



PREDICTION OF STATURE BY USING HAND LENGTH AND BREADTH AMONG YOUNG ADULTS

Forensic Medicine

**V P Kumar
Sriperumbuduru***

Assistant professor, Department of forensic medicine & Toxicology, ASRAM Medical College, Eluru, Andhra Pradesh, India. *Corresponding Author

Navajyothi Dalayi

Senior Lecturer, Department Of Anatomy, Perdana University Graduate College Of Medicine, Malaysia.

ABSTRACT

Introduction: Previous studies have shown that various measurements of the body tend to differ in various ethnic groups. The current study is an attempt to create a regression equation for determining the relationship between stature and measurements of hand length and breadth among Malaysians while taking the gender of different ethnic groups into consideration. It is an attempt to assess the reliability of identifying individuals among Malaysian's based on variations hand length and breadth measurements and stature of every different ethnic groups and gender. **Materials & Methods:** measuring the hand length and breadth and stature according to the anthropometric measurement of hand length and breadth and stature, where the data is obtained by random sampling method from 276 Malaysian young adults, male and female, striated across the ethnic group, where 92 subjects were selected from each group. **Result:** the obtained result shows a statistically significant positive correlation between hand length and breadth and stature. Pearson correlation shows ($r = 0.24$) for the hand length associated with stature and ($r = 0.40$) for the handbreadth associated with stature respectively. A linear regression equation was determined for the estimation of stature. **Conclusion:** The present study has shown a definite correlation between stature and hand length and breadth also regression equation was formed in the sample studied. There is no significant relationship between different ethnic group among Malaysians. Thus, the regression test analysis shows the hand length and breadth provides a better prediction of stature. The overall study is helpful during certain circumstances such as mass disasters, accidents or murders in Malaysia or even in other countries that was to identify the individual of Malaysian young adults.

KEYWORDS

Stature, Hand length, Handbreadth, the Regression equation

INTRODUCTION

Identifying the remains of an unknown individual is an important part of the forensic investigation. Identification can become difficult when a complete body is not available. investigation. Identification can become difficult when a complete body is not available. The determination of stature, along with sex, age, and ethnicity, is an important part of the identification process it has been shown that stature can be assessed from the hand, foot, or footprints, or from a shoe prints left at the crime scene¹. Forensic anthropometries play a major role there as they provide a tentative identification of unknown remains by formulating a 'biological profile', which involves the determination of stature, sex, age and ethnicity, Malaysia is a country with many different races, the major three ethnic groups are Malay, Indian, and Chinese. Thus, the stature of the Malaysian adults observed to be varying or similar owing to the variation of gender and race in the population. Although there are many studies have been done to show the relationship between bone measurement and the stature estimation, there is only one report about Malaysian population². So, the current study is intended to create a regression formula related to determining the relationship between stature and measurements of hand length and breadth in Malaysia, with taking in consideration of gender of different race groups.

MATERIALS AND METHOD

A cross-sectional study was conducted on 276 Malaysian men and women from different races which would be 46 Malay male and 46 Malay female, 46 Indian males and 46 Indian females, 46 Chinese male and 46 Chinese female. Populations which are to be taken as samples are young adults who are in the age range of 18-35 who are residing or working in Shah Alam. Methods of anthropometric measurement of hand length and breadth and stature are, first, the stature measurement will be measured in centimeters. Each subject will be requested to stand barefoot on a smooth and level surface. According to the Frankfurt Plane, the height will be taken from upright to the floor on anatomical position.

Hand length was defined as the linear distance between the distal wrist crease and the distal end of the most anterior projecting point. The subjects were requested to put their hands supine on a hard even surface with fingers extended and adducted, following which the hand length was estimated. Care was taken to see that there was no abduction or adduction at the wrist joint, i.e., the forearm was directly in line with the middle finger. Hand lengths were taken independently on left and right sides of each individual using Vernier calliper. Furthermore, the measurement was recorded by the same person to minimize the errors in metrology.

RESULTS

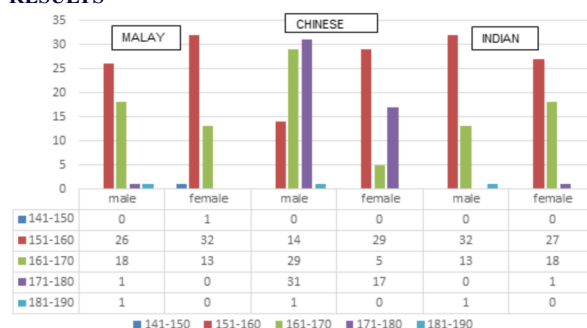


Figure 1: Description Of The Distribution Of Male And Female In Each Race On The Stature Range.

Figure 1 describes the number of male and female in each stature range among each race which is Malay, Indian and Chinese. The data shows male among the three races are in the stature range of (151-160), where Malay (26), Chinese (14), and Indian (32), followed by range of (161-170), found to be Malay (18), Chinese (29) and Indian (13), in the range of (171-180) the number of Malay was (1), Chinese (31) and (0) Indian, lastly in the range of (181-190) where Malay (1), Chinese (1) and (1) in Indian. On the other column the data shows female among the three race in the stature range (141-150) Malay (1), Chinese and Indian (0), followed by range of stature (151-160) where Malay (32), Chinese (29) and Indian (27), then in the range of (161-170), where Malay (13), Chinese (5) and Indian (18). in the range (171-180) where Malay (0), Chinese (17) and Indian (1) lastly no stature.

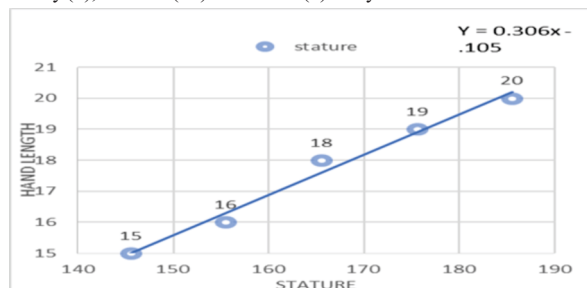


Figure 2 Linear Regression And Correlation Of Hand Length And Stature.

Regression Equation	(r)	P- value
$S = 0.31 \times \text{RHL} + 0.11 \times \text{LHL}$	0.24	<0.05
$S = 0.20 \times \text{RHB} + 0.51 \times \text{LHB}$	0.40	<0.05

Figure 3 The Linear Regression Analysis.

Figure 2 above is showing the linear regression and correlation of the hand length and stature. The graph was plotted from the values shown in table 4.9.1 which is the mean value of overall Malaysians stature on each range and the mean value of overall Malaysian hand length on each range corresponding to the stature. The graph shows a positive strong correlation between hand length and stature. A regression equation was obtained from that data.

Straight deterioration investigation (linear regression analysis) was done to evaluate the stature from the hand length and breadth as the independent variable. Pearson relationship coefficient was used to discover the connection between hand length and individual stature and handbreadth and individual stature. The stature ranges from 141 to 190 cm. Mean of hand length and breadth were 1.89 and 1.12, separately for both gender together. Distinct insights of stature, hand length measurement and handbreadth measurement appear in table 4.8 and 4.9. a factually critical connection was seen amongst stature and hand length and breadth. Pearson connection (r) for stature furthermore, hand length and breadth was 0.24 and 0.40, then (figure 3) the linear regression condition were decided for estimation of stature, Direct relapse condition determine the estimation of stature appeared in Table 4.9.3, hand length and breadth demonstrated a connection (significant correlation) with the stature ($p < 0.05$).

DISCUSSION

There were a few studies that could be best compared with the current study. The measurement of height is essential for the calculation of body mass index, which is one of the most commonly used nutritional assessment variable. "Anthropometric techniques are commonly used by anthropologists especially adopted by forensic anthropologists to estimate body size for the purpose of identification"³. Then, measurements of the right side were found to be greater than the measurement of the left side, but the difference was marginal and statistically insignificant⁴. In both, males and females, HL showed high positive value of the correlation coefficient, which suggests a strong positive correlation between stature, HL, and HB. There are some studies⁵, in which an attempt has been made to establish the correlation between stature and hand dimensions. This study extends the findings of previous researches by exploring data i.e. hand measurements (length and breadth) and height using linear and curvilinear regression models with sex and age indicator. Mean of stature, Hand length and Handbreadth of all studies are different from each other, which substantiate well-known fact that different population shows a difference in stature as well as in body proportions⁶. In the current study, the straight relapse was detailed for stature estimation from hand length and breadth in Malaysian young adults (female and male subjects). It is qualified to take note of that there are some different factors for example hereditary, nutrition, geographical area and physical action which influence measurement. The connection coefficient (r) among stature and hand length and breadth has been found in the present study.

Based on the current study, the hand length ($r=0.24$) can be a more consistent indicator of stature who have similarity in handbreadth ($r=0.40$) as revealed. Therefore, the direct relationship of stature with body parts of other people can be extraordinary.

CONCLUSION

Regression formula and multiplication factor derived by the present study cannot be applied in other population. So, a similar study should be conducted for other population to derive population specific formula and multiplication factor. Pearson correlation test was used to discover the connection between stature and hand length and breadth. The stature with the

range from 141-190cm, the mean of hand length and breadth was obtained. Linear regression was to decide for estimation of stature. Then the linear regression equation for reproducing for stature was produced. Hand length and breadth demonstrated a strong connection (significant correlation) with the stature ($p < 0.05$).

The present study has shown a definite correlation between stature and

hand length and breadth also regression equation was formed in the sample studied. Thus, the regression test analysis shows the hand length and breadth provides a better prediction of stature. The overall study is helpful during certain circumstances such as disasters, accident or murders in Malaysia or even in another country that was to identify the individual of Malaysian young adults.

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