Assessment of Morphogenetic Trait of AEL and CRT in Relation to Hb Genotype

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Abstract: Human genetics are known as hereditary traits, these hereditary traits include the dominant and recessive traits in humans. Most of the genes are transmitted in the Mendelian pattern and a few are transmitted through the non-Mendelian pattern that includes: co-dominance, sex-linked genes and polygenes. The aim of this research is to assess the morphogenetic trait such as attached earlobe (AEL) and tongue rolling (CRT) in relation to Hb genotype. Three hundred and thirty seven (337) subjects comprising of 162 females and 175 males, aged 18-61 years were randomly selected. The ears and ability to roll tongue were studied in the subject and recorded, as well as genotype as revealed by the subject. Prevalence of 57.2% (193) was recorded for the entire population studied as belonging to CRT as against 42.6% (144) belong to cRT. Prevalence for AEL was recorded as 38.2% (129) as against 61.6% (208) for uAEL. AA has the highest prevalence of 73.2% followed by AS with 19.8%, the least was SS 1 (0.3%). Genotype in relation to AEL and CRT recorded only 13% of AA individuals that have AEL and can roll tongue (CRT), while only 2.9% of the AS individuals that have AEL can roll their tongues. One (0.3%) SS individual have AEL and can roll tongue. Relating Hb genotype to AEL and CRT is of great important in the study of forensic pathology and anthropology.

Key words: Hb Genotype • Ear Lobe • Tongue rolling • Genes • Forensic Pathology

INTRODUCTION

Physical traits are observable characteristics determined by specific segments of DNA called genes. Multiple genes are grouped together to form chromosomes, which reside in the nucleus of the cell. Every cell (except eggs and sperm) in an individual’s body contains two copies of each gene [1]. Parent organisms pass traits to their offspring so there are often similar characteristics seen in both parent and offspring. Inherited human traits include: ability to roll your tongue or not, attached or unattached earlobes, dimples or freckles, naturally curly or straight hair, Hitchhiker’s or straight thumb, color-blindness or normal color vision, widow’s peak or straight hairline, color of skin and hair, cleft or smooth chin etc. However, humans have numerous traits, but some traits are more frequently seen in population such as free-hanging earlobes, can roll their tongue, right-handed and can taste PTC (a bitter tasting chemical that can be placed on the tongue) [2].

Human genetics are known as hereditary traits, these hereditary traits include the dominant and recessive traits in humans. Most of the genes are transmitted in the Mendelian pattern and a few are transmitted through the non-Mendelian pattern that includes: co-dominance, sex-linked genes and polygenes [3].

Genetic mechanism on morphogenetic traits is still not clearly understood as it is seen to occur with variable frequency in different populations and thus useful in evaluating and analyzing evolutionary forces and classification as well [4, 5].

Genotype is the genetic makeup of a cell, an organism, or an individual. Individual’s genotype (AA or AS or SS) and blood group (A, B, AB and O/ Rhesus factor [Rh+ and Rh-]) differ amongst the world’s population [4-11]. The aim of this research is to assess the morphogenetic trait such as attached earlobe (AEL) and tongue rolling in relation to Hb genotype.
MATERIALS AND METHODS

The assessment of morphogenetic trait of AEL and tongue rolling in relation to genotype was studied in the Southern Nigeria. Three hundred and thirty seven (337) subjects comprising of 162 females and 175 males, aged 18-61 years were randomly selected in 2012. The ears and ability to roll tongue were studied in the subject and recorded, as well as genotype as revealed by the subjects. Informed consent was granted by individual subjects.

RESULTS

Prevalence of Tongue Rolling (CRT): The result of this research shows that 104 males representing 30.8% can roll tongue (CRT) against 71 males representing 21.0% who cannot roll tongue (cRT), while 89 females (26.4%) falls into CRT group against 73 (21.6%) in cRT. A prevalence of 57.2% (193) was recorded for the entire population studied as belonging to CRT as against 42.6% (144) belong to cRT (Table 1).

Prevalence of Attached Earlobe (AEL): Seventy one of the male representing 21.9% have attached earlobe (AEL) as against 101 (29.9%) that have unattached earlobe (uAEL), fifty five of the female representing 16.3% have AEL as against 107 (31.7%) that have uAEL. The total prevalence for AEL was recorded as 38.2% (129) as against 61.6% (208) for uAEL (Table 1).

Prevalence of Genotype (AA, AS and SS): Among all the various type of genotypes recorded AA has the highest prevalence of 73.2% (male 38.5% and female 34.7%) followed by AS with 19.8% (Male 8% and female 11.8%), the least was SS as only one (0.3%) female was recorded (Table 1).

Genotype in relation to AEL and CRT recorded only 13% of AA individuals that have AEL can roll tongue (CRT), while only 2.9% of the AS individuals that have AEL can roll their tongues. One (0.3%) SS individual have AEL and can roll tongue (Table 2).

Table 1: The prevalence of AEL, CRT and Genotype.

<table>
<thead>
<tr>
<th>Sex</th>
<th>CRT</th>
<th>cRT</th>
<th>AEL</th>
<th>uAEL</th>
<th>AA</th>
<th>AS</th>
<th>SS</th>
<th>Genotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>104(30.8)</td>
<td>71(21.0)</td>
<td>74(21.9)</td>
<td>101(29.9)</td>
<td>130(38.5)</td>
<td>27(8.0)</td>
<td>0(0.0)</td>
<td>18(5.3)</td>
</tr>
<tr>
<td>Female</td>
<td>89(26.4)</td>
<td>73(21.6)</td>
<td>55(16.3)</td>
<td>107(31.7)</td>
<td>117(34.7)</td>
<td>40(11.8)</td>
<td>1(0.3)</td>
<td>4(1.1)</td>
</tr>
<tr>
<td>Total</td>
<td>193(57.2)</td>
<td>144(42.6)</td>
<td>129(38.2)</td>
<td>208(61.6)</td>
<td>247(73.2)</td>
<td>67(19.8)</td>
<td>1(0.3)</td>
<td>22(6.4)</td>
</tr>
</tbody>
</table>

DISCUSSION

There are very few investigations in this aspect of morphogenetic research. Tongue rolling ability may be due to a single gene with the ability to roll the tongue a dominant trait and the lack of tongue rolling ability a recessive trait [12]. A total prevalence of 57.2% (193) was recorded for the entire population studied as belonging to CRT as against 42.6% (144) belong to cRT. Whereas, 104 males representing 30.8% CRT against 71 males representing 21.0% who cannot roll tongue (cRT), while 89 females (26.4%) falls into CRT group against 73 (21.6%) in cRT. This is slightly lower than the report of a famous geneticist Alfred Sturtevant [12] who noted that about 70% of people of European ancestry are able to roll up the lateral edges of the tongue, while the remaining 30% were unable to do so. The present research agrees with the research of Alfred Sturtevant on the grounds that CRT is higher than cRT. Furthermore, the present study also agrees with the work carried out by Nwaopara et al. [4]. Who recorded 51.81% for CRT as against 48.19% for cRT.

The total prevalence for AEL was recorded as 38.2% (129) as against 61.6% (208) for uAEL. Seventy one of the male representing 21.9% have attached earlobe (AEL) as against 101 (29.9%) that have unattached earlobe (uAEL), fifty five of the female representing 16.3% have AEL as against 107 (31.7%) that have uAEL. This is also close to the report that says between 70-90% of a population have free-hanging earlobes [2] and also with the report of Nwaopara et al. [4] who recorded 31.61% for AEL and 63.39% for uAEL.

This research recorded a high percentage of AA genotype 73.2% among all the various type of genotypes followed by AS with 19.8% (Male 8% and female 11.8%), the least was SS as only one (0.3%) female was recorded.
This corresponds to the research of Akhigbe et al. [13] where Hb genotype AA was 71.03%, AS 22.19% and SS 0.54%.

It was interesting to ascertain that only 16.2% of the total population have AEL and can roll their tongues (CRT). Where only 13% of AA individuals have AEL can roll tongue (CRT), while only 2.9% of the AS individuals have AEL can roll their tongues. The 1(0.3%) SS individual have AEL and can roll tongue (Table 2).

**CONCLUSIONS**

Morphogenetic traits are genetically determined and AEL is recessive to dominant uAEL, CRT is dominant to recessive allele of cRT and varies from one individual to another, as well as the frequency from one geographical area to another. The aspect of relating morphogenetic traits are of great importance to many areas such as forensic pathology, anthropology and other related disciplines; as such it will be useful to determine the frequency of these traits in our tribes and regions which could aid in the identification of human of different races.

**REFERENCES**