

## Early childhood caries - risk factors and preventive strategies - a Baltic perspective

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### Summary

The Baltic countries are Estonia, Lithuania and Latvia, which in 2004 joined the European Union. Till regaining of independence dental care in the Baltic countries was free of charge to all population. Together with changes in the social order in all three Baltic countries situation in the area of oral health care changed as well. The dental care and preventive programmes which was formerly provided at schools, kindergartens and specialized dental clinics ceased to exist.

In Latvia dental caries is a problem of whole population and is relevant to all age groups. Social risk factors – unemployment, low incomes, a lack of preventive programmes in kindergartens and schools, lack of paediatric specialists in dentistry - are reasons for high prevalence of caries and periodontal diseases in Latvia.

A special dental public health problem is the early childhood caries, which is increasing during last years. According to a local clinical study performed in 2007, in Riga, near one third of the examined children at the age 2 to 4 had caries. Additionally the results showed that only one third of children brushed teeth twice a day. In most cases mothers did not supervise the tooth brushing.

### Conclusions:

1. Caries prevalence in Latvia is comparatively high.
2. Insufficient information and knowledge about caries prevention, oral hygiene and caries risk factors of children among mothers leads to high prevalence of ECC.
3. In Latvia is need for caries preventive programs in kindergartens and schools and special preventive programs for children with high caries risk.

**Key words:** ECC, dental caries, caries risk factors.

The Baltic countries are Estonia, Lithuania and Latvia, which in 2004 joined the European Union.

Latvia is one of the three Baltic countries on the eastern coast of the Baltic Sea, bordering with Estonia in the north, Lithuania in the south and Russia in the east. Territory and number of population are revealed in the *Table 1* [1, 2].

**Table 1.** Territory and number of population of the Baltic countries

Country	Territory (km <sup>2</sup> )	Number of population (millions)
Estonia	45 226	1.4
Latvia	64 600	2.4
Lithuania	65 300	3.5

Till regaining of independence dental care in the Baltic countries was free of charge to all population. Together with changes in the social order in all three Baltic countries situation in the area of oral health care changed as well. Dental care of children, organised in schools, nurseries and specialised polyclinics stopped to exist. Private sector was establishing and dental care became a charged service. In all Baltic countries oral health problems in children are similar – poor oral hygiene, insufficient amount of fluorides in drinking water, irregular tooth brushing.

Amount of fluoride in drinking water in all of the Baltic countries is not the same.

In Estonia, amount of fluorides in drinking water greatly differs in different regions of the country. According to data of the Institute of Public Health of Tartu University, in the northern part of

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Estonia it is slightly less than optimal (0.2 – 0.83 mg/l), in the western part – high (1.46 – 6.8 mg/l) and in the southern part - low (0.14 – 0.3 mg/l). The different amount of fluorides in drinking water accounts for difference in caries experience in different regions of Estonia (Table 2). In Tallinn, which is the capital of Estonia, prevalence of caries among 12-year old children is 84.3 % and the mean DMFT (Decayed, Missed, Filled teeth) index is 4.1. Tartu, which is situated in the region with comparatively high amount of fluorides in drinking water, prevalence of caries is 58% and DMFT index – 1.99 [3].

**Table 2.** Mean DMFT in different cities of Estonia

Age	City	
	Tartu	Tallinn
7 years	0.3	
12 years	1.99	4.1

In Lithuania, amount of fluorides in drinking water ranges from 1.5 mg/l in eastern districts to 5 mg/l in western districts of Lithuania [4]. Differences in the mean value of DMF index in different regions of Lithuania relating to amount of fluorides in drinking water have not been recorded.

In Latvia, amount of fluorides in drinking water is low – 0.2–1.09 mg/l.

Till the beginning of the 90-ties in all of the Baltic countries fluoride containing tooth-pastes were not available to wide population and, comparing to other European countries, caries experience in the Baltic countries is moderate [5] (Table 3).

**Table 3.** Mean values of DMFT in 12-year old children in the Baltic countries

Country	DMFT (year)
Latvia	3.5 (2003)
Lithuania	2.4 (2001)
Estonia	2.8 (2003)

European Board of Dentists has recommended 1 dentist per 1500 inhabitants in a country. Proportion of dentists per number of population in the Baltic countries is considered as satisfactory, though comparatively high prevalence of caries in these countries has not been taken into consideration (Table 4). Number of dental hygienists in the

Baltic countries is insufficient, and training of dental hygienists in Estonia is not carried out at all [1].

**Table 4.** Number of population per 1 dentist and number of dental hygienists in the Baltic countries

Country	Population per 1 dentist	Number of dental hygienists in the country
Latvia	1477	153
Lithuania	1133	277
Estonia	1411	-

In Latvia, similarly to other Baltic countries, private dental offices comprise majority of all establishments of dental care [6]. Most of them are located in capital and the biggest cities of Latvia. Legal status of the dental offices is shown in the Table 5.

**Table 5.** Legal status of the dental offices in Latvia

Status of the dental offices	Percentage
State and municipal institutions	3
Private institutions	97

In conformity with health care strategy of Latvia the state finances dental services for:

- children up to 18 years of age, except orthodontic treatment,
- patients having inborn facial clefts and severe malocclusions and deformations up to the age of 21,
- persons at the age of 18 – 27 being in military service,
- victims of Chernobyl accident [6].

Rest of the population have to cover expenses for dental care themselves.

In Latvia, dental caries is a serious problem, actually affecting the population of all age groups. Studies, conducted in the previous years, reveal that already 2% of children at the age of 1 are affected by caries, and at the age of 35-44 the number amounted to 100% [7, 8].

First respectable study in Latvia was “International Collaborative Study (ICS) – 2” project in 1993, which revealed results of dentistry in socialistic system. DMFT index for 12-year old children was 5.8 [9]. The results, acquired in the study in 2001, were similar – DMFT index was 5.03 [10] (Table 6, 7). Similarly, dmft index for 3 year old children in 1993 was 2.2 and in 2000 – 1.6.

**Table 6.** Mean values of dmft and DMFT in different age groups in Latvia [7, 9, 10, 11, 12]

Year	Age							
	3 yrs	4 yrs	6 yrs	11 yrs	12 yrs	13 yrs	15 yrs	18 yrs
1993	2.2	3.8	1.16	3.9	5.75	6.1	8.1	-
2000	1.6	2.7	-	4.4	5.03	6.04	7.4	-
2005	-	-	1.85	-	3.31	-	-	8.6

**Table 7.** Prevalence of caries in different age groups in Latvia [12]

Year	Age		
	6 years	12 years	18 years
2005	76%	60.2%	68.7%

Results from the study carried out in 2005, showed that 76% of children at age 6 had caries. The data refers to mixed dentition with both – deciduous and permanent teeth. At the age 12, 60.2% of the examined children had caries.

The population of the capital of Latvia, Riga, is more than 700 000, which is one third of the total number of the population of Latvia. In comparison to other regions of Latvia, caries experience in Riga is lower and with a tendency to decrease [13] (Table 8 and 9).

In all age groups in the period of 1989 to 2000 there was a significant decrease of caries prevalence, except in group of 2 years old, where caries experience increased from 17.3% to 20.3%.

DMFT index for 12-year old children in Riga in 1993 was 5.52 [10], but in 1998 – 3.95 [13]. Comparing values of DMFT index, only in the group of 5 year olds decrease of caries was significant – from 6.6 to 3.1. In the age group of 7 year olds dmft index increased from 1.25 to 4.59. It is explained that data achieved in 2000 refer to mixed dentition.

**Table 8.** Prevalence of caries in different age groups in Riga [7, 14]

Year	Age					
	1 year	2 years	3 years	4 years	5 years	6 years
1989	2.45%	17.3%	52%	74%	84%	-
2000	-	20.3%	36.1%	52.2%	50.3%	55.4%

**Table 9.** Mean values of dmft and DMFT in different age groups in Riga [7, 8, 9, 10, 14]

Year	Age										
	1	2	3	4	5	6	7	11	12	13	15
1989	0.03	0.96	2.2	3.8	6.6	3.01	-	-	-	-	-
1993	-	-	-	-	-	-	1.25	3.1	5.52	5.6	7.3
1998	-	-	-	-	-	-	0.6	-	3.95	-	5.67
2000	-	0.7	1.6	2.7	3.1	3.6	4.59	-	-	-	-
2001	-	-	-	-	-	-	-	4.75	5.03	5.75	7.04

In Latvia, epidemiologic studies on young children's oral health have been carried out comparatively rarely. In 2000 in Riga a study was conducted in which oral health and caries risk were assessed in children aged 2 – 6 [7]. Results revealing dmft index and its structural changes showed that number of filled and carious teeth was growing up with the age of children. In the age group of 4, greatest part of dmft index comprised carious teeth. Number of filled teeth in this age group was smallest.

**Table 10.** dmft index and its structure in children aged 2-6.

Age	dmft	d	f	m
2	0.7	0.55	0.11	0.03
3	1.6	1.26	0.29	0.03
4	2.7	2.04	0.1	-
5	3.1	1.63	3.4	-
6	3.6	1.86	3.4	-

Care index estimated in the study was increasing by children's age. The highest index was in the group of children aged 6. It can be explained with the fact that on starting attending school, cured teeth are required. Whereas in younger groups – children of age 2 - treated were only 17% of cari-

ous teeth, and in the group of children aged 3 – only 28% (Table 11).

**Table 11.** Care index in different age groups

Age	Care index (%)
2	17.7
3	28.0
4	24.7
5	46.1
6	50.0

Investigation of caries risk factors revealed that children with poor oral hygiene, irregular tooth brushing and gingivitis suffered from caries more frequently (Table 12).

**Table 12.** Prevalence of the most common caries risk factors in children

Risk factor	Caries	Caries free
Poor oral hygiene	73.7%	26.2%
Irregular tooth brushing	58.9%	41.1%
Gingivitis	69.1%	30.9%
Irregular fluoride usage	60.8%	39.3%

In children aged 2 caries most commonly is localised on buccal surfaces of the upper jaw, which can be explained with wrong nutrition and daily consumption of sweetened drinks. Beginning with the age of 4, number of caries-damaged occlusal and proximal surfaces increased.

Similarly to majority of developing countries in Latvia, with increase in children’s age, number of untreated proximal surfaces went up, which shows necessity for improvement of prevention and dental care in young children [7].

For children younger than 3 necessities to carry out dental treatment under general narcosis is increasing. In 2001 under general narcosis 85 children were treated, but in 2007 – 700 children, of whom 57% lived in the capital, 43% in other regions of Latvia. Majority of the children had four damaged molars and needed extraction of frontal maxillary teeth. Of the children treated under general narcosis 45% were younger than 3 with diagnosis early childhood caries, 30% - were not able to communicate, and 25% - disabled.

In 2007 in Riga a study was started on caries and its risk factors in children aged 30 months. Caries free were 77.3% of the children, but the

mean value of dmft index – 1.01 (dt – 0.88 un ft – 0.13). Most commonly caries was detected on the frontal teeth of the upper jaw. Plaque on upper incisors was found in 47% and signs of gingivitis – in 5.6% of the children. Great amount of Str. mutans was in 72% of the children. Caries was found to be related to cariogenic food and beverages and visible plaque and caries on upper incisors. Similarly, positive correlation was found between cariogenic food and Str. mutans. The children, involved in the study, consumed cariogenic food and beverages on average more than three times a day. Educational level and social status of the inquired parents were high [15].

Simultaneously with caries, high prevalence of periodontal disease is one of the most acute problems in dentistry of Latvia. Prevalence of periodontal pathologies among children and adolescents is revealed in Table 13 [12].

**Table 13.** Periodontal status in 6-18 years old children and adolescents in Latvia (2005).

Status	Age		
	6 years	12 years	18 years
Healthy	46.7%	28%	12.5%
Bleeding	20.4%	30.1%	16.7%

Healthy periodontal condition in group of 6 year old children had 46.7%, but in group of 18 year olds – only 12.5%.

Poor oral hygiene is noted as the main reason of high prevalence of these pathologies. Results, acquired in several studies, reveal that habits of oral hygiene among adolescents have not changed in the course of time. A lot of the children brushed their teeth once a day and some of them did not brush their teeth at all.

Frequency of tooth brushing among 12-13 years old teenagers is revealed in Table 14 [10].

**Table 14.** Frequency of tooth brushing among teenagers aged 12-13 in Latvia.

Year	Never	Once a day	Several times a day
1993	2%	43%	17%
2001	1%	39%	42%

In Latvia use of fluoride-containing tablets was started in the 80-ties. However, local and short-term deliveries of fluoride-containing tablets to certain nurseries and schools at the time were not assessed enough and continued.

In 1994 in Latvia a project of National preventive programme was worked out, which envisaged to establish Oral health care centres all over Latvia. This project has been partly implemented. The state has determined that financing of dental care should be at least 11% of finances for primary care. Within the recent 5 years 40-50% of children in Latvia have received dental care. On average, 20 euros per a year have been spent for a child [16].

Health Ministry of the Republic of Latvia only since 2006 have started paying a serious attention to dental problems and solution of issues of oral health. Financial resources have been allocated to support activities of oral health centres throughout Latvia. The main reasons for comparatively high prevalence of caries in Latvia are:

- poor oral hygiene. Habits in oral hygiene among adolescents in the course of time have not changed and a lot of them clean their teeth once a day;
- insufficient amount of fluoride in drinking water, lack of preventive programmes in schools and kindergartens,
- in schools lessons on health, including issues of oral health and hygiene, have been cancelled,
- lack of information. In Latvia, a lot of parents and their children still do not know, do not want to know or neglect the fact that children's dental care is state financed,
- there is no cooperation between dentists, family doctors and paediatricians,
- accessibility to services. Lack of specialists and technologies in the countryside of Latvia, problems with transport to reach the nearest dental office are the main reasons of bad accessibility to dental services,
- low service rates. State Agency of Compulsory Health Insurance has not ensured suf-

ficient increase in dental service rates. Due to the low rates, every year more and more dental offices express their dissatisfaction or even refuse to fulfil financially disadvantageous state order.

The possible solutions of these problems could be:

- to achieve state's interest in maintenance of public oral health by giving information to specialists of Health Ministry on status of oral health in different age groups of the population,
- to introduce national preventive programme at the state level,
- to resume health lessons at schools, including in them oral health programme as well,
- to give information to children and their parents on children's oral health status and possibilities to receive dental care,
- to make accessibility to dental services better by introduction of the already elaborated project of mobile dentistry, which would ensure dental services to the population of remote regions of the country,
- to allocate additional financial support to children dentistry, which would level out the existing rates of dental services.

## Conclusions

1. Caries prevalence in Latvia is comparatively high.
2. Insufficient information and knowledge about caries prevention, oral hygiene and caries risk factors of children among mothers leads to high prevalence of ECC.
3. In Latvia is need for caries preventive programs in kindergartens and schools and special preventive programs for children with high caries risk

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