

CORRELATION BETWEEN DIMENSION OF FINGERS PHALANX PROXIMAL AND HEIGHT IN THE AGE OF 18-45 YEARS OLD

**Talitha Lailatul Hafizah¹, Dedi Afandi², Chunin Widyaningsih²,
Fajri Marindra Siregar³**

¹Program of Medical Study, Riau University

²Department of Forensic and Medicolegal, Faculty of Medicine, Riau University

³Department of Biochemistry, Faculty of Medicine, Riau University

Email korespondensi: talithaelhafizah@gmail.com

Abstract: *Height is one of the data needed in forensic identification process of a remains that is difficult to identify in an incomplete condition. Height estimation can be determined by the proximal phalanx of the fingers which are long bones. This study was conducted on 113 men and 125 women in several places in Riau Province age 18 - 45 years. The height and dimensions of the proximal phalanx of the fingers are measured to get the correlation and linear regression formula for height. There are 6 dimensions measured on the fingers of the left and right hand. The study design was cross sectional. The statistical test used is Pearson correlation to determine the correlation between dimensions of the proximal phalanx on fingers with height and linear regression analysis for height regression formula. The results show that some dimensions of the proximal phalanx of the fingers are significantly correlated with height.*

Keywords: *identification, height, dimensions of the proximal phalanx bone fingers, correlation, regression formula.*

INTRODUCTION

Forensic identification is a process that has an primary role in the examination of someone who has died¹ due to several events such as accidents, natural disasters, killing², and parts of the human body or a mutilated, amputated and decomposed framework.³ Identification process can be more demanding when the corpse condition is heavily damaged, mutilated, or only as the bones that made it hard to be identified. One way to do forensics identification is identifying the bones, using human bones. Bones identification can be used to prove that the bone or skeleton found is human bone or skeleton, approximation of height, race, gender, age, and special marks.⁴

In a certain condition, the corpse height can not be determined, and need another parameter from the other body parts to approximate the height.² Determination of height can use certain long bones and complementary bones because the proportion of body parts can represent an estimate of height. The existence of this relationship is very important in anthropology and medicolegal in determining height and based on race.^{3,5} The principle of identifying the framework for estimating body height is to utilise the formula for approximating the height of certain body parts.⁶ Determining the specific features and similarities of a race can also be done through approximating the body height using bone.⁷ The three main races in human population spreaded all over the world are caucasian, negroid, and mongoloid. Trotter and Gleser stated that there are differences in the correlation of height and the length of long bone in those three races, so that a proper regression equation is needed to determine a person's height that belongs to a racial group.⁸

Human height after aged 45 years old will be shorten around 0,16 cm in every year that determination of height approximation using certain bone will be more accurate if the response is under 45 years old.⁸ The corpse from natural

disasters, traffic accidents, or criminal doing often in an incomplete condition and found only for some of the body parts. This condition causes the investigators face difficulties to identify the victim.⁹ The victim who is found only some of his body parts needs skeleton identification through determination of approximated height which is the main step in medicolegal because if there is an error in identifying victim, will make a fatal result in the justice process.^{4,10}

Although there has been some study about height approximating using the size of fingers phalanx, but the regression formula is different because done in different country and race. The coefficient value of the proximal phalanx size to height in the study result shows the most significant than medial and distal phalanx.¹¹

The need to find a regression model to find the approximate height formula using the dimensions of the phalanx fingers is still needed because there are different regression formulas in different populations and countries and this research has never been done in Indonesia.^{12,13} Shintaku et al in 1990 examined estimates of height based on proximal phalanx bone length in 213 Japanese women aged 18-39 years. The results obtained are a significant correlation with the correlation coefficient (r) 0.521 - 0.696.¹⁴ In 2010, Habib and Kamal conducted a study of approximated height and length of hands and fingers on 159 students (77 women and 82 men) who live in Egypt. The results obtained are significant ($p < 0.05$) indicating that the phalanx bone can be used as a benchmark in measuring a person's height. Based on the description that has been described, the researcher wants to conduct a study to analyze the correlation and determine the approximate height formula using the dimensions of the proximal phalanx bone size of the fingers in Riau Province.

RESEARCH METHOD

This research is an analytic – cross sectional research, aimed to determine the

correlation between the dimensions of the proximal phalanx fingers and human body height, and to determine the formulas of body height approximation based on the dimension of proximal phalanx fingers according to its gender. The population was people who lives in Riau with age range 18 – 45 years old. There were 238 samples (113 of men and 125 of women) taken using accidental sampling technique. The research tools were vernier caliper, staturemeter, and quisioneer. The variables were dimensions of the proximal phalanx fingers and human body height. Inclusion criteria in this research was people in 18 –

45 years old, mongoloid, Riau’s people, and agreed to be a sample and fulfill the research procedure and signed the informed concent. The exclusion criteria was having bones abnormality that can affect body height and deformity of phalanx proximal of finger. The obtained data was anlyzed using statistic computer and served as table.

RESULTS AND DISCUSSION

Characteristics of research respondents are listed in Table 1, which obtained a total sample of 238 people (113 men and 125 women).

Table 1 The Characteristics of Respondents based on Genders and Ages

Gender	Age (y.o)		
	Median	Min	Max
Male (n=113)	21	18	45
Female (n=125)	22	18	45

Table 2 shows descriptive statistics of height measurements and Table 3 shows descriptive statistics of the dimensions of

the proximal phalanx bones of the fingers of male and female respondents.

Table 2 Respondents Height based on Genders

Variable (cm)	Male (n=113)				Female (n=125)			
	Median	Min	Max	SD	Median	Min	Max	SD
TB	166,277	155	181	5,870	156,808	145	171	5,375

Table 3 Dimension Value of Phalanx Bone Proximal Fingers Size Left Hand and Right Hand by Gender

Variable (cm)	Male (n=113)				Female (n=125)			
	Left		Right		Left		Right	
	Median	SD	Median	SD	Median	SD	Median	SD
Thumb (D1)								
D1P	4,64	0,32	4,60	0,39	4,16	0,28	4,04	0,40
D1LBs	2,10	0,22	2,15	0,26	1,76	0,20	1,84	0,21
D1TBs	2,08	0,24	2,15	0,21	1,81	0,26	1,84	0,30
D1LKr	1,37	0,18	1,38	0,15	1,18	0,21	1,25	0,21
D1LKp	1,63	0,20	1,70	0,19	1,40	0,23	1,47	0,25
D1TKp	1,40	0,14	1,45	0,18	1,28	0,20	1,29	0,20
Index Finger (D2)								
D2P	5,73	0,41	5,73	0,39	5,15	0,33	5,18	0,35
D2LBs	2,05	0,36	2,06	0,33	1,56	0,29	1,68	0,25
D2TBs	2,19	0,27	2,26	0,23	1,81	0,30	1,93	0,33
D2LKr	1,37	0,18	1,41	0,15	1,18	0,25	1,25	0,24
D2LKp	1,52	0,18	1,58	0,15	1,33	0,23	1,41	0,22
D2TKp	1,43	0,43	1,45	0,17	1,22	0,19	1,27	0,19
Middle Finger (D3)								
D3P	6,18	0,55	6,24	0,45	5,66	0,42	5,51	0,47
D3LBs	1,71	0,30	1,79	0,28	1,32	0,24	1,45	0,20
D3TBs	2,26	0,40	2,37	0,38	1,78	0,41	1,92	0,41
D3LKr	1,31	0,16	1,33	0,16	1,15	0,20	1,21	0,22
D3LKp	1,54	0,18	1,58	0,17	1,33	0,22	1,40	0,20
D3TKp	1,47	0,16	1,55	0,17	1,30	0,19	1,36	0,19
Ring Finger (D4)								
D4P	5,71	0,41	5,77	0,35	5,17	0,36	5,18	0,55
D4LBs	1,48	0,25	1,48	0,27	1,24	0,31	1,16	0,24
D4TBs	2,00	0,32	2,09	0,38	1,63	0,33	1,69	0,41
D4LKr	1,21	0,17	1,25	0,18	1,04	0,21	1,11	0,20
D4LKp	1,44	0,18	1,48	0,15	1,23	0,22	1,28	0,20
D4TKp	1,40	0,14	1,45	0,15	1,20	0,21	1,30	0,20
Little Finger (D5)								
D5P	4,66	0,41	4,80	0,48	4,15	0,45	4,30	0,70
D5LBs	1,63	0,34	1,79	0,37	1,20	0,35	1,24	0,30
D5TBs	1,80	0,28	1,86	0,32	1,43	0,29	1,43	0,38
D5LKr	1,15	0,13	1,18	0,15	0,99	0,20	1,06	0,25
D5LKp	1,26	0,14	1,31	0,21	1,07	0,18	1,11	0,21
D5TKp	1,19	0,16	1,24	0,14	1,00	0,17	1,06	0,18

D1: Proximal thumb phalanx
 D2: Proximal phalanx of the index finger
 D3: Proximal phalanx of middle finger
 D4: Proximal phalanx of ring finger
 D5: Proximal phalanx of little finger
 P: Proximal phalanx bone length
 LBs: Base width of proximal phalanx

TBs: Thick base of proximal phalanx
 LKr: Width of corpus proximal phalanx
 LKp: The width of the proximal phalanx head
 TKp: The thick of proximal phalanx head
 SB: Standard deviation

There are differences in results between the genders: the size is greater for male respondents than for women. This is because there are differences in sexual dimorphism in terms of duration and a faster growth rate in men than women.¹⁵ Another theory states that the ratio of the difference in height of men and women is 100: 90 so that there are indirectly differences in the dimensions of the size of the proximal phalanx of the fingers based on gender.¹⁶ The difference in the average value of the dimensions of fingers proximal phalanx between the male and female in Mahakkanukrauh P studies compared by the researchers was based on the state of the bones when measured. The Mahakkanukrauh P study was carried out directly on the proximal phalanx bone in dry conditions¹⁷, while the researchers took measurements of the condition of the tissue that was still clad in skin, muscle, cartilage, and joints. The correction factor for proximal phalanx bone size has not yet been found so that the results of this research are better applied to the condition of intact fingers.

The analysis result of correlation between the dimensions of the size of the proximal phalanx of the fingers based on gender served in Table 4. The correlation coefficient obtained in varies. In male respondents, the highest correlation value (r) dimension of the proximal phalanx bone of the left hand was the length of the proximal phalanx of the left index finger (D2P) which showed a positive correlation with moderate correlation strength, which was 0.475 and the significance value (p) <0.01. On the right side, the highest correlation value (r) dimension of the proximal phalanx of the fingers was the length of proximal phalanx of the right middle finger (D3P) which showed a positive correlation with the strength of the strong correlation, which was 0.583 and the significance value (p) <0, 01. Research by

Agrawal J on male respondents also found the length of proximal phalanx bone of middle finger (D3P) with the highest correlation coefficient (r) than the length of other proximal phalanx fingers, namely 0.594 with a strong and significant correlation strength (p <0.01).¹⁸

From female respondents obtained the correlation value (r) the highest dimension of the proximal phalanx of the left hand finger was width of proximal phalanx base of the left ring finger (D4LBs) which showed a positive correlation with moderate correlation, which was 0.398 and the significance value (p) <0,01. On the right side, the highest correlation coefficient (r) for female respondents was the length of right proximal phalanx bone (D4P) which showed a positive correlation with moderate correlation 0.494 and the significance value (p) <0.01. Research by Habib SR and Kamal NN as well as Jasuja OP and Singh G also found the length of proximal phalanx of ring finger (D4P) as a dimension the proximal phalanx bone size with the highest correlation of the length of the other fingers proximal phalanx to height but on the left. Correlation coefficient (r) in both studies were 0.36611 and 0.4796 (medium correlation strength), respectively.

The difference in correlation between the size dimensions of the proximal phalanx of male and female respondents in this study might be due to differences in the number of respondents, height, and the determination of anatomical points of the dimensions of the size of the proximal phalanx bone of the fingers.¹⁶ The difference in the value of the correlation coefficient (r) of this study with previous studies is due to location and different ethnic types.¹⁵ Factors that influence height growth include ethnic or race. Each race has different bone characteristics and density so that it affects body height.¹⁹

Table 4 The Correlation of Phalanx Bone Proximal Fingers Size Dimension for Left Hand and Right Hand by Gender

Variable (cm)	Male (n=113)				Female (n=125)			
	Left		Right		Kiri		Left	
	r	p	r	p	r	p	r	p
Thumb (D1)								
D1P	0,410**	0,000	0,518**	0,000	0,191*	0,033	0,044	0,627
D1LBs	0,298**	0,001	0,243**	0,010	0,107	0,234	0,208*	0,020
D1TBs	0,318**	0,001	0,376**	0,000	0,235**	0,008	0,367**	0,000
D1LKr	0,110	0,246	0,123	0,195	0,180*	0,045	0,157	0,081
D1LKp	0,362**	0,000	0,297**	0,001	0,047	0,606	0,213*	0,017
D1TKp	0,172	0,069	0,025	0,792	0,214*	0,017	0,245**	0,006
Index Finger (D2)								
D2P	0,475**	0,000	0,539**	0,000	0,365**	0,000	0,199*	0,026
D2LBs	0,221*	0,019	0,194*	0,039	-0,167	0,063	-0,106	0,240
D2TBs	0,238*	0,011	0,315**	0,001	0,142	0,114	0,352**	0,000
D2LKr	0,288**	0,002	0,273**	0,003	0,229*	0,010	0,184*	0,040
D2LKp	0,270**	0,004	0,255**	0,006	0,146	0,104	0,131	0,145
D2TKp	-0,008	0,929	0,224*	0,017	0,197*	0,027	0,277**	0,002
Middle Finger (D3)								
D3P	0,402**	0,000	0,583**	0,000	0,394**	0,000	0,188*	0,036
D3LBs	0,209*	0,026	0,146	0,122	0,141	0,117	0,229*	0,010
D3TBs	0,453**	0,000	0,405**	0,000	0,057	0,530	0,243**	0,006
D3LKr	0,260**	0,005	0,257**	0,006	0,310**	0,000	0,318**	0,000
D3LKp	0,348**	0,000	0,299**	0,001	0,113	0,209	0,064	0,480
D3TKp	0,280**	0,003	0,143	0,130	0,317**	0,000	0,317**	0,000
Ring Finger (D4)								
D4P	0,430**	0,000	0,475**	0,000	0,380**	0,000	0,494**	0,000
D4LBs	0,105	0,266	0,258**	0,006	0,398**	0,000	-0,070	0,436
D4TBs	0,369**	0,000	0,293**	0,002	0,075	0,409	0,120	0,182
D4LKr	0,315**	0,001	0,225*	0,016	0,225*	0,012	0,185*	0,039
D4LKp	0,344**	0,000	0,293**	0,002	0,063	0,482	0,086	0,340
D4TKp	0,284**	0,002	0,195*	0,039	0,251**	0,005	0,257**	0,004
Little Finger (D5)								
D5P	0,440**	0,000	0,329**	0,000	0,288**	0,001	0,471**	0,000
D5LBs	0,261**	0,005	0,175	0,064	-0,416**	0,000	-0,229*	0,010
D5TBs	0,395**	0,000	0,295**	0,002	0,235**	0,008	0,183*	0,041
D5LKr	0,250**	0,008	0,265**	0,004	0,234**	0,009	0,163	0,070
D5LKp	0,199*	0,034	0,184	0,051	0,150	0,095	0,180*	0,045
D5TKp	0,108	0,253	0,283**	0,002	0,237**	0,008	0,285**	0,001

**Significant at level 0.01 (2-tailed)

* Significant at level 0.05 (2-tailed)

D1: Proximal thumb phalanx

D2: Proximal phalanx of the index finger

D3: Proximal phalanx of middle finger

D4: Proximal phalanx of ring finger

D5: Proximal phalanx of little finger

P: Proximal phalanx bone length

LBs: Base width of proximal phalanx

TBs: Thick base of proximal phalanx

LKr: Width of corpus proximal phalanx

LKp: The width of the proximal phalanx head

TKp: The thick of proximal phalanx head

r: Coefficient of correlation

p: Value of significance (p value)

The length of the proximal phalanges in each finger was the dimension that most correlated with height in the results of this study. This discovery was due to a relationship between the growth of long bones in line with human height.²⁰ Estimates of height in forensic identification are more often used to measure the length of the long bones because they have a stronger correlation with minimal errors. Methods of measuring height using long bones for the purposes of forensic identification are increasingly being developed. The reason is that the condition of the corpse is in a fragmented state and only in the form of remains of certain body parts which will make examination and analysis for medicolegal purposes more difficult. The remaining parts of the body that are found are not always in the form of the bones of the upper limbs, lower limbs and arm bones which are long bones so that it is necessary to develop various new measurement methods with other long bones, one of which is the phalanx.²¹ The results of the correlation analysis in this study indicate that the proximal phalanx bone can be used as a new method in the application of forensic identification because it has a significant correlation with height on several measurement dimensions, especially the length of the proximal phalanx bone.

Linear regression analysis in this study is listed in Table 5. The formulas for estimating height obtained using linear regression are obtained using the dimensions of the bone size of the proximal phalanx of the fingers which have a significant correlation. This research was conducted in the age range 18-45 years, so a correction factor is needed for the use of the formula for estimating height at over 25 years of age of 0.16 cm per year.

The comparison of the results of the height of this study with the Jasuja OP-

Singh G, and Habib SR-Kamal NN formulas is listed in Table 6. The Jasuja OP-Singh G formula was carried out in 2004 with a total of 60 respondents from the population of the Jat Sikh tribe in North India who are the Mongoloid race. The Habib SR-Kamal NN formula was carried out in 2009 with a total of 159 respondents in the population in Egypt and various unknown races.

The regression formula that can be compared is that there is a variable length size of the proximal phalanx of the index finger to the little finger. From the comparison of formulas in Table 5, the difference in height results is quite large in the use of the Jasuja OP-Singh G and Habib SR-Kamal NN formulas than the researchers' formulas when compared to actual height. The difference between the results of the researcher's formula and the actual height is not that far and can still represent a person's height. Meanwhile, the Jasuja OP-Singh G and Habib SR-Kamal NN formulas showed very different height results. This is based on the average height of respondents in the Jasuja OP-Singh G and Habib SR-Kamal NN studies with different researchers and carried out on populations in different countries. Height growth is influenced by ethnicity and race, which means that the application of the height regression formula should be adjusted according to the origin of the population in the research that has been carried out in order to obtain more accurate results. Gender is also a factor that differentiates human height growth, so it is necessary to determine a regression formula for estimating height according to sex.⁴ Variations in determining body height based on bone have been widely used, but the most accurate and reliable is the linear regression method.¹⁶

Table 5 Formulas for Estimating Height with Dimensions of the Proximal Phalanx Bone Size of the Fingers based on Gender

Gender	Variable	r	Linear Regrassion	SEE	
Male	Left				
	D1P	0,410	TB = 131,69 + 7,45(D1P)	5,38	
	D1LBs	0,298	TB = 149,60 + 7,95(D1LBs)	5,63	
	D1TBs	0,318	TB = 150,03 + 7,80(D1TBs)	5,59	
	D1LKp	0,362	TB = 149,16 + 10,48(D1LKp)	5,50	
	D2P	0,475	TB = 127,13 + 6,83(D2P)	5,19	
	D2LKr	0,288	TB = 153,08 + 9,62(D2LKr)	5,64	
	D2LKp	0,270	TB = 152,95 + 8,79(D2LKp)	5,68	
	D3P	0,402	TB = 139,64 + 4,31(D3P)	5,40	
	D3TBs	0,453	TB = 151,24 + 6,66(D3TBs)	5,26	
	D3LKp	0,348	TB = 149,05 + 11,19(D3LKp)	5,53	
	D3TKp	0,280	TB = 150,72 + 10,57(D3TKp)	5,66	
	D4P	0,430	TB = 131,42 + 6,11(D4P)	5,32	
	D4TBs	0,369	TB = 152,81 + 6,74(D4TBs)	5,48	
	D4LKr	0,315	TB = 153,29 + 10,75(D4LKr)	5,60	
	D4LKp	0,344	TB = 149,71 + 11,49(D4LKp)	5,54	
	D4TKp	0,284	TB = 150,19 + 11,52(D4TKp)	5,65	
	D5P	0,440	TB = 136,96 + 6,29(D5P)	5,29	
	D5TBs	0,395	TB = 151,50 + 8,21(D5TBs)	5,42	
	Female	Right			
		D1P	0,518	TB = 129,99 + 7,89(D1P)	5,05
		D1TBs	0,376	TB = 144,02 + 10,35(D1TBs)	5,46
		D1LKp	0,297	TB = 150,74 + 9,15(D1LKp)	5,63
		D2P	0,539	TB = 119,48 + 8,16(D2P)	4,96
		D2TBs	0,315	TB = 147,96 + 8,11(D2TBs)	5,60
		D2LKr	0,273	TB = 151,51 + 10,49(D2LKr)	5,67
		D3P	0,583	TB = 118,92 + 7,59(D3P)	4,79
		D3TBs	0,405	TB = 151,57 + 6,20(D3TBs)	5,39
		D3LKp	0,299	TB = 150,17 + 10,20(D3LKp)	5,63
		D4P	0,475	TB = 120,48 + 7,94(D4P)	5,19
		D4TBs	0,293	TB = 156,73 + 4,57(D4TBs)	5,64
		D4LKp	0,293	TB = 149,13 + 11,56(D4LKp)	5,64
		D5P	0,329	TB = 146,94 + 4,03(D5P)	5,57
		D5TBs	0,295	TB = 156,19 + 5,41(D5TBs)	5,63
		D5LKr	0,265	TB = 153,69 + 10,68(D5LKr)	5,68
D5TKp		0,283	TB = 151,98 + 11,51(D5TKp)	5,65	
Female		Left			
		D2P	0,365	TB = 126,31 + 5,92(D2P)	5,03
		D3P	0,394	TB = 128,34 + 5,03(D3P)	4,96
		D3TKp	0,317	TB = 145,07 + 9,03(D3TKp)	5,12
		D4P	0,380	TB = 127,67 + 5,64(D4P)	4,99
		D4LBs	0,398	TB = 148,20 + 6,93(D4LBs)	4,95
		D5P	0,288	TB = 142,42 + 3,46(D5P)	5,17
		Right			
		D1TBs	0,367	TB = 144,60 + 6,64(D1TBs)	5,02
		D2TBs	0,352	TB = 145,59 + 5,81(D2TBs)	5,05
		D3LKr	0,318	TB = 147,25 + 7,91(D3LKr)	5,12
		D3TKp	0,317	TB = 144,52 + 9,01(D3TKp)	5,12
		D4P	0,494	TB = 131,89 + 4,81(D4P)	4,69
		D5P	0,471	TB = 141,21 + 3,63(D5P)	4,76
		D5TKp	0,285	TB = 147,89 + 8,45(D5TKp)	5,17

- D1: Proximal thumb phalanx
- D2: Proximal phalanx of the index finger
- D3: Proximal phalanx of middle finger
- D4: Proximal phalanx of ring finger
- D5: Proximal phalanx of little finger
- P: Proximal phalanx bone length
- LBs: Base width of proximal phalanx
- TBs: Thick base of proximal phalanx
- LKr: Width of corpus proximal phalanx
- LKp: The width of the proximal phalanx head
- TKp: The thick of proximal phalanx head
- r: Coefficient of correlation
- SEE: Standard Errpr of Estimate

Table 6 Comparison of Height Measures with Researcher's Formula, Jasuja OP-Singh G, and Habib SR-Kamal NN

Gender	Finger	Formula						The Real Height
		Peneliti		Jasuja OP-Singh G		Habib SR-Kamal NN		
		Left	Right	Left	Right	Left	Right	
Male	D2P	169,50	171,46	204,93 – 214,59	206,33 – 215,99	199,14 – 213,44	220,12 – 233,86	170 cm
	D3P	168,00	167,90	177,33 – 188,13	177,11 – 187,91	230,86 – 243,96	237,57 – 251,15	
	D4P	169,00	169,47	180,13 – 190,91	180,17 – 190,95	234,36 – 247,36	231,42 – 244,66	
	D5P	167,40	166,93	183,84 – 185,33	184,37 – 194,86	193,49 – 206,95	202,00 – 215,74	
Female	D2P	154,13	-	161,47 – 171,94	161,75 – 172,21	167,86 – 178,54	183,87 – 194,05	154 cm
	D3P	154,50	-	156,65 – 167,17	156,65 – 167,17	189,08 – 199,36	196,61 – 206,35	
	D4P	154,74	157,38	160,24 – 170,68	161,30 – 171,74	177,82 – 188,04	189,81 – 200,01	
	D5P	154,88	151,37	156,30 – 166,82	155,53 – 166,05	170,37 – 180,33	163,22 – 173,06	

- D2P: Height of Proximal phalanx of the index finger
- D3P: Height of Proximal phalanx of middle finger
- D4P: Height of Proximal phalanx of ring finger
- D5P: Height of Proximal phalanx of little finger

This research height formula can be a new formula in determining height based on the length of the proximal phalanx of the fingers in men and women, especially in Indonesia. The importance of this researcher's regression formula is because it was examined on a sample that is still complete and allows for victims of accidents, mutilations, and natural disasters whose bodies are still intact and have not become bones. The number of height regression formulas found in this study can be applied to the condition of the discovery of bodies where only the proximal phalanx of the fingers is not intact and can only be

measured one dimension of the proximal phalanx bone only.

CONCLUSSION

Based on the results and discussion above, it can be concluded that there is a significant relationship between several dimensions of the size of the proximal phalanx of the fingers with height based on sex and a height regression formula can be searched based on the dimensions of the proximal phalanx bone size of the fingers in males and females. It is necessary to conduct a research estimating the height at the age under 18 years so that it can be used

in the population of children and adolescents.

It is also necessary to do research on correction factors for the population in Indonesia on soft tissue, muscles, skin, cartilage, and joints in the proximal phalanx of the fingers so that an estimate of height is more accurate based on the dimensions of the size of the proximal phalanx of the fingers.

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