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Summing-up

Affective-emotional disorders caused by obesity, risk factors in the oral pathology of children

Doctoral thesis

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INTRODUCTION

Key words: emotional disturbances, obesity, children, oral pathology, dental cavity and obesity, food at children, obesity effects

The WHO defines obesity as “excess of fat mass which brings about negative consequences for the general health state”. Obesity is a major health problem which implies a series of somatic (type II DZ, metabolic syndrome, cardiovascular diseases) as well as psychological (anxiety, depression) side-complications. Obesity is the most frequent metabolic disease, and can be labeled a pandemic in the true sense of the term.

The International Obesity Taskforce report shows that 1 out of 10 children is now overweight. The incidence of obesity in children is on the rise in Southern European countries (124) (60).

In Romania, a study conducted in the Western part of the country on children and infants aged 3 months to 16 years, showcased that 14,7% of children were obese, the frequency of obesity being higher with girls of schooling age. The study conducted on a group of 5.250 children aged 0-16 evinces a prevalence of obesity of 18,62% in infants, 15,05% in toddlers and 14,20% in schooling age children (104).

In Romania 3 out of 10 children and teenagers are overweight and 8% of them are obese. Romania ranks third in Europe in what infantile obesity is concerned (47).

What is worrisome is the fact that the prevalence of obesity is on the rise with increasingly younger children. Obesity is at present the most frequent nutritional malfunction with children and adolescents in developed countries. If a few decades ago overweight with children was considered by most parents a sign of health and wellbeing, nowadays the myth of the “plump, pretty and healthy” child is a thing of the past.

Even though obesity is recognized as a disease and as a major health risk, not enough is being done for its prevention. On a global level, a WHO study shows that from 1990 until 2014 the number of overweight children rose by 10 million, increasing from 31 to 41 million cases (76).

The increase in the prevalence of infantile obesity reflects genetic, psychological, ecological and socio-cultural influences (123).

Infantile obesity is one of the major challenges for public health in our century; a global issue which affects the majority of countries with small and medium incomes, and manifests itself primarily in the urban environment.

The prevalence of infantile obesity has risen at an alarming rate and varies significantly according to geographic region, recruitment level, comorbidities, and norms employed to define excess weight.

The majority of studies show that 30% of children and 33% of adolescents are overweight or obese. Generally, children with intellectual disabilities have higher chances of being overweight or obese (76).

The consequences and risks of infantile obesity are manifold. First and foremost, the obese child risks remaining obese into adulthood. Generally, complications arise only during adolescence.

Infantile obesity can generate short-, mid- and long-term complications, sometimes visible only during adult life.

Short- and mid-term complications include:

- type 2 diabetes,
- arterial hypertension,
- dyslipidemia,
- metabolic syndrome,
- sleep apnea,
- respiratory disfunctions and broncho-asthma,
- negative emotional states,
- polycystic ovary syndrome,
- orthopedic dysfunctions,
- chronic pulmonary chord.

Long-term complications are sometimes visible only during adult life and manifest themselves as overweight and obesity with accompanying metabolic and cardiac complications; 60% of obese children become obese adults.

Infantile obesity and diseases related to it can largely be prevented.

Obesity affects the general health state, as well as oral health, especially of children, through the acceleration of dental development and the diminishing of chewing performance (53).

Pediatric dentists play a crucial role in promoting orl as well as physical health. Periodic check-ups must include discovering and preventing obesity and its complications.

Part I
PRESENT FINDINGS

OBESITY IN CHILDREN

1.1 Introduction

The abnormal or excessive accumulation of fat tissue in children defines overweight and infantile obesity. Due to the absence and the high costs of techniques which measure bodily fat with precision, the body mass index (BMI), calculated based on weight and height, is a standard method widely accepted for defining overweight and obesity in children from age 2 onwards.

Excess of weight and obesity in children is a major public health care issue of the XXIst century in numerous countries, especially in the urban environment.

In the majority of cases it is a form of simple or common obesity, due to the interplay between genetic predisposition and environmental influences.

The prevention and treatment of infantile obesity must be tackled by interdisciplinary teams, including dentists, the goal of which has to be changing daily habits by including a balanced diet and an active workout regimen, actions which aim at preventing risks and complications derived from excess weight.

The obese child evinces apart from the somatic complications also a series of emotional and affective disfunctions due to being a socially stigmatized individual. The psychological and relational difficulties must be evaluated before starting out with psychotherapy.

1.2 Patophysiology

Obesity appears when prolonged energy intake rises, while energy output diminishes.

The autonomous neuro-vegetative mechanisms as well as the endocrine and metabolic ones in overweight and obese children are less active, a fact that leads to a diminished level of energy consumption; thus, an imbalance of the energy equilibrium occurs, which is turning positive, and as a result, triggers weight gain.

Infantile obesity has multiple causes, with genetic factors combining with socio-economic conditions and life style. The traditional diet plan has been replaced with the consumption of precooked foods, with eating in fast food establishments, the diminishing of physical activities, spending an increased amount of time in front of the TV, computer, tablet; all these have a significant impact on children's weight, making obesity more likely to occur, followed by a general decline in children's health.

1.3 Diagnosing childhood obesity

Establishing children's weight is done by calculating the body mass index (BMI) according to the recommendations of the Center for Disease Control and Prevention (CDC) and the American Academy of Pediatrics beginning with the age of 2.

Obesity in children can be quantifies by means of the BMI.

BMI = Present weight (kg) / Height2 (m2)

Obesity in children is defined as a BMI over 95 percentiles according to age and gender. Overweight corresponds to a BMI between 85 and 95 percentiles.

The Z score = (BMIo - BMIM) / ET

according to age and gender. The BMI increases in the first years of life, then diminishes until the age of 6.

Obesity is defined as a BMI higher than 97 percentiles (P 97).

The percentile represents each of the 99 values which divide the data extracted from 100 parts, part which represents 1/100 of the population target group. Thus, the 97 percentile corresponds to the value that is 3% higher than the measured data.

Thus, a BMI with a value between percentiles 85 and 95 defines an overweight individual; a BMI between percentiles 95-99 defines obesity; a BMI above percentile 99 characterizes severe obesity (tables 1-6), and a BMI above 40 kg/m2 signifies morbid obesity (120).

A new international definition of obesity was developed after the year 2000, based on the distribution curbs in percentiles of the BMI.

In the year 2006 the WHO has worked out reference data regarding the growth of children from 5 to 19 years old. These represent the reworking of the basic data of the National Center for Health Statistics (NCHS) / WHO 1977, which makes use of the original NCHS data to which data from the standard test groups of the WHO regarding children over the age of 5 were added (Fig. 1.3.1).

Child (nutritional state)	**P and BMI (according to gender and age)**
Obese	BMI ≥ P P 95 (+2DS
Overweight	85 ≤ BMI < P 95 /
Normal	≤ BMI < 85 P
Underweight	BMI < P 5 /

Fig. 1.3.1 *Reference data regarding the growth and the BMI of children aged 5 to 19 (WHO, 2006).*

1.4 The classification of obesity in children according to the BMI

Up to the age of 16 a child is considered obese if the fat mass is more than 20% higher than the reference value according to age and gender (104), (122).

Child (nutritional state)	**P and BMI (according to gender and age)**
Obese	BMI ≥ P P 95 (+2DS
Overweight	85 ≤ BMI < P 95 /
Normal	≤ BMI < 85 P
Underweight	BMI < P 5 /

Tab. 1.4.1. *The standardization of the child's nutritional state according to the BMI percentiles (CDC 2000, WHO 2010)*

1.5 The natural evolution of obesity in children

The short-term evolution of obese children who receive treatment is favorable: in 75% of cases a normal weight is reached within 6-12 months.

The long-term evolution is difficult to pin down, mainly due to the difficulties of maintaining the achieved weight goal after losing weight. We can observe an increase of morbidity and mortality in children with obesity comparing to children with normal weight scores.

1.6 The prevalence of obesity in children

The prevalence of obesity varies according to racial, ethnic and socio-economic factors (91), (6).

Obesity is also more frequently encountered in populations with small incomes (70).

Heredity has a significant effect on the prevalence of obesity in children. Obesity in one parent increases the risk of obesity in the child up to 2 or 3 times and up to 15 times if both parents suffer from obesity (4).

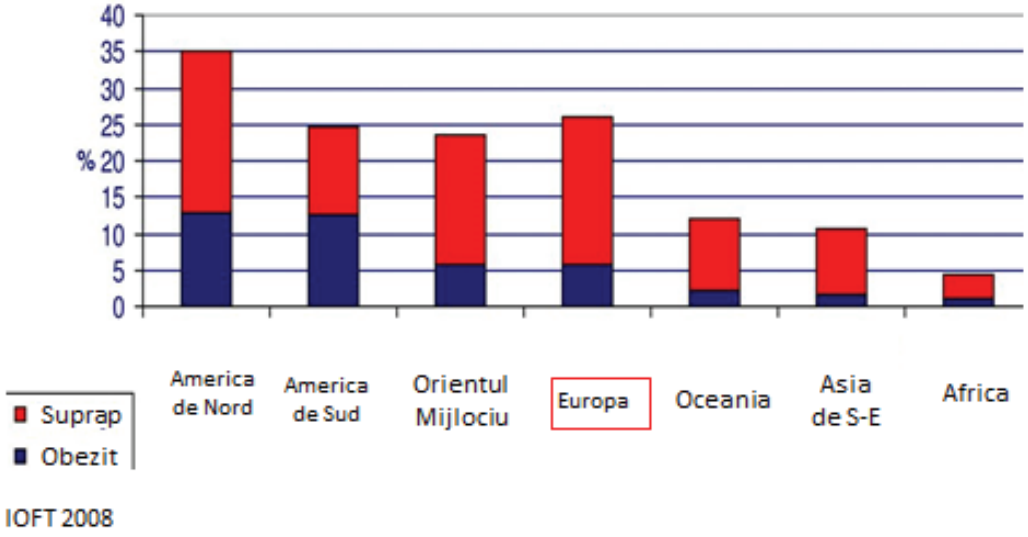
1.7 Tendencies

Obesity in children in the USA in the last 20 years.

The prevalence of obesity has risen by an alarming 15-20% with children of schooling age (6-11 years old) and teenagers (12-19 years old) (97), (92).

Obesity in European children.

Obesity in European children has tripled in the last 20 years. Infantile obesity in Europe varies between 15 and 50%.



The incidence of overweight and obesity worldwide (North America, South America, Middle East, Europe, Oceania, South-East Asia, Africa – red - overweight, blue – obese)

Țara	Sex	Sex Vârsta (ani)	Prevalența supraponderalității (%)	Prevalența obezității (%)	Perioada
Bulgaria	F B	5 -9	9,9 16,8	2,2 6,6	2004
Polonia	F B	1 -9	21,1 22,8	6,3 7,0	2000
Serbia	F B	6 -10	15,7 14,2	4,4 3,9	2002
Franța	F B	6 -9	18,3 17,9	3,6 3,9	2000
Italia	F B	6 -11	29,5 24,8	7,0 5,9	2005
Spania	F B	2 -9	30,2 19,0	10,5 10,3	2003
Romania	F B	8 -10	14,46 15,03	8,24 % 15,03 %	2016

The incidence of overweight and obesity in Europe and Romania (Bulgaria, Poland, Serbia, France, Italy, Spain, Romania – gender, age, prevalence of excess weight, prevalence of obesity, time-span)

With some children overeating appears as a means of facing conflicts, aggression, anguish or lack of affection. Hardships, stress, psychic trauma are frequently encountered in obese children.

Psychological profile

Psychological problems associated with pediatric obesity are frequent and sometimes very serious. Often obese children are stigmatized. Depression as well as loss of self esteem can negatively impact the quality of life.

We can observe in overweight and obese school children problems resulting from their physical appearance and the ensuing loss of self respect, frustration, the feeling of rejection coming from other children; as a result, these children isolate themselves, do not partake in physical and sports activities, which further leads to increased sedentarism and thus more weight gain; all of which end up by forming a wicked circle. Usually school performance is not influenced by the presence of overweight or obesity.

Usually, girls are more affected by overweight, showing signs such as:

- loss of self esteem;
- negative body image;

- psychic suffering;
- emotional dysfunction;
- anxiety;
- eating disorders.

Cultural and ethnic factors influence the social impact of obesity. In the rural environment childhood obesity is associated with beauty and health.

Conclusions

1. Infantile obesity is one of the most pressing public health care problems in many countries of the world, including Romania.
2. The etiology of the disease is manifaceted and complex, resulting from the interaction between genetic and biological factors, environment and ecological influences.
3. Preventing obesity represents a public health care problem which requires careful monitoring of children with a tendency of weight gain.
4. The rising prevalence of infantile obesity leads to the appearance of multiple comorbidities associated with obesity.
5. Obesity and its associated comorbidities not only threaten the health of those affected by them, but also places an additional burden on the health care system.
6. Childhood obesity affects adult life, especially those with severe obesity and a family history of the disease.
7. The majority of physicians, independent of their field of specialization, underline the fact that childhood obesity which is maintained into adolescence is much more difficult to treat than obesity which occurs in adolescence.
8. Obesity in children inevitably leads to a diminishment of the quality of life and of life expectancy.
9. The prevention and treatment of infantile obesity must be tackled by interdisciplinary teams, including dentists, with the aim of changing daily habits to include a balanced diet and increased physical activity, actions which target the prevention of risks and complications deriving from overweight.
10. With some children overeating appears as a means of facing conflicts, aggression, anguish or lack of affection. Hardships, stress, psychic trauma are frequently encountered in obese children.

Part II
PERSONAL CONTRIBUTION

MOTIVATION OF THE THESIS

Worldwide obesity has become an epidemic, with Romania not being an exception, the prevalence of obesity being on the rise in the past 25 years, in adults as well as in children (129).

The IOTF (International Obesity Task Force) report shows that in 2005, one child out of 5 will be overweight or obese.

Obesity is at present the most frequent health problem of children. According to the IOTF data, approximately 155 million children and teenagers aged 5-17 worldwide suffer from excess weight. Out of these, 35-40 million are obese. In Europe, 14 million children have excess weight, out of which 3 million are obese (81), (50)

Approximately 35.000.000 overweight children live in developing countries and 8.000.000 in developed countries. Children from countries with small and medium incomes are fed foods rich in fats, sugar, salt, with high energy density, with few micronutrients and generally cheaper. These nutritional models, alongside reduced physical activity, lead to a significant rise in childhood obesity.

The results of the preliminary study conducted by the Initiative of the WHO for the Supervision of Childhood Obesity in Europe (COSI), in which 15 European countries participate, indicates the fact that the prevalence of obesity in children is very high: 19,3-49% of boys and 18,4-42,5% of girls suffer from excess weight (including obesity). The prevalence of obesity was comprised between 6-26,6% with boys and 4,6- 17,3% with girls (146).

Obese children and adolescents have an increased risk of social and psychological problems, as well as an increased risk of becoming obese adults.

A UNICEF report of 2009-2010 which studied the health state of children aged 11, 13 and 15 ani from 29 countries has shown that the highest percentage of obese children was registered in the USA (almost 30%), our country being ranked in the middle area (15%) (132).

The National Institute of Public Health and the National Center for Evaluating and promoting Health in Bucharest, in its national health report regarding children and teenagers in Romania in 2015shows that irrespective of the environment they hail from or the type of the subjects, the disproportionate development through weight gain is present in a higher percentage than the one through underweight (58).

The nutritional state plays the most important role in development, growth and the maintenance of a healthy state of oral tissues. On the other hand, the health state of the oral cavity influences the nutritional state.

Obesity and oral as well as dental diseases have a common denominator: nutrition. Nutrition influences the oral and dental health as well as dentition; nutrition is a vital part of oral and dental health (128).

On the other hand, overeating increases the risk of obesity and of diseases of the oral cavity.

The WHO by means of its program for oral and dental health recommends integrating dental health in the global health program, underlining the fact that a series of non-transmittable chronic diseases like obesity and oral and dental diseases share a number of common risk factors (117).

Short-term, infantile obesity has repercussions on the affective and emotional state through:

- The loss of self esteem, anxiety, depression, diminished learning performances;
- Dysfunctional social integration and evolution;
- Discriminative effects : the stigmatized obese child who is excluded from playing;
- Impairment for sports and physical activities.

The early diagnosis and treatment of infantile obesity could diminish the risk of oral and dental pathology.

The early diagnosis and efficient treatment of infantile obesity in children with oral and dental pathology is the theme the present doctoral thesis tackles.

In Romania the thesis' topic has not been researched yet and in international secondary literature few studies on this topic can be found, many of them with contradictory results.

The notion of an "obesogenic" environment was associated with the rise of the prevalence of diet-related infantile obesity worldwide, especially in developing countries with socio-economic transition.

In 90% of cases, the diseases of the organism manifest themselves also at the level of the oral cavity – which means that the dentist can draw attention to a wide range of health issues. Thus, dentists can become an active instrument of maintaining structural, functional and psycho-social integrity of the child, through their work in fighting oral hygiene problems. The idea of writing the present thesis was born from this series of realizations.

WORK HYPOTHESIS AND RESEARCH OBJECTIVES

Infantile obesity requires a multidisciplinary approach due to the comorbidities that accompany it.

Obesity and oral pathology share common risk factors, especially in what nutrition is concerned. Foods can affect oral health and simultaneously an unbalanced diet increases the risk of obesity.

Specialized research evinces or rejects the hypothesis that among the multiple risk factors for the oral and dental pathology in children one can count also obesity (68), (11).

In the present thesis we have set out to evaluate the association between oral and dental diseases and infantile obesity, as well as the fact whether there is a specific way of oral manifestations in children suffering from excess weight.

Another one of our research objectives was to study the implications of obesity as a risk factor for the oral-dental pathology, as well as the nuancing of prevention and the treatment of infantile obesity.

The global objectives of the paper's research were the evaluation of psycho-social factors which are part of the offset and the evolution or worsening of childhood obesity, with negative implications on the oral-dental pathology.

The final objective of our research was finding methods which can be clinically employed for guiding overweight and obese children with the help of their dentist as part f regular check-ups, in view of identifying adequate solutions related to the early diagnosis of oral manifestations related to childhood obesity, and consequently, to the establishment of a proper treatment.

ETHICAL CONSIDERATIONS

The research was conducted while keeping in view the theory and data existing in the available secondary literature.

The study did not impose restrictions on the freedom of decision of the children's parents, the study was conducted based on the agreement and the willingness of both parents and children, who have signed a written informed agreement, with the right of removing their child from participating in the study at any moment.

The research was conducted by respecting the ethical norms and medical deontology.

The study was conducted with the approval of the heads of the schools involved.

Study nr. 1

THE INCIDENCE OF OVERWEIGHT AND OBESITY IN 95 CHILDREN AGED 7 TO 11 IN THE COUNTY OF SIBIU

1.1 Introduction and relevance of the topic

- Infantile obesity influences the general state of health, including and especially the oral health of the child, accelerating the dental development and diminishing the mastication performance (66).
- Obesity as well as the oral health state of the child are complex issues with multiple etiological factors.
- We assume that a common risk factor results in bad dental health and obesity in children; that common factor might be the alteration of the child's emotional and affective state.

1.2 Materials and method

Materials

The target population was represented by a number of 103 children, from the county of Sibiu, aged 7-11, out of which, after applying the inclusion and exclusion criteria, we selected 95 which have been subjected to a dental examination.

Out of the selected children, 55.8% were girls ($p=0.305>0.05$). The average age of the girls ($M=9.40$, $SD=1.21$) does not differ significantly ($p=0.379>0.05$) from the average age of the boys ($M=9.62$, $SD=1.23$).

The average age of the target group was relatively homogenous ($p=0.215>0.05$).

Method

We have made use of the monograms (CDC 2000, Epi Info 2000, SAS Program tables) of the CDC - Centers for Disease Control and Prevention CDC 2000,

corresponding to the age and the gender of the child. We have made use of the percentile classification.

A child aged 7-11 is:

- Overweight if: the BMI expressed in percentiles is of 85 - 95% or the one expressed in standard deviations (SD) ranges between +1SD - +2SD;
- Obese if: BMI >95% or over +2 SD;
- Normal weight if: BMI ranges between percentiles 5 and 85.

Copil (starea de nutriție)	P și IMC (pentru sex și vârstă)
Obez	IMC ≥ P P 95 (+2DS)
Supraponderal	85 ≤ IMC < P 95
Normal	≤ IMC < 85 P
Subponderal	IMC < P 5

După CDC 2000, WHO 2010

Classification of childhood obesity according to BMI and P - BMI = body mass index; P = percentiles (child (nutritional state), obese, overweight, normal weight, underweight – P and BMI (for gender and age))

Statistical analysis

The data was introduced into and processed in Excel first, then the statistics package SPSS (IBM, V20) was used. For summing up and describing the data we have calculated the frequency, the percentage, the average, the standard deviation and the trust intervals of 95% for the average.

The statistical tests employed were: Kolmogorov-Smirnov for normality, the Chi-Square test for associating categorical variable, Student T Test and ANOVA for average comparison.

The significance level was established for p <0,05 (95%).

1.3 Results

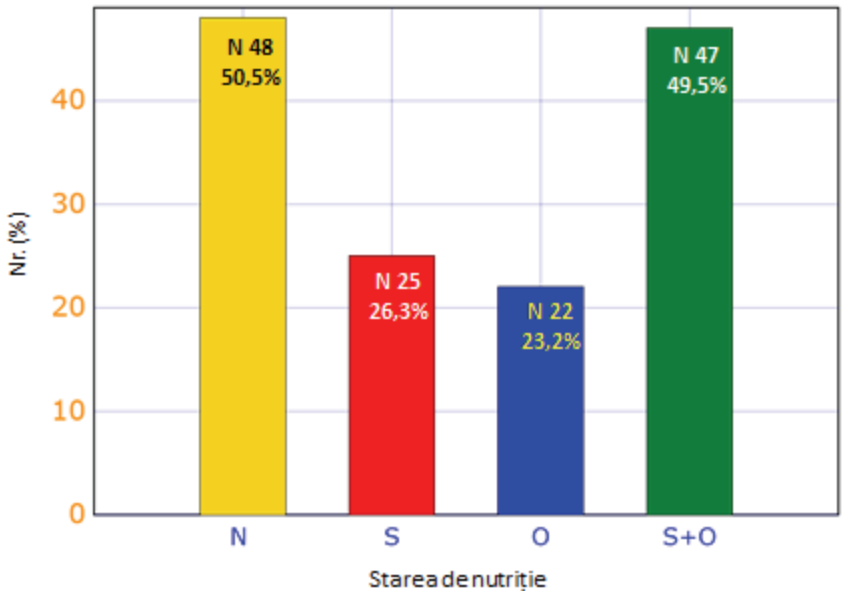
Out of the selected children, 55.8% were girls (p=0.305>0.05). The girls' average age (M=9.40, SD=1.21) does not differ significantly (p=0.379>0.05) from the boys' average age (M=9.62, SD=1.23).

The average age of the target group was relatively homogenous (p=0.215>0.05).

		N (95)	%	
Vârstă (ani)	7,00	27	28,42%	Chi-square=4.468 p=0.215
	8,00	24	25,26%	
	9,00	15	15,79%	
	1,00	28	29,47%	
	12,00	1	1,05%	
Sex	F	53	55,8%	Binomial test p=0.305
	B	42	44,2%	
IMC	Normoponderali	48	50,5%	Chi-square=12.779 p=0.002
	Supraponderali	25	26,3%	
	Obezi	22	23,2%	

Distribution of subjects according to nutritional state (age (years), gender, BMI)

			Age					Total	Average age	p
			8	9	10	11	12			
BMI	N	N	17	15	7	9	0	48	M=9.16 SD=1.11	Anova test F=3.815 p=0.026
		% BMI	35,4%	31,2%	14,6%	18,8%	0,0%	100,0%		
		% Age	63,0%	62,5%	46,7%	32,1%	0,0%	50,5%		
		% Total	17,9%	15,8%	7,4%	9,5%	0,0%	50,5%		
	S	N	5	6	4	10	0	25	M=9.76 SD=1.20	
		% BMI	20,0%	24,0%	16,0%	40,0%	0,0%	100,0%		
		% Age	18,5%	25,0%	26,7%	35,7%	0,0%	26,3%		
		% Total	5,3%	6,3%	4,2%	10,5%	0,0%	26,3%		
	O	N	5	3	4	9	1	22	M=9.90 SD=1.30	
		% BMI	22,7%	13,6%	18,2%	40,9%	4,5%	100,0%		
		% Age	18,5%	12,5%	26,7%	32,1%	100,0%	23,2%		
		% Total	5,3%	3,2%	4,2%	9,5%	1,1%	23,2%		
	Chi-Square test, Pearson Chi-square=10.807, p=0.213									



Distribution of the 95 school children according to BMI
(Nutritional state: N = normal weight; S = overweight; O = obese).

1.4 Discussion

Out of the selected children, 55.8% were girls (p=0.305>0.05). The girls' average age (M=9.40, SD=1.21) does not differ significantly (p=0.379>0.05) from the boys' average age (M=9.62, SD=1.23).

The age distribution according to gender was also similar (p=0.746>0.05), with boys 31% (N=13) being 11 years old, followed by the age of 9 (N=11, 26.2%), 8 (N=10, 23.8%) and 7 years respectively (N=7, 16.7%) and a boy of 12, and with the girls 32.1% (N=17) were 10, followed by the age of 11 (N=15, 28.3%), 9 (N=13, 24.5%) and 8 respectively (N=8, 15.1%).

In our research: 50.5% (N=48) were normal weight children, 26.3% (N=25) were overweight children and 23.2% (N=22) were obese. The amount of children with above average weight were 49,5% (overweight + obese).

We can observe that at the age of 8 we have approximately 60% children with normal weight and up to 20% overweight, respectively 20% obese and as the age advances up to 11 years we have only 30% of children with normal weight and over 30% overweight and over 30% obese (p=0.009<0.05).

In what the distribution of the nutritional state according to gender is concerned, the girls were overweight (9,41%) as compared to boys, while obesity was more frequently encountered in boys (7,05) as compared to girls (5,88%).

Country	Gender	Age (years)	Prevalence of overweight (%)	Prevalence of obesity (%)	Prevalence of Overweight and obesity (%)	Period
Romania	G + B	8-10	29,49	23,27	52,76	2016
Our research (Sibiu)	G + B	8-11	26,3%	23,2%	49,5%	2017

Comparison between the nutritional state of Romanian children and children comprised in our research.

According to the latest data of the Ministry of Health, included in a study coordinated by the WHO, in Romania too infantile obesity has become a problem: one child out of four aged 8 is overweight or obese.

1.5 Conclusions

1. Infantile obesity influences the general health state, including the child's oral health.
2. Overeating is the common risk factor which favors bad dental health and obesity in children.
3. The target population was represented by a number of 175 children, aged 7-11.
4. In the present study 50.5% (N=48) were children of normal weight, 26.3% (N=25) were overweight children and 23.2% (N=22) were obese. Children with above normal weight were 49,5% (overweight + obese).
5. The distribution of the nutritional state according to gender showed that girls were overweight (9,41%) as compared to boys, while obesity was more frequently present with boys (7,05) as compared to girls (5,88%).
6. It is essential for dentists to become aware of the problem under discussion and to participate in evaluating and preventing infantile obesity, thereby preventing oral pathology.

Study nr. 2.
THE INCIDENCE OF UNTREATED DENTAL CAVITIES IN OVERWEIGHT OR OBESE SCHOOL CHILDREN, VERSUS SCHOOL CHILDREN WITH NORMAL WEIGHT

2.1 Introduction and topic relevance

Dental cavities appear mostly due to a combination of an unhealthy diet and an inadequate oral hygiene which leads to a degradation of teeth and gums, which is not only a health issue per se, but also a negative consequence for children because of affecting their physical appearance.

Various studies have reported a positive association between weight and oral health in children (57), (133), (54).

Obesity and dental cavities are important health issues, with multifaceted causes.

There are studies which showcase an association between obesity and dental cavities (5), (42), while other studies do not find a correlation between dental cavities and infantile obesity (80).

Work Hypothesis

Our hypothesis was that there might be an important connection between the BMI and the presence of dental cavities in school children.

Research goal

Considering that in Romania there are no studies related to the connection between infantile obesity and dental cavities and considering the high prevalence of overweight in children, a topic of great actuality, the goal of our research is to evaluate the influence of the nutritional state of children on oral and dental health.

The principal goal of this study was to investigate and quantify the connection between dental cavities and excess weight in school children.

Research objectives

The principal objective of the research was to evaluate the connection between dental cavities and the BMI in school children aged 8-11 in the county of Sibiu.

The secondary objective was to evaluate overweight and obesity in these school children.

Statistical processing

The data was introduced and pre-processed first in Excel and then we have made use of the SPSS statistic package (IBM, V20). For summing up and describing the data we have calculated the frequency, percentage, average, standard deviation and trust intervals of 95% for the medium.

The statistical tests employed were: Kolmogorov-Smirnov for normality, the Chi-Square test for the association of categorical variables, Student T Test and ANOVA for average comparison. The significance level was established for $p < 0,05$ (95%).

2.2 Materials and method

Materials

We have conducted an observational, analytical, transversal epidemiological study in the county of Sibiu, on 95 school children aged 8-11 (grades I-IV) from random schools in the city, during the time span 2016 - 2017.

Method

The examination was conducted according to existing norms, respecting the methodology, and with the permission of the heads of the schools and the parents.

The examination was conducted according to the recommendations of the WHO (95), (145).

The children included in the study regarding the prevalence of dental cavities were examined in what mixed dentition is concerned (combination between milk teeth and permanent teeth).

For analyzing the dental cavity, we have made use of the affected surface index (16).

Results

On average, the children with normal weight and the overweight ones had a total number of cavities (on temporary and permanent teeth) ranging between 1 and 2 cavities (normal weight: M = 1,10, SD = 1,13, 95% CI: [0,77, 1,43] 1.40, SD = 1.25, 95% CI: [0.88, 1.92]), while obese children had an average of 3.73, SD = 2.41, 95% CI.

	Children with normal weight (N 48)	Overweight children (N 25)	Obese children (N 20)
No cavities	44,0%	56,0%	22,7%
Total of cavities	55,7%	44%	77,3%

Tab. 2.2.1 *Cavities on temporary teeth.*

	Children with normal weight (N 48)	Overweight children (N 25)	Obese children (N 20)
No cavitites	64,6%	36,0%	27,3%
Total of cavitites	35,4%	64,0%	72,7%

Tab. 2.2.2 *Cavities on permanent teeth.*

			Temporary teeth					Total		
			0	**1**	**2**	**3**	**4**			
BMI	**N**	N	28	15	3	2	0	48	M=0.56 SD=0.79	Anova test F=7.882 p=0.001
		% BMI	58,3%	31,2%	6,2%	4,2%	0,0%	100,0%		
		% tempo-rary teeth	59,6%	53,6%	23,1%	40,0%	0,0%	50,5%		
		% Total	29,5%	15,8%	3,2%	2,1%	0,0%	50,5%		
	S	N	14	6	4	1	0	25	M=0.68 SD=0.90	
		% BMI	56,0%	24,0%	16,0%	4,0%	0,0%	100,0%		
		% tempo-rary teeth	29,8%	21,4%	30,8%	20,0%	0,0%	26,3%		
		% Total	14,7%	6,3%	4,2%	1,1%	0,0%	26,3%		
	O	N	5	7	6	2	2	22	M=1.50 SD=1.22	
		% BMI	22,7%	31,8%	27,3%	9,1%	9,1%	100,0%		
		% tempo-rary teeth	10,6%	25,0%	46,2%	40,0%	100,0%	23,2%		
		% Total	5,3%	7,4%	6,3%	2,1%	2,1%	23,2%		
Total		N	47	28	13	5	2	95	M=0.81 SD=1.00	
		% BMI	49,5%	29,5%	13,7%	5,3%	2,1%	100,0%		
		% tempo-rary teeth	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%		
		% Total	49,5%	29,5%	13,7%	5,3%	2,1%	100,0%		
Chi-Square test, Pearson Chi-square=16.944, **p=0.031**										

Tab. 2.2.3 *Distribution of cavities on temporary teeth according to the BMI.*

Cavities on permanent teeth.

			Permanent teeth						Total		
			0	**1**	**2**	**3**	**4**	**5**			
BMI	**N**	N	31	10	5	2	0	0	48	M=0.54 SD=0.84	ANOVA test F=18.404 p=0.000
		% BMI	64,6%	20,8%	10,4%	4,2%	0,0%	0,0%	100,0%		
		% permanent teeth	63,3%	50,0%	35,7%	50,0%	0,0%	0,0%	50,5%		
		% Total	32,6%	10,5%	5,3%	2,1%	0,0%	0,0%	50,5%		
	S	N	12	9	3	1	0	0	25	M=0.72 SD=0.84	
		% BMI	48,0%	36,0%	12,0%	4,0%	0,0%	0,0%	100,0%		
		% permanent teeth	24,5%	45,0%	21,4%	25,0%	0,0%	0,0%	26,3%		
		% Total	12,6%	9,5%	3,2%	1,1%	0,0%	0,0%	26,3%		
	O	N	6	1	6	1	7	1	22	M=2.22 SD=1.71	
		% BMI	27,3%	4,5%	27,3%	4,5%	31,8%	4,5%	100,0%		
		% permanent teeth	12,2%	5,0%	42,9%	25,0%	100,0 %	100,0 %	23,2%		
		% Total	6,3%	1,1%	6,3%	1,1%	7,4%	1,1%	23,2%		
Total		N	49	20	14	4	7	1	95	M=0.97 SD=1.29	
		% BMI	51,6%	21,1%	14,7%	4,2%	7,4%	1,1%	100,0%		

Tab. 2.2.4 *Distribution of cavities on permanent teeth according to the BMI. (N=children with normal weight; S=overweight children; O=obese children).*

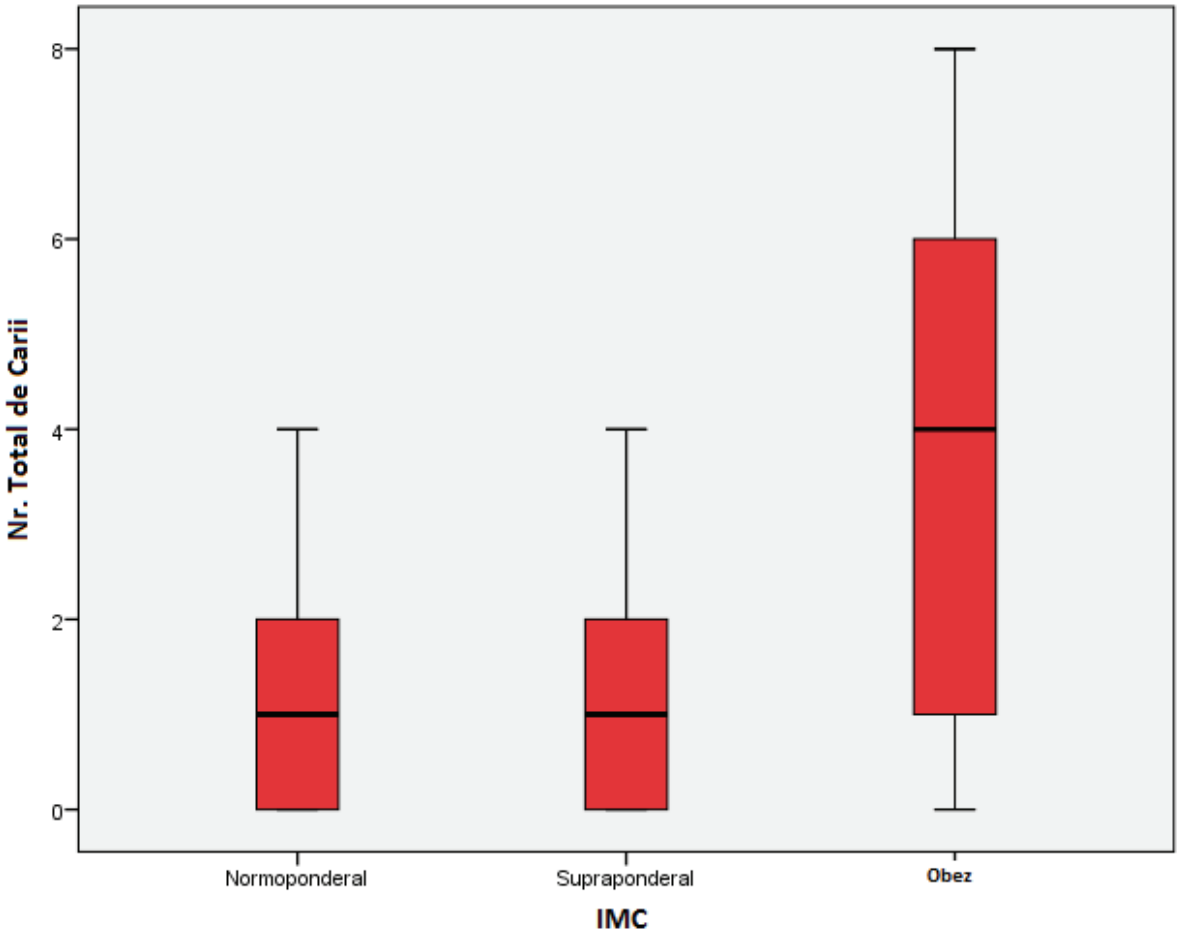


Fig. 2.2.5 *Total number of cavities. N=children with normal weight; S=overweight children; O=obese children.*

2.3 Discussion

Our study concludes that 49,5% of children were overweight or obese.

At the age of 8 60% of children were of normal weight, up to 20% overweight and 20% obese. As the age advances, we can observe that at the age of 11 only approximately 30% are of normal weight, while over 30% of children are overweight and over 30% are obese ($p = 0,009 < 0,05$).

Over 55% of the subjects with normal weight and overweight did not have cavities on temporary teeth, but with overweight children the cavity percentage is double and almost triple in comparison to the percentage of two cavities in the case of children with normal weight.

In the case of obese children, 20% of these children did not have cavities on their temporary teeth, but we could observe a significant rise of the percentage of cases with two or three cavities.

Children with normal weight and overweight had a total (on temporary and permanent teeth) of cavities ranging between 1 and 2 (children with normal weight: M=1.10, SD=1.13, 95%CI: [0.77, 1.43]; overweight children: M=1.40, SD=1.25, 95%CI: [0.88, 1.92]), while obese children had an average of 4 cavities (M=3.73, SD=2.41, 95%CI: [2.66, 4.80]) (p=0.000).

The connection between the BMI and oral health in children

By analyzing the correlation between the quantitative variable BMI and the number of cavities on temporary teeth, the number of cavities on permanent teeth and the total number of cavities we can observe a positive correlation between the BMI and the number of cavities on temporary teeth (r=0.241, p=0.019<0.05) and permanent teeth (r=0.411, p=0.000<0.05) as well as with the total number of cavities (r=0.414, p=0.000<0.05).

2.4 Conclusions

1. This study was conducted in order to evaluate the prevalence of dental cavities in temporary teeth as well as permanent teeth in 95 school children aged 8-11 in the urban environment.
2. Due to the high prevalence of dental cavities, we can talk about a true epidemic of this affliction in the infantile population.
3. Cavities affect both temporary and permanent teeth. Temporary teeth are affected in relation to permanent ones.
4. Children with normal weight and overweight had a general prevalence (on temporary and permanent teeth) ranging between 1 and 2 cavities (children with normal weight: M=1.10, SD=1.13, 95%CI: [0.77, 1.43]; overweight children: M=1.40, SD=1.25, 95%CI: [0.88, 1.92]), while obese children had an average of 4 cavities (M=3.73, SD=2.41, 95%CI: [2.66, 4.80]) (p=0.000).
5. Our results show that overweight and obese school children face a significantly higher risk of developing dental cavities.
6. Obese school children had significantly more cavities (p=0.000) as compared to children with normal weight.
7. In our research we could observe a significant correlation between dental cavities and the BMI. We could observe a positive correlation between the BMI and the number of cavities on temporary (r=0.241, p=0.019<0.05) as well as

permanent teeth ($r=0.411$, $p=0.000<0.05$), and the total number of cavities ($r=0.414$, $p=0.000<0.05$).

8. Our research has evinced a significant positive correlation ($r=0.316$, $p=0.002<0.05$) between the number of cavities on temporary teeth and on permanent teeth, and between the number of cavities on permanent teeth and the total number of cavities ($r=0.754$, $p=0.000<0.05$).
9. Dental cavities are a disease with multiple factors, with many identified risk factors, but the relation between infantile obesity and dental cavities is not fully established, further research being needed on this topic.
10. Eating habits and oral hygiene can and must be shaped starting with childhood, by parents as well as pediatricians and dentists.

Research limitations

Considering the small size of the study's target group, the results cannot be generalized. Further research is needed on more children to confirm our conclusions.

Study nr. 3.
THE PREVALENCE OF DENTAL PLACQUE AND TARTAR IN OVERWEIGHT AND OBESE SCHOOL CHILDREN, VERSUS SCHOOL CHILDREN WITH NORMAL WEIGHT

3.1 Introduction and topic relevance

Numerous studies evince the fact that oral and dental health is closely related to the nutritional state.

If dental placque is not removed daily, oral bacteria multiply and produce acid substances which attack the tooth smalt producing dental cavities and gum deterioration.

Research goals

The connection between the consumption of refined carbohydrates, especially sugars, and the prevalence of dental cavities is a matter of common knowledge.

Obese children usually consume large quantities of foods high in calories which contain saturated fats and carbohydrates which could aid the appearance of dental placque, thus contributing to bad oral health (99).

There are few studies in secondary literature which can establish a direct connection between obesity and dental tartar or dental placque in chidren.

The present study was conducted with the scope of researching if a correlation exists between the BMI and oral hygiene (food detritus, dental placque) in children.

3.2 Materials and method

Materials

We have conducted an observational, analytic, transversal epidemiological study in the county of Sibiu, on 95 school children aged 8-11 (grades I-IV) from random schools in the city, during the time span 2016-2017.

From the point of view of weight, 50,5% (N = 48) were children with normal weight, 26,3% (N = 25), were overweight children and 23,2% (N = 22) were obese.

Method

Evaluating the presence of dental placque and supragingival tartar was done by using the oral hygiene index (IIO) (45).

The OHI is made up of 3 components:

- the detritus index (DI);
- the dental placque index;
- the tartar index (CI).

The value of the OHI is the sum of the values of the indexes for detritus, dental placque of tartar, which are classified as scores:

- OHI < 1: very good oral hygiene;
- 1 ≤ OHI < 3: good oral hygiene;
- 3 ≤ OHI < 6: insufficient oral hygiene;
- 6 ≤ OHI: very bad oral hygiene.

3.3 Results and discussion

In what the simplified index for food detritus is concerned, 31,6% (N = 30) of patients did not have any residue, and no coloring, 35,8% (N = 34) had soft detritus covering a third of the tooth surface, 15,8% had soft residue covering up to 2/3 of the tooth surface and 16,8% (N = 16) had soft residue covering over 2/3 of the tooth surface. There was no significant statistic difference between children with normal weight and overweight ones, but between children with normal weight and obese ones the difference was obvious (p = 049).

From the point of view of dental placque, 35,8% (N = 34) of patients did not have any type of deposits, 33,7% (N = 32) of children did not have placque visible to the naked eye, but which could be collected by pushing the probe towards the gums. In 18,9% (N =

18) of children placque was visible to the naked eye and in 11,6% (N = 11) of them placque was visible to the naked eye in the gingival sulcus and and on the edge of the gums. The study evinced highly significant differences between the three groups of examined children (p=0.000).

In what dental tartar is concerned, 68.4% (N=65) of children did not have any tartar, 23.2% (N=22) had subgingival tartar covering less than 1/3 of the dental surface, 6.3% (N=6) had subgingival tartar covering 1/3 of the dental surface and 2.1% (N=2) had subgingival tartar covering 2/3 of the dental surface or a continuous band of subgingival tartar. There were no statistically significant differences between the three groups of children examined (p=0.130).

The OHI score, that is to say the sum of the values of the indexes for detritus, dental placque and dental tartar, was:

- good oral hygiene ($1 \leq IIO < 3$) for children with normal weight and overweight and,
- poor oral hygiene ($3 \leq IIO < 6$) for children suffering from obesity.

Pediatric dentists must consider the relation between the BMI and children's oral health. Moreover, it is necessary to instruct parents regarding children's oral hygiene, especially in the case of obese children who are more susceptible to developing dental cavities.

3.4 Conclusions

1. The oral hygiene index (OHI) which quantifies the presence of detritus in the oral cavity, of placque and o dental tartar is a method for evaluating the oral health state.
2. Due to the presence of detritus in the oral cavity, as well as of placque and tartar, the oral pH diminishes, favoring the apparition of cavities.
3. In what the OHI is concerned we could observe statistically highly significant differences between children with normal weight and obese children (p=0.000).
4. No significant statistical differences referring to the OHI were observed between children with normal weight and overweight ones, but between children with normal weight and obese children the difference was obvious (p = 049).
5. The OHI score (the sum of the values of the indexes for detritus, dental placque and dental tartar) was:

- good oral hygiene ($1 \leq IIO < 3$) for children with normal weight and overweight and,
- poor oral hygiene ($3 \leq IIO < 6$) for children afflicted with obesity.

6. Pediatric dentists must consider the relation between the BMI and oral health in children. Moreover, it is necessary to instruct parents regarding children's oral hygiene, especially in the case of obese children who are more susceptible to developing dental cavities.
7. Pediatric dentists must possess the necessary knowledge for preventing and treating infantile obesity.

Study nr. 4.

THE INCIDENCE OF GINGIVITIS AND GUM BLEEDING IN OVERWEIGHT AND OBESE SCHOOL CHILDREN, VERSUS SCHOOL CHILDREN WITH NORMAL WEIGHT

4.1 Introduction and research relevance

Childhood obesity and paradontal disease are major public health care problems due to their negative impact on the growth and development of children (47).

The connection between obesity and oral health is not only limited to the risk of dental cavities but also to paradontosis, the first stage of which is gingivitis (40).

Healthy gums have a pale pink color, are firm and adheres to the alveolar bone; it does not present ulcerations, it does not bleed during tooth brushing or eating.

Gum inflammation defines gingivitis. If gingivitis becomes chronic it can degenerate into paradontosis, a disease which may lead to tooth loss.

Objectives

Studies focusing on gingivitis and gum bleeding in children with normal weight and obese children are few and the results do not offer any clear-cut conclusions. Gingivitis is a reversible inflammation of the gums which can be prevented. Left untreated it can lead to the appearance of paradontosis.

The scope of this study was to evaluate the prevalence of gingivitis and gum bleeding in children with a BMI above normal values.

4.2 Materials and method

We have conducted an observational, analytical, transversal epidemiological study in the county of Sibiu, on 95 school children aged 8-11 (M = 9,49 years (SD = 1,21), grades I-IV) from randomly selected schools in the city, in the time span 2016-2017.

Out of the selected children 55,8% were girls (p = 0,305> 0,05). The girls' average age (M = 9,40, SD = 1,21) did not differ significantly (p = 0,379> 0,05) from the boys' age (M = 9,62, SD = 1,23).

Oral hygiene and the gingival state (inflammation, bleeding) were evaluated by using the simplified oral hygiene index OHI-S (Greene-Vermillion) and the gingival index, IG, respectively (Löe-Silness).

The presence of gingivitis and the gravity of gum bleeding were thus marked:

0: normal gums, no bleeding.

1: light inflammation (modified color, discrete edema, no bleeding).

2: moderate inflammation (intense redness, edema, bleeding upon contact with probe).

3: severe inflammation (intense redness and edema, ulcerations, spontaneous bleeding).

4.3 Results

From the point of view of weight, 50,5% (N = 48) were children with normal weight, 26,3% (N = 25) overweight children, and 23,2% (N = 22) obese (Fig.nr.4.3.1).

Light and moderate gingival inflammation was identified in 29 overweight and obese children, out of which 16 (55,1) were boys and 13 (44,9%) girls.

The incidence of female gender school children who were overweight or obese and who presented light gingival inflammation (modified color, discrete edema, no bleeding) and moderate gingival inflammation (intense redness, edema, bleeding on contact with probe) was 10% less than in boys.

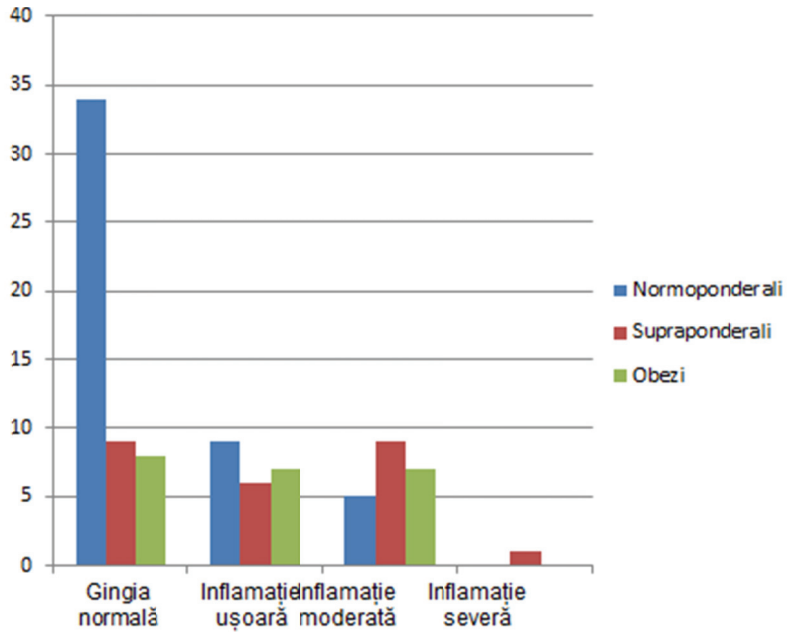


Fig. 4.3.1 *Gravity of gum bleeding (blue – normal weight, red – overweight, green – obese; normal gums, light inflammation, moderate inflammation, severe inflammation)*

Distribution of examined school children in relation with gingival inflammation and the gravity of gum bleeding is presented in Fig.nr.4.3.1 and Fig. nr.4.3.2.

Examined school children	**Normal weight** BMI : (<P85)	**Overweight** BMI : (P85-P95)	**Obese** BMI : (>P95)	**Overweight + Obese**
Normal gums (no bleeding) GBI = 0	70,8% (N = 34)	36,0% (N = 9)	36,3% (N = 8)	36,1% (N = 17)
Light inflammation (modified color, discrete edema, no bleeding) GBI = 1	18,7% (N = 9)	24,0% (N = 6)	31,8% (N = 7)	27,6% (N = 13)
Moderate inflammation (intense redness, edema, bleeding upon contact with probe) GBI = 2	10,4% (N = 5)	36,0%(N = 9)	31,8% (N = 7)	34,0% (N = 16)
Severe inflammation (intense redness and edema, ulce-rations, sponta-neous bleeding) GBI = 3	0%(N = 0)	4,0% (N = 1)	0%((N = 0)	2,1% (N = 1)
Total	100% (N = 48)	100% (N = 25)	100% (N = 22)	100% (N = 47)

Tab. 4.3.2. *Distribution of examined school children in relation with gingival inflammation and the gravity of gum bleeding.*

4.4 Discussion

Light inflammation (modified color, discrete edema, no bleeding) was identified in 9/48 (18,7%) of children with normal weight. Out of obese children (BMI: (>P95) the ones who presented light inflammation were 8/22 (36,3%). The difference between the two groups was significant: p = 0.0339.

Overweight children BMI: (P85-P95) the ones who presented light gingival inflammation were 6/25 (24,0%) on a level of signification of p = 0.5972 as compared to children with normal weight (statistically insignificant difference).

In what **moderate inflammation** is concerned (intense redness, edema, bleeding on contact with probe) it was identified in 5/48 (10,4%) of children with normal weight and with obese children 31,8% 7/22 (31,8%), the difference being significant, p = 0.0339. With overweight children moderate inflammation 9/25 (36,0%) was more frequently present as compared to children with normal weight: p = 0.0082.

Severe inflammation (intense redness and edema, ulcerations, spontaneous bleeding) was present only in one overweight child 1/25(4,0%).

Light and moderate gingivitis was significantly more frequent (p < 05) in both groups (overweight and obese children) in relation to children with normal weight.

Light and moderate inflammation was identified in 29 overweight and obese children, out of which 16 (55,1) were boys and 13 (44,9%) were girls. The number of boys was higher, but the differences between genders were insignificant: p = 0,593.

Our results match the ones of Franchini's studies, who evaluated the prevalence of gingivitis associated with the BMI in 98 school children (66 obese and overweight and 32 with normal weight). Results have proven that the gingival index was higher in overweight and obese patients (1,20) comparing to patients with no excess weight (0,76) (38).

The incidence of gingivitis was statistically significantly correlated with the frequency of dental tartar in healthy children and children who suffer from diabetes (p <0,001). Dental tartar seems to be a predisposing factor in the development of gingivitis (119), (69).

The prevalence of gingivitis was of approximately 73% with children between the age of 6 and 11. The incidence of gingivitis and gum bleeding increases after puberty and during adolescence (62).

For some authors gum bleeding upon examination was of 78,4%, the prevalence of gingivitis being higher in boys, probably due to poor oral hygiene (98).

Studies have shown that sexual hormones influence the composition of the subgingival flora, modify the capillary permeability and increase the accumulation of liquids in gum tissues (9), (29).

Considering the absence of epidemiological data in our country, our results were compared with studies conducted abroad. In a study conducted in 2012 a frequency of gum inflammation in children of 35% was established (10).

Gum bleeding in examined children was of 78,4% according to another study (161).

A similar frequency (71,9%) is reported by Agrawal et al (2).

The connection between infantile obesity and oral pathology, including gingivitis, could be explained by the excessive consumption of sweets and fats (4). The loss of immunity could also represent a risk factor (106), (37).

In the fat tissue adipocitokines are synthesized, which can favor inflammation in oral tissues (33), (35).

4.5 Conclusions

1. The present study has concluded that gingivitis and gum bleeding were statistically significantly ($p < 05$) higher in the obese children group.
2. The overweight children evinced light gum inflammation on a significance level of $p = 0.5972$ as compared to children with normal weight (statistically insignificant difference).
3. In spite of oral hygiene behaviors were similar in the examined children, in the ones with a BMI above the normal values, the presence of dental tartar in a higher percentage in this group (Study nr. 3) seems to be a predisposing factor in the development of gingivitis.
4. Even if oral hygiene habits were similar in obese and normal weight children, overweight and obese children are more predisposed to gum bleeding.
5. Obesity and overweight in children are predisposing factors for gingivitis associated with gum bleeding.
6. The prevention of the consequences of these afflictions must be done by properly caring for obese children and requires a multidisciplinary team made up professionals in the medical and dental field.
7. The oral health state must be considered when caring for children afflicted with obesity.

Study nr. 5.
PSYCHIC AND AFFECTIVE MANIFESTATIONS RELATED TO NUTRITION AND THE HEALTH STATE OF THE ORAL CAVITY IN INFANTILE OBESITY

5.1 Introduction and relevance of the topic

Health in general and in particular depends primarily on individual behaviors, but above all on eating habits and lifestyle, both of which significantly contribute to maintaining a balanced weight and a good oral hygiene.

Oral health reflects the cumulative negative biological, socio-economic effects, as well as the behavioral factors which act upon the individual since childhood.

Psychological dysfunctions such as anxiety, stress, depressive states, can cause eating disorders in the child (bulimia, anorexia), disfunctions which can result in an alteration of eating habits.

Generally, research in the field of infantile obesity have pursued only a non-parametric approach, that is to say, the BMI. Emotional and affective states which underlie eating habit changes related to the rise of the risk of oral and dental pathology in obese children are still unclear.

In the present study we will evaluate three psycho-affective manifestations in children of normal weight, overweight and obese children, namely:

- Compulsive eating habits or compulsive eating;
- Self-esteem;
- Emotivity.

1.1 Compulsive eating habits

Compulsive eating disorder refers to the habit of eating out of other reasons than hunger. A person may eat because they are sad, depressed, stressed, lonely, or when he /she can use food as a means of reward. Consuming foods under such circumstances brings about a state of tranquility which can distract the person from what is truly bothering him / her.

1.1.1 Research objectives

Generally, research in the field of infantile obesity have focused solely on a non-parametric approach, that is to say, on the BMI. Emotional and affective states which underlie eating habit changes related to the rising risk of oral and dental pathology in obese children are still unclear.

Work hypothesis

We have set out to evaluate the hypothesis whether dissatisfaction, anxiety, stress and confusion in obese children can bring about the desire to eat in order to induce a feeling of pleasure.

1.1.2 Materials and method

We have conducted an observational, analytical, transversal epidemiological study in the county of Sibiu on 95 school children aged 8-11 (grades I-IV) from randomly selected schools in the city in the time span 2016 -2017.

From the point of view of weight, 50,5% (N = 48) were children with normal weight, 26,3% (N = 25) overweight children, and 23,2% (N = 22) were obese.

In order to evaluate compulsive eating habits, we have made use of the auto-reporting questionnaire with six elements, adapted from the Compulsive Scale (CES) of Kagan and Squires. The questionnaire's elements refer to eating habits and the incapacity to control them. The provided answers were codified on a Likert scale of 5 points, with an interval ranging between 6 and 30. Severe eating disorder is identified in case of a high score.

1.1.3 Results

a) Analysis of the entire lot

By analyzing the entire lot we have observed that out of the respondents, over 50% never considered that they ate because they were feeling lonely, and 45% reported that this happened to them once or twice a year (p=0,000).

Sadness and nervousness are considered causes for excess eating once or twice a year by 26%, once a year by 33% and once a week by 7% of the respondents (p=0,158). Boredom is another factor which causes overeating once or twice a year for 32%, once. Ayear for 25% and once a week for 15% of the respondents(p=0,131).

b) Analysis of individual lots (normal weight, overweight, obese)

58% of overweight children and 45% of obese children happen to eat because they feel lonely, while 61% of school children with normal weight claim that this has never happened to them (p=0.034).

70% of overweight and 90% of obese children happen to lose control when it comes to food; to children with normal weight this happens once or twice a year (49%) or never (41%) (p=0.019).

Obese (64%) and overweight (46%) children frequently eat so much that their stomach hurts; this aspect being encountered also in children with normal weight (35%), but to a much lesser degree (p=0.063).

86% of obese school children and 42% of overweight ones frequently eat too much because they are upset or nervous, while in children with normal weight 50% of cases report never having experienced this, while 22% frequently experience it (p=0,000).

Boredom is another factor associated with frequent overeating in obese (73%) and overweight (58%) school children, while children with normal weight (20%) only experience it in few situations (p=0.000).

1.1.4 Discussion

As a conclusion of the univaried analysis, we can observe that in case of all the six items of the scale which measures uncontrolled, compulsive eating in the case of overweight and obese individuals we have higher percentages for the situations in which these eating habits are encountered once or twice a year or more often than that. Furthermore, for four out of six items we have scored signification levels under the margin of 0.05 and for the remaining two the level of significance was situated on the borderline, under the 0.1 margin, a fact that underlines the correlation between obesity and eating habits, especially the inability to control the eating impulse in the case of overweight and obese individuals.

1.1.5 Conclusions

1. The univaried and statistical analysis of the score values obtained by means of the questionnaire analyzing compulsive eating habits shows that significantly higher scores were obtained with overweight and obese children, as compared to children with normal weight.
2. Compulsive eating (the overwhelming need and obsessive tendency to eat) is more frequently encountered in the case of overweight and obese children as compared to children with normal weight.

1.2 Self esteem

Self esteem represents the evaluation component of the self and refers to the affective state and emotions the human being experiences when he refers to his / her own persona.

A child's self esteem can be negatively impacted by bad oral hygiene.

Investigating oral health and quality of life should be key results in evaluating oral health programs.

In spite of this, no previous study has evaluated self esteem related to oral health with overweight and obese children.

1.2.1 Research objectives and hypothesis

Infantile obesity can have negative consequences on children's self esteem. In spite of this, the social and emotional effects of low self esteem on obese children are a controversial topic.

Research goals

The goal of the present study was to evaluate the impact of weight in 95 school children aged 9-11 on self esteem. We anticipate a close relation between self esteem (physical and psychic) as related to the BMI.

1.2.2 Materials and method

We have presented the respondents with a questionnaire focusing on self esteem, made up of 15 items. The provided answers were codified with the values 0 (no) and 1 (yes). The score was obtained as a sum of all the questions, with an interval ranging between 0 and 15.

1.2.3 Results

Out of the 95 respondents, 55 (58%) were girls and 40 (42%) were boys, aged 8-11 (M=9.51, SD=1.21).

Out of the respondents, 52% (N=49) had normal weight, 25% (N=24) were overweight and 23% (N=22) obese.

86% of obese respondents often feel lonely at school as compared to children with normal weight (16%) or overweight children (33%) ($p=0.000<0.05$). Approximately 71% of overweight children and 64% of obese children do not consider that other children say ugly things about them, while only 35% of children with normal weight share this opinion ($p=0.006<0.05$).

Approximately 65% of overweight or obese children do not feel inhibited when they have to speak in front of the teacher, while 65% of children with normal weight feel inhibited in such a situation ($p=0.012<0.05$), 20% of overweight respondents feel sad because they have nobody to play with, the percentage being higher with obese children (50%), while children with normal weight made up a significantly higher percentage, 71% ($p=0.000$).

1.2.4 Discussion

Overweight children are characterized by the fact that that they are not sad because they do not have someone to play with (79%), they do not feel others believe they are telling lies (70%) and also do not say ugly things about them (70%), they do not consider that there are things about themselves they would like to change (62%), they are not afraid of teachers (66%), but they feel shy around other children (62%), they dislike writing essays (66%), playing in a team (66%) and do not feel lonely at school (66%).

In the case of obese school children, they often feel lonely at school (86%), they feel embarrassed when talking to their parents, teachers or other children (50%, 50%, 54%), they do not consider themselves gifted in mathematics (63%), they dislike team games (59%), they like writing tales or essays (59%).

1.2.5 Conclusions

1. Overweight and obese children which have taken part in our research evince significantly lower levels of self esteem. Obese children with low self esteem evince a significantly higher rate of sadness or tendency of loneliness.
2. Overweight and obese children have lower score values than those obtained by children with normal weight, which indicates a lower level of self esteem in case of children with weight issues.
3. Obesity affects children's self perception, especially in the case of girls.

4. Evaluating the risks of low self esteem should contribute to identifying more resources for the treatment of infantile obesity.

1.3 Emotivity

1.3.1 Introduction

Emotivity is an affective reaction to an unexpected situation, accompanied by a pleasant or unpleasant affective state of varying intesnsity and of relatively short duration, often accompanied by changes in the organism's activity, mirroring the individual's attitude towards reality.

Negative emotions even in the case of minor daily stress affect children's eating habits, both during meals and in what snacks are concerned. Especially under light stressful circumstances we can observe a higher food intake and a more unbalanced eating behavior in many children.

1.3.2 Materials and method

We have made use of the multidimensional auto-reporting HIF (how I feel) questionnaire with 30 questions.

1.3.3 Results

For each of the indicators of the three subscales we have calculated the average as well as the frequencies. The hierarchy of items regarding the positive emotions subscale was the following: enthusiasm (frequency: often: M=2.82, SD=1.12, always: M=2.86, SD=0.99), joy (frequency often: M=2.86, SD=0.95, always: M=2.89, SD=1.15), joy (strength: M=2.87, SD=1.08, intensity (strong): M=2.93, SD=1.15), enthusiasm (powerful): M=2.96, SD=0.98, intensity (strong): M=3.07, SD=1.19).

In the case of the negative emotions subscale we can observe variations of the responses for this scale's items in the case of: angry (frequency: often: M=2.64, SD=1.19, always: M=2.82, SD=1.05), scared (frequency: often: M=2.57, SD=1.20, always: M=2.74, SD=1.28), upset (powerful): M=2.96, SD=0.98, intense (strong): M=2.80, SD=0.81), angry (powerful): M=2.96, SD=0.98, intense (strong): M=2.85, SD=1.01). In what the items relating to anger (frequency: often: M=2.74, SD=1.03, always: M=2.81, SD=1.10) and fear (powerful): M=2.69, SD=1.11, strong): M=2.71, SD=1.22) we can observe that these evinced a greater stability of responses.

From the point of view of emotional control, the hyerarchy of items in the case of control of the frequency of emotions was the following: scared (M=2.77, SD=0.86),

enthusiastic (M=2.79, SD=1.09), angry (M=2.87, SD=1.19), happy (M=3.04, SD=1.03), sad (M=3.04, SD=1.06), while the hyerarchy for items in the case of the control of the intensity of emotions was the following: sad (M=2.76, SD=1.08), enthusiastic (M=2.79, SD=1.09), angry (M=2.79, SD=0.91), happy (M=2.85, SD=1.11), scared (M=2.98, SD=1.12).

1.3.4 Discussion

In case of the stratification according to BMI (normal weight, overweight, obese) the results indicated significant differences between the subgroups for the items joy (frequency: often) and strongly enthusiastic (powerful) in case of the positive emotions subdivision; for the items upset (frequency: often), angry (frequency: always), sad (intensity: strong) and angry (powerful) in case of the negative emotions subcategory, while in case of the emotion control subcategory no significant differences between subgroups were identified.

1.3.5 Conclusions

1. Significant differences were identified between the higher frequency of positive emotions in children with normal weight as compared to overweight and obese ones.
2. The present study has evinced statistically significant differences between the higher frequency of negative emotions in obese children as compared to children with normal weight and overweight ones.
3. From the point of view of emotion control no significant differences were identified between children with normal weight, overweight and obese ones.

GENERAL CONCLUSIONS

1. Infantile obesity is one of the biggest public health issues in many countries worldwide, including Romania. The disease's etiology is multifaceted and complex, resulting from an interaction between genetic and biological factors, environment and ecological influences.
2. Obesity and its associated comorbidities not only threaten the health of those affected, but also places a significant pressure on the health system. Childhood obesity affects adult life, especially in the case of those suffering from severe obesity and who have a family history of the disease.
3. The majority of physicians, independent of their field of specialization, underline the fact that obesity which appears in childhood and continues into adolescence is much more difficult to treat than obesity which appears in adolescence.
4. The prevention and treatment of infantile obesity must be tackled by interdisciplinary teams, including dentists, with the scope of changing daily habits to include a balanced diet and increased physical activity, actions which target preventing the risks and complications of excess weight.
5. With some children overeating appears as a means of facing conflicts, aggression, anguish or lack of affection. Hardships, stress, psychic trauma are frequently encountered in obese children.
6. Infantile obesity influences the general health state, including the oral health of the child. Overeating is the common risk factor which favors poor dental health and obesity in children.

7. The target population of the present study was represented by a number of 95 school children aged 7-11 from the county of Sibiu in the time span 2016 -2018.
8. In the present study 50.5% (N=48) were children with normal weight, 26.3% (N=25) were overweight children and 23.2% (N=22) were obese. Children with excess weight made up 49,5% of the study subjects (overweight + obese).
9. The distribution of the nutritional state according to gender was the following: girls were overweight (9,41%) as compared to boys, while obesity was more frequently encountered in the male gender (7,05) then in the female one (5,88%).
10. It is vital for dentists to become conscious of the problem under discussion and to participate in the evaluation and prevention of infantile obesity, thereby preventing oral pathology.
11. Children with normal weight and overweight ones had a general prevalence (on temporary and permanent teeth) between 1 and 2 cavities (children with normal weight: M=1.10, SD=1.13, 95%CI: [0.77, 1.43]; overweight children: M=1.40, SD=1.25, 95%CI: [0.88, 1.92]), while obese children had an average of 4 cavities (M=3.73, SD=2.41, 95%CI: [2.66, 4.80]) (p=0.000).
12. Our results showcase that overweight and obese school children face a significantly higher risk of developing dental cavities.
13. Overweight and obese school children had significantly more cavities (p=0.000) than children with normal weight.
14. Our study evinced a significant correlation between dental cavities and the BMI. We have observed a positive correlation between the BMI and the number of cavities on temporary teeth (r=0.241, p=0.019<0.05) and on on permanent teeth (r=0.411, p=0.000<0.05), as well as a connection to the total number of cavities (r=0.414, p=0.000<0.05).
15. Our study has evinced a significant positive correlation between the number of cavities on temporary teeth (r=0.316, p=0.002<0.05) and the number of cavities on permanent teeth, as well as between the number of cavities on permanent teeth an the total number of cavities (r=0.754, p=0.000<0.05).
16. Dental cavities are a multifaceted disease with many identified risk factors, however, the connection between infantile obesity and dental cavities is not fully established, further research on the topic being required.

17. The oral hygiene index (OHI) quantifies the presence of detritus in the oral cavity, as well as of placque and tartar, and is a method of evaluating oral health. In the presence of detritus in the oral cavity, as well as of placque and tartar, the oral pH diminishes favorising the apparition of dental cavities.
18. In what the OHI is concerned statistically significant differences were observed between children with normal weight and obese children who were examined (p=0.000).
19. No statistically significant differences were observed regarding the OHI between children of normal weight and overweight ones, however between children with normal weight and obese ones the difference was obvious (p = 049).
20. The OHI score (sum of the values of the indexes for detritus, dental placque and dental tartar) was:
21. Good oral hygiene ($1 \leq IIO < 3$) for children with normal weight and overweight ones and,
22. Poor oral hygiene ($3 \leq IIO < 6$) for children afflicted with obesity.
23. The health state generally and particularly depends primarily on individual behavior, and especially on eating habits and life style which contribute significantly to maintaining an adequate weight and oral hygiene.
24. Psychological disfunctions such as anxiety, stress, depression, can cause eating disorders in the child (bulimia, anorexia), disorders which result in changed eating habits.
25. The univaried and statistical analysis of the values of the scores obtained by means of the questionnaire for analyzing compulsive eating habits shows that significantly higher scores were obtained in the case of overweight and obese children, as compared to the scores of children with normal weight.
26. Compulsive eating (the overwhelming need and obsessive tendency to eat) is more frequently encountered in overweight and obese children as compared to children with normal weight.
27. Overweight and obese children in our study evince significantly lower levels of self esteem, as well as a higher rate of sadness and a tendency to experience loneliness.

28. Overweight and obese children have lower score values than those obtained by children with normal weight, which indicated a lower level of self esteem in the case of school children with weight issues.
29. Obesity affects children's self-image, especially in the case of girls.
30. Evaluating the risk of low self esteem should contribute to identifying more resources for the treatment of infantile obesity.
31. Significant differences were observed between the higher frequency of positive emotions in children with normal weight as compared to overweight and obese ones.
32. The present study has evinced statistically significant differences between the higher frequency of negative emotions in obese children as compared to children with normal weight and overweight ones.
33. From the point of view of emotion control no significant differences were observed between children with normal weight, overweight and obese ones.
34. Eating habits and oral hygiene can and must be guided starting from childhood, by parents as well as by pediatricians and dentists.
35. Pediatric dentists must consider the relation between the BMI and children's oral health. Furhermore, it is necessary to instruct parents regarding children's oral hygiene, especially in the case of obese children who are more susceptible to developing dental cavities.
36. Pediatric dentists must possess the necessary knowledge to prevent and treat infantile obesity.
37. The present paper's most important message directed at pediatric dentists is to recommend the monitoring and registering of the BMI of overweight children in each child's dental record.
38. This recommendation should lead to a better knowledge of the impact of infantile obesity on dental health in future studies; but most importantly it should increase the degree of consciousness in the medical field and including this aspect in the battle against infantile obesity, a pandemic which threatens not only the present generations of children, but also future adult generations.

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