

Some Upper Extremity Proportions in the Young Turkish Male Adults

O. Taskinalp, R. Mesut, L. Elevli

*Trakya University, Faculty of Medicine, Department of Anatomy,
Edirne, Turkey*

In this study our aim was to investigate the relationships of the lengths of the upper extremity parts to their circumferences in the Turkish male adults. 532 male students who were studying at the Trakya University Faculty of Medicine in the period 1986-1993 participated in our study. We found the arm length as 34.82 ± 2.55 cm, the forearm length as 24.94 ± 2.16 cm and the hand length as 18.92 ± 1.5 cm while the circumference values for the arm, the forearm and the hand were 26.87 ± 2.81 cm, 25.95 ± 1.85 cm and 20.79 ± 1.11 cm, respectively. The arm circumference/arm length ratio was 69.21%, the forearm circumference/forearm length ratio was 104.04% and the hand circumference/hand length ratio was 109.88%. Considering these values while the arm circumference/arm length ratio was approximately 2/3 the forearm and the hand circumferences were higher than their lengths.

Key words: anthropometry, upper extremity, circumference.

Introduction

The history of the studies concerned with the human body begins from the time of Hippocrates. These studies which were for scientific purposes formerly became artistically oriented during the Renaissance so that they were inspirational for many artists. The artists such as Polykleitos, Lysippos, Gyaume, Vitruvius, Michelangelo and Paul Richer worked on the theme of the human body and created such masterpieces that are admired by the society even today [1, 2, 3, 12]. "The Scientific Rule" was used in the measurements concerned with the human formerly [1, 3], then Fritsch found "The Fritsch Rule" improving on this. Physical anthropologists used these rules to reveal the racial differences [5] in their studies. They considered that there were many proportions in the human body while they were doing those studies.

The measurements of the different parts of the human body and the ratios between these measurements became commercially useful as well as they have been in arts as a consequence of developing technology. Those measurements and ratios which are especially important in the clothing and automotive fields differ between the societies. With this regard we believe that the results of our study will be useful for the Turkish clothing industry.

Material and Methods

We conducted our study in the anthropometry laboratory in the Department of Anatomy of the Trakya University, Faculty of Medicine. 532 male students who were studying at the Faculty of Medicine between the years 1986-1993 participated in our study. All the measurements were done by the same researcher at the same time of the day. A ruler fixed to the wall, a pelvimeter and a tape measure made of cloth, all with milimetric scales were used in the study. All the data were recorded using forms prepared before and they were analyzed statistically in the NCSS programme.

Upper extremities are the parts of the body with the greatest mobility and connected to the upper lateral sides of the trunk by the shoulder joint. In the anatomical terminology extremities are called as membrum or member but the preferred term is extremities [6, 7, 8, 9]. Anatomically upper extremity is divided into three parts; the arm, the forearm and the hand. These parts are separated from each other with the shoulder, cubital and wrist joints, respectively [8, 9, 10, 11].

We first determined the anthropologic landmarks before the measurements we have done on the upper extremity. Then we performed our measurements from these points. Our measurements and the anthropologic landmarks we used in these measurements are below [3, 4]:

- 1. Arm length:** The distance between the acromion (acromiale) and the radiale.
Acromion: The highest lateral process of the processus acromialis.
Radiale: The highest point of the lateral border of the caput radii.
- 2. Forearm length:** The distance between the radiale and the stylium.
Stylium: The lowest point of the processus styloideus radii.
- 3. Hand length:** The distance between the radiale and the dactylium.
Dactylium: The lowest point of the middle finger.
- 4. Arm circumference:** The measurement taken from the widest part of the arm.
- 5. Forearm circumference:** The measurement taken from the widest part of the forearm.
- 6. Hand circumference:** The measurement taken from the widest part of the palm of the hand.

Results

The length, the circumference and the circumference/length ratios of the parts of the upper extremity are shown in Table 1.

Discussion and Conclusion

In our literature review we encountered length measurements on the upper extremity. However, we could not find any article concerned with the circumference measurements and the length/circumference ratios.

Table 1. The lengths, the circumferences and the circumference/length ratios of the parts of the upper extremity

| Upper extremity part | Length, cm | Circumference, cm | Circumference/length ratio, % |
|----------------------|------------|-------------------|-------------------------------|
| Arm | 34.82±2.55 | 26.87±2.81 | 69.21 |
| Forearm | 24.94±2.16 | 25.95±1.85 | 104.04 |
| Hand | 18.92±1.5 | 20.79±1.11 | 109.88 |

We found the arm length as 34.82 cm, the forearm length as 24.94 cm and the hand length as 18.92 cm. Kahraman found these lengths as 32.21 cm, 25.2 cm and 19.51 cm, respectively while these values were 32.48 cm, 24.22 cm and 20.97 cm in Muftuoğlu's study [5]. In a study conducted in USA these lengths were 28.20 cm, 25.1 cm and 19 cm, respectively. When we compare our arm length values were significantly different from the US based study while the differences were lower with the Kahraman's and Muftuoğlu's studies [1, 5]. But the differences between the forearm lengths were minimal [2, 3, 5, 7].

The arm circumference/arm length ratio was 69.21% while these values were higher than 100% for the forearm and the hand. We could not make any comparison for these data as there are no previous data in the literature. We think that the reason for the ratio higher than 100% is related to the structure of the extremities and the population's inactivity in sports.

Considering the hand we think that the ratio higher than 100% is related to the anatomical structure and this ratio is not much prone to a high degree of variability.

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