

COMPARATIVE ANALYSIS OF BODY COMPOSITION IN HEALTHY CHILDREN AND CHILDREN WITH 1ST TYPE DIABETES.

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Purpose of the research. Study the results of bioimpedance analysis of body composition in healthy schoolchildren and schoolchildren with type 1 DM.

Materials and methods of research. To perform the work, the results of bioimpedance analysis of body composition were studied in 112 boys aged 7-17 years with type 1 diabetes mellitus, observed at the RSSPMCE Bukhara branch (group I). To compare the data, a control group (Group II) was selected using random sampling (Owen, 1966) from 1248 healthy 7-17-year-old boys studying at School No. 17 in the city of Bukhara, consisting of 100 practically healthy boys. A total of 212 children were examined in the study.

Results of the study. Muscle mass in children with type 1 diabetes mellitus was significantly lower in both ages: at 7 years - 10.5 ± 0.08 kg ($p < 0.05$) versus 11.2 ± 0.08 kg in healthy individuals; at 8 years - 11.7 ± 0.09 kg ($p < 0.05$) versus 12.6 ± 0.07 kg. Bone mass in children with type 1 diabetes mellitus was also significantly lower: by 0.2 kg (or 10%) compared to healthy children of both ages ($p < 0.05$). Without fat mass (FFM), including skeletal muscles, bone mass, internal organ mass, and water content, in children with type 1 diabetes mellitus at 7 years of age, it was 16.3 ± 0.10 kg versus 17.8 ± 0.17 kg in healthy individuals, at 8 years of age - 18.6 ± 0.15 kg versus 20.1 ± 0.19 kg ($p < 0.05$). The amount of adipose tissue, expressed as a percentage of body composition, was higher in children with type 1 diabetes mellitus: at 7 years old - 16.5% versus 15.3% in healthy individuals, at 8 years old - 16.2% versus 14.9%. The water content in the body of children with type 1 diabetes mellitus was lower: at age 7 - 59.4% versus 61.2% in healthy individuals, at age 8 - 58.9% versus 61.8% ($p < 0.05$). The protein content was also lower in children with DM1, indicating a slowdown in protein synthesis and growth retardation (7 years old - 13.5% versus 14.3%, 8 years old - 13.7% versus 14.7%, $p < 0.05$). The percentage of skeletal muscles in children with type 1 diabetes was 1-2% lower: at age 7 - 37.7% versus 38.7% in healthy individuals, at age 8 - 37.9% versus 39.1% ($p < 0.05$).

Muscle mass in children with type 1 diabetes mellitus was significantly lower: at 9 years - 13.2 ± 0.12 kg ($p < 0.05$), at 10 years - 14.4 ± 0.09 kg ($p < 0.05$) compared to healthy children. Bone mass was higher in healthy children and significantly lower in children with type 1 diabetes mellitus ($p < 0.05$). Without obesity, the fat mass in children with type 1 diabetes mellitus was lower and significantly differed from the indicators of healthy children ($p < 0.05$). Fat tissue in children with type 1 diabetes mellitus was higher: at 9 years old - 16.7%, at 10 years old - 16.2% versus 15.3% and 14.5% in healthy individuals, respectively ($p < 0.05$).

Muscle mass in healthy children at age 11 was 17.6 ± 0.16 kg, at age 12 - 19.3 ± 0.23 kg. In children with type 1 diabetes mellitus, these indicators were 15.9 ± 0.18 kg and 17.3 ± 0.37 kg, respectively. Bone mass in healthy children aged 11-12 years averaged 3.4-3.8 kg, in children with DM1 - 3.0-3.3 kg ($p < 0.05$). Without fat mass in healthy children, it was 24.1 kg at 11 years and 26.6 kg at 12 years, respectively, in children with DM1 - 21.3 kg and 23.2 kg, which is on average 3 kg less ($p < 0.05$).

Fat tissue in children with type 1 diabetes mellitus was 2% higher: 15.9-16.1% versus 13.8-14.2% in healthy individuals ($p < 0.05$). The water and protein content in healthy children was higher (63% and 15.3-16.2%), compared to children with type 1 diabetes mellitus (61% and 14.1-14.8%). The decrease in water content is associated with a decrease in bone and muscle mass. Skeletal muscles in healthy children constituted 42.3-44.1%, in children with DM1 - 40.6-42.2% ($p < 0.05$).

Muscle mass in children with type 1 diabetes mellitus was less than 2 kg (13 years old - 2.1 kg, 14 years old - 2.5 kg). Bone mass in children with type 1 diabetes mellitus decreases by 0.6 kg at both ages, which increases the risk of osteopenia or osteoporosis. The proportion of adipose tissue in children with type 1 diabetes mellitus was 2.3-2.5% higher, indicating the development of insulin resistance characteristic of metabolic syndrome and a decrease in fat degradation. The water content in children with type 1 diabetes mellitus was 2.4-2.5% lower, which is associated with a decrease in muscle mass and an increase in adipose tissue. Muscle mass in healthy children increased from 27.7 kg to 32.2 kg (18.4%), in children with type 1 diabetes - from 24 kg to 28.4 kg (18%), which is 3-3.5 kg less than in healthy children. Bone mass in healthy children increased from 5.1 kg to 5.9 kg (15.7%), in children with type 1 diabetes - from 4.4 kg to 5.0 kg (14%), which indicates a lag in development. Without fat, the body weight in healthy children increased from 37.5 kg to 43.9 kg (17.1%), in children with type 1 diabetes - from 33.2 kg to 39.0 kg (17.4%), but on average 4 kg less.

The proportion of adipose tissue decreased by 1% in healthy children and by 0.5% in children with type 1 diabetes. Fat mass in children with type 1 diabetes mellitus was higher: by 2.6% at age 15, by 2.8% at age 16, and by 3.1% at age 17. The water content in healthy children increased from 64.4% to 65.7% (by 1.3%), in children with type 1 diabetes - from 61.7% to 62.6% (by 0.9%). The protein content in healthy children increased by 0.9%, in children with DM1 - by 0.6%, while in healthy children the protein content was 2% higher. The total water content in healthy children increased from 47.3% to 49.7% (2.4%), in children with type 1 diabetes - from 44.9% to 47.1% (2.2%), which is 2.2-2.4% lower.

Conclusion. It was established that in boys with type I DM, compared to healthy children, muscle mass is 4.2 kg (14.2%), bone mass is 0.8 kg (13.3%), fat-free mass is 5.6 kg (15.6%), water content is 7.3%, protein is 4.6%, skeletal muscle is 11.5%, and fat mass is 17.7% higher.