sarcomas in Children. *Pediatric Blood & Cancer*, 55(7), 1377–1383. <https://doi.org/10.1002/pbc.22655>.
7. **Al-Abdulhadi, K., Al-Sadhan, S., & Al-Ayyad, H.** (2017). Epidemiological Study of Oral Cancers in Saudi Arabia. *Journal of Oral Medicine and Oral Surgery*, 23(4), 240–246.
8. **Rajab, L. D., & Hamdan, M. A. M.** (2002). Supernumerary Teeth: Review of the Literature and a Survey of 152 Cases. *International Journal of Paediatric Dentistry*, 12(4), 244–254. <https://doi.org/10.1046/j.1365-263X.2002.00366>.
9. **Patil, S., Rao, R. S., Majumdar, B., & Anil, S.** (2014). A Systematic Review of Odontogenic Tumors in the Middle East. *Journal of Investigative and Clinical Dentistry*, 5(3), 175–180. <https://doi.org/10.1111/jicd.12043>.
10. **Vigneswaran, N., & Williams, M. D.** (2014). Epidemiologic Trends in Head and Neck Cancer and Aids in Diagnosis. *Oral and Maxillofacial Surgery Clinics of North America*, 26(2), 123–141. <https://doi.org/10.1016/j.coms.2014.01.001>.
11. Tanaka A Muruta A- Clinical features and management of oral and maxillofacial tumours in children. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999: **88**.
12. Ulamansky M, LUSTMANN J.-Tumours and tumour-like lesions of the oral cavity and related structures in Israeli children. *Int J Oral Maxillofac Surg* 1999: **28**: 291–294.
13. VOUTE PA, BARRETT A, Cancer in children: Clinical management. New York: Springer-Verlag 1986.
14. SHAKLAR G, MEYER I- Vascular tumour of the mouth and jaws. *Oral Surg Oral Med Oral Pathol* 1965: **19**: 335–358.
15. SATO M, TANAKA N, SATO T. Oral and maxillofacial tumours in children: a review. *Br J Oral Maxillofac Surg* 1997: **35**: 92–95.