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Determination of Level 2 Dermatoglyphic Details and the Paul's Index in Uterine Leiomyoma

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Abstract: Uterine fibroids, also known as uterine leiomyomas or fibroids, are benign smooth muscle tumors of the uterus. Most women have no symptoms while others may have painful or heavy periods. If large enough, they may push on the bladder causing a frequent need to urinate. Dermatoglyphics is referred to as study of the friction ridge formation that appears on the palms of the hands and soles of the feet. There have been works done by different researchers on dermatoglyphics in the field of medicine which has helped in the detection of diseases like breast cancer, anemia etc. But not much has been done at level 2 dermatoglyphics which has created a gap in literatures on those areas especially uterine leiomyoma. This study was aimed at determining the level 2 dermatoglyphic digital patterns in Uterine Leiomyoma. The study was non-experimental and analytical. One hundred subjects selected by simple random sampling. Chi-square test was done using SPSS twenty version. The result of the study has shown clearly that the most distributed level-2 pattern in both categories is the bifurcation and ridge crossing the least distributed pattern in both categories. In uterine leiomyoma the distribution of bifurcation was higher than in the control group. The higher distribution of bifurcations in the uterine leiomyoma could be attributed to the genetic difference in both categories. The difference between the uterine leiomyoma subjects and the control subjects (normal) was not significant statistically ($p>0.05$) in there pattern distribution, but there was a marked difference that can be used as a guide in the diagnosis of uterine leiomyoma condition.

Keywords: Uterine leiomyoma, Trifurcation, Bifurcation, Ridge ending, Dot.

INTRODUCTION

Uterine fibroids, also known as uterine leiomyomas or fibroids, are benign smooth muscle tumors of the uterus [1]. Most women have no symptoms while others may have painful or heavy periods 2]. If large enough, they may push on the bladder causing a frequent need to urinate [2]. They may also cause pain during sex or lower back pain [3]. A woman can have one uterine fibroid or many [3]. Occasionally, fibroids may make it difficult to become pregnant, although this is uncommon [3].

Fig-2: Uterine fibroids as seen during laparoscopic surgery [22]

The exact cause of uterine fibroids is unclear [4]. However, fibroids run in families and appear to be partly determined by hormone levels [4]. Risk factors include obesity and eating red meat [4]. Diagnosis can be performed by pelvic examination or medical imaging [4].

Treatment is typically not needed if there are no symptoms [5]. NSAIDs, such as ibuprofen, may help with pain and bleeding while paracetamol (acetaminophen) may help with pain [6, 7]. Iron supplements may be needed in those with heavy periods [7]. Medications of the gonadotropin releasing hormone agonist class may decrease the size of the fibroids but are expensive and associated with side effects [8]. If greater symptoms are present, surgery to remove the fibroid or uterus may help [1]. Uterine artery embolization may also help [8]. Cancerous versions of fibroids are very rare and are known as leiomyosarcomas [9]. They do not appear to develop from benign fibroids [9].

About 20% to 80% of women develop fibroids by the age of 50 [10]. In 2013, it was estimated that 171 million women were affected [11]. They are typically found during the middle and later reproductive years [1]. After menopause, they usually decrease in size [12]. In the United States, uterine fibroids are a common reason for surgical removal of the uterus [13].

Signs and symptoms

Some women with uterine fibroids do not have symptoms. Abdominal pain, anemia and increased bleeding can indicate the presence of fibroids [6]. There may also be pain during intercourse, depending on the location of the fibroid. During pregnancy, they may also be the cause of miscarriage [7], bleeding, premature labor, or interference with the position of the fetus (citation needed). A uterine fibroid can cause rectal pressure. The abdomen can grow larger mimicking the appearance of pregnancy [1]. Some large fibroids can extend out through the cervix and vagina [6].

While fibroids are common, they are not a typical cause for infertility, accounting for about 3% of reasons why a woman may not be able to have a child [8]. The majority of women with uterine fibroids will have normal pregnancy outcomes [9, 10]. In cases of intercurrent uterine fibroids in infertility, a fibroid is typically located in a submucosal position and it is thought that this location may interfere with the function of the lining and the ability of the embryo to implant [8].

Risk Factors

Some risk factors associated with the development of uterine fibroids are modifiable[11]. Fibroids are more common in obese women[12]. Fibroids are dependent on estrogen and progesterone to grow and therefore relevant only during the reproductive years.

Diet

Diets high in fruits and vegetables tend to lower the risk of developing fibroids [11]. Fibers, vitamin A, C and E, phytoestrogens, carotenoids, meat, fish, and dairy products are of unclear effect [11]. Normal dietary levels of vitamin D may reduce the risk of developing fibroids [11].

Genetics

Fifty percent of uterine fibroids demonstrate a genetic abnormality. Often a translocation is found on some chromosomes [6]. Fibroids are partly genetic. If a mother had fibroids, risk in the daughter is about three times higher than average [13]. Researchers have completed profiling of global gene expression for uterine fibroids. They found that only a few specific genes or cytogenetic deviations are associated with fibroids [14]. 80-85% of fibroids have a mutation in the mediator complex subunit 12 (MED12) genes [15, 16].

Familial leiomyoma

A syndrome (Reed's syndrome) that causes uterine leiomyomata along with cutaneous leiomyomata and renal cell cancer has been reported [17-19]. This is associated with a mutation in the gene that produces the enzyme fumarate hydratase, located on the long arm of chromosome 1 (1q42.3-43). Inheritance is autosomal dominant.

Pathophysiology

Fibroids are a type of uterine leiomyoma. Fibroids grossly appear as round, well circumscribed (but not encapsulated), solid nodules that are white or tan, and show whorled appearance on histological section. The size varies, from microscopic to lesions of considerable size. Typically lesions the size of a grapefruit or bigger are felt by the patient herself through the abdominal wall [12]. Microscopically, tumor cells resemble normal cells (elongated, spindle-shaped, with a cigar-shaped nucleus) and form bundles with different directions (whorled). These cells are uniform in size and shape, with scarce mitoses. There are three benign variants: bizarre (atypical); cellular; and mitotically active.

The appearance of prominent nucleoli with perinucleolar halos should alert the pathologist to investigate the possibility of the extremely rare hereditary leiomyomatosis and renal cell cancer (Reed) syndrome [20].

Location and classification

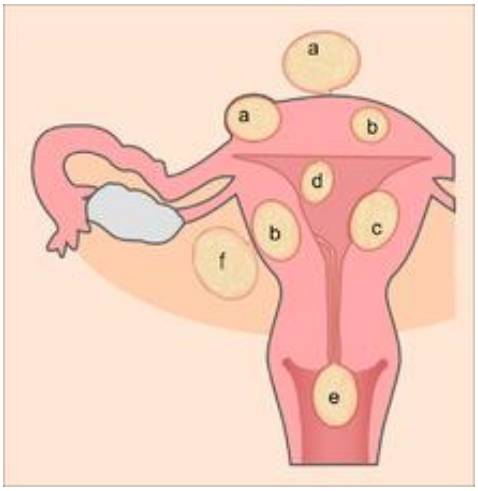

Fig-2: Schematic drawing of various types of uterine fibroids: a=subserosal fibroids, b=intramural fibroids, c=submucosal fibroid, d=pedunculated submucosal fibroid, e=fibroid in statu nascendi, f=fibroid of the broad ligament [22].

Growth and location are the main factors that determine if a fibroid leads to symptoms and problems [5]. A small lesion can be symptomatic if located within the uterine cavity while a large lesion on the outside of the uterus may go unnoticed. Different locations are classified as follows:

Intramural fibroids are located within the muscular wall of the uterus and are the most common type. Unless they are large, they may be asymptomatic. Intramural fibroids begin as small nodules in the muscular wall of the uterus. With time, intramural fibroids may expand inwards, causing distortion and elongation of the uterine cavity.

Subserosal fibroids are located on the surface of the uterus. They can also grow outward from the surface and remain attached by a small piece of tissue and then are called pedunculated fibroids [10]. These pedunculated growths can actually detach from the uterus to become a parasitic leiomyoma.

Submucosal fibroids are located in the muscle beneath the endometrium of the uterus and distort the uterine cavity; even small lesions in this location may lead to bleeding and infertility. A pedunculated lesion within the cavity is termed an intracavitary fibroid and can be passed through the cervix.

Cervical fibroids are located in the wall of the cervix (neck of the uterus). Rarely, fibroids are found in the supporting structures (round ligament, broad ligament, or uterosacral ligament) of the uterus that also contain smooth muscle tissue.

Fibroids may be single or multiple. Most fibroids start in the muscular wall of the uterus. With further growth, some lesions may develop towards the outside of the uterus or towards the internal cavity. Secondary changes that may develop within fibroids are hemorrhage, necrosis, calcification, and cystic changes. They tend to calcify after menopause [11]. If the uterus contains too many to count, it is referred to as diffuse uterine leiomyomatosis.

Diagnosis

The presence of a uterine fibroid versus an adnexal tumor is made. Fibroids can be mistaken for ovarian neoplasms. An uncommon tumor which may be mistaken for a fibroid is Sarcoma botryoides. It is more common in children and adolescents. Like a fibroid, it can also protrude from the vagina and is distinguished from fibroids [6]. While palpation used in a pelvic examination can typically identify the presence of larger fibroids, gynecologic ultrasonography (ultrasound) has evolved as the standard tool to evaluate the uterus for fibroids. Sonography will depict the fibroids as focal masses with a heterogeneous texture, which usually cause shadowing of the ultrasound beam. The location can be determined and dimensions of the lesion measured. Also, magnetic resonance imaging (MRI) can be used to define the depiction of the size and location of the fibroids within the uterus.

Statement of the Problem

There have been works done by different researchers on dermatoglyphics in the field of medicine which has helped in the detection of diseases like breast cancer, anemia, diabetes mellitus and Down's syndrome [1-10]. But not much has been done at level 2 dermatoglyphics which has created a gap in literatures on those areas especially uterine leiomyoma. Therefore, there is paucity of information on the level 2 dermatoglyphics on people living with uterine leiomyoma.

Aim of the Study

The study was aimed at determining the level 2 dermatoglyphic digital patterns in Uterine Leiomyoma.

Significance of the Study

The determination of digital patterns at level 2 dermatoglyphics will aid easy and quick diagnoses of uterine leiomyoma condition by merely sighting the fingerprint patterns of the subjects who have the condition since it has a genetic undertone, though at the moment are asymptomatic.

Scope of the Study

The study was limited to the study of the fingerprint patterns at level 2 dermatoglyphics.

MATERIALS AND METHODS

Research Design

The study was non-experimental and analytical. A total of one hundred subjects were used for the study. 30 were subjects with uterine leiomyoma and 70 without uterine leiomyoma. These subjects were randomly selected through simple random sampling method. Ethical approval was obtained from Research Ethics Committee of the University of Port Harcourt, Nigeria.

Duration of the study

The study was done between March 8, 2018, - August 2, 2018 in Braithwaite Memorial Specialist Hospital and University of Port Harcourt Teaching Hospital (BMSH, UPTH) resident in Port Harcourt, Rivers State, Nigeria.

Data Collection

Dermatoglyphs of the finger and palmar areas were determined using a classical scanner type, Hp G3110 Scanjet Scanner (9000x4800 dpi resolution). Hands were cleaned from dirt before taking prints and a little pressure was put to press the palm on the scanner for adequate contact between the fingers and the scanner to have a clear image of the print and the prints were taken twice.

Inclusion Criteria

Subjects who have uterine leiomyoma between the ages 30 – 45 years who do not have any finger or hand deformities. Those who have finger or hand deformities or have had surgical procedure on their finger/hand were excluded.

CALCULATION OF THE PAUL'S INDEX

$$\frac{Bifurcation}{Ridge\ Ending} \times 100$$

Paul's Index (PI) for Uterine Leiomyoma subjects

$$\frac{301}{161} \times 100 = 186.95 \cong 187$$

Paul's Index (PI) for Control subjects $\frac{181}{124} \times 100$

$$= 145.96 \cong 146$$

Statistical Analysis: Chi-square test was done using Statistical Package for the Social Sciences (SPSS version 21).

RESULTS

The result of the study in table-2 indicates that bifurcation was most frequent for both categories while ridge crossing was the least distributed pattern.

Table-1: Total level 2 Digital Patterns in Uterine Leiomyoma and Control subjects (%)

S/N	Patterns	Leiomyoma		Control	
		Right (%)	Left (%)	Right (%)	Left (%)
1	Ridge ending	80(18.69)	81(18.75)	62(16.48)	62(16.48)
2	Opposed bifurcation	40(9.35)	43(9,95)	36(9.58)	36(9.57)
3	Bridge	16(3.74)	15(3.47)	12(3.19)	14(3.72)
4	Lake (enclosure)	40(9.35)	46(10.65)	38(10.11)	36(9.57)
5	Bifurcation	150(35.05)	151(34.95)	140(37.23)	141(37.50)
6	Double bifurcation	24(5.60)	22(5.09)	23(6.12)	22(5.85)
7	Dot	19(4.45)	16(3.70)	14(3.72)	16(4.26)
8	Trifurcation	29(6.77)	27(6.26)	22(5.85)	20(5.32)
9	Island	18(4.20)	16(3.70)	16(4.26)	14(3.72)
10	Ridge crossing	12(2.80)	15(3.48)	13(3.46)	15(3.98)
TOTAL					

Table-2: Comparison of Paul's Index (PI) in Uterine Leiomyoma and Control subjects

Subjects	Paul's Index (PI)
Uterine Leiomyoma	187
Control	146

The results showed that there was no statistically significant difference between both categories.

Table-3: Statistical analysis of level 2 Digital Patterns in Leiomyoma and Control subjects

S/N	Patterns	Leiomyoma		Control				
		Right	Left	Right	Left	X^2	P-value	Inference
1	Ridge ending	80	81	62	62	0.0027	0.9585	Insignificant
2	Opposed bifurcation	40	43	36	36	0.0504	0.8223	Insignificant
3	Bridge	16	15	12	14	0.1686	0.6813	Insignificant
4	Lake (enclosure)	40	46	38	36	0.3729	0.5414	Insignificant
5	Bifurcation	150	151	140	141	0.0000	0.9977	Insignificant
6	Double bifurcation	24	22	23	22	0.0103	0.9192	Insignificant
7	Dot	19	16	14	16	0.3752	0.5401	Insignificant
8	Trifurcation	29	27	22	20	0.0034	0.9534	Insignificant
9	Island	18	16	16	14	0.0001	0.9749	Insignificant
10	Ridge crossing	12	15	13	15	0.0218	0.8825	Insignificant

$P<0.05$

DISCUSSIONS

The result of the study has shown clearly that the most distributed level-2 pattern in both categories is the bifurcation and ridge crossing the least distributed pattern in both categories. In uterine leiomyoma the distribution of bifurcation was higher than in the control group. The higher distribution of bifurcations in the uterine leiomyoma could be attributed to the genetic difference in both categories. It has been indicated in literatures that there is a genetic undertone in the leiomyoma. Though the difference between the uterine leiomyoma subjects and the control subjects (normal) is not significant statistically ($p>0.05$) in there pattern distribution, it suggests that there is a marked difference that can be used as a guide in the diagnosis of uterine leiomyoma condition. It is necessary at this point to state that though there no known works published on uterine leiomyoma at level two dermatoglyphics, there is a study at level one dermatoglyphics by Ibewuike *et al*., [21] and the findings of this present study agrees with the results of Ibewuike *et al*., [21].

The result of this study also showed that there is a marked difference in the value of the Paul's Index calculated. Paul's Index was higher in uterine leiomyoma subjects than the control subjects which is another marker or indicator could be used to different between both categories. This difference again could be traceable to the genetic interplay in the development of uterine leiomyoma which accounts for a higher value in this condition than the control subjects. This result of this present study again agrees with the result by Ibewuike *et al*., [21] which states that the Pattern Intensity Index (PII) of the right and left hands was higher in the experimental group as compared to the controls.

CONCLUSIONS

It is worthy of note that the difference between the uterine leiomyoma subjects and the control subjects (normal) was not significant statistically ($p>0.05$) in there pattern distribution, but there was a marked difference that can be used as a guide in the diagnosis of uterine leiomyoma condition.

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