JMBR: A Peer-review Journal of Biomedical Sciences
December 2012, Vol. 11 No.2 pp 90-96

Digital Dermatoglyphic Patterns of Anioma and Urhobo Students in Two Tertiary Institutions of Delta State, Southern Nigeria

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Abstract

Dermatoglyphics has a potential contribution to biological anthropology and population genetics. The purpose of this study was to assess the dermatoglyphic features of the Anioma and Urhobo peoples of Nigeria, which could be useful in future studies, especially in population relationships. The study consisted of 820 individuals, 340 Aniomas (176 males and164 females) and 480 Urhobos (224 males and 256 females) aged between 13 and 48 years (mean=21.04 years). The systematic random sampling technique was employed. Voluntary informed consent was obtained from all prospective subjects prior to data collection. Digital ink prints of all the fingers of both hands in each subject were taken on a plain white duplicating paper and studied with the aid of a magnifying glass based on standard practice. The three primary ridge patterns of arches, loops and whorls were identified and recorded in a data sheet. The dominant finger print in the two ethnic groups was loop followed by whorl and then arch. No two finger prints were noted to be same. There was no significant association between gender and finger ridge patterns ($p>0.05$). In both ethnic groups, there was significant association between ethnicity and finger ridge pattern ($p<0.05$). The pattern of finger ridge distribution in the two populations is different. This study will be of relevance in population dynamics.

Introduction

Dermatoglyphics is defined as the scientific study of epidermal ridges and their configuration on the volar aspect of the palmar and plantar regions [1]. It has been posited that in contrast to monogenic polymorphisms, dermatoglyphics are polygenic traits under possible environmental influences that are restricted to the first few months of embryonic life [2, 3]. This corroborates the fact that the characteristic patterns of epidermal ridges are differentiated in their definitive forms during third (3rd) and fourth (4th) month of fetal life (Purkinje, 1940)[4]. It has also been noted that there are normal variations in these traits, representing hereditary differences between members of separate populations and members of same population or family [3, 5]. Hence, dermatoglyphic traits are most useful in studying population dynamics [3, 6].

KEY WORDS: *Parents, socioeconomic status, nutrition, primary school*

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The development of ridge patterns coincides with the regression of embryonic volar pads on fingers, and the type and size of patterns are largely determined by the size and timing of subsidence of these pads [7]. Genetically or environmentally determined growth disturbances that affect the limbs in the critical period of ridge formation may also affect normal development of ridges and ridge patterns [8].

Dermatoglyphic variation has a primary aim of identifying individuals, sex, race, ethnic differences as well as serving as a tool in the diagnosis of congenital malformations [8, 9,10]. The present study is directed towards the dermatoglyphic features of the two populations as these could be useful in future studies, especially in population relationships between Aniomas and Urhobos. This study will be of relevance in forensic anthropology and forensic medicine. It will provide the basis to compare the digital dermatoglyphic patterns of the Aniomas and Urhobos.

Materials and Method

The descriptive method was used in this study. The population comprised all Anioma and Urhobo students in Delta state University, Abraka, and College of Education, Agbor, in Southern Nigeria. The study consisted of 820 individuals, 340 Aniomas (176 males and164 females) and 480 Urhobos (224 males and 256 females) aged between 13 and 48 years (mean=21.04 years). The systematic random sampling technique was employed in this study conducted between September to December, 2011.

The Aniomas are a people generally called Delta Ibo, who are bonded by linguistic and are geo-politically defined. They comprise the Aniocha, Ika, Oshimili and Ukwuani ethnic groups. They form the second largest people in Delta state and occupy the Northern part of the state. The Urhobos, occupying the central part, form the largest ethnic group in Delta state. The geographical proximity and the numerical size of these two peoples informed their choice in this study. Subjects were screened if they are apparently healthy and belonged to either of Urhobo or Anioma. Family pedigree study was done prior to data collection.

Voluntary informed consent was obtained from all prospective subjects prior to data collection in accordance with International Ethical Guidelines for Biomedical research involving Human Subjects[11]. In addition, the Research and Ethics committee of College of Health Sciences, Delta State University, approved the method employed in the study.

Digital ink prints of all the fingers of both hands in each subject were taken on a plain white duplicating paper and studied with the aid of a magnifying glass. The prints were analyzed based on Cummins method [1, 12]. The three primary ridge patterns of arches, loops and whorls were identified and recorded in a data sheet (fig 1).

Statistical analysis was done using frequency distribution and cross-tabulation to assess degree of association between gender and finger print patterns; and between fingers and finger print patterns, with the aid of the Statistical package of Social sciences (SPSS) version 16. P-value < 0.05 was considered statistically significant.

Arch Loop Whorl

Figure 1: The three basic fingerprint patterns.

Results

Table 1 shows the distribution of finger ridge patterns in Anioma and Urhobo peoples. The dominant ridge pattern was loop in both Aniomas (54.6%) and Urhobos (56.6%). This was followed by whorl (Aniomas= 28.4%; Urhobos=29.1%) and the least was arch (Aniomas= 17.0%; Urhobos=14.6%).

Table 2 depicts the distribution of the finger ridge patterns of the Aniomas and Urhobos with respect to specific fingers. Among the Aniomas, the arch pattern occurred in 19.4% of little fingers. This was followed in order by index finger (18.5%), thumb and middle finger (17.4% each) and ring finger (12.4%). Also, the loop pattern featured in 71.5% of little fingers, followed by middle finger (60.0%), index finger (49.1%), thumb (47.1%) and the least was ring finger (45.6%). Whorl occurred in 42.1% of ring fingers, followed in descending order by thumb (35.6%), index finger (32.4%), middle finger (22.6%) and little finger (9.1%).

Among the Urhobos, 23.3% of index fingers has arch pattern as compared to the other fingers that are less. 75.4% of little fingers have loop, followed by middle finger (65.0%), ring finger (51.9%), thumb (45.2%) and the least was index finger (43.8%). 39.8% of ring finger have whorl pattern, next is thumb (38.3%), index finger (32.9%), middle finger (20.8%) and little finger (13.8%). In both ethnic groups, there is significant association between finger and finger ridge patterns ($p<0.05$).

Table 3 shows the distribution of the finger ridge patterns with respect to gender. Among Aniomas, more male have arch compared to females. Slightly more males have loop compared to females. 29.1% of females have whorl compared to males

with 27.6%. There is no significant association between gender and finger ridge pattern ($p>0.05$). Among Urhobos, more males have arch (16.7%) and whorl (29.4%) compared to females. 58.3% of females have loop compared to male (53.9%). There is significant association between gender and finger print patterns ($p<0.05$).

Table 1: Frequency distribution of the digital patterns across the cohort of each ethnic group.

Ethnicity	Ridge pattern	Frequency	Percent
Anioma	ARCH	578	17.0
	LOOP	1858	54.6
	WHORL	964	28.4
	Total	3400	100.0
Urhobo	ARCH	702	14.6
	LOOP	2700	56.2
	WHORL	1398	29.1
	Total	4800	100.0

Table 2: Distribution of the digital ridge patterns in specific fingers.

Ethnicity	Ridge pattern	Finger					Total
-	-	THUMB	INDEX	MIDDLE	RING	LITTLE	-
[b]Anioma		118	126	118	84	132	578
	Arch	17.4%	18.5%	17.4%	12.4%	19.4%	17.0%
	Loop	320	334	408	310	486	1858
		47.1%	49.1%	60.0%	45.6%	71.5%	54.6%
		242	220	154	286	62	964
	whorl	35.6%	32.4%	22.6%	42.1%	9.1%	28.4%
		680	680	680	680	680	3400
	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
[a]Urhobo		158	224	136	80	104	702
	Arch	16.5%	23.3%	14.2%	8.3%	10.8%	14.6%
	Loop	434	420	624	498	724	2700
		45.2%	43.8%	65.0%	51.9%	75.4%	56.2%
		368	316	200	382	132	1398
	Whorl	38.3%	32.9%	20.8%	39.8%	13.8%	29.1%
		960	960	960	960	960	4800
	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

: X^2= 230; [a]: X^2=385; df=8; P<0.05.

Table 3: Distribution of the digital ridge patterns with respect to gender.

Ethnicity	Ridge pattern	Gender		Total
-	-	FEMALES	MALES	-
[b]Anioma	Arch	270	308	578
		16.5%	17.5%	17.0%
	Loop	892	966	1858
		54.4%	54.9%	54.6%
	Whorl	478	486	964
		29.1%	27.6%	28.4%
	Total	1640	1760	3400
		100.0%	100.0%	100.0%
[a]Urhobo	Arch	328	374	702
		12.8%	16.7%	14.6%
	Loop	1492	1208	2700
		58.3%	53.9 %	56.2%
	Whorl	740	658	1398
		28.9%	29.4%	29.1%
	Total	2560	2240	4800
		100.0%	100.0%	100.0%

[a]: X^2=16.44; df=2; P<0.05; [b]: X^2=1.28; df=2; P>0.05

Discussion

In the present study, 8,200 finger ridge patterns from 820 individuals were examined. No two prints were the same, indicating the individuality, uniqueness of finger prints for identification and authentication. Loop is the dominant ridge pattern, followed by whorl and the least was arch in both Aniomas and Urhobos. This is consistent with other studies done in Nigeria which observed loop pattern to have the highest frequency, followed in order by whorl, then arch pattern[12, 13, 14, 15]. Similar results were reported on the Urhobos and Hausa [16], the Ijaws [17, 18], Delta state University students [19]. Studies in other parts of Africa have also reported characteristic and similar dermatoglyphic

patterns like that of Nigerians though with variations in percentages [20, 21].

In all fingers except the little fingers of the Aniomas, the loop patterns occurred most followed by whorl patterns, but the arch patterns exceed whorl in the case of little fingers. In the case of Urhobo people, the frequency of occurrence of loops was highest in all fingers, followed by whorl patterns. This corroborates Udoaka and Udoaka [12] who recorded that the loop pattern was highest in all five fingers, followed by whorl patterns among Ijaw students of University of Port Harcourt. The present study also noted significant association between the fingers and finger ridge patterns, in both the Aniomas and Urhobos. This indicates that the patterns of ridge distribution in the respective populations studied are unique to them. This is in tandem with reports that normal variations exist in the traits of lip prints, representing hereditary differences between members of separate populations and members of same population [3, 5]. Hence their usefulness in the study of population dynamics [6].

On gender in relation to digital ridge patterns, Reddy [22] reported higher loops in females than the males among Bagathas, India. Ekanem et al [13] reported that loops were higher in females than males among Annang ethnic group. The present study supports these in the case of Urhobos but departs from them in the case of the Aniomas in which males have higher frequency of loop patterns. This observation among the Aniomas is in tendem with Anibor et al [18] who reported higher frequency of loop in males than in females among the Ijaws. Odokuma and Igbigbi [19] reported that females had a greater proportion of arches while males had a greater proportion of whorls compared to opposite counterparts. It is observed in this study that among the Aniomas, males and females have a higher frequency distribution of arch prints and whorl prints respectively. Among Urhobos, males have frequency distribution of both the arch and whorl prints compared to their female counterparts. There is no significant association ($p>0.05$) between gender and ridge patterns.

Conclusion

The dominant ridge pattern in the two populations was loop followed by whorl and the least was arch. In spite of the close geographical proximity of the Aniomas and Urhobos, variations exist between the two populations with regards to pattern and frequency of distribution of fingerprint. This reaffirms that finger print patterns are reliable in studying population dynamics.

Recommendation

A more grandiose study on the dermatoglyphic patterns of the generality of Urhobo and Anioma peoples is recommended.

Acknowledgement

I wish to appreciate the efforts of some of my students who served as research assistants during the stage of data collection.

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