

## Impact of obesity on malocclusions incidence in children

### *Wpływ otyłości na częstość występowania wad zgryzu u dzieci*

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#### ABSTRACT

**Introduction.** Nowadays, obesity is an increasing problem in population of schoolchildren. It is connected with oral health, altered facial and stomatognathic system morphology and higher occurrence of some ethiological factors leading to malocclusions.

**Aim.** The aim of the study was to check the malocclusions prevalence in overweight/obese schoolchildren children with respect to chosen external ethiological factors as caries, dysfunctions and bad habits.

**Material and methods.** The study was conducted on the group of 120 children aged from 7 to 15 years old, including 60 children with alimentary (simple) overweight and obesity, 26 girls and 34 boys (mean age  $10 \pm 10$  months). The control group was composed of the same number of children adjusted by gender and age to the study sample. Extra and intraoral clinical trial and questionnaire were subjected to statistical analysis  $\chi^2$ .

**Results.** All kind of malocclusions except vertical ones were found out more frequent in overweight children however without statistical difference. In ethiological factors analysis only breathing problems had statistically significant difference.

**Keywords:** malocclusion, overweight, obesity, children.

#### STRESZCZENIE

**Wstęp.** Obecnie otyłość stanowi rosnący problem w populacji dzieci szkolnych. Ma ona wpływ na zdrowie jamy ustnej, morfologię tkanek twarzy i układu stomatognatycznego, a także na częstsze występowanie niektórych czynników etiologicznych wpływających na powstawanie wad zgryzu.

**Cel.** Celem badania była ocena występowania wad zgryzu w grupie dzieci szkolnych z nadwagą i otyłością z uwzględnieniem takich czynników etiologicznych jak próchnica, dysfunkcje i parafunkcje.

**Materiał i metody.** Badania objęły grupę 120 dzieci od 7–15 lat, w tym 60 dzieci z nadwagą i otyłością prostą, 26 dziewczynek i 34 chłopców (średni wiek  $10 \pm 10$  miesięcy). Grupa kontrolna składała się z tej samej liczby dzieci dostosowanej pod względem wieku i płci do grupy badanej. Kliniczne badanie zewnętrzne i wewnętrzne oraz autorska ankieta były poddane analizie statystycznej  $\chi^2$ .

**Wyniki.** Wykazano częstsze występowanie u dzieci otyłych wszystkich typów wad zgryzu oprócz wad pionowych, jednakże bez potwierdzenia istotności statystycznej. W analizie czynników etiologicznych wykazano istotność statystyczną jedynie w przypadku dysfunkcji układu oddechowego.

**Słowa kluczowe:** wada zgryzu, nadwaga, otyłość, dzieci.

### Introduction

Overweight and obesity are an increasing problem in growing population all over the world [1, 2]. Simple alimentary overweight/obesity in growing population has many different genetic and environmental causes. However its direct reason is the imbalance between energy intake and total energy expenditure TEE. Numerous genes responsible for metabolism are disclosing in favorable obesogenic environment. The concept of metabolic syndrome is characterized by abdominal obesity, hyperglycaemia, hypertension and dyslipidemia.

In 2007 International Diabetes Federation introduced recognition principles of metabolic syndrome in growing population up till now observed only in adults [3, 4].

The children obesity is connected with many systemic complications, some of them influencing oral health and timing of facial growth. Overweight and obese children and adolescents have an altered morphology of the face, oral cavity and surrounding structures. The increased neck circumference, tongue and soft palate dimensions, narrowing of upper respiratory airway are characteristic [5, 6].

The shape and position of teeth and jaws are also connected with function of muscles during speech, chewing, swallowing and the way of breathing and may be altered sometimes by bad habits.

### Material and methods

Among a great number of overweight/obese children a sample of 120 children aged from 7–15 was chosen; 60 children with alimentary (simple) overweight and obesity including 26 girls and 34 boys (mean age  $10 \pm 10$  months). The control group was composed of the same number of children adjusted by gender and age to the study sample. The weight and height of each child were measured. The BMI Index ( $\text{kg}/\text{m}^2$ ) calculated, the 85. percentile was chosen as threshold for overweight and obesity assessed together. The national percentile charts of BMI elaborated by the Institute of the Mother and Child in Warsaw were chosen as investigation tool. Genetic syndromes, neural or endocrinologic disorders, chronic drugs intake or a history of previous orthodontic treatment were excluding criteria. Data derived from two sources: 1. questionnaire filled out by parents and children, with questions about previous or current respiratory disorders (recurrent tonsillitis, frequent rhinitis, asthma, respiratory allergies, sleep disorders with snoring, obstructive sleep apnea or hypopnea, adenoid and/or tonsillectomy) and about bad habits (finger sucking, nail or pens biting, lips sucking, nocturnal teeth grinding). All questions were closed. 2. clinical trial supported by medical photographic documentation. Malocclusions were systematized according to three planes of space: vertical (open and deep bites, sagittal (crossbites) and antero-posterior (Class II and Class III malocclusions).

The data were described by means of quality characteristics measured on nominal scale. The presence of a property variant was defined as 1 and its lack as 0. Chi square statistics was used; if level of significance was below 0.05 a significant correlation relationship was stated and then contingency coefficient C was assessed.

### Results

1. All kind of malocclusions were found out more frequent in overweight children; however without statistical difference. All malocclusions occurrence in overweight group was 55% (Class II malocclusions 30%, crossbites 25%, vertical malocclusions including deep and open bites 11,8% and Class III malocclusions — 6,7%) in comparison with 43,3% in the control group (21,7%, 16,7%, 15% and 3,3% respectively).

2. In ethiological factors analysis only respiratory problems had statistically significant difference ( $p = 0.023$ , with contingency coefficient  $C = 0.203$ ). The caries measured as DMF index and oral dysfunctions as impaired speech, swallowing and chewing were similar in both groups. Bad habits incidence was close to statistical significance ( $p = 0.067$ ).

### Discussion

In both groups of children the distribution of particular types of malocclusions was similar except the vertical ones. Class II malocclusions were the most prevalent and Class III were the least frequent in both groups. The connection of obesity with caries as ethiological factor of malocclusions is still controversial though both problems are depending on diet [7, 8, 9]. However socioeconomic factors were found out to be more relevant than increased BMI in caries occurrence. There were confirmed reports about accelerated dental age [10, 11, 12] and accelerated prepubertal growth, with shorter period of puberty itself in obese adolescents [13, 14, 15, 16]. On average the pubertal growth spurt begun 6 months earlier than in the control group. The lesser percentage of deep bites in overweight children is probably connected with the different timing of vertical facial growth. As it is commonly known, the growth in height decline as the last one in the human life and the increased overbite typical to the mixed dentition period improves earlier in overweight/obese children. There is a statistically significant correlation between upper respiratory disturbances and obesity, such as obstructive sleep apnea OSA, adenotonsillary hypertrophy, hypertrophy of lingual tonsils, asthma and chronic local inflammation in upper airway area [17, 18, 19, 20, 21]. There are also some reports concerning lower self-esteem in obese adolescents especially in girls [22]. In this group psychological problems being reason or result of obesity, connected with self-esteem lowering, may manifest in oral deleterious habits having some impact on the form of occlusion and jaws development. The higher incidence of respiratory problems, more frequent bad habits (almost on the threshold of statistical significance) as ethiological factors are not sufficiently strong to give statistical significance to the prevalence of malocclusions in overweight/obese children. Altered facial and oral morphology and more common respiratory diseases contribute to a higher percentage of malocclusions however without statistical significance because of the multifactorial character of malocclusions. In clinical practice the ortho-

dontic treatment of overweight children should be sometimes performed in cooperation with other specialists and its timing should be adequate to the biological rather than chronological children age. The different timing of growth in this group, both dental and skeletal was not subject of the above study and needs probably further examination.

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#### Conflict of interest statement

The authors declare that there is no conflict of interest in the authorship or publication of contribution.

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