ORIGINAL ARTICLE

An Anthropometric study of 2D:4D digit ratios in Urhobo people of Southern Nigeria

ABSTRACT

Background: Anthropometric study of the 2D:4D digit ratio in Urhobo people of Nigeria was carried out to determine the values of 2D and 4D lengths and ascertain if there are sexual differences between the 2D:4D ratios of male and female Urhobos.

Materials and Method: A total of 300 Urhobo volunteers (146 males and 154 females) were employed in the study aged 18 and above. The lengths of the index (2D) and ring (4D) digits were measured with a Vernier Caliper and 2D:4D digit ratios were calculated. Ethical approval was sought and obtained from the Ethics and Research Committee of the Department of Human Anatomy and Cell biology, Delta State University, Abraka. Nigeria. (DELSU/CHS/ANA/121)

Results: Results from the presents study showed that males had higher right index digit (R2D) lengths and ring digit (R4D) length compared to females. It was also revealed that males had higher left ring digit (L4D) lengths compared to females. However, females had higher left index (L2D) digit lengths compared to males.

Conclusion: In conclusion males had lower 2D:4D digits ratios compared with that of females and this was statistically significant ($P<0.05$). Mean ratio of 0.96±0.06 is suggestive of male sex while a ratio of more than 1.00±0.05 is suggestive of female sex. 2D:4D ratio could therefore be used in sex determination and identification.

KEYWORD: Index digit, Ring digit, Digit-ratio

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INTRODUCTION

Introductions here Anthropometric and morphological relationship existing between different body parts has profoundly intrigued anthropologists, medical scientist and forensic experts due to the unprecedented increase in cases of explosions, wars, assault, mass disasters and other events which may lead to death of numerous people.[1-3] It therefore, becomes imperative in the field of forensic investigation to note that accurate determination of sex of human remains could proffer solution in narrowing down searches involving a particular sex and helps the forensic investigators know exactly where to focus.

The index finger (2D) is the second digit from the thumb[4,5] while the ring finger (4D) located between the little and middle finger is the fourth digit found on the human hand. The index finger has been shown to be the most sensitive finger of the hand.[4,5] Several researches have shown that index finger (2D) is relatively shorter in males compared to the ring finger (4D).[6-8] It has also been documented that the fourth digit (4D) lengths of males are longer than the second digit (2D) lengths, while the fourth digit lengths of female is shorter than the second digit lengths.[9] A study by Ibegbu et al., revealed that the digit ratio of males is lower than the digit ratio of females.[9]

This study is therefore aimed at investigating sexual differences in the 2D:4D digits ratio among the Uhrobo people of Nigeria and to compare current findings with others in different population.

MATERIAL AND METHOD

Study Population/Size

The study was conducted among 300 (146 males and 154 females) volunteered indigenous subjects who are 18 years and above. A simple random sampling technique was employed. Only subjects who do not have any abnormality of the digits were employed in the study. Ethical approval was sought and obtained from the Ethics and Research Committee of the Department of Human Anatomy and cell biology, Delta State University, Abraka. Nigeria. (DELSU/CHS/ANA/121

Method of Measurement

A Vernier Caliper was used to measure the lengths of the index (2D) and ring (4D) fingers for both right and left hand from the tip of the index (2D) and ring (4D) fingers to the crease of the respective fingers. The index finger had only one crease for most of the participants which was used as the proximal limit of measurement. However, a band of creases were noticed in the ring finger. The proximal end of these crease served as a limit point of measurement. All

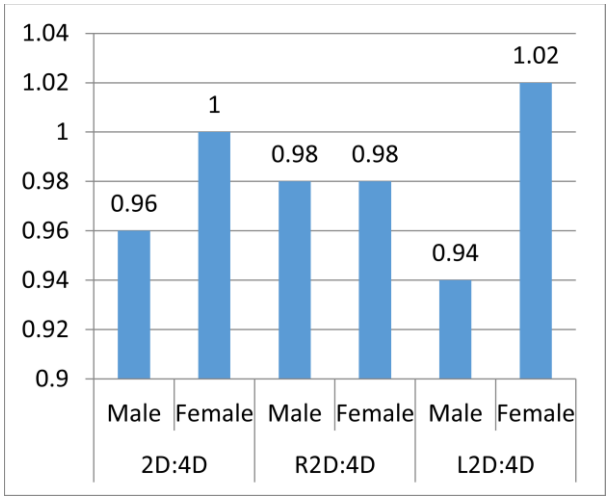
measurements were taken twice and the mean recorded for accuracy while the digits were fully extended. Protruding finger nails were excluded in the measurement.[10]

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) (22.0). Data were expressed in the form of mean ± standard deviation (Mean ± SD). Independent sample t-test was used to ascertain the mean difference between the 2D:4D ratios of males and females. P-value set at ≤0.05 was considered statistically significant.

RESULTS

Results here Results on the anthropometric analysis of the 2D:4D digits ratio showed that the mean values for right 2D, 4D and the ratios of 2D:4D in males is 7.65cm, 7.86cm and 0.98 respectively. On the other hand, the mean values for left 2D, 4D and ratios of 2D:4D in males is 7.56cm, 8.09cm and 0.94 respectively. For females, the mean values for right 2D, 4D and ratios of 2D:4D is 7.64cm, 7.83cm and 0.98 respectively. On the left hand, females had mean values of 2D, 4D and 2D:4D of 7.90cm, 7.74cm and 1.02 respectively. These mean values of the ratios of 2D:4D are represented in graph 1 below. There was a significant difference between the lengths of the index finger (2D), ring finger (4D), and the ratios of index to ring finger (2D:4D) in both males and females as shown in table 1 below.



Parameters	Gender	Mean±SD	t-Value	Sig. Level
R2D	Male	7.65±0.60	0.17	0.86*
	Female	7.64±0.72		
R4D	Male	7.86±0.61	0.40	0.69*
	Female	7.83±0.66		
L2D	Male	7.56±0.62	-4.68	0.00*
	Female	7.90±0.62		*
L4D	Male	8.09±0.58	4.67	0.00*
	Female	7.74±0.71		*
R2D:4D	Male	0.98±0.04	0.58	0.95*
	Female	0.98±0.05		
L2D:4D	Male	0.94±0.08	-8.43	0.00*
	Female	1.02±0.10		*
M2D:4D	Male	0.96±0.06	-6.84	0.00*
	Female	1.00±0.05		*

2D: Length of index finger, 4D: Length of ring finger. M2D:4D: Mean ratio of 2D and 4D. *P>0.05- Not statistically significant. **P<0.05- Statistically significant.

Graph 1 and table 1, revealed that males and females had equal 2D:4D ratio in the right hand. However, females had higher 2D:4D ratio in the left hand compared to males which was statistically significant (P<0.05). Furthermore, it was revealed that the mean ratio of the index and ring finger (M2D:4D) was higher in females compared to males and was statistically significant (P<0.01).

Males had greater right index digit (R2D) lengths and ring digit (R4D) length compared to females. It was also revealed that males had greater left ring digit (L4D) lengths compared to females. However, this study also revealed that females had greater left index (L2D) finger lengths compared to males. T-test showed that there was no statistical significant relationship between the lengths of the right index (R2D) and ring (R4D) fingers among males and females (P>0.05). On the other hand, there was a statistical significant difference between the lengths of the left index (L2D) and ring (L4D) fingers of both males and females (P<0.05).

DISCUSSION

Anthropometric analysis of the index (2D) and ring (4D) digit was conducted in a South-South population in Nigeria to ascertain the differences between males and females digit length and their ratios. It was previously observed that males have longer ring digit (4D) and shorter index (2D) digit lengths compared to females.[9] Our study revealed that ring (4D) digit lengths were longer than index (2D) digit lengths in males and it was statistically significant. This agrees with various studies who reported that ring (4D) digit lengths in males tends to be longer than index (2D) digit lengths.[11,12] Also, right ring (4D) digit lengths was longer than right index (2D) digit lengths for females which also agrees with the work of Meera et al., in (2015).[13] However, the left ring (4D) digit length was shorter than the left index (2D) digit length. This finding agrees with Ibegbu et al., (2012) and Manning et al., (2000). [9,12] which concluded the ring (4D) digit lengths is shorter than the index (2D) digit lengths.

The present study also showed that there was a significant difference between the 2D:4D ratios of males and females. Females had a longer 2D:4D digit ratios compared to males. This corresponds to previous finding.[15-20]

It has been documented that digit ratios vary from one part of Nigeria to the other part of Nigeria. The Andonis and Ikwerres records shorter digit ratios

for males than females.[10] The present study on digit ratios in Urhobos revealed that females have shorter digit ratios compared to males which is in agreement with the finding of studies conducted in other parts of Nigeria.

In conclusion, the present study showed that males had shorter 2D:4D digits ratios compared with that of females. Results from the presents study also showed that males had higher right index digit (R2D) lengths and ring digit (R4D) length compared to females. It was also revealed that males had higher left ring digit (L4D) lengths compared to females. However, females had higher left index (L2D) finger lengths compared to males. Mean ratio of 0.96±0.06 is suggestive of male sex while a ratio of more than 1.00±0.05 is suggestive of female sex. 2D:4D ratio could therefore be used in sex determination and identification. Adequate knowledge of the above could be of importance to forensic experts, sports medicine and anthropologist.

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