Institute of Experimental Morphology, Pathology and Anthropology with Museum
Bulgarian Anatomical Society

Acta morphologica et anthropologica, 19
Sofia • 2012

Anthropology

Age Changes in the Topical Distribution of Subcutaneous Fat Tissue in Certain Body Parts and Areas in Adult Men Aged 20-50 Years

E. Andreenko

Plovdiv University "P. Hilendarski", Faculty of Biology,
Department of Human anatomy and physiology

The purpose of this study is to track the age changes in the topical distribution of SFT on some body parts and areas in adult men, aged 20-50 years. 801 clinically healthy men, aged 20-50 years, were the object of this study. Men are divided into six age groups, in 5-year intervals. The thickness of 9 SF of the body and limbs were measured with calipers. The topical distribution of SFT on certain body parts was evaluated basing on the five ratios according to formulas. The results showed that the thickness of SFT for the men of all age periods is greater on lower limbs than upper limbs, a greater torso, compared with the limbs, and greater in the lower torso in the compare with the upper torso.

Key words: skin folds, ratios, age, males.

Introduction

The quantity and topical distribution of subcutaneous fat tissue /SFT/ as characteristics of the physical development of individuals, and in particular, as characteristics of their body composition, are indicators that have an essential role in the etiology of obesity and a number of socially significant diseases [1, 2, 3]. The thickness of various skin folds help us to estimate the specificities of the "external" fat tissue and its changes under the influence of various external factors – physical activity, diet, health status, as well as the influence of age [4, 5, 6, 7, 8].

The purpose of this study is to track the age changes in the topical distribution of SFT on some body parts and areas in adult men, aged 20-50 years.

Material and Methods

801 clinically healthy men, aged 20-50 years, were the object of this study. Men are divided into six age groups, in 5-year intervals. The thickness of 9 SFs of the body and limbs were measured with calipers (subscapular SF, biceps SF, triceps SF, forearm SF, X rib SF, abdomen SF, suprailiac SF, thigh SF, and calf SF).

The topical distribution of SFT on certain body parts was evaluated basing on the following five ratios:

1. Ratio of SFT – *torso/limbs* through **4 SF** (by Rolland-Cachera et al., 1990)
(subscapular SF + suprailiac SF) / (triceps SF + biceps SF)

2. Ratio of SFT – *torso/limbs* through **6 SF** (by Malina-Bouchard 1988 and 1996);
(subscapular SF+ suprailiac SF + abdomen SF) / (triceps SF + biceps SF + calf SF)

3. Ratio of SFT – *upper/lower torso* through **4 SF** (by Malina-Bouchard 1988 and 1996);
(subscapular SF + X-rib SF) / (suprailiac SF + abdomen SF)

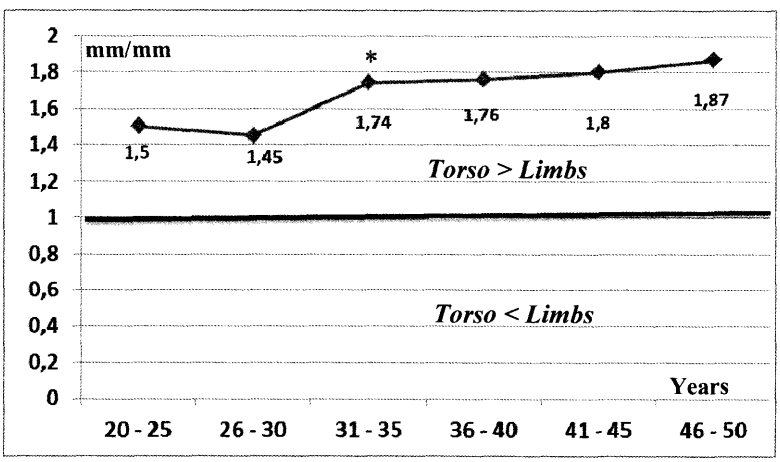
4. Ratios of SFT – *upper/lower limbs* (by Malina - Bouchard 1988 and 1996):
(1.First ratio) (triceps SF + biceps SF) / (thigh SF + calf SF)
(2. Second ratio) (triceps SF + forearm SF) / (thigh SF + calf SF)

The data were analyzed using SPSS statistical package. Reliability of intersexual and interage differences was checked by t-criterion of Student at the level of significance $P<0.05$.

Results and Discussion

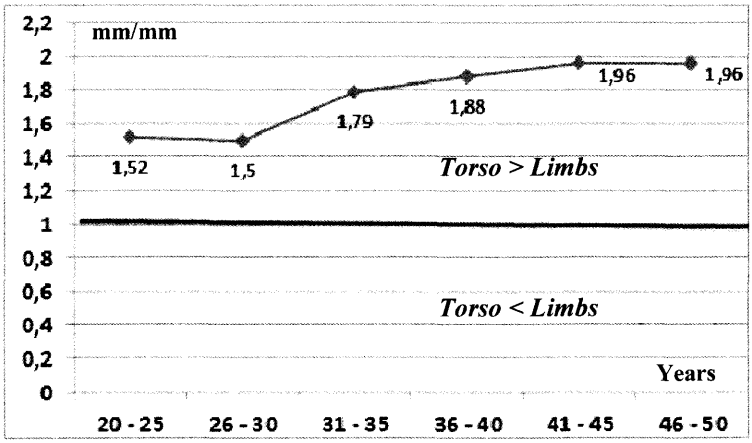
1. RATIO OF SFT – ***TORSO/LIMBS*** through **4 SF** (Figure1).

The results show that throughout the period of research, from 20 to 50 years of age, the values of the ratio between SFT on the torso and limbs, calculated through 4 SFs, are over 1.00mm/mm, which means a greater accumulation of SFT on the body compared to limbs – a typical feature of adulthood. The tendency for a thicker layer of SFT on the body compared to that of limbs increases significantly after 30 years of age.



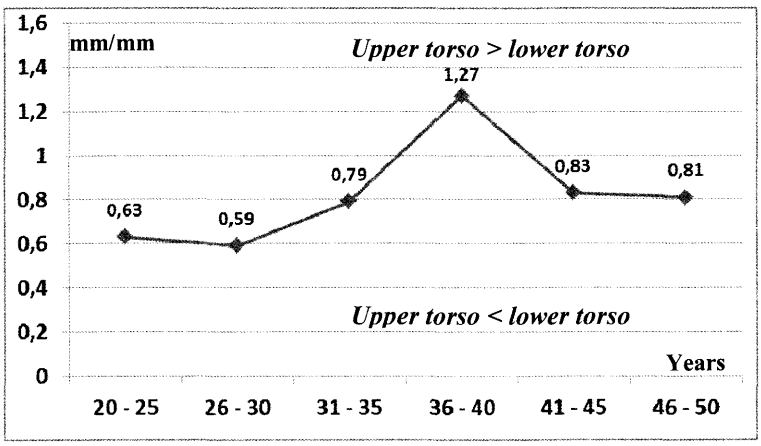
* statistical significance

Fig. 1. Ratio of SFT ***torso/limbs*** through **4 SF**



* statistical significance

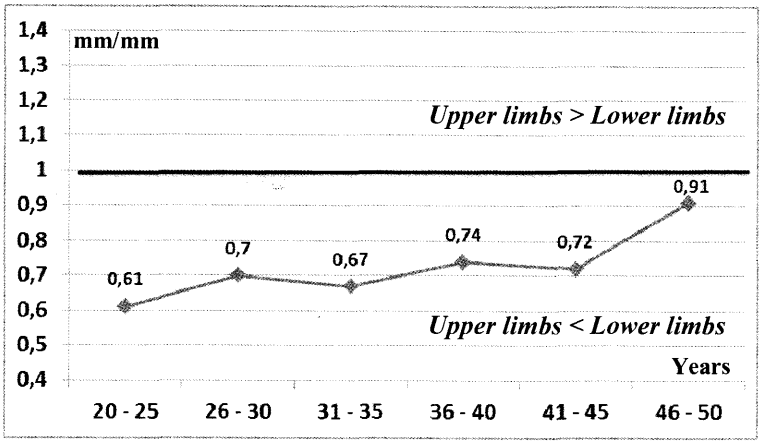
Fig. 2. Ratio of SFT – ***torso/limbs*** through **6 SF**



* statistical significance

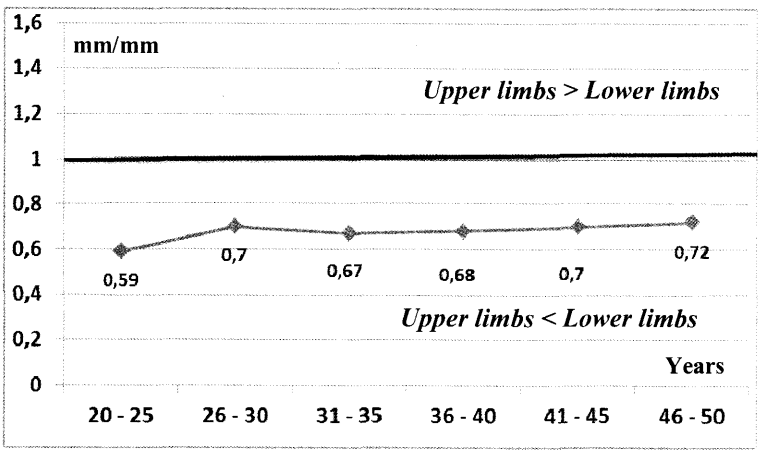
Fig. 3. Ratio of SFT – ***upper/lower torso*** through **4 SF**

2. RATIO OF SFT – ***TORSO/LIMBS*** through **6 SF** (Figure 2).
The comparative analysis of the data, obtained for the ratio of SFT on the torso and limbs through 6 SFs, shows a similar result to that of the ratio torso/limbs through 4 SFs. Throughout the study period, the age curve is located above the level of 1.00 mm/mm and tends to increase with age advancing, which objectifies the greater increase of SFT on the torso than limbs.
3. RATIO OF SFT – ***UPPER/LOWER TORSO*** through **4 SF** (Figure 3).
The change in distribution of SFT on the upper and lower torso, with age advancing, in the men we studied was evaluated with the ratio of two chest SFs and 2 abdomen SFs. The results show proportionately thicker SFT in the abdomen area compared to the chest area, in the first half of the age period. Between 36-40 years, the accumulation



* statistical significance

Fig. 4. Ratio of SFT – ***upper/lower limbs*** **(1)**



* statistical significance

Fig. 5. Ratio of SFT – ***upper/lower limbs*** **(2)**

of "external" fat tissue in the chest area significantly increases and exceeds that of the abdomen, leading to location of the curve over 1.00 mm/mm. In the second half of the age period, there is a redistribution of SFT, which is related to its reduction on the chest and its accumulation on the abdomen. The values of the ratio fall and they are below 1.00mm/mm but not reaching those from the beginning of the study.

4. RATIOS OF SFT – ***UPPER/LOWER LIMBS*** (Figure 4, Figure 5).

The results obtained in the two ratios show generally similar changes with age advancing, but there are some differences, too. In both ratios the values are below 1.00 mm/mm throughout the age period which shows a greater thickness of the SFT on lower limbs than upper. On the other hand, with the ratio [6, 7] from the beginning to the end of the age period of research, it seems to have a clear tendency of increasing values,

respectively proportional reduction of SFT on lower limbs, while with ratio [6, 8] there is a tendency to retaining and retention. The bigger number of statistically significant, interage differences that we found in ratio [6, 7] gives us reason to believe that it evaluates more accurately and objectively the topical distribution of SFT on upper and lower limbs in the men of the study.

Conclusions

1. Throughout the age period of research, from 20 to 50 years of age, there is a greater accumulation of SFT on the body compared to limbs, and after the age of 30, this trend grows significantly.

2. In the first half of the period of research, as well as at the end of it, there is a proportionately thicker layer of SFT on the abdomen, compared to that on the chest. A significant distribution of SFT on the trunk occurs in men aged 36-40 years. This is the period when there is an intense accumulation of "external" fat tissue on the chest area exceeding that on the abdomen.

3. For the men of all age periods, the thickness of SFT is greater on lower limbs than upper limbs, and there is a distinct trend towards topical redistribution with age advancing and progressive increase in the area of upper limbs.

References

1. Malina, R., C. Bouchard. Subcutaneous fat distribution during grow. – New York Plenum, 1988, 63-84..
2. Malina, R. Regional body composition: age, sex end ethnic variation. – Human Kinetics, 1996, 217-255
3. Rolland-Cachera, M, M. Sempte, M. Batail, E. Patois, F. Guggenbuhl, V. Fautrad. Adiposity indices in children. – Amer. J. Clin. Nutrition, 36, 1982, 178-184.
4. Te Velde S., J. Twisk, W. Mechelen, H. Kemper. Birth weight, adult body composition, and subcutaneous fat distribution. – Obes Res, 11, 2003, 202-208.
5. Tineshev. S. Estimating body composition in 18-year-old girls and boys through the method of bioelectrical impedance analysis. – Glasnik, ADS, 46, 2011, 67-72.
6. Митова, З. Антропологична характеристика на физическото развитие, телесния състав и телесната охраненост при 9-15 годишни деца и подрастващи от София. Автореферат дисерт. труд, 2009, София, 1-28.
7. Младенова С., Николова М., Д. Коджебашева. Развитие на подкожната мастна тъкан при деца и подрастващи от Смолянски регион. –Scientific research of the Union of scientists in Bulgaria-Plovdiv, Series C. Technics and technologies, Balkan Conference of Young Scientists, 16-18 June 2005, Plovdiv, 5, 2005, 248-256.
8. Младенова, С. Количество и разпределение на подкожната мастна тъкан в периода на растеж. – Сборник доклади от Международна научна конференция „Науката в условията на глобализацията през XXI век", Съюз на учените-Стара Загора, 1-2 юни 2006, 4, 2006, 68-74.