International Journal of Medical Science and Applied Biosciences
ISSN: 2536-7331 (Print): 2536-734x (Online)
Volume 3, Number 2, June 2018
http://www.casirmediapublishing.com

PREVALENCE OF PALMAR FLEXION CREASE VARIANTS AND ITS RELATIONSHIP TO GENDER AMONG SECONDARY SCHOOL STUDENTS OF IGBO ORIGIN IN ANAMBRA STATE, NIGERIA

Izuchukwu Stanley Etoniru[1], Okwudili Onochie Udemezue & [2]PUkoha U. Ukoha[2]
[1]Department of Anatomy, Chukwuemeka Odumegwu Ojukwu University, Uli, Anambra State
[2]Department of Anatomy, , Nnamdi Azikiwe University, Nnewi, Anambra State,
E-mail: nazariteforlife@gmail.com

ABSTRACT

Palmar flexion crease which was initially relegated to the domain of palmistry has elicited a lot of interest with its various application in science ranging from its use in demonstrating ethno-racial differences among populations to medical diagnosis of genetic syndromes like Down's syndrome, its association with psychiatric disorders like schizophrenia, to its use in hand surgery practice. This study was carried out to determine the prevalence of palmar flexion crease variants and their relationship with gender among secondary school students of Anambra state origin and to compare it with known population prevalence. One thousand and sixty seven subjects of the Igbo tribe (of Anambra state) were randomly selected. Palm prints of the subjects' hands were obtained by the ink method and the prevalence of the various patterns was obtained. The results show that the prevalence of Simian, Suwon and Sydney creases in the study population was 2.62%, 4.22%, and 0.56%, respectively. Only one subject (female) presented with Suwon on the right and Sydney on the left. The Simian crease had a total prevalence of 2.62%, with 1.12% bilateral and 1.50% unilateral presence. The unilateral presence was more on the left hand than the right. The Suwon crease had 1.78% bilateral and 2.44% unilateral presence. The unilateral presence was more on the right hand than the left. The Sydney crease had 0.19% bilateral and 0.28% unilateral presences hence no unilateral or bilateral predominance. It appeared in females only. There was a statistically significant relationship between the palmar crease pattern (open, closed and meeting) and gender in both right and left palms. The open was significantly higher among the females in both palms while the closed was significantly higher among the males in both palms. There was no significant relationship between palmar crease (Simian, Sydney and Suwon) and gender. Among other findings, there is evidence that anthropological characteristics varies among populations as shown by the prevalence of the various palmar crease patterns among the Igbos of Anambra state when compared with other studied populations.

***Key words**: Palmar Flexion Crease, Suwon, Simian, Sydney, Igbos.*

INTRODUCTION

The human hand is a paired intricate body part designed for physical manipulation of the physical environment. The fingers on each hand can be folded over the palm and this feature enables both man and primate to grasp objects in the immediate surroundings [1]. Palmar creases are found as obvious markings on the palms and are made prominent by folding the fingers over the palm. The creases are disposed in such a way as to make for security of grasp, while the underlying fat provides padding for greater firmness in holding. These creases do not necessarily relate to the position of the joints of the hand [1]. Palmar creases arise from temporary mesenchymal swellings called volar pads. Early genetic and environmental factors causing hand malformations and alterations of the form or

function of the hand, and occurring prior to the fetal crease development may affect the developing flexion creases [1]. Palmar creases are generally classified into major and minor creases. The major palmar creases include radial longitudinal crease, proximal transverse crease, and distal transverse crease corresponding to palmistry's life line, head line, and heart line respectively [2]. The major palmar creases are further classified on the basis of the relationship between radial longitudinal and proximal transverse creases, and that between the proximal and distal transverse creases. On the basis of the relationship between the radial longitudinal and proximal transverse creases, the major palmar creases are classified into open, closed, and meeting [2]. In the open type, the radial longitudinal and the proximal transverse do not meet; they meet to form a common crease in the closed type; they meet on the radial border of the palm in the meeting type [2]. On the basis of the relationship between the proximal and distal transverse creases, the major palmar creases are classified into Normal (the two transverse palmar creases do not meet), Simian (a single transverse crease that extends across the palm, formed by the fusion of the two transverse palmar creases), Sydney (proximal transverse crease extending across the entire palm while the distal crease appears normal), and the more recent Suwon (a single transverse crease that extends across the palm, formed by the fusion of the two transverse palmar creases with an accessory proximal transverse crease [2].

Scientific studies on the hand have focused mainly on the genetic basis of certain medical disorders. A more recent trend has been to look at the genetic basis of certain psychological disorders or characteristics by studying the dermatoglyphics of the hand and even, more recently, finger digit ratios [3]. Very few studies observe the variations of the palmar creases, although significant increases in unusual palm creases have been found in relation to a number of psychological disorders or other medical conditions [4,5, 6]. These include Simian crease and its relationship with Down Syndrome [7]; Sydney crease and its relationship with Down Syndrome, congenital rubella and leukemia [8]; the prevalence of certain palmar crease patterns in people with epilepsy, leprosy, schizophrenia and, more recently, tuberculosis and cancer[9, 10, 11]. The diagnostic importance of the palmar crease may not be unrelated to the influence of early prenatal stress in its malformation which results in some level of intellectual and psychological disability [3]. This is the case in the majority of disorders associated with abnormal palmar flexure creases but it is important to note that the presence of a particular palmar crease pattern does not absolutely indicate an abnormality or disorder. An example is the presence of Simian crease in some normal individuals [12, 13]. Palmar creases are useful in revealing anthropologic characteristics of various ethnic populations. This has been confirmed by the varying palmar crease characteristics found in different populations around the

world [12, 14, 15, 16]. Therefore, it is important to undertake parallel study on every human population where possible. The Igbos of South - Eastern Nigeria are yet to be identified with any particular palmar crease pattern or the proportion of the various patterns.

MATERIAL AND METHODS

The study was performed among students of the indigenous ethnic group (the Igbos) in Anambra State which is situated in South-Eastern Nigeria.
The data was collected by multi-staged random technique. Both right and left palmar prints of 1067 volunteers (544 males and 523 females) who reside in the state were obtained by the ink method and analysed[17]. The poorly imprinted specimens (40) were regarded as missing value.

RESULTS

Mean age of the subjects

Table 1: Mean age of the subjects

Sex of subjects	
Male Count (N%)	**Female** Count (N%)
518 (50.4%)	509 (49.6%)

Table 1 shows the mean age of the subjects. The ages of the students ranged from 10 to 23 years. For the males, it was 12 – 23 years with a mean age of 16.20 $\pm$ 1.56 years; for the females 10 – 22 years with a mean age of 15.26 $\pm$ 2.04 years.

Table 2: Sex distribution of the subjects

	Age at last birthday (years)			
Sex	**Mean $\pm$ S.D**	**Range**	**Maximum**	**Minimum**
Male	16.20$\pm$1.56	11.00	23	12
Female	15.26$\pm$2.04	12.00	22	10

Table 2 shows the sex distribution of the subjects. There were a total of 518 (50.4%) males and 509 (49.6%) females.

Prevalence of the various palmar crease patterns (normal, Simian, Sydney, Suwon) and their relationship with gender using Fisher's exact test

RIGHT PALMAR CREASE	MALE n (%)	FEMALE n (%)	BOTH n (%)	p value
Normal	485 (93.6)	483 (94.9)	968 (94.3)	
Simian	10 (1.9)	6 (1.2)	16 (1.6)	
Sydney	0 (0)	4 (0.8)	4 (0.4)	0.109
Suwon	23 (4.4)	16 (3.1)	39 (3.8)	
LEFT PALMAR CREASE				
Normal	494 (95.4)	480 (94.3)	974 (94.8)	
Simian	13 (2.5)	11 (2.2)	24 (2.3)	
Sydney	0 (0)	4 (0.8)	4 (0.4)	0.233
Suwon	11 (2.1)	14 (2.8)	25 (2.4)	

Table 3: Prevalence of the various palmar crease patterns (normal, Simian, Sydney, Suwon) and their relationship with gender using Fisher's exact test

Table 3 shows the prevalence of the various palmar crease patterns (normal, Simian, Sydney, Suwon) and their relationship with gender using Fisher's exact test. The normal palmar crease has a total prevalence of 94.55% and was therefore the commonest. This was followed by Suwon, Simian and Sydney creases in that order. Normal creases were more frequent in males, and were more frequent in the left palm than in the right. Sydney crease was present in only females. Fisher's exact test showed no significant relationship ($p>0.05$) between palmar crease (normal, Simian, Sydney, Suwon) and gender.

Prevalence and relationship between palmar crease (open, close, meeting) and gender using Fisher's exact test

RIGHT PALM	MALE n (%)	FEMALE n (%)	BOTH n (%)	P Value[a]
Open	124 (23.9)	213 (41.8)	337 (32.8)	
Closed	277 (53.6)	174 (34.2)	451 (44.0)	0.000
Meeting	117 (22.5)	122 (24.0)	239 (23.2)	
LEFT PALM				
Open	135 (26.1)	204 (40.1)	339 (33.0)	
Closed	278 (53.7)	204 (40.1)	482 (46.9)	0.000
Meeting	105 (20.3)	101 (19.8)	206 (20.1)	

Table 4: Prevalence and relationship between palmar crease (open, close, meeting) and gender using Fisher's exact test

Table 4 shows the prevalence and relationship between palmar crease (open, close, meeting) and gender using Fisher's exact test. There was a significant relationship between this palmar crease pattern and gender in both right ($p<0.001$) and left palms ($p<0.001$).

DISCUSSION

The ages of the students ranged from 10 to 23 years. For the males, it was 12 – 23 years with a mean age of 16.20 $\pm$ 1.56 years; for the females 10 – 22 years with a mean age of 15.26 $\pm$ 2.04 years (table 1). The normal palmar crease had a total prevalence of 94.55% and was therefore the commonest. This agrees with the finding of Park *et al,* [2]. This was followed by Suwon, Simian and Sydney creases in that order. Normal creases were more frequent in males, and were more frequent in the left palm than in the right, which also agrees with the findings of Park *et al*[2]. Of the abnormal creases, Suwon crease showed the highest general prevalence at 4.22%. This differed from the finding of Park *et al* where Suwon crease was found to be the least common of the abnormal palmar creases [2]. There was a higher unilateral presence of Suwon crease than bilateral. This was also the finding of Sharma and Sharma [18]. The unilateral presence was more on the right hand than the left. Overall, 3.8% of the population presented with it on their right palms (4.4% males and 3.1% females); 2.4% on their left palms (2.1% males and 2.8% females) (see table 3) The Simian crease had a total prevalence of 2.62%. The general population prevalence of 2.62% is lower than the prevalence for the Ijaws (4.1%) of South-South Nigeria [16]. This difference may be explained by sample size (1067 in this study against 507 in the referenced study) or the fact that anthropologic variation in human populations is a norm. The general population prevalence of simian crease in this study is higher than that for the Swiss (1.2%), Eskimos (1.3%) and Dutch (1.5%), but lower than those for the Spanish (3.4%), Japanese (4.0%), Jews (4.6%), Koreans (11.2%), Gypsies (14.3%) and Pygmies (34.7%). The closest was the Germans (2.8%) and Iranians (2.5%) [18].

Simian crease has been found to appear in 4% of Caucasians and about 13% of all Asians in at least one hand [18]. This clear difference can be explained by variations in ethno-historic and geographic characteristics between different human populations [14]. Simian crease has 1.12% bilateral and 1.50% unilateral presence in the present study. This is lower than the finding of Sharma and Sharma in Central India which found 5.7% and 8.7% respectively [18]. Unlike other works [2,18] which found that unilateral presence was commoner on the right, unilateral presence was more on the left hand in this study. The Sydney crease, the least common crease variety, had a total prevalence of 0.56%. This differs from the finding among the Ijaws of 0.19% [16]. This can be explained by variations in ethno-historic and geographic characteristics between different human populations [14]. There was 0.19% bilateral and 0.28% unilateral presence. There

was no unilateral or bilateral predominance. Fisher's exact test showed no significant relationship ($p>0.05$) between palmar crease (normal, Simian, Sydney, Suwon) and gender (table 3). Other studies found the same [16, 19]. Another study, however, demonstrated sexual dimorphism with respect to Simian crease [13]. The closed palmar crease was the most common crease in its category followed by open and meeting creases in that order. This agrees with the finding of Park *et al* in Suwon, Korea [2]. Forty-four percent (44%) of the subjects presented with it on the right palm (53.6% of males and 34.2% of females) and 46.9% on the left palm (53.7% of males and 40.1% of females). In 32.8% of the subjects, Open palmar crease pattern was observed on the right palm (23.9% of males and 41.8% of females) and 33.0% on the left palm (26.1% of males and 40.1% of females). In 23.2% of the subjects, the meeting palmar crease pattern was observed on the right palm (22.5% of males and 24.0% of females) and 20.1% on the left palm (20.3% of males and 19.8% of females). The meeting creases were found to be commoner in the right palm of females but not on the left palm where it is commoner in males. Fisher's exact test shows a significant relationship between this palmar crease pattern (open, closed and meeting) and gender in both right ($p<0.001$) and left palms ($p<0.001$).The open palmar crease was more frequent in females in both palms and the closed palmar crease was more frequent in males in both palms; these are both statistically significant (table 4). It has been suggested that union of major palmar creases (as seen in Closed, simian, Sydney, and Suwon creases)may result from powerful hand grip because they were found to be more frequent in males and the right palm both of which are known for powerful hand grip[2]. Although these findings are consistent with other studies[20, 21], this study agrees with the male preponderance of closed, simian and Suwon creases but they were not particularly more frequent in the right palm; Simian crease was more frequent in the left palm but Suwon was more frequent in the right (table 3).

CONCLUSION

This study has further projected the scientific aspect of palmar flexion creases. From comparisons made with the findings of this study, there is a reaffirmation that there are differences in anthropological characteristics from one population to another. This can be explained by variations in ethno-historic and geographic characteristics between different human populations [14]. Having established the palmar crease prevalence of the Igbo people of Anambra state, it is hoped that the important findings of this study will be a source of reference for the Igbo ethnic group of South - Eastern Nigeria especially when comparisons are made with other populations. Furthermore, these finding could also be applied as an inexpensive adjunct test in recruitment into vocations that require the use of force since theunion of major palmar creases are associated with more powerful hand

grip.Further studies are hereby invited to unlock the secrets hidden behind palmar flexion creases.

REFERENCES

1. Chauhan P, Kalra S, Jain SK, Munjal S, Anurag A. Relationship between Palmar Skin Creases and Osseous Anatomy - a Radiological Study Identification. Journal of Morphological Science. 2011; 28(3):184-188

2. Park JS, Shin DS, Jung W, and Chung MS. Improved Analysis of Palm Creases. Anatomy and Cell Biology; 2010; 43(2): 169–177.

3. Rosa A, Gutierrez B, Guerra A, Arias B, Fananas L. Dermatoglyphics and Abnormal Palmar Flexion Creases as Markers of Early Prenatal Stress in Children with Idiopathic Intellectual Disability. Journal of Intellectual Disability Research 45(5): 2001; 416 – 423.

4. Shiono, H. Dermatoglyphics in Medicine. American Journal of Forensic Medical Pathology. 1986; 7(2):120-126.

5. Lopuszanska M, Jankowska EA. Dermatoglyphic Morphology in Some Diseases. Poland Medical Journal. 2001; 11(63):282-286.

6. Nazarabadi MH, Roofian R, Abutorabil R, & Hosseini HB. Dermatoglyphic Assessment in Down and Klinefelter Syndromes. Iran Journal of Medical Science. 2007; 32(2):105-9.

7. Down LH. Observations on an Ethnic Classification of Idiots. London Hospital Clinical Report; 1866; 21: 695-697

8. Purvis-Smith SG. The Sydney line: A significant sign in Down's syndrome. Australian. Paediatrics Journal. 1972; 8(4):198-200.

9. Gupta CM, Tutakne MA. An Evaluation of Palmar Flexion Creases and Dermatoglyphics in Leprosy. Indian Journal of Leprosy. 1986; 58:263-75.

10. Johannes HM, Heval MO, Jan K. Prevalence and Patterns of Morphological Abnormalities in Patients with Childhood Cancer. Journal of American Medical Association. 2008; 299(1):61-9.

11. Aminu A.T, Magaji G.T, Lawan H.A. Palmar Creases; A Comparative Study between Epilepsy Patients and Healthy Subjects among Hausas of

Northern Nigeria. American Journal of Medicine and Medical Sciences. 2014. 4(5): 175-179

12. LdeLestrange, M.T. The Transverse Crease in Europe: Index and Comparative Study of Different Samples Cited in the Literature. American Journal of Physical Anthropology. 1969; 30(2), 173-182.

13. Hernández M. Palmar creases in Spaniards. Anthropologische Anzeiger. 1985; 43(2):187-190.

14. Arrieta MI, Martinez B, Simon A. Quantitative and Qualitative Finger Dermatoglyphics in the Basque Valley of Urola, Spain. Anthropolgischer Anzieger. 1990; 48: 65-84.

15. Arrieta MI, Criado B, Martinez B. Fluctuating Dermatoglyphic Asymmetry: Genetic and Prenatal Influences. Annals of Human Biology. 1993; 20: 557-563.

16. Oyinbo C, Fawehinmi H. Prevalence of Simian and Sydney Creases in the Ijaws of South- South Nigeria. The Internet Journal of Biological Anthropology. 2008; 3(2): 85-91.

17. Antonuk SA. The Method of Receiving Human Palmar Prints. Voprosy Anthropology. (1975); 50:217-221.

18. Sharma, D. K., Sharma, V. Prevalences of Simian, Sydney and Suwon Creases and their Association with Each Other, Body Sides, Handedness, Sex and Anomalies/Diseases/Syndromes in a Population of Central India. International Journal of Morphology. 2011; 29(3):1069-1075.

19. Kamali MS. Simian Crease Polymorphism among Fifteen Iranian Endogamous Groups. Anthropolgischer Anzeiger. 1985; 43:217-25.

20. Davies PA. Sex and the single transverse palmar crease in newborn singletons. Developmental Medicine and Child Neurology.1966; 8: 729-734.

21. Dar H, Schmidt R, Nitowsky HM. Palmar Crease Variants and their Clinical Significance: a Study of Newborns at Risk. Pediatric Research.1977; 11(2): 103-108