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Original Article

Dermatoglyphic Digital Patterns and Pattern Intensity Index in Uterine Leiomyoma

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ABSTRACT

Uterine leiomyoma is a type of benign tumor that originates from the myometrium of the uterus. Research has proven that medical conditions such as diabetes mellitus, Down syndrome, Schizophrenia etc., may have genetic origin. These have been reported to exhibit peculiar dermatoglyphic patterns. The aim of this study was to ascertain the possibility of a dermatoglyphic pattern common to patients with uterine leiomyoma. A total of 120 female subjects were recruited for this study. These were divided into two groups, the control group consists of 60 females in their reproductive years and free from uterine leiomyoma as confirmed by individual pelvic scan performed in them. They were sourced from female students of University of Port Harcourt. While 60 females (attending the gynaecology clinic of University of Port Harcourt Teaching Hospital) with medically confirmed presence of uterine leiomyoma formed the experimental group. Digital prints (finger and palmar) of all the subjects were captured after the method adopted by Oghenemav we and Osaat. Ulnar loop had the highest occurrence 189 (63.0%) in total digital patterns of the subjects (table 1), but greater in the experimental group as compared to the controls. However, the difference was not statistically significant. There was a statistically significant decrease in total digital pattern of the right Arch 13(4.3%) in the experimental group as compared to the controls 38(12.7%) (table 1). Furthermore, there was a statistically significant difference in the digital patterns of the subjects on the right and left thumbs, right index fingers and right ring fingers. Pattern intensity index of the right and left hands was higher in the experimental group as compared to the controls (table 4). The pattern exhibited by the experimental group suggests that lower Arch, as well as the presence of Ulnar loop on the right thumb, index finger and ring finger were characteristic marker for uterine leiomyoma.

Keywords: Dermatoglyphics; Uterine Leiomyoma; finger prints; Infertility; Reproduction.

1. INTRODUCTION

Uterine leiomyoma (also referred to as fibroid, uterine fibroid or myoma) is a type of benign tumor that originates from the myometrium of the uterus, and is the most common type of benign tumor encountered in gynecological practice. The precise cause of uterine leiomyoma is unknown[1], but risk factors include age, nulliparity, early menarche,

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increased body mass index, ethnicity and familial history of uterine leiomyoma. [1,2,4] Uterine leiomyoma has a high prevalence rate among Africans and African Americans. The prevalence of this disease ranges from 60% to 80% in women of reproductive age.[3]

Uterine leiomyoma is dependent on estrogen and progesterone to grow and therefore relevant only during the reproductive years. Although sometimes asymptomatic, uterine leiomyoma may cause anemia, abdominal pain, menorrhagia, dysmenorrhea, abdominal distention, increased urinary frequency etc[5]. Most women go through their lives unaware that they actually have uterine leiomyoma until symptoms starts to manifest. The most common forms of treatment for uterine leiomyoma are gynecological operations, such as myomectomy or hysterectomy. The later involves removal of the uterus leaving women of reproductive age unable to have children.[3]

Dermatoglyphics is the scientific term used for study of epidermal ridges and their configuration on the palms, fingers, soles and toes of humans and other higher primates.[9] Dermatoglyphics are established by the end of the second trimester. Research has proven that medical conditions such as diabetes mellitus, Down's syndrome, Schizophrenia etc., may have genetic origin.[4, 9] These have been reported to exhibit peculiar dermatoglyphic patterns. [4, 9] Therefore, it was considered to find out if there is any specific dermatoglyphic pattern expressed by subjects who have uterine leiomyoma.

Aim and Objectives

The aim of this study was to investigate the dermatoglyphic patterns exhibited by subjects with uterine leiomyoma. Objectives includes: to evaluate the predominant fingerprint patterns in the experimental and control groups, as well as to compare the Pattern Intensity Index (PII) in both groups.

2. MATERIALS AND METHODS

Research Design

The present research was designed as a cross-sectional prospective study. It was performed via convenience sampling. The finger and palmar prints were obtained using Print Scanner (Hp G3110 Photo scanner). Standard protocol for collecting palmer prints as modified after Oladipo *et al*.[7] was adopted. A total of 120 female subjects were recruited for this study. These were divided into two groups, the control group consists of 60 females in their reproductive years and free from uterine leiomyoma as confirmed by individual pelvic scan performed in them. They were sourced from female students of the University of Port Harcourt. While 60 females (attending the gynaecology clinic of the University of Port Harcourt Teaching Hospital) with medically confirmed presence of uterine leiomyoma formed the experimental group. Digital prints (finger and palmar) of all the subjects were captured after the method adopted by Oghenemavwe and Osaat[6]. Only subjects of Nigeria nationality, without distorted finger and palms nor cuts to the fingers or palms were included in the study. The sample size was determined using Fisher's formula for large population (>10,000) and Cochran, (1963). Chi-square and Z-test of proportionality were used to test for association and differences in the distribution of the variables between the subjects. The confidence interval (CI) was set at 95%, hence $P< 0.05$ was considered significant.

Data Collection

The selection and collection of required parameters relied on informed consent of volunteer subjects. Standard protocol for collecting palmar prints as modified after Oladipo *et al*.[7] was adopted. The subjects recruited for this study had their age range between 20-40 years. The finger prints were obtained using Print Scanner (Hp G3110 Photo scanner). Hands were thoroughly washed with water and soap and dried before taking prints so as to remove dirt from hands. A little pressure was applied to press the palm on the scanner for adequate contact between the fingers and the scanner using Digital Print Model adopted from Oghenemavwe and Osaat[6] in order to have a sharp print capture. The dermatoglyphic features investigated were Ridge patterns and Pattern intensity index. The standard types of fingerprint pattern that were considered are: Arch (A), Radial loop (R loop), Ulnar loop (U loop) and Whorl (W).

After obtaining prints, the prints were magnified using the zooming tool on Hp mini-laptop connected to the scanner via USB cords. At the end, the data got was recorded for computation. The prints on the fingers were summed up to have a total figure for each pattern before calculating Pattern Intensity Index (PII).

The pattern intensity index on the palm was calculated using the formula below:

$$\text{PII} = \frac{2 \times Whorls + Loops}{n}$$

Where n= the total number of subjects. This was done for both the uterine leiomyoma subjects and the controls.

Ethical Approval

Ethical clearance was sort from the Research Ethics Committee of the University of Port Harcourt and that of University of Port Harcourt Teaching Hospital. Informed consent was obtained from the subjects before capturing their finger prints. Every subject was assured of confidentiality of the information provided for the research. The study was limited to finger and palmar prints examination.

3. RESULTS

The results observed from this study were presented in tables. Chi-square and Z- test were used to test for association and differences in the distribution of the variables between the subjects. The confidence interval (CI) was set at 95%, hence $P< 0.05$ was considered significant.

Table 1: Z and Chi-square test comparing the total dermatoglyphic patterns of the experimental group and controls

Group	Right				Chi-square analysis			Left				Chi-square analysis		
	A (%)	RL (%)	UL (%)	W (%)	Df	X^2	P-value	A (%)	RL (%)	UL (%)	W (%)	Df	X^2	P-value
Experimental group	13(4.3)	22(7.3)	189(63.0)	76(25.3)	3	17.707	**0.001****	22(7.3)	25(8.3)	166(55.3)	87(29.0)	3	6.458	0.091
Control group	38(12.7)	24(8.0)	150(50.0)	88(29.3)				39(13.0)	18(6.0)	153(51.0)	90(30.0)			
Z-test analysis														
Z score	-2.918	-0.148	1.271	-0.393				-1.477	0.667	0.401	-0.120			
P-value	**0.004****	0.882	0.204	0.694				0.140	0.505	0.689	0.905			

***P*<0.05** = Significant, X^2 = Chi-square, *df*= degree of freedom, *A* = Arch, *RL* = Radial Loop, *UL* = Ulnar Loop, *W* = Whorl**

In table 1, the Ulnar loops had the highest occurrence 189 (63.0%) and 166 (55.3%) in the experimental group while for the controls it was 150 (50.0%) and 153 (51.0%) in the right and left hands respectively. The Whorls for the experimental group were 76 (25.3%) and 87 (29.0%) while for the controls it was 88 (29.3%) and 90 (30.0%) in the right and left hands respectively. The Radial loops for the experimental group were 22 (7.3%) and 25 (8.3%) while for the controls it was 24 (8.0%) and 18 (6.0%) in the right and left hands respectively. Arches for the experimental group were 13 (4.3%) and 22 (7.3%) while for the controls it was 38 (12.7%) and 39 (13.0%) in the right and left hands respectively. Chi-square analysis showed that there was a statistically significant difference in the total digital patterns on the right hand of the experimental and control groups at $p<0.5$ ($x^2=17.707$, $p=0.001$). Z-test analysis showed Arches had a significantly lower frequency of occurrence 13(4.3%) in the experimental group as compared to the controls 38(12.7%).

Table 2: Distribution of the right digital dermatoglyphic patterns of the experimental group and controls and test of association

Right Finger	Group	Arch (%)	R Loop (%)	U Loop (%)	Whorl (%)	Chi-Square analysis		
						X^2	Df	P-value
Thumb	Experimental group	2 (3.3)	10 (16.7)	35 (58.3)	13 (21.7)	9.11	3	**0.03****
	Control group	11 (18.3)	13 (21.7)	23 (38.3)	13 (21.7)			
Index	Experimental group	2 (3.3)	5 (8.3)	50 (83.3)	3 (5.0)	8.47	3	**0.04****
	Control group	7 (11.7)	9 (15.0)	36 (60.0)	8 (13.3)			
Middle	Experimental group	4 (6.7)	-	27 (45.0)	29 (48.3)	2.28	2	0.32
	Control group	6 (10.0)	-	33 (55.0)	21 (35.0)			
Ring	Experimental group	-	4 (6.7)	49 (81.7)	7 (11.7)	11.36	3	**0.01****
	Control group	4 (6.7)	1 (1.7)	38 (63.3)	17 (28.3)			
Little	Experimental group	5 (8.3)	3 (5.0)	28 (46.7)	24 (40.0)	4.47	3	0.21
	Control group	10 (16.7)	1 (1.7)	20 (33.3)	29 (48.3)			

***P*<0.05 *R* = Radial, *U* = Ulnar, X^2 = Chi-square, *df* = degree of freedom, ** = asterisked and bolded signified significance**

In table 2, Ulnar loop had the highest occurrence 50 (83.3%) in the right digits followed by Whorl 29 (48.3%), Radial loop13 (21.7%) and Arch 11(18.3%). Ulnar loop was consistently higher in all the digits in the experimental group than in the normal except on the middle finger where it was higher in the controls. The Arch was consistently lower in all the digits in the experimental group as compared to the controls but was absent on the ring finger of the experimental group. Radial loop was absent on the middle finger of both groups and higher on the ring and little fingers in the experimental group than in the controls. The Whorl had equal distribution on the thumb. It was higher on the little, ring, and index fingers in the controls than in the experimental group but lower on the middle finger of the controls. The result showed that on the right thumb, index finger and ring finger of the subjects, there was a statistically significant difference in the digital patterns between the controls and the experimental group

Table 3: Distribution of the left digital dermatoglyphic pattern of the Experimental group and controls and test of association

Left Finger	Group	Arch (%)	R Loop (%)	U Loop (%)	Whorl (%)	Chi-Square analysis		
						X^2	Df	P-value
Thumb	Experimental group	4 (6.7)	19 (31.7)	17 (28.3)	20 (33.3)	13.56	3	**0.004****
	Control group	10 (16.7)	9 (15.0)	31 (51.7)	10 (16.7)			
Index	Experimental group	4 (6.7)	4 (6.7)	42 (70.0)	10 (16.7)	2.79	3	0.425
	Control group	8 (13.3)	7 (11.7)	35 (58.3)	10 (16.7)			
Middle	Experimental group	3 (5.0)	-	31 (51.7)	26 (43.3)	0.39	2	0.823
	Control group	4 (6.7)	-	33 (55.0)	23 (38.3)			
Ring	Experimental group	1 (1.7)	2 (3.3)	48 (80.0)	9 (15.0)	6.56	3	0.087
	Control group	4 (6.7)	1 (1.7)	37 (61.7)	18 (30.0)			
Little	Experimental group	10 (16.7)	-	28 (46.7)	22 (36.7)	5.04	3	0.169
	Control group	13 (21.7)	1 (1.7)	17 (28.3)	29 (48.3)			

***P*<0.05, *R* = Radial, *U* = Ulnar, X^2 = Chi-square, *df* = degree of freedom, ** = asterisked and bolded signified significance**

In table 3, Ulnar loop had the highest frequency of occurrence 48(80.0%) in the right digits followed by Whorl 29(48.3%), Radial loop 19(31.7%) and Arch 13(21.7%). Ulnar loop was higher on the index, ring and little fingers in the experimental group as compared to the controls but lower on the thumbs and middle fingers of the experimental group. The Arches were consistently lower in all the digits in the experimental group as compared to the controls. Radial loops were higher on the thumbs and ring fingers in the experimental group than in the controls but lower on the index fingers of the experimental group. The Whorls had equal distribution on the index fingers of the subjects.

Whorls were higher on the thumbs and middle fingers in the experimental group than in the controls but lower on the ring and little fingers in the experimental group. The result showed that on the right thumbs of the subjects, there was a statistically significant difference in the digital patterns between the controls and the experimental group.

Table 4: Pattern intensity index of the experimental group and controls

Pattern intensity index	
Right Hand	
Leiomyoma subjects	6.05
Non Leiomyoma subjects	5.83
Left Hand	
Leiomyoma subjects	6.21
Non Leiomyoma subjects	5.78

In table 4, Pattern intensity index of the right and left hand was higher in the experimental group as compared to the controls

4. DISCUSSION

The study has given ample information on the dermatoglyphic patterns of uterine leiomyoma subjects in Port Harcourt metropolis. The result of this study has shown that Ulnar loop 189 (63.0%) had the highest occurrence followed by Whorl 90 (30.0%), Arch 39 (13.0%) and Radial loop 25 (8.3%) with respect to the total digital pattern in the study population (table 1). This is consistent with the observation of some authors in their study such as on coronary heart disease patients,[11] on congenital lame adults,[8] on sickle cell,[10] and on children with congenital hearing loss, [12]as Ulnar loop had the highest percentage of occurrence. Chi-square analysis showed that there was a statistically significant difference in the total digital patterns in the right hands of the experimental and control groups at $p<0.5$ ($x^2 =17.707$, $p=0.001$). Z-test analysis showed that Arches had a significantly lower frequency of occurrence 13(4.3%) in the experimental group as compared to the controls 38(12.7%) (table 1). This shows that uterine leiomyoma has a characteristic dermatoglyphic pattern. The implication of this finding is that individuals with low or absence of Arch in their right hands may develop uterine leiomyoma later in life. Ulnar loops had the highest occurrence 50 (83.3%) in the right digits followed by Whorls 29(48.3%), Radial loops 13(21.7%) and Arches 11(18.3%) (table 2). A test of significance for the right digital patterns shows that there was a statistically significant increase in Ulnar loops and decrease in Arches on the right thumbs, index fingers and ring fingers of the experimental group as compared to the controls (table 2). This shows that uterine leiomyoma has a characteristic digital pattern. The implication of this finding is that individuals with Ulnar loops in their right thumbs, index fingers and ring fingers may be at risk of developing uterine leiomyoma later in life. This could be attributed to genetics. Furthermore, we found a significant decrease in the frequency of Arch and Ulnar loop on the left thumb of the experimental group when compared to the control group which could be predictive of uterine leiomyoma (table 3). This implies that individuals with Whorls and Radial loops on their left thumbs may develop uterine leiomyoma later in life. Pattern intensity index of the right and left hands was higher in the experimental group as compared to the controls (table 4). This could have happened by chance since the difference was not statistically significant.

5. CONCLUSION

This study has established that there is a characteristic digital pattern in leiomyoma Port Harcourt metropolis. The pattern exhibited by the experimental group suggests that lower or absence arch as well as the presence of Ulnar loop on the right thumb, index finger and ring finger were characteristic marker for uterine leiomyoma. The study has also established that pattern intensity index in right and left hand was greater in the experimental group as compared to the controls.

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