

## THE PREVALENCE OF OBESITY AND SUPER OBESITY AMONG SCHOOLCHILDREN OF PÉCS IN THE 1990-S

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**Abstract:** *The prevalence of obesity was determined by the data of the Second Pécs Growth Study (Dóber), in which a cross-sectional anthropometric survey was carried out in a representative sample of 3414 school children aged 6-18 years in the school year of 1993-94 in Pécs, a town with the population of 180 000. The prevalence values were determined by two types of methods, by triceps skinfold and by body mass index (BMI). In case 1, obese children were determined as those with triceps skinfold greater or equal with 90th percentile of the triceps standard of Tanner and Whitehouse (1975) and super obese children as those with greater or equal with 97th percentile of the same standard. In case 2, obese children were defined as those with BMI greater or equal with 90th percentile of the local BMI standard (Dóber 1992) and super obese children as those with greater or equal with the 97th percentile of the same BMI standard. The mean prevalence of obesity in the whole sample as determined by triceps skinfold ( $TS \geq 90p$ ) was 16,3%, and 13,2% by the BMI ( $BMI \geq 90p$ ). There were no significant differences between boys and girls. The mean prevalence of super obesity was 5,9% and 4,0% as determined by triceps skinfold and BMI, respectively. These data shown that the prevalence of both obesity and super obesity has increased during the last decade. The results confirm that effective preventive measures are badly needed to stop or reverse the increase of prevalence of obesity in Hungary.*

**Key words:** *Obesity; BMI; Pécs children*

### Introduction

The population of Hungary has been decreasing, from time to time, according to the data of Central Statistical Office (Hungarian Annual of Statistics, 1993). The „life expectancy at birth“, „the risk of death between 15 and 59“ and other statistical health measures have been continuously worsening in Hungary as in the other so called „formerly socialist economies“ as in Hungary (Feachem 1994). The increasing trend of morbidity and mortality is partly due to the high rate of cardiovascular diseases which are frequently accompanied by obesity. The prevalence of obesity in the adult population of Hungary was 25% in the middle of 1980s as reported by the First Hungarian Nutritional Survey (Bíró 1992-1993). Furthermore, Halmy (1984) revealed 39% prevalence of obesity in a cohort of chronically ill patients. In the 80s, 2,5-15,7% of schoolchildren were found to be obese (Bedő and Bihari 1981, Blatniczky 1994, Czinner et al. 1983, Dóber 1987, Jakabfi 1986, Jakabfi et al. 1986, Somogyi 1987, Wilhelm and Csombók 1983). On one hand, the clinical experiences in the 90s suggest that the rate of obesity is increasing and on the other that the cases seem to be the same in connection with the super obese children. Large survey in United States demonstrated that childhood obesity is becoming more and more frequent (Gortmaker et al. 1987).

The aim of the present study was to investigate the trend of the prevalence of childhood obesity in Hungary.

## Patients and Methods

The prevalence of obesity was investigated using the data of the Second Pécs Growth Study (Dóber, publication is in progress), where a cross-sectional anthropometric survey was carried out in a representative sample of 3414 (male: 1856, female: 1558), 6 to 18 year old school children in the school year of 1993-94 in Pécs, a town in South-Hungary with a population of 180 000. The methodology of this study was similar to that of the First Pécs Growth Study made in the 1983-84 school year (Dóber and Jeges 1987, Dóber 1991, 1992). The anthropometric techniques were in accordance with internationally accepted standards described by Martin and Saller (1957) and by the International Biological Program (Tanner et al. 1969). Only healthy children were included. Those suffering from any chronic disease, congenital defects or endogen type of obesity, as in the first one, also were excluded from the study.

The prevalence of obesity was determined by two methods. In the first case the criteria of obesity was the triceps skinfold (TS) being equal with or greater than the 90th percentile of the Tanner and Whitehouse' standard (1975). Children whose skinfold values were equal with or greater than 97th percentile were considered super obese. In the second case the BMI was used to define obesity. Obese children were those whose BMI was equal with or greater than the 90th percentile of the BMI Standard of the First Pécs Growth Study (Dóber and Jeges 1987), and the ones whose BMI was 97th percentile or greater were defined as super obese.

Data are expressed as mean  $\pm$ SD or mean  $\pm$ SE. Statistical significance of differences between mean values of the different groups was tested by using Students' paired t-test.

## Results

The first two tables summarise the results obtained by using the TS standard. The data of the obese children determined by TS ( $TS \leq 90p$ ), can be seen in the table 1.

Altogether 3414 children were investigated of which 1856 were boys and 1558 were girls. The total number of obese children was 538, of which 314 were boys, and 224 were girls. The mean of the prevalence of obesity in the academic year of 1993-94 was 16,3 % in the whole cohort, 17,4 % among the boys and 16,3 % among the girls. Statistically the difference between sexes was not significant.

The data of the super obese children determined by TS, can be seen in the table 2. The total number of super obese children was 198, of which 122 were boys and 76 were girls. The prevalence of super obesity was 5,9%, 6,8 and 4,9% in the whole cohort in boys and in girls, respectively. According to the results the rate of super obesity in boys was significantly higher than in girls ( $p < 0.01$ ).

Table 1: The Prevalence of Childhood Obesity of Pécs's School-children by Triceps Skinfold in the 1993-94 Academic Year

Age (Years)	Total Number of Children	Total Number of Obese Children	Total Prevalence of Obesity (%)	Number of Boys	Number of Obese Boys	Boys's Prevalence of Obesity (%)	Number of Girls	Number of Obese Girls	Girl's Prevalence of Obesity (%)
6	241	33	13.7	119	14	11.8	122	19	15.6
7	225	33	14.6	125	19	15.2	100	14	14.0
8	230	33	14.6	128	16	12.5	102	17	16.7
9	228	31	17.5	125	29	23.2	103	12	11.7
10	235	54	23.0	119	35	29.5	116	19	16.4
11	227	37	16.4	117	17	14.6	110	20	18.2
12	244	47	19.7	116	32	27.6	128	15	11.8
13	239	45	18.8	104	19	18.3	135	26	19.3
14	387	58	15.0	239	36	15.1	148	22	14.9
15	205	34	16.6	101	14	13.9	104	20	19.3
16	342	49	14.3	211	31	14.7	131	18	13.8
17	362	51	14.0	228	33	14.5	134	18	13.5
18	249	33	13.3	124	19	15.4	125	14	11.2
<b>Total:</b>	<b>3414</b>	<b>538</b>		<b>1856</b>	<b>314</b>		<b>1558</b>	<b>234</b>	
<b>Mean:</b>			<b>16.3</b>			<b>17.4</b>			<b>15.1</b>
<b>SD:</b>			<b>2.85</b>			<b>5.70</b>			<b>2.78</b>
<b>SE:</b>			<b>0.79</b>			<b>1.58</b>			<b>0.77</b>

Table 2: The Prevalence of Childhood Superobesity of Pécs's School-children by Triceps Skinfold (TS) in the 1993-94 Academic Year

Age (Years)	Total Number of Children	Total Number of Super Obese Children	Total Prevalence of Super Obesity (%)	Number of Boys	Number of Super Obese Boys	Boys's Prevalence of Super Obesity (%)	Number of Girls	Number of Super Obese Girls	Girls's Prevalence of Super Obesity (%)
6	241	15	6.2	119	6	5.0	122	9	7.5
7	225	11	4.9	125	8	6.4	100	3	3.0
8	230	19	8.3	128	10	7.9	102	9	8.9
9	228	14	6.1	125	12	9.6	103	2	2.0
10	235	18	7.7	119	11	9.3	116	7	6.1
11	227	12	5.3	117	6	5.2	110	6	5.5
12	244	14	5.7	116	9	7.8	128	5	4.0
13	239	18	7.5	104	7	6.8	135	11	8.2
14	387	27	7.0	239	20	8.4	148	7	4.8
15	205	10	4.9	101	5	5.0	104	5	4.8
16	342	15	4.4	211	7	3.4	131	8	6.2
17	362	15	4.1	228	14	6.2	134	1	0.8
18	249	10	4.0	124	7	5.7	125	3	2.4
<b>Total:</b>	<b>3414</b>	<b>198</b>		<b>1856</b>	<b>122</b>		<b>1558</b>	<b>76</b>	
<b>Mean:</b>			<b>5.9</b>			<b>6.8</b>			<b>4.9</b>
<b>SD:</b>			<b>1.41</b>			<b>1.85</b>			<b>2.47</b>
<b>SE:</b>			<b>0.39</b>			<b>0.51</b>			<b>0.69</b>



The figure 1 and the table 3 demonstrate the changes in the prevalence of obesity (left hand side) and super obesity (right side) determined by TS in the 1983-84 and in the 1993-94 school year. The mean prevalence of obesity in both sexes has increased from 11,8% to 16,3% during the last decade. The prevalence of obesity has increased from 13,1% to 17,4% in boys and from 10,4% to 15,1% in girls. The trend of changes was similar in both genders. The prevalence of super obesity has increased from 3,4 % to 5,9 % in the whole cohort, from 3,6 % to 6,7 % in boys and from 3,1% to 4,9% in girls. The increase of super obesity was significantly higher in boys than in girls.

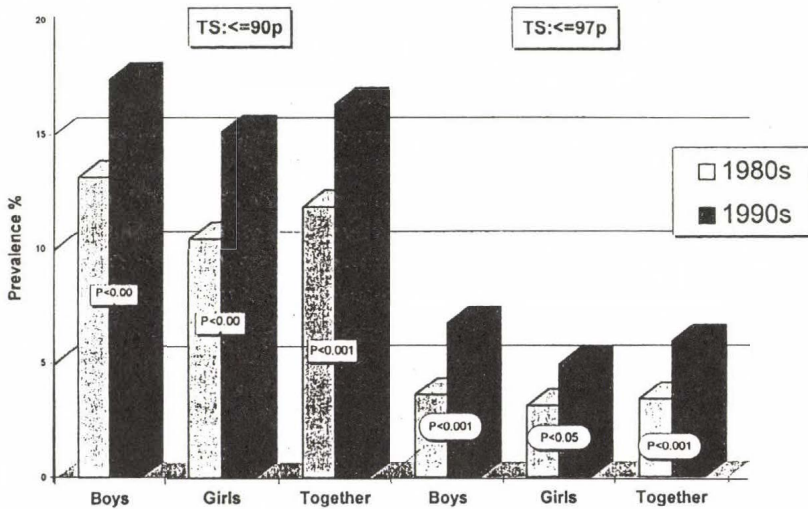


Fig. 1: The prevalence of childhood obesity in the town of Pécs determined by triceps skinfold in 1980s and in 1990s. The black columns represent the mean values obtained in 1980s, and white columns the values in 1990s. Left hand side of the figure: triceps skinfold (TS) ≤ 90p, right hand side: TS ≤ 97p.

Table 3: Changes in the Prevalence of Childhood Obesity by Triceps Skinfold (TS) between 1980s and 1990s

	TS ≤ percentiles						Level of significance	TS ≤ percentiles						Level of significance
	1980s			1990s				1980s			1990s			
	Mean	SD	SE	Mean	SD	SE		Mean	SD	SE	Mean	SD	SE	
Boys	13.1	3.3	0.92	17.4	5.7	1.58	***	3.6	1.31	0.08	6.7	1.85	0.51	***
Girls	10.4	2.3	0.64	15.1	2.78	0.76	***	3.1	1.62	0.15	4.9	2.47	0.77	*
Together	11.8	2.2	0.61	16.3	2.85	0.79	***	3.4	1.01	0.08	5.9	1.41	0.39	***

\* : p < 0.05  
 \*\* : p < 0.01  
 \*\*\* : p < 0.001

Table 4 shows the main data of obesity prevalence obtained by using BMI. Altogether we found 461 obese children (250 boys and 211 girls). The mean prevalence of obesity in the academic school year of 1993-94 was 13,2% of the whole group, 12,8% among boys and 13,4% among girls. The difference between sexes was not significant.

*Table 4: The Prevalence of Childhood Obesity of Pécs's School-children by Body Mass Index (BMI) in the 1993-94 Academic Year*

Age (Years)	Total Number of Children	Total Number of Obese Children	Total Prevalence of Obesity (%)	Number of Boys	Number of Obese Boys	Boys's Prevalence of Obesity (%)	Number of Girls	Number of Obese Girls	Girl's Prevalence of Obesity (%)
6	241	31	12.9	119	6	5.0	122	25	20.7
7	225	23	10.2	125	18	14.4	100	5	5.0
8	230	32	13.9	128	20	15.7	102	12	11.8
9	228	20	8.8	125	11	8.8	103	9	8.8
10	235	37	15.7	119	21	17.7	116	16	13.8
11	227	17	7.5	117	7	6.0	110	10	9.1
12	244	25	10.2	116	5	4.4	128	20	15.7
13	239	19	7.9	104	10	9.7	135	9	6.7
14	387	39	10.1	239	24	10.1	148	15	10.2
15	205	31	15.1	101	14	13.9	104	17	16.4
16	342	77	22.6	211	49	23.4	131	28	21.4
17	362	64	17.7	228	41	18.0	134	23	17.2
18	249	46	18.5	124	24	19.4	125	22	17.6
<b>Total:</b>	<b>3414</b>	<b>461</b>		<b>1856</b>	<b>250</b>		<b>1558</b>	<b>211</b>	
<b>Mean:</b>			<b>13.2</b>			<b>12.8</b>			<b>13.4</b>
<b>SD:</b>			<b>4.6</b>			<b>5.98</b>			<b>5.26</b>
<b>SE:</b>			<b>1.28</b>			<b>1.66</b>			<b>1.46</b>

The data of the super obese children determined by BMI are presented in table 5. The number of super obese children was 143, of which 92 were boys and 51 were girls. The prevalence of super obesity was 4,0%, 4,6% and 3,6% in the whole cohort, in boys and in girls, respectively. No sex difference in the rate of super obesity was found.

### Discussion

The results of the present study demonstrated a marked increase in the prevalence of both the obesity and super obesity among children of Pécs. The careful analysis of the data suggest that the increase in prevalence of obesity might be the consequence of the increase in the prevalence of super obesity.

Our data confirm the results reported in the other population (Gortmaker et al. 1987). Although childhood obesity accounts for only 30-40% of adult obesity (Mullins 1958, Abraham et al. 1979), adults obese as adolescents constitute a majority of the heaviest adults (Rimm and Rimm 1976). Therefore, childhood obesity may contribute a disproportionate share of morbidity and mortality of adult obesity, making greater risk for developing

of Syndrome „X“ (Dean et al.1991, Suba et al. 1994). Our data confirm that effective preventive measures are badly needed to stop or reverse increase of the prevalence of obesity in Hungary.

Table 5: The Prevalence of Childhood Superobesity of Pécs's School-children by Body Mass Index (BMI) in the 1993-94 Academic Year

Age (Years)	Total Number of Children	Total Number of Super Obese Children	Total Prevalence of Super Obesity (%)	Number of Boys	Number of Super Obese Boys	Boys's Prevalence of Super Obesity (%)	Number of Girls	Number of Super Obese Girls	Girl's Prevalence of Super Obesity (%)
6	241	8	3.3	119	1	0.9	122	7	5.8
7	225	4	1.8	125	4	3.2	100	0	0
8	230	11	4.8	128	5	4.0	102	6	5.9
9	228	6	2.6	125	6	4.8	103	0	0
10	235	16	6.8	119	9	7.6	116	7	6.1
11	227	2	0.9	117	1	0.9	110	1	1.0
12	244	5	2.0	116	2	1.8	128	3	2.4
13	239	9	3.8	104	4	3.9	135	5	3.8
14	387	14	3.6	239	8	3.4	148	6	4.1
15	205	7	3.4	101	3	3.0	104	4	3.9
16	342	34	10.0	211	27	12.9	131	7	5.4
17	362	14	3.9	228	12	5.3	134	2	1.5
18	249	13	5.2	124	10	8.1	125	3	2.4
<b>Total:</b>	<b>3414</b>	<b>143</b>		<b>1856</b>	<b>92</b>		<b>1558</b>	<b>51</b>	
<b>Mean:</b>			<b>4.0</b>			<b>4.6</b>			<b>3.3</b>
<b>SD:</b>			<b>2.36</b>			<b>3.33</b>			<b>2.21</b>
<b>SE:</b>			<b>0.65</b>			<b>0.92</b>			<b>0.61</b>

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