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A STUDY ON DETERMINATION OF ANTHROPOMETRIC DATA BETWEEN YOUTHS AGE 15-29 WITHIN THE SCOPE OF OHS[1]

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Abstract

In Türkiye one-third of its employed population are composed of female and male young people aged 15-29 and according to the 2019 occupational accident data, 41% of the accidents occurred by young people aged 15-29. Therefore, an anthropometric data was wanted to be determined by making a study especially on the young population. In this study, a questionnaire including basic information was applied to the Turkish young population and their photographs were taken to determine their anthropometric data. A platform was created for photographing and on this platform, 394 randomly selected people were photographed standing up to reveal their postures. The obtained photos were transferred to a drawing software, individual measurements were made for each person, and an analysis showing some statistical parameters such as correlation and percentile were performed. The study shows that the change differs depending on age range of males and females. Healthy and safe working environments to be created with the anthropometric data obtained will reduce occupational accidents in the future. Furthermore, it will also contribute to the design of personal protective equipment in terms of occupational safety and design of office products as desk and chair to be used in the office conveniently for employees.

Keywords ***:*** *Anthropometric Measurements, Ergonomy, Occupational Health and Safety, Vitruvian Man.*

Jel Classification ***:*** *J28.*

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İŞ SAĞLIĞI VE GÜVENLİĞİ KAPSAMINDA 15-29 YAŞ ARALIĞINDAKİ GENÇ KİŞİLERİN ANTROPOMETRİK VERİLERİNİN İNCELENMESİ ÜZERİNE BİR ARAŞTIRMA

Öz

Türkiye'de istihdam edilen nüfusun üçte biri 15-29 yaş arası kadın ve erkek gençlerden oluşmakta olup, 2019 iş kazası verilerine göre de kazaların % 41'ine 15-29 yaş arası gençler maruz kalmıştır. Bu nedenle, özellikle genç nüfus üzerinde bir çalışma yapılarak antropometrik verilerin belirlenmesi istenmiştir. Bunların ışığında, uygun kişisel koruyucu donanım ve ekipman kullanılarak bu kaza sayılarının azaltılabileceği düşünülmektedir. Bu çalışmada, Türk genç nüfusuna yaş, cinsiyet ve doğum yeri gibi temel bilgileri içeren bir anket uygulanmış ve antropometrik verilerini belirlemek için fotoğrafları alınmıştır. Fotoğraf çekmek için bir platform oluşturulmuş ve bu platformda rastgele seçilen 394 kişi duruşlarını ortaya çıkarmak için ayakta fotoğraflanmıştır. Elde edilen fotoğraflar bir çizim yazılımına aktarılmış, her bir kişi için ayrı ayrı ölçümler yapılmış ve korelasyon, ortalama ve yüzdelik gibi bazı istatistiksel parametreleri gösteren bir analiz gerçekleştirilmiştir. Çalışma, değişimin erkek ve kadınların yaş aralığına bağlı olarak değiştiğini göstermektedir. Elde edilen antropometrik verilerle oluşturulacak sağlıklı ve güvenli çalışma ortamları gelecekte iş kazalarını azaltacaktır. Ayrıca iş güvenliği için kişisel koruyucu donanım, iş kıyafeti üretimi ve ofis ürünlerinde çalışanların rahatça kullanabileceği masa ve sandalye olarak kişisel koruyucu ekipman tasarımına da katkıda bulunacaktır.

Anahtar Kelimeler ***:*** *Antropometrik Ölçümler, Ergonomi, İş Sağlığı ve Güvenliği, Vitruvius Adamı.*

Jel Sınıflandırılması ***:*** *J28.*

INTRODUCTION

Lifestyle and genetic characteristics of every community are different from each other. For this reason, different cultures have emerged in terms of food, clothing and sheltering. This difference has made every society open to specific developments and societies have been able to continue the struggle for life easily by producing what is convenient for them.

Anthropometry, which carries an ergonomic value, stands out at this point. If the means of struggle of societies are not convenient for the society, how does this affect them? To give a very simple example, people walk on the right side of paths in Türkiye. However, if someone accustomed to this culture goes to a country where traffic flow is on the left, the probability of having a traffic accident will increase.

In fact, ergonomics integrates these elements without differentiating from the cultural characteristics of individuals and helps to organize the working environment and the daily lives of individuals in a way to enable the most productive result and not to exhaust individuals. From this point of view, it is possible to define ergonomics scientifically as follows: *"Ergonomics is the scientific discipline related to the understanding of interactions among individuals and other elements of a system, and the profession that applies theories, principles, data and methods in order to optimize well-being of individuals and overall system performance"* (Kurban, Kaygın, Tankut, 2016: 2). Anthropometry can be defined as follows: *"Anthropometry is the science of measurement and art of application that determines the physical geometry, mass characteristics and strength characteristics of the human body"* (Del Prado-Lu, 2007: 497). With its most understandable definition, anthropometry is *"the studies related to body dimensions, i.e. body size, shape, strength and working capacity for design objectives and body composition"* (Dawal, Zadry, Syed-Azmi, Rohim, Sartika, 2012: 461; Majumder, 2014: 54; Shiru & Abubakar, 2012: 132; Taifa & Darshak, 2016: 232).

As a matter of fact, as it can also be understood from the definitions, if human body dimensions are known, we also know their physical capacities, and this information helps to accurately determine the design dimension of any product and ensures that everything used in every part of our lives is convenient for the human dimension. For instance, it is very important to know these data in the production of many products such as clothes, beds, controllers and toothbrushes.

When the literature is examined, it is seen that there are many studies conducted on the determination of anthropometric data. Although these studies have been carried out sometimes in the field of sports, sometimes in the field of health and sometimes for the groups with certain characteristics, the aim of all these studies is to create the most comfortable living space for people.

The design of ergonomic chair, which was finalized by Kahya & Arapoğlu (2010: 37), is among the anthropometric studies conducted in Türkiye. In this study, a chair was designed to ensure that the employees using workbench could sit comfortably in accordance with their body sizes. In order to perform this design, knee, hip, shoulder elbow sizes of the employees were determined. Anthropometry set, a table closed on one side (Holtain sitting height measurement table device), a chair with flattened base and back and tape measure were used as the measurement equipment (Kahya & Arapoğlu, 2010).

In 2001, another study was conducted by Mokdad (2002: 332) on Algerian farmers to determine the anthropometric data. Compass, dynamometer, weighing device and stool were used for the measurements. In this study, it was determined that the obtained data affected each other (Mokdad, 2002).

Another study was carried out by Alojado, Benette, Klarissa, & Paco (2015: 1813) in the study carried out in the Philippines, a chair was designed to provide a solution for health complaints of the individuals working as manicurist and pedicurist resulting from posture disorders. In order to design the chair, a questionnaire was conducted, and body sizes of the individuals were determined through measurement (Alojado et al., 2015: 1813).

Another anthropometric study was carried out in Türkiye to determine the body sizes of 100 male volleyball players whose ages varied between 14-18. The weights of the volleyball players were determined, and the parts used actively by the players such as shoulder, upper extremity, forearm and arm circumference were measured (Baş, Yakup, Oğuz, Songur Üçok, Mollaoğlu, & Toktaş, 2006: 45).

In the study conducted by Yılmaz, Akın, Aydın, & Büyükmumcu (2013: 1) in 2013, it was aimed to determine the anthropometric body measurements of medical students. In this study, it was determined that there is an increase in height with age and, in parallel, the sitting height regulation.

In another study conducted by Ozkocak and Ozdemir (2018: 78), the aim was to determine the periocular anthropometric measurements of young adults, adults, and elderly Anatolian men. 300 men participated in the study, and the photographs which were taken to determine the measurements of the participants were measured using the Image J program.

The aim of the strudy titled Relationship of the Anthropometric Reference Values and Ergonomics of Individuals aged 65+ conducted by Başıbüyük, Özdemir-Güler, Kılıç, and Ay (2021: 119) between 2016-2017 was to determine the anthropometric data that will be the source of the right designs in order to increase the quality of life of individuals aged 65 and over. For this purpose, the study was done with 2721 people.

The lengths of the upper and lower extremity bones of the Turkish society were determined by the measurements taken from the dry bones sent to the Forensic Medicine Institute, by Günay, Özden, and Çetin (2001: 3–4) between 1997 and 1998.

In the research carried out by Ahmet Fahrı Ozok and his friend in 1981, 1000 male industrial workers participated in the study and the largest, smallest, mean, and standard deviation values, coefficient of variation, and distribution frequencies in certain intervals were found (Kaya & Ozok, 2017: 313).

Lastly, the goal of the study by Kahya, Ünlüer, Güzeldal and Demirci, (2018: 59) was to ascertain the suitability of 3 benches used for educational purposes in the Industrial Engineering Department of a university with the anthropometric measurements of the students. 46 women and 35 men participated in the study, and Holtain Anthropometer, anthropometer set, tape measure, and laser meter were used to take the measurements. As a result of the research, it has been ascertained that the seat depth is very low, the backrest height is short and the table height is low in the existing double benches.

When the scientific studies are examined, it is observed that anthropometric studies have been generally performed for certain groups or professions. In this way, the health and safeties of the individuals representing the groups were tried to be optimized and their performances were improved.

I. MATERIAL AND METHOD

I.I. Subject

Young individuals in the 15-29 age range defined as the young individual age range by the International Labor Organization (ILO, 2017: 12) were included in this study. The reason for the selection of this age group was that the 15-29 age range was specified as "Expected Years in Education and Work (MOLSS, 2021: 36)" in the study titled "National Youth Employment Strategy 2021–2023" published by the Ministry of Labor and Social Security. In addition, within the scope of Article 71 of the Labor Law No. 4857, it has been deemed appropriate to employ children who have reached the age of fourteen and have completed the compulsory primary school age in light jobs that will not prevent their physical, mental, social and moral development and those who continue their education from continuing their education (Labor Law No.4857, 2013: 8446). 394 individuals voluntarily participated in the measurements. 394 people who participated in the study were born in different provinces in Türkiye and consisted of people who continue their lives in Türkiye. People born abroad were not included in the research. The reason for choosing 394 people is so that the research can be generalizable to Türkiye. In order to achieve a generalizable result, the total number of people between the ages of 15-29 in Türkiye in 2018 was determined. According to the population information of TUIK in 2018, there are a total of 19.247.865 people between the ages of 15-29 (TUIK, 2022). The sample size to express the universe size is in accordance with the table expressed by Lorcu (2015: 18) and shows that the research is generalizable.

The measurements were performed in a way to reveal 16 data while the subjects were in standing position. Before starting the measurements, literature review was performed and, in this direction, it was aimed to reveal the body measurements of today's individuals in accordance with the Perfect Human model. The measurement points of the individuals whose data are determined by photographing are shown in Table 1 and Figure 1.

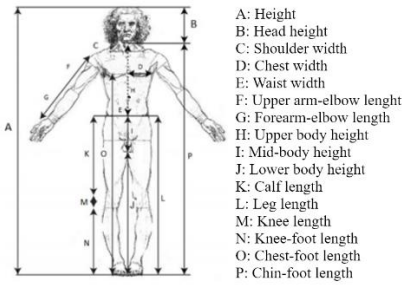

Figure 1. Vitruvian Man and Measuring Points.
(Panero & Zelnik, 1996: 16)

I.II. Equipment

This is the design-based preparation stage. It consists of two sections which are background image design and platform design.

Background image design: The background necessary for more accurate measurements was designed. In the background design, attention was paid to the color tones for clear reading of the data.

Platform design: A portable platform, that would enable the background image design to be made to stand upright on the measurement area and had a fast assembly/disassembly feature when necessary, was designed.

Determination of Settings: After the background and platform design, these two materials were brought together.

Determination of Camera-Platform Distance: For this purpose, based on the lens focus of the camera, it was ensured that only the background remained in the photo to be taken. In this way, it will be ensured that the images in all photos to be taken will be static.

Determination of camera height: In addition to the horizontal distance between the platform and the camera, the height of the camera from the ground needs to be static. The determination of the tripod height to be used for this purpose was performed.

Determination of camera settings: In order to avoid photographing with various camera settings, a common setting was determined for all images within the scope of test shootings and setting-determination procedure and this setting was used during the study.

I.III. Pilot Study

This study was approved by the Ethics Commission with the decision of the Istanbul Aydın University meeting dated 30.01.2018 and numbered 2018/05. The photos were taken with the camera in a standing position in front of the platform and in accordance with the predetermined settings. The accuracy of the shots was checked by one-to-one measurements on 50 people. Thus, it has been observed that all shooting errors were eliminated after the measurements were transferred to the drawing program on a computer. The measurement-specific scale value calculation in line with the examinations made on the picture of each person to be measured also explains this situation.

I.IV. Data Collection

The determined measurement points were photographed by spreading arms while the individuals were in standing position as shown in Fig. 2.

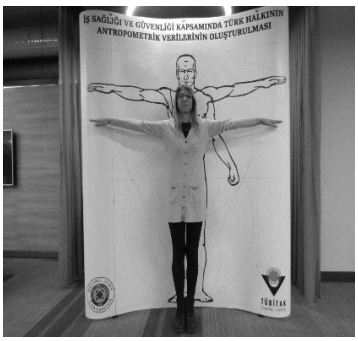

Figure 2. Data Collection Method (Standing).

II. EXPERIMENTAL RESULTS

In order to ensure the accuracy of the data, each measurement point and the distance corresponding to the measurement point were stored with Microsoft Excel software. In the light of the revealed data, the analyses of the anthropometric measurements were performed with SPSS Version 20.0 program. Descriptive and inferential statistics were used in these analyses.

Table 2 shows the male and female age distribution by age groups. Measurements of 394 people are taken; 58.9% of these people are men and 41.1% are women.

Table 2. Age Range by Gender.

	Male		Female		Total	
	n	**%**	**n**	**%**	**n**	**%**
15-19	52	39.3%	40	24.7%	92	23.4%
20-24	171	73.7%	117	72.2%	288	73.1%
25-29	9	3.9%	5	3.1%	14	3.6%
Total	232	58.9%	162	41.1%	394	100.0%

Table 3 and Table 4 show the minimum, maximum, 5% and 95% percentiles, mean and standard deviation (SD) values. Table 3 and Table 4 show body size information of females and males, respectively.

When the anthropometric dimensions of females are examined, it is seen that the mean height is 16.11 ± 5.7. The mean head dimensions were determined as 24.4 ± 1.8, the mean shoulder dimensions 13.8 ± 1.8, the mean breast 33.8 ± 4.7, the mean waist 33.6 ± 3.6, the mean upper arm and elbow length 20.4 ± 2.2, the mean elbow-forearm length 23.8 ± 2.2, the mean upper body 55.4 ± 4.2, the mean mid-body 15.3 ± 2.3, the mean lower body 67.9 ± 5.0, the mean calf length 36.8 ± 5.0, the mean leg length 83.2 ± 6.0, the mean knee length 12.9 ± 2.0, the mean length between knee and foot 33.6 ± 3.2, the mean length between chest and foot 118.1 ± 5.6 and finally the mean length between chin and foot 138.7 ± 5.6.

Table 3. Descriptive Statistics for Measured Anthropometric Dimensions (cm) for Females.

Code	Dimensions	Min.	Max.	Percentile		Mean	SD
				%5	%95		
A	Height	149.0	176.0	153.2	172.0	163.1	5.7
B	Head height	20.3	29.6	21.7	27.8	24.4	1.8
C	Shoulder width	9.9	20.0	11.9	17.3	13.8	1.8
D	Chest width	13.6	46.4	27.1	42.4	33.8	4.7
E	Waist width	26.9	44.9	27.9	40.4	33.6	3.6
F	Upper arm-elbow length	15.4	27.8	17.0	24.7	20.4	2.2
G	Forearm-elbow length	17.6	31.6	20.7	27.9	23.8	2.2
H	Upper body height	38.1	64.5	49.0	62.0	55.4	4.2
I	Mid-body height	11.9	25.7	12.3	19.9	15.3	2.3
J	Lower body height	55.1	79.1	59.6	77.3	67.9	5.0
K	Calf length	24.2	53.4	26.5	44.8	36.8	5.0
L	Leg length	69.5	102.6	72.5	92.5	83.2	6.0
M	Knee length	9.5	25.2	10.8	15.8	12.9	2.0
N	Knee-foot length	23.5	42.1	28.1	39.1	33.6	3.2
O	Chest-foot length	100.5	134.8	108.8	127.1	118.1	5.6
P	Chin-foot length	123.1	150.7	129.2	147.4	138.7	5.6

When the anthropometric dimensions of males are examined, it will be accurate to examine the values between the part of 95% at the most and the part of 5% at the least accepted in the literature (Kahraman, 2013: 13). When these values are examined, it is seen that the mean height of males is 177.0 ± 6.6. The mean head dimensions were determined as 26.0 ±1.9, the mean shoulder dimensions 15.6 ± 2.1, the mean breast 37.1± 5.1, the mean waist 36.0 ± 3.0, the mean upper arm and elbow length 23.0 ±2.4, the mean elbow-forearm length 25.8 ± 2.4, the mean upper body 61.9± 4.2, the mean mid-body 17.2 ± 2.3, the mean lower body 71.9 ± 4.9, the mean calf length 41.2 ± 4.8, the mean leg length 89.4 ± 6.0, the mean knee length 13.2 ± 1.5, the mean length between knee and foot 35.0 ± 3.2, the mean length between chest and foot 129.4 ± 6.0 and finally the mean length between chin and foot 151.1 ± 6.4.

Since the measurements showed normal distribution, the relationship between the data was analyzed with Pearson correlation. Pearson correlation coefficient obtains values in the range of (-1:1). When the absolute value of the coefficient approaches 1, it indicates that the relationship is strong, when it approaches 0, the relationship is weak; negative sign shows that while a variable increases, the other decreases and positive sign shows that while a variable increases, the other decreases (Lorcu, 2015: 231). It was tried to be revealed whether body measurements increased or decreased in the same direction with this analysis.

First of all, the correlation coefficients in females' body sizes were shown in Table 5. The body sizes with the positive relationship in females were determined between the leg and lower body with 0.836 ($p<0.01$). The strongest negative relationship is seen between the upper body and lower body, calf and leg with $p<0.05$. This shows us that when the upper body dimensions increase, the lower body, calf and leg dimensions decrease and vice versa.

Table 4. Descriptive Statistics for Measured Anthropometric Dimensions (cm) for Males.

Code	Dimensions	Min.	Max.	Percentile		Mean	SD
				%5	%95		
A	Height	150.0	195.0	167.0	188.0	177.0	6.6
B	Head height	20.7	30.8	22.9	29.0	26.0	1.9
C	Shoulder width	11.0	27.4	12.5	19.3	15.6	2.2
D	Chest width	15.5	49.1	30.0	43.5	37.1	5.1
E	Waist width	28.9	47.3	31.3	41.8	36.0	3.0
F	Upper arm-elbow length	16.4	31.3	19.0	27.5	23.0	2.4
G	Forearm-elbow length	13.8	34.1	22.1	29.3	25.8	2.4
H	Upper body height	47.9	72.5	55.6	69.5	61.9	4.2
I	Mid-body height	13.0	25.7	13.8	21.6	17.2	2.3
J	Lower body height	58.3	84.6	64.0	80.1	71.9	4.9
K	Calf length	30.0	61.0	34.3	51.1	41.2	4.8
L	Leg length	73.4	110.7	80.4	100.0	89.4	6.0
M	Knee length	9.9	21.8	10.9	15.8	13.2	1.5
N	Knee-foot length	26.5	43.6	29.6	39.9	35.0	3.2
O	Chest-foot length	108.1	146.2	120.2	140.2	129.4	6.0
P	Chin-foot length	123.7	166.2	140.8	161.7	151.1	6.4

Table 5. Correlation Coefficients Between Dimensions for Females

Code	Dimensions	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A	Height	1.000															
B	Head height	0.243**	1.000														
C	Shoulder width	0.269**	-0.068	1.000													
D	Chest width	0.174*	0.148	0.516**	1.000												
E	Waist width	0.323**	0.249**	0.407**	0.643**	1.000											
F	Upper arm-elbow length	0.383**	0.109	0.179*	0.176*	0.187*	1.000										
G	Forearm-elbow length	0.395**	0.246**	-0.077	-0.064	0.173*	0.276**	1.000									
H	Upper body height	0.294**	0.136	0.005	0.050	0.001	0.095	-0.044	1.000								
I	Mid-body height	0.436**	0.020	0.285**	0.226**	0.380**	0.275**	0.252**	-0.262**	1.000							
J	Lower body height	0.612**	-0.198*	0.195*	0.002	0.108	0.196*	0.287**	-0.422**	0.253**	1.000						
K	Calf length	0.510**	-0.025	0.381**	0.229**	0.322**	0.357**	0.204**	-0.398**	0.636**	0.630**	1.000					
L	Leg length	0.607**	-0.156*	0.257**	0.128	0.227**	0.250**	0.281**	-0.423**	0.573**	0.836**	0.752**	1.000				
M	Knee length	0.069	-0.136	-0.065	-0.167*	-0.087	-0.049	0.105	-0.087	0.121	0.144	-0.042	0.370**	1.000			
N	Knee-foot length	0.287**	-0.170*	-0.080	-0.014	-0.027	-0.065	0.139	-0.110	-0.009	0.481**	-0.145	0.455**	0.135	1.000		
O	Chest-foot length	0.805**	-0.006	0.098	0.053	0.133	0.319**	0.341**	0.044	0.368**	0.715**	0.487**	0.650**	0.060	0.412**	1.000	
P	Chin-foot length	0.950**	-0.071	0.298**	0.132	0.253**	0.359**	0.327**	0.259**	0.442**	0.692**	0.532**	0.674**	0.115	0.350**	0.829**	1.000

Not: (N = 162) [: p < 0.01; *: p < 0.05]**

Table 6. Correlation Coefficients Between Dimensions for Males

Code	Dimensions	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A	Height	1.000															
B	Head height	0.229**	1.000														
C	Shoulder width	0.320**	-0.015	1.000													
D	Chest width	0.263**	0.131*	0.197**	1.000												
E	Waist width	0.416**	0.175**	0.420**	0.472**	1.000											
F	Upper arm-elbow length	0.411**	0.045	0.220**	-0.176**	0.235**	1.000										
G	Forearm-elbow length	0.455**	0.174**	0.078	0.381**	0.257**	0.380**	1.000									
H	Upper body height	0.515**	0.074	0.172**	0.370**	0.293**	-0.004	0.265**	1.000								
I	Mid-body height	0.313**	0.017	0.212**	-0.080	0.323**	0.380**	0.033	-0.210**	1.000							
J	Lower body height	0.674**	-0.151*	0.192**	0.022	0.092	0.367**	0.303**	-0.103	0.136*	1.000						
K	Calf length	0.487**	-0.180**	0.265**	-0.072	0.271**	0.496**	0.198**	-0.132*	0.603**	0.566**	1.000					
L	Leg length	0.707**	-0.105	0.311**	0.014	0.259**	0.479**	0.313**	-0.064	0.478**	0.835**	0.787**	1.000				
M	Knee length	0.312**	0.098	0.198**	0.127	0.151*	0.055	0.189**	0.036	0.127	0.294**	0.098	0.388**	1.000			
N	Knee-foot length	0.455**	0.022	0.095	0.073	0.012	0.136*	0.203**	0.058	-0.056	0.585**	-0.049	0.523**	0.104	1.000		
O	Chest-foot length	0.860**	0.071	0.239**	0.294**	0.294**	0.295**	0.408**	0.362**	0.227**	0.719**	0.470**	0.738**	0.343**	0.522**	1.000	
P	Chin-foot length	0.958**	-0.059	0.333**	0.231**	0.376**	0.408**	0.415**	0.507**	0.316**	0.735**	0.553**	0.756**	0.291**	0.460**	0.861**	1.000

Not: (N = 232) [: p < 0.01; *: p < 0.05]**

When Table 6 is examined, it is seen that the data with the strongest positive relationship in males are between chin-foot length with 0.958 ($p<0.01$) like in females. Another positive relationship is between the lower body and leg with 0.836 ($p<0.01$). When females and males are compared, there is no significance in terms of negative relationship in males at the level of $p<0.05$ below 0.400. In males, there is no negative relationship like in females between upper body and lower body, calf and leg at the level of $p<0.05$. In males, the strongest negative relationship is between the lower body and mid-body with -0.210 ($p<0.01$). As the upper body dimensions increase, the mid-body dimensions decrease and vice versa.

Another analysis result is the length (Fig. 3), weight (Fig. 4), and waist width (Fig. 5) percentage curves which represent the change in the mean of the anthropometric data according to age groups.

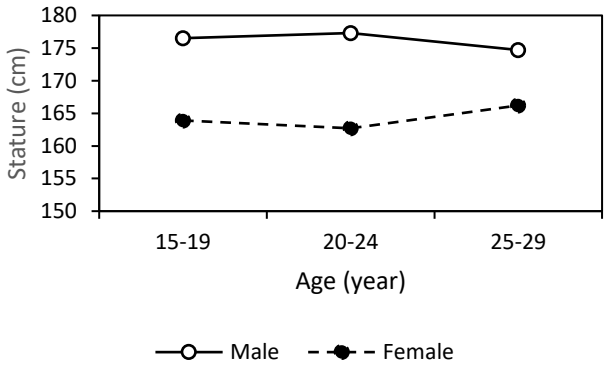

Figure 3. Stature for The Age Groups.

The mean height of females varies in the mean heights. While the mean height in females was found to be in the 20-24 age range, it was seen that the mean height increased as the age range increased. This suggests that the mean height of the new generation is decreasing. It was also determined that males had the maximum height in the 20-24 age range and the mean height decreased as the age range increased.

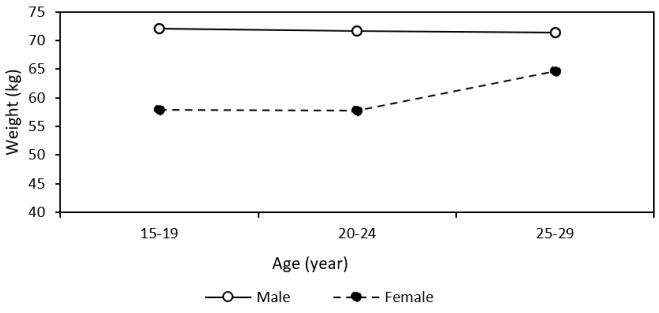

Figure 4. Weight for The Age Groups.

While the mean weight of females is low in the 15-19 age range, it is seen that mean weight increases as age ranges increases. An opposite result was obtained in males. The age range is the highest in 15-19 and decreases as the age range increases. These mean values suggest that females prefer a more sedentary life compared to males.

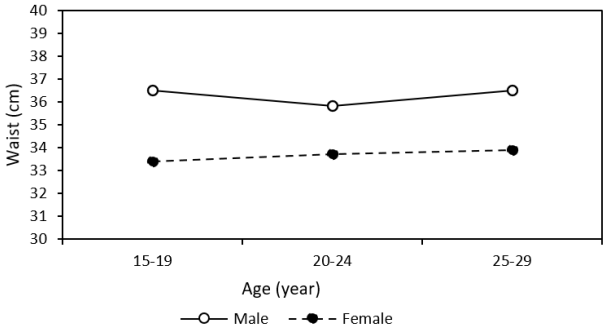

Figure 5. Waist for The Age Groups.

Lastly, when the mean waist width in females and males were examined, it was seen that waist width increased with increasing age in females. While the waist width data were obtained with the lowest rate in the 20-24 age range in males, it was seen that as the age increased, this rate also increased. This suggests that the thickening of the waist circumference is related to eating habits.

II.I. Data Validation

An internal consistency calculation for anthropometric measurements was performed by using the SPSS Version 20.0 statistical package program. Cronbach's Alpha value was found to be 0.843 for females and 0.876 for males. These Cronbach's Alpha values reveal that the collected and analyzed measurements are consistent.

II.II. Limitations of the Research

1. Limited access to data due to the voluntary conduct of the research,

2.. People think that such a study is unnecessary,

3. The similar number of previous studies is not sufficient,

4. Limited time to complete the work.

RESULT AND DISCUSSION

In this study, Turkish young individuals, who are in the 15-29 age range, constitute 22.65% of the population of Türkiye and 26.19% of the employment in 2019 (TSI, 2020). In the study conducted, 16 body points of the subjects were determined, and anthropometric measurements were calculated on these points. The measurements performed as standing and static in the study will be a source for the design studies requiring static body dimensions such as blackboard, machine control panel and laboratory bench to be used by young individuals. In addition, it can be seen from the results that in its simplest form, the heights of males and females are different from each other. Therefore, designs have to differ by gender. Moreover, the study shows that the change differs depending on age range of males and females. This difference is highly significant in terms of occupational health and safety. It is imperative to know the anthropometric dimensions in terms of occupational health and safety in every object we need in order to take the ergonomic precautions, in the design of the workplace, in the production of the materials used. It is true that if the equipments used in the workplaces are produced only for men, women will not be able to use these equipments or they will find some solutions for themselves. As a result, it

is clear that people will be exposed to work accidents or occupational diseases. Important outcomes to be emphasized with this study are as follows:

- The obtained data will help to create an anthropometric database for ergonomic design needs.
- Occupational accidents lay the foundation of the need for creating this database. According to the recently published Türkiye SSI 2019 accident statistics, young individuals in the 15-29 age range (41%) were exposed to 173.501 out of 422.463 accidents (SSI, 2020). Factors such as machines used (SSI, 2020) and improper design of workplace are among the causes of occupational accidents.
- At this point, it is clear that the suitability of machines, equipment and every product used in workplaces to employees will contribute significantly in terms of preventing accidents.
- Healthy and safe working environments to be created with the anthropometric data obtained will increase the work efficiency of the young population and improve their work potentials in the future.
- Furthermore, it will also contribute to the design of personal protective equipment in terms of occupational safety, production of work clothes and design of office products such as desks and chairs to be used in the office conveniently for employees.

When this concluded study is compared with the anthropometric study examples mentioned in the text, it is seen that the number of people participating in the research, the reference points taken for measurement, the purposes of determining the measurements, the units of measurement used, and the groups in which the research was applied differ from each other. Yet, the most prominent common point in these studies was determined as "valuing people and being a guide for their welfare".

It is expected that this study will be a guide for future and large-scale studies in obtaining the anthropometric database of the young population included in the employment of Türkiye. The data obtained in a sitting position will be used as a source for the design studies requiring dynamic body dimensions such as desk, chair and operator control panel used in a sitting position to be used by young individuals. The development of a multidimensional database is targeted by analyzing the measurement dimensions to be obtained from young individuals in a sitting position which is not included in this study but will be performed within the scope of the project in the future.

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