ABSTRACT

The aim of this study is to determine the indicator of % body fat tissue of children suffering from Diabetes type 1, boys and girls aged 7 to 18 years, and to present its dynamics in the aspect of age and gender. We examined 37 boys and 36 girls suffering from Diabetes type 1, they were divided into two age groups: 7 to 12 years and 12 to 18 years. The body fat % was determined by bioelectrical impedance analysis with the apparatus “Tanita”. The obtained quantitative data was processed through variation analysis. The results show that the indicator is higher in girls than in boys. There is a statistically significant difference of high extent (P<0.001) in the senior age (12-18) between boys and girls. A reliable difference of low extent (P<0.05) also exists in the interage comparison in boys. Conclusion: There is a characteristic interage and intersexual dynamics of the indicator of % body fat in children with Diabetes type 1. Bioelectrical impedance gives accurate data on the components of body composition.

Keywords: bioelectrical impedance, % body fat tissue, Diabetes type 1, body composition

Introduction

Diabetes is an endocrine disease that is associated with the metabolism and therefore it affects the components of body composition, especially the fat mass. Diabetes type 1 is a disease of childhood, and its effects on body composition are correlated with the changes occurring with the onset of puberty (2). The fat-free mass (FFM), also called lean body mass, and especially the fat mass are the most sensitive to changes (3, 5 and 9). Attention is drawn to the change of total body water (TBW) (9), as well as to the changes in bone mass (BM) (4, 6 and 10). The changes in the components of body composition cause an increase in weight of patients with Diabetes type 1. According to the “acceleration hypothesis” this is a risk factor for the early manifestation of the disease (8). This hypothesis postulates that obesity-related insulin resistance accelerates the disease process of Diabetes (1, 7).

Bioelectrical impedance (BIA) is an advanced technique for quantitative studying the components of body composition. Recently it has extensively been used because it is fast, portable, inexpensive and noninvasive and it provides accurate data (9). In modern research, % body fat tissue has been presented as a significant component. The purpose of this study is to determine the indicator of % body fat tissue of children suffering from Diabetes type 1, boys and girls aged 7 to 18 years, and to present its dynamics in the aspects of age and gender.

Materials and Methods

We examined 36 girls and 37 boys suffering from Diabetes type 1, aged 7 to 18. The children we measured were divided into two age groups: junior - 7 to 12 years old and senior - 12 to 18 years. All the children we examined were Bulgarian, from the central region of Southern Bulgaria. Bioelectrical impedance testing for body fat % was done with Tanita apparatus. The quantitative data were processed by variation analysis. We applied Student’s t-test for comparing the averages, at the minimum level of significance P≤ 0.05.

Results and Discussion

The analysis of data from Table 1 shows that % body fat is higher in the younger group of children diabetics - 12 years, compared to that in older diabetics – over 12 years, but between the averages of the indicator there was a lack of difference with statistical reliability, but only a trend was identified.
### % body mass tissue in diabetic boys

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤12</td>
<td>10</td>
<td>17.48</td>
<td>4.23</td>
<td>1.34</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>≥12</td>
<td>27</td>
<td>13.30</td>
<td>7.32</td>
<td>1.41</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

### % body mass tissue in diabetic girls

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤12</td>
<td>11</td>
<td>19.84</td>
<td>3.78</td>
<td>1.14</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>≥12</td>
<td>25</td>
<td>24.30</td>
<td>6.48</td>
<td>1.29</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

The average value of the indicator in Table 2 is bigger in girls over 12 years compared with that of diabetics girls under 12 years, there is statistical significance of low extent (P<0.05).

The intergroup interage comparison shows that the boys with Diabetes tend to a greater percentage of body fat in junior age, compared to the senior age. The explanation for this can be found in the shorter period of illness of children up to 12 years. In older boys, the advancing puberty has not resulted in compensation of the fat mass that is metabolized by Diabetes. Girls’ body fat % is higher in older ones, as the difference is statistically reliable (P<0.05). Here the contribution of puberty is clear for the more deposition of fat tissue in girls’ bodies in this period. The effects of estrogen hormones, that are active in puberty, contribute to fat deposition at the predilection regions of the female body.

The intersexual comparisons showed higher values of the indicator % body fat tissue in girls of both age groups compared with boys. In the younger age group this is just a trend, since there was no statistically significant difference in the average values (P>0.05). In the senior age, % body fat is higher in girls with a high degree of reliability (P<0.001). This is probably due to the different contribution of the puberty and the more consumer nature of Diabetes in boys. Gomez et al. (3) also reported lower fat mass in the diabetic boys.

### Conclusions

The indicator % body fat shows typical dynamics of changes in children with Diabetes type 1. It has lower values in boys than in girls. In boys, it is lower in senior age, and in girls - in the younger age group. The puberty and probably the duration of the disease affect the dynamics of the indicator in both sexes.

### Acknowledgment

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### REFERENCES