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DETERMINING HEIGHT BASED ON HAND LENGTH IN TOBA BATAK TRIBE STUDENTS

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Abstract:
Indonesia is famous for being a maritime country or the largest archipelagic country in the world that has a diversity of terrain. Geologically, Indonesia is the meeting area of 3 large tectonic plates, namely the Indo-Australian plate, Eurasia, and the Pacific plate. The Indo-Australian plate collides with the Eurasian plate off the coasts of Sumatra, Java and Nusa Tenggara, while with the Pacific north of Irian and North Maluku. This geographical location can be the cause of various natural disasters such as volcanic eruptions, earthquakes, tsunamis, and so on. Not only natural disasters, crime cases also bring fatalities. According to data reported by the Central Statistics Agency, in 2022 there were 372,965 cases of crime, often found bodies in a state of decay, heavy damage or in the form of body pieces that sometimes only left a few parts of the body to be examined and identified. Methods: This research is an analytical research with a cross-sectional design, with the aim of finding the relationship between the free variable (hand length) and the dependent variable (height) in the Batak ethnicity.
Results: right and left hand length in males and females had a significant relationship with a p-value < 0.005 (p = 0.001), with a correlation rate varying from moderate to very strong r = 0.557 – 0.876
Conclusion: hand length has a relationship with height with a moderate to very strong correlation so that hand length can be used as a good predictor of height.

Keywords: hand length, height, identification

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Introduction

Indonesia is famous for being a maritime country or the largest archipelagic country in the world that has a diversity of terrain. Geologically, Indonesia is the meeting area of 3 large tectonic plates, namely the Indo-Australian plate, Eurasia, and the Pacific plate. The Indo-Australian plate collides with the Eurasian plate off the coasts of Sumatra, Java and Nusa Tenggara, while with the Pacific north of Irian and North Maluku. This geographical location can be the cause of various natural disasters such as volcanic eruptions, earthquakes, tsunamis, and so on. Not only natural disasters, crime cases also bring fatalities. According to data reported by the Central Statistics Agency, in 2022 there were 372,965 cases of crime, often found bodies in a state of decay, heavy damage or in the form of body pieces that sometimes only left a few parts of the body to be examined and identified.[1]

In 2024, data obtained from DIBI-BNPB shows that there were 485 disasters with 87 deaths, and in North Sumatra itself until April there were 16 disasters with 37 deaths.[2] The Central Statistics Agency, in 2022 stated that there were 372,965 cases of crime, of which crimes against life (murder) were 854 cases, of which in North Sumatra there were 84 cases.[3]

According to the American Board of Forensic Anthopology, forensic anthropology is the scientific application of physical anthropology to legal proceedings. The main goal of forensic anthropology is to identify unidentified victims, determine the cause of death, and provide important information to authorities incrime or disaster investigation. And for the measurement of height of humans for identification purposes, anthropometry is used.[4,5,6] Several studies related to palm length and height, including research by Christanti Sambeka in 2013 at the Faculty of Medicine of Samratulangi University, Manado, research by Nurul Ilmi Rahmatullah in 2018 at PSPD Sriwijaya University, Palembang, research by MD.Asadujjaman in 2019 in Bangladesh and research by Jansen Jakaria in 2022 on the Batak Toba and Sundanese tribes.[7,8,9,10] Research to find the relationship and formula between hand length and height in the Toba Batak tribe has never been conducted. This makes researchers interested in conducting research on the relationship between hand length and height in the Toba Batak tribe so that they get the formula as a contribution for researchers to complement similar research data on tribes in Indonesia.[11,12]

Methodology

Objective: The purpose of this study was to see if there was a significant relationship between a person's height (Batak tribe) and hand length, in male and female adults at the age of 21-25 years. Hypothesis: a significant relationship can be found between hand length and a person's height, a person's height can be calculated using hand length if there is a significant relationship between hand length and height.

Sample: this study was conducted on 56 adults with a total of 18 men and 38 women who are studying at the Faculty of Medicine, Methodist University of Indonesia, Medan. The subjects were selected according to the criteria, without body defects and body measurements were carried out after obtaining permission from the university. Measurements are made using a digital sliding caliper, the instrument is held in such a way that the tip of the sliding caliper is free to touch the fingertips. Improper stress is avoided when the measurement is made three times to avoid measurement errors.

The vertex is the highest point of the head in the middle of the sagittal plane, when the head is upright or in the Frankfurt plane, the height is measured from the vertex to the floor with the subject standing upright barefoot, upright on a flat floor, in the frankfurt plane, the subject's head is positioned parallel to the floor with the heel tight and the weight evenly distributed between the legs. The distance is measured from the highest point in the subject's head to the floor.

Observation and Calculation: this study was conducted on 56 adults, to evaluate the correlation between height and hand length and estimate a person's height (batak toba) using hand length. The data collected was analyzed by correlation test and regression test.

Results

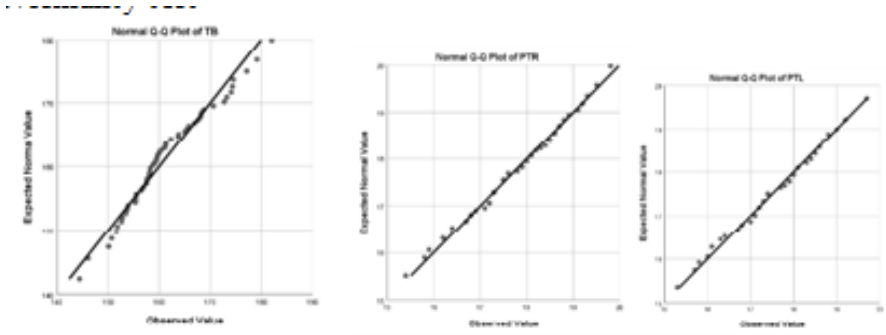
The results of the descriptive analysis related to age, height (TB), right hand length

Table 1 Descriptive statistics

Sample		Man	Woman
		18	38
Age	Eldest	24	24
	Youngest	21	21
	Mean	31,7105	21,4211
	Standard Deviation	0,84017	0,72154
Height	Longest	182	166,90
	Shortest	158	144,40
	Mean	170,0444	156,9447
	Standard Deviation	6,55073	4,85658
PTR	Longest	19,80	18,60
	Shortest	17,30	15,40
	Mean	18,6333	17,1421
	Standard Deviation	0,62214	0,81394
PTL	Longest	19,70	18,70
	Shortest	17,20	15,30
	Mean	18,6500	17,0395
	Standard Deviation	0,69473	0,84455

From the data above, it appears that the height and arm length of men are greater than that of women at the same age.

Normality test



Based on the Q-Q plot chart image of the normality variable Height and right and left hand length, most of the data distribution values are located around a straight line, this shows that the Height and hand length data are normally distributed.

Correlation test

Table 2 Correlation coefficient (level of relationship) of hand length with height in men and women

No.	Variable	R^2 (%)	SEE	*P-Value*	Correlation/r
1	PTRMF	68,2	4.62513	0,001	0,829
2	PTLMF	65,8	4,79323	0,001	0,815
3	PTRMF; PTLMF	68,6	4,59320	0,001	0,835

Ket.: SEE (standard error estimate), PTRMF (male and female right hand length), PTLMF (male and female left hand length)

In table 4.2 above, it was found that there was a significant relationship between hand length and height in men and women, with a p-value <0,05 (p="0,001)." long="" hand="" have="" value="" correlation="" very="" strong="" ;="" r=""> of 0.8 (0.815 – 0.835).

Table 4.2 shows the variables that have the strongest correlation if the PTR and PTL variables are found together, where in the correlation test using both variables at once (PTRMF; PTLMF), found a very strong correlation (r = 0.835).</0,05>

In the table above, it can be concluded that the PTRMF variable; PTLMF affects height by 68.6%. is the variable that has the most influence on height. And the best accuracy level in estimating height with Standard Error Estimation (SEE) = 4.59320.

4.2.2.1 Correlation test for women

Table.3 Correlation coefficient (level of relationship) of arm length with height in women

No.	Variable	R^2 (%)	SEE	*P-Value*	Correlation/r
1	PTRF	32.7	3,98328	0,001	0,588
2	PTLF	29,2	4,08750	0,001	0,557
3	PTRF; PTLF	34,1	3,94236	0,001	0,614

Ket.: SEE (standard error of estimation), PTRF (female right hand length), PTLF (female left hand length)

In table 4.3 above, it was found that there was a significant relationship between hand length and height in women with a p-value < 0.05 (p = 0.001). Hand length has a moderate to strong correlation value (r: 0.557 – 0.614). Table 4.3 also shows the variables that have the strongest correlation if the PTR and PTL variables are found together, where in the correlation test using both variables at once (PTRF; PTLF), a strong correlation was found (r = 0.614).

In the table above, it can be concluded that the PTRF variable; PTLF affects height by 34.1%. is the variable that has the most influence on height. And the best accuracy rate in estimating height with Standard Error Estimation (SEE) = 3.94236

4.2.2.2 Correlation test for men

Table. 4 Correlation coefficient (level of relationship) of arm length with height in men

No	Variable	R^2 (%)	SEE	*P-Value*	Correlation/r
1	PTRM	74,3	3,32114	0,001	0,871
2	PTLM	56,2	4,33472	0,001	0,767
3	PTRM; PTLM	73,6	3,36566	0,001	0,876

Ket.: SEE (standard error estimation), PTRM (male right hand length), PTLM (male left hand length)

In table 4.4 above, it is found that there is a significant relationship between hand length and height in men with a p-value of <0.05 (p = 0.001). Hand length has a strong correlation value and is very strong; (r = 0.7 – 0.8).

Table 4.4 shows that variables that have a very strong correlation if the PTR and PTL variables are found together, where in the correlation test using both variables at once (PTRM; PTLM), found a very strong correlation (r = 0.876).

In the table above, it can be concluded that the PTRM variable affects height by 74.3% is the most influential variable on height, and the best level of accuracy in estimating height with Standard Error Estimation (SEE) = 3.32114 as well as the most accurate variable in determining height using the hand length variable.

Discussion

The longest left hand length in the male respondent group was 19.70 cm, while the shortest was 17.20 cm with an average of 18.6500 cm with a standard deviation of 0.69473. In the group of female respondents, the longest left hand length was 18.70 cm, and the shortest was 15.30 cm. The average length of the left hand in the female group was 17.0395 cm with a standard deviation of 0.84455.

In the normality test, all variable dependent and independent data were normally distributed. So the data is continued with the Spearman correlation test. The results of the correlation test showed that all independent variables were related to height with a correlation level of "moderate" to "very strong" (r = 0.557-0.871).

The results of the correlation test of the dependent variable with the independent can be concluded that the PTRM variable has an effect on height by 74.3%. is the variable that has the most influence on height, and the best level of accuracy in estimating height with Standard Error Estimation / SEE = 3.32114 as well as the most accurate variable in determining height using the hand length variable.

BIBLIOGRAPHY

1. Nurhanisah Y, 2024. Indonesia baik : 4.940 Bencana Terjadi di Indonesia Sepanjang 2023. Diakses pada tanggal 16 April 2024. https://indonesiabaik.id/infografis/4940-bencana-terjadi-di-indonesia-sepanjang-2023
2. Badan Nasional Penanggulangan Bencana (BNPB). 2024. Data informasi Bencana Indonesia(DIBI). Jakarta. Diakses pada tanggal 16 April 2024. https://dibi.bnpb.go.id
3. Badan Pusat Statistik Sumatera Utara.2024. Banyaknya Peristiwa Kejahatan/Pelanggaran yang Dilaporkan menurut Jenis Kejahatan/Pelanggaran 2019-2021. Medan. Diakses pada tanggal 10 April 2024. https://sumut.bps.go.id/indicator/34/493/1/banyaknya-peristiwa-kejahatan-pelanggaran-yang-dilaporkan-menurut-jenis-kejahatan-pelanggaran.html
4. Nirmalasari nila. Identifikasi & fotografi forensik. Yogyakarta. 2020
5. PUSDOKKES POLRI, 2010. Pedoman Tentang Penatalaksanaan Disaster Victim Identification Bagi Polri. Jakarta. juni 2010:35-55.
6. Idries A M. Pedoman Ilmu Kedokteran Forensik. In: Sagung Seto; 2013.
7. Sambeka C, dkk. 2015. Hubungan Tinggi Badan Dengan Panjang Tangan Pada Mahasiswa Fakultas Kedokteran UNSRAT angkatan 2013. Ejournal.unsrat.ac.id/v3/index.php/ebiomedic/artcle/view/7126/6637
8. Rahmatullah Nurul Ilmi. Korelasi Tinggi Badan Dengan Ukuran dan Lebar Telpak Tangan Pada Subras Deutro Melayu. 2019. G researchgate.net/publication/331252739_Korelasi_Tinggi_Badan_dengan_Ukuran_Panjang_dan_Lebar_Telapak_Tangan_pada__Subras_Deutromelayu
9. Asadujjama, MD, et.al, 2019. Stature Estimation From Hand Anthropometric Measurements In Bangladeshi Population. Journal homepage: www.elsevier.com/locate/yjflm
10. Zansen J.2022. perbandingan penentuan formula tinggi badan berdasarkan panjang telapak tangan antara suku batak Toba dengan suku sunda. https://repositori.usu.ac.id/handle/123456789/86519
11. Kementerian Pendidikan dan Kebudayaan. 2017. Indonesia Kaya : Ilmu Pengetahuan Sosial. Jakarta. Diakses pada 14 Maret 2024. https://banpaudpnf.kemdikbud.go.id/upload/download-center/IPS%20_Modul%201%20_Indonesia%20Kaya_Paket%20B_1563779609.pdf
12. Sherwood, L.Human Physiology:From Cells to System.Cengage Learning(2016)
13. Kamus Besar Bahasa Indonesia. Diakses pada tanggal 10 April 2024. https://kbbi.web.id/identifikasi
14. Quinney Randolph S Patrick, et.al, 2011. Forensic Anthropology.https://www.researchgate.net/publication/265600814_Forensic_Anthropology
15. Glinka J, Artaria M, Koesbardiati T. *Metode Pengukuran Manusia*. Airlangga University Press; 2008.

16. Perhimpunan Ergonomi Indonesia. 2013. Antropometri. Diakses pada tanggal 16 April 2024. https://antropometriindonesia.org/index.php/detail/sub/3/4/45/d28
17. Syagata AS, Rohmah FN, Khairani K, Arifah S. Evaluasi pelaksanaan pengukuran tinggi badan oleh kader Posyandu di Wilayah Yogyakarta. *Jurnal Kebidanan dan Keperawatan Aisyiyah*. 2021;17(2):195-203. doi:10.31101/jkk.2311
18. Prof.Friedrich Paulsen & Prof.Jens Waschke, Sobotta , Atlas Anatomi Manusia,Anatomi Umum dan Sistem Muskuloskletal Edisi 24, Elsevier 2017