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Caries Prevalence in Children with Down Syndrome

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Abstract

Down syndrome is a chromosome anomaly, which is a result of trisomy of chromosome 21. The aim of this study is to compare the distribution of dental caries among the children with Down syndrome and healthy children. As means of this study we have examined 60 children with Down syndrome and 60 healthy children, using the DMFT index. The results show the group with Down syndrome have a tendency for a lower DMFT index and fewer caries lesions, compared to the control group. In 79% of the patients with Down syndrome there is no detectible caries, compared to 40% in the control group. The lower DMFT index could be a result from retarded eruption of primary and permanent teeth, diastemas, hypodontia of permanent teeth, premature exfoliation, as well as maintaining a diet, which includes less cariogenic foods and drinks.

Keywords: caries, Down syndrome, distribution, children

Background

Down syndrome is an autosome, chromosome anomaly, which is a result of trisomy of chromosome 21. The main characteristics are mental retardation, cranial dismorphy and impeded interpretation. The oral cavity manifests many changes induced by the environment as well as alteration in immune system. The most common oral anomalies in Down syndrome children are small maxilla, mouth breathing, cheilitis angularis, short frenulums, anomalies in the number of teeth. (1, 2, 3, 4). In primary dentitions the lateral incisors are usually missing, which can be determined on an x-ray. (8) In permanent dentitions the missing

teeth can reach up to 10, as the ones missing most often are the third molars, second premolars and lateral incisors. (5) Down syndrome children often have hypoplastic teeth with a conic shape (6,7) There is protrusion of the maxilla, often with diastemas and an open bite, which are a result from the macroglossia and placing the tongue between the teeth and a narrow, gothic palate, which can result in Angle class III deformities. (8,9) A lot of medical and physiological characteristics of Down syndrome have direct impact on the oral health of the patients. There should be special programs, designed to teach them proper ways to maintain oral hygiene, delivered in a way that is easy for them to understand. (10)

Aim

The aim is to compare the distribution of dental caries in children with Down syndrome and healthy children.

Materials and methods

The subject of this study were 60 children with Down syndrome and 60 healthy children. The children were divided into three groups, according to age (< 6years, 6-12 years, 12-18 years). The prevalence of caries was measured by dft/dmf(t+T)/DMFT indices. The index DMFT is the sum of the number of decayed (D), missing (M) and filled (F) teeth (T). DMFT and dft scores were assessed according to the World Health Organization's criteria. The used diagnostic limit is D1 (Non-cavitated enamel lesions). D2, D3 and D4 caries lesions were also registered

D1 – clinically observed non-cavitated enamel lesion

D2 – clinically observed cavitated enamel lesion

D3 – clinically observed dentin lesion

D4 – dentin lesion, with pulp involvement

Optimal documentation was created for registration of all necessary data, allowing systematic observation of the caries process, in order for it to be prevented and treated effectively. The patients were examined in a dental clinic with enough light, on surfaces that were cleaned and dried beforehand. Sterile individual dental sets were used. The dental status of every child is registered in a special ambulatory document. Tooth-brushing habits and daily dietary sugar exposures of the children, family income and education levels of the parents were recorded. The parents of the children have signed a declaration of informed consent and a questionnaire, regarding the health status of the children.

Results

In 79% of the patients with Down syndrome there is no detectible caries, compared to 40% in the control group. The Down syndrome children under 6 years have a caries prevalence as follows: d1 – 0,87±1,29, d2 – 0,99±1,36, d3 – 1,75±1,43 and d4 – 1,65±1,7 and filled teeth - 0,01±0,28. The average value of the

dft index 5,00±1,01. For the second age group the results are: d1/D1- 0,55±1,72, d2/D2 – 0,01±0,93, d3/D3 – 1,06±1,41 and d4/D4 – 1,08±0,05, missing teeth (m/M) – 0,28±0,56 and filled teeth (f/F) - 0,7±0,66. The average value of the dft/DMFT index 3,68±0,89. The Down syndrome children in the third age group show the following results: D1 2,91±1,92, D2 – 0,23±1,30, D3 – 0,73±0,89 and D4 – 0,6±0,85, missing teeth – 0,03±0,26 and filled teeth - 0,13±0,61. The average value of the DMFT index 4,63±0,97 (Table 1).

Table 1. Caries prevalence in Down syndrome children

Years	**N**	**d1/D1**	**d2/D2**	**d3/D3**	**d4/D4**	**m/M**	**f/F**	**dmft/ dmf(T+t)/ DMFT**
< 6 years	20	0,87±1,29	0,99±1,36	1,75±1,43	1,65±1,7	-	0,01±0,28	5,00±1,01
6-12 years	20	0,55±1,72	0,01±0,93	1,06±1,41	1,08±0,05	0,28±0,56	0,7±0,66	3,68±0,89
> 12 years	20	2,91±1,92	0,23±1,30	0,73±0,89	0,6±0,85	0,03±0,26	0,13±0,61	4,63±0,97
P $_{1,2}$		> 0,05	< 0,05	< 0,05	< 0,05	-	> 0,05	< 0,05
P $_{1,3}$		< 0,001	< 0,05	< 0,01	< 0,001	-	> 0,05	> 0,05
P $_{2,3}$		< 0,001	< 0,05	> 0,05	> 0,05	> 0,05	> 0,05	< 0,05

The results for the first age group of healthy children are: d1- 1,43±1,32, d2 - 1,25±1,40, d3 – 2,01±1,57, d4 – 1,93±1,76 and filled teeth – 1,48±0,33. The average value is 8,1±1,01. The second age group results are: d1/D1 – 0,95±1,73, d2/D2 – 0,92±0,95, d3/D3 – 0,83±1,44, d4/D4 – 2,03±0,06, missing teeth – 1,6±0,58 and filled teeth – 1,7±0,69. The average value is 8,03±0,91. The healthy children from the third

age groups show the following results: D1 2,9±2,01, D2 – 1,03±1,37, D3 – 1,54±0,83 and D4 – 1,02±0,87, missing teeth – 0,83±0,32 and filled teeth - 0,76±0,65. The average value of the DMFT index 9,47±1,0 (Table 2).

Table 2. Caries prevalence in healthy children

Years	N	d1/D1	d2/D2	d3/D3	d4/D4	m/M	f/F	dmft/ dmf(T+t)/ DMFT
< 6 years	20	1,43±1,32	1,25±1,40	2,01±1,57	1,93±1,76	-	1,48±0,33	8,1±1,01
6-12 years	20	0,95±1,73	0,92±0,95	0,83±1,44	2,03±0,06	1,6±0,58	1,7±0,69	8,03±0,91
> 12 years	20	2,9±2,01	1,03±1,37	1,54±0,83	1,02±0,87	0,83±0,32	0,76±0,65	8,08±0,86
P $_{1,2}$		< 0,05	> 0,05	< 0,05	> 0,05	-	> 0,05	> 0,05
P $_{1,3}$		< 0,05	> 0,05	< 0,05	< 0,05	-	< 0,05	> 0,05
P $_{2,3}$		< 0,01	> 0,05	< 0,05	< 0,05	< 0,05	< 0,05	> 0,05

Discussion

In the group with Down syndrome children, there is a tendency for less caries lesions, compared to the control group Children with Down syndrome have a significantly lower DMFT index, compared to healthy children. This is a result from the different shape of the teeth, fissures, which are shallower and less retentive, as well as the higher risk of hypodontia. The buffer capacity of the saliva should also be taken into account, which is a result from the more alkaline pH and the higher levels of sodium chloride and

bicarbonate, potassium and phosphorus, which help reduce the acid attack. The low DMFT index is also a result of eruptio tarda of the primary and permanent teeth, smaller mediodistal size of the teeth and more diastemas, which help with self-cleaning. (11, 12,13) Researchers such as Morinushi et. Al. study the serum levels of the antibodies of S. mutans and S. mitis, because an increased reaction to S. mutans can be a reason for the low percent of caries lesions in DS children. (14,15) They determine a positive correlation between the severity of the caries process and IgM levels of the antibodies of S. mutans. The sIgA in the saliva serves as an antibody for the bacterial antigens and inhibits their colonization. In Down syndrome children the level of sIgA is higher in the saliva and it provides immune protection. (16,17) The results show that D1 lesions are highest in prevalence in the third age group of both the healthy and DS children and that is based on the fact, that their oral hygiene is insufficient. The decrease in maintaining oral hygiene is in direct ratio to the increase of age. Deep caries lesions - D3 and complicated caries lesions - D4 are more characteristic for earlier age, especially for the second age group, which is a result from the prolonged effect, that cariogenic factors have on the tooth surface. Having in mind that in special needs children (SNC) there are additional risk factors for caries development, except the basic ones, such as the regular use of cariogenic medicaments and sometimes a cariogenic diet, which results in more complicated caries lesions in these age groups (18,19,20).

Conclusion

Down syndrome children experience a lower DMFT index than their healthy peers, which could be a result from delayed eruption of primary and permanent teeth, diastemas, hypodontia of permanent teeth, premature exfoliation, as well as maintaining a diet, which includes less cariogenic foods and drinks.

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