Pediatric Dental Medicine

Prevalence of dental caries in children with autism

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Разпространение на зъбния кариес при деца с аутизъм

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Summary

Aim: *The aim of this study is to investigate the prevalence of dental caries in children with autism.*

Material and methods: *The study includes 30 children with autism in age between 5 and 12 years old and a control group of 100 healthy children on the same age.*

For the evaluation of dental caries, the D_1MF index (T + t) was used with an initial diagnostic threshold D_1 at which the earliest carious lesions are presented.

Results: *The children with autism have fewer teeth, which are affected by caries compared to healthy controls. Against the background of the lower DMF (T + t) index compared to healthy children, there is lack of complicated D4 carious lesions. There are also fewer reversible lesions in stage D_2, but significantly more initial carious lesions in stage D_1 were detected compared to healthy children. The majority of children with autism and most of the healthy controls have a dental caries intensity above 4 DMF and a high caries risk with more than one active carious lesion.*

Conclusion: *Parents and caregivers of children with autism, as well as dental specialists, should be encouraged to care for the oral health of these children by making an effort to improve their oral hygiene, change their bad eating habits, and provide timely dental care.*

Keywords: *autism spectrum disorder, dental care, dental caries, developmental disabilities, eating behavior, oral health*

Резюме

Цел: *Целта на настоящото изследване е да се поучи разпространението на зъбния кариес при деца с аутизъм.*

Материал и методи: *Изследването обхваща 30 деца с аутизъм на възраст между 5-12 години и контролна група от 100 здрави деца.*

За оценката на зъбния кариес беше използван индекса D1MF(T+t) с начален диагностичен праг D1, при който се отчитат най ранните кариозни лезии.

Резултати: *децата с аутизъм имат по-малък брой засегнати от кариес зъби в сравнение със здравите деца от контролната група. На фона на общо по-ниската стойност на индекса DMF (T+t) в сравнение със здравите деца не се откриват усложнени кариозни лезии в стадий D4. По-малко са и обратимите лезии в стадий D2, но се откриват достоверно повече начални кариозни лезии в стадий D1 в сравнение със здравите деца. Преобладаващата*

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част от децата с аутизъм и повечето от здравите контроли са с интензитет на зъбния кариес над 4 DMF и висок риск от развитието му и имат повече от една активна кариозна лезия.

Заключение: *Родителите и възпитатели на децата с аутизъм, както и денталните специалисти трябва да бъдат насърчавани да се грижат за оралното здраве на тези деца, като полагат усилия за подобряване на оралната им хигиена, промяна на вредните им хранителни навици и да предоставят навременни дентални грижи.*

Ключови думи: *разстройство на аутистичния спектър, стоматологична помощ, зъбен кариес, увреждания в развитието, поведение на хранене, орално здраве*

Introduction

In the last decade, autism has become a major concern for society in many countries. Although known for over 50 years as one of the most severe childhood neuropsychiatric disorders, it was thought to be quite rare [1]. Children with autism have disorders in social interaction and communication and exhibit some recurring behaviors [2].

Autism is a complex set of emotional and behavioral characteristics in children affected by this neuropsychiatric disorder. The term "autism" was first used by the American psychiatrist Leo Kanner of Johns Hopkins University in 1943 [3, 4] and means seclusion and isolation [5, 6].

Today we talk about a spectrum of autistic disorders, which are presented in some reports. The diagnostic criteria are detailed in the Tenth Revision of the International Classification of Diseases and Health Problems [7, 8]. The oral health of children with autism is a subject of little scientific research, but the interest about this group of children with disabilities has increased in recent years.

Aim: The aim of this study is to investigate the prevalence of dental caries in children with autism.

Material and methods

The study includes 30 children with autism in age between 5 and 12 years old and a control group of 100 healthy children of the same age. The children were included in the study after informed consent was obtained from their parents. The study was approved by the Research Ethics Committee of the Medical University of Sofia.

For the evaluation of dental caries, the D_1MF index (T + t) was used with an initial diagnostic threshold D_1 which marks the earliest carious lesions. For determination of the stages of carious lesions and their activity we used Peneva`s diagnostic scale. Visual clinical criteria were used to determine the activity of carious lesions: active lesion - developing at caries-typical locations; located below dental biofilm; with loss of gloss, transparency and smoothness; with discoloration; lack of clear borders.

Visual clinical criteria were also used to evaluate inactive carious lesions as follows: inactive lesion - located away from typical for caries locations, with limited size, clear borders from healthy enamel, and lack of dental biofilm above the lesions.

The data of each examined child were recorded in a patient card, used at the Department of Pediatric Dental Medicine, Faculty of dental medicine, Medical university - Sofia. Statistical data processing was performed with a software product (SPSS Inc., Chicago, version 17.0 for Windows).

Results

The results obtained after evaluating the prevalence of dental caries in the experimental and control children are presented in **Table 1**.

Statistical analysis shows that children with autism have a significantly lower number of teeth

Table 1. *Prevalence of dental caries in children with autism and healthy children*

Children	n	D1 mean±SD	D2 mean±SD	D3 mean±SD	D4 mean±SD	M mean±SD	F mean±SD	DMF(T+t) mean±SD
With autism	30	3.23±1.04	0.83±1..36	0.76±1.00	0	0	1.9±1.68	6.73±2.53
Healthy	100	2.0±0.64	2.11±0.87	0.96±0.80	0.06±0.25	0	3.3±1.39	8.5±1.83
T		5.59	7.52	0.9	1.5	0	3.58	3.16
P		p<0.001	p<0.001	p>0.05	p>0.05	0	p<0.001	p<0.001

with caries than those in the control group. This suggests that, at the outset, the disease itself is not associated with greater prerequisites for the development of a carious process. Against the background of the generally lower DMF index value (T + t), there are no complicated carious lesions in stage D4. There are also less reversible lesions in stage D_2, which is supported with statistically significant difference (p <0.001). At the same time, significantly more initial carious lesions were detected in stage D_1 compared to healthy children (p <0.001).

This finding may be explained by the fact that children with autism do not consume large amounts of carbohydrates in relation to the specificity of their disease in order to reduce their hyperactivity. Therefore, the carious process develops more slowly and the severe stages of carious lesions are relatively fewer than those in healthy children. The issues during feeding and difficulties in maintaining oral hygiene will lead to development and progressing of the caries process in these children, unless the necessary preventive measures are taken.

Children with autism find difficulties to maintain oral hygiene, to learn the rules for its administration, and even some of them do not allow to be touched or to put toothbrush with toothpaste into their mouths. In many cases, the parents perform the oral hygiene procedures or help the children brush their teeth. This is why the cariogenic situation develops and progresses over time and begins to manifest itself subsequently. With advancing age, the earliest reversible carious lesions begin to increase, as we report in this study. This complex emerging process demonstrates the urgent need to create special programs adapted to the specific, problematic risk factors associated with the disease.

The incidence of dental caries is one of the factors in assessing the risk of dental caries.

The results presented in **Table 2.** show that the majority of children with autism and most of the healthy controls have a dental caries intensity above 4 DMF and a high risk of developing caries without statistically significant difference (p>0.05). The results were also not considered reliable in children with a moderate risk of developing dental caries and DMF up to 4 caries lesions (p> 0.05).

Table 2. *Incidence of dental caries in children with autism and healthy children*

Incidence of dental caries	**Number of children**	**Low risk Up to 2 DMF**	**Moderate risk Up to 4 DMF**	**High risk Over 4 DMF**
Children with autism	30	0%	3 (10%)	27 (90%)
Healthy children	100	17 (17%)	7 (7%)	76 (76%)
χ^2			χ^2 =0.3 p>0.05	χ^2 =2.7 p>0.05

Table 3. *Active carious lesions in children with autism and healthy children*

Active carious lesions	Number of children	Low risk No active lesions	Moderate risk One active lesion	High risk More than one active lesion
Children with autism	30	2 (6.7%)	4 (13.3%)	24 (80%)
Healthy children	100	13 (13%)	37 (37%)	50 (50%)
χ^2			χ^2 =5.9 p<0.05	χ^2 =8.5 p<0.01

The presence of active carious lesions is another risk factor in assessing the risk of dental caries. The results for the activity of carious lesions in the studied groups of children are presented in **Table 3.**

The analysis of the results shows that the majority of children with autism and half of the healthy controls have more than one active carious lesion. This indicates that they have an active oral environment due to serious omissions in the prevention of oral diseases. This is also an indicator of a serious risk of dental caries development, which is statistically confirmed ($\chi 2 = 8.5$ p <0.01) and should be taken into account when designing prophylactic programs. For the rest of the children, one active carious lesion was found in both groups, with statistically significant results ($\chi 2 = 5.9$ p <0.05).

Parents and caregivers of children with autism, as well as dental specialists, should be encouraged to care for the oral health of these children by making an effort to improve their oral hygiene, change their bad eating habits, and provide timely dental care.

Discussion

According to some reports, the prevalence of dental caries in children with autism spectrum disorders is not significantly different from healthy children of the same age [9].

There are studies reporting a low DMFT index [10] and no tendency for its prevalence in children with autism [11, 12, 13, 14, 15, 16, 17].

Other authors have found a higher index in children with autism compared to a control group of healthy children of the same age [16].

At the same time, there are a number of indirect factors that can lead to more teeth with dental caries in these children. There is evidence that it is increasing due to behavioral characteristics, such as a markedly stronger affinity for soft and sugary foods, a tendency to retain food in the mouth, poor coordination of the tongue [17, 18, 19].

A similar indirect relationship exists in children using Methamphetamine [20].

The role of family income is emphasized. There have been reported cases of higher income families in whom dental caries is well-controlled [12]. Other reports show that children of parents with higher incomes have more caries [21]. Obviously, with respect to this indirect factor, behavior is more important than the direct connection to the carious process.

Some studies have found that at an earlier age, children with autism are less affected by caries. The reason for this is the lower consumption of sugar and better care by mothers who, at that age, have taken great care to maintain oral hygiene [22, 23]. These studies acknowledge and emphasize the important role of the mother in the oral health of these children [22, 23]. With the age progression [22] of the children with autism, the number of teeth, which are affected by dental caries, also increases [23]. This observation is confirmed by other authors. In the group of children between 10 and 12 years there are about 16 times more carious lesions compared

to those between the ages of 7 and 9. Many studies have highlighted the multifunctionality of the disease and the large number of specific behavioral factors that indirectly increase the risk of developing caries [24, 25].

Although many factors influence the individual risk of dental caries, there is insufficient evidence to reveal whether autism is a risk factor for the occurrence of dental caries [15, 23, 24].

Some studies have found that the obturated carious lesions of the permanent teeth in children with autism are fewer than those in healthy children [15, 25, 26]. This is confirmed by our study. This suggests that their treatment is more difficult and therefore more neglected. Tooth extractions have been reported to be preferred over teeth obturation [14]. Children with autism have more missing permanent teeth than healthy children of the same age [14]. A possible explanation is the unsatisfactory level of dental care and the difficulty in treating them as a result of the behavioral specificity of this neuropsychiatric developmental disorder [14, 16). However, treatment and oral care are possible, as indicated by some studies in which dental practitioners report that 86% of autistic children, which are examined allow dental examination by a mirror or imitation of oral hygiene with a toothbrush is also possible [14].

The data from our study support the results of other authors, which show fewer caries in children with autism [12, 27]. Other researchers have reported more carious teeth in these children [28, 29, 30, 31].

Children with autism are at high risk of developing caries because of their preference for sugary foods and foods with a soft consistency. The existence of a bad habit in these children is reported - to keep the food in the mouth for a long time and unsatisfactory to poor oral hygiene. It is pointed out that there are other factors that influence the development of caries in these children. The antioxidant content of saliva in children with autism has been found to be significantly lower than that of healthy children, but it cannot be clearly stated that this is related to the number of caries [32].

The results of studies conducted over the past two years on the oral health of children with autism are contradictory. One study provides data on the prevalence of caries in children with autism of about 78.6% and an average 4.5 teeth affected of caries, which is similar to our study [33]. The authors have found that the development of dental caries is related to oral hygiene and eating habits of children, as confirmed by other authors [34]. Children with autism have a higher incidence of caries (50%) than their healthy siblings (22.2%) and have greater oral health problems [35].

Conclusion

It has been found that the children with autism have fewer teeth, which are affected of caries compared with the children from the control group. More reversible carious lesions were reported, supported by a high statistical significance compared to healthy children. The results in both groups of children with one or more than one active carious lesions are also reliable, which is an indicator of an active oral environment. Therefore, it is necessary to model the oral environment and reduce the risk factors after assessing the risk of caries.

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