Tooth Decay Prevalence among Children with Somatotropin Hypopituitarism*

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Abstract

The malfunction of pituitary gland can be one of the factors disturbing the growth and development of long bones and may have the adverse effect on the development of maxilla, mandible and dentition in children. The aim of the study was to assess the state of dentition by dental caries prevalence among children with short stature in comparison to healthy children. The examined group comprised 110 children who were hospitalized due to growth hormone deficiency and the control group consisted of 41 generally healthy children. To assess the condition of the teeth the mean DMFT index for permanent dentition and dmft index for primary dentition were used. In patients with short stature, the mean DMFT index was 5.0 and in the control group the mean DMFT index was 4.37. In patients with short stature, the average dmft index was 3.37 and in the control group, the mean dmft was 3.39. The prevalence of dental caries for permanent and milk dentition did not differ significantly between the group of children with growth hormone deficiency and the control group.

Keywords: Dental Caries; Growth Hormone; Somatotropin Hypopituitarism; DMFT

Introduction

Tooth decay is one of the most prevalent infectious diseases nowadays. It is a bacterial infectious disease consisting in the demineralization and proteolytic disintegration of hard tissues of the tooth caused by microbes of the natural microflora colonizing the mouth. Joint action of certain factors contributes to the formation of carious lesion. These include biofilms (plaque), carbohydrates (mostly sucrose), the susceptibility of the tooth tissue and surface and the time of noxious stimuli affecting the tooth. Cariogenic bacteria due to the fermentation of carbohydrates produce organic acids, decreasing the pH in the dental plaque. Lactic acid is responsible to the greatest extent for the demineralization of dental enamel and from among a large number of microorganisms inhabiting the oral cavity, the most involved in the dental caries formation are Streptococcus mutans and Streptococcus sobrinus (1, 2, 3).

The basic building block of bones and teeth is calcium and phosphorus. Vitamin D, however, increases the concentration of calcium in the blood, affecting the increase in its intestinal absorption. Therefore, the presence of the three components in the diet significantly influences dental health.

The malfunction of pituitary gland can be one of the factor disturbing the growth and development of long bones and may have the adverse effect on the development of maxilla, mandible and dentition in children (4). Secretions of endocrine glands regulate growth development and sex characteristics. They affect the growth of bones, teeth, regulate metabolism of calcium, phosphate, protein, lipids, and carbohydrates (5). The most important role in the endocrine system plays the pituitary gland which is responsible for the production of somatotropin – the growth hormone. The deficiency of somatotropin, caused by hypopituitarism of anterior lobe of pituitary body is the most common cause of dwarfism of hormonal origin (6).

The aim of the study was to assess the state of the dentition by caries prevalence of children with diagnosed hypopituitarism.

Materials and methods

The examined group comprised 110 children (27 girls, 83 boys) who were hospitalized due to growth hormone deficiency (somatotropin hypopituitarism) at the Department of Paediatric Endocrinology and Diabetology, University Children's Hospital in Lublin, Poland. In this group there were 47 children (43%) who just started treatment with growth hormone (SNP group starting treatment) and 63 children (57%) who started treatment 2 to 3 years ago (SNP group during treatment).

The control group consisted of 41 generally healthy children with laryngological problems, such as hearing impairment, condition after nose injury (which didn’t influence on their general health),

hospitalized in the Department of Paediatric Otolaryngology, University Children's Hospital in Lublin, Poland.

In short stature patients, the average calendar age was 13 years with a standard deviation of 2 years and 6 months. In the control group, the mean calendar age was 11 years and 5 months, with a standard deviation of 2 years and 5 months. The study did not include the children who used supplementation preparations containing calcium, phosphorus and vitamin D. The research received a positive opinion of the Committee on Bioethics at the Medical University of Lublin (number of the resolution: KE-0254/216/2012).

To assess the condition of teeth the mean DMFT index for permanent dentition and dmft index for primary dentition were used [2]. Average score of DMFT (dmft) was calculated in the examined group - children with growth hormone deficiency (SNP starting treatment and SNP during treatment) and in the control group. The mean score of DMFT (dmft) means the number of teeth with one or more primary or secondary decay (D, d), missing due to dental caries (M, m) and filled (F, f). This index may concern both, one person or the whole population. Its value is calculated by dividing the sum of D + M+ F (d + m + f) in respondents by the number of people. An indication that the person is or has been affected by tooth decay is when DMFT (dmft) score occurs bigger than zero.

The obtained results were compared between the groups by used of statistical tests.

Results

In the group of patients with short stature, the mean DMFT index (for permanent dentition) was 5.0 with a standard deviation of 4.37, and the median was 4.0. The largest fraction - 23% (20 individuals) were patients with the DMFT equal to 0 and in one patient DMFT value equal to 24 was reported; for the remaining patients the DMFT score of patients ranged from 1 to 13. The mean value D was 2.13, the mean M value was 0.03, the mean value of F was 2.84 (Table 1). In the control group the mean DMFT index was 4.37 with a standard deviation of 9.16, and the median was 2.0. The largest group, accounting for 37% (14 individuals) was patients with the DMFT equal to 0 and in one patient the value of DMFT index equal to 28 was reported; for the remaining patients, the DMFT score ranged from 1 to 10. The average value of D (decayed teeth) was 1.90, the average value of M (missing teeth) was 0.03, and the average value of F (filled teeth) was 2.38 (Table 2). There were no significant differences in the mean DMFT score between the control group and the group of patients with short stature ($p > 0.05$).

In patients with short stature, the average dmft index (for deciduous dentition) was 3.37 with a standard deviation of 4.03, and the median was 2.0. The largest fraction - 30% (9 people) were patients with the dmft equal to 0 for the remaining patients, the dmft score was in the range of 1 to 15 (Tab.1). The mean value d was 2.77, the mean value m was 0.07, and the average value f was 0.53.

In the control group, the mean dmft was 3.39 with a standard deviation of 3.65, and the median was 2.0. The largest fraction - 30% (7 subjects) were patients with the dmft equal to 0; in the remaining subjects, the dmft score ranged from 1 to 12 (Table 1). The average value of d was 3.04, the mean value of m was 0.22, and the average value of f was 0.13. There were no significant differences in the mean dmft score between the control group and the group of patients with short stature ($p > 0.05$).

By using the Mann-Whitney test, a comparison of D, M, F, d, m, f numbers between the control group and the group of patients with short stature was made. There were no significant differences ($p > 0.05$).

Discussion

Statistics on the epidemiological situation in Poland of caries are worrying. This problem affects as many as 95% of Poles. Only in half of 18-year-olds, the presence of all teeth can be confirmed. Seventy-percent of preschool children have dental decay in deciduous teeth (7). Implementation of pro-health education should be the task of the dental team and paediatricians. Adherence to oral hygiene, proper diet and eating habits are important in the prevention of dental caries. A healthy diet containing appropriate quantities of minerals and vitamins to facilitate the process of their absorption is very important for prophylaxis against caries.

To evaluate the clinical status of the oral cavity among children with short stature and control group of children, the dental DMFT and dmft index was used. The problem of dental caries affected both groups of children, as evidenced by increased mean value of the index in both groups. In patients with short stature, mean DMFT score was 5.0, in the control group the mean score of DMFT was 4.37.

Deciduous teeth caries is one of the most important causes of developing malocclusion; therefore, appropriate dental care of deciduous teeth is extremely important (8). Incorrect positioning of the teeth may also lead to caries formation. Such an example is the crowding of the teeth, which favors the accumulation of plaque and makes the mechanical cleaning difficult. Malocclusions also cause the formation of improper stresses and forces in the mouth. In the process of chewing in addition to normal vertical forces, horizontal forces can form which act destructively on the periodontium. In patients with short stature, the mean dmft score for deciduous dentition was 3.37 and in the control group, the mean dmft score was 3.39.

The problem of dental caries in children with growth hormone deficiency turns out to be the theme unexplored, because there are only a few reports on this topic. There is some information that somatotropin pituitary insufficiency is manifested by a series of changes in the oral cavity: tooth caries susceptibility, decreased growth of maxilla and mandible, gnathic and bite dysfunctions, dental age is delayed, the replacement of deciduous teeth by permanent teeth is also delayed, and newly erupted

permanent teeth often require orthodontic treatment (9, 10, 11, 12). The dentist can therefore play an important role in the initial diagnosis of the disease. In the cases of suspected endocrine problems, in the face of delayed development of bones, teeth, and abnormal occlusion, it is important to carry out skillfully a detailed family history. Advising the patient about the observed irregularities, referral to a specialist at the right time seems to be very important. Even dental caries is not the main problem of patients with somatotropin hypopituitarism but dental surgeons may come across patients with short stature in their practice. The most important is a careful observation, accurate diagnosis and planned management of such patients, especially during the patient's formative years to prevent caries and malocclusion complications. Preventive oral care and consultations with medical specialists could be helpful because the implementation of the somatotropin therapy at a patient's appropriate age can bring positive results for accelerating growth and proper development of stomatognathic system. The growth hormone can also have a positive effect on development and forming such hard tooth's tissues as enamel, dentine and cement and through that decrease their susceptibility to dental caries (13, 14, 15).

Conclusion

The prevalence of tooth decay describing by the average value of DMFT (dmft) index for permanent and milk dentition did not differ significantly between the group of children with growth hormone deficiency and the control group.

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	N of valid	Mean	Median	Minimum	Maximum	Lower quartile	Upper quartile	SD
D	88	2.13	1	0	10	0	4	2.66
M	88	0.03	0	0	2	0	0	0.24
F	88	2.84	2	0	14	0	4,5	3.38
d	30	2.77	2	0	15	0	3	3.83
m	30	0.07	0	0	2	0	0	0.37
f	30	0.53	0	0	8	0	0	1.59

Table 1. The mean value of D, M, T and d, m, t – the group of children with short stature.

	N of valid	Mean	Median	Minimum	Maximum	Lower quartile	Upper quartile	SD
D	39	1.90	0	0	28	0	2	4.68
M	39	0.03	0	0	1	0	0	0.16
F	39	2.38	0	0	28	0	4	4.76
d	23	3.04	2	0	12	0	5	3.60
m	23	0,22	0	0	4	0	0	0.85
f	23	0.13	0	0	2	0	0	0.46

Table 2. The mean value of D, M, F, and d, m, f – the group of healthy children.