



VARIATION IN MORPHOGENETIC TRAITS (HAND CLASPING AND TONGUE ROLLING) IN KWARA, NORTH CENTRAL AND LAGOS, SOUTH WESTERN NIGERIA

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ABSTRACT

Discrepancy and difference in morphogenetic features such as hand clasping and tongue rolling are apparent and marked in human race. Though the incidence, distribution and causes of these traits are not so pronounced and convincing enough because of contrasting results from previous studies. This survey aimed at providing information on these traits was carried out from June to September 2009 among individuals residing in Kwara and Lagos states. The incidence and mode of distribution of tongue rollers and hand claspers (left or right) were determined by screening 1450 individuals (Male 901; Female 549) and 1254 individuals (Male 602; Female 651) in Kwara and Lagos respectively. Incidence of right hand claspers in Kwara and Lagos was 87% (60.3%) and 96% (77.0%) respectively while the frequency of non-tongue roller was 57% and 77.4% in Kwara and Lagos respectively. The overall frequency of right hand claspers 1840 (68.0%) and non-rollers 1796 (66.4%) were more common than left hand claspers 864 (32.0%) and rollers 908 (33.6%). Chi square test showed that hand clasping was dependent on sex and geographical location ($p < 0.006$). Our results showed that these traits are sexual dimorphic and there was variation in their occurrence in the study population, suggesting the influence of geographical location on these traits.

Key words: Hand clasping, Tongue rolling, Morphogenetic traits, geographical region.

Introduction

Variation in morphogenetic traits such as hand clasping and tongue rolling are evident in the world's population, but the incidence, distribution and causes of this trait is not so pronounced and convincing enough. It was believed and found in elementary genetics courses that these traits are inherited, though Martin (1975) reported that variance in both traits arises by chance and from environmental influence. Also, Whittinghill (1970) reckon you can learn to roll tongue with practice but there is the need to carry the gene in order to have any chance of rolling. However, whether tongue rolling is genetically inherited at all, has been a debate among geneticist for more than three decades now; studies have shown that about 1/3 of identical twins don't share the trait. Unlike handedness, there is no known scientific basis for hand clasping; it appears to be simple behavioral preference (McManus and Mascie-Taylor, 1979) but Reiss (1999) inferred that

there may be some genetic basis for this character. We don't know yet if both hand clasping and tongue rolling have any evolutionary advantage in a population.

These traits are still germane in anthropological and genetics studies in terms of variation and diversity but their genetic basis is still under intense argument. Some studies in Europe and Asia by Mohr *et al.* (2006) and Bulliyya (2003) respectively have shown distribution and incidence of these traits. Similar studies have been done in South-South geographical region in Nigeria (Nwaopara *et al.*, 2008; Odokuma *et al.*, 2008; 2011) but little is known about their incidence in North Central and South Western Nigeria. Thus this study aims at providing information on these traits in these parts of Nigeria.

Materials and methods

This survey was carried out from June to September 2009 among individuals resident in

Kwara and Lagos states. The incidence and mode of distribution of tongue rollers and hand claspers (left or right) were determined by screening 1450 individuals (Male 901; Female 549) and 1254 individuals (Male 603; Female 651) in Kwara and Lagos respectively. Personal interview and demonstration was conducted to confirm whether they really exhibit the trait or not. Orthodox technique as reported by Freire-Maria (1961) was applied in recording hand clasping. All participants were asked to clasp the hands such that the fingers were intertwined in the process. If the right thumb was located above the corresponding left fingers, this was described as right hand clasping and if the left thumb was intertwined over the right fingers. This was described as left hand clasping (figure 1). For tongue rolling, a person was classified as positive (+) or negative (-) depending upon his/her ability to turn up the lateral edges of the tongue (figure 1) as described by Sturtevant (1940).

Everybody screened for these traits were asked to perform the act twice or more in order to ensure that error of clarification and extrapolation were clearly avoided and to distinguish ambidextrous in hand clasping. Children below age 5 were excluded basically because they might not get the performance right. Individuals who are detected ambidextrous were left out of the study. Age of participants in the study ranged between 5 - 60 years.

Statistical Analysis

Questionnaires were coded and statistical analysis was done using Statistical Package Social Sciences software (SPSS) Version 16 to calculate frequencies and chi-square analysis to test for associations between categorical variables.



Figure 1. Showing right hand clasper (1), left hand clasper (2) and tongue roller (3). Shown are the right-thumb-top (1) and left-thumb-top (2) positions in hand clasping.

Results

Table 1 shows a total of 2704 individuals (1504 males and 1200 females) of ages between 5 and 60 years. A total of 901 and 603 males from Kwara and Lagos respectively participated in this study, while 549 and 651 females from Kwara and Lagos took part. Frequency distribution of hand clasping and tongue rolling in Kwara and Lagos male and female is shown Table 1. Incidence of right hand clasping in male was 59.2% and 76.0% in Kwara and Lagos respectively while the incidence among female in Kwara and Lagos was 62.1% and 78.0% respectively. As shown in Table 1, the incidence of tongue roller was lower compared to non tongue roller but higher fraction of female (61.6%) in Kwara are tongue rollers. The incidence of right hand clasping was higher in female than their male counterparts, while the occurrence of tongue rolling in Kwara was higher in female than male. All disparities recorded in this study were statistical difference as shown from chi square analysis at $P < 0.006$.

Table 1 shows that majority of the respondents (77.0% and 60.3%) in Lagos and Kwara are right hand clasping while 22.6% and 43.0% of the participants in Lagos and Kwara respectively can roll their tongue. Overall 68.0% of our respondents are right hand clasper while 33.6% were able to roll their tongue. Chi square test showed that hand clasping was dependent on sex ($\chi^2=7.42$, $df=1$, $p<0.006$), and geographical location ($\chi^2=86.87$, $df=1$, $p<0.006$). Similar significant result was recorded for tongue rolling (for sex $\chi^2=32.91$, $df=1$, $p<0.006$ and $\chi^2=125.32$, $df=1$, $p<0.006$ for location).



Table 1. Distribution by sex of hand clasper and tongue roller in Kwara and Lagos *

	Hand claspings		Total	Tongue rolling		Total
	R	L		+	-	
Kwara						
Male	533(59.2)	368(40.8)	901(62.1)	286(31.7)	615(68.3)	901(62.1)
Female	341(62.1)	208(37.9)	549(37.2)	338(61.6)	211(38.4)	549(37.9)
Total	874(60.3)	576(39.7)	1450	624(43.0)	826(57.0)	1450
Lagos						
Male	458(76.0)	145(24.0)	603(48.1)	149(24.7)	454(75.3)	603(48.1)
Female	508(78.0)	143(22.0)	651(51.9)	135(20.7)	516(79.3)	651(51.9)
Total	966(77.0)	288(23.0)	1254	284(22.6)	970(77.4)	1254
Overall total	1840(68.0)	864(32.0)	2704	908(33.6)	1796(66.4)	2704

* percentage in brackets, R = right, L = left, + = can roll tongue and - = cannot roll tongue

Discussion

All people are recognizably human, but no one is exactly like anyone else, not even identical twins. Thus, variation exists among human populations in their ability to roll tongue and be a right or left hand clasper. Results from this study showed that right hand clasping is more common in male and female, this is similar to earlier report in India (Das and Sengupta, 2003) but contrary to what Sivokora *et al.* (1999) reported. In addition, our result showed that more females are right hand clasper (RHC) (though not statistically significant). This is also in-tandem with result from India (Das and Sengupta, 2003) and a recent report in Nigeria (Odokuma *et al.*, 2011). Incidence of RHC in this study was 68.0%, this was higher than 59.1%, 56.52% and 45.97% reported by Odokuma *et al.* (2011), Das and Sengupta (2003) and Sivokora *et al.* (1999) respectively. The incidence of the ability to roll tongue in this study was 33.6%, this is in congruent with 32.61% reported in India by Das and Sengupta (2003). But less than 51.81% and 60.8%

reported in Nigeria by Nwaopara *et al.* (2008) and Odokuma *et al.* (2008) respectively. The discrepancy recorded could be due to difference in population size and geographical region.

We observed that the incidence of tongue rollers in Kwara was higher in females when compared with males. These findings were not different from previous studies as reported by Hernandez (1980) that showed that ability to roll the tongue in males was 63.1%, while their female counterparts accounted for 66.84% in the population studied. A similar result though not significantly different was recorded amongst Nigerians (Odokuma *et al.*, 2008; 2011). Contrary to what was reported in Kwara, more male are tongue roller in Lagos; this is similar to the report in India by Das and Sengupta. (2003).

Conclusion

This study shows that Nigerians are genetically varied in terms of these morphogenetic traits (tongue rolling and hand clasping). Data from this study could be useful in anthropological studies by proving baseline information on these traits in our study area. Significant difference ($P= 0.006$) among sex and



geographical location recorded in this study could mean that these traits are sexually dimorphic and there is great influence of environment on them.

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