Digital Dermatoglyphic Patterns Of Annang Ethnic Group In Akwa Ibom State Of Nigeria

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Citation

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Abstract

Digital dermatoglyphics has been found useful in forensic medicine and identification purposes. It is useful in medical diagnosis of genetically inherited diseases and in detection of crimes. Anthropometric studies of the digit, palm and feet provides data that reveal the relative distribution of dermal ridges among people in different geographical zones. Cross-sectional study was carried out using 200 males and 200 females healthy volunteers of Annang ethnic group in Akwa Ibom State of Nigeria to establish their digital dermatoglyphic traits. This was done by counting and classifying their ridge pattern configurations of arches, loops and whorls. Ulnar loops were the most predominant digital pattern in females (50.1 percent) than in males (39.6 percent), followed by whorls (42.9 percent) in males, then arches (31.1 percent) in females and radial loop (2.1 percent) in males. The sex differences between these patterns were statistically significant (chi2 equal to 154.569; d.f. equal to 4; 0.001 greater than P). The index of pattern intensity (P11) showed a higher value in males (15.13) than the females (11.88). Sexual dimorphism was also evident with the males showing higher total finger ridge count (TFRC) than the females ($p < 0.001$). This study has established for the first time the normal dermatoglyphic patterns of Annang ethnic group in Akwa Ibom State of Nigeria.

INTRODUCTION

Through decades of scientific research, the hand has come to be recognized as a powerful tool in the diagnosis of psychological, medical and genetic conditions. It was in 1926 that Cummins introduced the term “Dermatoglyphics”. It is the term applied to the study of the naturally occurring patterns of the surface of the hands and feet [1].

Finger ridges and ridge patterns are highly heritable, durable, and age-independent human traits and have been studied as a model quantitative trait in humans for over 80 years [2]. They develop between approximately the 13th and 18th weeks of gestation, and in the absence of trauma remain essentially unchanged throughout life. The cutaneous mechanoreceptive afferent neurons that innervate the fingertips develop in alignment with the ridges, lending support to the theory that fingerprints play a role in gripping, and tactile perception [345].

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 [6]. 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.

Traditionally, the ridge count is defined as the number of ridges that intersect or touch the line drawn from the easily recognized triradius (where three ridges meet) to the center of the pattern [7].

The most common pattern, a simple loop (60%–70% of all patterns, characterized by a single triradius, is most advantageous for tactile perception and precision grip [378]. Whorls have two triradii yielding two counts, while simple arches have no true triradii, resulting in a zero count.

The study of palmar, and finger prints has a primary aim of identifying individuals sex, race, ethnic differences as well as serving as a tool in the diagnosis of congenital malformations [7, 910].

The existence of ethnic and racial differences has however necessited the documentation of parameter values for use in each ethnic group, race or region of the world. Such parameters values do not exist for Annang ethnic group in Akwa Ibom State of Nigeria. Thus this study was aimed at determining and establishing the dermatoglyphic pattern among the Annang ethnic group.

MATERIALS AND METHODS

A total of 400 indigenous Annang subjects of Akwa Ibom

State origin distributed in Abak, Essien Udim, Etim Ekpo, Ika, Ikot Ekpene, Obot Akara, Oruk Anam and Ukanafun Local Government Areas, volunteered for the study. The study population consisted of 200 males and 200 females. Research Ethics committee guidelines relating to the use of human subjects for research purposes were duly followed. Bilateral palmar prints of all the 400 subjects were obtained using endorsing ink and plain duplicating paper [11]. Screening was done on the white duplicating paper containing the prints with the aid of magnifying glass and the different patterns were identified and classified into whorls, tented arch, plain arch, ulnar loops and radial loop. Interpretation of the pattern were carried out according to Antonuck and Cumnins[1213]. The parameters analyzed include the pattern frequency, pattern intensity index and total finger ridge count with sex differentiation.

STATISTICAL TECHNIQUE FOR DATA ANALYSES

Chi-square was used to analyzed data with statistical significance at $p < 0.001$.

RESULTS

Figure 1

Table 1a: Showing the frequency of digital pattern and sex differentiation of Annang ethnic group.

Digital pattern	Males	Females	Row total
Whorl	429 (42.9%)	195 (19.5%)	624 (31.2%)
Ulnar loop	396 (39.6%)	501 (50.1%)	897 (44.9%)
Radial loop	21 (2.1%)	6 (0.6%)	27 (1.4%)
Tented arch	74 (7.4%)	152 (15.2%)	226 (11.3%)
Plain arch	80 (8.0%)	164 (16.4%)	226 (11.3%)
Column total	1000	1000	2000

$Chi^2 = 154.569$; $df = 4$; $p < 0.001$

Table 1a shows the frequency of the digital patterns and sex differentiation obtained from the study of 400 Annang subjects. Ulnar loops were the most predominant pattern (44.9%) followed by whorls (31.2%), arches (11.3%), the least were the radial loop (1.4%). Ulnar loops were significantly greater in females than in males while in the males whorls were significantly greater.

Figure 2

Table 1b: Showing total finger ridge count and pattern intensity index of the Annang ethnic group

Pattern intensity index (PII)	Males	Females
	15.13	11.88
Total Finger Ridge Count (TFRC)	142 – 146	123 - 125
Mean TFRC	144	124

$P < 0.001$

The index of pattern intensity showed higher value in males (15.13) than in females (11.88) while the males showed a higher mean TFRC (144), than the females (124) as shown in table 1b.

DISCUSSION

Dermatoglyphics is a scientific method for anthropological, medicolegal and genetic studies. Its genetic bases are used to study familial inheritance and in diagnosis of genetic diseases. The science of fingerprints – dermatoglyphics – had acclaimed and reputed as panacea for individualization, particularly in forensic investigations [12131415].

The result of the dermatoglyphic pattern of Annangs, the second largest ethnic group in Akwa Ibom State revealed the following, 11.3%, 1.4%, 11.3%, 44.9% and 31.2% for plain arches, radial loops, tented arches, ulnar loops and whorls respectively.

The most prevalent digital ridge pattern type was ulnar loops followed by whorls, arches and the least prevalent was radial loops and these values are in conformity with the work of Boroffice, which showed that ulnar loops were the most predominant pattern (50.09%) and the least was the radial loops (1.13%) in the study of digital dermatoglyphic pattern in a sample of the Nigerians populations. Jaja and Igbigbi in their work on the digital and palmar dermatoglyphics of the Ijaw of Southern Nigeria reported the ulnar loops as being the most prevalent digital ridge pattern type, followed by whorls, arches and the least being the radial loops [1617].

In this study, loops were higher (50.1%) in females than males (39.6%). This is in line with the work of Reddy, on

finger dermatoglyphics of the Bagathas of Araku Valley (A.P), India. He documented that 235 females of the Bagathas of Araku Valley (A.P), India reveal higher loops (57.58 percent) than the males (49.19 per cent) [18].

Sex differences in the distribution of the patterns were statistically significant. Males had higher value of pattern intensity index (15.13) than the females (11.88). A cross sectional study of palmar and digital patterns randomly in Malawian subjects carried out by Igbigbi and Msamati showed that the arches were the most predominant digital pattern in both sexes followed by radial loops in males and whorls in females. In the same study on Zimbabweans, ulnar loop were the most predominant digital pattern type in both sexes followed by whorls in males and arches in females [1920]. These disparities may be due to genetic as well as environmental factors and it has been reported that digital dermatoglyphic patterns are genetically determined and influenced by environmental, physical and topological factors [1]. This is in line with the work on the dermatoglyphic variations in five ethno – geographical cohort 4 Indian population. Significant variations were found for total ridge count between North vs. East cohort ($p < 0.001$) and East vs. West cohort ($p<0.001$). Blood group "O" and "AB" were found significantly ($p = 0.07$) associated with "whorl" and "loop" finger print pattern types in each cohort [21].

The similiarities observed in the digital dermatoglyphic patterns amongst the Annangs may be attributed to the peoples ancestral relationship. This study has provided the normal dermatoglyphic patterns of Annang ethnic group and also shows that digital patterns are more specific in differentiating tribes and population groups.

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