

RESEARCH PAPER

ASSESSMENT OF DERMATOGLYPHIC PATTERNS AND SEX DISTRIBUTION IN ESAN ETHNIC GROUP OF EDO STATE, NIGERIA.

*¹Ujaddughe M. O, ²Abue A. D, ¹Izunya M. A., ³Ezeuko V. C., ³Eze I. G. and ³Baxter-Grillo D.

¹Department of Anatomy, College of Medicine, Ambrose Alli University, Ekpoma, Nigeria.

²Department of Anatomical Sciences, College of Health Sciences, University of Abuja, Abuja, Nigeria.

³Department of Anatomy, School of Basic Medical Sciences, University of Benin, Benin City, Nigeria.

*Correspondence: docsotie@yahoo.com

Received: 19th March, 2015

Accepted: 29th March, 2014

Published: 31st March, 2015

Endorsed By: Innovative Science Research Foundation (ISREF). Indexed By: African Journal Online (AJOL); Texila American University; Genamics; Scholarsteer; EIJASR; CAS-American Chemical Society; and IRMS Informatics India (J-Gate)

ABSTRACT

This study was carried out to find out the possibility of a unique pattern of palm and finger prints (Dermatoglyphics) among 192 adults (96 males and 96 females) of Esan origin who, at the time of this study, were residing in Esan-land -the central senatorial district of Edo state, Nigeria. The subjects were selected via multi-stage sampling technique and fingerprint determination was performed using the Indian ink methods. Palm and fingerprints were observed for the angles connecting the triradii at the roots of the fingers (a-index finger, b-middle finger, c-ring finger d-small finger and t-the most proximal triradii in the palm) taken as *atd*, *tad* and *tda* angles. The data collected were statistically analyzed using the Statistical Package for Social Science (SPSS) using the student t-test, chi square test and ANOVA as statistical tools. Results showed that the loop pattern had the highest frequency (61.7%) followed by whorl (24.9%), arch (12.8%) and double whorl (0.6%). The mean *atd* angles were 43.49 for males and 44.02 for females; *tad* angles were 75.11 for males and 74.71 % for females; and *tda* were 61.22% for males and 61.35% females. These reveals that the pattern of finger prints distribution were similar for both sexes except that the males had more arches on the right hand (53%) than the females with more arches on the left hand (57.1%).

Key Words: Esan people, Dematoglyphic patterns, Finger prints, Palm

INTRODUCTION

Dermatoglyphics is the scientific study of epidermal ridges present on the surfaces of palms, fingers, sole and toes (Cummins, 1941). The dermatoglyphic features of the hand include finger prints and the types include *Arches*, *Loops*, and *Whorls* (David, 1981). On the other hand, palms have angles connecting the triradii at the roots of the fingers and starting and starting from the root of the index finger, the triradii are labeled A to D with the most proximal triradius on the palm taken as *t* (See figures 1and 2). Anatomically however, the fingers are numbered one to five latero-medially (Moore *et al.*, 2012).

Interestingly, dermatoglyphic patterns are genetically determined and are inheritable (Abue *et al.*, 2013). All the configurations of palmer and finger prints are laid down permanently from the 3rd month of intra-uterine life and such patterns remain unchanged throughout life (Manoj *et al.*, 2012). It is believed that they follow a polygenic pattern of inheritance (Abue *et al.*, 2013).



The usefulness of dermatoglyphic patterns in establishing ethnic and sexual differences have been highlighted (Osunwoke *et al.*, 2008; Igbigbi *et al.*, 1999; 2002), Unfortunately, available data show that unlike in other Nigerian populations where several studies have been conducted to determine the palmar and finger print patterns (Igbigbi *et al.*, 1999; 2002), not much if not any, have been done in that regard among the Esan population of Edo State, Nigeria. This study therefore, was designed to determine the features and specific variations in the dermatoglyphic patterns among people of Esan ethnic group in relation to gender.



Figure 1: Dermatoglyphic features of the palm and fingers.



Whorl Pattern

Loop Pattern

Arch Pattern

Figure 2: Dermatoglyphic patterns on fingers (Trimpe, 2006)



MATERIALS AND METHODS

Study Design: A total of 192 subjects (96 males and 96 females) whose parents are of Esan origin in Nigeria and residing in Esan land during the survey were recruited for the study. The Indian ink method by Cummins (1961) was used to collect digital prints on the palms and fingers of the subjects. The prints were analysed using a hand lens, ruler, pencil and protractor. Frequencies were expressed in percentages.

Location and Duration of Study: The study was conducted in Esan land in the Central senatorial district of Edo State, Nigeria. Esan is located at Longitude 60°5' and Latitude 60° 5'. (Okojie, 1960; Okoduwa, 2006). It has boundaries on the North West with Owan and Etsako on the North-East; on the South-West with Orhionmwon and Ika, while on the South and South-East with Aniocha and Oshimili (Eweka, 1992). Data collection was over a period of six months, between July and December, 2013.

Study Population/ Sampling Technique: A total of 192 subjects (96 males and 96 females) who are genuinely of Esan ethnic group in Nigeria and residing in Esan during the survey were recruited for the study.

Ethical Consideration: Ethical certificate for the study was sought and obtained from the Research and Ethics Committee of the College of Medical Sciences, University of Benin, Benin City. Consent was also a criterion as intending subjects gave consent to the study by signing (or as the case may thumb-printed). Parentage was used as the only exclusion criterion, as subjects with either or both parents not being Esan origin.

Inclusion and Exclusion: Parentage and Domiciliation were used as inclusion criteria viz: Adult male and female of Esan descent and who reside in Esan-land at the period of the study; both parents having to be of Esan descent. Consent was also a criterion as intending subjects gave consent to the study by signing (or as the case may thumb-printed). Parentage was used as the only exclusion criterion, as subjects with either or both parents not being Esan origin.

Dermatoglyphic Pattern Determination: The Indian ink method by Midlo and Cummins (as cited by Osunwoke *et al*, 2008, Manoj *et al*, 2012, Abue *et. al*. 2013) was used to collect digital prints on the palms and fingers of the subjects. The prints were analyzed using a hand lens, ruler, pencil and protractor. Frequencies were expressed in percentages.

Statistical Analysis: The data collected were statistically analyzed using the Statistical Package for the Social Science (SPSS) with student's t-test, chi square test and ANOVA as choice tools.

RESULTS AND DISCUSSION:

The results showed that the loop pattern had the highest frequency (61.7%) followed by whorl (24.9%), arch (12.8%) and double whorl (0.6%). The mean *atd* angles were 43.49 for males and 44.02 for females; *tad* angles were 75.11 for males and 74.71 % for females; and *tda* were 61.22% for males and 61.35% females (*Table 1*).

These reveals that the pattern of finger prints distribution were similar for both sexes except that the males had more arches on the right hand (53%) than the females with more arches on the left hand (57.1%). *Table 2* however, shows that the frequency of Loops was found to be highest, followed by Whorles and Arches; the least being Double Whorles.



Table 1: Relationship between age, right and left TDA, ATD and TDA angles versus sex of respondents.

	SEX		TEST STATISTIC
	MALE (n = 100)	FEMALE (n = 92)	
AGE	36.22 ± 17.21	35.08 ± 16.74	t=0.466; df=190; p=0.642
RIGHT ATD	43.49 ± 2.94	44.02 ± 3.36	t = - 1.170; df = 190; p = 0.244
RIGHT TAD	75.11 ± 4.03	74.71 ± 4.55	t = 0.644; df=190; p=0.521
LEFT TDA	76.74 ± 4.08	75.46 ± 4.61	t=2.046; df=190; p=0.042
LEFT ATD	42.83 ± 3.11	43.54 ± 3.79	t = - 1.432; df=190; p=0.154
LEFT TAD	60.23 ± 3.68	61.15 ± 5.06	t = - 1.452; df=190; p=0.148

Values are expressed as Mean ± SD

Table 2: Relationship between sex and finger print patterns distribution in right and left hands

		WHORL n (%)	LOOP n (%)	ARCH n (%)	DOUBLE WHORLS n (%)	TEST STATISTIC
RIGHT HAND	MALE	123(53.0)	318(53.0)	53(53.0)	4(50.0)	$\chi^2= 6.74$ df = 3 p=0.081
	FEMALE	109(47.0)	282(47.0)	77(47.0)	4(50.0)	
LEFT HAND	MALE	129(52.2)	316(54.1)	54(42.9)	1(33.3)	$\chi^2=5.68$ df=3 p=0.128
	FEMALE	118(47.8)	268(45.9)	72(57.1)	2(66.7)	

Table 3: Relationship between sex and finger print patterns of distribution in both hands

	WHORL n (%)	LOOP n (%)	ARCH n (%)	DOUBLE WHORLS n (%)	TEST STATISTIC
MALE	252(52.6)	634(53.5)	107(41.8)	5(45.5)	$\chi^2= 12.00$ df = 3 p = 0.007
FEMALE	227(47.4)	550(46.5)	149(58.2)	6(55.5)	



DISCUSSION

Comparatively, the finger prints distribution on both hands for males and female with a chi square value of 6.74 and a $p=0.081$, was found not to be statistically significant on both hands; though the presence loop were more on the right hand of males. This could be due to chance as a loop pattern on the right hand of an Esan person cannot be said with certainty to belong to a male. Similarly neither the higher occurrence of whorls on the left hand of males nor the higher occurrence of arch on both hands of females do certainly resolve the presence of whorls on left hand as masculine nor the presence of arch on a hand as feminine. However, comparing both hands in combination, the distribution pattern of fingerprints for both sexes became statistically significant with chi-square value of 12.0 and $p=0.007$ (Table 2).

Also, the loops and whorls were observed to be higher in the hands of males and this was statistically significant with a chi square value of 12.00 at $p=0.007$ (Table 3). It therefore means that when a whorl and a loop are found on any hand for an Esan person, there is the likelihood other than chance, that he is a male. The same goes for the presence of an arch depicting femininity. So, the difference is not hand-specific rather it relates to sex. This finding is however in keeping with findings among the Urhobo and Ikwerre ethnic groups (Igbigbi *et. al.*, 2002; Osunwoke *et. al.*, 2008).

Finally, loops had the highest occurrence and were found to be highest in the right hand of the males. Although not statistically significant, it is in keeping with the findings among the Ijaw and Ikwerre ethnic groups of southern Nigeria (Igbigbi *et. al.*, 2000, Anibor *et. al.*, 2011). Meanwhile, the statistically significant observation about loop pattern being the highest in males is a unique observation possibly peculiar to Esan people, as it is at variance with the findings among Okirika people in Rivers State, Nigeria (Osunwoke *et. al.*, 2008). Thus, the digital patterns - whorls, loops and arches, remains an important features for identification of gender and of possibly determining ethnic groups.

ACKNOWLEDGEMENT:

We are grateful to all those who contributed in one way or the other to the success of this study

REFERENCES

- Abue, A., Ujaddughe, M. and Kpela, M. (2013). The Arch Pattern Dermatoglyphics on the Toes of Hausa Ethnic Group of Nigeria. *Advances in Anthropology*; 3 (4): 237-239. Doi: 10.4236/aa.2013.3
- Abue, A., Duru, F., Ibeabuchi, N. M. and Basse, R. (2012). Digits-palmar Dermatoglyphic Patterns of Asthmatics in Lagos, Nigeria-<http://www.open-science-repository.com/anthropology-23050401.html#sthash.Z73NJbMB.dpuf>, December 2013 at 6. 30 pm.
- Anibor, E., Eboh, D. E. O., Okumagba, M. T. and Etetafia, M. O. (2011). Palmar and digital dermatoglyphic patterns of the Ijaws in Delta State of Nigeria. *Archives of Applied Science Research*; Scholars research library, USA. 3 (6):301-306
- Cummins, H. M. (1961) *Finger Prints, Palms and Soles: An introduction to Dermatoglyphics*. New York: Dover Publications
- Cummins, H. (1941). Ancient fingerprints in clay; the scientific monthly 52; 389-402 Reprinted in *Journal of criminal Law and criminology*; 34 (4): 4068-481.
- David T. J. (1981). Dermatoglyphs in congenital heart disease. *Journal of Medical Ethics*; 18:344-349
- Esan People Progressive Union, Esan People Veneto, Italy, <http://www.esanveneto.com/esanhhistory.html>, January 18, 2015, by 2.35 pm



Eweka, E. B. (1992). Evolution of Benin Chieftaincy Titles. Benin City, UNBEN Press, pp. 17-29.

Galton, F. (1892) Fingerprints classification,; Macmillan and co. publishes, London. pp.17-18; 192-93

Hilbun, W.B. (1970). Dermatoglyphic findings on a group of psychotic children. *The Journal of nervous and mental disease*; 151 (5): 352-358.

Igbigbi, P. S. and Samati, M. (2005). 'Digital Dermatoglyphic traits of Kenyans and Tanzanians. *West African Journal of medicine*; 24 (1): 26-38.

Igbigbi, P. S and Msamati, B. C. (2002): 'Palmer and Digital dermatoglyphic of indigenous black Zimbabweans. *Journal of Medical Science Monitors*; 8 (2): 757-761

Igbigbi P. S. and Msamati, B. C. (1999). Palmer and Digital Dermatoglyphic patterns in Malawian subjects. *East Africa Medical Journal*. 76 (12): 668-671.

Igbigbi, P. S., Msamati, B. C. and Ngambi, T. M. (2001). Plantar and digital dermatoglyphic patterns in Malawian patients with diabetes, hypertension and diabetes with hypertension. *International Journal of Diabetes and Metabolism*. 9: 24 – 31.

Manoj, K. S. and Hemlata, S. (2012) Dermatoglyphics as a diagnostic to predict diabetes: *Journal of Clinical and Diagnostic Research*. 6(3): 327-332.

Moore, K. L., Darley A. F. and Anne M. R. A (2012): Clinically oriented Anatomy, 6th Edition Wolter Kluwer / Lippincott Williams and Wilkins, Ontario, Canada P. 771.

Okoduwa, A. I. (2000). Studies in Esan History and Culture, Ever Best Publishers Ekpoma-Edo State, Nigeria. 2nd Edition; pp. 21-28.

Okoduwa, A. I. (2006). Tenacity of Gerontocracy in Nigeria an example of Esan people in Edo State. *Journal of Studies of Tribes and Tribals*; 4 (1):47-51.

Okojie, C. G. (1960). Esan Native Laws and Customs, 1st Edition, John Okwessa Publishers, Lagos-Nigeria: 223-247.

Osunwoke, E. A., Ordu, K.S., Hart, J. and Tamunokuro, F. B. (2008). A Study on the Dermatoglyphic patterns of Okrika and Ikwerre Ethnic groups of Nigeria. *Scientia Africana*; 7 (2):143-147.

Trimpe, T. (2006). Fingerprinting Basics, 8th grade forensic sciences, <http://sciencespot.net>, January 18, 2015 by 6.11 pm.

Wayne, W. D. (2010). Biostatistics: Basic concept and Methodology for the Health Science, 9th Edition. John Wiley & Sons Incorporated, London; pp. 192-193.

AUTHORS' CONTRIBUTIONS

Ujaddughe M. O. and Abue A. D. conceptualized the research. Data analysis collection and analysis were done by Ujaddughe M. O., Eze G. I and Baxter-Grillo D., while Ujaddughe, Abue, Izunya, and Ezeuko joined in the writing of this paper. All authors funded it and no conflict of interest declared.

