Oral Oncology 75 (2017) 39–45

Contents lists available at ScienceDirect

Oral Oncology

journal homepage: www.elsevier.com/locate/oraloncology

# A multicenter study of malignant oral and maxillofacial lesions in children and adolescents

José Alcides Almeida de Arruda[a,*], Leni Verônica de Oliveira Silva[a], Camila de Nazaré Alves de Oliveira Kato[a], Lauren Frenzel Schuch[b], Aline Carvalho Batista[c], Nádia Lago Costa[c], Sandra Beatriz Chaves Tarquinio[b], Elena Riet Correa Rivero[d], Vinícius Coelho Carrard[e], Manoela Domingues Martins[e], Ana Paula Veras Sobral[f], Ricardo Alves Mesquita[a]

[a] Department of Oral Surgery and Pathology, School of Dentistry, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil
[b] Diagnostic Center for Oral Diseases, School of Dentistry, Universidade Federal de Pelotas, Pelotas, RS, Brazil
[c] Department of Stomathology (Oral Pathology), School of Dentistry, Universidade Federal de Goiás, Goiânia, GO, Brazil
[d] Department of Pathology, Health Sciences Center, Universidade Federal de Santa Catarina, Florianópolis, SC, Brazil
[e] Department of Oral Pathology, School of Dentistry, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil
[f] Department of Oral and Maxillofacial Pathology, School of Dentistry, Universidade de Pernambuco, Camaragibe, PE, Brazil

ARTICLE INFO

*Keywords:*
Oral oncology
Oral lesions
Neoplasms
Child
Adolescent
Epidemiology

ABSTRACT

*Objectives:* To investigate the frequency of malignant oral and maxillofacial lesions among children and adolescents from representative geographic regions of Brazil.
*Materials and Methods:* A retrospective study was conducted on biopsies obtained from 1990 to 2016 at six Brazilian oral and maxillofacial pathology referral centers. A total of 85,105 biopsy specimens from children and adolescents were analyzed. Gender, age, anatomical location, symptomatology and histopathological diagnosis were evaluated. Data were analyzed using descriptive statistical methods.
*Results:* Fifty-eight (0.06%) malignant oral and maxillofacial lesions were diagnosed in children (19%) and adolescents (81%). The lesions were more frequent among females (60.3%) and adolescents. The most prevalent lesions were mucoepidermoid carcinomas (22.4%), osteosarcomas (13.8%), squamous cell carcinomas (12.1%), and Burkitt's lymphomas (12.1%). The most commonly affected sites were the palate (19%), mandible (13.8%), and maxilla (13.8%). Almost half the patients were asymptomatic.
*Conclusion:* Pediatric oral and maxillofacial malignant lesions were infrequent and showed wide diversity, with a prevalence of mucoepidermoid carcinomas. Analysis of malignant lesions in children and adolescents helps pediatric dentists and oncologists to obtain a better understanding of such lesions and to reduce the time for diagnosis, with a consequent improvement of prognosis.

## Introduction

Children and adolescents constitute about a third of the world's population and their health status is important for every country [1]. They represent the future, and ensuring their healthy growth and development should be a major concern of all societies [2]. Cancer in children and adolescents represents a group of diseases considered rare, with an incidence of 0.01% in the age range of 0–19 years in developed countries [3]. When compared to adult malignancies, it corresponds to 2–3% of all malignant tumors [4]. Brazil has a young population and the current estimate of its total population is 207 million inhabitants. Brazilian demographic data for 2017 show that 30.98% of the population is in the 0–19 year age range [5]. In this country, cancer represents the first leading cause of death (8% of the total) by disease

* Corresponding author at: Departamento de Clínica, Patologia e Cirurgia Odontológicas, Faculdade de Odontologia, Universidade Federal de Minas Gerais, Av. Antônio Carlos, 6627, sala 3202 D. Pampulha, Belo Horizonte, MG CEP:31.270-010, Brazil
*E-mail addresses:* alcides_almeida@hotmail.com (J. Alcides Almeida de Arruda), veronica.oliveira.3162@hotmail.com (L. Verônica de Oliveira Silva), cnao20@yahoo.com.br (C. de Nazaré Alves de Oliveira Kato), laurenfrenzel@gmail.com (L. Frenzel Schuch), ali.caba@uol.com.br (A. Carvalho Batista), nadialago@hotmail.com (N. Lago Costa), sbtarquinio@gmail.com (S. Beatriz Chaves Tarquinio), riet.elena@gmail.com (E. Riet Correa Rivero), vccarrard@gmail.com (V. Coelho Carrard), manomartins@gmail.com (M. Domingues Martins), anapvsobral@yahoo.com.br (A. Paula Veras Sobral), ramesquita@ufmg.br (R. Alves Mesquita).

http://dx.doi.org/10.1016/j.oraloncology.2017.10.016
Received 28 September 2017; Accepted 19 October 2017

among children and adolescents [6].

Over the last four decades, extremely significant progress has been made in the treatment of childhood and adolescence cancer. Nowadays, about 80% of children and adolescents with cancer can be cured if diagnosed early and treated at specialized centers, most of them having a good quality of life after treatment [7,8].

The world's population should reach 9.7 billion by 2050 [9], being accompanied by a high incidence of oral and systemic diseases. Several studies on the epidemiology of malignant lesions among children and adolescents have been conducted worldwide [3,10–15]. The incidence of oral lesions among children and adolescents requires attention in terms of public health policies for the diagnosis and treatment of diseases, promoting a better quality of life. For childhood cancers in particular, a classification of cancers by histological type is important in order to understand the etiology and progression of the disease and has led to new studies about the health of pediatric patients [16,17].

Epidemiological studies based on histopathological results of oral and maxillofacial biopsies provide more accurate data [18–22]. The objective of the present study was to determine the frequency of malignant and maxillofacial oral lesions in children and adolescents from representative geographic regions of Brazil.

## Material and methods

### *Study design and ethical approval*

A total of 85,105 histopathological records of oral and maxillofacial biopsies were analyzed in a retrospective study. The records were obtained from six oral diagnostic referral centers in four regions of Brazil (Southeast, Northeast, South and Midwest) (Table 1). The study was approved by the Ethics Committee of Federal University of Minas Gerais (Approval No. 016/2003). The patient's identity remained anonymous according to the Declaration of Helsinki.

### *Sample*

A total of 85,105 biopsy records from patients aged 0–19 years were analyzed. The malignant oral and maxillofacial lesions were analyzed regarding gender, age, anatomical location, symptomatology, and histopathological diagnosis. The patients were stratified by age, i.e., 0–9 years: children, and 10–19 years: adolescents [23] in order to evaluate the distribution of lesions according to age. The anatomical sites involved were divided into lips, maxilla, mandible, palate, floor of the mouth, tongue, cheek mucosa, parotid gland, temporomandibular joint, and extraoral sites.

Exclusion criteria were lack of information about age (≤19 years of age) or gender and lack of a histopathological diagnosis. Malignant oral and maxillofacial lesions were classified according to the 2017 classification of the World Health Organization (WHO) [24]. The cases were analyzed by six independent oral and maxillofacial pathologists with more than 20 years of experience. Immunohistochemical analysis was performed when routine hematoxylin-eosin staining was not sufficient to establish the final diagnosis of the lesions.

**Table 1**
Sources of the reviewed cases.

| Institution | Years | Lesions biopsied during the study period | Oral lesions diagnosed in patients (0–19 Y) | Malignant lesions diagnosed in patients (0–19 Y) | %[a] |
|---|---|---|---|---|---|
| UFMG[b] | 1996–2016 | 35,118 | 2487 | 26 | 0.07 |
| UFG[c] | 1996–2016 | 10,246 | 1507 | 15 | 0.14 |
| UPE[d] | 1990–2016 | 6250 | 1109 | 12 | 0.19 |
| UFPel[e] | 1996–2016 | 16,182 | 1832 | 3 | 0.01 |
| UFRGS[f] | 1996–2016 | 14,606 | 2164 | 1 | 0.006 |
| UFSC[g] | 2006–2016 | 2703 | 312 | 1 | 0.03 |
| Total | | 85,105 | 9411 | 58 | 0.406 |

[a] Percent of the sample of malignant lesions at each center.
[b] Department of Oral Surgery and Pathology, School of Dentistry of the Federal University of Minas Gerais (Southeastern region).
[c] Department of Stomathology (Oral Pathology), School of Dentistry of the Federal University of Goiás.
[d] Department of Oral Pathology, School of Dentistry of the University of Pernambuco (Northeastern region).
[e] Diagnostic Center for Oral Diseases of the Federal University of Pelotas (South region).
[f] Department of Oral Pathology, School of Dentistry of the Federal University of Rio Grande do Sul (South region).
[g] Health Sciences Center, School of Dentistry of the Federal University of Santa Catarina (South region); Y, years of age.

### *Data analysis*

Descriptive and quantitative data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 22.0 (SPSS Inc., Chicago, IL, USA).

## Results

A total of 85,105 patients were diagnosed with oral and maxillofacial lesions at the centers studied; of these, 9411 (11.0%) were 0–19 years old, with malignant lesions being detected in 58 cases. This value represented 0.06% of all diagnoses made at all centers and 0.61% of the diagnoses made in the age range of 0–19 years at all centers; and 5.3% of neoplasms of the total sample of children and adolescents. The average percentage of malignant lesions at all centers was 0.40%.

Among the malignant cases studied, 44.8% (n = 26) were from the Federal University of Minas Gerais, 25.9% (n = 15) from the Federal University of Goiás, 20.7% (n = 12) from the University of Pernambuco, 5.1% (n = 3) from the Federal University of Pelotas, 1.7% (n = 1) from the Federal University of Rio Grande do Sul, and 1.7% (n = 1) from the Federal University of Santa Catarina (Table 1).

The most prevalent lesions were mucoepidermoid carcinomas (MEC) (22.4%), osteosarcomas (OS) (13.8%) (Fig. 1), squamous cell carcinomas (SCC) (12.1%), and Burkitt's lymphomas (BL) (12.1%) (Fig. 2); 60.3% (n = 35) of the cases were females. The highest frequency of lesions (81.0%) was observed in the age group of 10–19 years. Most of the lesions proved to be asymptomatic (43.1%). The lesions affected different sites, the most common being the palate (19%), mandible (13.8%), and maxilla (13.8%) (Table 2).

Eleven cases of Langerhans cell histiocytosis were detected at the centers studied. However, since there is no consensus about the classification of this disease as malignant, these cases were not included in the sample of malignant lesions. For this kind of lesion, females were slightly more affected (54.5%) than males. Children were more affected (72.7%) than teenagers; most cases were asymptomatic (63.3%) and the mandible (63.6%) was the most common anatomical region.

Worldwide studies of oral and maxillofacial biopsied lesions involving children and adolescents have reported variations in the geographic distribution, prevalence, age, period of data collection, number of lesions and most prevalent malignant lesions (Table 3).

## Discussion

Annually, it is estimated that 127,459 deaths are caused by oral cavity malignancies worldwide, 96,720 of which occur in less developed countries [25]. Oral cancer is highly prevalent in India, Pakistan, Afghanistan, Iran, Bangladesh, Sri Lanka, Bhutan, Nepal, Maldives, Brazil, and France. In these countries, it ranks first or second among the different types of cancer [26]. In Brazil, it is estimated that in 2017 about 15,500 new cases of malignancies will occur among all ages [6]. The causes of most childhood malignant diseases remain poorly