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Original Article

Investigation of Ancestral Relationship of Ikwerres' with Binis' and Igbos' Using Level 2 Dermatoglyphic (Minutiae) Patterns

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ABSTRACT

Background: This study was aimed at investigating the ancestral relationship of the Ikwerre ethnic group with the Bin and Igbo ethnic groups using level 2 dermatoglyphic patterns.The studies was an observational, analytical and cross-sectional design with volunteers age ranging from 18-60 years. For the purpose of this study, an individual was considered to be a Nigeria of a particular ethnic group if the parents and four grandparents are of the same ethnic group. **Materials and Methods**: Cluster sampling method was used for the study. The selection and collection of required parameters relied on informed consent of volunteer subjects. This was done by giving them a copy of the informed consent letter which was signed and dated. A total of 1,200 subjects (Bini 400, Ikwerre 400 and Igbos 400) subjects were recruited for the study. The fingerprints were obtained using print scanner (Hp G3110 Photo scanner) following Oghenemavwe and Osaat (2015) improvised model. **Results and Discussion**: Distribution of total digital patterns in Ikwerre and Bini ethnic groups. Ikwerre had the following distribution on the left hand: Ridge ending 4656(17.0%), Ridge Crossing 2467(9.0%), Bifurcation 5444(19.9%), on the right hand it was: Ridge ending 4660(17.0%), Ridge Crossing 2483(9.1%), Bifurcation 5442(19.9%), Whereas Bini had on the left Ridge Ending 4399(17.1%), Ridge Crossing 2335 (9.0%), Bifurcation 5283(20.5%), on the right the distributions were seen: Ridge Ending 4415 (17.2%), Ridge Crossing 2323 (9.0%), Bifurcation 5303(20.6%). Distribution of total digital patterns in Ikwerre and Igbo ethnic groups. Ikwerre had the following distribution on the left hand: Ridge ending 4656(17.0%), Ridge Crossing 2467(9.0%), Bifurcation 5444(19.9%), on the right hand it was: Ridge ending 4660(17.0%), Ridge Crossing 2483(9.1%), Bifurcation 5442(19.9%) whereas the Igbos had on the left hand, the distribution were thus: Ridge ending 4504(16.5%), Ridge crossing 2526(9.2%), Bifurcation 5477(20.0%) on the right, Ridge ending 4526(16.6%), Ridge crossing 2527(9.2%), Bifurcation 5473(20.0%). **Conclusion**: The prediction of ancestry of the Ikwerre ethnic groups using level 2 total digital patterns of Binis showed that there is a chance of 1.7 while between Ikwerre and Igbo ethnic group a probable chance of 2.1 that the Ikwerres emanated from the Igbos. It appears that they have almost equal values by approximation. It suggests that there is almost an equal possibility of ancestry from both Bini and Igbo. It further suggests that the Ikwerre ethnic group received contributions from Igbo ethnic groups in its formation.
Keywords: Ikwerre, Bini, Igbo, Bifurcation, Ridge ending, ridge crossing.

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1. INTRODUCTION

The term dermatoglyphics was ''coined in 1926 by Dr. Harold Cummins from derma, skin + the Greek glyphe, carve''. It is referred to as the branch of science which studies the patterns of the skin (dermal) ridges present on human fingers, toes and the soles [1].

The role of dermatoglyphics on establishing similarities in ethnicity or ancestry cannot be overemphasized. In determining the dermatoglyhic patterns of people, the fingerprint of subjects from the ethnic group, tribes or races under investigation are examined to check for the various patterns or minutiae that exists [2, 3]. This is done to establish whether or not there is a common characteristic pattern observed between the tribes, ethnic groups or races being investigated. If there are common characteristic patterns seen in the tribes investigated, suggests a relationship exists between them [4, 5].

The Ikwerre people have stated that they have their ancestral root from the Bini ethnic group with history that documented how the ancestor of the Ikwerre fled the old Bini and came down to the present location of the Ikwerre ethnic to settle. Again, the Igbo ethnic group lay claims on the Ikwerre people. This controversy has persisted for very long time without any thorough scientific investigation to back any of these claims. It is based on this paucity of information that this study was undertaken to explore whether there is an anatomical evidence to back or reject any of the claims [6-10].

There have some reports on investigations done by other researchers on the positions of axial triradii [11-21].

There is paucity of information on the level 2 dermatoglyphic patterns of these tribes under investigation.

Aim and Objective: This study was aimed at investigating the ancestral relationship of the Ikwerre ethnic group with the Bin and Igbo ethnic groups using level 2 dermatoglyphic patterns.

Scope of the Study: This study was done specifically on the digital prints.

Significance of the Study: This study will benefit the body of knowledge on ancestry of Ikwerres which will be significant to historians, sociologists, anthropologists, Rivers State people and Ikwerres specifically.

Dermatoglyphics whether level 1 or 2 operates on the principle of medical genetics and familiar inheritance. This is the reason dermatoglyphics at level 2 is used in the diagnosis of medical conditions such as down's syndrome, idiopathic blindness, idiopathic lameness, diabetics of genetic origin etc. Ancestral relationship is based on similarity in genetic makeup or proximity of individuals or siblings in distant region. This examination of fingerprint (dermatoglyphics) is a cost-effective approach to health management as compared to DNA analysis that is expensive or not readily affordable by many health seekers, not only in ancestral relationship but in the detection chronic genetic health conditions [22].

2. METHODS

Research Design: The study was descriptive and cross-sectional.For the purpose of this study, an individual was considered to be a Nigeria of a particular ethnic group if the parents and four grandparents are of the same ethnic group. Volunteers with age ranging from 18-60 years from the Ikwerre, Bini and Igbo extractions were recruited for this study by random sampling. The study was conducted from January 6- December 20, 2018.

Data Collection: The selection and collection of required parameters relied on informed consent of volunteer subjects after the procedure was explained to them. This was done by giving each volunteer a copy of the informed consent letter which was signed and dated. A brief questionnaire on the age, sex, ethnicity of the parents and grandparents was self-administered except for the subjects that could not read or write where the researcher administered the questionnaire himself. A total of 1,200 (Bini 400 subjects, Ikwerre 400 subjects and Igbos 400) subjects were recruited for the study.Obtaining data for dermatoglyphics: the fingerprints were obtained using print scanner (Hp G3110 Photo scanner) using the improvised method described by Oghenemavwe and Osaat (2015). The subjects were asked to wash their hands thoroughly with water, detergent and dried with a hand towel (clothe) before taking prints. This process was followed to avoid the interference of dirt with the photo images of the print. In course of taking the prints a little pressure was put to press the palm on the scanner for adequate contact between the palm and the scanner. The first step of the scanning process was to place the palm or sole on the scanner, closed the scanner cover to the extent the hand or feet can accommodate and then click on scan. Allow the exposure light which could be seen from the scanner glass surface to run through until it showed the scan preview on the computer screen. Once the scanned image appeared on the computer screen, the following was done: a) cropped the picture to reduce the extra space surrounding the picture of the palm. b) clicked on correct picture menu and did the followings: change "removed dust" and "scratches" from normal to high, changed "sharpen" from medium to extreme and clicked on descreen; c) Adjusted the colour of the scan by clicking on "adjust colour" menu then selected "invert colour" or "invert grayscale colour"; d) clicked on resize output and changed percentage scale from 100 to 10 to reduce the size of the picture. e) Changed the output type from colour to grayscale. After all these changes were done, clicked on "finish". Then the scanner did the final scanning. This was the second step in the scanning process. Because the scanning process was a bit slow, after the automatic re-scanning, it was possible to switch the scanner cord to any other USB ports on the computer to make it faster. At this point, a new scan could begin, while the former one was still running until it finished by itself. When it had finished

scanning, the scanned picture was saved in scan folder. It could be resaved using appropriate file name for easy identification. After prints had been obtained it was magnified using the zooming tool on Hp laptop connected to the scanner via USB cords where the data collected was examined, identified and grouped into the various categories and recorded.

Description of paramaters
The parameters in dermatoglyphics were bifurcation, bridge, ridge ending, dot, island, lake, double bifurcation, opposed bifurcation, ridge crossing and trifurcation.

Bifurcation- where a single ridge is split into two
Trifurcation-where a single ridge is split into three
Bridge- where a single ridge sends a branch to a parallel ridge.
Double bifurcation- where a single ridge splits twice in the same direction
Opposed bifurcation -where a single ridge splits twice in opposite direction with a short strand connecting them.
Dot- as the name implies. A ridge that has the appearance of a full stop.
Island- A short ridge standing in isolation.
Ridge crossing- two ridges connecting to each other like the shape of a chromosome
Ridge ending- the termination of single ridge
Lake(enclosure)- when two ridges are juxtaposed to form an enclosure

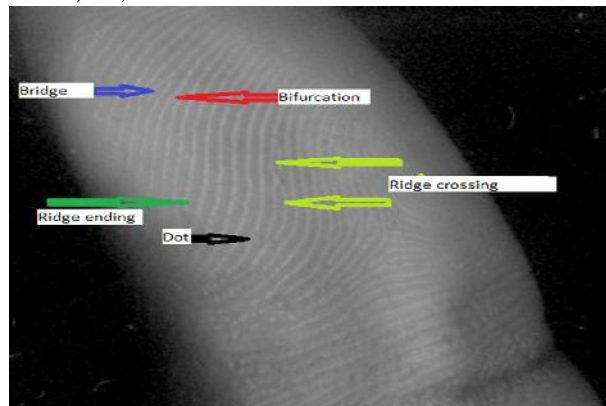**Fig 1: The level two dermatoglyphic patterns (courtesy from fournier andross,2015)**

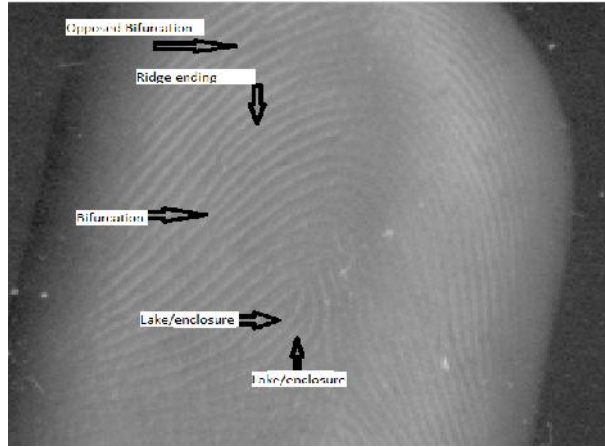**Fig 2: Bridge, Bifurcation, Ridge ending, Ridge crossing, Dot from the study.**

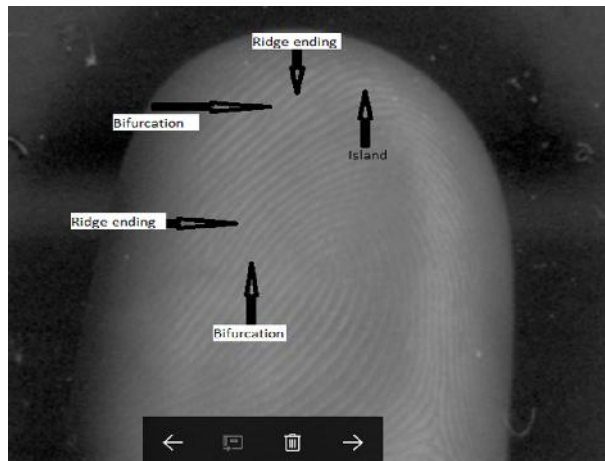**Fig 3: Opposed bifurcation, Ridge ending, Bifurcation, Lake (enclosure) from the study.**

Fig 4: Ridge ending, Bifurcation, Island from the study.

Data Analysis: Data obtained were inputted into Microsoft excel 2010 for data analysis using chi square test to determine the distribution of level 2 patterns amongst the Ikwerre, Bini and Igbo ethnic groups.

Criteria for Subject Selection: Subjects recruited were indigenes of the ethnic groups under investigation with no form of anatomical abnormality of the hands. Blurred prints were excluded as well as foreign nationals.

Ethical Consideration
Ethical clearance was obtained from the Research Ethics Committee of the University of Port Harcourt with REC Number: UPH/CEREMAD/REC/MM59/036 before commencement of the study.

3. RESULTS

In table 1; distribution of total digital patterns in Ikwerre and Bini ethnic groups. Ikwerre had the following distribution on the left hand: Ridge ending 4656(17.0%), Ridge Crossing 2467(9.0%), Bifurcation 5444(19.9%), on the right hand it was: Ridge ending 4660(17.0%), Ridge Crossing 2483(9.1%), Bifurcation 5442(19.9%), Whereas Bini had on the left Ridge Ending 4399(17.1%), Ridge Crossing 2335 (9.0%), Bifurcation 5283(20.5%), on the right the

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distributions were seen: Ridge Ending 4415 (17.2%), Ridge Crossing 2323 (9.0%), Bifurcation 5303(20.6%).

In table 2; distribution of total digital patterns in Ikwerre and Igbo ethnic groups. Ikwerre had the following distribution on the left hand: Ridge ending 4656(17.0%), Ridge Crossing 2467(9.0%), Bifurcation 5444(19.9%), on the right hand it was: Ridge ending 4660(17.0%), Ridge Crossing 2483(9.1%), Bifurcation 5442(19.9%) whereas the Igbos had on the left hand, the distribution were thus: Ridge ending 4504(16.5%), Ridge crossing 2526(9.2%), Bifurcation 5477(20.0%) on the right, Ridge ending 4526(16.6%), Ridge crossing 2527(9.2%), Bifurcation 5473(20.0%).

In table 3; comparison of total patterns between Ikwerre and Bini ethnic groups using chi square (X^2) test all patterns were significantly different in both ethnic groups.

In table 4; comparison between Ikwerre and Igbo males using chi square (X^2) test all patterns were insignificantly different in both ethnic groups.

Table 1: Distribution of total digital patterns in Ikwerre and Bini ethnic groups

S/N	Parameters	Total Patterns in Ikwerren(%)		Total Patterns in Bini n(%)	
	Digital Patterns	Left hand	Right hand	Left hand	Right hand
1	Ridge Ending	4656(17.0)	4660(17.0)	4399(17.1)	4415 (17.2)
2	Ridge Crossing	2467(9.0)	2483(9.1)	2335 (9.0)	2323 (9.0)
3	Bridge	2088(7.6)	2086(7.6)	1979(7.7)	1999(7.7)
4	Lake	2185(8.0)	2191(8.0)	2077(8.1)	2065(8.0)
5	Bifurcation	5444(19.9)	5442(19.9)	5283(20.5)	5303(20.6)
6	Double Bifurcation	2093(7.7)	2087(7.6)	2021 (7.8)	2005 (7.7)
7	Dot	2051(7.5)	2055(7.5)	2015 (7.8)	2025 (7.8)
8	Trifurcation	2016(7.4)	2018(7.4)	1938 (7.5)	1915 (7.4)
9	Opposed Bifurcation	2288(8.4)	2294(8.4)	2029 (7.9)	2044 (7.9)
10	Island	2069(7.5)	2073(7.5)	1723 (6.6)	1709 (6.7)

Bifurcation > Ridge ending > Ridge crossing, **Ikwerre> Bini.**

Table 2: Distribution of total digital patterns in Ikwerre and Igbo ethnic groups

S/N	Parameters	Total Patterns in Ikwerren(%)		Total Patterns in Igbo n(%)	
	Digital Patterns	Left hand	Right hand	Left hand	Right hand
1	Ridge Ending	4656(17.0)	4660(17.0)	4504(16.5)	4526(16.6)
2	Ridge Crossing	2467(9.0)	2483(9.1)	2526(9.2)	2527(9.2)
3	Bridge	2088(7.6)	2086(7.6)	2095(7.7)	2097(7.7)
4	Lake	2185(8.0)	2191(8.0)	2196(8.0)	2188(8.0)
5	Bifurcation	5444(19.9)	5442(19.9)	5477(20.0)	5473(20.0)
6	Double Bifurcation	2093(7.7)	2087(7.6)	2097(7.7)	2095(7.6)
7	Dot	2051(7.5)	2055(7.5)	2045(7.5)	2051(7.5)
8	Trifurcation	2016(7.4)	2018(7.4)	2017(7.4)	2015(7.3)
9	Opposed Bifurcation	2288(8.4)	2294(8.4)	2286(8.4)	2290(8.4)
10	Island	2069(7.5)	2073(7.5)	2080(7.6)	2078(7.7)

Bifurcation > Ridge ending > Ridge crossing, **Ikwerre< Igbo**

Table 3: Comparison of total patterns between Ikwerre and Bini ethnic groups using chi square (X^2) test

Patterns		Ikwerren(%)	Bini n(%)	X^2 (P-value)	Inference
Ridge ending	Right	4656(17.0)	4399(17.1)	13.899(0.001)	Significant
	Left	4660(17.0)	4415 (17.2)		
Ridge crossing	Right	2467(9.0)	2335 (9.0)	8.874(0.002)	Significant
	Left	2483(9.1)	2323 (9.0)		
Bifurcation	Right	5444(19.9)	5283(20.5)	4.192(0.04)	Significant
	Left	5442(19.9)	5303(20.6)		

All patterns were significantly different in both ethnic groups.

Table 4: Comparison between Ikwerre and Igbo males using chi square (X^2) test

Patterns		Ikwerren(%)	Igbo n(%)	X^2 (P-value)	Inference
Ridge ending	Right	2363(17.0)	2298(16.5)	1.885(0.172)	Not significant
	Left	2375(17.0)	2308(16.5)		
Ridge crossing	Right	1240(8.9)	1292(9.3)	1.528(0.216)	Not significant
	Left	1250(8.9)	1289(9.3)		
Bifurcation	Right	2772(19.9)	2790(20.0)	0.080(0.776)	Not significant
	Left	2784(20.0)	2796(20.0)		

All patterns were insignificantly different in both ethnic groups.

Table 5: Summary of the odds ratios in dermatoglyphics at level two between Ikwerre and Bini, Ikwerre and Igbo populations

Parameters	Odds Ratios	
	Ikwerre and Bini	Ikwerre and Igbo
Ridge ending	1.727	2.011
Ridge crossing	1.665	1.904
Bifurcation	1.719	2.101

4. DISCUSSIONS

The distribution of the dermatoglyphic patterns were such that bifurcation was most prevalent, then the ridge ending andridge crossing. Comparison of total digital patterns between Ikwerre and Bini indicated that the three patterns (ridge ending, ridge crossing and bifurcation) differed significantly. This gives a clear indication that the two ethnic groups compared do not have ancestral relationship based on digital patterns. This agrees with the result of Segura-Wang and Barrantes [11] who stated that significant difference in results indicate no relationship exist between two ethnic groups compared.

Comparison of the total digital patterns in both ethnic groups (Ikwerre and Igbo) indicated that one pattern (ridge ending) differed significantly between the two ethnic groups whereas the other two patterns (ridge crossing and bifurcation) differed insignificantly. It may imply that the two patterns that had no significant difference in their distribution in Ikwerre and Igbo which goes on to tell that the two ethnic groups could have genetic proximity(related). This result agrees with the reports of Namouchi [12] and Fournier and Ross [13] who stated that insignificance in digital pattern difference suggests close ancestral relationship.

Prediction of ancestral relationship using total digital patterns

The prediction of ancestry of the Ikwerre ethnic groups using level 2 total digital patterns of Binis showed that there is a least chance of 1.6 (from ridge crossing) and highest

chance of 1.7 (from ridge ending and bifurcation) that the Ikwerres have ancestry from the Binis.

The prediction of ancestry of the Ikwerre ethnic groups using level 2 total digital patterns of Igbos showed that there is a least chance of 1.9 (from ridge ending) and highest chance of 2.1 (from bifurcation) that the Ikwerres have ancestry from the Igbos.

The chances that the Ikwerre people came from both Bini and Igbo showed that the Igbos and Binis have almost equal values by approximation. It suggests that there is almost an equal possibility of ancestry from both Bini and Igbo. By this outcome, it is rational for someone to think that Ikwerre ethnic group may possibly be heterogenous in its formation. Implying that they have contributions from Bini and Igbo ethnic groups.

5. CONCLUSION

The prediction of ancestry of the Ikwerre ethnic groups using level 2 total digital patterns of Binis showed that there is a chance of 1.7 while between Ikwerre and Igbo ethnic group a probable chance of 2.1 that the Ikwerres emanated from the Igbos. It appears that they have almost equal values by approximation. It suggests that there is almost an equal possibility of ancestry from both Bini and Igbo. It further suggests that the Ikwerre ethnic group received contributions from Igbo ethnic groups in its formation.

6. ACKNOWLEDGEMENTS

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AUTHOR'S CONTRIBUTION

We write to state that both authors have contributed significantly, and that all authors are in agreement with the contents of the manuscript. 'Author A' (John Nwolim Paul) designed the study and protocol, wrote the first draft of the manuscript; 'Author B'(Gabriel Sunday Oladipo) 'reviewed the design, protocol; 'Author C' (Loveday Ese Oghenemavwe) examined the intellectual content of the manuscript. All authors read and approved the final manuscript

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