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Research Paper

Association between fingerprint and blood group among Libyan students

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***ABSTRACT*:**
***Background*:** The skin of the palms and soles is marked by a unique carved ridge, which is called dermatoglyphic. Fingerprints are expected to perform some important physiological functions. Fingerprints are classified into a loop, whorl and arch. There are two systems for blood group classification known as ABO and Rh. Objectives: To study the pattern of fingerprint on the thumb of the right hand and the association between fingerprint, blood group and gender.
Methods: This study was conducted in the faculty of sciences at Omar Elmkhtar University in ALBYDA, LIBYA from January 2019 to January 2020. A total of 480 persons were selected randomly for this study. After taking consent from the subjects, participants were asked to press their right thumb fingertip on the inkpad and then to Pre-designed form to transfer the fingerprint impression. Results: Majority of the subjects (38.7%) in the study were of blood group O followed by blood group B, A and AB of whom Rh-positive was dominant. The distribution of fingerprint pattern is higher (59.4%) in loops followed by whorls and arches. Almost the same order was noticed in both ABO blood groups and Rh blood group, except blood group AB negative were loop and whorl had the same percentage (50.0%).
Conclusions: The study has revealed a significant association between blood group types and gender. This study failed to find significant association neither between fingerprint patterns and gender nor between fingerprint patterns and blood group types.
***KEYWORDS*:** *Blood groups; Gendre; fingerprints*

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I. INTRODUCTION

DERMATOGLYPHICS IS STUDY OF DESIGN OF FINE EDGES ON FINGERS, PALMS AND SOLES. CUMMINS 1926 CREATED THE TERM DERMATOGLYPHICS [1] THE DESIGN OF THE PAPILLARY EDGES WITHIN THE HANDS IS TOTALLY BUILT UP BETWEEN 11TH AND 24TH WEEKS OF EMBRYONIC DEVELOPMENT [2]. DACTYLOGRAPHY IS HENCE, CONSIDERED AS AN SUCCESSFUL TOOL FOR DISTINGUISHING PROOF. IT IS ROUTINELY UTILIZED WITHIN THE IDENTIFICATION OF PEOPLE. OTHER THAN, FINGERPRINTS GOTTEN AT THE SCENE OF WRONGDOING CAN PROVIDE CRUCIAL CLUES TO THE CHARACTER OF THE PERPETRATOR OF THE CRIME. RECENTLY, PONDERS HAVE BEEN CONDUCTED ON THE CONVENIENCE OF UNIQUE FINGER IMPRESSION EDGE THICKNESS IN DISTINGUISHING PROOF [3,4]. THE 'ABO' SYSTEM IS CLASSIFIED AS A, B, AB AND O TYPES ACCORDING TO PRESENCE OF CORRESPONDING ANTIGEN IN PLASMA. 'RHESUS' SYSTEM IS ASSESSED INTO RHESUS POSITIVE (RH +VE) AND RHESUS NEGATIVE (RH –VE) IN STEP WITH THE PRESENCE OR ABSENCE OF 'D' ANTIGEN [5]. CORRELATION BETWEEN FINGERPRINT PATTERN AND THESE PARAMETERS MAY HELP IN USING FINGERPRINTS AS AN IMPORTANT AID IN SEX AND BLOOD GROUP DETERMINATION AND VICE VERSA, THUS, ENHANCING THE AUTHENTICITY OF FINGERPRINTS IN DETECTION OF CRIME AND CRIMINALS[6]. THE CURRENT STUDY AIMED TO FIND OUT THE LINK BETWEEN DIFFERING KINDS OF FINGERPRINTS WITH BLOOD GROUPS AND GENDER AND TO FIGURE OUT THE DISTRIBUTION OF DIFFERENT FINGERPRINT PATTERNS AMONG UNIVERSITY STUDENTS IN LIBYA.

II. MATERIAL AND METHODS

The study was conducted at the faculty of sciences in Omar Elmkhtar University during the period of 2019-2020. A total of 480 students (230 male and 250 female aged from 17 to 26 years. Each subject hands being washed with soap and water and dried. The individual being fingerprinted were asked to stand in front of

and at a forearm's length from the fingerprinting paper. The individual should stand to the right and rear of the person taking the fingerprints, then asked to press his right hand thumb on the stamp pad and then to the paper to transfer the fingerprint impression by rolling the thumb on paper from outward to inward in such a way as to obtain an impression of whole tip, details such as sex, age were noted after taking finger prints. Their blood group were recorded from university student files. The fingerprint patterns loops, whorl and arches were studied with the help of a magnifying lens and were identified as: Loops, Whorls and Arches based on the appearance of ridgelines according to Henry's system of classification. The distribution of dermatoglyphic fingerprint patterns in right hand thumb of individuals and its relationship with different ABO and Rh blood groups and gender were evaluated and statically analyzed by Chi square test.

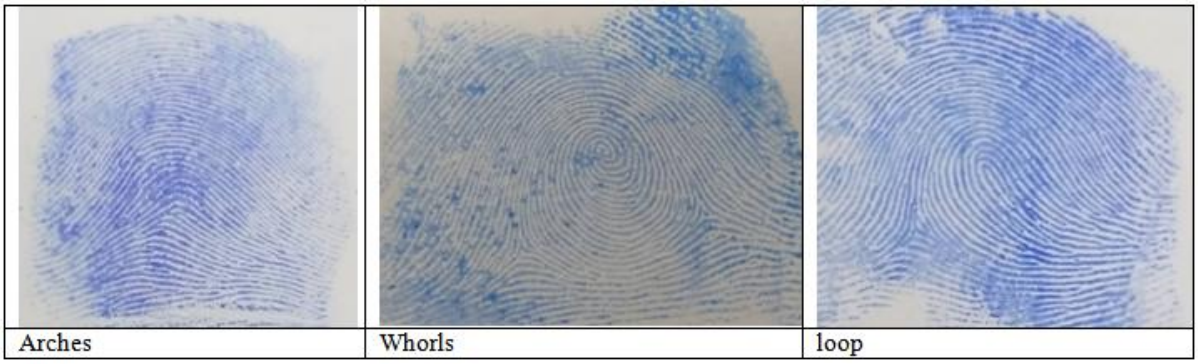

Figure 1: three primary types of fingerprint patterns

III. RESULTS

In this study, of the 480 student participated, 52.08% were females while 47.91% were males. The dominant ABO blood group in the population was group O (38.33%), followed by group A (33.33%), group B (20.41%) and then AB group (7.91%) as showed in table 1

Table 1: Distribution of ABO blood group among males and females.

Blood group	**Male**		**Female**		**Total**	
	Frequency	Percentage%	frequency	Percentage%	frequency	Percentage%
A	73	15.20833	87	18.125	160	33.33
B	33	6.875	65	13.54167	98	20.41
AB	26	5.416667	12	2.5	38	7.91
O	98	20.41667	86	17.91667	184	38.33
Total	230	47.91667	250	52.08333	100	100
Chi-square test	0.00073					
Statistical Significant at 0.05 level	Significant *					

Maximum 448 (89.16%) subjects in the study were Rh positive, of which 204 (88.7%) was male, 224 (89.7%) was female, while only 52 (10.83%) had Rh negative. Among Rh negative individuals were equal in both genders, 26 (11.30%) for each gender as showed in table. 2

Table 2: Distribution of Rhesus blood group according to gender

Rh positive and Rh negative blood group	Male		Female		
		Percentage		Percentage	Total
Rh+	204	88.7%	224	89.7%	428
Rh-	26	11.30%	26	11.30%	52
Chi-square test	0.75013				
Statistical Significant at 0.05level	Not Significant				

In the study fingerprint pattern analyses showed that, loops were the most common pattern in the study group 282 (58.75%) 128 male and 154 female, followed by whorls 182 (37.92%), 96 male and 86 female, while arches were present in a smaller percentage (3.8%) among study sample as illustrated in Table. 3.

Table 3: Distribution of fingerprint patterns in relation to gender

Pattern of finger print	**Meal**	**Female**	**Total**
Loops	128	154	282 (60.625%)
Whorls	96	86	182 (36.25%)
Arches	6	10	16 (3.125%)
Total	230	250	480
Chi-square test	0.2103		
Statistical Significant at 0.05level	Not significant		

Table 4 shows general distribution of fingertip patterns according to ABO-Rh groups. The Loop pattern had the most numbers in all the ABO-Rh groups with whorl and arch patterns following respectively.
There was no significant association between fingerprint patterns and ABO blood group in chi square test ($P > 0.05$).

Table 4: Distribution of fingerprint patterns within ABO blood group

Fingerprint pattern	ABO Blood groups								
	A		B		AB		O		Total
	Male	Female	Male	Female	Male	Female	Male	Female	
Loops	44	53	19	43	16	6	49	52	282
Whorls	28	30	14	19	10	5	44	32	182
Arches	1	4	0	3	0	1	5	2	16
Total	73	87	33	65	26	12	98	86	480
Chi-square test	0.4746		0.2335		0.3047		0.2868		
Statistical Significant at 0.05level	Not significant		Not significant		Not significant		Not significant		

In Rhesus factor ±, loops were the most common followed by whorls and arches as shown in table 5. By calculating chi square test there is significant association between fingerprint pattern and Rhesus blood group [P >0.05].

Table 5: Distribution of fingerprint pattern within Rhesus blood group

Fingerprint pattern	**Rh of ABO Blood Groups**		
	Rh-	Rh+	Total
Loops	32	250	282
Whorls	15	167	182
Arches	5	11	16
Total	52	428	480
Chi-square test	0.01618		
Statistical Significant at 0.05 level	significant*		

IV. DISCUSSION

In regards to blood group distribution, this study showed that, maximum participants belonged to blood group O+ followed by A+, B+ and AB+. This finding is consistent with those observed by study done on Libyan population in 2016 [7,8]. This study revealed that there is association between gender and blood group type, using chi square test the differences was significant at p value > 0.05. In this study, there was significantly higher incidence of Rh+ve (89.16%) subjects in all the blood groups as compared to Rh −ve (10.80%) In this study, there was no considerable association among fingerprint patterns and ABO blood group at ($P > 0.05$). However, there is a huge association between fingerprint styles and Rhesus blood group, and between fingerprint patterns and ABO-Rhesus blood group ($P < 0.05$). This result was same result obtained by Odokuma in Nigeria in 2008 [9] In current study, loop pattern was most common dactylographic pattern (58.75%) followed by whorl (37.10%) and (3.33%) arch pattern this which agree with a study done in Malabar Medical College in India [10] also with another study done in Iraq[11]. In Rh+ individual loop pattern was dominant but in Rh- group whorl pattern was most common dactylographic pattern. This Study focusing on such topic have not been undertaken to this extent in Libyan population, and aimed to determine fingerprint patterns in relation to gender and blood groups among students of faculty of Science in east of Libya. In conclusion, the present study demonstrated that there was no significant relationship among fingerprint patterns, blood group in ABO system. However, there was significant association between Rh system and fingerprint.

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