DOCTORAL THESIS

PRIMARY OBESITY IN CHILDREN -
Etiopathogenic, clinical and prophylactic aspects

ABSTRACT

Scientific Advisor:
Professor Dumitru Bulucea, PhD

PhD Candidate:
Carmen Simona Coșoveanu

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KEYWORDS: obesity, overweight, alimentary behaviour, physical activity, child.
I. INTRODUCTION

In the last decades, obesity turned into one of the most frequent nutritional diseases in the world, resembling a pandemic, according to the WHO’s Report in 2011; it was considered the 21st century disease. Healthy nutrition and obesity prevention in children represent public health priorities. The topic approached in this thesis belongs to a public health priority field in the European Union and Romania, being included in the Prevention National Program launched by the Health Ministry.

II. CURRENT STATE OF KNOWLEDGE

Obesity and overweight prevalence in children is alarmingly growing and varies considerably from one region to another, from under 5% in Africa and some areas in Asia, to over 20% in Europe and over 30% in America and in some countries in the Middle East.

Obesity in children in Europe tripled in the last 20 years (European Commission 2007). In most of the Western Europe countries, obesity has a frequency of 10-25%, in the Eastern Europe reaching 40%; in Northern Europe countries, the overweight prevalence is 10-20%, while in Southern Europe is 20-35%.

According to the data provided by the National Centre for Evaluating and Promoting the Health State in Romania, the obesity prevalence in the 3-16 year children grew from 0.7% in the rural areas and 1.6% in the urban areas, in 2004, to 1.5%, and 3.1%, respectively, in 2010.

The occurrence of obesity supposes multiple interactions among genetic, social, behavior, metabolic, cellular and molecular factors, followed by changes in the energetic balance (Cabalerro, 2005). The increase, at a global level, of the obesity and overweight prevalence is due, on the one hand, to an increase of the energetic intake, especially with high caloric density food, rich in fat and sugar, and, on the other hand, to a decrease of the physical activity as a consequence of an increase of sedentarism.

Obesity can be defined through the body mass index (BMI), which is the most used method in practice and in epidemiologic studies. The best definition of obesity in children is given by the body fat mass content measured through bioelectric impedance. Absorptiometry with X-ray double energy is used for research purposes, since it has a high cost and requires a high training level for the users in order to provide a proper reliability.
III. PERSONAL CONTRIBUTIONS

1. ARGUMENT

Obesity represents a major health problem, at a global level, continuously increasing all over the world, including Romania. Children are a very important target group, since early, healthy food habits represent the most efficient method to preserve the state of health in the long run.

The research was meant to follow some correlations which exist between obesity, overweight, children’s lifestyle and a better knowledge, etiopathogenically and clinically, of children’s obesity, in order to set an efficient diagnosis at an early age and to elaborate a program to promote a healthy lifestyle in the preschool and school children.

2. STUDY OBJECTIVES:

1. Establishing the overweight and obese prevalence in the children aged 2-14 years, from a school and a kindergarten in Craiova, and subsequently comparing the obtained data to data found in the specialty literature.

2. Evaluating the obesity risk factors.

3. Identifying, evaluating, analyzing and establishing some correlations among behavioral factors (food intake, feeding habits, sedentarism, physical activity), environmental factors (family, kindergarten, school, community) and obesity in children.

4. Analyzing, recording and tracing the anthropometric parameters.

5. Studying the clinical findings of obesity in children.

6. Elaborating and implementing a program for promoting a healthy lifestyle in the preschool and school children and for sanitary education in order to change the lifestyle and to lose weight in the obese and overweight children.

7. Performing sanitary education activities in kindergarten and school, which can, on the one hand, enrich children’s knowledge on obesity and how to prevent it, and, on the other hand, make them aware of the disease complications and the risk of developing an unbalanced alimentation.

8. Evaluating the results of the program for promoting a healthy lifestyle and for sanitary education in the preschool and school children, after 2 years from the beginning of the study, having as a goal the increase of children’s life quality.
3. MATERIAL

The target population was represented by 803 children, aged 2-14 years, among who 99 were preschool children from the “Dumbrava minunată” Kindergarten no 7, and 704 pupils from “Mircea Eliade” School no. 22, in Craiova, between 2008 and 2010.

INCLUSION CRITERIA:

- **Children with age between 2 and 14 years**
- **obesity**: BMI ≥ percentile 95 for sex and age
  - children with primary obesity (idiopathic, essential)
- **overweight**: percentile 85 ≤ BMI < percentile 95 for sex and age
- **normoweight**: percentile 5 ≤ BMI < percentile 85 for sex and age
- **possibilities for tracing and evaluating the results** of the program for promoting a healthy lifestyle and for sanitary education in the preschool and school children
- **signing the Study Participation Agreement** by children’s parents

EXCLUSION CRITERIA:

- secondary obesity: of endocrine, genetic or neurologic cause, with a suggestive clinical exam, confirmed by specialty examinations,
- impossibility of monitoring the children,
- parents or/and children’s refusal to take part in the study.

According to inclusion and exclusion criteria, I included in the study 205 children, aged 2-14 years (39 preschool children and 166 school children). Group S was made up of 54 overweight children aged 2-14 years. Group O consisted in 79 obese children aged 2-14 years. Group N was made up of 72 normoweight children aged 2-14 years.

4. METHOD

Study protocol. I carried out a retrospective study, case-witness type, regarding obesity in children, following some anamnestic, clinical and anthropometric parameters and a prospective study; for two years, I promoted a healthy lifestyle in preschool and school children, and then I proceeded to a clinical-statistical re-evaluation of the children.

I elaborated a questionnaire which includes: anamnestic data, anthropometric parameters (weight, length, abdominal circumference, forearm average perimeter, finding the body mass index and the adipose tissue percentage), clinical findings, nutritional investigation, physical activity investigation, environmental factor influence, physical activity-food intake relationship.

Statistic analysis. The statistic and graphical processing of the obtained data was carried out by using the Microsoft Excel and EPI INFO 2000 programmes.
**Ethical issues.** The study did not intend to impose restrictions on the freedom of decision of the children’s parents who were part of the study; it was carried out through the acceptance and free will of both parents and children, who signed the Informed Acceptance Form, and who had the right to withdraw, at any time, from the study.

5. **RESULTS**

It includes 9 subchapters: *Epidemiological and demographic data (overweight and obesity prevalence in the target population and in the studied group, on groups of age and sex), Evaluation of the obesity risk factors, Evaluation of overweight and obesity, Study of the clinical findings, Study on the nutritional investigation, Study on the physical activity investigation, Study on the alimentary behavior-physical activity relationship.*

In the second part of my study, I aimed at promoting a healthy lifestyle in the preschool and school children, which consisted of:

a. Elaboration and implementation of a program to promote a healthy lifestyle in the normoweight preschool and school children, and sanitary education for changing the lifestyle and the loss in weight in the obese and overweight children.

b. Performing some sanitary education in schools and kindergartens, which can, on the one hand, enrich children’s knowledge on obesity and prevention, and, on the other hand, make them aware of the disease complications and the risks of an unbalanced alimentation.

c. Evaluation of the results after 2 years from the beginning of the study, our goal being the increase of children’s life quality.

I conceived brochures and games to encourage adopting a healthy lifestyle: healthy food, physical activity, prevention of sedentarism, limiting the period of time spent in front of TV and computer screen.

### IV. CONCLUSIONS

1. The overweight prevalence, in the target population, was 8.8% (21.2% in the preschool children, 7.1% in the school children), and that of obesity 13.7% (24.2% in the preschool children and 12.2% in the school children). The overweight prevalence in the studied group was 6.7%, and that of the obesity was 9.8%.

2. In the preschool children, obesity prevailed in boys, overweight being without differences between boys and girls. In school children, obesity prevailed in boys and overweight in girls.
3. 3.7% of the overweight children and 15.2% of the obese ones had a weight at birth bigger than 4000 g, as compared to normoweight children (2.8%). The big weight at birth correlated with a big length at birth and with a higher risk for obesity in children, with a prevalence for boys.

4. In the first 6 months of life, artificial feeding prevailed in children with overweight (27.8%) and obesity (39.2%) as compared to the normoweight children (18%).

5. Food diversification happened before the age of 4 months in 41.8% of the obese children, in 38.9% of the overweight children, as compared to the normoweight children (23.6%). Approximately 50% of the children who had a birth weight lower than 2800 g, or higher than 4000 g and whose feeding was diversified before the age of 4 months became overweight and obese children.

6. Children who have both their parents obese present a higher risk to develop obesity (13.9%), while those with only one obese parent develop a risk to become both overweight (16.7%) and obese (15.2%).

7. In preschool children, I noticed a uniform, harmonious disposition of adiposity in 15 cases, at the abdominal level in 9 cases, while in school children, at an abdominal level in 37 cases, at trunk level in 35 cases, at hip, thigh, and nappy level in 34 cases and at mammal level in 11 cases.

8. The overweight and obese children, as compared to the normoweight children, eat, daily, sweets (55.6%, 42.3% respectively, vs. 11%), soft drinks (38.8%, 38.2% respectively, vs. 8.2%), fast-food (31.8%, 34% respectively, vs. 8.3%), meat and meat products (59.6%, 79.4% respectively, vs. 63.9%) and occasionally fruits (38.5%, 58.9% respectively, vs. 27.1%), vegetables (18.6%, 34.8% respectively, vs. 11.2%), cereals (11.2%, 14.2% respectively, vs. 6.7%), milk and milk products (5.2%, 6.1% respectively, vs. 2.8%).

9. The parents of the overweight and obese children are influenced by their children in choosing their food and they do not consider important their caloric content, as compared to the parents of the normoweight children.

10. I noticed a tendency to replace one or two meals with snacks in the overweight and obese children. The consumption of large meals was associated with the presence of overweight and obesity in children.

11. Regarding the food consumption at school, the overweight and obese children frequently eat sweets (37%, 32.9% respectively), sandwich (16.7%, 26.6%
respectively) and fast-food (22.2%, 15.2% respectively), as compared to the normoweight children (22.2%, 33.3%, 9.7% respectively).

12. Following the physical activity investigation, I noticed that 25.9% of the overweight and 36.7% of the obese, as compared to 8.3% of the normoweight, do not attend the physical education and sports classes. 62.9% of the overweight children and 64.5% of the obese do not perform any physical activity in their spare time, as compared to the normoweight 22.2%.

13. The food consumption while watching TV or playing the computer was associated with overweight and obesity in children. While watching TV programs more than 2 hours a day, 36.8% of the overweight and obese children are eating, as compared to the normoweight children (8.3%).

14. Following the nutritional and physical activity investigation in the preschool and school children, I noticed an alimentary abuse, both quantitative and qualitative, associated with the physical activity decrease. Children spent more time watching TV and playing the computer rather than performing physical activity. Sedentarism can be both cause and effect for the extra weight.

15. At the re-evaluation, I noticed that the number of obesity cases decreased (from 79 cases in 2008 to 64 in 2010), and there was an increase in the number of overweight cases (from 54 to 62 cases) and normoweight cases (from 72 to 79 cases). From the 54 overweight children, 8 became obese while 13 normoweight. From the 79 obese cases, 22 became overweight and 2 normoweight. From the 72 normoweight children, 7 became overweight and 1 obese.

16. 38% of the children understood the goals of the program for promoting a healthy lifestyle and did want to correct their old lifestyle. 12% of the children wanted to change their alimentary behavior, but they failed in the long run and returned to eating sweets and fast food they were previously used to. 2% of the children could not follow a proper diet for a healthy lifestyle because of financial reasons. 25% of the children said that they were not interested in changing their feeding habits and in observing a healthy alimentation.

17. For preventing obesity in children, it is important to identify the environmental, socio-economic and educational barriers through the involvement of a multidisciplinary team made up of the general practitioner, the pediatrician, the teacher, the psychologist, the trainer and the nutritionist.
**COSOVEANU CARMEN SIMONA**  
Parcul Campul Libertatii 1848, Vila E23, Craiova, Romania  
scosoveanu@yahoo.com  
Romanian  
28.10.1975  
Female

### Work experience

<table>
<thead>
<tr>
<th>Dates</th>
<th>Occupation or position held</th>
<th>Name and address of employer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 2005 onwards</td>
<td>Junior Lecturer</td>
<td>University of Medicine and Pharmacy, Craiova, Faculty of Medicine, Department of Pediatrics, Infant Care and Neonatology 2-4, Petru Rares Street, Craiova, Romania</td>
</tr>
</tbody>
</table>

### Education

<table>
<thead>
<tr>
<th>Dates</th>
<th>Title of qualification awarded</th>
<th>Principal subjects/occupational skills covered</th>
<th>Name and type of organisation providing education and training</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 onwards</td>
<td>Pediatric Specialist</td>
<td>Emergency County Hospital, 2nd Pediatric Clinic, Craiova 1, Tabaci Street, Craiova, Romania</td>
<td>Medical</td>
</tr>
<tr>
<td>2002-2007</td>
<td>Resident Pediatrician</td>
<td>Emergency County Hospital, Craiova</td>
<td>Pedriatics</td>
</tr>
</tbody>
</table>

For more information on Europass go to [http://europass.cedefop.europa.eu](http://europass.cedefop.europa.eu)
Dates
Title of qualification awarded
Principal subjects/occupational skills covered
Name and type of organisation providing education and training

2001-2002
Medical Intern
General Medicine
Emergency County Hospital, Craiova

Dates
Title of qualification awarded
Principal subjects/occupational skills covered
Name and type of organisation providing education and training

1994-2000
MD
General medicine
University of Medicine and Pharmacy, Craiova

Dates
Title of qualification awarded
Principal subjects/occupational skills covered
Name and type of organisation providing education and training

1990-1994
Baccalaureate
Mathematics-Physics
“Henri Coanda” High School, Craiova

Foreign Languages
Self-assessment

Understanding
Listening
B2

Reading
B2

Spoken interaction
B2

Spoken production
B2

Writing
B2

European level (*)

English
B1

French
B1

(*) Common European Framework of Reference for Languages

Computer skills and competences

Microsoft Office, Microsoft Office, Microsoft Power Point, Excel, MS-DOS, Windows, FoxPro 2.6, Dbase IV, Internet user

Additional information

Postuniversity courses attended: 9
Postuniversity courses trainer: 4
Abstracts in Medline Type Journals: 8
Full Articles published in national journals: 25
Abstracts published in national abstract volumes: 58
Abstracts published in national abstract volumes with international participation: 17
Abstracts published in international abstract volumes: 18
National conferences attended: 39
National conferences with international participation attended: 8
International conferences attended: 5
Member of Professional Associations: SRPED member
SROHP member
SRGHNP member
Winner of a BD Grant financed by CNCSIS (2008-2010)