

Prevalence and Risk Factors of Early Childhood Caries in Minsk

Поширеність та фактори ризику розвитку раннього дитячого карієсу у м. Мінську

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Purpose: Was to estimate the prevalence, intensity and risk factors of early childhood caries (ECC) in children up to 3 years old in Minsk (Belarus). **Methods:** There were examined 800 children (767 children in randomly selected paediatric clinics in Minsk and 33 toddlers from orphan's home) aged 6 to 36 months were examined for caries. Caries severity was determined using the dmft index. Parents were suggested to fill in the questionnaires about children oral hygiene and feeding practice. **Results:** It was determined that dental caries prevalence among 800 infants and toddlers was 31.1%, mean d1-4mft was 1.7 in Minsk. Main risk factors were early transmission of mutans streptococci, high-frequency feeding in late infancy, including both bottle use and breastfeeding, late oral hygiene practice, especially without fluoridated toothpaste, visible dental plaque. The prevalence of early childhood caries was 2.45 times higher in children who consume extrinsic sugar. The frequency of night feeding during the last 2 to 3 months, and night bottle feeding were the strongest predictors of early childhood caries. **Conclusions:** It is need both dentists and pediatricians provide primary oral care together to young children.

Key words: early childhood caries, *Streptococcus mutans*, toothbrushing, feeding practice, risk factors, fissure sealing.

Мета: Оцінити поширеність, інтенсивність та фактори ризику раннього дитячого карієсу (РДК) у дітей до 3 років у м. Мінську (Білорусь). **Методи:** Було обстежено 800 дітей (767 дітей у рандомізовано відібраних педіатричних клініках у Мінську та 33 малюків із дитячих будинків) віком від 6 до 36 місяців на наявність карієсу. Тяжкість карієсу визначали за допомогою індексу dmft. Батькам було запропоновано заповнити анкету щодо гігієни порожнини рота та практики годування дітей. **Результати:** Встановлено, що поширеність карієсу у 800 немовлят та дітей раннього віку становила 31,1%, d1-4mft у середньому в м. Мінську до 1,7. Основними факторами ризику були рання передача мутантних стрептококів, дуже часте догодовування, в тому числі використання як пляшки, так і грудне вигодовування, пізня практика гігієни порожнини рота, особливо без фторвмісної зубної пасти, видима зубна бляшка. Поширеність РДК у дітей, які додатково споживають цукор, у 2,45 раза вища. Частота нічного догодовування протягом останніх 2 до 3 місяців та харчування вночі з пляшечки були найсильнішими предикторами раннього дитячого карієсу. **Висновки:** Необхідно, щоб як стоматологи, так і педіатри надавали первинну допомогу з догляду за порожнининою рота маленьких дітей.

Ключові слова: ранній дитячий карієс, *Streptococcus mutans*, зубна щітка, практика вигодовування, фактори ризику, герметизація фісур.

Early childhood caries (ECC) remains difficult to control despite its well-known aetiology. The common risk indicators associated with ECC include early colonization with mutans streptococci, lack of toothbrushing and frequent sugar consumption [1]. The crucial importance of early childhood for a child's further development is recognized by all profes-

sions involved in developmental care. To foster general well-being and quality in a child's life, a wide set of health and nonhealth outcomes must be achieved. There is consensus in the literature that the child's quality of life is characterized by four core domains: physical symptoms (pain and fatigue), functional status (ability to perform age – appropriate

daily activities), psychological functioning (affective states, adjustment indices and self-esteem) and social functioning (the number, type and quality of social contacts and relationships). ECC is associated with physical symptoms such as discomfort, pain, infection, abscesses, gastrointestinal disorders, malnutrition, including retarded growth because of

pain and reluctance to eat. Thus, the consequences of ECC can reach well beyond the dental area and negatively influence general health and development of the child [2].

The purpose of this study was to investigate the prevalence and intensity of ECC in infants and toddlers in Minsk and to reveal the main risk factors of Early Childhood Caries.

MATERIAL AND METHODS

In 2012-2013, 800 children (767 children in randomly selected paediatric clinics in Minsk and 33 toddlers from orphan's home) aged 6 to 36 months were examined for caries. Caries severity (d_{1-4} mft index), oral hygiene, frequency of sugar consumption, feeding practise, level of CFU of SM in saliva (CRT test) were determined. The pH level of dental plaque was determined by Plaque Indicator Kit (GC). Parents were suggested to fill in the questionnaires about chil-

dren oral hygiene and feeding practice. The prediction model was created to reveal the most important risk factors. The results were analyzed statistically (descriptive statistics, Spearman rank, Mann-Whitney U-test).

RESULTS AND DISKUSSION

The prevalence of early childhood caries was 31.1% (Table 1). The prevalence increased from 6.7% in 1-year-olds to 57.3% in 2-year-olds and 63.5% in 3-year-olds. The mean d_{1-4} mft was 1.7 ± 2.9 and the mean d_{1-4} mfs was 2.72 ± 5.27 . The mean d_1 was 0.42, $d_2 - 0.33$, $d_3 - 0.85$, $d_4 - 0.04$, $m - 0.04$ and $f - 0.02$. The data suggests that dentine caries was more prevalent and almost all caries lesions in infants and toddlers were untreated [3].

White spot lesions were diagnosed in 114 children (15.0%) and were more evident in toddlers from ages 1.5 to 2 years old (28.0%). The most affect-

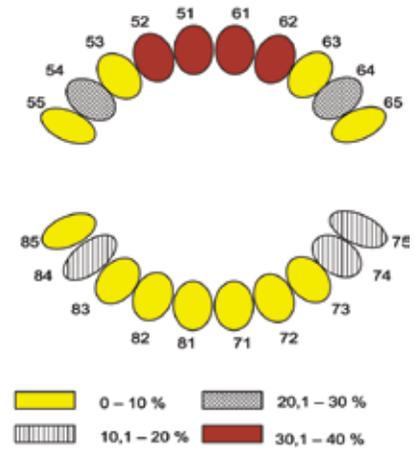


Fig. 1. Dental caries patterns in infants and toddlers

ed teeth were central upper incisors (33.6%), lateral upper incisors (37.6%) and first upper molars (29.3%). Early childhood caries of type I was diagnosed in 24.5%, type II in 66.7% and type III in 8.8% children. Figure 1 represents the distribution of dental caries lesion in the oral cavity of infants and toddlers in Minsk.

Table 1. Dental caries experience in infants and toddlers

Age groups	6-12 mo (n=376)	13-18 mo (n=229)	19-24 mo (n=143)	25-36 mo (n=52)	Total (n=800)
Dental caries prevalence	6.7%	47.6%	57.3%	63.5%	31.1%
Caries free	93.3%	52.4%	42.7%	36.5%	68.9%
d_{1-4} mft, M (SD)	0.30 (1.13)	2.10 (1.77)	3.29 (3.75)	4.58 (4.16)	1.70 (2.87)
d_{1-4} mfs, M (SD)	0.58 (2.67)	3.42 (5.22)	4.97 (6.56)	7.29 (7.55)	2.72 (5.27)

Table 2. Severity of dental caries in infants with different duration of breastfeeding

Variable	Duration of breastfeeding					$P_{\text{Mann-Whitney}}$	
	≤ 3 mo (n=116)	≤ 6 mo (n=90)	≤ 12 mo (n=267)	≤ 18 mo (n=148)	> 18 mo (n=75)		
d_{1-4} mft	1.02 (2.74)	1.21 (2.43)	0.84 (2.08)	2.99 (2.88)	4.67 (3.71)	$p_{1-2}=0,39$ $p_{1-3}=0,71$ $p_{1-4}<0,001^*$ $p_{1-5}<0,001^*$ $p_{2-3}=0,17$	$p_{2-4}<0,001^*$ $p_{2-5}<0,001^*$ $p_{3-4}<0,001^*$ $p_{3-5}<0,001^*$ $p_{4-5}<0,001^*$
d_{1-4} mfs	1.53 (4.40)	1.72 (4.12)	1.57 (4.48)	4.82 (5.83)	7.05 (6.75)	$p_{1-2}=0,46$ $p_{1-3}=0,74$ $p_{1-4}<0,001^*$ $p_{1-5}<0,001^*$ $p_{2-3}=0,17$	$p_{2-4}<0,001^*$ $p_{2-5}<0,001^*$ $p_{3-4}<0,001^*$ $p_{3-5}<0,001^*$ $p_{4-5}<0,001^*$
d_1	0.29 (0.90)	0.22 (0.76)	0.21 (0.81)	0.75 (1.46)	1.07 (1.94)	$p_{1-2}=0,58$ $p_{1-3}=0,28$ $p_{1-4}<0,001^*$ $p_{1-5}<0,001^*$ $p_{2-3}=0,69$	$p_{2-4}<0,001^*$ $p_{2-5}<0,001^*$ $p_{3-4}<0,001^*$ $p_{3-5}<0,001^*$ $p_{4-5}=0,24$

RISK FACTORS FOR EARLY CHILDHOOD CARIES

Infant Feeding Practices: Most of the children were breastfed at least for one year: 36.0% up to one year, 18.5% up to one and a half years, 11.9% up to two years, and 1.2% to 2.5 years. Up to 43.5% of infants and toddlers were breastfed at will. The severity of dental caries increased significantly in infants who were breastfed beyond 12 months (Table 2). There was also an association between the duration of breastfeeding and dental caries prevalence (Table 3): caries prevalence was more than two times higher in children who were breastfed for two years compared to children who stopped breastfeeding by one year of life (56.0% and 24.2% respectively) [3]. Up to 45.9% of infants and toddlers were bottle fed. More often, the content of the bottle was baby formula (33.1%), juice (35.8%) and water (17.8%). The prevalence of dental caries in children who were

bottle fed beyond the age of one year and who consumed sugar-containing drinks from the bottle more often than two times during the night is seen in table 3. The prevalence of caries was highest in children who were bottle fed with fruit water (53.6%), sweet tea (61.5%) and fruit juice (61.5%). Children bottle fed with cow milk had a caries prevalence of 37.5% [4]. The prevalence of early childhood caries was significantly high in children who had breast or bottle feeding before bed or at night (Table 4). The prevalence of early childhood caries was 40.6% in children who practiced night breastfeeding. There was also a moderate correlation between frequency of night feeding and dental caries severity in children aged 13 to 18 months and those aged 19 to 24 months [3]. The frequency of night feeding during the last 2 to 3 months, and night bottle feeding were the strongest predictors of early childhood caries [4]. **Sugar Consumption:** As high as 44.5% of infants and toddlers consume ex-

trinsic sugar every day. Among these, early childhood caries was diagnosed at 48.8%. The prevalence of early childhood caries was 19.9% in those who did not consume extrinsic sugar. Index d1-4mft was 3.2 times higher in children who consumed extrinsic sugar (Table 5). There was an association between mother's education level and children's consumption of extrinsic sugar: mothers with high education rarely gave extrinsic sugar to their infants and toddlers [4]. **Social Risk Factors:** There is a significant association between mothers' educational level, their dental caries severity and presence of dental caries in their kids. The prevalence of early childhood caries was 27.6% in children with families with good dental health habits as against a prevalence of early childhood caries of 58.5% in children with families with poor oral habits. **Oral Hygiene Practices:** As high as 46% of infants had not started brushing, 26% brushed irregularly, and only

Table 3. Dental caries experience and feeding practice in children up to 3 years old

Variable	N	dmft>0	p
Duration of breastfeeding	0-12 mo	86	24.2%
	13-18 mo	48	32.2%
	>19 mo	107	56.0%
Time of breastfeeding	night	101	43.4%
	day	4	21.1%
	day and night	124	30.0%
Duration of bottle feeding	<12 mo	9	17.0%
	>12 mo	99	27.0%
Frequency of night drinking	≥ 2 times	26	26.0%
	< 2 times	20	45.5%
Night bottle feeding	instant tee	8	10.5%
	milk formula	34	16.3%
	sweet beverage	15	50.0%

Table 4. Prevalence of dental caries experience in infants and toddlers with different feeding time

Variable	N	Prevalence of dental caries (%)	OR	p
Night feeding	No	183	13.7	6.19 p<0,001
	Yes	584	38.4	
Feeding before bedtime	No	238	16.4	3.45 p<0,001
	Yes	521	40.3	

Table 5. Dental caries severity in children with different food habits

Variable	No extrinsic sugar intake(n=421)	Extrinsic sugar intake (n=338)	pMann-Whitney
d ₁₋₄ mft	0.86 (1.90)	2.75 (3.47)	p<0,001
d ₁₋₄ mfs	1.38 (3.67)	4.41 (6.37)	p<0,001
d ₁	0.27 (0.88)	0.62 (1.42)	p<0,001

Table 6. Early childhood caries severity in children with different dental plaque pH level

Variable		pH=5.5	pH=6.0	pH=6,5	pH=7.0	p
d ₁₋₄ mft>0	n (%)	46 (90.2%)	73 (85.9%)	29 (56.9%)	1(5.6%)	p ₁₋₂ =0,012 p ₁₋₃ <0,0001*
d ₁₋₄ mft	M (SD)	6,27 (3.58)	4.66 (2.88)	2,45 (3.38)	0,22 (0.94)	p ₁₋₄ <0,0001* p ₂₋₃ <0,0001* p ₂₋₄ <0,0001* p ₃₋₄ =0,0014*

«*» –p<0.008

28% brushed regularly. Up to 37.8% of children had visible dental plaque in their mouth. Visible dental plaque was association with the presence of early childhood caries and it was a strong predictor of early childhood caries [4]. Also, only 33% parents brushed their kid's teeth with fluoridated toothpaste. The prevalence of early childhood caries was lower in children who used fluoridated toothpaste twice a day (OR=4.23). Streptococci Mutans Count: A strong correlation was established between Streptococci mutans count and early childhood caries severity. Not all infants and toddlers had Streptococci mutans in their oral cavity: only 45.8% of infants and toddlers were Streptococci mutans positive. The Streptococci mutans level was moderate (SM 1) in 20.0% of kids, high (SM 2) in 22.0% of kids and

very high (SM 3) in 3.8% of kids. The prevalence of early childhood caries increased from 1.9% in children with SM 0 to 100% in kids with SM 3 [5]. Dental Plaque pH: The mean dental plaque pH was 6.09. The dental plaque pH level was higher in caries free children (6.45) than in children with early childhood caries (5.99). There is a significant correlation between the prevalence and severity of early childhood caries and dental plaque pH. Also, the dental plaque pH in children with night feeding was lower than the dental plaque pH of children without night feeding [6].

CONCLUSIONS

The prevalence and intensity of dental caries are harshly increased in 3 years

old children. The main associated risk factors are bad oral hygiene (visible plaque) and inappropriate feeding practice (prolonged breast and bottle feeding at night after one year of life). It is obvious that both dentists and paediatricians should work together. And paediatricians can also provide primary oral care for infants and toddlers.

There is the need to conduct epidemiological studies on early childhood caries in preschool children in all the regions of Belarus using both the WHO criteria and ICDAS II. This should help with the identification of disparities in the prevalence and severity of early childhood caries between rural and urban populations of Belarus; and help with the design and implementation of effective preventive strategies.

REFERENCES

- Dye, B.A., Hsu, K.L., & Afful, J. (2015). Prevalence and Measurement of Dental Caries in Young Children. *Pediatr Dent*. Vol. 37, № 3, p. 200-216 (in English).
- Alazmah, A. (2017). Early Childhood Caries: A Review. *J Contemp Dent Pract*. Vol.18, № 8, p. 732-737 (in English).
- Shakovec, N.V. (2016). Karies zubov u detej rannego vozrasta: avtoref. dis. ... d-ra med.nauk: 14.00.21/ BGMU. Minsk, 40 s. (in Russian).
- Shakovets, N., & Tserakhava, T. (2015). Feeding practice in young children as risk factor of ECC. 20th European Association of Dental Public Health Conference, Istanbul, Turkey 17-19 September, 2015. Istanbul. Abstr. 3054 (in English).
- Shakovets, N., & Tserakhava, T. 2016. Three year results of ECC prevention in children with Streptococcus mutans in saliva. 21st Congress of the European Association of Dental Public Health. 29 September–1 October, 2016, Budapest, Hungary, p. 62 (in English).
- Shakovets, N. (2014). Dental status and risk factors of ECC in young children in Belarus. 3rd International Congress USSI EDI, Novi Sad 15-16 May, 2014, Novi Sad, S. 73–76 (in English).

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