

Early lesion detection at 6-7 years and 12-13 years schoolchildren from Bucharest, a prediction factor of decay evolution

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Summary:

Until recently, dentists have relied only on clinical and x-ray examinations to detect caries. The modern caries diagnosis methods can improve on the accuracy of detection and, more important, offer the possibility of early caries detection.

The program „Prediction of the evolution of oro-dental diseases and oro-maxillo anomalies in grade-school children" had the purpose of making an early diagnosis for the early carious lesion, of promoting the implementation of a well targeted preventive program into communities and of motivating dental practitioners in schools to use modern methods of early lesions' diagnosis.

The present article shows the final results of the study which took place in several schools in Bucharest. The results refer to the number and localization of early carious lesions in 6-7 and 12-13 years old children. The carious lesions were diagnosed by clinical examination and fibre optic transillumination (FOTI).

Key words: early decay; clinical examination; fiber optic transillumination (FOTI)

Introduction. Motivation

Dental caries are present in 97% of the population. Early diagnosis of the carious lesion will lead to non-invasive or minimal invasive treatment procedures which will increase the life time of the tooth [1].

Caries diagnosis is usually synonym to identifying the level of dental tissue destruction; practically speaking, the diagnosis should reflect the individual caries' activity, should show the localization of the lesion and should determine weather the lesion is active or stagnant [2].

The current caries management includes 3 major aspects: prevention, control and

treatment, all based on precise diagnosis and detection of pathological changes. All these translate into early detection of incipient lesions [3].

Although, consecutive to changes occurred in the epidemiological pattern of the carious lesion, the caries incidence has decreased among the young population, the disease is far from being eradicated. The changes show that the evolution of the carious lesion is slower, due to the increased use of preventive measures (tooth brushing) [4].

The program „**Prediction of the evolution of oro-dental diseases and oro-maxillo anomalies in grade-school children**" took place between the 01.12.2004 and

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01.12.2006, in several schools in Bucharest. It included almost 1000 children, 6-7 and 12-13 years of age, from the 1st and 5th grades. It was a screening type of program using clinical examination and fibre optic transillumination.

The program was approved by the Health and Family Ministry and the Department of Public Health in Bucharest. The latter is also a direct partner together with the Oral Health and Preventive Dentistry Department from the Bucharest Dental School.

One of the specific objectives of this program is the detection of incipient carious lesions and clinical differentiation with fibre optic transillumination (FOTI). Other objectives of the program include establishment of carious prevalence in 6-7 and 12-13 years children, discovery of socio-demographic risk factors of the risk groups, identification of the caries risk groups and performance of para clinical tests inside the cariogram, teaching oral hygiene and detection of oromaxillo anomalies and the implementation of the OMS chart.

The obtained data are recorded in an OMS chart and 2 types of questionnaires, one for the 1st grade and one for the 5th grade, are filled in.

For educational purposes, students from the Dentistry School and from the School for Dental Nurses, both in Bucharest, are also involved in the program.

The data gathered from the program will be used to devise a well targeted prevention program, which will determine the decrease of the DMF-T indicator, the remineralisation of incipient lesions, the decrease of orthodontic treatment need, the creation of good habits for keeping dental health, the increase of visits to the dental practitioner among the children of 6-7 and 12-13 years old.

The school dentists are also involved in the program. We hope this may establish a future pattern of collaboration between the research department and the school dentists which will improve the clinical and econom-

ical aspects of prevention and treatment of oral and dental diseases.

Material and method

Clinical differentiation of the incipient lesions by use of fibre optic transillumination included the examination of the following:

- In 6-7 years old group:
 - 20,813 dental surfaces on decidual teeth
 - 13,262 dental surfaces on permanent teeth
- In 12-13 years old group:
 - 1125 dental surfaces on decidual teeth
 - 33.437 dental surfaces on permanent teeth.

Clinical Examination

Before the clinical examination the children rinsed their mouths with water; the direct light source was provided by the halogen bulb of the dental unit lamp and the indirect light was provided by the use of the dental mirror. The number and position on all the tooth surfaces of white lesions were recorded after drying the tooth surfaces for 5 s (Ekstrand, 1998) with the air syringe.

Fibre optic examination (FOTI)

The Microlux Transilluminator (AdDent Inc.) was used. The probe was placed on the occlusal surface in order to detect the occlusal incipient lesions and perpendicular on the smooth surfaces, to detect approximal lesions.

In between examinations, Zeta 3 (Zermack) was used to disinfect the probe.

Results

All tooth surfaces (V, O, M, D and Occl) were examined. Fibre optic transillumination detected more lesions than clinical examina-

tion. The largest amount of lesions was located on smooth surfaces. The numbers can be seen in the following tables.

The number of incipient lesions detected by fibre optic transillumination is approximately 6 times bigger on smooth surfaces for both dentitions.

In this age group incipient lesions are located both on smooth and approximal surfaces and are more easily detected by FOTI.

Figure 3 shows the difference in the number of lesions detected by FOTI and the one detected by clinical examination in children of 7 and 12 years of age. In both dentitions, FOTI detects more lesions than clinical examination does.

The largest percentage of incipient lesions on primary tooth surfaces (7.84%) can be found at the 12-13 years group, probably because those teeth are closer to their

Table 1. Distribution of incipient lesions in the 6-7 years old group: a comparison between the clinical examination and fibre optic transillumination (FOTI)

Incipient lesions on approximal surf. Primary teeth	Incipient lesions on smooth surf. Primary teeth	Incipient lesions on occl. surf. Primary teeth	Incipient lesions on approximal surf Perm.	Incipient lesions on smooth surf. Perm.	Incipient lesions on occl. surf. Perm.	Incipient lesions on approximal surf. Primary teeth	Incipient lesions on smooth surf. Primary teeth	Incipient lesions on occl. surf. Primary teeth	Incipient lesions on approximal surf. Perm.	Incipient lesions on smooth surf. Perm.	Incipient lesions on occl. surf. Perm.
94	289	36	218	274	28	205	1056	58	363	1237	63

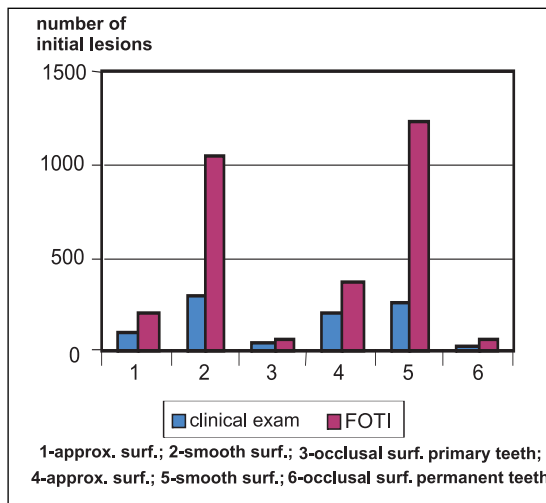


Fig. 1. Early decay detection at 6-7 years using clinical examination vs fiber optic transillumination (FOTI)

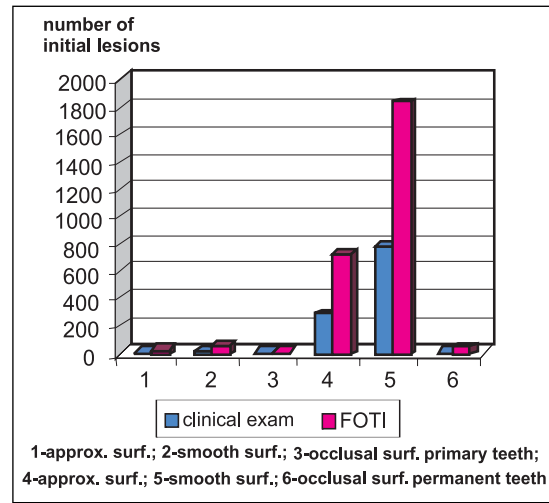


Fig. 2. Early decay detection at 12-13 years using clinical examination vs fiber optic transillumination (FOTI)

Table 2. Distribution of incipient lesions in the 12-13 years old group

Incipient lesions on approximal surf. Primary teeth	Incipient lesions on smooth surf. Primary teeth	Incipient lesions on occl. surf. Primary teeth	Incipient lesions on approximal surf Perm.	Incipient lesions on smooth surf. Perm.	Incipient lesions on occl. surf. Perm.	Incipient lesions on approximal surf. Primary teeth	Incipient lesions on smooth surf. Primary teeth	Incipient lesions on occl. surf. Primary teeth	Incipient lesions on approximal surf. Perm.	Incipient lesions on smooth surf. Perm.	Incipient lesions on occl. surf. Perm.
15	20	3	294	784	13	31	54	9	717	1821	36

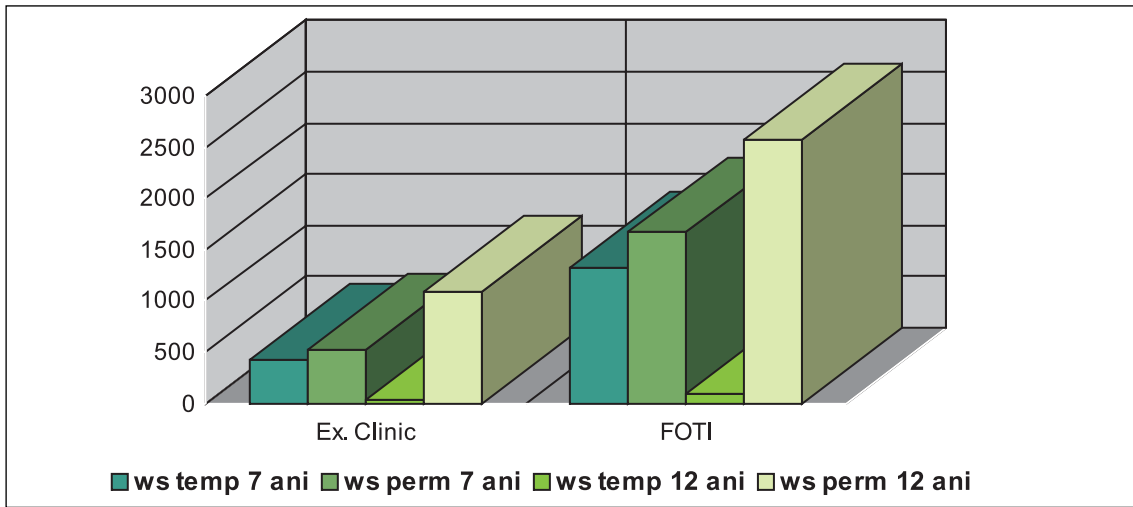


Fig. 3. Distribution of incipient lesions on dental surfaces in both age groups; comparison between FOTI and clinical examination

Table 3. Percentage evaluation of the frequency of incipient lesions at 7 and 12 years of age detected by clinical examination and FOTI

	Clinical exam. 6-7 y	Clinical exam. 12-13 y	FOTI 6-7 y	FOTI 12-13 y
Primary teeth	2,46%	3,59%	4,16%	7,84%
Permanent teeth	3,92%	4,13%	12,62%	8,51%

shading time. The largest percentage of incipient lesions located on permanent tooth surfaces (12,62%) can be found at 6-7 years group, which proves once again, the necessity

of introducing preventive programs in schools starting with children in this age group. More incipient lesions could be detected by FOTI examination.

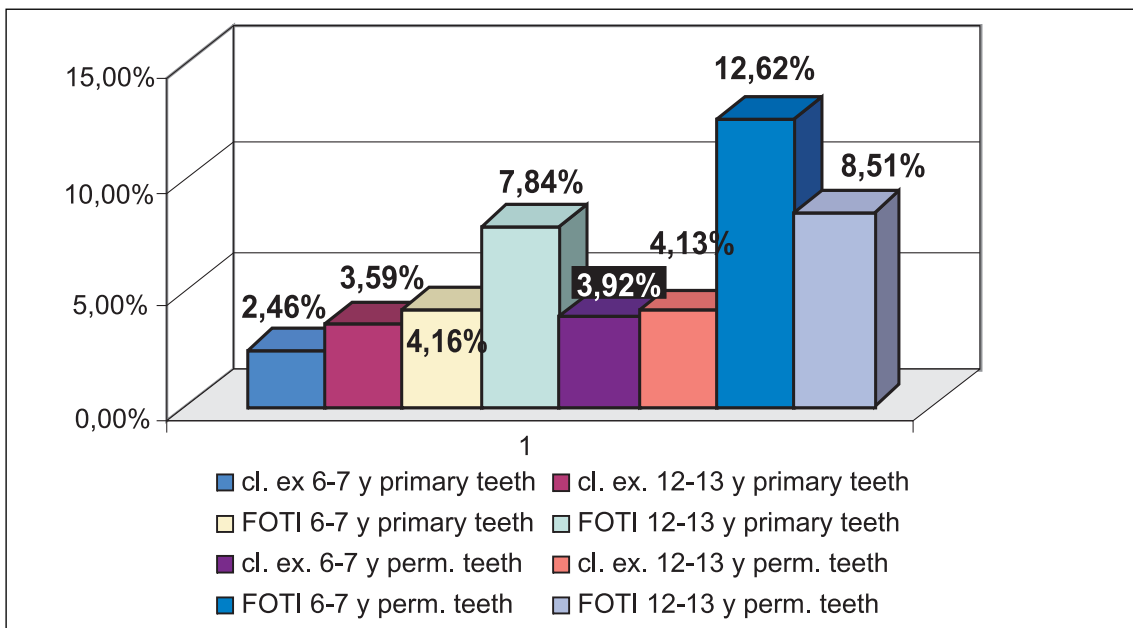


Fig. 4. Percentage evaluation of incipient lesion frequency at 7 and 12 years

In 12 years old children, both detecting methods found incipient lesions on the smooth and approximal surfaces of lateral teeth and on smooth surfaces of frontal teeth. FOTI was better at detecting lesions on occlusal surfaces and on the approximal surfaces of frontal teeth.

The conclusions of the program are as follows:

- the screening of 1000 children and the detection of a large number of incipient lesions in the permanent dentition pointed out clearly the necessity of implementing prevention programs in schools from the age of 6-7 years old or even earlier;

- given the large number of incipient lesions found on smooth and approximal surfaces, the preferred course of treatment in children in primary and secondary schools would be fluoridation in trays (because of the tixotropic properties of the fluoride gel);

- the results of fluoridation would be monitored through future evaluations;

- a correct brushing method should be taught in the school's dental practice and should need further monitoring by parents at home;

- the consumption of sweet acidulated beverages and of junk food could be reduced if school management could monitor their sale on school premises;

- no differences were found between the number of incipient lesions in children from schools in the outskirts of Bucharest when compared to children that studied in schools

situated in the centre of Bucharest (the socio-economical status isn't a risk factor)

- there are more children with a 100% plaque index in schools from the centre of town than in schools on the outskirts of town;

- FOTI, as a complementary diagnosis device, can detect lesions especially on smooth and approximal surfaces, in both dentitions;

- for incipient lesion detection on occlusal surfaces laser fluorescence (DIAGNOdent and DIAGNOdent pen) is preferred; unfortunately, its fragility and high cost make it difficult to use in large collectivities;

- the dental practitioners in schools were open to the new and modern early lesion diagnostic procedures. This, together with the fact that they are economically and clinically efficient, makes us conclude that they should be used in schools on a daily bases;

- as a direct participant in the program, the Department of Public Health in Bucharest, will take the results of the program into consideration and take the necessary health measures.

Dentists have, through practice experience, a well trained visual diagnostic system, which should be assisted, not replaced, by the use of modern aids (ten Bosch, 1996).

Fibre optic transillumination (FOTI) has proved itself to be a useful and handy complementary device for incipient lesion detection. Therefore, early lesion detection and correct caries diagnosis should be considered as a necessary trade-off between the cost of treatment and treatment quality [5].

References

1. Heinrich-Weltzien R, Kuhnisch J, Ifland S, Tranaeus S, Angmar-Mansson B si colab. Detection of Initial Caries Lesions on Smooth Surfaces by Quantitative Light-Induced Fluorescence and Visual Examination: an in vivo comparison. *Eur J Oral Sci* 2005;**113**:494-499.

2. Kidd EA ., Fejerskov O . -, "What constitutes dental caries?" *J Dent Res.* 2004;**83 Spec No C**: C35-8

3. Kidd EAM, Joyston-Bechal S. Essentials of Dental Caries: The disease and its management. (2nd ed).

New York, Oxford University Press, 1997.

4. Stookey GK. Practical applications of early caries detection methods. In: Stookey GK, editor. *Early Detection of Dental Caries II*. Indianapolis: Indiana University, School of Dentistry. 2000;357-363.

5. Verdonschot EH, Angmar-Månsson B, ten Bosch JJ, Deery CH, Huysmans MCDNJM, Pitts NB, Waller E. Developments in caries diagnosis and their relationship to treatment decisions and quality of care. *Caries Res* 1999;**33**:32-40.

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