Anthropometric Characteristics of Iranian Military Personnel and their Changes over Recent Years

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Abstract

Background: In most armies, clothes, equipment and weapons are designed according to the physical characteristics and anthropometric data of soldiers.

Objective: To study the anthropometric characteristics of Iranian army force and their changes over recent years.

Methods: 12 635 Iranian military personnel aged between 18 and 30 years with tenure of <10 years who were normally engaged in educational military activities and soldiers were enrolled in this study, which was conducted in 2010.

Results: The military personnel had a mean±SD stature of 174.1±6.3 cm and sitting height of 89.7±3.8 cm. They had a mean weight of 70.0 kg, and body mass index of 23.3 kg/m².

Conclusion: The stature of Iranian army has increased by 14 mm during the last 15 years. The stature was less than those of the western countries and 3–4 cm more than those of East Asian personnel. The body mass index has had an increasing trend.

Keywords: Human engineering; Anthropometry; Military personnel; Equipment design; Iran

Introduction

Problems with ergonomics at work may cause musculoskeletal disorders, early fatigue, physical inabilities, and even accidents and diseases. Design of military machinery, weapons, and equipment should thus be according to soldiers' body dimensions and ergonomic principles. The standard program to measure physical dimensions of the US military force dates back to 1775. Thereafter, a database of the anthropometric dimensions of the military force was developed in 1970 and has been in use as a standard for the physical dimensions for designing the required equipment and accessories of the army. These standards have been modified constantly over the past 200 years. Each sector of the US army has declared a number as the maximum allowable weight to height ratio for employment and recruit.
ment. The military sectors are obliged to pay attention to these ratios. In 1995, almost 5000 American military forces were dismissed from the army because of weight to height mismatch.¹

Nowadays, most of the armies produce their military clothes, weapons, and equipment according to the physical characteristics of their soldiers. To prevent the production of instruments which are not fit for their personnel, the need to perform anthropometric measures.² Furthermore, they need to study the temporal changes made in the physical dimensions and military force ability over years. In a study on the physical dimensions of the US military

Figure 1: Some anthropometric parameters measured in this study

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¹ The number refers to a citation or reference.

² The number refers to another citation or reference.
personnel, Anderson asserted that most of the injuries and damages which occurred during military trainings happened to those who suffered from inappropriate body dimensions.3

Many countries measure the anthropometric dimensions of their military personnel on alternate years to be able to design their work settings and tools and equipment based on anthropometrically updated information.4 In a study on a large sample of 17–20-year-old American population, Rochelle found that 13%–56% of participants were not fit for military standards with regard to their gender and age, and that most of the mismatch was among the Afro-Americans.5 It is possible for various people with different dimensions to work properly with tools and equipment suitable for their physical characteristics by employing anthropometry to equipment and work setting design. Designing based on anthropometric data leads to eliminating awkward postures and their subsequent complications for the body.6

Therefore, being informed of body characteristics and individuals' anthropomorphic dimensions is essential for having an effective work setting, even for those with physical disabilities.7

McNolty showed that anthropometric dimensions of personnel are among the most important factors causing physical injuries in the US army.8 Henderson believes that most of the injuries occurred in US military personnel are due to unfit physical dimensions and their mismatch with tools and equipment.9

The significance of ergonomics and considering the physical dimensions of the soldiers in designing are increasingly acknowledged by Iranian army. The earliest data available on Iranians' body dimensions dates back to an anthropological research performed in 1934 by Henry Field, affiliated to the American Museum of Natural History.10 Field analyzed different Iranian tribes, including Kurds, Lors, Turks, Arabs, Fars, and the Jews, and measured many anthropometric parameters, especially stature and cranial dimensions.

The first research on anthropometry and design in Iran's army was proposed and designed in 1970 by Nourani and Dillard11 in Army's Department of Health and was performed by Kennedy, White, and Hendrix12 who measured the anthropometric data of 7784 Iranian soldiers for designing military shoes and clothes. The last study conducted on the anthropometry measurements of Iranian Military ground forces was conducted in 1995, where 2130 soldiers and military staff were evaluated.13

We therefore conducted this study to determine the ergonomics and anthropometric measures of the military forces of Iran. We also studied the temporal changes occurred over recent years in the indices.

Materials and Methods

A total of 12,635 military ground force personnel aged between 18 and 30 years (including soldiers) with tenure of <10 years who were normally engaged in educational activities, was studied. The participants were selected using a systematic random sampling method. They were also stratified by age, ie, 18–20, 21–25, and 26–30 years.

Physical dimensions of the personnel were measured by a stadiometer, which is consisted of two scaled perpendicular sheets with a measurement accuracy of 1 mm. For the measurements, the proposed method of National Health and Nutrition Examination Survey (NHANES) was used.14 This method, which has also been used by the US army, conforms to the proposed ISO methods for anthropometric and ergonomic design principles.15,16 Body weight was measured with an accuracy of 0.1 kg (Ziemens, Germany).

For each participant, we recorded...
Table 1: Stature and sitting height of the studied participants. The unit of measurement is cm. For numbers in the first column, see Figure 1.

| No. | Parameter                      | Mean±SD | Range          | Percentile  |
|-----|--------------------------------|---------|----------------|-------------|
|     |                                |         |                | 5th | 25th | 50th | 75th | 95th |
| 1   | Stature                        | 174.1±6.3 | 153.6–225.0    | 164.6       | 170.0 | 173.9    | 178.0 | 185.4 |
| 2   | Cervical Height                | 147.9±5.9 | 131.2–195.2    | 138.9       | 144.0 | 147.7    | 151.7 | 158.0 |
| 3   | Shoulder (Acromion) Height     | 144.6±5.8 | 125.7–166.0    | 135.5       | 140.7 | 144.6    | 148.2 | 155.0 |
| 4   | Waist Height Standing          | 101.6±5.8 | 73.9–128.0     | 92.0        | 98.0  | 101.5    | 105.2 | 111.3 |
| 5   | Crotch Height Standing         | 75.5±5.0  | 47.8–92.0      | 67.7        | 72.2  | 75.4     | 79.0  | 84.0  |
| 6   | Knee Height Standing           | 50.5±4.1  | 44.0–60.5      | 45.0        | 48.2  | 50.3     | 52.5  | 56.3  |
| 7   | Calf Height Standing           | 37.3±3.8  | 22.0–56.6      | 31.0        | 35.0  | 37.3     | 39.6  | 43.0  |
| 8   | Functional Arm Reach Forward   | 83.9±4.3  | 56.2–99.2      | 77.5        | 81.4  | 84.0     | 86.6  | 90.5  |
| 9   | Elbow Height Standing          | 108.9±5.4 | 97.7–158.8     | 101.0       | 105.3 | 108.9    | 112.0 | 117.5 |
| 10  | Tip Finger Height Standing     | 72.9±4.3  | 49.3–93.4      | 66.0        | 70.4  | 72.8     | 75.5  | 80.0  |
| 11  | Eye Height Standing            | 163.6±6.6 | 143.0–191.0    | 153.0       | 159.0 | 163.3    | 167.8 | 175.4 |
| 12  | Vertical Functional Arm Reach Standing | 212.2±8.1 | 188.2–246.6   | 199.5       | 206.8 | 212.0    | 217.5 | 225.7 |
| 13  | Elbow to Elbow Length Standing | 46.7±4.0  | 35.0–61.8      | 41.0        | 44.1  | 46.7     | 49.0  | 53.7  |
| 14  | Arm Reach Up Sitting Rest      | 136.5±5.1 | 119.4–164.5    | 129.8       | 133.6 | 136.7    | 139.2 | 143.8 |
| 15  | Sitting Rest Height            | 89.7±3.8  | 83.0–122.8     | 85.8        | 87.5  | 89.3     | 91.1  | 94.3  |
| 16  | Eye Height Sitting Rest        | 77.7±4.1  | 69.5–98.3      | 73.2        | 75.5  | 77.7     | 79.6  | 82.9  |
| 17  | Min-Shoulder Height Sitting Rest | 63.2±3.5 | 51.0–82.5     | 59.7        | 61.1  | 63.0     | 64.6  | 67.5  |
| 18  | Shoulder (Acromion) Height Sitting Rest | 60.6±3.6 | 40.5–69.9     | 57.0        | 59.0  | 60.6     | 62.0  | 65.2  |
| 19  | Knee Height Sitting Rest       | 54.5±3.3  | 41.5–64.6      | 50.0        | 53.0  | 54.3     | 56.0  | 59.0  |
| 20  | Popliteal Height Sitting Rest  | 42.4±2.4  | 31.0–55.5      | 39.0        | 41.0  | 42.3     | 43.8  | 46.0  |
| 21  | Elbow Height Sitting           | 25.5±3.1  | 21.5–42.7      | 22.5        | 24.0  | 25.5     | 26.7  | 19.0  |
| 22  | Functional Leg Length          | 105.1±6.9 | 83.0–153.5     | 95.9        | 101.0 | 104.3    | 408.5 | 118.0 |
| 23  | Acromion to Right Wrist Height | 71.7±7.6  | 49.0–95.9      | 61.0        | 65.4  | 70.9     | 78.2  | 84.0  |
| 24  | Hip Length                     | 33.2±2.7  | 20.0–64.0      | 29.3        | 32.0  | 33.2     | 34.6  | 37.1  |
The most important parameters studied were standing posture, sitting posture, and breadth and depths of different parts of the body. Appropriate instructions and guidelines for measurement teams were provided. Measurement teams were first instructed about the way they should work; they were familiarized with all landmarks (Fig 1) that

| No. | Parameter                      | Mean±SD   | Range        | Percentile |
|-----|--------------------------------|-----------|--------------|------------|
|     |                                |           |              | 5th   | 25th | 50th | 75th | 95th |
| 25  | Chest Length                   | 27.9±3.1  | 16.2–52.1    | 23.3   | 25.9 | 27.8 | 29.9 | 33.3 |
| 26  | Chest Depth                    | 21.4±2.7  | 11.0–42.3    | 17.2   | 20.0 | 21.3 | 22.7 | 25.7 |
| 27  | Arm Reach Forehead             | 76.7±4.5  | 47.2–99.0    | 70.3   | 73.8 | 76.4 | 79.0 | 85.0 |
| 28  | Shoulder Elbow Length          | 36.6±2.5  | 23.7–49.2    | 32.4   | 35.3 | 36.8 | 38.3 | 40.4 |
| 29  | Forearm Hand Length            | 46.5±2.9  | 26.0–59.0    | 42.6   | 45.0 | 46.6 | 48.1 | 50.8 |
| 30  | Shoulder Length                | 43.6±3.2  | 30.2–59.0    | 38.9   | 41.6 | 43.5 | 45.6 | 49.4 |
| 31  | Elbow to Elbow Length          | 41.2±5.0  | 22.2–59.8    | 34.2   | 37.8 | 40.8 | 44.1 | 50.6 |
| 32  | Hip Breadth Sitting Rest       | 35.5±3.2  | 20.3–66.7    | 31.1   | 33.7 | 35.3 | 37.3 | 40.5 |
| 33  | Elbow to Elbow Length          | 46.4±4.9  | 21.1–61.8    | 39.0   | 43.2 | 46.1 | 49.4 | 55.0 |
| 34  | Buttock-Knee Length            | 57.2±3.4  | 25.1–69.5    | 52.1   | 55.8 | 57.4 | 59.3 | 61.7 |
| 35  | Buttock-Popliteal Length       | 45.5±3.1  | 36.7–58.3    | 40.6   | 43.6 | 45.5 | 47.5 | 50.6 |
| 36  | Depth Abdominal                | 20.9±4.0  | 13.4–48.0    | 16.0   | 18.5 | 20.2 | 22.8 | 28.8 |
| 37  | Depth Thigh Sitting Rest       | 13.9±2.0  | 9.9–25.5     | 10.9   | 12.6 | 13.8 | 15.2 | 17.9 |
| 38  | Elbow Height Sitting Rest      | 25.7±3.5  | 15.4–57.5    | 20.2   | 23.5 | 25.7 | 27.8 | 31.2 |
| 39  | Back Waist Length              | 50.0±3.9  | 36.8–64.0    | 43.5   | 48.0 | 50.0 | 52.0 | 57.0 |
| 40  | Shoulder Length                | 16.3±2.5  | 9.5–25.0     | 12.1   | 14.1 | 17.0 | 18.0 | 20.0 |
| 41  | Armpit to Armpit Back          | 42.1±4.8  | 26.0–63.1    | 32.4   | 39.5 | 42.4 | 45.2 | 49.0 |
| 42  | Back Chest Length              | 57.3±7.8  | 30.0–74.1    | 35.5   | 55.6 | 59.0 | 62.0 | 66.2 |
| 43  | Hand Armpit to Wrist           | 49.0±4.8  | 30.5–71.3    | 42.4   | 46.3 | 49.0 | 51.0 | 55.7 |
| 44  | Spine to Wrist (Hand Forward)  | 85.9±5.8  | 56.8–100.6   | 77.5   | 83.0 | 86.5 | 89.5 | 93.3 |

weight and 89 more parameters. The most important parameters studied were standing posture, sitting posture, and breadth and depths of different parts of the body.
Table 2: Hands, legs, head, and body surface sizes of the studied participants. The unit of measurement is cm. For numbers in the first column, see Figure 1.

| No. | Parameter                        | Mean±SD | Range     | Percentile |
|-----|----------------------------------|---------|-----------|------------|
| 45  | Head Circumference               | 55.7±2.8| 32.0–76.4 | 53.0 55.0 56.0 57.0 59.0 |
| 46  | Neck Circumference               | 36.3±2.8| 22.5–57.4 | 32.7 34.5 36.0 37.8 42.0 |
| 47  | Shoulder Circumference            | 114.9±7.5| 85.0–146.4| 103.9 110.0 114.2 119.0 129.0 |
| 48  | Chest Circumference               | 93.6±7.4| 53.0–125.0| 83.9 89.0 93.0 97.7 108.0 |
| 49  | Waist Circumference               | 83.8±9.2| 55.2–128.3| 71.0 78.0 82.0 89.0 101.0 |
| 50  | Hip Circumference                 | 97.2±6.5| 69.0–126.5| 88.0 93.0 96.5 100.8 109.7 |
| 51  | Vertical Trunk Circumference      | 171.9±9.3| 147.0–230.0| 157.0 166.0 171.5 177.5 188.0 |
| 52  | Armpit Circumference              | 64.5±5.3| 21.6–63.0 | 38.4 43.0 46.6 50.0 55.5 |
| 53  | Upper Arm Circumference Relaxed   | 29.6±3.2| 20.5–49.0 | 25.0 27.5 29.0 31.0 36.0 |
| 54  | Biceps Circumference Relaxed      | 32.5±3.2| 21.0–44.5 | 28.0 30.2 32.0 34.4 38.3 |
| 55  | Forearm Circumference Relaxed     | 28.2±3.1| 20.6–41.5 | 24.0 26.0 27.9 30.0 34.3 |
| 56  | Wrist Circumference               | 17.5±1.5| 14.0–28.5 | 15.8 16.8 17.5 18.0 19.4 |
| 57  | Hand Circumference                | 21.7±1.6| 16.0–38.0 | 19.5 21.0 21.8 22.6 24.0 |
| 58  | Crotch Thigh Circumference        | 55.0±6.8| 40.0–99.0 | 46.0 50.5 54.0 58.3 66.6 |
| 59  | Lower Thigh Circumference         | 41.7±4.2| 28.5–59.0 | 36.0 39.0 41.0 44.1 49.1 |
| 60  | Calf Circumference                | 36.8±3.1| 22.0–48.4 | 32.0 35.0 37.0 39.0 42.0 |
| 61  | Ankle Circumference               | 26.1±2.2| 20.0–38.6 | 23.0 25.0 26.0 27.1 29.5 |
| 62  | Hand Length                       | 19.2±1.0| 14.7–29.9 | 17.7 17.6 19.3 19.9 20.8 |
| 63  | Palm Length                       | 11.0±0.8| 8.9–18.2  | 10.0 10.5 11.0 11.4 12.3 |
| 64  | Hand Breath                       | 8.4±0.6 | 6.6–10.9  | 7.5 8.1 8.5 8.8 9.3  |
| 65  | Wrist Depth                       | 2.8±0.4 | 2.0–5.7   | 2.3 2.6 2.8 3.0 3.6  |
| 66  | Hand Breath Open Thump            | 10.2±0.8| 6.3–15.6  | 9.0 9.8 10.2 10.6 11.3 |
| 67  | Ear Top Head Height               | 11.1±1.1| 6.3–18.8  | 9.3 10.4 11.1 11.9 13.0 |
| 68  | Head Length                       | 19.1±1.4| 12.0–30.8 | 16.9 18.5 19.2 19.8 20.6 |
Continued

Table 2: Hands, legs, head, and body surface sizes of the studied participants. The unit of measurement is cm. For numbers in the first column, see Figure 1.

| No. | Parameter                              | Mean±SD   | Range     | 5th | 25th | 50th | 75th | 95th |
|-----|----------------------------------------|-----------|-----------|-----|------|------|------|------|
| 69  | Maximum Head Height                    | 22.3±2.1  | 12.9–37.0 | 19.6| 21.0 | 22.0 | 23.7 | 26.0 |
| 70  | Head Breadth                           | 15.3±1.1  | 10.6–27.1 | 13.6| 14.9 | 15.4 | 15.8 | 16.7 |
| 71  | Head Length Maximum                    | 22.2±1.5  | 16.2–34.3 | 20.0| 21.5 | 22.2 | 23.0 | 24.2 |
| 72  | Face Breadth                           | 11.3±1.3  | 6.8–21.0  | 9.0 | 10.7 | 11.4 | 12.1 | 13.3 |
| 73  | Ear to Ear Length                      | 14.5±1.3  | 10.2–22.8 | 13.0| 13.8 | 14.4 | 15.1 | 16.5 |
| 74  | Face Height (Eyes to Haggle)           | 13.1±1.2  | 10.0–22.0 | 11.5| 12.5 | 13.0 | 13.7 | 14.8 |
| 75  | Inter Pupillary Distance               | 5.5±0.5   | 2.9–7.6   | 4.7 | 5.2  | 5.6  | 5.9  | 6.2  |
| 76  | Foot Length                            | 25.8±1.7  | 18.8–39.2 | 23.6| 24.9 | 25.8 | 26.7 | 28.0 |
| 77  | Instep Length                          | 18.5±2.9  | 7.3–26.0  | 10.0| 18.3 | 19.2 | 20.0 | 21.3 |
| 78  | Foot Breadth                           | 9.7±0.8   | 6.5–13.9  | 8.4 | 9.4  | 9.8  | 10.2 | 10.9 |
| 79  | Heel Breadth                           | 6.3±0.6   | 4.3–9.8   | 5.4 | 6.0  | 6.4  | 6.7  | 7.4  |
| 80  | Ball of Foot Circumference             | 26.0±1.8  | 20.5–38.5 | 23.5| 25.0 | 26.0 | 27.0 | 28.5 |
| 81  | Instep Circumference                   | 25.6±1.7  | 21.0–48.0 | 23.0| 24.5 | 25.5 | 26.5 | 28.2 |
| 82  | Heel-Ankle Circumference               | 33.5±2.0  | 20.1–46.4 | 31.0| 32.5 | 33.8 | 35.0 | 36.8 |
| 83  | Head Height (Eyes to Vertex)           | 5.7±1.0   | 3.5–9.2   | 4.1 | 5.0  | 5.7  | 6.3  | 7.5  |
| 84  | Right Ear Height                       | 6.1±0.5   | 3.0–9.3   | 5.3 | 5.8  | 6.1  | 6.4  | 6.9  |
| 85  | Right Ear Width                        | 3.4±0.4   | 1.9–8.2   | 2.9 | 3.2  | 3.5  | 3.7  | 4.1  |
| 86  | Nose Width                             | 3.6±0.4   | 2.2–6.7   | 3.0 | 3.4  | 3.6  | 3.9  | 4.3  |
| 87  | Nose Height                            | 5.6±0.5   | 3.0–8.6   | 4.8 | 5.4  | 5.7  | 6.0  | 6.4  |
| 88  | Index Finger Length                    | 8.8±1.3   | 5.8–12.5  | 6.8 | 7.5  | 9.0  | 10.0 | 10.9 |
| 89  | Index Finger Depth                     | 1.9±0.1   | 1.0–3.8   | 1.7 | 1.9  | 2.0  | 2.0  | 2.2  |
| 90  | Weight (kg)                            | 70.0±9.0  | 45.0–123.0| 57.0| 64.0 | 70.0 | 76.0 | 92.0 |
Anthropometric Characteristics of Iranian Military Personnel

The team became fully proficient in working with stadiometer and practicing the anthropometric methods. The accuracy and reliability of anthropometric data are related to method of measurement, standardization of tools and characteristics of population. The stadiometer was calibrated after each replacement; all calipers were used according to the recommended method by Osquei-Zadeh. An expert in anthropometry supervised each site before starting data collection. The coefficient of reliability of parameters calculated was above 95% for all measurements.

The collected data was analyzed by SPSS® for Windows® ver 17. Student’s t test for independent variables was used to compare the means between two groups. A p value <0.05 was considered statistically significant.

**Result**

Table 1 shows a number of statistics for the standing and sitting height of the studied participants. Measures of hands, legs, head, and body surfaces are presented in Table 2.

**Discussion**

The studied military personnel had a mean±SD stature of 174.1±6.3 cm; the mean±SD sitting height was 89.7±3.8 cm. In comparison with measurements of Henry who recorded Iranians’ anthropometric data in 1934, the mean height of 20–30-year-old Iranians has increased by 8.6 cm (Table 3). The mean stature of Iranian soldiers was 172.7 cm in the study conducted by Pourtaghi and Salem in 1995; this reflects a 1.4 cm increase in the stature over the past 15 years.

In a study on Iranian male students, their stature was found to be 174.2 cm, that was similar to our findings. The mean stature found by Habibi, et al, was 174.9 cm—0.7 cm more than what we found. However, because they studied only the Isfahani male students (in central Iran), their findings could not be generalized to all Iranian students. Osquei-Zadeh reported a stature of 166.9 cm for students; this value was different from that found by Mirmohammadi and Habibi, most likely because the data for males and females were combined.

Body dimensions of Iranian soldiers

**Table 3:** Comparison of various parameters measured in Iranian soldiers in various studies. Figures represent mean±SD in cm.

| Study               | Year | Stature | Sitting Height | Weight |
|---------------------|------|---------|----------------|--------|
| Present study       | 2010 | 174.1±6.3| 89.7±3.8       | 70.0±9.0|
| Pourtaghi and Salem | 1995 | 172.7±5.9| 89.2±3.6       | 67.0±9.3|
| Noorani and Hendrix | 1970 | 166.6±7.4| 87.7±3.3       | 61.3±7.4|
| Henry Field         | 1934 | 165.5±66.3| 84.0±3.5       | —      |
were generally 2–4 cm lesser than those of the Western countries and 3–4 cm more than those of East Asian nations (Tables 3 and 4).

To determine the difference in sitting and elbow height among Eastern and Western countries, the sitting height to stature ratio and elbow height or leg length to stature ratio were compared (Table 4); the elbow height to stature is 48% in the US, Australia, and the UK (Table 4), while it is 46% in China, Japan, Korea, and Taiwan,\(^24\) that reflects the elbow height to stature ratio is lower in Eastern countries compared to the Western nations; this means that European people's legs have grown more than their body—in other words, the higher height of Europeans compared to the Eastern people is attributed to their legs rather than their body.

In the current study, the mean weight was 70.0 kg, the mean body mass index (BMI) was 23.3 kg/m\(^2\)—11.5% of participants had a BMI >25 kg/m\(^2\). All these reflect the increasing trend of BMI over years. The prevalence of overweight people is less than that reported in the US army, which was 13%.\(^5\)

Now that we have the anthropometric dimensions of Iranian military personnel, we can design ergonomic military tools and equipment for them, however, since the dimensions are constantly changing, we need to conduct national anthropometric examinations every ten years. Given the increasing trend of BMI in the studied participants, it is also suggested to establish weight control and body fit programs for the Iranian defense personnel.

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**Table 4:** Comparison of Iranian soldiers stature, sitting height, and elbow height with some other populations. All measurements belong to the past 15 years. Also, the leg (lower limb) length was calculated by the researcher through estimating the sitting height from stature.

|                | Stature | Sitting Height | Upper Limb/Stature | Lower Limb/Stature |
|----------------|---------|----------------|-------------------|--------------------|
| US Army        | 175.6   | 91.4           | 0.521             | 0.479              |
| Australian Army| 178.5   | 93.2           | 0.522             | 0.478              |
| UK Army        | 177.4   | 90.5           | 0.510             | 0.490              |
| Iranian Army   | 174.1   | 89.7           | 0.515             | 0.475              |
| Chinese Males  | 167.8   | 90.8           | 0.541             | 0.459              |
| Japanese Males | 169.0   | 90.9           | 0.538             | 0.462              |
| Taiwanese Males| 169.9   | 90.7           | 0.534             | 0.465              |
| Korean Males   | 170.7   | 92.1           | 0.540             | 0.460              |
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