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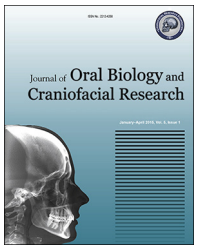

Original Article

A review of seasonality of cleft births – The Brazil experience

Sibele Nascimento de Aquino [a,*], *Renato Assis Machado* [b], *Lívia Máris R. Paranaíba* [c], *Daniella Reis B. Martelli* [c], *Daniela Araújo Veloso Popoff* [c], *Mário Sérgio O. Swerts* [d], *Hercílio Martelli-Júnior* [c,d]

[a] *School of Dentistry, Federal University of Juiz de Fora, Governador Valadares, Minas Gerais, Brazil*
[b] *Department of Oral Diagnostic, Piracicaba Dental School – State University of Campinas, Piracicaba, São Paulo, Brazil*
[c] *Health Science Program, State University of Montes Claros, Montes Claros, Minas Gerais, Brazil*
[d] *Center for Rehabilitation of Craniofacial Anomalies, Dental School, University Jose Rosário Vellano, Alfenas, Minas Gerais, Brazil*

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ABSTRACT

Aims: Evaluate the seasonal influence in nonsyndromic cleft lip and/or palate (NSCL/P) in Brazilian patients.
Methods: A case-control study, with 361 unrelated patients with NSCL/P and 481 healthy individuals, was done on a reference service for craniofacial deformities in Minas Gerais State, Brazil. Information was collected from clinical records considering gender, month of birth, as well as with the seasons.
Results: Nonparametric tests did not show a seasonal variation in month of birth and in seasons of year of NSCL/P compared to a control group ($p = 0.902$ and $p = 0.679$, respectively). A difference in births between the groups was identified only in January, however, was not significant. Moreover, among the control group there were more births in the months of February and August, and for the cleft group, more in July and August. The males were more affected by cleft lip with or without palate (CLP) and the females by isolated cleft palate (CP) manifestation. The ratio of CL:CLP:CP indicated that CLP was predominant when compared with CL and CP, CLP was more frequent in male patients, and CP predominance was seen in females.
Conclusion: This study did not show seasonal differences in births on NSCL/P in a Brazilian group, emphasizing that environmental factors may be related to oral clefts. These results provide a basis for further epidemiological studies of orofacial clefts in Brazil.

* *Corresponding author.*
E-mail address: sibeleaquino1@yahoo.com.br (S.N. de Aquino).
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1. Introduction

Cleft lip and/or palate (CL/P) are among the most common birth defects around the world with a prevalence of 1.43:1000 live births.[1] In Brazil, epidemiological studies demonstrated that incidence of CL/P episodes varies from 0.19 to 1.54 per 1000 births.[2,3] Approximately 65% to 70% of cleft lip with or without cleft palate (CLP) and 40% to 70% of cleft palate only (CP) were isolated defects[4–6] and the remaining related to syndromic clefts.[7–9] A recent systematic literature review discussing the issue have also demonstrated that its incidence varies according to gender, 2:1 being the ratio of males to females for cleft lip and palate and 1:2 the approximate ratio of male to female for isolated CP, as well as unilateral clefts are more common than bilateral clefts, and of the unilateral cases of non-syndromic cleft lip and palate, left-sided cleft lips occur more frequently than right-sided cleft lips.[10]

The multifactorial threshold model is one of the well-established models for describing the aetiology of CL/P.[7,11] According to this model, the malformations result from factors such as genetic predisposition and exogenous factors like maternal malnutrition, low intake of folic acid, teratogens including drugs and alcohol, viruses and maternal age.[1,8,12] There are studies which evaluated a seasonal influence on the occurrence of CL/P[13–19] and they considered that it was reasonable to expect that orofacial clefts may show seasonal variations due to indirect factors such as maternal malnutrition and low intake of folic acid,[13,15] and other direct factors such as temperature, intensity of ultraviolet light exposure, use of fertilizers and pesticides in agriculture and infectious disease cycles.[18]

Although the theory of a seasonal influence on the occurrence of NSCL/P is controversial, showing studies without variation,[5,16,19,20] studies by Fraser and Gwyn,[15] Elliot et al.[13] and Krost and Schubert[17] proved an influence of seasonality on the aetiology of clefts. Moreover, there are no previous studies which dealt with this subject in a Brazilian population. Thus, the aim of this investigation was to verify a seasonal influence on NSCL/P Brazilian births, which may provide epidemiological evidence toward understanding the role of environmental in the development of clefts.

2. Methodology

2.1. Study population

This study included 361 unrelated patients with NSCL/P recruited from the Center for Rehabilitation of Craniofacial Anomalies, Minas Gerais state, Brazil. The patients recruited in the service were residents in southern of state, an area of approximately 200 km^2 inside the state of Minas Gerais. All patients were carefully examined and screened for the presence of associated anomalies or syndromes by the team of the Center for Rehabilitation of Craniofacial Anomalies. Atypical facial clefts were excluded because are rare congenital anomalies and frequently associated with syndromic cases.[21,22] The control group was chosen among subjects admitted as in patients in the Dental School of the same University with conditions unrelated to clefting disorders (n = 481). The control group was matched by age, ethnic group, and place of birth.

For the case group, type and laterality of the cleft were collected from medical records. The clefts were classified with reference to the anatomy of the incisive foramen in: (1) CL: lip cleft before incisive foramen, unilateral or bilateral; (2) CLP: cleft lip and palate, unilateral or bilateral; (3) CP: all the clefts post foramen, complete or incomplete.[23]

2.2. Data analysis

Chi-square tests were chosen to evaluate the frequency distributions of the months of birth between the groups and for the types of NSCL/P separately. The hypothesized value of $p \leq 0.05$ was selected as significant in this analysis. For analysis of seasonality, the patients were divided according to date of birth in the 12 months (corresponding to the months of the year). We also evaluated the groups considering gender and the birth according the seasons: spring (September, October and November), summer (December, January and February), autumn (March, April and May), and winter (June, July and August). The nonparametric chi-square test was performed in order to determine the relationship between the groups considering seasons and gender.

3. Results

The NSCL/P group consisted of 361 patients with 191 (52.9%) males and 170 (47.1%) females comprising 194 CLP, 101 CL and 66 cases of CP. The control group was composed by 481 individuals with 262 (54.5%) males and 219 (45.5%) females. The overall male/female ratio was 1.12 for NSCL/P group and 1.20 for control group, without statistical significance between the groups ($p = 0.653$). The ratio of CL:CLP:CP was 0.52:1:0.34 (27.9%, 53.7% and 18.4%, respectively). The unilateral cleft was more frequent than the bilateral cleft (75.3% and 24.7%, respectively). Bilateral clefts occurred more often in CLP patients than in CL patients (33% and 9%, respectively) ($p < 0.0001$) (Table 1). Unilateral left clefts occurred more

Table 1 – Frequencies of NSCL/P according to type of cleft, laterality and gender.

Type	Male	%	Female	%	Total	%	p
CL-right	23	63.9	13	36.1	36	9.9	0.096
CL-left	28	50.0	28	50.0	56	15.5	1
CL-bilateral	6	66.7	3	33.3	9	2.5	0.317
CL total	57	56.4	44	43.6	101	27.9	0.196
CLP-right	34	64.1	19	35.9	53	14.7	0.039
CLP-left	40	51.9	37	48.1	77	21.3	0.732
CLP-bilateral	38	59.4	26	40.6	64	17.7	0.134
CLP total	112	57.7	82	42.3	194	53.7	0.031
CP	22	33.3	44	66.7	66	18.4	0.007
Total	191	52.9	170	47.1	361	100.0	0.269
	$p < 0.0001$		$p < 0.0001$		$p < 0.0001$		

NSCL/P, nonsyndromic cleft lip and/or palate; CL, cleft lip; CLP, cleft lip and palate; CP, cleft palate.

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