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Research Article

EVALUATION OF RISK INDICATORS AND RISK-BASED MANAGEMENT OF CARIES LESIONS

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ABSTRACT

Introduction: Preventive attitude and minimally invasive techniques are new approaches that have been interested in dentists lately aiming to develop the best strategies in dental practice.
Caries risk assessment is one of the most important stages of early diagnosis of caries lesions and the best decision-making for caries management.
Material and methods: 42 patients, 30 boys, and 12 girls, aged 9-14 years old, were questioned and examined, aiming to identify risk indicators for caries lesions development. We used Microsoft Excel program to do some basic data analysis.
Results: After evaluating risk indicators for each patient we found only 5% with low risk, 38% with moderate risk and 57% with high risk of caries. We could explain the high frequency of permanent teeth caries lesions, 74% of the patients, since 38% of the children never visited o dentist.
Conclusions: Including the patient in one of the risk categories helps practitioner to make a good treatment plan, taking into account the wellbeing of patient.

INTRODUCTION

Dental caries is a multifactorial disease which was considered for so long to be an irreversible process determined by enamel demineralization followed by dentin destruction and cavity formation. Lately it was widely accepted the Keyes etiology concept which involves oral microbial biofilm, dietary habits with sugar consumption, and host factors. New findings about caries etiology include also social factors, habitual factors, or psychological issues. (5, 8, 9) New concepts consider caries as a result of demineralization-remineralization process imbalance. This concept underlines the importance of periodical controls in order to detect early lesions, which are only demineralization on enamel surface, without cavity, and encourages practitioners to adopt preventive and noninvasive attitude for lesions remineralization. (6)

Considering the fact that tooth decay is a dynamic process involving cycles of demineralization and remineralization, the caries initiation is determined by oral conditions that increase demineralization leading to mineral loss.Teeth health involves conditions to maintain the balance between pathological factors, leading to demineralization, and protective factors, helping in remineralization process.

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Pathological factors are microbial biofilm, frequent consumption of carbohydrates, salivary disorders, and lack of preventive procedures: fluoridation, surfaces sealing.
Protective factors are good oral hygiene, healthy diet, preventive procedures, systemic or local fluoridation, sealing procedures, normal salivary function. (7)

Caries risk assessment and categorization in low, moderate, or high risk for caries development is based on preponderance of pathological or protective factors for each patient. (1)

Caries risk indicators are variables considered to be more or less directly associated with the disease, contributing factors including: socioeconomic factors, education, general health status, epidemiological factors, and caries history. (11)

Carrying out a risk assessment including the best available evidence is important in the decision of caries management in dental practice, taking into account also the wellbeing of patient.

Risk-based categorization of patients helps practitioners to adopt the best therapeutic attitude of preventive and noninvasive techniques, to identify the main risk factor for caries development, and to manage the evolution and the future visits.

MATERIAL AND METHODS

42 patients from country side were taken into the study, 30 boys, and 12 girls, aged 9 to 14 years old. Each patient has been informed about the procedure and the parents signed

consent. We made observation file for each patient, including all risk indicators, either contributing or protective factors.
After evaluating risk indicators, we were able to include patients in one of the risk categories: low, moderate, or high risk of caries disease.

Risk indicators of caries initiation are shown in table 1. For the statistical section we used Microsoft Excel program to do some basic data analysis.Socioeconomic status and education level were the same for all the patients, considering the fact that they have been selected from the same school from a country region. Rural areas where they live and low education are high risk indicators.

Each patient was questioned about carbohydrates consumption, oral home hygiene, brushing habits, and hygiene items they use daily: dental brush, tooth paste, mouthwash. Regarding sugar consumption and daily diet, the questions were about frequency of sweets consumption, type of sweets, and protective aliments:

- Frequency: rarely, as a dessert, or often a day
- Type of sweets: cookies, chocolate, ice cream, candies, or sparkling juices
- Protective aliments like fruits or peanuts
- The questions about hygiene focused on frequency and moment of home brushing and on the hygiene items used in their daily home care habits.

Risk Indicators for caries development

Table 1 Risk categories based on risk indicators

Risk indicators	Low	Moderate	High
Socioeconomic status and education	Urban Good education	Urban or rural Moderate education	Rural Low education
Carbohydrates consumption	Rarely	As a dessert	Often a day Between meals
Oral hygiene at home	Normal brushing twice a day	Once a day	Irregular
Bacterial biofilm	None	Moderate	Heavy
Dental status Restorations	None	1-2 restorations	More than 3 restorations
Caries lesions	None	Incipient lesions, white spots	Cavity lesions
Preventive measures	Yes	none	None
Family history	None	Low caries activity	High caries activity
Other special conditions	None	Enamel hypoplasia Orthodontic appliance	Eating and salivary disorders Special needs Alcohol and drug abuse
Dental visits	Periodical controls	Only if necessary for treatments	Urgency or never

RESULTS

Of the 42 patients under study, 30 were boys, 71%, and 12 were girls, 29%.The type of sweets preferred by the patients were ice cream (88%) and sparkling juices (86%), but most of them noted they consume all types of sweets.

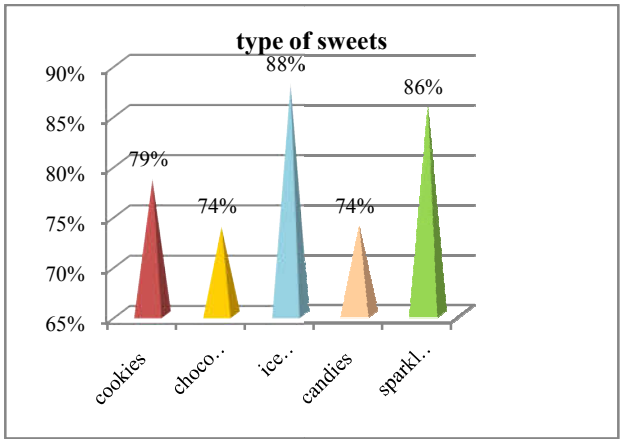

Fig 1 The type of sweets preferred by the patients

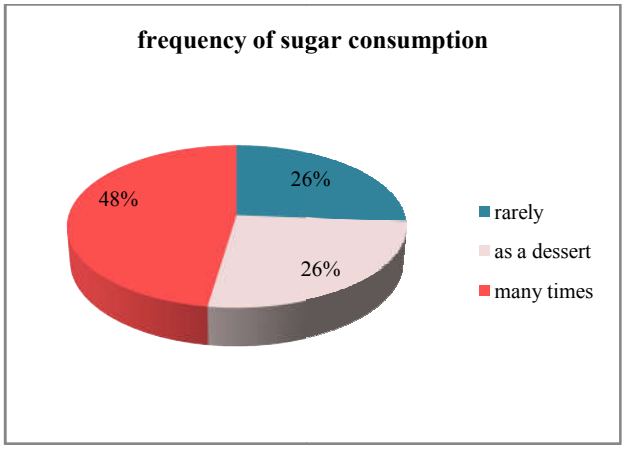

Fig 2 The frequency of sweets consumption

In terms of brushing habits, 64% of the patients make their oral care twice a day, 24% once a day, of which 5% in the evening and 19% in the morning, and 12% brush their teeth occasionally.

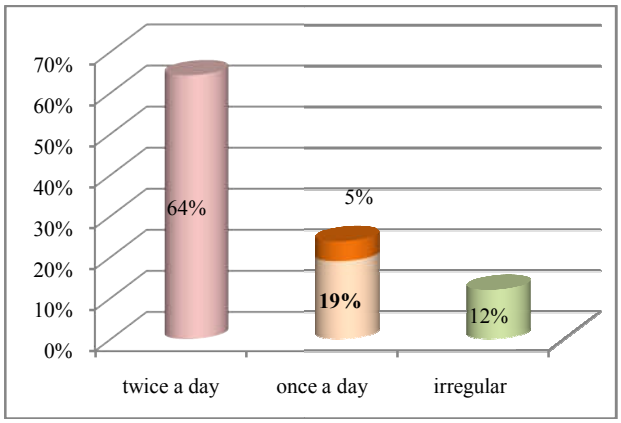

Fig 3 Brushing time

One person said he rarely brushes his teeth, and 4 persons do not use tooth paste in their oral home care.

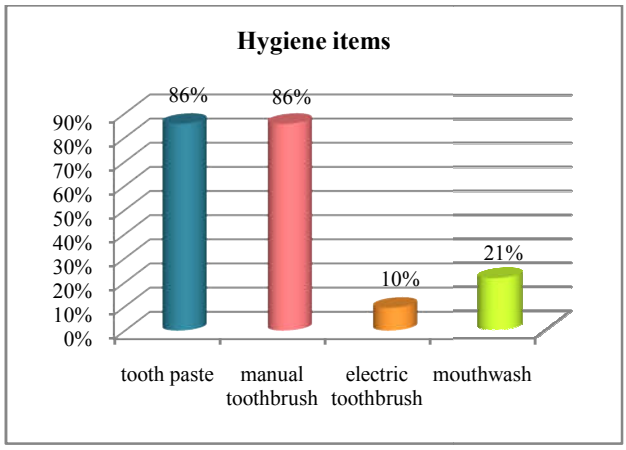

Fig 4 Dental care items used

Talking about dental visits, only 5% of the children make their periodical controls every 6 month, 12% visit the dentist when necessary, for caries treatments.

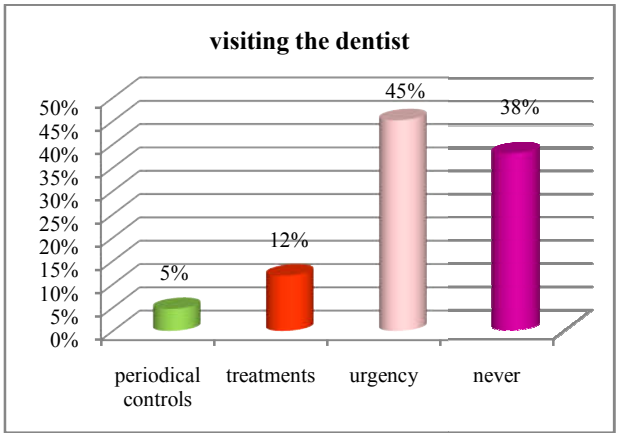

Fig 5 Visits to dental office

After completing the questionnaire, each patient was examined to observe the amount of microbial biofilm and the presence of caries lesions.

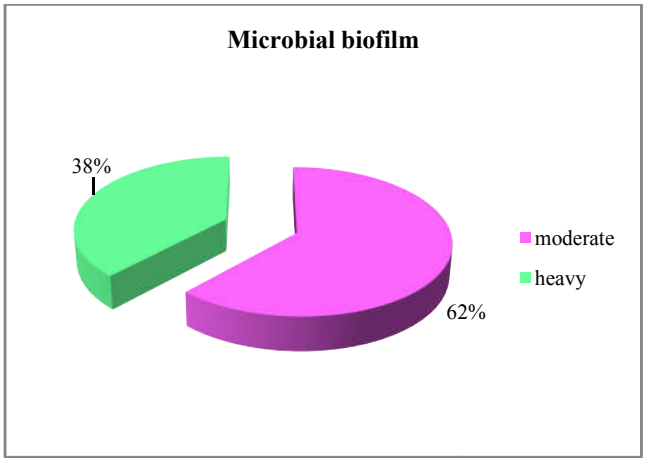

Fig 6 Presence of microbial biofilm

93% of the patients had current or past history of caries lesions on temporary teeth and 74% had caries on permanent teeth, most of them on first molars.

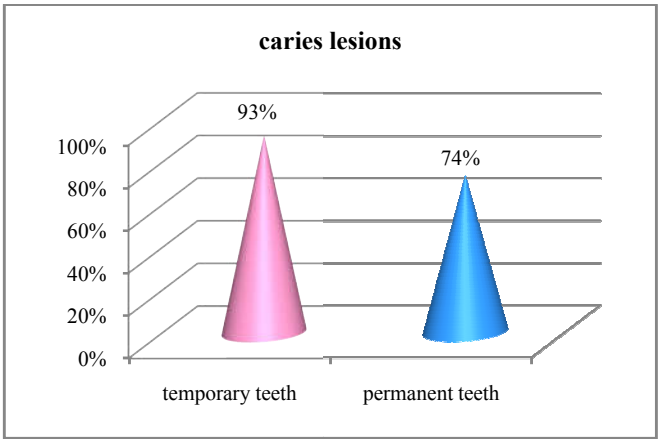

Fig 7 Presence of caries lesions on temporary and permanent teeth

Finally, after collecting information about risk indicators, each patient was included in one of the risk categories.

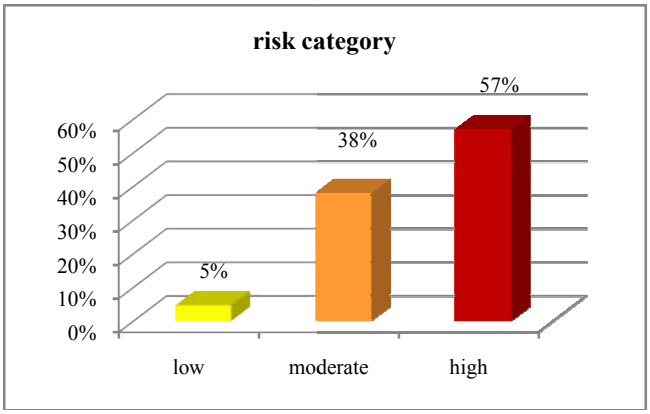

Fig 8 Risk categories of caries

DISCUSSIONS

The outcome of our study highlights, once again, the importance of evaluating risk indicators, helping the practitioner to take the best decision about therapeutic plan, and adopting the optimal strategy for each situation.

Caries risk assessment and caries management protocols help to individualize treatment based on risk level, considering also the needs of the patient. (White BA and Maupome G., 2001) When analyzing risk indicators, of great importance is the exposure to fluorides, or other preventive procedures. (CDC, 2001)In this study, none of the patients benefited from preventive procedures in their previous history, which was considered a risk factor for the initiation of caries.

M. Fontana and C. Gonzalez-Cabezas consider that it is a moderate risk assessment to a high risk of caries the presence of new caries lesions, active caries, and restorations on permanent teeth. (M. Fontana and C. Gonzalez-Cabezas, 2012) The high prevalence of caries lesions on temporary teeth and also on permanent teeth is a risk factor for caries progress. (Twetman S, Fontana M., 2009) In what regards dental visits, few patients had visited dental office for periodical controls, or for dental treatments, most of them had never or only for urgency visited dental office. This might be a contributing factor to the high frequency of caries lesions on permanent teeth.The high frequency of sugar consumption and increased consume of cookies and sparkling juices are also risk factors for caries development. Assessing risk indicators gives the dentist the opportunity to identify the main etiological factors

and factors contributing to caries development, taking the best decision for preventive strategy.

Children with an increased number of risk factors are more likely to develop future carious lesions. The main strategy for primary prevention begins with improving patients' attitude in terms of diet, reducing sugar intake and consuming sweets only with meals. (Zero D T., 2004) Also, talking about patients habits, they need to make a more accurate hygiene at home, improving brushing technique and increasing oral care time.The multitudes of risk assessment tools that have been developed the recent years are instruments useful for deciding on caries management. (Doméjean-Orliaguet S. *et al*, 2009)Clinical caries management based on standardized protocols uses the experience of dental practitioner for clinical decision-making.

New approach in caries management includes early diagnosis of incipient lesions, specific patient's risk level and preventive strategies.

Caries risk indicators are limited predictors of caries progress and the risk of future caries as adults. The most important predictor for future caries is the caries history and current caries activity. (National Institutes of Health (US), 2001)

CONCLUSIONS

It is necessary for dental practitioners to include in their clinical practice the caries risk assessment as a periodic examination protocol. The dentists need more evidence-based approach for caries risk assessment to establish diagnostic and preventive strategies. Preventive attitude, rather than restorative treatment, should be the strategy of dental practice, including changing of dietary habits and oral hygiene at home through educational programs.

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