

## PREMATURITY AND LOW WEIGHT AT BIRTH: RISK FACTORS FOR DEFECTS OF ENAMEL DEVELOPMENT

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**Abstract.** The aim of this study was to determine the prevalence of enamel defects in two school communities using SCOTS Index and to correlate the results to two potential risk factors: prematurity and low weight at birth. Mixed dentition status was assessed at 121 children and the prevalence highest value of enamel defects was 9%. A significantly strong prevalence ( $p < 0.001$ ) of the defects of enamel development and of the analyzed potential risk factors was noticed. Further studies are needed to clarify whether achieving near optimum intra-uterine mineral retention would decrease the prevalence of subsequent enamel defects in infants born prematurely.

**Key words:** primary and permanent dentition, SCOTS index, defects of enamel development, prematurely

**Rezumat.** Obiectivul acestui studiu a fost determinarea prevalenței defectelor de smalț în două comunități școlare, cu ajutorul indicelui SCOTS și corelarea rezultatelor cu 2 factori potențiali de risc: prematuritatea și greutatea mică la naștere. Statusul dentiției a fost evaluat la 121 de copii, iar prevalența maximă a defectelor de smalț a fost de 9%. S-au observat o prevalență statistic semnificativă ( $p \leq 0,001$ ) a defectelor de dezvoltare ale smalțului, și a factorilor potențiali de risc analizați. Sunt necesare diverse studii pentru a se stabili dacă nivelul optim de retenție minerală intrauterină ar coborî nivelul prevalenței defectelor de smalț la copiii născuți prematur și cei cu greutate mică la naștere.

**Cuvinte cheie:** dinți temporari, dinți permanenți, indice SCOTS, defecte de dezvoltare ale smalțului, prematuritate

### INTRODUCTION

Dental dysplasia as complex pathogenic structure anomaly, despite its relatively low incidence in the oral pathology of child, aroused a high interest, proved by the considerable quantity of scientific material in the reference literature.

In present-day conceptions, the verity of these cases calls for large systematic studies in order to have a correct image of the dimension and characteristics of this disease taking

into account predictive correlations to in order to have different potential risk factors.

The references report that children with a low weight at birth and premature ones have more enamel dysplasia than children born in due time, this fact suggesting that the pre-native and neo-native conditions have a strong influence in the development of this defect.

Although the high cause and its effect on the ameloblast metabolism have

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not been made clear yet, it is obvious that the disturbed local or systemic environment, the hereditary factors or a combination of these are responsible for the appearance of enamel and dentin development defects (1).

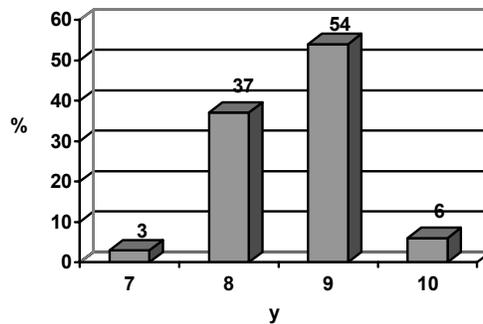
The aim of the study was to prove the epidemiological characteristics of enamel development defects and to correlate them to parameters, which

could be established as risk factors of their appearance, namely the prematurity and low weight at birth.

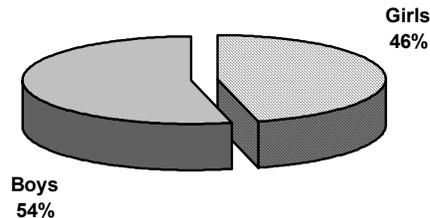
### SUBJECTS AND METHOD

A lot of 121 children aged between 7 and 10 y, from two Secondary Schools (A and B) have been investigated.

Age and sex distribution are shown in figures 1 and 2.



**Fig. 1 Age distribution of examined children**



**Fig. 2 Sex distribution of examined children**

This age interval was chosen in order to grasp the first period of mixed dentition when in the superior incisive group both temporary permanent teeth coexist.

Taking into account that, on one hand this disease is not very much studied

on our population and on the other hand, time and human resources at our disposal were reduced, we chose a transversal descriptive study which is useful for getting some quantitative data regarding the frequency and distribution of the studied disease into

population, the risk factors and the subgroups of population affected. The children were examined under standardized conditions with natural light and without previous drying of the teeth. SCOTS Index (2) has been used. This includes the examination of the four superior incisors and the question the

child was asked by the stomatologist: "Do you think you have any mark on your superior front teeth, mark which can't be brushed off?", the answer being recorded by the examiner. The presence of clinical examination: opacity (I), maximum extent of serious opacity (II) and the symmetry of opacities (III) are presented in table 1.

**Table 1. The SCOTS Index. Modified DDE Version (PITTS and STEPHEN, 1991)**

Opacity codes	Description
<b>I</b>	
<b>0</b>	Normal Within the range normal enamel N, no developmental defect evident.
<b>1</b>	Demarcated opacities: white/cream or yellow/brown well demarcated opacity from adjacent normal enamel
<b>2</b>	Diffuse opacities a) fine white lines b) patchy, irregular cloudy areas or strips lacking well defined margins c) continuous condensed chalky white opacity
<b>3</b>	Hypoplasia External defect associated with a reduced thickness of enamel. The surface may be characterized by pits, grooves or the complete absence of surface enamel
<b>4</b>	Demarcated and diffuse opacities Codes 1+ 2
<b>5</b>	Demarcated and hypoplastic Codes 1+3
<b>6</b>	Diffuse and hypoplastic Codes 2+3
<b>7</b>	Others Defects which cannot be classified under codes 1-6, for example discromia
<b>8</b>	All demarcated, diffuse and hypoplastic Codes 1+2+3
<b>9</b>	Excluded Tooth is missing or is present but cannot be examined e.g. presence of orthodontic band.
<b>II</b>	
< 1/3	Less than one third of the tooth, from the incisal edge, affected
> 1/3 < 2/3	Between one and two-thirds of the tooth, from the incisal edge, affected
> 2/3	More than two-thirds of the tooth, from the incisal edge, affected
<b>III</b>	
0	Defects not symmetrical
1	Only one type of defect, and it is symmetrical
2	More than one type of defect, all symmetrical

The database was created by EPI-INFO 6.0 programme and analysed by

FPI-INFO 6.0 and SPSS 6.0 programmes. Both descriptive and analytical

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methods were used for statistical analysis with a 95% CI. We used our own examination-record cards, which also included details on birth and weight at birth, for each subject.

RESULTS AND DISCUSSION

A 9% prevalence of enamel defects for children from Secondary School A and a 3% prevalence of enamel defects for children from Secondary School B have been found (fig. 3).

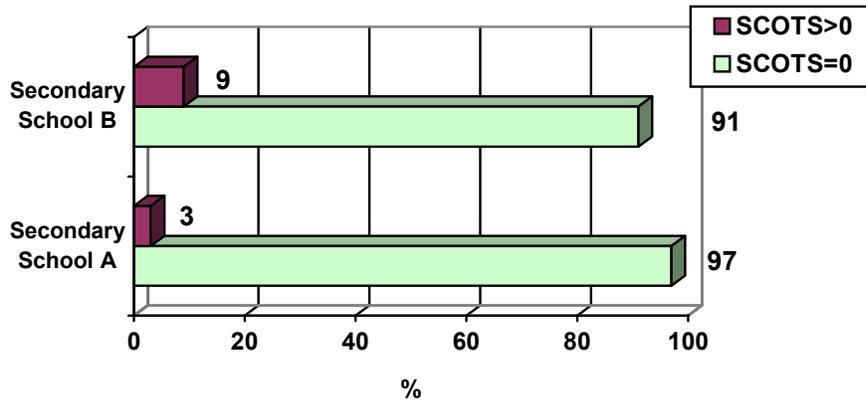


Fig. 3 Prevalence of enamel defects - SCOTS index

Related to the type of delivery, we noticed that the subjects born prematurely have got a higher

frequency of enamel defects (score SCOTS > 0) than the subjects born in due time ( $p < 0.05$ ) (fig. 4).

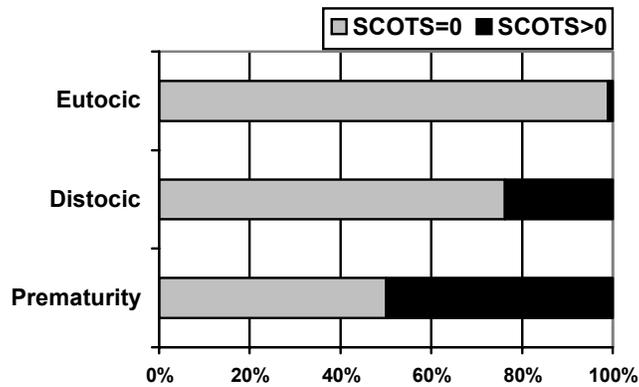


Fig. 4 Enamel defects related to the type of delivery

Children with a low weight at birth (under 2500 g) had a SCOTS Index significantly higher than those with a normal weight at birth ( $p < 0.05$ ) (fig. 5).

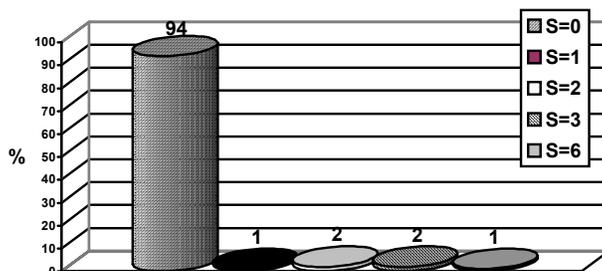


Fig. 5. SCOTS index values at children of low weight at birth

SCOTS score 0 have been found in 94% of children, SCOTS score 2 and 3 in 2% of children and SCOTS score 1 and 6 in lowest percentage (1%) of examined children.

Although the girls were more frequently affected, there are not significantly difference about sex and age of children (table 2).

Table 2. SCOTS index variation on gender, age, tpe of birth and birth weight

	Subjects		95%CI	SCOTS>0	$\chi^2$ p
	n	%			
<b>SEX</b>					
Male	55	46	36.7-55.2	6	2.91
Female	65	54	44.8-63.3	2	0.09
<b>AGE (y)</b>					
7	3	3	0.6-8.5	0	1.54 0.67
8	37	37	27.6-47.2	1	
9	54	54	43.7-64.0	4	
10	6	6	2.2-12.6	0	
<b>TYPE OF DELIVERY</b>					
Eutocic	95	80.5	70.2-87.2	1	23.04
Distocic	21	17.8	11.4-25.1	5	<0.001
Prematutity	2	1.7	0.2-6.0	1	
<b>BIRTH WEIGHT (g)</b>					
2250-2499	1	0.8	0.0-4.6	1	18.9 0.008
2500-2749	4	3.4	0.9-8.4	0	
2750-2999	28	23.5	16.2-32.2	3	
3000-3249	45	37.8	29.1-47.2	2	
3250-3499	20	16.8	10.6-24.8	1	
3500-3749	16	13.4	7.9-20.9	0	
3750-3999	4	3.4	0.9-8.4	0	
4000-4249	1	0.8	0.0-4.6	0	

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The results of this study have shown, by means of SCOTS Index, a maximum 9% prevalence of enamel defects in the studied group. In the same area, using the same index but in much larger population the values of prevalence of enamel defects were very close to 6.7% (3).

Previous researches done by Davies and Pitts in Scotland in 1993-1995 (4) using the same index, indicated a much higher prevalence of 24% of enamel dental dysplasia, fact that can be explained by: differences regarding the size of the lots, different environment, the excessive use of fluor in the northern countries which sometimes leads to fluorosis phenomenon.

In Bulgaria, the studies done by Atanasov report an 11.4% frequency of congenital dental dysplasia, a much closer value to ours one (5).

A series of recent researches achieved by Sweeney in Guatemala correlated the high enamel hypoplastic prevalence to the malnutrition state in different population groups, getting significant statistical values (6).

In our study, the premature children present a higher SCOTS Index than those born in due time (Figure 4). The pathogenic mechanism which explains how the prematurity and low weight at birth affect the enamel development and mineralisation, is not known, but elements such as respiratory stress, apnea, hypoglycemia, cardiac defects and infections have been associated to high prevalence of enamel hypoplasia (7). Other investigations reported that children with congenital or acquired imbalance of the phospho-calcium equilibrium presented enamel hypoplasia

(8). Ameloblasts are very sensitive to seric calcium fluctuation even for short periods of time. This proves that in the presence of an unbalanced and low mineral diet, calcification of dental tissue may be diminished or even stopped, trying to gain the mineral equilibrium in the serum (8).

## CONCLUSIONS

1. The prevalence of enamel development defects assessed by SCOTS index ranged from 3 to 9 per cent in children aged between 7 to 10 y.
2. There were not significant statistical differences by age or sex of child.
3. A highly significant prevalence ( $p < 0.001$ ) of enamel development defects has been noticed and correlated to risk factors: prematurity and low weight at birth.
4. Each age group needs a thorough and complete clinical and paraclinical assessment of these entities as the involved risk factors in order to evaluate their prognosis and, last but not least, the best preventive and interceptive methods.

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