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The Proportions of Upper Extremity in Turkish Women

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The aim of our study is to investigate the lengths of upper extremity and their proportions to body height and to each other in adult Turkish women.

493 female students who have studied in Medical Faculty of Trakya University had taken place in our study. Body height, total upper extremity, arm, forearm and hand lengths were taken as parameters for the study. The proportions of these findings to body height and to each other were found.

The differences between the other populations and adult Turkish women were defined by comparing our results with the data from literature.

Key words: Anthropology, upper extremity, proportion.

Introduction

From the first human "Homo habilis" that had lived three million years ago on earth to the father of todays' human "Homo sapiens", the human body had changed continuously. Historians, artists and scientists had always been interested in this change [9].

All the civilizations in history had taken the human body up in their own cultural and social intelligence. Artists of the period had always used the human body as a way of telling. So, they had tried to understand the human anatomy. They had accepted the existence of some proportions in human body and used them in their studies [4]. The proportions between the parts of human body had been called as "canon" (Old Egypt, New Egypt, Greek Canons etc.). The unit measure of each canon had been named as "module". Hand, foot, head and length of third finger of the hand had been used as a module in various canons [3, 4, 7, 8, 11, 12].

In 19th century, the anatomic structure of human body had been explained with mathematical expressions by Schmidt and Fritsch. With this study which had made history as Schmidt-Fritsch Rule, the length of the parts could be defined from the length of another part. The proportions of human body had been defined scientifically by French anatomist Dr. Paul Richer first [7, 11, 12].

The men's body had been mostly examined as human body in social and cultural intelligence of its period. Albrecht Dürer was the first who had examined the

proportions of women body [12]. However, there are not enough and comprehensive studies on women anthropology in our country yet. We tried to fill this point with this study some.

Material and Methods

493 female students who studied in 2nd class of Trakya University Medical Faculty took place in our study. There was not any orthopaedical defect in our subjects. Measurements were made by the same researcher at the same times of the days in anthropometry laboratory. The results that measured with millimetric segmented, not bending, wooden meter fixed on the wall were recorded in the forms prepared before. The data collected were evaluated with the NCSS computer statistics program, the averages and standard deviations were calculated.

Constant anthropological points and superficial anatomical formations were used for our measurements to get standardization [3, 6, 10]. The anthropological points used and the measurements made in our study are respectively like that:

1-Total upper extremity length: The distance between acromion and dactylion in erect anatomical position.
2-Acromion (Acromiale) : The point that fits to angulus acromii.
3-Dactylion (Onychion) : The tip of of the middle finger which is the longest.
4-Arm length : The distance between acromion and radiale.

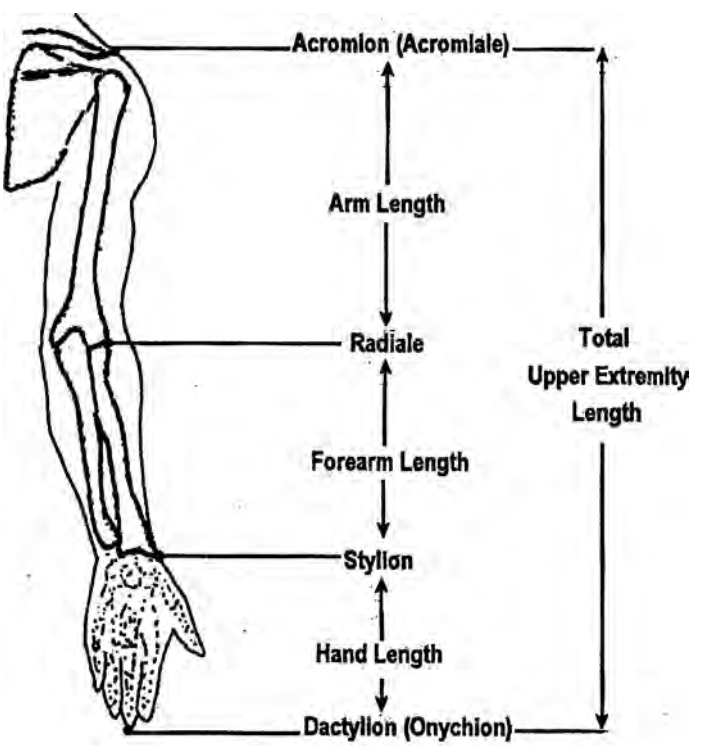

Fig. 1. Anthropological points and features

5-Radiale : The upper border of caput radii which is felt in fovea lateralis olecrani.
6-Forearm length : The distance between radiale and stylion.
7-Stylion : The point at the bottom of processus styloideus radii in carpal region.
8-Hand length : The distance between stylion and dactylion.

Findings

First, the lengths of upper extremities were measured on 493 female students whose mean age were 19,4 ± 1,1 (Table 1). Then the proportions of the parts of upper extremities to body height were calculated (Table 2). In Table 3 the proportions of the parts to upper extremity can be seen.

Table 1. The length of upper extremity

Features	Average (cm)
Upper Extremity Length	70.93±3.95
Arm Length	30.99±2.47
Forearm Length	22.74±1.98
Hand Length	17.21±1.56

Table 2. The proportions between upper extremity and body height (%)

Upper Extremity Length / Height	44.12
Arm Length / Height	19.28
Forearm Length / Height	14.14
Hand Length / Height	11.00

Table 3. The proportions between the parts and upper extremity (%)

Arm Length / Upper Extremity (%)	44
Forearm Length / Upper Extremity (%)	32
Hand Length / Upper Extremity (%)	24

Result and Conclusion

The studies are not much in number in the whole country which were made for the aim of defining the anthropometric measures of Turkish people. Studies about anthropometric measures of females are seen rarely as well. So that we could not come across a study in which all of our findings exist. But we could find the chance to compare some of our results with some studies.

We measured the body height of the subjects 160.73 ± 5.95 cm. At 1937 İnan, at 1960 Ciner, at 1999 Fellahoğlu, at 1995 Kahraman et al. and at 1999 Akın & Sağır had reported the body height 152.26 cm, 155.4 cm, 157.8 cm, 162.64 cm and 153.7 cm respectively [1, 2, 5, 6]. These values had been reported as 161,5 cm in Italians and 163,8 cm in Frenchs [6]. Our subjects' body heights are nearly close to Kahraman et al. and Italians' results but shorter than the Frenchs' and longer than the other reseaerchers' results as well.

We measured the total upper extremity length 70.93 cm in our study. This length had been measured 69.64 cm by Kahraman et al., 66.78 cm by Fellahoğlu, 66.66 cm by Akın & Sağır. Italians had measured 70,20 cm and Frenchs 74,93 cm as well [1, 6].

According to this, our findings are more likely with the findings of Italians and Kahraman et al. Noticeable differences can be seen with the other researchers' findings.

Arm, forearm and hand lengths are 30.99 cm, 22,74 cm and 17.21 cm respectively. Kahraman et al. had reported these as 28.42 cm, 22.82 cm and 18.40 cm [6]. In 1991 Fellahoğlu had measured arm length 31.33 cm and forearm length 24.20 cm, however Akın & Sağır had measured the same distances as 31.7 cm and 23.6 cm [1].

Our subjects' arm lengths are longer than the findings of K a h r a m a n et al., but likely with Akın and Fellahoğlu. And the forearm lengths are shorter than the findings of Fellahoğlu and Akın & Sağır in spite of the similarity with Kahraman's findings.

We could make a comparison only with Kahraman et al. in hand lengths. Kahraman et al. had measured 18,40 cm while we measured 17.21 cm in our subjects [6]. With the help of these results we can see that arm length plays the biggest role in the formation of upper extremity length.

The results we found by comparing each of our results with the body height are shown in Table 4. Approximately 2.25 times of total upper extremity length, 5 times of arm length, 7 times of forearm length and 9 times of hand length equals to body height. When we compare our results with the literature we could not find a noticeable difference.

T a b l e 4. The comparison of our findings with literature

Features	Our study	Kahraman (1995)	Italian	French	Çiner (1960)	Fellahoğlu (1991)	Akın (1999)	İnan (1937)
Height	160.73	162.64	161.50	163.83	155,40	157.80	153 70	152.26
Upper Extremity Length	70.93	69.64	70.20	74.93		66.78	66.6	
Arm Length	30.99	28.42				31.33	31.7	
Forearm Length	22.74	22.82				24.20	23.6	
Hand Length	17.21	18.40						
Upper Extremity/Height	44.12	42.80	44	45.73		42.34	43.31	
Arm Length/Height	19.28					19.85	20.62	
Forearm Length / Height	14.14					15.33	15.35	
Hand Length / Height	10.70	11.34						
Arm Length / Upper Extremity	43.69	26.42				46.91	47.7	
Forearm Length / Upper Extremity	32.05	32.75				36.23	35.43	
Hand Length / Upper Extremity	24.26	40.80						

If we have a look at the proportions between the parts that form the upper extremity, we find arm (upper extremity proportion 44 %, forearm / upper extremity proportion 32 % and hand) upper extremity proportion 24 % in our study. We could compare all of our findings only with Kahraman et al. Kahraman et al. reported these proportions as 40.8 %, 32.7 % and 26.42% respectively [6]. Fellahoğlu and Akın & Sağır had compared only the arm and forearm lengths with upper extremity length. Fellahoğlu reported as 46.91 %, 36.23 % and Akın & Sağır 47.7 % and 35.43 % as well respectively [1]. If we compare our results with K a h r a m a n et al. we see that our first proportion is higher, second is nearly close and third is

lower. We could compare only the proportions of arm and forearm lengths to upper extremity length with Fellahoplu and Akın & Sağır. Our findings are lower than their findings.

The anthropometric measurements of women, men and children from any country are different. Also by examining the studies made at various times, we can say that the anthropometric values can change with the time progression. Geography, genetics, nourishment style, habits, traditions and socioeconomic differences can cause differences in anthropometric measures of societies [1]. As a conclusion it is not true to evaluate the upper extremity length in Turkish women only. It must be evaluated together by accepting the existence of some proportions in human body.

We hope that the results we found in this study may be useful in different parts of industry like clothing, furniture, body prosthesis, hand devices and making gloves.

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