

The Impact of Clavicle Morphometric and Volumetric Measurements on Sex Determination: An Autopsy Study

El Impacto de las Mediciones Morfométricas y Volumétricas de la
Clavícula en la Determinación del Sexo: un Estudio de Autopsia

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SUMMARY: The objective of the study was the determination of sex from skeletal remains is of interest in forensic anthropology. The results on the use the clavicle in sex determination have been relatively encouraging. In this study, we aimed to discuss the usefulness of morphometric and volumetric measurements of the clavicular bone for sex determination. The measurements in our study were obtained from autopsies performed in Tokat province. Cases with decomposition and chest trauma were not included in the study. After determining age, height and gender, the maximum length, oblique length, midline circumference, vertical and sagittal diameters, volume and mass of the clavicle on both sides were measured. The study included 43 female and 43 male patients. The mean age was 50.4 years in women and 43.1 years in men. The mean maximum length of the right and left clavicle was 12.5 cm/12.9 cm (right/left) in women and 15.3 cm/15.6 cm in men, the mean measure of inclined length on both sides was 14.5 cm/15.01 cm (right/left) in women and 17.9 cm/18.3 cm in men, the mean length of the midline circumference was 2.26 cm/2.33 cm (right/left) in women and 2.89 cm/2.91 cm in men, the mean vertical diameter distance was 1.0 cm bilaterally in females and 1.2 cm bilaterally in males, mean sagittal diameter distance was 0.85/0.86 cm (right/left) in women and 1.05/1.06 cm (right/left) in males, mean clavicle volume was 18.2/17.8 ml in females (right/left) and 23.3/22.7 ml in males (right/left), mean clavicle mass was 31.93 g/31.48 g in females and 40.66 g/40.14 g in males. The results obtained in this study show that height and age are important predictors in anthropometric analyses. The strong influence of height on the measurements is particularly striking.

KEY WORDS: Sex determination; Clavicle; Autopsy.

INTRODUCTION

Sex determination is one of the fundamental components of constructing a biological profile from skeletal remains, and it is one of the key areas of research in forensic anthropology (Akhlaghi *et al.*, 2012). Particularly, in forensic cases involving severe damage to body integrity such as decomposition, fragmentation, and burning, it is crucial that the material used is of an analyzable nature (Kranioti *et al.*, 2020). In such cases, bones are often among the least affected and most durable structures. Therefore, the structural characteristics of bones and the anthropometric measurements specific to these features provide significant data sources for sex determination (Samala & Manasa, 2019; Rohmani *et al.*, 2021).

The skull and pelvis are among the most reliable skeletal regions for sex estimation due to the pronounced sexual dimorphism. However, in cases where these bones fail to provide sufficient information due to decomposition, fragmentation, animal interference, or deficiency, evaluating alternative bones becomes essential (Scheuer & Black, 2000; Iscan & Steyn, 2013). The clavicle stands out among these alternatives due to its resistance to environmental factors and its tendency to be well-preserved. Its morphological characteristics, length measurements derived from curvature, and unique structural features make the clavicle a valuable bone for detailed examination.

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The clavicle is a long bone that forms the shoulder girdle and is unique for being the only long bone without a medullary cavity. As the first bone to undergo ossification in humans, it also stands out as the first structure in which hematopoiesis occurs. Additionally, as one of the last bones to complete ossification, the clavicle offers a meaningful biological indicator for age and sex determination due to this characteristic (Scheuer & Black, 2000). The clavicle acts as a bridge between the scapula and the sternum, with two ends: the acromial end, which articulates with the acromion distally, and the sternal end, which articulates with the sternum proximally.

The clavicle is a structure that stands out due to its unique ossification characteristics. The acromial end undergoes intramembranous ossification, while the remaining bone structure develops through endochondral ossification. This feature distinguishes the clavicle from other bones. Additionally, the clavicle is considered a structure of interest for research due to its contribution to 5-10 % of all body fractures, highlighting its fragility (Robinson, 1998). This fragility also allows the use of bone integrity as an important parameter in sex determination.

The clavicle's morphometric characteristics such as thickness, volume, length, width, strength, and circumference vary depending on factors such as age, sex, and ethnicity (Akhlaghi *et al.*, 2012). However, it has been observed that the most significant differences between sexes appear not in metric measurements but in lateral and angular changes (Torimitsu *et al.*, 2018). In countries like Turkey, which host various cultural groups and experience continuous migration, conducting new studies on the clavicle is crucial to understanding the effects of changing sociodemographic structures. This situation necessitates the updating and diversification of existing data, making significant contributions to the field of forensic anthropology.

In this study, the potential use of the clavicle's morphometric and volumetric measurements for sex determination has been discussed, and the contributions of the data obtained from this bone to the field of forensic anthropology have been evaluated.

MATERIAL AND METHOD

This study has been approved by the Clinical Research Ethics Committee of the Faculty of Medicine, Tokat Gaziosmanpasa University, with the decision number 83116987-274 (28.03.2024). Approval for the study was also obtained from the Training and Scientific Research Commission of the Turkish Institute of Forensic Medicine (02.07.2024). The study was conducted in accordance with

the principle of data confidentiality and in adherence to medical ethical guidelines.

The study included 43 female and 43 male cases, all aged over 18 years. The overall average age of the participants was 46.77 ± 20.63 years. The average age of the females was found to be 50.4 ± 20.1 years, while the average age for males was 43.14 ± 20.75 years. The general average height was 172.41 ± 11.53 cm, with females measuring 164.53 ± 9.13 cm and males measuring 180.28 ± 7.65 cm. Statistically significant differences were observed between male and female groups in terms of height and age.

The measurements were obtained from clavicular bones collected during autopsies conducted in Tokat province. Cases with deformities in the clavicle structure due to signs of decomposition or chest trauma were excluded from the study.

The age, height, and sex information of the cases were recorded, and various morphometric and volumetric measurements of the clavicles on both sides were performed.

The parameters examined include the following:

- * Maximum length: The longest linear distance of the clavicle (Fig. 1).
- * Inclined length: The distance measured along the curvature of the clavicle (Fig. 1).
- * Midline circumference: The circumference at the midpoint of the clavicle.
- * Vertical diameter: The vertical thickness at the midpoint of the clavicle.
- * Sagittal diameter: The sagittal width at the midpoint of the clavicle.
- * Volume: The total volume of the clavicle.
- * Mass: The total weight of the clavicle.

During data collection, a Valkyrie brand digital electronic caliper (0.01 mm) (Fig. 2) was used for length measurements, and a Swock brand scale (0.001 g) was used for weight measurements. Volume measurement was performed using the water displacement method. No external funding was received for the instruments used, and the

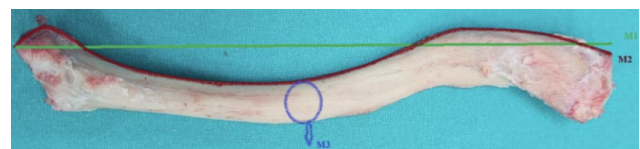


Fig. 1. Photograph showing 3 measured collarbone parameters: maximum length (M1) measured with an electronic precision caliper, inclined length (M2) measured with a tape measure and midline circumference (M3).

necessary budget was provided by the researchers. All methods used in the study were conducted in accordance with the accepted standards in forensic medicine and anthropology.



Fig. 2. Measurement of the sagittal width distance at the midpoint of the clavicle with an electronic precision caliper.

The data were transferred to and analyzed using SPSS (Statistical Package for the Social Sciences) version 22.0. For summarizing qualitative data, frequency and percentage were used.

RESULTS

In this study, the relationship between morphometric measurements of the clavicle bone and variables such as sex, height, and age was examined in detail, and significant differences between the measurements were identified. The results indicate that the clavicle bone provides important information, especially for sex and height estimation.

When examining the length measurements of the clavicle bone, both the right (15.31 ± 1.09 cm) and left (15.63 ± 1.02 cm) clavicle lengths in males were found to be significantly longer than those in females (right: 12.51 ± 0.36 cm; left: 12.97 ± 0.4 cm) ($p < 0.001$). Additionally, in terms of inclined lengths, the values in males were also higher compared to females. The right inclined length was measured as 17.97 ± 0.81 cm in males and 14.52 ± 0.51 cm in females, while the left inclined length was 18.33 ± 0.77 cm in males and 15.01 ± 0.47 cm in females ($p < 0.001$).

The circumference measurements at the midpoint were also significantly larger in males than in females. The right clavicle circumference in males was 2.89 ± 0.24 cm, while in females it was 2.26 ± 0.15 cm. The left clavicle circumference was 2.91 ± 0.26 cm in males and 2.33 ± 0.40 cm in females ($p < 0.001$).

When examining the cross-sectional diameters, both the vertical and sagittal diameters were found to be significantly wider in males compared to females. For example, the right vertical diameter was 1.22 ± 0.08 cm in males and 1.0 ± 0.11 cm in females ($p < 0.001$). The right sagittal diameter was measured as 1.05 ± 0.06 cm in males and 0.85 ± 0.06 cm in females ($p < 0.001$). The measurements on the left side also showed similar significant differences (Table I).

In males, parameters such as the right and left clavicle lengths, inclined lengths, cross-sectional diameters (vertical and sagittal), volume, and weight were statistically significantly higher compared to females. For instance, in

Table I. General distribution of variables.

Variables	Total	Sex		p Value
		Female	Male	
	Mean $\pm$ SD (Mean $\pm$ Standard Deviation)	Mean $\pm$ SD (Mean $\pm$ Standard Deviation)	Mean $\pm$ SD (Mean $\pm$ Standard Deviation)	
Age	46,77 $\pm$ 20,63	50,4 $\pm$ 20,1	43,14 $\pm$ 20,75	0,103
Height	172,41 $\pm$ 11,53	164,53 $\pm$ 9,13	180,28 $\pm$ 7,65	<0,001
Maximum Length (Right)-cm	13,91 $\pm$ 1,62	12,51 $\pm$ 0,36	15,31 $\pm$ 1,09	<0,001
Maximum Length (Left)-cm	14,3 $\pm$ 1,54	12,97 $\pm$ 0,4	15,63 $\pm$ 1,02	<0,001
Inclined Length (Right)-cm	16,25 $\pm$ 1,86	14,52 $\pm$ 0,51	17,97 $\pm$ 0,81	<0,001
Inclined Length (Left)-cm	16,67 $\pm$ 1,78	15,01 $\pm$ 0,47	18,33 $\pm$ 0,77	<0,001
Midline Circumference (Right)-cm	2,58 $\pm$ 0,37	2,26 $\pm$ 0,15	2,89 $\pm$ 0,24	<0,001
Midline Circumference (Left)-cm	2,62 $\pm$ 0,44	2,33 $\pm$ 0,40	2,91 $\pm$ 0,26	<0,001
Cross-sectional Vertical Diameter (Right)-cm	1,11 $\pm$ 0,15	1,0 $\pm$ 0,11	1,22 $\pm$ 0,08	<0,001
Cross-sectional Vertical Diameter (Left)-cm	1,12 $\pm$ 0,15	1,01 $\pm$ 0,12	1,23 $\pm$ 0,08	<0,001
Cross-sectional Sagittal Diameter (Right)-cm	0,95 $\pm$ 0,12	0,85 $\pm$ 0,06	1,05 $\pm$ 0,06	<0,001
Cross-sectional Sagittal Diameter (Left)-cm	0,96 $\pm$ 0,12	0,86 $\pm$ 0,06	1,06 $\pm$ 0,05	<0,001
Volume (Right)-ml	20,78 $\pm$ 3,08	18,22 $\pm$ 1,27	23,34 $\pm$ 2,04	<0,001
Volume (Left)-ml	20,29 $\pm$ 3,11	17,84 $\pm$ 1,26	22,74 $\pm$ 2,39	<0,001
Weight (Right Clavicle)-Gram	36,29 $\pm$ 5,35	31,93 $\pm$ 2,09	40,66 $\pm$ 3,82	<0,001
Weight (Left Clavicle)-Gram	35,81 $\pm$ 5,41	31,48 $\pm$ 2,19	40,14 $\pm$ 4,01	<0,001

males, the right clavicle was 1.623 cm longer than in females, while the left clavicle was 1.493 cm longer. The right clavicle weight in males exceeded that in females by 4.016 g, and the left clavicle weight was 3.757 g greater. In males, the right oblique length was 2.363 cm longer, and the left oblique length was 2.312 cm longer. All these differences were statistically significant ($p < 0.001$). Each 1 cm increase in height was associated with significant increases in clavicular morphometric measurements. Specifically, each 1 cm increase in height corresponded to a 0.073 cm increase in right clavicle length and a 0.074 cm increase in left clavicle

length. The weights of the right and left clavicles increased by 0.293 g and 0.305 g, respectively, per 1 cm increase in height. Regarding volume, each 1 cm increase in height resulted in an increase of 0.168 ml in the right clavicle and 0.18 ml in the left clavicle. These relationships were statistically significant ($p < 0.001$). The age variable did not have a significant effect on clavicle lengths, inclined lengths, cross-sectional diameters, volume, or weight parameters. For instance, the right clavicle length ($p = 0.419$), left clavicle length ($p = 0.589$), and all other parameters showed no statistical relationship with age (Table II).

Table II. Results of multiple linear regression analysis.

Model	Dependent Variable	Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	p
			B	Std. Error	Beta		
1	Maximum Length (Right)-cm	Sex	1,623	0,154	0,503	10,53	<0,001
		Age	-0,003	0,003	-0,032	-0,812	0,419
		Height	0,073	0,008	0,521	9,768	<0,001
2	Maximum Length (Left)-cm	Sex	1,493	0,135	0,486	11,062	<0,001
		Age	-0,001	0,003	-0,02	-0,542	0,589
		Height	0,074	0,007	0,55	11,189	<0,001
3	Inclined Length (Right)-cm	Sex	2,363	0,108	0,638	21,957	<0,001
		Age	0,001	0,002	0,01	0,397	0,692
		Height	0,07	0,005	0,431	13,288	<0,001
4	Inclined Length (Left)-cm	Sex	2,312	0,109	0,652	21,167	<0,001
		Age	0,001	0,002	0,003	0,111	0,912
		Height	0,064	0,005	0,412	11,965	<0,001
5	Midline Circumference (Right)-cm	Sex	0,314	0,03	0,425	10,411	<0,001
		Age	0,001	0,001	-0,014	-0,429	0,669
		Height	0,02	0,001	0,617	13,522	<0,001
6	Midline Circumference (Left)-cm	Sex	0,194	0,083	0,22	2,339	0,022
		Age	0,001	0,002	0,043	0,55	0,584
		Height	0,025	0,004	0,649	6,169	<0,001
7	Cross-sectional Vertical Diameter (Right)-cm	Sex	0,068	0,014	0,231	4,961	<0,001
		Age	<0,001	<0,001	-0,019	-0,504	0,616
		Height	0,01	0,001	0,773	14,876	<0,001
8	Cross-sectional Vertical Diameter (Left)-cm	Sex	0,055	0,014	0,183	3,773	<0,001
		Age	-0,001	<0,001	-0,01	-0,24	0,811
		Height	0,011	0,001	0,811	14,912	<0,001
9	Cross-sectional Sagittal Diameter (Right)-cm	Sex	0,097	0,008	0,426	12,306	<0,001
		Age	-0,001	<0,001	-0,004	-0,15	0,881
		Height	0,006	<0,001	0,631	16,32	<0,001
10	Cross-sectional Sagittal Diameter (Left)-cm	Sex	0,100	0,008	0,437	12,664	<0,001
		Age	0,001	<0,001	0,007	0,235	0,815
		Height	0,006	<0,001	0,625	16,2	<0,001
11	Volume (Right)-ml	Sex	2,439	0,262	0,398	9,32	<0,001
		Age	-0,006	0,005	-0,038	-1,09	0,279
		Height	0,168	0,013	0,628	13,144	<0,001
12	Volume (Left)-ml	Sex	2,026	0,329	0,327	6,157	<0,001
		Age	-0,006	0,007	-0,043	-0,981	0,329
		Height	0,18	0,016	0,666	11,207	<0,001
13	Weight (Right Clavicle)-Gram	Sex	4,016	0,504	0,378	7,975	<0,001
		Age	-0,013	0,01	-0,05	-1,268	0,208
		Height	0,293	0,025	0,632	11,941	<0,001
14	Weight (Left Clavicle)-Gram	Sex	3,757	0,537	0,349	6,993	<0,001
		Age	-0,015	0,011	-0,055	-1,343	0,183
		Height	0,305	0,026	0,649	11,625	<0,001

In the entire group, as age increased, a decrease was observed in clavicle morphometric measurements. These decreases were weak in magnitude but statistically significant ($p < 0.05$). In females, the effect of age was weak, and no significant relationship was found for some measurements (e.g., left midline circumference). In males, the decreases in measurements with increasing age were more pronounced, and moderate significant relationships were identified. Notably, right straight-line length ($r = -0.543$), right inclined length ($r = -0.494$), and right clavicle weight ($r = -0.559$) exhibited notable decreases. The effect of age was more pronounced in males, with decreases in both right and left straight-line length being particularly prominent (Table III).

In the entire group, as height increased, an increase in clavicle morphometric measurements was observed. These increases were very strong and statistically significant for all measurements ($p < 0.001$). In females, strong relationships between height and clavicle measurements were found. Notably, relationships between height and right straight-line length ($r = 0.882$), right inclined length ($r = 0.854$), and right clavicle weight ($r = 0.928$) were prominent. In males, strong relationships between height and clavicle measurements were also identified. The relationships between height and measurements such as left inclined length ($r = 0.946$) and left vertical diameter ($r = 0.873$) were the most pronounced. Height has a very strong positive effect on clavicle morphometric measurements (Table III).

Table III. Pairwise correlations of age and height by total group and sex.

		Total Group		Female		Male	
		Age	Height	Age	Height	Age	Height
Maximum Length (Right)-cm	r	-0,368*	0,882*	-0,304*	,882*	-0,543*	0,945*
	p	<0,001	<0,001	0,047	<0,001	<0,001	<0,001
Maximum Length (Left)-cm	r	-0,366*	0,894*	-0,337*	,920*	-0,523*	0,945*
	p	0,001	<0,001	0,027	<0,001	<0,001	<0,001
Inclined Length (Right)-cm	r	-0,308*	0,865*	-0,275	,854*	-0,494*	0,936*
	p	0,004	<0,001	0,074	<0,001	0,001	<0,001
Inclined Length (Left)-cm	r	-0,308*	,858*	-0,349*	0,790*	-0,454*	0,946*
	p	0,004	<0,001	0,022	<0,001	0,002	<0,001
Midline Circumference (Right)-cm	r	-0,382*	0,916*	-0,311*	0,880*	-0,547*	0,936*
	p	<0,001	<0,001	0,043	<0,001	<0,001	<0,001
Midline Circumference (Left)-cm	r	-0,304*	0,780*	-0,080	,440*	-0,527*	0,904*
	p	0,004	<0,001	0,609	0,003	<0,001	<0,001
Cross-sectional Vertical Diameter (Right)-cm	r	-0,426*	0,940*	-0,375*	0,894*	-0,585*	0,878*
	p	<0,001	<0,001	0,013	<0,001	<0,001	<0,001
Cross-sectional Vertical Diameter (Left)-cm	r	-0,426*	0,941*	-0,366*	,900*	-0,588*	0,873*
	p	<0,001	<0,001	0,016	<0,001	<0,001	<0,001
Cross-sectional Sagittal Diameter (Right)-cm	r	-0,378*	0,925*	-0,418*	,900*	-0,488*	0,904*
	p	<0,001	<0,001	0,005	<0,001	0,001	<0,001
Cross-sectional Sagittal Diameter (Left)-cm	r	-0,367*	0,922*	-0,412*	,897*	-0,462*	0,900*
	p	0,001	<0,001	0,006	<0,001	0,002	<0,001
Volume (Right)-ml	r	-0,406*	0,919*	-0,423*	,919*	-0,529*	0,904*
	p	<0,001	<0,001	0,005	<0,001	<0,001	<0,001
Volume (Left)-ml	r	-0,416*	0,911*	-0,369*	,881*	-0,536*	0,903*
	p	<0,001	<0,001	0,015	<0,001	<0,001	<0,001
Weight (Right Clavicle)-Gram	r	-0,416*	0,915*	-0,385*	,928*	-0,559*	0,894*
	p	<0,001	<0,001	0,011	<0,001	<0,001	<0,001
Weight (Left Clavicle)-Gram	r	-0,424*	0,915*	-0,417*	0,914*	-0,545*	0,893*
	p	<0,001	<0,001	0,005	<0,001	<0,001	<0,001

DISCUSSION

The determination of sex and age are primary diagnostic interests in forensic medical research. Examples include corpses retrieved from fire scenes, deaths due to trauma or explosive materials, and the advanced stages of decomposition, where the integrity of the body is severely compromised postmortem. In such cases, where the bodies are unrecognizable, bone analysis becomes crucial for identifying the victim (Iskan & Steyn, 2013).

Our study will be the first in Turkey to analyze the weight, volume, and dimensions of the clavicle bone through direct measurements during autopsy. Therefore, we believe that once we reach the target sample size, the data obtained will not only provide anatomical knowledge but also complement previously published studies focused on sex differentiation through clavicular measurements.

This study examined the morphometric characteristics of the clavicle bone in the context of variables such as sex, height, and age, and the findings were consistent with the literature. Our study revealed significant differences in clavicle measurements between sexes, demonstrated strong correlations with body height, and showed that the effect of age as a variable was limited.

In our study, the clavicle lengths, inclined lengths, circumference measurements, and cross-sectional diameters of males were found to be significantly higher compared to females. These findings are consistent with the study by Bachoura *et al.* (2013), which demonstrated that clavicle morphometry is an important tool for sex determination. Additionally, in the analysis performed by Aira *et al.* (2017), using 3D measurements, it was noted that the clavicle lengths and volumes of males were significantly larger than those of females (Aria *et al.*, 2017). Similarly, in another study of the South African population, collarbone length was reported as a reliable indicator of sex (Ishwarkumar *et al.*, 2016). In this regard, the clavicle bone plays a critical role, particularly in forensic anthropology and sex estimation studies.

The strong effect of height on clavicular morphometric measurements is one of the important findings of this study. As height increased in both males and females, significant increases were observed in parameters such as clavicle length, inclined length, and weight. This finding is consistent with the results of Patted *et al.* (2020), who indicated that each centimeter increase in height leads to significant changes in clavicular morphometry. A strong positive correlation between height and clavicular morphometric measurements was also shown in another study conducted in Tamilnadu (Prakash *et al.*, 2024). In our study, the effect of height on the clavicle was found to be more pronounced compared to the age variable.

The effect of age on clavicular morphometric measurements was found to be limited, with a general trend of decreased clavicle measurements as age increased. However, these decreases were generally weak and varied between sexes. In males, the effect of age was more pronounced, particularly in the straight-line length and clavicle weight. These results are consistent with the findings of Guedes de Almeida *et al.* (2020), which suggested that age influences clavicle volume and weight (Guedes de Almeida *et al.*, 2020). However, Akhlaghi *et al.* (2012) proposed that the effect of age on clavicular measurements is generally negligible. Our study demonstrates that the effect of the age variable may vary depending on sex and the type of measurement.

Overall, the findings obtained in our study are in strong agreement with the literature that emphasizes the

importance of clavicular morphometry as a tool for sex and height estimation. In particular, in parallel with the findings of the study published by Özşahin *et al.* (2018) on the clinical significance of clavicular measurements, it was concluded that these measurements have a wide application potential in forensic anthropology, orthopaedics and biomechanics. Furthermore, when compared to other studies examining age-related changes in clavicular morphometry, it has been concluded that the effect of the age variable is limited.

Limitations and Future Studies. Our country has a rich cosmopolitan structure encompassing various ethnic backgrounds. The use of clavicular bones obtained from forensic death cases in our study poses legal restrictions for genetic analysis and ethnic origin identification. Since there is no data network available to inquire about the ethnic background of the cases included in the study, the information regarding whether the individual undergoing the autopsy has lived in Turkey for the past three generations was used for ethnic origin analysis. Conducting ethnic origin analysis based on verbal information is one of the limitations of our study.

Although this study thoroughly examined various aspects of clavicular morphometry, the regional distribution of the sample population was limited. Future studies are expected to enhance the generalizability of the results by including larger populations from different ethnic groups. Additionally, more precise measurements of clavicular morphometry could be achieved through the use of modern imaging techniques and artificial intelligence-based analysis methods.

In this context, it is clear that clavicular bone morphometry provides an important biological indicator in understanding individual differences and population characteristics. This field holds vast potential for both academic and applied research.

This study highlights the effects of age and height on clavicular morphometric measurements, considering sex differences. The results demonstrate that height and age are significant predictors in anthropometric analyses. The strong influence of height on measurements is particularly noteworthy and should be taken into account in both clinical and forensic anthropology applications. Additionally, the potential of AI-assisted analyses to enhance accuracy and expedite processes presents an important area of research for future studies.

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RESUMEN: El objetivo del estudio fue determinar el sexo a partir de restos óseos, ya que es de interés para la antropología forense. Los resultados sobre el uso de la clavícula para la determinación del sexo han sido relativamente alentadores. En este estudio, nuestro objetivo fue analizar la utilidad de las mediciones morfométricas y volumétricas del hueso clavicular para la determinación del sexo. Las mediciones de nuestro estudio se obtuvieron de autopsias realizadas en la provincia de Tokat. Los casos con descomposición y traumatismo torácico no se incluyeron en el estudio. Tras determinar la edad, la estatura y el sexo, se midieron la longitud máxima, la longitud oblicua, la circunferencia de la línea mediana, los diámetros vertical y sagital, el volumen y la masa de las clavículas en ambos lados. El estudio incluyó a 43 mujeres y 43 hombres. La edad media fue de 50,4 años en las mujeres y de 43,1 años en los hombres. La longitud máxima media de las clavículas derechas e izquierdas fue de 12,5 cm/12,9 cm (derecha/izquierda) en mujeres y de 15,3 cm/15,6 cm en hombres, la medida media de la longitud inclinada en ambos lados fue de 14,5 cm/15,01 cm (derecha/izquierda) en mujeres y de 17,9 cm/18,3 cm en hombres, la longitud media de la circunferencia de la línea mediana fue de 2,26 cm/2,33 cm (derecha/izquierda) en mujeres y de 2,89 cm/2,91 cm en hombres, la distancia media del diámetro vertical fue de 1,0 cm bilateralmente en mujeres y de 1,2 cm bilateralmente en hombres, la distancia media del diámetro sagital fue de 0,85/0,86 cm (derecha/izquierda) en mujeres y de 1,05/1,06 cm (derecha/izquierda) en hombres, el volumen clavicular medio fue de 18,2/17,8 ml en mujeres (derecha/izquierda) y 23,3/22,7 ml en varones (derecha/izquierda), la masa clavicular media fue de 31,93 g/31,48 g en mujeres y de 40,66 g/40,14 g en hombres. Los resultados obtenidos en este estudio indican que la estatura y la edad son predictores importantes en los análisis antropométricos. La fuerte influencia de la estatura en las mediciones es particularmente notable.

PALABRAS CLAVE: Determinación del sexo; Clavícula; Autopsia.

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