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The Determination of the Prevalent Lipprint Pattern among Identical and Non-Identical Twins

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Abstract

Background: Twin is a form of multiple birth in which the mother gives birth to two offspring from the same pregnancy. Twins can either be Monozygotic or dizygotic. In this research, lip print as a means of identification in human was studied using 80 individuals (40 pairs- 25 pairs of non-identical and 15pairs of identical twins) of the Yoruba tribe of Nigeria (ranging between of ages of 5- 66 years) residing in Igbo-Ora community of Oyo state in Western Nigeria. The lips of the subjects were properly cleaned and a red lipstick was applied on it. After which, the lip print impression was made on a white plane sheet. Cellophane tape was then struck on it for permanent record. The obtained lip print was studied using a magnifying lens. ***Results and Discussion:*** The results showed that the lip print pattern is unique to individuals and there were no two similar patterns even among identical twins and twins of the same parents and tribe. The most distributed lip patterns were type II in both non-identical and identical twin (26.5% and 31.7% respectively). The least distributed pattern in non-identical twin was type V (5.5%), type I' (8.3%) and type V (8.3%) was the least distributed in identical twin. In total, the most distributed lip pattern in non-identical and identical twin was type II (28.4%) while the least was type V (6.7%). ***Conclusion:*** The study has revealed that the most distributed lip pattern in non-identical and identical twin was type II (28.4%) while the least was type V (6.7%). By implication amongst twins whether identical or non-identical, in a random selection there is a greater probability of picking someone who has a type II pattern as the most frequent pattern type. This information could aid in a forensic study and serve as a strong means of identification when the identity was not established beforehand.

Keywords: Identical, Non-identical, Pattern, Lip, Twin, Igbo-Ora.

INTRODUCTION

Historically, human identification is one of the most changing subjects that man has confronted. The concept of 'identity' is a set of physical characteristics, functional or psychic, normal or pathological that define an individual [1, 2].

Identity can be established by a combination of methods which makes the identification process relatively flawless. The traditional method for identification include anthropometry, fingerprint, sex determination, age estimation, measurement of height and determination of blood group, DNA and odontology [3].

IGBO – ORA COMMUNITY

Igbo-Ora, also called the 'The Land of Twins' is a town in the southwest Nigeria that is rated as having the highest rate of twin birth in the whole world [4].

It is the headquarter of Ibarapa Central Local Government Area in Oyo state. Igbo-Ora is a sleepy town located 77km from Ibadan the state's capital and 80km north of Lagos state. It consists of six blocks made of rural community settlement and its people are of the Yoruba ethnicity. Its population as at 2017 was approximately 92,000. Hardly is there any family in the community without twins. This unusually large number of twins in the region has therefore earned the town a nickname 'Twin capital of the world'. The rate of twin birth has being attributed to the people's diet. It is attributed to a particular vegetable called "Ilasa leaf". The vegetable is peculiar to this people and is believed to contribute to their high fertility rate. It is also believed by the indigenes that their high regard for twins has also contributed to the prevalence of twin birth in the community [4].

In individuals, the fingerprint pattern are unique and permanent and hence a guide to identity.

Just as the fingerprint print is unique to each individual so also is the lip print. Lip print pattern serve as a guide to vital information and help in personal identification [5-7].

Embryology of the Lip

The lip is both ectodermal and mesodermal in origin. Its development is seen during the 6^{th}-7^{th} week of intrauterine d development alongside the development of the face. It is possible to identify the lip pattern as early as the 6^{th} week of the intrauterine life. The upper lip is formed by the fusion of the frontonasal process with the right and left maxillary processes. The mesodermal basis of the lateral part of the lip is formed from the maxillary process, the overlying skin derived from ectoderm covering this process. The mesodermal basis of the median part of the lip (philtrum) is from the frontonasal process while the ectoderm of the maxillary process overgrows this mesoderm to meet that of the opposite maxillary process in the midline [8].

Brief Physiology of the Lips

- Food Intake: The lips are used for eating functions like holding food or to get it into the mouth. It also close to hold mouth airtight shut, to hold food and drink inside and prevent unwanted agents. It can also be used to suck [9].
- Articulation: This serves in creating sound, enables whistling and performing of wind instruments [10].
- Tactile Organ: Due to the presence of many nerve endings, the lips react as part of the tactile senses. It is very sensitive to warmth, cold and touches so is a necessary aid for exploring unknown objects for babies and toddlers [11].
- Erogenous Zone: The lips are erogenous zone because of the high number of nerve ending. It is vital in kissing and other acts of intimacy [12].

Brief Anatomy of the lips

Fig-1a: The lip print pattern of a male identical twin

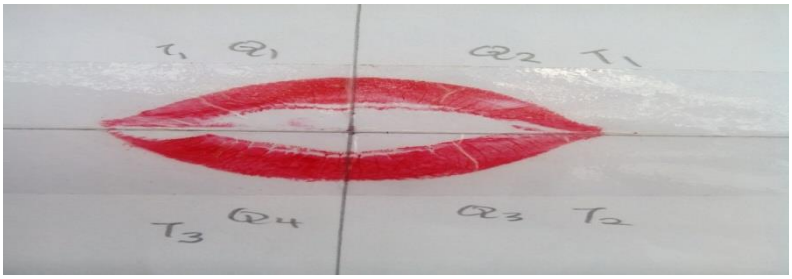

Fig-1b: The lip print of a male non- identical twin.

Lip Surfaces

Each Lip Has Two Surfaces

An outer surface covered by skin and an inner surface covered by mucosa membrane. Both meet at the red margin [13].

Outer Surface

It is covered with thin skin and is made up of:

- *Epidermis*: composed of dry rough and opaque keratinized squamous epithelial rich in nerve ending.
- *Dermis*: consist of areolar connective tissue rich in elastic fibres. It contains hair follicles, sebaceous and sweat gland, and have numerous dermal papillae, formed of connective tissue rich in blood capillaries [13].

Inner Surface or Mucosa

It consists of the following tissues:

- Thick transparent non-keratinized squamous epithelium which is rich in nerve ending. Its cells are rich in collagen [13].
- Corinum or lamina propia is formed of connective tissue rich in elastic fibres, blood and lymphatic capillaries as well as sensory nerve ending. Minor salivary glands called Labial glands are also present in the connective tissues which open on the surface of the lip by small ducts [13].
- Red free margin of the lip-the transitional zone between the skin surface and the mucosa membrane of the lip and is found in human only. It consist of partially keratinized stratified squamous epithelial which is thick and transparent [13].

The red coloration is due to reflection from the blood vessels present in the underlying connective tissue papillae.

These high papillae are rich in blood capillaries and sensory nerve endings which render the lip highly vascular as well as highly sensitive. No sweat glands or hair follicles are present in the red margin of the lip [13].

Muscles acting on the lips

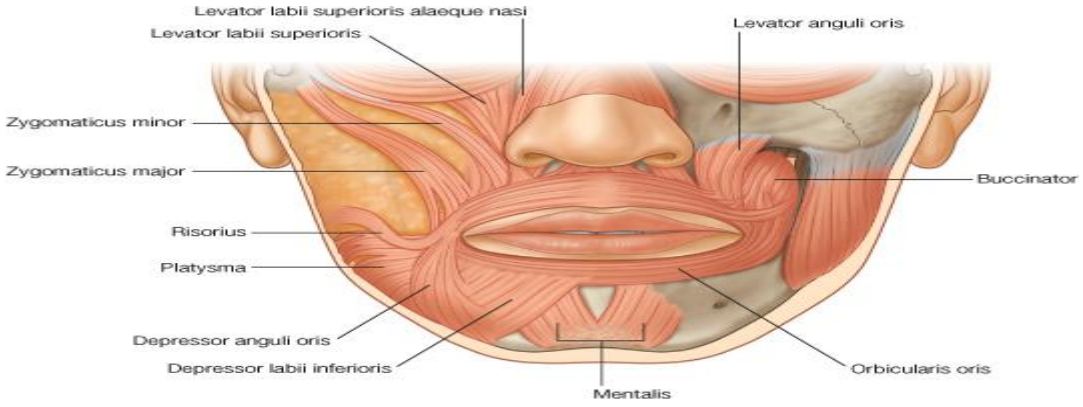

Fig-2: A diagram showing muscles acting on the lips (www.studentconsult.com)

The muscles that act on the lips are considered as part of the muscles of the facial expression. The muscles arise from the second pharyngeal arch and are supplied by the facial nerve. Those muscles are all specialized members of the panniculumcarnosus, which attach to the dermis and so wrinkle or dimple the overlying skin [14]. These muscles aid in speech, alteration of the lips and mouth.

There have been works on cheiloscopy by different authors on different subjects [15-18, 14, 19-31].

Statement of the Problem

There is dearth of information on lip prints in twining especially in indigenous populations in Nigeria as compared to as compared to fingerprint and toeprints. This has posed a lag in literatures on this subject.

Aim and Objectives

To determine the prevalent pattern among identical and non-identical twins

Significance of the Study

This study would be useful in the fields of forensics and genetics.

Limitations of the Study

This study was limited to the examination of the lip prints for visible characteristic patterns.

METHODS

Research Design

The study was descriptive and analytical.

Sample Size and Sampling Technique

The study comprised 80 subjects consisting of 50 (25 pairs) non- identical and 30 (15 pairs) identical male and female twins between the ages of 5-66 years of age randomly selected.

Criteria for Subject Selection

All subjects used for this study were from Igbo-Ora community, Southwest Nigeria. They were healthy individuals free of congenital abnormalities, trauma, inflammation and orthodontic treatments.

Ethical Clearance

Ethical clearance was obtained from the Research Ethics Committee of the University of Port Harcourt, Nigeria.

Data Collection

The informed consent was obtained from the volunteer subjects before commencement of the study. This study was done from January 10 - November 15, 2014. The lip of the individual was properly cleaned using a clean piece of clothe after which a red- coloured lipstick was applied evenly on the lips of the individual over the entre transition zone and vermillion border. The subject was asked to rub both lips evenly so as to spread the applied lipstick. After few minutes, a lip impression was made on the white sheet that is folded into two halves. It was made in the centre and then uniformly towards the corners of the lips. The paper was removed after the impression was made. The cellophane strip was stroked over the lip impression serving as a permanent record. The impression was analyzed using a magnifying lens. The lip impression was divided into four quadrants – two compartments on each lip using figures 1-4.

RIGHT UPPER LIP I QUADRANT (Q1)	LEFT UPPER LIP II QUADRANT(Q2)
RIGHT LOWER LIP IV QUADRANT (Q4)	LEFT LOWER LIP III QUADRANT (Q3)

In this study, the method of classification used was the classification scheme proposed by Suzuki and Tsuchihashi (1974).

RESULTS

In table-1 the most distributed lip patterns were type II in both non-identical and identical twin (26.5% and 31.7% respectively). The least distributed pattern in non-identical twin was type V (5.5%), type I' (8.3%) and type V (8.3%) was the least distributed in identical twin.

Table-1: Percentage frequency distribution table showing the percentage distribution of the lip print pattern of both the identical and non -identical twin groups

Lip print pattern	Total % distribution for all non- identical twins	Total % distribution for all identical twins
Type I	18.5%	14.2%
Type I^1	13.0%	8.3%
Type II	26.5%	31.7%
Type III	23.0%	20.0%
Type IV	13.5%	17.5%
Type V	5.5%	8.3%

In table-2 the most distributed lip pattern in non-identical and identical twin was type II (28.4%) while the least was type V (6.7%).

Table2: The overall percentage frequency distribution for each lip print pattern in all subjects

Lip print pattern	Percentage
Type I	16.7%
Type I^1	11.3%
Type II	28.4%
Type III	21.9%
Type IV	15.0%
Type V	6.7%

DISCUSSION

The analysis of the study showed that there were no similar lip print pattern even among twins though that of identical twins were closely related, but no two identical twins had the same lip print pattern and this is in accordance with the work done by Suzuki and Tsuchihashi [32] and Rashmi *et al.,* [30].

The most prevalent lip print pattern seen was the Type II (the Y or branched shaped). It appears like at formative stage, the genes that codes for type II were more present than the others which could be reason for the high frequency of type II pattern. This trend of finding agrees with the works of Bindal *et al.*, [33], Uma *et al.*, [34], Vahamwala *et al.*, [20] and Karki [35]. The next most frequent pattern was type III (Intersecting groove), while the least and rarely seen pattern was the Type V (Undetermined).

At a closer observation, it was observed with respect to the quadrants that, Type II was more prevalent in the first quadrant (Q1) while Type IV and I' were the least frequent lip print pattern in this quadrant for the male groups. This agrees with the work of Hirth *et al.*, [27] that shows that Type II is more in the upper quadrant. Type III was dominant in the second quadrant (Q2) and fourth quadrant (Q4) while Type I' was the least seen in these quadrants.

It was also observed that there was no similar lip print pattern observed among sibling's pair (2 pairs of twins) from the same parent. In few identical twins (about 5.8%), it was observed that there was repeated pattern in the either the upper right or left quadrant or lower right or left quadrants, but not repeated in different region.

The consistency of the prevalence of the lip print pattern seen in this work could be attributed to the tribal similarity among the research study group while the uniqueness of each lip print pattern is based on individualization and uniqueness of each subject therefore showing that lip print can be a means of identification and individualization of each individual irrespective of the type of birth whether single birth or twin birth.

CONCLUSION

The study has revealed that the most distributed lip pattern in non-identical and identical twin was type II (28.4%) while the least was type V (6.7%). By implication amongst twins whether identical or non-identical, in a random selection there is a greater probability of picking someone who has a type II pattern as the most frequent pattern type. This could aid in a forensic study and serve as a strong means of identification when the identity was not established beforehand.

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CONFLICT OF INTEREST

We write to state that there is no conflict of interest.

SOURCE OF FUNDING-Self-funding.

AUTHOR'S CONTRIBUTION

We write to state that all authors have contributed significantly, and that all authors are in agreement with the contents of the manuscript. 'Author A' (Ezon-Ebidor Innocent Edibamode) designed the study and protocol, 'Author B' (Peter D. Okoh) reviewed the design and protocol, 'Author C' (John Nwolim Paul) wrote the first draft of the manuscript and managed the literature search, 'Author D' (Josiah S. Hart) examined the manuscript for intellectual content, 'Author E' (Adozue Chinasaokwu C. Harold) managed the analyses of the study. All authors read and approved the final manuscript.

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