

# A Comparison of Qualitative Dermatoglyphics in Rheumatoid Arthritis Patients with Normal Persons in Iraq

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**Abstract:-** The characteristics of the fingerprints were analyzed descriptively random sample consist of 200 individuals of these 100 individuals were effected by Rheumatoid Arthritis, 100 as control the age over 30 years. The results of the current study showed that the calculated chi-square three degrees of freedom in the female sample was (17.21) and a probability ( $P < 0.005$ ), while for the male sample the calculated chi-square value of three degrees of freedom was equal to (9.79) and a probability ( $P < 0.05$ ), when comparing the two samples of patient females and males using the chi-square no significant differences appeared, while significant differences appeared in the fingerprint patterns between the two control samples, where the value of the chi-square was equal to (5.96) with a probability ( $P < 0.05$ ). Results imply that dermatoglyphics could be useful in diagnosing Rheumatoid Arthritis patients.

**Keywords:-** Rheumatoid Arthritis, Finger Print's Patterns, Dermatoglyphic.

## I. INTRODUCTION

Dermatoglyphics the scientific study of fingerprints derives from the Greek word derma (skin) and glyph (carving) [1]. Dermatological lines and their applications in the field of diseases. Dermatoglyphics refers to the configurations of dermal ridges on the digits, palms, and soles [2, 3]. These patterns begin to form during the sixth to seventh weeks of intrauterine life and are fully formed by the second trimester. Galton was the first to use ridge patterns in finger prints to investigate the varied patterns created by them in 1892. [4]. Rheumatoid arthritis is autoimmune chronic inflammatory disease that affects both men and women; however it affects women more frequently. The etiology of RA has been linked to genetics [5]. Dermatoglyphics, on the other hand, are tied to inheritance and are found in the hands and feet. As a result, some research on the link between dermatoglyphics and Rheumatoid Arthritis is available [6]. Susceptibility to Rheumatoid Arthritis. Disease and its severity can be influenced by genetic and environmental factors. Because ridge patterns are generated early in fetal development and does not change throughout life, odd dermatoglyphics may signal gene or chromosomal abnormalities that are associated with diseases like Rheumatoid Arthritis [7]. The study of fingerprint patterns for the purpose of identification is sometimes known as Dactylography, Dactyloscopy, or the Henry-Galton

categorization system. [8] Dermatoglyphic pattern analysis is strongly related to genetics, biology, forensic sciences, medicine, and evolutionary history the classification of dermatoglyphic patterns proposed by Henry: Type I- Loop pattern, Type II- Arched pattern Type III- Whorl pattern [9]. Many studies have demonstrated that dermatoglyphics can predict a variety of illnesses and conditions [10, 11, 12, 13, and 14]. The study's aims were to analyze the dermatoglyphic finger print pattern in Rheumatoid Arthritis patients and to compare with the control groups to determine whether dermatoglyphics can be used to aid in the early detection of hereditary disease.

## II. METHODS

Fingerprints were taken from 200 samples 100 diagnosed cases of Rheumatoid Arthritis (50 female and 50 male) and 100 healthy persons (50 female and 50 males) as a control group the aged above 30 years were chosen for the study collected from different centers in Baghdad after obtaining informed consent . Dermatoglyphic patterns were captured on a white paper sheet using a stamp ink pad and uniform finger pressure. The ink method of recording finger prints has been widely utilized to record imprints. Cummins and Ruldo first proposed this strategy in 1926 [15].

➤ *The method used to analyze the phenotypic patterns of fingerprints -*

Method of descriptive analysis of finger patterns were determined according to Galton 1892 method for dividing fingerprints into the main patterns, which are the arches, ulnar loops, radial loops and whorls.

➤ *Quantitative analysis of fingerprint pattern Types*

The number of lines is calculated according to the method (Holt, 1968) [16]. If a future line is drawn from the center of the delta to the center of the pattern, and the number of lines that cut and touch that future line is calculated, bearing in mind that the center and deltas are excluded from the calculation. From the radial side and the other from the ulnar side. In the case of the radial lugs that have an account located on the ulnar side, one value is recorded for them, and vice versa for the ulnar loop, while the tented and simple arches do not have any account, and therefore a zero value is recorded for them for arithmetic purposes.

➤ *Statistical analysis*

Statistical analyzes were performed on the information obtained by the chi-square method.

$$X^2 = \sum \frac{(O - E)^2}{E}$$

O=Observed number

E=Expected number

∑= Summation ,

X<sup>2</sup> =chi-square

Degrees of freedom = the number of samples – 1

**III. RESULTS**

➤ *Qualitative Analysis of Digital Patterns:*

Present study was a 100 patient with rheumatoid arthritis and 100 controls. (Table 1) shows Percentage of gender distribution in the group study. 100 sample, 50 (50%) were female and 50 (50%) were male. Of the total 100 controls, 50 (50%) were female and 50 (50%) were male table 1.

Table 1: Percentage of gender distribution in the group study.

Gender	Patient	control	Percentage
Female	50	50	%50
Male	50	50	%50

Table 2 shows the phenotypic numbers in the ten fingers and their percentage in each finger in the male and female samples. It is clear with regard to the whorl their percentage was lower in the patient female sample than in the control one. Where in the patient female sample it was 30.8%, in the control sample 35.0%, in the male, the percentage increased by a small amount 19.6% in the patient male, while in the control sample 18.0%.

The percentage of Ulnar and radial loop decreased in the patient females and males, reaching 36.6% , 40%, 24 % and 30% respectively compared to the control sample. With regard to the arches, its percentage increased in the patient female and male sample than in the control sample, where it was 7.6% in the control sample and 9.2% of patient female, in the sample of patient males it was 6.2%, and in the control male it was 5.0%.

When comparing the two samples of patient male and female with to the percentages of the four types, the percentage of whorl in the patient male sample was low than the patient female sample. As for the ulnar and radial loops and arches, their percentage showed an increase in the patient female sample compared to the patient male sample Figure 1.

Table - 2: The number and percentage of fingerprints in the female patient and male samples compared with control.

Arch's		Radial Loop		Ulnar Loop		Whorl		sample
%	No	%	No	%	No	%	No	
9.2	46	12.4	62	36.6	183	30.8	154	<b>Female patient No=75</b>
7.6	38	6.4	32	40	200	35.0	175	<b>Female control No=75</b>
6.2	31	6.6	33	24.0	120	19.6	98	<b>Male patient No=50</b>
5.0	25	3.2	16	30.0	150	18.0	90	<b>Male control No=50</b>

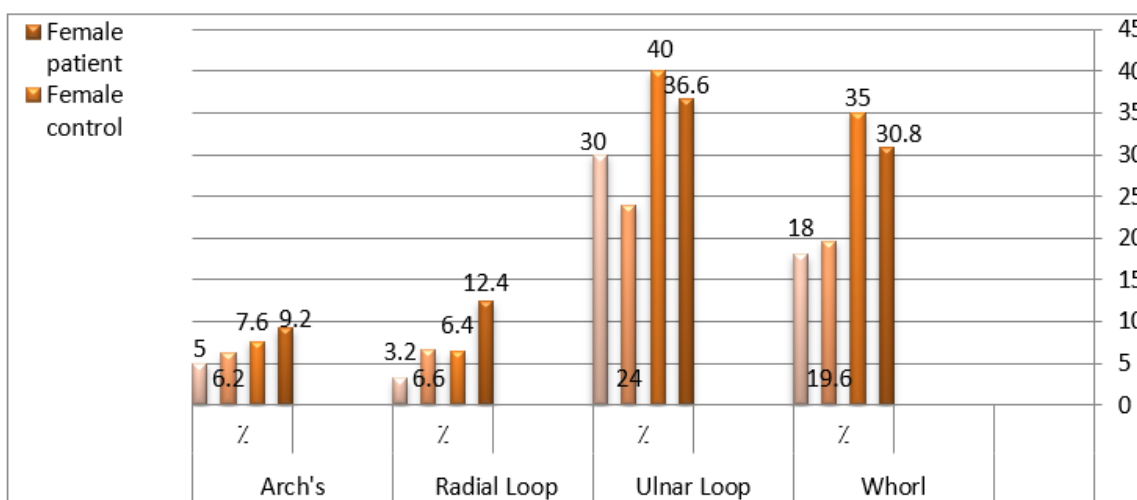


Fig 1: The percentage of fingerprints in the female and male patient samples compared with control.

A comparison has been made between the female patient and their control sample using chi-square for the frequency of fingerprint patterns. The results shown in table table - 3 showed a significant difference between the two samples, where the chi-square value calculated for three degrees of freedom was equal to 17.21 and the probability less than (0.001).

Table - 3: Comparison between the female patients and the control samples using chi-square.

Total	Arch		Loop Radial		Ulnar Loop		Whorl		sample
	expected	observed	expected	observed	expected	observed	expected	observed	
445	40.658	46	47	62	191.5	183	164.5	154	<b>Patient Female No=50</b>
445	40.341	38	47	32	191.5	200	164.5	175	<b>control Female No=50</b>
890	84		94		383		329		<b>Total</b>

$$\sum \chi^2 = 17.21$$

Degrees of freedom = 3

Significance level = (P < 0.005)

The result shown in the table 4 a comparisons have been made between the male patient and their control sample using chi-square for the frequency of fingerprint patterns. The results shown in table table - 4 showed a significant difference between the two samples, where the chi-square value calculated for three degrees of freedom was equal to 9.79 and to probability less than (0.005).

Table - 4: Comparison between the male patient sample and the control samples using chi-square

Total	Arch		Loop Radial		Ulnar Loop		Whorl		sample
	expected	observed	expected	observed	expected	observed	expected	observed	
928	30.68	98	30.68	110	248.46	468	118.70	252	<b>Patient male No=50</b>
1000	30.24	50	30.24	32	244.34	606	235.71	312	<b>Control male No=50</b>
1928	148		142		1074		564		<b>Total</b>

$$\sum \chi^2 = 9.79$$

Degrees of freedom = 3

Significance level = (P < 0.05)

Table 5 a comparisons has been made between the Female and male patient and their control sample using chi-square for the frequency of fingerprint patterns. The results shown a significant difference between the two samples, where the chi-square value calculated for three degrees of freedom was equal to 0.79 and the possibility is greater than 0.79

Total	Arch		Loop Radial		Ulnar Loop		Whorl		sample
	expected	observed	expected	observed	expected	observed	expected	observed	
1500	47.13	46	71.35	62	185.46	183	154.2	154	<b>Female patient No=50</b>
928	29.86	31	44.64	36.85	117.53	120	97.7	98	<b>Male patient No=50</b>
2428	77		95		303		252		<b>Total</b>

Table - 5: Comparison between the Female and male patient and the control samples using chi –square.

$$\sum \chi^2 = 0.79$$

Degrees of freedom = 3

Significance level = (P > 0.79)

Table 6 a comparisons has been made between the Female and male control and their control sample using chi-square for the frequency of fingerprint patterns. The results shown a significant difference between the two samples, where the chi-square value calculated for three degrees of freedom was equal to 5.96 and the possibility is greater than 5.96

Table - 6: Comparison between the Female and male control sample using chi –square.

Total	Arch		Loop Radial		Ulnar Loop		Whorl		sample
	expected	observed	expected	observed	expected	observed	expected	observed	
445	39.17	38	21.36	32	214.23	200	162.20	175	Female control No=50
282	24.82	26	18.61	16	135.76	150	102.79	90	Male control No=50
727	64		48		350		265		Total

$$\sum \chi^2 = 5.96$$

Degrees of freedom = 3

Significance level = (P < 0.05)

#### IV. DISCUSSION

Dermatoglyphics is a scientific method used in anthropological, legal, medical, and genetic research. Finger printing's importance should not be overlooked, and because each person's pattern is unique to each every individual , it can be used to national identification , mass disaster injuries and blast injuries, as well as for identify criminals at crime scenes [17]. In our study, we noticed that the percentage of whorl decreased by a small and insignificant percentage in the patient female sample compared with the control sample, while it sample increased in the patient male and also insignificantly compared with the control sample, this result is consistent with the study (Hanan Mohammad, E. S. *et al.*, 2009) [7] As for the ulnar loops, their percentage decreased in the two patient samples of females and males, compared to their control sample. With regard to the radial loops, their percentage increased in the patient samples of females and males compared to the standard sample for each of them, and this result is consistent with the study of (Kareem, M. I. A. *et al.*, 2020 ; Narayanan, el al., 2017; Kumar, C. *et al.*, 2015 and Igbigbi and Msamati 2002) [6,18, 19,20]. As for the arch, it increased in both pathological samples, females and males, compared with the standard sample for each of them, and this is consistent with the study Kareem, M. I. A. *et al.*, 2020 [6]. The case of the difference in the phenotypes of some descriptive characteristics of the skin lines on the fingers may be due to the case of asymmetry resulting from the genetic heterogeneity of the members of the patient sample.

#### V. CONCLUSION

When Rheumatoid Arthritis patients were compared to the control group, significant differences were seen in qualitative dermatological. The results of this study show a link between some dermatoglyphics qualitative parameters and Rheumatoid arthritis, implying that dermatoglyphics could be used as an anatomical, non-invasive, and low-cost screening tool for high-risk populations, allowing for early detection and management.

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