

## Skin Folds of Children with Type I Diabetes Mellitus

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The model of distribution of subcutaneous adipose tissue is investigated in children with type I diabetes mellitus. For this goal is determined the skin folds thickness in 9 regions of the body: sfTriceps, sfBiceps, sfAntebrachium, sfSubscapulare, sfXcosta, sfAbdomen, sfSuprailiaca, sfThigh, sfCrus. The distribution of the subcutaneous adipose tissue is more in the periphery and not in the trunk.

*Key words:* somatotype, children, type I diabetes mellitus

### Introduction

Skin folds thickness is an important anthropometrical parameter for defining the model of distribution of subcutaneous adipose tissue in norm and in a range of metabolic diseases such as obesity, metabolic syndrome, etc [3]. It is particularly very useful in defining the anthropological status of people with diabetes mellitus. This procedure is relatively non-invasive. It demands simple technology and shows good applicability giving results with acceptable accuracy [1]. This study aims to determine the model of distribution of subcutaneous adipose tissue in children with Diabetes mellitus type 1.

### Material and Methods

Male and female children from the Bulgarian ethnic group with Diabetes mellitus type 1 were examined.

Girls were 80 distributed in two age groups: from 7 to 12 years and from 12 to 18 years. Boys were 90 distributed also in two age groups: from 7 to 12 years and from 12 to 18 years. 9 skin folds were sized with Harpenden skinfolds caliper using The Method of Martin – Saller: sfTriceps, sfBiceps, sfAntebrachium, sfSubscapulare, sfXcosta, sfAbdomen, sfSuprailiaca, sfThigh, sfCrus. Data about the same skin folds sized in 100 healthy boys and 100 healthy girls from the same age range was used for check that was kindly placed by the Department of Human Anatomy and Physiology of University of

Plovdiv "Paisii Hilendarski" Received results were performed using the statistical programme SPSS and Instat Degrees of significance are: low ( $p \geq 0,05$ ), moderate ( $p = 0,051 - 0,001$ ) and high ( $p < 0,001$ ).

## Results

### Boys 7-12 years (Table 1)

The skin fold in the thigh area is the thickest one in sick and in healthy boys, but the thickness is bigger in sick boys. Statistically significant difference in the skin folds thickness in sick and healthy boys was found in: sfSubscapulare ( $p = 0,051 - 0,001$ ), sfXcosta ( $p = 0,051 - 0,001$ ), sfAntebrachium ( $p = 0,051 - 0,001$ ), sfCrus ( $p < 0,001$ ) everywhere they are thicker in healthy boys with moderate degree of significance. and in the crus area the degree of significance is high. Such a tendency in precipitation of subcutaneous adipose tissue is seen also in sfSuprailiaca, sfAbdomen, sfBiceps, but with a low degree of reliability ( $p \geq 0,05$ ). In all skin folds, values are higher in the healthy children compared to the sick ones. Ratio sfTriceps/sfSubscapulare is 1.52.

Table 1. Skin folds measurements in diabetic and healthy boys aged 7-12 years

Variables	Diabetic patients			Healthy subjects		
	N	Mean	SD	N	Mean	SD
sfTriceps	45	12.29	4.20	50	12.94	4.88
sfSubscapulare	45	8.06	4.39	50	9.85	5.14
sfXrib	45	6.82	4.44	50	8.50	4.72
sfSuprailiaca	45	7.54	6.12	50	10.07	5.80
sfAbdomen	45	11.05	7.08	50	13.70	6.95
sfBiceps	45	6.48	3.09	50	7.95	3.44
sfAntebrachium	45	7.09	2.58	50	8.01	2.73
sfThigh	45	19.57	8.11	50	17.72	6.37
sfCrus	45	11.85	6.12	50	14.55	5.14

### Boys 12-18 years (Table 2)

At this age, the skin folds in the thigh area are the thickest ones in both groups, but the thickness is bigger in sick boys. Statistically significant difference in the skin folds thickness in sick and healthy boys was found in sf Biceps ( $p = 0,051 - 0,001$ ), sfAntebrachium ( $p = 0,051 - 0,001$ ), sfCrus ( $p < 0,001$ ). The degree of significance in the area of the

Table 2. Skin folds measurements in diabetic and healthy boys aged 12-18 years

Variables	Diabetic patients			Healthy subjects		
	N	Mean	SD	N	Mean	SD
sfTriceps	45	11.82	5.96	50	11.49	5.43
sfSubscapulare	45	9.44	4.62	50	10.49	4.93
sfXrib	45	9.21	6.27	50	9.33	5.59
sfSuprailiaca	45	10.03	7.51	50	11.37	6.70
sfAbdomen	45	14.66	9.83	50	15.56	8.19
sfBiceps	45	5.61	3.32	50	7.25	3.66
sfAntebrachium	45	5.91	2.89	50	7.26	3.10
sfThigh	45	20.73	9.81	50	19.12	8.01
sfCrus	45	12.11	8.34	50	14.55	6.26

biceps and forearm is moderate and in the area of the crus, it is high. These three skin folds are thicker in healthy children than in the sick ones. In the rest skin folds, clearly pronounced tendency of differentiated distribution of subcutaneous adipose tissue is deficient in sick and healthy children. Ratio sfTriceps/sfSubscapulare is 1.25.

*Girls 7-12 years (Table 3)*

Skin folds in the area of the thigh are the thickest in both sick and healthy girls. Statistically significant difference in the skin folds thickness in sick and healthy girls was found in sfSuprailiaca ( $p < 0,001$ ), sfAbdomen ( $p < 0,001$ ), sf Antebrachium ( $p < 0,001$ ), sf Thigh ( $p < 0,001$ ). The degree of significance is high in all four skin folds. Skin folds in the area of crista iliaca, abdomen and forearm are thicker in healthy girls, but in the area of the thigh, it is thicker in the sick ones. In sfSubscapulare, sfXcosta, sfBiceps is seen a tendency for bigger distribution of subcutaneous adipose tissue in healthy children, but with a low degree of reliability ( $p \geq 0,05$ ). Ratio sfTriceps/sfSubscapulare is 1.60.

Table 3. Skin folds measurements in diabetic and healthy girls aged 7-12 years

Variables	Diabetic patients			Healthy subjects		
	N	Mean	SD	N	Mean	SD
sfTriceps	40	13.93	4.54	50	13.98	4.66
sfSubscapulare	40	8.69	3.83	50	10.83	4.90
sfXrib	40	7.58	3.39	50	9.22	4.59
sfSuprailiaca	40	7.82	4.37	50	11.21	5.44
sfAbdomen	40	11.66	5.22	50	14.59	5.79
sfBiceps	40	7.55	3.54	50	8.93	3.31
sfAntebrachium	40	6.64	2.16	50	8.74	2.73
sfThigh	40	24.34	9.26	50	18.95	5.67
sfCrus	40	14.69	5.32	50	15.86	4.67

*Girls 12-18 years (Table 4)*

Skin folds are thicker in girls with diabetes mellitus, with the exception of the ones in the area of the biceps and forearm. Statistically significant difference in the skin folds thickness in sick and healthy girls was found in sfSuprailiaca ( $p < 0,001$ ), sfAbdomen ( $p < 0,001$ ), sf Antebrachium ( $p < 0,001$ ), sf Thigh ( $p < 0.051$ ). In the first three skin folds, the degree of significance is high and in the last one, it is moderate. Such a tendency is found also in sfSuprailiaca. Ratio sfTriceps/sfSubscapulare is 1.33.

Table 4. Skin folds measurements in diabetic and healthy girls aged 12-18 years

Variables	Diabetic patients			Healthy subjects		
	N	Mean	SD	N	Mean	SD
sfTriceps	40	19.64	7.27	50	16.52	5.57
sfSubscapulare	40	14.73	7.80	50	13.73	6.11
sfXrib	40	14.45	7.26	50	11.49	5.24
sfSuprailiaca	40	16.13	8.90	50	13.69	6.06
sfAbdomen	40	21.17	8.75	50	18.34	5.98
sfBiceps	40	9.88	4.49	50	10.03	3.79
sfAntebrachium	40	8.96	4.07	50	9.40	3.41
sfThigh	40	32.28	11.92	50	23.33	6.64
sfCrus	40	19.85	7.56	50	18.41	5.48

## Discussion

The precipitation of subcutaneous adipose tissue in boys at the age of 7-12 years is bigger in healthy children than in the ones with diabetes mellitus. With the exception of the thigh area, where the precipitation of subcutaneous adipose tissue is bigger in sick boys, but the degree of significance is low. Such dependency is reported by Ferrante et al. [2].

The precipitation of subcutaneous adipose tissue in boys at the age of 12-18 years is also bigger in healthy children than in the ones with diabetes mellitus. With the exception of the thigh area, where the precipitation of subcutaneous adipose tissue is bigger in sick boys, but the degree of significance is low.

The precipitation of subcutaneous adipose tissue in girls at the age of 7-12 years is bigger in healthy children than in the ones with diabetes mellitus. With the exception of the thigh area, where the precipitation of subcutaneous adipose tissue is bigger in sick boys, but the degree of significance is high.

The precipitation of subcutaneous adipose tissue in girls at the age of 12-18 years is bigger in sick ones than in the healthy ones. Tu v e m o et al. /1997/ and T i l l m a n n et al. [5] have reported such dependency. With the exception of the area of the biceps and forearm, where the precipitation is bigger in healthy girls. These differences are with a high degree of significance in triceps, X rib, thigh and moderate degree in the abdomen. Other skin folds are with a low degree of significance.

In boys and girls with diabetes mellitus, the precipitation of subcutaneous adipose tissue is higher in the periphery [upper limb] than in the trunk. Same conclusion is also drawn out by other authors [3].

## Conclusion

The skin folds in boys and girls with diabetes mellitus type I are thinner than in the healthy controls. The exception is the skin fold in the thigh area in girls of 12-18 that is thicker in sick ones. Skin folds ratio of triceps/subscapulare shows that the model of distribution of adipose tissue is in the periphery (upper limb) and not in the trunk.

## References

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