

Weight, Height and Puberty in a Cohort of Macedonian Girls

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ORIGINAL PAPER SUMMARY

Obesity is becoming a growing problem in developed and developing countries. Many studies report an increasing incidence of obesity in the last decade. The aim of our transversal epidemiological study was to evaluate the prevalence of overweight children, axiological characteristics and pubertal stage in healthy girls from first (200 girls), third (209), fifth (290) and seventh (223) grade of school. In this study 928 girls were evaluated through systematic school examinations in the ambulance of municipality of Karposh, Skopje. The Rome and Turkish nationality, as well as Serbian were present in a small percentage, while detailed analysis was performed in the Macedonian and Albanian population of girls. The initiation of puberty (stage M₂ or P₂ by Tanner) was present in Macedonian girls: 4,3% of children in first grade, 23% in third grade, and 51,7% in fifth grade. In Albanians, in first grade M₂ is present in 2,7%, in third grade 5,2%, and in fifth grade 46,9%. Body mass index (BMI SDS) was +3,5 ± 1,5 in 35% of Macedonian girls and only 5% of Albanian girls. The Macedonian girls were also significantly higher ($p < 0,01$) and more obese than the Albanian girls. The pubertal stage was also more advanced in Macedonian girls. Most of the obese children who were included in the study reported increased consumption of fast food. Although in the past years obesity was not a problem in our country, it is becoming more severe with every year.

Key words: Macedonian girls, weight, height, puberty, obesity.

1. INTRODUCTION

Obesity has become a global problem during the past years. The World Health Organization categorizes adult overweight into four subgroups based on body mass index: BMI 25 to 30 (overweight), BMI 30 to 35, grade 1, (moderately obese), BMI 35 to 40, grade 2 (severely obese), and BMI > 40 grade 3 (morbidly obese) (1). In childhood, comparison of BMI to normal curves for age allows for categorization of BMI above the 85th percentile as overweight and above the 95th percentile as obese. The use of BMI SDS as given by Roland-Cachera et al is also used in childhood (2).

Also, the age of puberty in girls has declined during the past century and there are still reports of an earlier menarcheal age.

2. AIM OF STUDY

The aim of our cross-sectional epidemiological study was to evaluate the prevalence of overweight children, axiological characteristics and pubertal stage of healthy girls from first (n=200), third (n=209), fifth (n= 96) and seventh grade (n=223) of school.

3. MATERIAL AND METHODS

928 girls were evaluated through systematic annual school ex-

aminations in the ambulance of the municipality of Karposh, a suburb of the capital of the Republic, Skopje. The girls are considered to come from an urban population. The Rome and Turkish nationality, as well as the Serbian, were present in a small percentage, while detailed analysis was performed in the Macedonian and Albanian population of children.

The height was measured using a Harpenden stadiometer and expressed as height SDS using the standards of Tanner and Whitehouse (3).

The weight was measured on a standardized scale and expressed as body mass index ($\text{weight}^2/\text{height}^2$) SDS (2). Pubertal stage was expressed also using Tanner standards of development (4).

4. RESULTS

The initiation of puberty (stage M₂ or P₂ by Tanner) was present in 4,3% of Macedonian girls in first grade. One of them was diagnosed with idiopathic central precocious puberty after being tested with an GnRH agonist. In third grade, 23% of girls had pubertal signs, and in the fifth grade 51,7%. In Albanians, in first grade M₂ present in 2,7 %, in third grade 5,2 %, in fifth grade 46,9 %. The Macedonian girls were significantly higher ($p < 0,01$), and more obese ($p < 0,01$), than the Albanian girls. Body mass index (BMI SDS) was $3,5 \pm 1,5$ in almost 35 % of Macedonian girls. Only 5 % of Albanian girls were registered as obese.

5. DISCUSSION

In the previous two centuries, it has been registered that the mean height in children has significantly increased and earlier sexual maturation has occurred, in almost all European countries (5). Still, this trend did not occur in each European country at the same time. Genetic factors as well as environmental factors had had their influence upon population differences. The same environmental factors would not influence all children in the identical matter, due to variations of their genetic sensitivity. These secular changes towards higher stature, greater weight and earlier sexual maturation are predominantly involved with improved nutrition and health (5). In that sense, the growth of one population may be described as "the mirror of the society situation" (6).

The secular trend towards earlier sexual maturation is probably caused by environmental factors (7), like improved socioeconomic conditions, improved medical care and prevention (8). Due to improved living standards (which are in favor of the poorer population),

First grade primary school						Third grade primary school							
Macedonians No=164			Albanians No=16			Macedonians No=190			Albanians No=19				
A	II	M	A	II	M	A	II	M	A	II	M		
1	96.50%	94.50%	95.70%	100%	97.30%	97.30%	1	86.35%	76.40%	77.50%	100%	100.00%	94.80%
2	3.50%	5.50%	4.30%	0%	2.70%	2.70%	2	13.65%	23.60%	22.50%	0%	0%	5.20%
3	0%	0%	0%	0%	0%	0%	3	0%	0%	0%	0%	0%	0%
4	0%	0%	0%	0%	0%	0%	4	0%	0%	0%	0%	0%	0%
5	0%	0%	0%	0%	0%	0%	5	0%	0%	0%	0%	0%	0%
Fifth grade primary school						Seventh grade primary school							
Macedonians No=230			Albanians No=66			Macedonians No=179			Albanians No=44				
A	II	M	A	II	M	A	II	M	A	II	M		
1	45.22%	26.52%	17.83%	62%	40.91%	34.85%	1	10.04%	1.12%	1.67%	22.73%	0.00%	2.27%
2	41.30%	40.00%	51.74%	27.27%	33.33%	46.97%	2	35.71%	12.78%	26.70%	36.36%	11.36%	6.80%
3	12.61%	26.96%	24.78%	9.09%	16.67%	13.64%	3	31.24%	44.64%	36.93%	36.36%	61.36%	59.09%
4	0.87%	6.52%	5.22%	0%	7.58%	4.55%	4	21.75%	36.83%	32.92%	4.54%	27.27%	31.81%
5	0%	0%	0%	1.52%	1.52%	0%	5	0.55%	3.91%	0.56%	0%	0%	0%

TABLE 1. Tabular representation of study groups

the differences in growth and maturation are diminished among social groups (9). This is the effect that we mostly see in developed European countries. The effect of interference among races may also contribute to this secular trend (10). In North America, in the recent years, there has been a concern that early puberty is more common than in the last decades (11). In developing countries, the differences in the socioeconomic status, or way of living, urban or rural, are still important and may be a reason for variations in the timing of puberty.(12) In our case, we have girls from an urban settings. When we compare groups of girls who live in good social conditions to those in bad conditions, we see that the secular trend is still present. The socioeconomic status of the studied group is not always known, so we can speculate that it is over age in most girls.

Very few large population studies have addressed the issue of how overweight is related to childhood growth, the timing of puberty and final height. The results of a large Swedish longitudinal study of growth show that BMI gain in childhood is related to greater height in the same period, for example an increase of BMI for one unit is associated with a gain in height of 0,23 cm in male and 0,29 cm in female children. The increase in BMI in puberty is associated with an early puberty (0,6 years in male and 0,7 years in female children). Every increase in the BMI in childhood reduces

the growth in adolescence. There is no direct correlation between BMI in childhood and final height. Increased nutrition between the age of 2 and 8 years is not satisfactory regarding the final height, because the temporary increased growth in childhood would be compensated with early pubertal maturation and subnormal gain in growth during adolescence (13).

6. CONCLUSIONS

Most of the obese children who were included in our study reported increased consumption of fast food. Although in the past years, obesity was not a problem in our country it is a becoming more severe with every year especially in different ethnic groups. Knowing the fact that we have evaluated only an urban cohort of girls, a larger study is needed to evaluate the situation also in the other parts of the country and ensure adequate prevention by primary care pediatricians.

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