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DIGIT RATIO OF PRISON INMATES WITHIN SOUTH-SOUTH NIGERIA

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ABSTRACT
Digit ratio is a putative biomarker for the concentration of testosterone in utero. The present study was aimed at documenting the values of the digit ratio of the prison inmates within the South-South region of Nigeria. A total of 399 prison inmates drawn from Maximum Security Prison creek Road, Port Harcourt and Federal Prison, Ahaoda (Rivers State), Okere Prison, Warri (Delta State), Oko Prison, Oko-Ogba and Benin Prison, Benin City (Edo State) and Ikot Abasi Prison, Ikot Abasi (Akwa Ibom state) all in South-South Nigeria were used for this study. 358 were males (89.72%) and 41 (10.28%) were females. Those having any form of hand deformity were excluded. Second and fourth digit lengths were measured from the basal crease of the 2nd and 4th digits to the tip using digital veneer calliper. The measurements were done twice and average value recorded. The measurements were done on the right and left hands. Values obtained were tabulated. Digit ratio (2D:4D) was then calculated by dividing the length of the second digit by the length of the fourth digit and the values recorded for both hands. The data was analyzed using SPSS software. The second to fourth digit ratios on both hands were observed to be higher in males compared to the females. Digit ratio was unexpectedly lower in the females compared to the males. Males had digit ratio of 0.97 on both hands while females had digit ratio of 0.96 also on both hands. This difference was statistically significant ($p<0.05$).The results of this study showed that women's involvements in crime is minimal and recommends that more women be given position of leadership and trust.

KEYWORDS: *Digit ratio, Prison inmates and South-South Nigeria.*

INTRODUCTION
Digit ratio is the ratio of different digits or fingers typically measured from the bottom crease where the fingers join the hand to the tip of the finger (Manning *et al.*, 1998; Mayhew *et al.*, 2007). Scientists have suggested that this ratio, in particular the ratio of index to the ring commonly known as 2D:4D is affected by exposure to prenatal hormones example testosterone and oestrogen in utero (Manning *et al.*, 2002, Phelps, 1952). A foetus is exposed to prenatal testosterone from the foetal testes and the adrenal glands. The main source of prenatal oestrogen comes from the placenta and the adrenal glands through the aromatase conversion of testosterone from the maternal blood stream (George *et al.*, 1981). The developmental differentiation of foetal gonads is greatly influenced by these foetal sources of steroids (Lording and De Kreter, 1972). The differentiation of the foetal gonads is controlled by the homeobox or Hox genes (Zakany and Duboule, 1999). This putative biomarker is sexually dimorphic (Gwunireama *et al.*, 2010; Oladipo *et al* 2006).

Crime is an unlawful act punishable by a state or other authority (Oxford, 2009). A decade old theory hypothesizes that brain exposure to androgens promote involvement in criminal behavior. A study reported that the 2D:4D ratio was lower (indicating higher prenatal androgens) among persons who scored high in psychopathy (Blanchard & Lyons, 2010, Stevenson *et al.*, 2007, and Hanoch *et al.*, 2012). This work seeks to investigate and document values of the digit ratio of Nigerians in the prisons within the South-South region.

Digit ratio have been reported by many investigators to be sexually dimorphic (Manning *et al.* 1998; Manning *et al.* 2002; Putz *et al.* 2004; McIntyre *et al.* 2006; Trivers *et al.* 2006). This difference has also been reported to exist in other animals and primates (Burley and Foster 2004; Brown *et al.* 2002). Digit ratio has been associated with many biological traits including utero levels of testosterone (Lutchmaya *et al.* 2004), aggression (Bailey and Hurd 2005; Millet and Dewitte 2006), spatial ability (van Anders and Hampson 2005; Bull and Benson 2006) and academic performance (Romano *et al.* 2006). Some disease conditions like

autism, depression and developmental psychopathology, congenital adrenal hyperplasia, polycystic ovarian syndrome have also correlated with digit ratio (Manning *et al.* 2001; Brown *et al.* 2002; Okten *et al., 2*002; Catrall *et al.* 2005; Fink *et al.* 2007). Ronalds *et al.* (2002) have shown that, 2D:4D ratio is associated with body size and proportion at birth in men, and that, men who had higher 2D:4D were shorter at birth. Since digit ratio is correlated to traits that are putatively link to testosterone, a few studies have reported the association of 2D:4D with birth weight.

MATERIALS AND METHODS

A total of 399 prison inmates drawn from Maximum Security Prison creek Road, Port Harcourt and Federal Prison, Ahaoda (Rivers State), Okere Prison, Warri (Delta State), Edo Oko Prison, Oko-Ogba and Benin Prison, Benin City (Edo State) and Ikot Abasi Prison, Ikot Abasi (Akwa Ibom state) all in South-South Nigeria were used for this study. 358 were males (89.72%) and 41 (10.28%) were females. These subjects gave their informed consent and were willingly recruited for the study. Those having any form of hand deformity were excluded. Second and fourth digit lengths were measured on the ventral (inferior) surface of the hand from the basal crease of the 2nd and 4th digits to the tip using digital venier calliper. The measurements were done twice and average value recorded. The measurements were done on the right and left hands. Values obtained were tabulated. Digit ratio (2D:4D) was then calculated by dividing the length of the second digit by the length of the fourth digit and the values recorded for both hands (Manning *et al.*, 1998). The data was analysed with Descriptive statistics presented in Mean and standard error. Comparison of differences in mean was tested with Analysis of Variance (ANOVA) using SPSS software.

RESULTS

The results of the present study are summarized on table 1 below.

Table 1: Digit Ratio of Males and Females Subjects.

PARAMETERS	MALES n=358	FEMALES n=41	F-RATIO	PR. OF SIGNIFICANCE (p-value)
R2D(CM)	6.77 ±0.76	6.60±0.74	1.757	0.186 (No)
R4D(CM)	6.97±0.75	6.90±0.80	0.283	0.595 (No)
R2D:4D	0.97±0.04	0.96±0.04	5000	0.026 (Yes)
L2D(CM)	6.80±0.74	6.71±0.67	0.713	0.399 (No)
L4D(CM)	7.01±0.70	6.97±0.70	0.150	0.698 (No)
L2D:4D	0.97±0.03	0.96±0.03	2695	0.04 (Yes)

All values = Mean ± S.E

In this study, digit ratio was observed to be sexually dimorphic with males having 0.97 and females 0.96 on both hands. This difference was statistically significant ($p < 0.05$). Females in this study demonstrated a very low digit ratio that can be described as masculine ratio. The reason could be that the females had very high concentration of testosterone. The outcome of this work is rare. This is because females have a lower ratio compared to the males. It is also suggestive of the fact that, females with low digit ratio are more prone to criminal tendencies. The digit ratio of 0.96 is the normal digit ratio for males. This is also indicative of the fact that males are naturally predisposed to crime.

DISCUSSION

Finger length ratio, a measure of the second finger to the fourth finger shows a significant difference with males having a lower average compared to the females apparent in children as young as 2years of age (Manning *et al.*, 1998). This sexually dimorphic trait has been reported previously by different workers (Gwunireama *et al.*, 2010, Oladipo *et al.*, 2006, Manning *et al.*, 2000). In the present study, the sexual dimorphism observed was different since females had digit ratio with a lower average compared to the males. This finding suggests an uncommon high concentration of the testosterone among the female participants in this study. However, it is consistent with other studies regarding the level of masculinisation of the fingers due to the levels of the prenatal testosterone in utero (Stevenson *et al.*, 2007, Blanchchard *et al.*, 2010 and Hanoch *et al.*, 2012).

CONCLUSION

The observation from this study concludes that masculine digit ratio is directly related to crime and criminal tendencies. It also suggests that males are naturally susceptible to crimes than do females. On the other hand, masculinized digit ratio patterns in females can be a more useful pointer to suggest male characterization of the female such as aggressive behaviour, increased physicality of body muscles as well as swift decision-making, a propensity to be more adventurous and risk-loving.

RECOMMENDATION

From this study, it can be recommended that more females be given position of responsibility and trust. It also recommends that more work be done in other geopolitical regions of Nigeria.

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