Anthropological Review • Vol. 89(3), 41–55 (2026)

ANTHROPOLOGICAL REVIEW

Available online at: https://doi.org/10.18778/1898-6773.89.3.03

Effectiveness of equations for the prediction of stature from foot measurements in the Eastern Slovak population

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Abstract

Introduction

Stature is one of the key characteristics for establishing personal identity, particularly in forensic investigations. One of the methods for its estimation is based on a mathematical correlation between foot dimensions and body height.

Study aimed

The aim of this study was to evaluate the effectiveness of various regression equations based on foot measurements for stature estimation in the Eastern Slovak population and to develop new population-specific equations.

Materials and Methods

A total of 200 individuals (100 males and 100 females) aged over 18 years from Eastern Slovakia were analysed. Stature, foot length, and foot breadth were measured using standard anthropometric methods. Six previously published regression equations were tested and compared with newly derived models.

Results

Our findings confirmed the presence of statistically significant sexual dimorphism in measured foot dimensions. Bilateral asymmetry was confirmed for foot breadth but not for foot length. A strong, positive, statistically significant relationship was found between foot length and stature, particularly in females. The accuracy of stature estimation varied depending on the applied regression approach, while newly developed models demonstrated improved predictive performance.

Original article

Received: 1.09.2025; Revised: 5.04.2026; Accepted: 1.07.2026

Conclusion
Foot dimensions, especially foot length, represent reliable predictors of stature. The results demonstrated that regression equations derived from other populations do not provide uniformly accurate stature estimates, highlighting the need to develop population-specific regression models to ensure reliable forensic stature estimation.

Keywords: anthropometry, correlation, estimation, foot morphology, regression equation

Introduction

The human foot reflects an individual's functional characteristics. In forensic investigation, foot measurements and footprints can provide valuable information for personal identification, such as estimating stature, body weight and build (e.g. symmetry), and potential insights into motor behaviour. These characteristics enable the identification or exclusion of an individual (Porada & Straus, 2018). Stature is an important anthropometric measurement that varies across different human groups due to genetic, environmental, nutritional, hormonal, and socioeconomic factors (Mittal et al., 2021). Prior research confirmed a strong relationship between foot measurements and stature, and that foot dimensions are thus a reliable predictor of stature (García-Mora et al., 2025; Karmalkar & Nikam, 2021). Foot length and breadth have been the major measurements used for stature predictions (e.g., Kanchan et al., 2010; Uhrová et al., 2015).

Numerous researchers have proposed regression equations for predicting stature from foot dimensions. However, due to variability in body height across populations, it is necessary to use population-specific equations for different demographic groups. Estimates of stature based on foot measurements or footprints in the Slovak population have been performed in previous studies. The study by Titlbach et al. (1971) was the first regression equation developed for the population of Czechoslovakia, in which stature was estimated from footprints. Later, focusing exclusively on the Slovak population, the study by Uhrová et al. (2015) estimated stature from foot dimensions in young individuals (students).

Our research aimed to assess the effectiveness of regression equations for the Slovak population, as well as equations for other European populations that are anthropometrically and geographically relatively close to the Slovak population. Our study determines which regression models developed in similar European populations can be reliably applied to the eastern Slovak population.

Material and methods

Subjects

All anthropological procedures followed the ethics protocol approved at the University of Prešov (No. ECUP-022023PO) and were taken in accordance with the 1964 Helsinki Declaration and its later amendments. The current study was conducted using 200 participants (100 males and 100 females) from Eastern Slovakia. All participants were born and raised in Eastern Slovakia and had long-term residence there. The sample can be considered representative of the adult Eastern Slovak population and was of Caucasian ethnicity. Subjects with any skeletal and pathological changes that affected the foot parameters and bipedalism were excluded. Individuals with any endocrine abnormalities (e.g. gigantism, achondroplasia) were also excluded. The age range for the sample was 18 to 58 years. Informed consent was sought from all participants.

Measurements

Stature was measured using an anthropometer. Participants stood barefoot against a wall to ensure a vertical posture, with the measurement taken as the vertical distance from the floor to the vertex. The bony landmarks of acropodian, pternion, metatarsal tibiale, and metatarsal fibulare were identified in each subject for measurements. In Figure 1, these landmarks are represented as the points of tangency between the measurement lines and the outline of the foot silhouette.

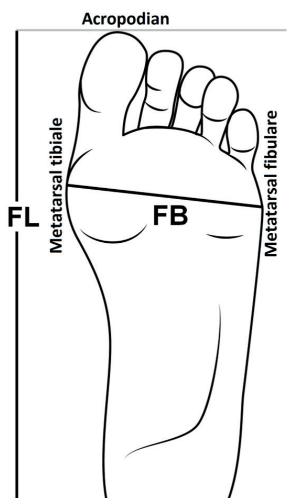

Figure 1. Anthropometric points and their distances for measurements of the foot (FL – foot length; FB – foot breadth)

The foot breadth (FB) was measured as the distance between the distal anterior epiphysis of the first metatarsal – the most prominent point on the medial side of the foot (metatarsal tibiale) – and the distal anterior epiphysis of the fifth metatarsal, the most prominent point on the lateral side (metatarsal fibulare). The distance between the acropodian and the pternion was FL. The acropodian refers to the most anteriorly projecting point on the pad of the first or second toe, while the pternion denotes the most posteriorly projecting point of the heel (Kanchan et al., 2010). During measurement, ensuring a flat surface and even weight distribution was crucial for accuracy. Following Vallois (1965), these measurements (in cm) were taken for each foot using a digital caliper. A single trained anthropologist performed all measurements, and each measurement was conducted twice. This procedure allowed us to assess intra-observer reliability, ensuring consistency and minimizing measurement error.

Statistical analysis

Statistical analysis was conducted using SPSS statistical software (version 30). Descriptive analysis, including mean, standard deviation, minimum, maximum, was undertaken first. Data normality was evaluated using the Kolmogorov-Smirnov test. Differences between left and right foot measurements were tested using a paired t-test, while male and female comparisons were undertaken using an independent samples t-test. Pearson correlations were run to check for relationships between stature and foot measurements. Multiple linear regressions were run to calculate our own equations for stature estimation from foot dimensions.

We followed six equations to estimate the effectiveness of stature calculation (S) from foot dimensions:

1. Feix (1965): S = 7 FL
2. Titlbach et al. (1971): S = 3.1 FL + 4 FB + 53

3. Straus (2001): S = 3.5026 FL + 83.883 (for males), and S = 2.8789 FL + 94.038 (for females)
4. Cyplík *and* Chojak (2010): S = 2.4963 FL + 113.15 (for males) and S = 2.9353 FL + 96.369 (for females)
5. Strnadová (2014): S = 34.6879 + 4.00555 FL + 4.24845 FB
6. Uhrová et al. (2015): S = 84.74 – 0.36 FB + 3.75 FL (for males, for right side), S = 87.75 - 0.46 FB + 3.68 FL (for males, for left side), S = 66.89 + 1.98 FB + 3.42 FL (for females, for right side), and S = 68.46 + 1.83 FB + 3.42 FL (for females, for left side)

To evaluate the effectiveness of regression equations for stature estimation in our sample, actual stature and estimated stature in each equation and foot side (right and left), separately for males, females, and the total sample, was tested using a paired t-test. Equations that provided statistically non-significant differences between estimated and actual stature showed good predictive accuracy.

Results

The descriptive statistics for each measured dimension, as well as the t-test results for stature and foot dimensions, are summarised in Table 1. Among the 200 participants, the mean age (± standard deviation, SD) was 31.94 ± 10.19 years for Slovak males and 30.56 ± 9.12 years for Slovak females. The mean values of all measurements were significantly higher in males than in females. The mean stature (± SD) was 181.04 ± 6.07 cm in males and 167.16 ± 5.48 cm in females.

Table 1. Descriptive statistics for anthropometric measurements of the Slovak sample and statistical comparison of males and females

Parameters		Age (years)	Stature (cm)	R-FL (cm)	L-FL (cm)	R-FB (cm)	L-FB (cm)
Entire sample (n=200)	min	18	150.9	21.6	21.8	7.8	7
	max	58	196.7	29.3	29.4	12.2	12.1
	Mean ±SD	31.25 ±9.67	174.10 ±9.04	25.25 ±1.65	25.24 ±1.67	9.45 ±0.76	9.13 ±0.75
Males (n=100)	min	18	163.5	24	23.3	8	8
	max	58	196.7	29.3	29.4	12.2	12.1
	Mean ±SD	31.94 ±10.19	181.04 ±6.07	26.47 ±1.11	26.50 ±1.16	9.83 ±0.66	9.51 ±0.67
Females (n=100)	min	18	150.9	21.6	21.8	7.8	7
	max	54	185.3	27.4	28	10.7	10.3
	Mean ±SD	30.56 ±9.12	167.16 ±5.48	24.02 ±1.11	23.98 ±1.03	9.06 ±0.64	8.74 ±0.63
p-value		0.3296	< 0.001***	< 0.001***	< 0.001***	< 0.001***	< 0.001***

FL – Foot Length; FB – Foot Breadth; L – left, R – right, n – number, SD – standard deviation, ***statistically significant p≤ 0.001

The differences between measurements of the left and right foot are shown in Table 2. Bilateral asymmetry was not confirmed in foot length. There was a non-significant bilateral difference in mean foot length for both sexes. However, a statistically significant difference was noted between the left and right means of the foot breadth. Foot breadths were significantly larger on the right than on the left side.

Table 3 shows Pearson's correlation coefficients for actual stature and foot measurements. A stronger positive correlation with actual stature was found for the mean left and right foot lengths rather than breadth parameters. Foot length measurements were in a statistically significant ($p < 0.01$) relationship with stature in all studied groups. Foot breadth was in a statistically significant correlation with stature only in females. Stature and left foot length had the highest correlation coefficient of r = 0.74 in females and r = 0.51 in males.

Multiple regression equations for estimating stature from foot measurements, considering sex and foot side, developed and tested on the study sample are shown in Table 4. In both sexes, regression equations based on measurements from the left foot showed slightly better predictive accuracy than those based on the right foot. While the equations for males demonstrated only a moderate correlation, the equations for females showed stronger correlations and a lower error of estimate.

Table 2. Comparisons of the dimensions of the right and left foot

	Parameters	Mean		p-value
		Right (cm)	Left (cm)	
Entire sample (n=200)	FL	25.25	25.24	0.489
	FB	9.45	9.13	< 0.001***
Males (n=100)	FL	26.47	26.50	0.847
	FB	9.83	9.51	< 0.001***
Females (n=100)	FL	24.02	23.98	0.792
	FB	9.06	8.74	< 0.001***

FL – Foot Length; FB – Foot Breadth; n – number; ***statistically significant p≤ 0.001

Table 3. Correlation between actual stature and dimension of the foot

	r	
	Males	Females
Right Foot Length	0.44***	0.72 ***
Left Foot Length	0.51***	0.74***
Right Foot Breadth	-0.03^{ns}	0.42***
Left Foot Breadth	0.03^{ns}	0.43***

ns – statistically not significant; r – Pearson´s correlation coefficient; ***statistically significant p≤ 0.001

Table 4. Multiple regression equations for stature estimation (cm) from foot dimensions according to sex, developed based on the study sample

Males				Females			
Regression equation	r	R^2	S.E.E (cm)	Regression equations	r	R^2	SEE (cm)
S = 124.74+2.70RFL–1.55RFB	0.475	0.225	5.400	S = 80.34+3.49RFL+0.32RFB	0.729	0.531	3.791
S = 115.10+2.86LFL–1.03LFB	0.527	0.278	5.212	S = 72.13+4.19LFL–0.63 LFB	0.745	0.555	3.696

RFL – Right Foot Length; RFB – Right Foot Breadth; LFL – Left Foot Length; LFB – Left Foot Breadth; S – Stature, R^2 – Coefficient of determination, SEE – Standard Error of Estimate

The linear regression formulae developed in previous studies to estimate stature from foot dimensions were applied to our sample (Table 5). A statistical comparison of differences between actual stature and estimated stature from foot dimensions using the paired t-test in males showed that the most effective regression equation was by Uhrová et al. (2015). In addition, the equation by Strnadová (2014) also showed statistically non-significant differences between estimated and actual stature, particularly for the left foot, indicating good predictive accuracy (Table 6). In the female group, the results revealed statistically non-significant differences between actual stature and estimated stature for the equations proposed by Feix (1965), Cyplík and Chojak (2010), Uhrová et al. (2015) for both feet, and Strnadová (2014) for the left foot, which indicates the reliability of these models. The equation by Uhrová et al. (2015) provided the most accurate stature estimation from right-foot dimensions. In contrast, the equation proposed by Cyplík and Chojak (2010) showed the highest accuracy for stature estimation based on left-foot dimensions (Table 7). For the entire sample, the statistical comparison of actual stature and estimated stature from foot measurements showed that the regression equation by Uhrová et al. (2015) was the most effective for predicting stature regardless of foot laterality (Table 8).

Table 5. Estimated stature (in cm) from foot measurements using published regression equations, applied to the study sample (mean ± SD)

Equations	Entire sample (n=200)		Males (n=100)		Females (n=100)	
	Mean±SD		Mean±SD		Mean±SD	
	Right Foot	Left Foot	Right Foot	Left Foot	Right Foot	Left Foot
Feix (1965)	176.76 ± 11.56	176.73 ± 11.7	185.32 ± 7.77	185.54 ± 8.12	168.2 ±7.78	167.92 ±7.23
Titlbach et al. (1971)	169.08 ± 7.38	167.83 ± 7.46	174.41 ± 4.90	173.22 ± 5.02	163.75 ± 5.32	162.36 ± 5.19
Straus (2001)	169.91 ± 7.6	169.91 ± 7.7	176.61 ± 3.89	176.72 ± 4.07	163.22 ± 3.2	163.10 ± 2.97
Cyplík and Chojak (2010)	173.07 ± 6.88	173.05 ± 6.94	179.24 ± 2.77	179.31 ± 2.90	165.85 ± 3.75	166.78 ± 3.03
Strnadová (2014)	175.98 ± 8.97	174.61 ± 9.06	182.51 ± 5.90	181.27 ± 6.06	169.45 ± 6.39	167.94 ± 6.20
Uhrová et al. (2015)	173.74 ± 8.03	173.77 ± 8.4	180.47 ± 4.10	180.91 ± 4.2	167.02 ± 4.63	166.51 ± 4.36

n – number, SD – Standard Deviation

Table 6. Statistical comparison of differences between the actual stature and estimated stature from foot dimension in males, using published equations applied to the study sample

	Right Foot					Left Foot				
	Average of differences	SD_d	t	Normality P-value	P-value	Average of differences	SD_d	t	Normality P-value	P-value
Feix (1965)	4.27	7.42	5.76	0.023	≤ 0.001***	4.49	7.21	6.23	0.00075	≤ 0.001***
Titlbach et al. (1971)	-6.64	6.58	-10.08	0.00062	≤ 0.001***	-7.82	6.21	-12.60	0.011	≤ 0.001***
Straus (2001)	-4.43	5.56	-7.97	0.0027	≤ 0.001***	-4.33	5.29	-8.18	0.0029	≤ 0.001***
Cyplík and Chojak (2010)	-1.81	5.44	-3.33	0.0025	≤ 0.001***	-1.73	5.29	-3.32	0.009	≤ 0.001***
Strnadová (2014)	1.47	6.98	2.11	0.0004	0.038	0.23	6.59	0.35	0.0081	0.728
Uhrová et al. (2015)	-0.57	5.57	-1.02	0.004	0.311	-0.133	5.28	-0.25	0.0032	0.802

SD_d – Standard Deviation of differences; t – test statistic of the paired t-test; Normality P-value – shape of distribution; P-value – difference between values; *** statistically significant p≤ 0.001

Table 7. Statistical comparison of differences between the actual stature and estimated stature from foot dimension in females, using published equations applied to the study sample

	Right Foot					Left Foot				
	Average of differences	SD_d	t	Normality P-value	P-value	Average of differences	SD_d	t	Normality P-value	P-value
Feix (1965)	1.037	5.33	1.94	0.592	0.0547	0.76	4.84	1.56	0.545	0.1212
Titlbach et al. (1971)	-3.41	4.33	-7.88	0.1654	≤ 0.001***	-4.81	4.35	-11.04	0.085	≤ 0.001***
Straus (2001)	-3.95	3.84	-10.29	0.678	≤ 0.001***	-4.07	3.83	-10.61	0.0527	≤ 0.001***
Cyplík and Chojak (2010)	-0.26	3.83	-0.69	0.7282	0.4909	-0.38	3.82	-1	0.0557	0.3192
Strnadová (2014)	2.29	4.73	4.83	0.5984	≤ 0.001***	0.78	4.7	1.65	0.3415	0.102
Uhrová et al. (2015)	-0.15	3.9	-0.38	0.3898	0.708	-0.65	3.85	-1.7	0.1173	0.0923

SD_d – Standard Deviation of differences; t – test statistic of the paired t-test; Normality P-value – shape of distribution; P-value – difference between values; ***statistically significant p≤ 0.001

Table 8. Statistical comparison of differences between the actual stature and estimated stature from foot dimension in the entire sample, using published equations applied to the study sample

	Right Foot					Left Foot				
	Average of differences	SD_d	t	Normality P-value	P-value	Average of differences	SD_d	t	Normality P-value	P-value
Feix (1965)	2.66	6.65	5.65	0.00099	≤ 0.001***	2.62	6.4	5.79	0.000036	≤ 0.001***
Titlbach et al. (1971)	-5.02	5.79	-12.27	0.0741	≤ 0.001***	-6.32	5.56	-16.07	0.6586	≤ 0.001***
Straus (2001)	-4.19	4.77	-12.42	0.00137	≤ 0.001***	-4.2	4.61	-12.88	0.0019	≤ 0.001***
Cyplík Chojak (2010)	-1.04	4.75	-3.08	0.0079	≤ 0.001***	-1.06	4.6	-3.24	0.01	0.00138
Strnadová (2014)	1.88	5.96	4.45	0.0036	≤ 0.001***	0.5	5.72	1.24	0.0433	0.2148
Uhrová et al. (2015)	-0.36	4.8	-1.05	0.0059	0.2939	-0.4	4.62	-1.21	0.00184	0.229

SD_d – Standard Deviation of differences; t – test statistic of the paired t-test; Normality P-value – shape of distribution; P-value – difference between values; ***statistically significant p≤ 0.001

Discussion

Foot measurements, footprints or shoeprints can play a key role in forensic investigations. Direct anthropometric measurements, such as foot length and foot breadth, provide accurate, population-specific data that enable forensic anthropologists to estimate stature and create a biological profile of an individual (Krishan, 2008). In cases of mass disasters or natural catastrophic events where bodies may be fragmented or partially recovered, these direct measurements are often essential for reliable victim identification and effective disaster management (Davies et al., 2014). Footprints and shoeprints at crime scenes are an important additional source of evidence. Even partial or single footprints can preserve measurable characteristics – such as length, width, and pressure patterns – that correlate with an individual's height and often provide information about their gait, weight distribution, or locomotion, which can be crucial in revealing their identity (Reel et al., 2012). Analysis of these prints allows investigators to obtain key data for identifying suspects or reconstructing events, especially when no other direct physical evidence exists (García-Mora et al., 2025). In practice, foot measurements and footprints have become the basis for creating and applying regression equations that enable the estimation of stature for individuals from a specific population (Krishan et al., 2015). The higher the number of individuals in the population included in the creation of regression equations, the greater their accuracy and applicability in real investigative situations (Hansen et al., 2022).

This study was conducted to provide anthropometric data on foot length and breadth for adults from eastern Slovakia, adding to existing data. Our study provided data on foot dimensions and their relationship to stature across a wider age range of adults from this region. On the other hand, this study examined available regression equations for the Slovak population to estimate stature from foot dimensions or footprints and their effectiveness for a given demographic group.

Anthropometric measurements showed that Slovak males' foot measurements were significantly larger than those of females, but this was due to sex and biological factors (Ulijaszek et al., 1998). Previous studies (Krauss et al., 2008; Ozaslan et al., 2012; Romphothong & Traithepchanapai, 2019; Wunderlich & Cavanagh, 2001) demonstrated significant sex differences in all foot parameters. In our study, the mean body height (±SD) was 181.04 ± 6.07 cm in males and 167.16 ± 5.48 cm in females, which is consistent with the statistical analysis of the mean body height of the Slovak population published by Worlddata.info (2025). A study by Hitka et al. (2018) reported average body height (±SD) in Slovak males to be 182.1 ± 6.7 cm and in Slovak females 168.2 ± 5.9 cm. The authors predicted that the average height of Slovak males could reach the value of 184.27 cm in the year 2025. The increase in body height in a population may also influence changes in average foot measurements.

Anthropological analysis confirmed bilateral asymmetry of foot breadth, which was significantly larger on the right side across all studied groups and may indicate a higher load on the dominant foot. This result was consistent with the previous study by Kanchan et al. (2010) in the North Indian population. The study by Hemy et al. (2013) reported different results, confirming that the left foot was significantly larger than the right in males in the Western Australian population. In contrast, in females, there was no significant asymmetry. The study by Sen and Ghosh (2008) showed that both adult males and females from North Bengal had significantly longer left feet. Krishan and Sharma (2007) indicated that bilateral variation was not significant for all foot measurements in both sexes in the North Indian population. A similar conclusion was noted by Saxena et al. (2023) in a research group from Uttar Pradesh, by Karaddi et al. (2013) in males from Karnataka, in India.

Sexual differences in human body characteristics and their relations are well-established and documented (Danborgno & Elukpo, 2007; Kirchengast, 2014). Our study clearly demonstrated that the length parameters showed a significantly stronger positive correlation with stature than the foot breadth in the male population. On the other hand, in females, an important relationship between stature and both foot length and foot breadth was seen. The study by Ozaslan et al. (2012) found that a stronger correlation was observed between all variables and stature in males than in females. It was in agreement with the Ozdens et al. (2005) study, which also confirmed that foot length showed a better correlation with stature than foot breadth. The same result was found in research by Kim et al. (2018). A different result was obtained by the study of Igbigbi et al. (2018), which found that the breadth parameters showed a stronger correlation with foot measurements in the Nigerian population. Different biological growth mechanisms can explain the varying strength of the correlation between stature and individual foot dimensions. Stature is primarily influenced by epiphyseal growth of long bones, a genetically regulated process closely associated with longitudinal dimensions, such as the foot length (Jee & Baron, 2016). Foot length shows a strong and consistent correlation with stature across populations and sexes (Kim et al., 2018). In contrast, foot breadth is more influenced by periosteal expansion, mechanical loading, body weight, footwear habits, and movement behavior, leading to greater interindividual variability (Xiong et al., 2009). Foot breadth shows a weaker relationship with stature (Singh et al., 2019), especially in men, which can be attributed to sexual dimorphism, as men tend to have more robust and wider feet at comparable statures, resulting in reduced predictive value of this parameter (Luo et al., 2009; Putti et al., 2010; Singh et al., 2019). Wunderlich and Cavanagh (2001) confirmed that women's feet differ from men's in several characteristics, such as the arch, toes, the ball of the foot, and the lateral side of the foot, which are important when designing shoes.

Environmental influences such as nutrition, physical activity, habitual footwear, and secular trends change the shape and size of the foot over time, regardless of body type. Regression equations developed for one demographic group or time period may not apply accurately to another (Kouchi, 2003). Each researcher on this issue has developed population-specific regression formulas. Some take sex into account; others take laterality into account as well. Our goal was to identify the effectiveness of stature estimation equations for the Eastern Slovak population. The regression equation by Titlbach et al. (1971) was created for forensic practice at a time when the Slovak population was part of Czechoslovakia. Although this equation was based on foot dimensions, it proved inappropriate for the current population living in Eastern Slovakia, which may be attributed to secular trends in stature across generations. Our results showed that the regression equations of Uhrová et al. (2015) were the best for estimating stature from foot dimensions for the Eastern Slovak population. Their research followed young Slovak students and used correlation and regression analysis to determine the relationships between stature and measurements of the feet and hands. Moreover, the equations of Uhrová et al. (2015) were also based on foot laterality and sexual dimorphism. Our study also used equations from Strnadová et al. (2014) for the Czech population and from Cyplík and Chojak (2010) for the Polish population, which share borders and ethnic origins with Slovakia. However, a comparison of estimated and actual stature showed that the accuracy of these equations varied depending on sex and foot laterality. In both equations, we also observed statistically significant differences between the estimated and actual stature in the analyzed groups. These findings suggest that even geographically close and ethnically similar populations may differ in anthropometric characteristics, potentially affecting the reliability of stature-estimation models.

Our results contribute to the importance of introducing an optimal population-specific regression equation for estimating stature into Slovak forensic practice, which could help analyse foot in forensic investigations. We confirm the opinion of other authors that different regression equations need to be developed for various populations and ethnic groups (Ashizawa et al., 1997; Hisham et al., 2012; Parlak et al., 2024; Singh et al., 2019) due to different cultures and lifestyles, mechanical effects of use and wear, and physical stress affecting body morphology and height changes (Bagga, 2013). These aspects must also be kept in mind when we create an individual profile from foot dimensions. The data and equations we present might be valuable in future anthropological and forensic research, as well as genetic studies and medical practice.

Conclusion

The presented anthropometric study contributes to the existing data on foot dimensions in Slovak adults. The following key findings were observed: a statistically significant difference in foot measurements between males and females, in right and left foot breadth, and between actual stature and foot length. These findings confirmed the presence of sexual dimorphism and bilateral asymmetry in foot dimensions and predicted stronger correlations between foot dimensions and actual stature in females. The findings underline the necessity of using population-specific regression equations when estimating stature from foot dimensions in forensic contexts. Among available regression equations for stature estimation, the formulas suggested by Uhrová et al. (2015), which accounted for laterality and sex, were the most accurate in our study group. Therefore, we recommend their application and have also proposed our formulas, which should be verified in other Slovak research groups. These findings have potential for use in Slovak forensic practice, particularly for cases involving the analysis of foot.

Contributions from individual authors

E. Petrejčíková, M. Zigová, contributed to conception and design, data acquisition, drafted and critically revised the manuscript; J. Gaľová, L. Kmeťová, contributed to conception and design, data acquisition, and critically revised the manuscript; S. Kalafutová, M. Pavlíčková, contributed to design, data analysis and interpretation, and critically revised the manuscript. All authors gave their final approval and agreed to be accountable for all aspects of the work.

Ethics Statement

All anthropological procedures performed in this study were in accordance with the ethical standards of the research committee at the University of Prešov (No. ECUP -022023PO) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Financial Disclosure

The research was supported by grants from the EU NextGenerationEU, through the Recovery and Resilience Plan for Slovakia under the project No. 09I03-03-V05-00006 (GAPU_VF/22) and by the Scientific Grant Agency under grant No. VEGA 1/0055/26.

Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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