Dermatoglyphic Patterns of Autistic Children in Nigeria

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ABSTRACT
Dermatoglyphic patterns have positive correlation in a number of genetic diseases. This research was carried out to determine any possible relationship between dermatoglyphics and autism in Nigeria using digital and palmar patterns, total ridge count, a-b ridge count and crease pattern. The digital and palmar prints of 20 autistic subjects from an autistic centre in Port Harcourt, Rivers state Nigeria were taken with parental guidance. The percentage frequency distribution of the digital pattern of the autistic subject was 49.5% for the arch, 18.5% for the whorl, 28.5% for the ulnar loop and 3.5% for the radial loop against 44% for the ulnar loop, 25.5% for the arch, 22% for the whorl and 8.5% for the radial loop for normal subjects. The mean values of the a –b ridge counts on the right and left hands of autistic male were 34.66 and 33.33 against 36.40 and 31.33   in non-autistic children respectively while in female they were 38.6 and 35.8 against 41.40 and 38.6 respectively.
Though no statistical significant difference was observed when the two groups were compared (P>0.05). It was, however, observed that the number of the total ridge counts in the right and left hands of the autistic children were lower than those of the normal subjects. Thus, there is need for further investigation using larger sample size. The data from this study will serve as a good reference for future study on this subject in Nigeria.
Key Words: Dermatoglyphics and Autism

INTRODUCTION
Autism is a complex developmental disorder or disability that typically appears during the first three years of life.The term autism was derived from a Greek word "Auto" meaning self, thus it is also defined as the tendency to morbid self absorption at the expense of regulation by outward reality. Autism impairs the normal development of the brain in the area of social interaction and communication skills. Children and adult with autism typically have difficulties in verbal and non-verbal communication, social interactions, and leisure. Autism is the most common of the pervasive Developmental Disorders, affecting an estimated 2 – 6 per 1,000 or 0.002 – 0.006% individuals, this means that as many as 300,000 to 900, 000 Nigerians today are believed to have some form of autism. It is four times more prevalent in boys than girls. Autism is mutifactorial, that is it is influenced by both genetic and environmental factors (Walker, 2005).
Studies have shown that a positive correlation exist between dermatoglyphics and some disease conditions, especially those with genetic basis. Such conditions include those associated with organic mental retardation(Boroffice,1978;Steveson et al.,1997;Than et al.,1998;Franceschini et al.,2002).It has been suggested also that dermatoglyhic studies may aid in the diagnosis of such conditions(Rex and Preus,1982;Schmnidt et al.,1981).Nervous system disorders of functional ethiopathogenesis have also been positively correlated with dermatoglyphics. These include schizophrenia(Oladipo et al.,2005) and schizotypal personality(Van-Os et al.,2000).Reports are also available on the correlation of Dermatoglyphics in Diabetes mellitus(Oladipo and Ogunowo,2004), Idiopathic(primary) dilated cardiomyopathy(Oladipo et al.,2007) , breast cancer(Oladipo et al.,2009), epileptic disorder (Bogdanov et al., 1999), rheumatism(Belov and Miakotkin, 1988) prostate cancer (Oladipo et al.,2009;Howard et al., 1988).
This study was carried out to determine any possible correlation between dermatoglyphic patterns and autism in Nigeria.

MATERIALS AND METHODS

In this study, 20 autistic (16 males and 4 females) and 20 non autistic (16 males and 4 females) children were selected from the Autistic Centre and the Catholic Special Child Day School in Port Harcourt Rivers State, Nigeria. All subjects were Nigerians by both parents and grandparents.

The parents/guidance of the children were administered a questionnaire containing their names, age, sex background and behaviour to fill to make sure they fall into the category.

Fingerprints were then taken with white paper and purple ink pad (Penrose,1963). Hands were thoroughly washed with water and soap and dried before taking prints. This was done to remove dirt from the hands. Screening was done on the white duplicating paper containing the prints with the aid of a magnifying glass. No distinction was made between the varieties of whorl (w) patterns, also tented arch was recorded as an arch (A).Loop was recorded as either ulnar loop (UL) or radial loop (RL).All the patterns were as defined by Penrose (1963).A straight line was drawn to join A and B triradii and the number of intersecting ridges counted. These gave A-B ridge counts(Figure 1).

The various digits were designated as follow: Thumb- i; Index finger-ii; Middle finger-iii; Ring finger-iv; Little finger-v. L and R stand for left and right respectively.

Data analysis: The student t-test and chi-square test were used for statistical analysis at significant level of 0.05.
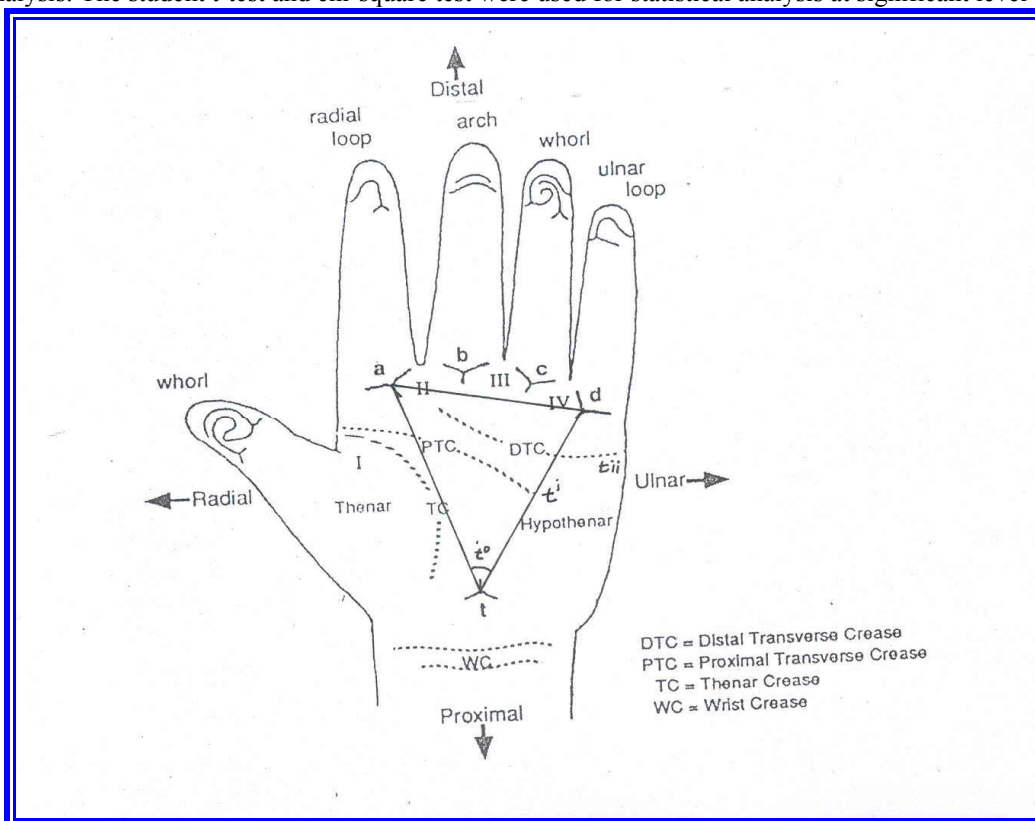

Figure 1: Scheme to show digital patterns, a,b,c,d and triradii, and palmar crease .

RESULTS

The mean percentage frequency distribution of digital pattern among autistic and normal subjects (left hand) is summarized in table 1.Arch and Radial loop had the highest number in autistic patient compare to normal subjects. While the Whorl and Ulnar loop showed the highest percentage frequency in normal subject compare to autistic patients.

The mean percentage frequency distribution of digital pattern among autistic and normal subjects (right hand) is summarized in table 2. Arch and Ulnar loop had the highest frequency in autistic patient compare to normal subjects. While the Whorl and Radial loop showed the highest percentage frequency in normal subject compare to autistic patients.

The total ridge counts on each digit of autistic patients is summarized in table 3,the total ridge count is higher on the left hand compared to the right hand, although within the highest count on the thumb of the right hand.

The total ridge counts on each digit of normal subjects is summarized in table 4,In normal subjects the total

ridge count is also higher on the left hand as compare to the right, but the overall total count is about twice higher in normal subject compare to autistic patients

The mean, standard deviation and standard error of A-B ridge count of both normal and autistic male and female subject is summarized in tables 5 and 6.A-B ridge counts is observed to by higher in both normal and autistic females than male, but no significant difference was observed statistically.

DISCUSSION

Dermatoglyphic analysis of the digital patterns in Down's syndrome and normal individuals showed a statistically significant different of 96% loop pattern as against 63.6% in normal (Boroffice, 1978). No such difference was observed in the present study.

On the right palm arch and ulnar loop had the highest frequency in autistic patient compare to normal subjects. While the Whorl and Radial loop showed the highest percentage frequency in normal subject compare to autistic patients, on the left palm arch and radial loop had the highest number in autistic patient compare to normal subjects. While the Whorl and Ulnar loop showed the highest percentage frequency in normal subject compare to autistic patients.

In this study it was observed that the total ridge count of both right and left hands of the normal subjects were higher compare to those of autistic patients, our findings is in line with that of Walker, 2005,who compared the dermatoglyphic patterns of autistic children to control subjects matched socioeconomically and by age and sex. Analysis of the dermal ridge patterns and ridge count resulted in significant difference between the 78 autistic and 78 normal children.

CONCLUSION

It is recommended that this study should be carried out in other centres in Nigeria to establish standard parameter values which could be used when making diagnosis for these patients.

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Table 1: The mean percentage frequency distribution of digital pattern among autistic and normal subject (left hand).

PATTERN	AUTISTIC SUBJECT (LEFT HAND)			NORMAL SUBJECT (LEFT HAND)		
	Male	Female	Mean	Male	Female	Mean
ARCH	49.37	59.26	54.32	28.38	24	26.19
WHORL	17.72	11.11	14.42	17.57	24	20.78
ULNARLOOP	30.38	22.22	26.30	51.35	48	49.68
RADIAL LOOP	2.58	7.4	4.99	2.70	4	3.35

Table 2:   The mean percentage frequency distribution of digital pattern among autistic and normal subject (right hand)

PATTERN	AUTISTIC SUBJECT (RIGHT HAND)			NORMAL SUBJECT (RIGHT HAND)		
	Male	Female	Mean	Male	Female	Mean
ARCH	43.66	56.52	50.10	26.66	66.15	46.41
WHORL	21.13	8.69	14.91	24	10.77	17.39
ULNARLOOP	30.99	34.78	32.89	34.66	18.46	26.56
RADIAL LOOP	4.23		2.12	14.66	4.62	9.64

Table 3: The total ridge count on each digit of autistic subject

PATTERN	LEFT HAND						RIGH HAND						
	L_I	L_{II}	L_{III}	L_{IV}	L_V	L_T	R_I	R_{II}	R_{III}	R_{IV}	R_V	R_T	GT
WHORL	148	53	27	27	-	255	15	41	27	56	62	201	456
ARCH	-	-	-	-	-	-	-	-	-	-	-	-	-
ULNARLOOP	9	29	137	93	68	336	71	43	28	31	54	227	563
RADIAL LOOP	-	-	-	-	23	23	-	-	42	21	15	78	101
					614							506	1,120

Table 4: The total ridge count on each digit of normal subject

PATTERN	LEFT HAND						RIGH HAND						
	L_I	L_{II}	L_{III}	L_{IV}	L_V	L_T	R_I	R_{II}	R_{III}	R_{IV}	R_V	R_T	GT
WHORL	58	77	96	70	49	350	123	80	83	86	-	372	722
ARCH	-	-	-	-	-	-	-	-	-	-	-	-	-
ULNARLOOP	156	108	91	136	132	623	47	64	91	133	164	499	1122
RADIAL LOOP	11	22	24	-	-	57	35	28	17	-	32	112	167
						1030						983	2013

Table 5: Mean, standard deviation and standard error of a-b ridge count of both normal and autistic subjects (male)

PARAMETER	AUTISTIC MALE		NORMAL MALE	
	LEFT	RIGHT	LEFT	RIGHT
MEAN + S.E	34.66$\pm$ 1.89	33.33$\pm$2.25	36.40$\pm$ 1.03	31.33 $\pm$ 1.72
S.D	7.34	9.09	3.96	6.67
VARIANCE	53.81	82.76	15.69	44.52
SAMPLE SIZE	15	15	15	15

P > 0.05

Table 6: Mean, standard deviation and standard error of a-b ridge count of both normal and autistic subjects (female)

PARAMETER	AUTISTIC MALE		NORMAL MALE	
	LEFT	RIGHT	LEFT	RIGHT
MEAN + S.E	38.6$\pm$ 2.59	35.8$\pm$1	41.40$\pm$ 1.29	38.60 $\pm$ 2.11
S.D	5.18	2.24	2.88	4.22
VARIANCE	26.8	5	8.3	17.8
SAMPLE SIZE	5	5	5	5

P > 0.05

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