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Study of the prevalence of dental caries in adults

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Abstract

***Aim**: The study aimed to investigate the prevalence of dental caries in individuals over 18.*

***Materials and methods**: Patients over 18 participated in the study after signing informed consent. The risk factors for developing dental caries were evaluated - carbohydrate diet, oral hygiene, and saliva with its characteristics.*

***Results**: The obtained results show that the risk factors for developing dental caries intake of carbohydrate foods and oral hygiene in most participants are high risk, leading to their oral risk profile.*

***Conclusion**: The present study demonstrated significant levels of carbohydrate intake and poor oral hygiene in most of the patients; according to WHO recommendations for improving the oral health of the population, the focus should be placed on prevention, health education, promotion of oral health, and implementation of preventive measures in them by creating preventative programs.*

***Key words:** Oral health, caries risk, diet, oral hygiene, prevention.*

Introduction

Dental caries is a multifactorial disease resulting from the action of various factors, including clinical, microbiological, behavioral, and socio-economic factors (1, 2, 3). Numerous risk factors and indicators of caries have been identified in research in recent decades. However, the key triad of the main factors

responsible for the occurrence of caries - fermenting carbohydrate substrate, cariogenic bacteria, and susceptible host (4, 6) is still the basis of caries prevention.
In recent years, many methods and tools have been established for caries risk assessment (CRA - Caries Risk Assessment) to assist clinicians in this task by developing a set of risk criteria applicable at the individual level (10).

Aim

The study aimed to assess the risk of developing caries in adult patients about some of the leading risk factors for the development of dental caries – carbohydrate nutrition, oral hygiene, and saliva with its indicators.

Materials and Methods

The study involved 100 patients over 18 after signing informed consent. The participants' diet in terms of carbohydrate nutrition and the consistency of the food intake was evaluated by analyzing the food logs over three days.
The assessment of oral hygiene is carried out by applying the simplified oral-hygienic index of Greene & Vermillion - OHI-S (Simplified – 1964), consisting of two parts: 1. Debris Index (DI) - "index for deposits": 0 - no plaque; 1 - plaque covering 1/3 of the vestibular tooth surface; 2 - plaque covering 2/3 of the tooth surface; 3 - plaque covering more than 2/3 of the tooth surface. 2. Calculus Index (CI) – "tartar index": 0 - no tartar; 1 - supragingival tartar up to 1/3 of the vestibular or lingual tooth surface; 2 - supragingival tartar covering more than 1/3 but not more than 2/3 of the tooth surface (vestibular/lingual) or a continuous strip of subgingival tartar is observed; 3 - supragingival tartar covering over 2/3 of the tooth surface or a continuous strip of subgingival tartar is observed.
Evaluation of stimulated saliva using the "Saliva Check" of firm GC.
Salivation of the patient is stimulated with sugar-free wax gum, which is chewed for 30 seconds. And read the amount of saliva collected in a graduated container for 5 min: 0:> 1.1 ml/min; 1: 0.9-1.1 ml/min; 2: 0.5-0.9 ml/min; 3: <0.5 ml/min.

Saliva pH is assessed with a litmus test strip placed on the tongue for a few seconds. pH estimate: 1: normal saliva (pH 6.8 - 7.8); 2: acid saliva (pH 6.0 - 6.6.); 3: very acidic saliva (pH 5.0 - 5.8)

Consistent saliva is determined: as liquid saliva, saliva with bubbles, and viscous saliva.

The buffering capacity of saliva was also examined; a pipette was taken from collected saliva and dripped onto the three fields of the buffer capacity test strips. The test is reversed to 90º and after 2 min. The color change of each area shall be recorded, which shall be scored by several points shown in the description of the test methodology. The rating scale is as follows: 0-5 points. Very low buffer capacity; 6-9 t. low buffer capacity; 10-12 t. normal buffer capacity.

Results

Table N1 presents the carbohydrate diet at risk for developing dental caries, distributed according to the results obtained in the three risk groups for dental caries.

Table 1. Diet – carbohydrate nutrition

Risk factor nutrition	low risk Limited intake or with main meals	Medium risk Rarely between meals	High risk Frequent intake of simple sugars
N =100	2%	32%	64%
χ^2	Rarely between meals/frequent intake χ^2=44,1 p<0.001 Limited intake/frequent intake χ^2 =38,0 p<0.001 Limited intake/infrequent between meals χ^2 =28,0 p<0.001		

Regarding diet, only 2% of patients have a limited intake of carbohydrates during the main meals. However, in the group taking, simple sugars rarely between meals fall 32%, and in most patients (64%), the intake of low-molecular carbohydrates is a severe risk factor for the development of caries.
When comparing the relative shares between the three risk groups, statistical confidence between them is established. Different nutrition principles are essential and occupy an important place in the causes of carious lesions in the patients studied. Analysis of food logs showed a large relative share (79%) of carbohydrate food preferers.
The consumption of cariogenic foods, such as carbohydrates, will lead to an increase in their oral risk profile. Intermediate carbohydrate food intake includes pizzas, patties, muffins, biscuits, chips, and snacks. Consumption of sweet and carbonated drinks in most patients increases the risk of developing caries; therefore, prevention is necessary. Dairy and meat products are in second place. These patients need to build a healthy diet by avoiding carbohydrates harmful to their dental health. Lack of professional care and consultation about the harm of favorite treats and lack of knowledge about the importance of oral health may cause the development of caries in these patients.
The relative share of patients mainly consuming fruits and vegetables is very small - 8%; the remaining 11% prefer fruits, and only 2% prefer vegetables.

In Table N 2. the level of oral-hygienic status of the patients studied was reflected.

Table 2. Oral hygiene

Risk factors Oral hygiene	**Low risk** Good (OHI = <1- 1,4)	**Medium Risk** unsatisfactory (OHI = 1,5-2)	**High risk** poor (OHI = >2)
N =100	3%	27%	70%
χ^2	Good/unsatisfactory χ^2 =22,5 p<0.001 Unsatisfactory/poor χ^2 =37,1p<0.001 Good/poor χ^2 =96,8 p<0.001		

Patients with good oral hygiene are only 3%, predominantly those with poor (70%) and inadequate (27%) oral hygiene. This unsatisfactory result is indicative, very alarming, and reflects the low oral-hygienic level categorically. Brushing teeth, this most popular and easiest method of prevention of dental caries, is poorly applied by the studied patients. Statistical confidence is established when comparing the relative shares of the three risk groups.
The other leading risk factor for caries pathology in the studied patients is also realized by assessing the characteristics of saliva (saliva current, pH, buffering capacity, consistency).

Table 3 shows the measurements made on stimulated saliva in the patients studied.

Table 3. Stimulated saliva

Risk factor Stimulated saliva	**Low risk** normal	**Medium risk** A weak amount	**High risk** Very weak amount
N =100	75%	25%	0
χ^2	normal/ weak amount χ^2=13,1 p<0.001		

From the results obtained, it can be seen that 75% of patients have normal salivary secretion, and the remaining 25% have a weaker salivary current. A statistical difference is found when comparing the results of the two risk groups.

Table N 4 presents the results after assessing the viscosity of the saliva of the studied persons – a significant risk factor for the occurrence of caries.

Table 4. Saliva consistency

Risk factor saliva consistency	**Low risk** **Liquid**	**Medium risk** With bubbles	**Low risk** viscous
N =100	64%	6%	30%
χ^2	Liquid/with bubbles χ^2=21,4 p<0.001 With bubbles/viscous χ^2=5,45 p<0.05 Liquid/viscous χ^2=6,69 p<0.01		

Data analysis showed that patients with liquid saliva accounted for 64% of the total, and those with medium flowing/with bubbles and viscous saliva were 6% and 30%, respectively. Statistical reliability is established when comparing this risk factor between groups of patients.

Table N 5 shows the results after the saliva acidity study.

Table 5. Saliva pH

Risk factor Saliva pH	**Low risk** neutral (6.8-7.8)	**Medium risk** slightly sour (6.0-6.6)	**High risk** sour (5,5 -5,0)
N =100	77%	23%	0
χ^2	neutral/slightly sour χ^2 =17,1 p<0.001		

The studied patients formed only two groups with neutral saliva, 77%, and mild/slightly acidic saliva – 23% of the total share with a statistical certainty of this fact.

Table N 6 reflects the results of determining the buffering capacity of saliva in the patients studied.

Table 6. Influence of saliva buffering capacity

Risk factor Saliva buffering capacity	**Low risk** normal	**Medium risk** weak	**High risk** Very weak
N =100	88%	12%	0
χ^2	normal/weak χ^2=45,0 p<0.001		

The normal buffering capacity of saliva has 88% of all patients studied. The remaining 12 % exhibits a weak buffering capacity. When comparing the data, a statistically reliable difference is found. Patients with weak buffering capacity had slightly more cavities diagnosed than those with normal, indicating that saliva buffering capacity was not among the study's most important risk factors for caries development.

Discussion

Our study included three critical risk factors for developing dental caries. In the available literature, caries risk assessment studies typically use risk models with risk variables and predictive factors (3, 4, 5, 6, 10).
Zero and colleagues point out that in assessing the risk of caries for different ages, an account should be taken of the other risk factors associated with caries risk patterns that have been developed for different ages (11).
In the present study, saliva secretion rate and plaque amount were not strongly associated with caries risk in the subjects studied.
It is important to emphasize that nutrition is difficult to study and very complicated since nutrition has an individual characteristic for each patient (7, 8). Unhealthy eating patterns and frequency of carbohydrate food consumption are considered to be the most significant factors contributing to the diet's cariogenicity. Frequent intake of sugary foods and beverages between meals may increase the intensity of dental caries in individuals with poor oral hygiene (7, 8).
Prevention of dental caries can be done by reducing the intake of foods and beverages containing sugar between meals and conducting proper oral hygiene to remove dental plaque. The most important oral hygiene behavior is brushing teeth twice daily with pastes containing fluorides (1, 11). Since nowadays dental caries prevention focuses on individuals' eating habits and oral health-related behaviors (9), the introduction of proper oral-hygienic and eating habits is crucial. The SZO makes recommendations regarding food sources, paying attention to strategies to reduce the intake of sugars by the population (9). According to the SZO, both factors – quantity and frequency of sugar intake are equally important (9). Fermentation of carbohydrates and sucrose is associated with the initiation and development of caries (7, 8). Several studies have found significant associations with frequent exposure to sugary foods (8). In contrast, some others have failed to prove such an association or have found only a weak association with dental caries (3).
The scientific community generally accepts that diet is essential to maintaining health. Healthy eating is considered one of the most important means of strengthening general and oral health (7, 8, 9). It contributes to overall well-being (8) and prevents many common chronic diseases (7).

Conclusion

The present study demonstrates the importance of eating habits, oral hygiene, and saliva characteristics as risk factors for developing dental caries. Caries risk assessment is the most successful strategy for caries development in children and adults.

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