Morphologic distribution of lip prints among genders, season of birth and different dialects of a Nigerian population

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ABSTRACT

The objective of this study was to determine lip prints pattern distribution among genders, seasons of birth in different dialects of Yoruba tribe in Kwara State. Five hundred subjects comprising of 288 males and 212 females were used for the study. Lipstick method and questionnaires were used to collect data. Lip prints were then divided into quadrants and identified according to Suzuki and Tsuchihashi’s classification. Statistical analysis was done using the Chi-Square test, statistical significance differences was set at p < 0.05. Type I’ lip print was the predominant pattern in males while in females it was Type II. The predominant lip prints for subjects born during dry and wet seasons were Type IV and Type I’ respectively. Among the dialects, predominant lip print patterns were Type V (Ekiti-kwara), Type I (Ibolo), Type I’ (Igbomina) and Type V (Ilorin). There was no statistical significant difference between genders; seasons of birth; and dialects regarding the types of lip print patterns.

INTRODUCTION

Lip prints involve patterns of clefts (sulci labiorum) in the shape of elevations and depressions on the labial mucosa that is located in the transition zone between the inner labial mucosa and outer skin [1, 2]. The forensic technique that deals with the study of distinctive lip print pattern is regarded as Cheiloscopy [1, 3].

Although lip prints are unique to individuals [1, 4], Lip prints show few similarities between parents and children as well as siblings [5]. Personality or character of individuals such as pessimist, introvert, dogmatic e.t.c., has been reported to be associated with lip print pattern [1]. There is correlation between lip print and thumbsprint pattern [6-9].

Based on the classification of Suzuki & Tsuchihashi [10, 11], lip print patterns are grouped into different types. These are:

- Type I: Long vertical with clear-cut vertical grooves that run across the lips.
- Type I’: Short vertical that have partial length groove of type I.
- Type II: Branched grooves with branching Y-shaped pattern.
- Type III: Intersected grooves pattern.
- Type IV: Reticular pattern (Grooves that forms rectangular shape).
- Type V: Mixed/Indefinite (The grooves do not fall into any of the Types I–IV and cannot be differentiated morphologically).

As a result of variation in lip print patterns, lip prints are being use as a mode of identification in forensic investigations [6, 7]. In addition, lip print pattern distribution is used to identify races, nationalities, genders and paternity [5, 12-14]. Earlier studies in Nigeria associated lip print patterns with gender [8], but no influence of environmental factors such as season of birth was linked to lip print patterns [15].

Despite increased data on lip print pattern distribution in earlier studies from Nigeria and different parts of the world [4, 16, 17], lip print pattern data among dialects in Nigerian tribes is still scanty. Hence, this study was aimed at investigating lip print pattern distribution among genders, season of birth and different dialects of Yoruba tribe in Kwara State, Nigeria.
2. MATERIALS AND METHODS

2.1. Ethical approval

Approval for this study was obtained from the university ethical review committee (UERC) of University of Ilorin before the study began.

2.2. Sample

Five hundred healthy individuals comprising of 288 males and 212 females in Ilorin Town, Kwara State, Nigeria were used for the study. Ethnicity of the subjects was based on their paternal parent's tribe (Yoruba) from Kwara State (comprising of Ilorins', Ibolos, Igboninas, Ekiti-Kwara dialects). Subjects season of birth were decided based on the month of birth that falls within dry and wet season in Nigeria. Wet season was defined as the period that extends from April to October while dry season extends from November to March. The subjects of the study were fully informed about the purpose of the study and their consent were obtained.

2.3. Inclusion criteria

Subjects included in the study were, healthy, free from any oral pathologies, inflammation, abnormalities or deformities such as cleft lip, cut marks, surgical scars or lesions of the lip. All the subjects were from Yoruba tribe in Kwara State.

2.4. Procedure for recording lip prints and data collection

The subjects were made to stand in a relaxed position while lip gloss were applied on their lips. Clean glass slides were placed on the lips of the subjects in a single motion. Thereafter black powder was sprinkled on the surface of the glass slides so that lip print stamps on the glass slides were clearly seen (Fig 1). Transparent cello tape was then used to cover the prints generated while care was taken to avoid formation of wrinkles on the glass slide. Lip prints generated were photographed using a digital camera (Nikon D3100-14.2 MP). After collection of lip prints was completed, the subjects were made to complete questionnaires that contained basic questions such as Name, Gender, Day and Month of birth, Tribe, Dialect, State of Origin etc.

Analysis of the prints was done by dividing the prints into compartments for perfect estimation (Fig 1). These include:

- Upper Left Lateral (ULL)
- Upper Left Medial (ULM)
- Upper Median (UMo)
- Upper Right Medial (URM)
- Upper Right Lateral (URL)
- Lower Right Lateral (LRL)
- Lower Right Medial (LRM)
- Lower Median (LMo)
- Lower Left Medial (LLM)
- Lower Left Lateral (LLL).

In addition lip prints were further analyzed according to the types of prints proposed by Suzuki & Tsuchiahashi, [10,11]. These include:

Type I: Long vertical; Type I’: Short vertical; Type II: Branched grooves; Type III: Intersected pattern; Type IV: Reticular pattern; Type V: those that do not belong to any group of 1-4 (Fig. 3).

Figure 1. Lip print compartments.

Figure 2. Procedure for collecting lip print pattern.
2.5 Statistical analysis

SPSS (Statistical Package for the Social Sciences, version 20.0) software was used for descriptive statistics. The difference between male and female lip print pattern was done by Chi square test. Statistical significance was set at $p<0.05$.

3. RESULT

3.1 Distribution of lip prints types on upper and lower margin according to sex

In table 1 the percentage distribution of lip print in males upper lip shows that the most frequent lip pattern in the upper margin was type I' (20.8%) this was followed by type II (20.5%), type IV (19.4%), type V (16.7%), type I (11.8%) and the least was type III (10.8%). For lower lip, I' (22.2%) was the most frequent, this was followed by type IV (18.8%), type II (18.4%), type V (16.3%), type I (13.5%) and the least was type III (10.1%).

The percentage distribution of lip print pattern in females upper margin (Table 1) shows that the most frequent lip pattern in the upper lip was the type II (20.3%) this was followed by type I' (19.3%), type V (18.4%), type IV (17.5%), type I (13.2%) and the least was type III (11.3%). For lower lip, V (22.6%) was the most frequent, this was followed by type I' (21.7%), type IV (17.0%), type III (14.6%), type II (12.7%) and the least was type I (11.3%). The study shows that the $P=0.898$ between male and female for upper margin while $P=0.194$ for lower margin.

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Sex</th>
<th>N</th>
<th>I (%)</th>
<th>I' (%)</th>
<th>II (%)</th>
<th>III (%)</th>
<th>IV (%)</th>
<th>V (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>UM</td>
<td>M</td>
<td>287</td>
<td>11.8</td>
<td>20.8</td>
<td>20.5</td>
<td>10.8</td>
<td>19.4</td>
<td>16.7</td>
<td>0.898</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>212</td>
<td>13.2</td>
<td>19.3</td>
<td>20.3</td>
<td>11.3</td>
<td>17.5</td>
<td>18.4</td>
<td></td>
</tr>
<tr>
<td>LM</td>
<td>M</td>
<td>287</td>
<td>13.5</td>
<td>22.2</td>
<td>18.4</td>
<td>10.1</td>
<td>18.8</td>
<td>16.3</td>
<td>0.194</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>212</td>
<td>11.3</td>
<td>21.7</td>
<td>12.7</td>
<td>14.6</td>
<td>17.0</td>
<td>22.6</td>
<td></td>
</tr>
</tbody>
</table>

UM = Upper Margin; LM= Lower Margin; M= Male; F= Female; N= Number

3.2 Distribution of lip prints types on upper and lower margin according to season of birth

In table 2 the percentage distribution of lip print according to season of birth shows that the most frequent lip pattern for those born during the dry season for upper lip was type I (45.2%) this was followed by type IV (41.9%), type V (40.8%), type I' (39.6%), type II (35.6%) and the least was type III (30.9%). For lower lip compartment, IV (53.3%) was the most frequent, this was followed by type I (43.5%), type V (40.0%), type III (36.7%), type II (36.2%) and the least was type I' (35.5%). There was no significant difference in lip print pattern between those who were born in wet and dry season ($P=0.233$ for upper margin and $P=0.236$ for lower margin).

In table 2 also shows the percentage distribution of lip print according to season of birth shows that the most frequent lip print pattern for those born during the wet season for upper lip was type III (69.1%) this was followed by type II (64.4%), type I' (60.4%), type V (59.2%), type IV (58.1%) and the least was type I (54.8%). For lower lip compartment, I' (64.5%) was the most frequent, this was followed by type II (63.8%), type III (63.3%), type V (60.0%), type I (56.5%) and the least was type IV (46.7%).
Table 2: Percentage distribution of lip prints types on upper and lower margin according to season of birth.

<table>
<thead>
<tr>
<th>Compartm ent</th>
<th>Season</th>
<th>N</th>
<th>I (%)</th>
<th>I' (%)</th>
<th>II (%)</th>
<th>III (%)</th>
<th>IV (%)</th>
<th>V (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>UM</td>
<td>Dry</td>
<td>206</td>
<td>45.2</td>
<td>39.6</td>
<td>35.6</td>
<td>30.9</td>
<td>41.9</td>
<td>40.8</td>
<td>0.233</td>
</tr>
<tr>
<td></td>
<td>Wet</td>
<td>296</td>
<td>54.8</td>
<td>60.4</td>
<td>64.4</td>
<td>69.1</td>
<td>58.1</td>
<td>59.2</td>
<td></td>
</tr>
<tr>
<td>LM</td>
<td>Dry</td>
<td>206</td>
<td>43.5</td>
<td>35.5</td>
<td>36.2</td>
<td>36.7</td>
<td>53.3</td>
<td>40.0</td>
<td>0.236</td>
</tr>
<tr>
<td></td>
<td>Wet</td>
<td>296</td>
<td>56.5</td>
<td>64.5</td>
<td>63.8</td>
<td>63.3</td>
<td>46.7</td>
<td>60.0</td>
<td></td>
</tr>
</tbody>
</table>

UM = Upper Margin; LM= Lower Margin; N= Number

3.3 Distribution of lip prints types on upper and lower margin according to dialects

In table 3 the percentage distribution of lip print according to dialects showed that type II (5.0%) lip pattern within the Ekiti-Kwara dialect was the commonest pattern on the upper margin. This was followed by type V (4.6%), type IV (4.3%), type I (1.6%), type I' (1.0%) and the least was type III(0%). On the lower margin compartment, IV (53.3%) was the most frequent pattern, this was followed by type I(43.5%), type V(40.0%), type III(36.7%), type II(36.2%) and the least was type I' (35.5%).

The most frequent lip pattern within the Ibolo dialect (Table 3) on the upper margin was type I (16.1%) this was followed by type III (14.5%), type IV(14.0%), type I(9.9%), type I' (8.9%) and the least was type V(5.7%). On the lower margin compartment, type I (16.1%) was the most frequent pattern, this was followed by type II (12.5%), type I' (11.8%), type III (11.7%), type IV (7.8%) and the least was type V (7.4%).

The lip print pattern within the Igbomina dialect on the upper margin (Table 3), showed that type IV (32.3%) pattern was the commonest. This was followed by type III (30.9%), type I' (28.7%), type II (27.7%), type I (22.6%) and the least was type V (19.5%). On the lower margin compartment, type I(34.5%) was the most frequent, this was followed by type II (31.2%), type IV (27.8%), type III (25.0%), type I (21.0%) and the least was type V (20.0%).

Ilorin dialect (Table 3) showed that type V (70.1%) lip print pattern on the upper margin was the most frequent. This was followed by type I'(61.4%), type I (59.7%), type II (57.4%), type III (54.5%) and the least was type IV (49.5%). On the lower margin compartment, type V (66.3%) was the most frequent, this was followed by type IV (64.4%), type III (60.0%), type I(56.5%), type II(55.0%) and the least was type I'(51.8%).

Table 3. Percentage distribution of lip prints types on upper and lower margin according to dialects.

<table>
<thead>
<tr>
<th>Compartm ent</th>
<th>Tribe</th>
<th>N</th>
<th>I (%)</th>
<th>I' (%)</th>
<th>II (%)</th>
<th>III (%)</th>
<th>IV (%)</th>
<th>V (%)</th>
<th>P</th>
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<tbody>
<tr>
<td>UM</td>
<td>Ekiti Kwara</td>
<td>15</td>
<td>1.6</td>
<td>1.0</td>
<td>5.0</td>
<td>0.0</td>
<td>4.3</td>
<td>4.6</td>
<td>0.366</td>
</tr>
<tr>
<td></td>
<td>Ibolo</td>
<td>55</td>
<td>16.1</td>
<td>8.9</td>
<td>9.9</td>
<td>14.5</td>
<td>14.0</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Igbomina</td>
<td>135</td>
<td>22.6</td>
<td>28.7</td>
<td>27.7</td>
<td>30.9</td>
<td>32.3</td>
<td>19.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ilorin</td>
<td>295</td>
<td>59.7</td>
<td>61.4</td>
<td>57.4</td>
<td>54.5</td>
<td>49.5</td>
<td>70.1</td>
<td></td>
</tr>
<tr>
<td>LM</td>
<td>Ekiti Kwara</td>
<td>15</td>
<td>6.5</td>
<td>1.8</td>
<td>1.2</td>
<td>3.3</td>
<td>0.0</td>
<td>6.3</td>
<td>0.210</td>
</tr>
<tr>
<td></td>
<td>Ibolo</td>
<td>55</td>
<td>16.1</td>
<td>11.8</td>
<td>12.5</td>
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<td></td>
<td>Igbomina</td>
<td>135</td>
<td>21.0</td>
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<td>31.2</td>
<td>25.0</td>
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<tr>
<td></td>
<td>Ilorin</td>
<td>295</td>
<td>56.5</td>
<td>51.8</td>
<td>55.0</td>
<td>60.0</td>
<td>64.4</td>
<td>66.3</td>
<td></td>
</tr>
</tbody>
</table>

UM = Upper Margin; LM= Lower Margin, M= Male; F= Female; N= Number
4. DISCUSSION

The results obtained from this research show that Type I and Type II were the prevalent lip pattern on the upper margin among males and female population respectively while Type I and Type V was the prevalent pattern in the lower lip for both male and female respectively. In addition, no statistically significant difference was observed in the lip print patterns of males and females [4]. Earlier study on lip prints types and sex among Nigerian population showed Type V pattern to be the predominant in both males and females [15]. Previous study in North Indian population showed that branched pattern (Type II) in males and vertical pattern (Type V) in females were the predominant lip print patterns. Earlier report by Šimović et al., [2] stated Type II pattern to be the commonest in Croatian women but in men it was Type III. In Marathi population, Type I and Type III lip patterns were found most predominant in males and females respectively [13]. Also Kumar et al. [9] reported that amongst Africans, Type I pattern was prevalent in females while Type IV was the prevalent pattern in males. Abidullah et al. [1] reported that the predominant lip pattern recorded in males was Type I however their conclusion did not involve that of female result rather it was correlated with personality. The possible reason for result variation between this study and previous study might be due to differences in race.

The distribution of lip prints patterns for those born during dry season obtained in the present study shows that type I and Type IV pattern were prevalent in the upper and lower margins respectively. Type III and Type I’ were the predominant patterns in those born during the wet season. Despite these results, there was no statistical significant difference between the two seasons of birth. Previous study by Adamu et al. [15] on influence of season of birth on lip print pattern carried out in Samaru, Zaria, Nigeria, showed Type III lip pattern to be predominant in both dry and wet season. It was concluded that season of birth had no influence in the determination of the lip prints pattern in their study which is also the same outcome as seen in this study.

Lip prints patterns among dialects shows that Ekiti-kwara dialect has Type II and Type I lip pattern to be predominant in upper and lower margins respectively. In Ibolos dialect, Type I lip pattern was the predominant pattern in both upper and lower margins population. Igbonina has Type IV and Type I’ lip pattern to be common in upper and lower lip margins respectively. In Irorin dialect, Type V and Type IV lip pattern were the predominant patterns in upper and lower lip margins respectively. Taken together, the variation seen in the lip prints of different dialects is considered as a result of variation within the Yoruba race. This suggestion is supported by Kumar et al. [9] who reported existence of various lip prints pattern among genders in inter racial group which include African, Mongoloid and Dravidian.

5. CONCLUSION

This study has shown that Type I and II lip prints are the commonest in male and female; and there was no significant difference between the genders. The study also showed that despite the difference seen in lip print pattern for season of birth and various Yoruba dialects, the differences seen were not statistically significant.

AUTHOR CONTRIBUTIONS

ASA designed the study, STO and NOA performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. ASA and STO managed the analyses of the study. SFL and SBK managed the literature searches. All authors read and approved the final manuscript.

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