

## CLINICAL STUDY

# Prevalence of cleft lip and palate in western Slovakia in the years 2001–2007

Fedeles J Jr<sup>1</sup>, Ziak P<sup>2</sup>, Krizko M<sup>2</sup>, Payer J Jr<sup>2</sup>, Bohac M<sup>2</sup>, Palencar D<sup>2</sup>, Hulin I Jr<sup>2</sup>, Fedeles J<sup>2</sup>*Department of Hand Surgery, Comenius University Hospital, Bratislava, Slovakia. fedelesmd@gmail.com*

**Abstract:** *Objectives:* The aim of this study was to investigate the prevalence of orofacial clefts (OC) in live newborns from 2001 to 2007 in Western Slovakia and correlate their occurrence with a number of relevant seasonal and geographical factors and epidemiological trend of this condition. In this study we used retrospective active survey collecting clinical data of 220 children with OC registered and operated at the cleft centre in Bratislava. Our study group included 67 patients from Bratislava region and 151 patients from the remaining Western Slovakia (Nitra, Trnava, Trenčín regions). Data of live births was obtained from Health Statistics of the Slovak Republic. *Results:* Total incidence (TI) of 1.49/1000 live births (LB) in the region of Western Slovakia in 2001–2007 marked a decrease of prevalence compared to 1.64/1000 LB in the years 1985–2000. Bratislava region dominated in total prevalence of 1.82/1000 LB compared to the rest of Western Slovakia regions with 1.37/1000 LB. Most observed cleft type was the CP with 38.6 % frequency, followed by CLP with 35.5 % and CL with a frequency of 24.1 %. The frequency of AM with 1.82 % was the lowest.

*Conclusion:* The results showed that the frequency risk rate of a birth of a child with OC was 1 to 671 LB in Western Slovakia. The data proved a higher prevalence of OC in Bratislava region with 1 child with this type of congenital anomaly to 549 LB compared with 1 child with OC to 730 LB in the rest of the Western Slovakia regions (Tab. 7, Ref. 16). Full Text in PDF [www.elis.sk](http://www.elis.sk)

**Key words:** cleft lip, cleft palate, incidence, prevalence, epidemiology.

Cleft centre in Bratislava has a 58 years experience (1) in cleft lip and palate operations. Orofacial clefts (OC) are quite common congenital defects. Nonsyndromic cleft lip and palate are caused by the misdevelopment of mesoderm in facial region in second and third week of gestation. They are ranked 9th of all congenital malformations in Slovakia (2), including clefts of primary palate (CL), clefts of secondary palate (CP) and clefts of primary and secondary palate (CLP). They can occur in association with other congenital malformation (AM) such as Pierre-Robin sequence in syndromic clefts. Surgical protocol at our cleft centre includes Grayson's method of presurgical nasoalveolar molding and a two-stage closure of lip and palate. Modification of Millard's rotation – advancement technique (3) is used for cheiloplasty in unilateral cleft lip/palate (UCLP) and Black's (4) or Cutting/Grayson's technique (5) for bilateral cleft lip/palate. In most of the cases palatoplasty is performed according to Veau–Wardill–Kilner (6) and since 2002 also with Furlow double opposing Z-plasty (7, 8) (Tab. 1). Most of the patients underwent primary lip surgery in the time period of 3–6 months and in few cases later only due to pediatric reasons (9). Initial palatoplasty is performed at 9 months of age.

<sup>1</sup>Department of Hand Surgery, Comenius University Hospital, Bratislava, Slovakia, and <sup>2</sup>Clinic of Plastic and Reconstructive Surgery, Comenius University Hospital, Bratislava, Slovakia

**Address for correspondence:** J. Fedeles Jr, MD, Department of Hand Surgery, Comenius University Hospital, Ruzinovska 6, SK-826 06 Bratislava, Slovakia.

## Material and methods

In this study we used retrospective active survey collecting clinical data of 220 children with OC registered and operated at the cleft centre in Bratislava to compare the prevalence in Western Slovakia in the years 2001–2007. Our study group included 67 patients from Bratislava region and 151 patients from the remaining Western Slovakia (Nitra, Trnava, Trenčín regions). Comparison with the prevalence in the years 1985–2000 was also performed. Frequency of clefts in any regions was stated in percentage of total incidence (TI). Data of live births was obtained from Health Statistics of the Slovak Republic. Cleft Lip and palate classification according Kernahan and Stark (10) was used.

## Results

### Occurrence

TI of 1.49/1000 live births (LB) in the region of Western Slovakia in 2001–2007 marked a decrease of prevalence compared to 1.64/1000 LB in the years 1985–2000 (11) (Tab. 2).

Bratislava region dominated in total prevalence of 1.82/1000 LB compared to the rest of Western Slovakia regions with 1.37/1000 LB.

### Occurrence according to sex and the cleft type

Most observed cleft type was the CP with 38.6 % frequency, followed by CLP with 35.5 % and CL with a frequency of 24.1 %.

**Tab. 1. Surgical protocol at the Cleft Centre in Bratislava.**

0–3 months	nasoalveolar moulding
3–6 months	cleft lip and nose primary operation
9 month	cleft palate primary operation
2,5 years	correction of soft-nose deformity
4 years	correction of soft palate
6 years	pharyngeal flap
8 years	dentoalveolar bone graft
14 years	nasal osteotomy

**Tab. 2. Total incidence (TI) of OC in 2001–2007 in the regions of Western Slovakia.**

Cleft type	Sex	Bratislava region	Western Slovakia regions	Total
CL	M	0.67	0.37	0.45
	F	0.27	0.26	0.26
	M+F	0.48	0.32	0.36
CP	M	0.77	0.42	0.51
	F	1.03	0.50	0.64
	M+F	0.90	0.46	0.57
CLP	M	0.57	0.78	0.72
	F	0.16	0.37	0.32
	M+F	0.37	0.58	0.53
AM	M	0.05	0	0.01
	F	0.10	0.02	0.04
	M+F	0.08	0.01	0.03
Total	M	2.07	1.57	1.7
	F	1.57	1.16	1.26
	M+F	1.82	1.37	1.49
Live births	M	19356	56572	75928
	F	18472	53474	71946
	M+F	37828	110046	147874
%	M	18.18	40.45	58.64
	F	13.18	28.18	41.36
	M+F	31.36	68.64	100

**Tab. 3. The number children born with orofacial clefts in Western Slovakia in the years 2001–2007.**

Cleft type	Sex	Bratislava region	Western Slovakia regions	Total	%
CL	M	13	21	34	15.5
	F	5	14	19	8.6
	M+F	18	35	53	24.1
CP	M	15	24	39	17.7
	F	19	27	46	20.9
	M+F	34	51	85	38.6
CLP	M	11	44	55	25
	F	3	20	23	10.5
	M+F	14	64	78	35.5
AM	M	1	0	1	0.45
	F	2	1	3	1.36
	M+F	3	1	4	1.82
Total	M	40	89	129	58.64
	F	29	62	91	41.36
	M+F	69	151	220	100

The frequency of AM with 1.82 % was the lowest as expected (Tab. 3). Total incidence achieved the highest rate in probands with CP 0.57/1000 LB, tailed by CLP with 0.53/1000 LB and 0.36/1000 LB in CL. AM had the lowest rate of 0.003/1000 LB (Tab. 2). Our study group consisted of 129 boys (58.64 %) and 91 girls (41.36 %) and the predominance of males was observed in both Bratislava

**Tab. 4. The percentage of OC according to laterality.**

Cleft side		CL	CLP	Total
Unilateral	Left-sided	64%	40%	50%
	Right-sided	27%	31%	29%
Bilateral		9%	29%	21%

**Tab. 5. The percentage of OC laterality according to sex.**

Cleft side	Female %	Male %
Left-sided	56	46
Right-sided	28	30
Bilateral	16	24

and the rest of Western Slovakia (Tab. 3). The prevalence of OC in the examined period was higher in male population with TI 1.7/1000 LB than in the female population with TI 1.26/1000 LB with a ratio of 1.35:1. The female population was affected higher by CP TI 0.64/1000 LB especially in Bratislava region than the male population TI 0.51/1000 LB with a ratio of 1.25:1. On the other hand the male probands had a higher prevalence of CLP (TI 0.72/1000 LB) than the female probands (TI 0.32/1000 LB) with a ratio of 2.25:1. The male preponderance was also observed in CL group (TI 0.45/1000 LB) compared to females (TI 0.26/1000 LB), a ratio of 1.73:1.

#### Geographical occurrence of OC

Regional distribution showed a higher frequency of CL (TI 0.48/1000 LB) and CP (TI 0.9/1000 LB) in Bratislava region. In contrast other Western Slovakia regions had a higher prevalence of CLP (TI 0.58/1000 LB) (Tab. 2).

#### Occurrence according to laterality and sex

Considering laterality, unilateral defects were found in 79 % of cases, dominated by left-sided clefts. Left side was more frequent for both CL (64 %) and CLP (40 %) (Tab. 4).

The female probands were mostly affected by left-sided OC (56 %), followed by right-sided (28 %) and bilateral clefts in 16 % of the cases. The same cleft side sequence was observed in the male probands, although with different percentage (Tab. 5).

#### Variations in annual and seasonal incidence of OC

Annual incidence ranged from 1.24/1000 LB to 1.82/1000 LB, showing highest prevalence in the year 2003 (TI 1.82/1000 LB). Distribution according to seasonal fluctuation marked September as the highest OC birth rate month in the years 2001–2007 (Tabs 6 and 7).

#### Discussion

Thus, there is supporting evidence that racial heterogeneity exists in the frequency of OC in a descending order of frequency among Orientals, Caucasians and Africans. The differences in occurrence are not only between divergent ethnic groups, but in different districts and areas of one region as well. Czech authors mentioned a lack of isolated palatal clefts in Czech Roma population (12). The incidence ranges from 1.0/1000 to 2.21/1000. The

**Tab. 6. Monthly distribution of OC cases in %.**

Month	M	F	M+F
January	3.64	4.55	8.18
February	5.45	3.18	8.64
March	5	2.73	7.73
April	5.91	2.27	8.18
May	5.45	2.73	8.18
June	5.45	3.64	9.09
July	5	3.64	8.64
August	7.27	3.64	10.91
September	6.82	5.91	12.73
October	4.09	4.09	8.18
November	1.36	2.27	3.63
December	3.18	2.73	5.91
Total	58.62	41.38	100.00

**Tab. 7. Annual distribution of OC cases.**

Year	OC+AM			Incidence		
	M	F	M+F	M	F	M+F
2001	13	16	29	1.27	1.66	1.46
2002	15	13	28	1.49	1.35	1.42
2003	26	11	37	2.49	1.11	1.82
2004	19	10	29	1.73	0.97	1.36
2005	20	16	36	1.77	1.49	1.63
2006	17	16	33	1.5	1.49	1.49
2007	19	9	28	1.64	0.82	1.24
Total 01-07	129	91	220	1.7	1.26	1.49
Total 85-00	369	301	670	1.76	1.51	1.64

highest incidence was in former Czechoslovakia (1.81/1000 LB), followed by France (1.75/1000 LB), Finland (1.74/1000 LB), Denmark (1.69/1000 LB), Belgium and the Netherlands (1.47/1000 LB), Italy (1.33/1000 LB), California (1.12/1000 LB) and South America (1.0/1000). All studies showed a higher incidence of cleft lip and/or palate CL/P compared with CP. There was a predominance of girls in the CP group, while the CL/P group comprised mainly boys. The left side was affected twice as often as the right side (13). Other studies showed a moderate prevalence of 1.65 per 1000 LB in Chinese population and a low prevalence of 0.36 per 1000 LB in Brazil and 0.24 per 1000 LB in Zambia (14, 15, 16). According to our results Western Slovakia is among those with moderate prevalence of OC. We observed highest occurrence in CLP, followed by CP and the lowest rate in CL. As mentioned by other authors (13), our data confirmed the predominance of girls in CP group with the highest rate in Bratislava region. The comparison with the previous study noticed a decrease of TI in Western Slovakia population (11).

## Conclusion

The aim of this study was to investigate the prevalence of orofacial clefts in live newborns from 2001 to 2007 in Western Slovakia and correlate their occurrence with a number of relevant seasonal and geographical factors and epidemiological trend of this condition. The results showed that the frequency risk rate of a birth of a child with OC was 1 to 671 LB showing a decrease from 1 to 611 LB in the years 1985–2000. The data proved a higher prevalence of OC in Bratislava region with 1 child with this type

of congenital anomaly to 549 LB compared with 1 child with OC to 730 LB in the rest of the Western Slovakia regions.

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