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Cheiloscopy and Dactylography in Relation to ABO Blood Groups: Egyptian vs. Malay Populations

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***Abstract*—**Establishing association between lip print patterns and those of fingerprints as well as blood groups is of fundamental importance in the forensic identification domain. The first aim of the current study was to determine the prevalent types of ABO blood groups, lip prints and fingerprints patterns in both studied populations. Secondly, to analyze any relation found between the different print patterns and the blood groups, which would be valuable in identification purposes. The present study was conducted on 60 healthy volunteers, (30 males and 30 females) from each of the studied population. Lip prints and fingerprints were obtained and classified according to Tsuchihashi's classification and Michael Kuchen's classification, respectively. The results show that the ulnar loop was the most frequent among both populations. Blood group A was the most frequent among Egyptians, while blood groups O and B were the predominant among Malaysians. Significant relations were observed between lip print patterns and fingerprint (in the second quadrant for Egyptian males and the first one for Malaysian). For Malaysian females, a statistically significant association was proved in the fourth quadrant. Regarding the blood groups, 89.5% of ulnar loops were significantly related to blood group A among Egyptian males. The results proved an association between the fingerprint pattern and the lip prints, as well as between the ABO blood group and the pattern of fingerprints. However, further researches with larger sample sizes need to be directed to approve the current results.

***Keywords*—**ABO, cheiloscopy, dactylography, Egyptians, Malaysians.

I. Introduction

CHEILOSCOPY and dactyloscopy are adopted tools in forensic domains for identification in civil and criminal situations [1].

The fingerprint has been successfully used for decades, as it is one of the traditional, reliable and mature biometric indicators as it is unique and innate [2]. The pattern of wrinkles on the lips has individual characteristics analogous to fingerprints. Lip prints are unique and remain unchanged from birth till death [3], [4].

Controversial results have been reported about the relationship between the lip print pattern and the blood groups [5]-[7]. In addition, the relation between both of fingerprints and lip prints was studied by Srilekha et al. [8]. A previous study was conducted in Egypt in 2016 by the same authors to demonstrate the predominant lip print pattern in both Egyptian and Malaysian populations in regards to sex and ethnic origin [9]. However, studies concerned with the association between the fingerprints, lip prints patterns and blood groups are scant among the Egyptian population. In this light, the aim of the present work is to analyze the predominant blood groups, lip and finger print patterns in the study populations and to identify whether any relation among the above parameters could help forensic investigators in solving crimes.

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II. Material and Methods

The study sample was carried out on 120 adult volunteers divided into two racial groups: 60 adult Egyptians (30 males and 30 females) and 60 adult Malaysians (30 males and 30 females), in the Department of Forensic Medicine & Clinical Toxicology, Faculty of Medicine, Alexandria University. The Ethics Committee of Alexandria Faculty of Medicine approved the study, and all participants were briefed about the purpose of the research.

The participants were asked about their ABO blood group type.

III. Lip Print Collection Technique

Only lips that were free from disease and inflammation (e.g. cold sores, chapping) were included. Lips that displayed deformities, obvious scarring and other lip abnormalities were excluded from the study.

The lip prints were divided into four quadrants (UR¼upper right; UL¼upper left; LR¼lower right, LL¼lower left), and with the help of a magnifying glass, the lines and furrows of lip prints, as well as the pattern, were studied.

The lip print patterns were classified according to Tsuchihashi's classification. Lip prints were obtained from the participants and analyzed according to the predominant pattern. In addition, fingerprint collection from the right index. Then, lip prints and fingerprints patterns were compared in the two populations, and with the ABO blood groups.

IV. Method of Collecting Fingerprints

After the right index finger was cleaned with tissue paper, the subjects were asked to roll the tip of the digit across the inked surface, ensuring that the ink covered the entire pattern area. The finger was then transferred to a white paper to obtain the print. Any external pressure was avoided during the process to ensure that no smudging of prints occurs. The pattern was analyzed using a magnified hand lens. Fingerprints were classified according to [10]: loop (radial, ulnar loop or double loop), arch (plain arch or tented arch) or whorl patterns (including central pocket).

Subjects with any evidence of disease and injury of the fingertips that was likely to alter the fingerprint pattern (leprosy, scars of the fingertips, lacerations) were excluded.

V. Statistical Analysis

Data were subjected to statistical analysis using statistical package for social sciences (SPSS) version 20. Data were expressed as means±standard deviation. Comparison between the studied groups was analyzed using F-test (ANOVA) and Post Hoc test (Scheffe). P-values less than 0.05 were considered statistically significant.

VI. Results

The current study was conducted on 120 adult volunteers divided into two ethnic groups, Egyptian and Malaysian. The Egyptian group consisted of participants with ages ranging from 20 to 25 years and mean age of 22.37±1.79 years for males, and age range of 21 to 25 years and mean age of 22.37 ±1.79 years for females. The Malaysian group consisted of males aged from 21 to 23 years with a mean age of 22.0±0.74 years, while females' ages ranged from 21 to 24 years with a mean age of 22.30±0.84 years. There were no significant differences between both sexes as regard to age in the same population and even between the two populations.

VII. Lip Prints and Fingerprints Patterns

Among the Egyptian population, lip prints type II and type III were the most frequent in males (28.3% each), while type I and type V were of least incidence (2.5% for both). On the other hand, in females, type III (46.7%) was the predominant pattern and type V was the least prevalent (0.8%).

In Malaysian population, type III (41.7%) lip print pattern was the predominant one in males and type V (3.3%) was of least incidence, while type II (30.8%) lip print pattern was predominant in females and type I was of least incidence (4.2%).

Regarding the distribution of the pattern of fingerprints among both populations, the ulnar loop pattern represented the highest percentage among Egyptian males (63.3%) and females (53.3%). Plain arch was the least common in both sexes (1.7%). For Malaysian males, the ulnar loop was the most frequent (40%), while in females, both the ulnar loop and the plain whorl were the most prevalent (33.3% each). Radial loop and tented arch were the least observed among Malaysians (1.7% each).

Regarding blood groups, blood group A was the most frequent among Egyptian males and females (70% and 46.7%, respectively) followed by Group O (20% in both sexes). Among Malaysians, blood groups O and B were the most prevalent in both sexes (40% and 33.3% in males and 36.7% and 33.3% in females). Blood group AB was the least found in both populations (5% in Egyptians and 3.3% in Malaysians). See Table I.

For Egyptian males, a significant relation was observed between the lip print pattern in the second quadrant and the fingerprint ($\chi2$=22.059 and ^{MC}p=0.039). More than half of the subjects (52.6%) with an ulnar loop had a type II lip print pattern. All males with a central pocket whorl (100%) had a type IV lip print in the fourth quadrant. See Table II.

Regarding Egyptian females, 37.5% of ulnar loop was associated with type IV lip print in the first quadrant, yet the difference was not statistically significant ($\chi2$ =24.992 and ^{MC}p =0.878). In addition, 71.4% of plain whorl was related to type III in the first quadrant. See Table III.

For Malaysian population, Table IV demonstrates the statistically significant relation ($\chi2$=23.238 and ^{MC}p=0.049) for males in Q1 between both lip print and fingerprint patterns; 58.3% of ulnar loop was associated with type III lip print, again, 54.5% of plain whorl was linked to type III.

For Malaysian females, a statistical significant relation was recorded between lip print and fingerprint patterns in Q4, where $\chi2$=17.487 and ^{MC}p = 0.039 (see Table V). Ulnar loop (70%) and plain whorl (70%) were prevalent with type II lip print patterns in the 4th quadrant.

VIII. Fingerprints Pattern and ABO Blood Groups

Significant relation was recorded between the pattern of fingerprints and ABO blood groups among Egyptian males, where the percentage of ulnar loop was highest among those with blood group A (89.5%). Regarding Egyptian females, a higher percentage of ulnar loop was found among those of blood group A (43.8%), yet, no significant difference was noted. See Tables II and III.

No statistically significant difference was demonstrated for Malaysians regarding fingerprint and blood groups. For Malaysian males, ulnar loop was the most frequent among blood group O (41.7%) followed by A (33.3%). While for Malaysian females, ulnar loop was the highest among blood group O (50%) followed blood group B and group A with 30% and 20%, respectively. See Tables IV and V.

TABLE I
Distribution of Studied Populations (n=120) According to Sex and Blood Groups

	Egyptians		Malaysians	
Blood groups	**Male n (%)**	**Female n (%)**	**Male n (%)**	**Female n (%)**
A	21 (70%)	14 (46.7%)	7 (23.3%)	8 (25%)
B	1 (3.3%)	9 (30%)	10 (33.3%)	10 (33.3%)
AB	2 (6.7%)	1 (3.3%)	1 (3.3%)	1 (3.3%)
O	6 (20%)	6 (20%)	12 (40%)	11 (38.3%)
Total	30 (100%)	30 (100%)	30 (100%)	30 (100%)

IX. Discussion

Establishing an association between fingerprint patterns and those of lip prints is of fundamental importance in the forensic domain [11].

Identification of ethnic group and sex is one of the important issues facing forensic pathologists. The ability to predict specific blood groups depending on the pattern of lip and fingerprints is potentially useful in a variety of ways [8], [12].

TABLE II
DISTRIBUTION OF THE EGYPTIAN MALES (N=30) ACCORDING TO THE LIP PRINTS, FINGERPRINTS PATTERNS AND ABO BLOOD GROUPS

	Right index								p
Studied quadrant	**Plain arch (n=1)**	**Tented arch (n=1)**	**Ulnar loop (n=19)**	**Radial loop (n=1)**	**Double loop (n=1)**	**Plain whorl (n=4)**	**Central pocket whorl (n=3)**	**Test of significance**	
Q1									
I	0 (0%)	0 (0%)	1 (5.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
I'	0 (0%)	0 (0%)	5 (26.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
II	0 (0%)	0 (0%)	3 (15.8%)	0 (0%)	0 (0%)	1 (25%)	0 (0%)	χ^2= 24.992	^{MC}p=0.878
III	0 (0%)	0 (0%)	7 (36.8%)	0 (0%)	1 (100%)	1 (25%)	2 (66.7%)		
IV	1 (100%)	1 (100%)	3 (15.8%)	1 (100%)	0 (0%)	2 (50%)	1 (33.3%)		
Q2									
I'	1 (100%)	0 (0%)	3 (15.8%)	0 (0%)	0 (0%)	1 (25%)	0 (0%)		
II	0 (0%)	0 (0%)	10 (52.6%)	0 (0%)	0 (0%)	1 (25%)	0 (0%)	χ^2= 22.059*	^{MC}p= 0.039*
III	0 (0%)	0 (0%)	4 (21.1%)	0 (0%)	1 (100%)	1 (25%)	0 (0%)		
IV	0 (0%)	1 (100%)	2 (10.5%)	1 (100%)	0 (0%)	1 (25%)	3 (100%)		
Q3									
I'	0 (0%)	0 (0%)	1 (5.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
II	0 (0%)	0 (0%)	8 (42.1%)	1 (100%)	1 (100%)	1 (25%)	0 (0%)	χ^2= 19.590	^{MC}p= 0.784
III	1 (100%)	1 (100%)	7 (36.8%)	0 (0%)	0 (0%)	2 (50%)	1 (33.3%)		
IV	0 (0%)	0 (0%)	3 (15.8%)	0 (0%)	0 (0%)	1 (25%)	2 (66.7%)		
Q4									
I	0 (0%)	0 (0%)	2 (10.5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
I'	0 (0%)	0 (0%)	4 (21.1%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)		
II	0 (0%)	0 (0%)	6 (31.6%)	1 (100%)	0 (0%)	1 (25%)	0 (0%)	χ^2= 25.625	^{MC}p= 0.402
III	0 (0%)	1 (100%)	2 (10.5%)	0 (0%)	0 (0%)	2 (50%)	0 (0%)		
IV	1 (100%)	0 (0%)	5 (26.3%)	0 (0%)	0 (0%)	1 (25%)	3 (100%)		
Blood groups									
A	0 (0%)	1 (100%)	17 (89.5%)	1 (100%)	1 (100%)	1 (25%)	0 (0%)		
B	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (33.3%)	χ^2= 35.847*	^{MC}p= 0.002*
AB	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (25%)	0 (0%)		
O	0 (0%)	0 (0%)	2 (10.5%)	0 (0%)	0 (0%)	2 (50%)	2 (66.7%)		

χ^2: Chi square test , F: F for ANOVA test, MC: Monte Carlo. p: p value for relation between RT index and different parameters in the female Egyptian group.
*: Statistically significant at $p \leq 0.05$.

TABLE III
DISTRIBUTION OF THE EGYPTIAN FEMALES (N=30) ACCORDING TO THE LIP PRINTS, FINGERPRINTS PATTERNS AND ABO BLOOD GROUPS

	Right index								p
Studied quadrant	**Plain arch (n=0)**	**Tented arch (n=3)**	**Ulnar loop (n=16)**	**Radial loop (n=2)**	**Double loop (n=2)**	**Plain whorl (n=7)**	**Central pocket whorl (n=0)**	**Test of significance**	
Q1									
I	0 (0%)	0 (0%)	1 (6.3%)	0 (0%)	0 (0%)	1 (14.3%)	0 (0%)		
I'	0 (0%)	0 (0%)	1 (6.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
II	0 (0%)	0 (0%)	4 (25%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	χ2= 18.934	^{MC}p= 0.206
III	0 (0%)	0 (0%)	4 (25%)	2 (100%)	2 (100%)	5 (71.4%)	0 (0%)		
IV	0 (0%)	3 (100%)	6 (37.5%)	0 (0%)	0 (0%)	1 (14.3%)	0 (0%)		
Q2									
I	0 (0%)	0 (0%)	1 (6.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
I'	0 (0%)	0 (0%)	3 (18.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
II	0 (0%)	0 (0%)	2 (12.5%)	0 (0%)	1 (50%)	1 (14.3%)	0 (0%)	χ^2= 15.160	^{MC}p= 0.630
III	0 (0%)	0 (0%)	5 (31.3%)	2 (100%)	1 (50%)	3 (42.9%)	0 (0%)		
IV	0 (0%)	3 (100%)	5 (31.3%)	0 (0%)	0 (0%)	3 (42.9%)	0 (0%)		
Q3									
I	0 (0%)	0 (0%)	2 (12.5%)	0 (0%)	1 (50%)	0 (0%)	0 (0%)		
I'	0 (0%)	0 (0%)	3 (18.8%)	0 (0%)	1 (50%)	0 (0%)	0 (0%)	χ^2= 12.808	^{MC}p= 0.239
II	0 (0%)	0 (0%)	5 (31.3%)	0 (0%)	0 (0%)	1 (14.3%)	0 (0%)		
III	0 (0%)	3 (100%)	6 (37.5%)	2 (100%)	0 (0%)	6 (85.7%)	0 (0%)		
Q4									
I	0 (0%)	0 (0%)	1 (6.3 %)	0 (0%)	0 (0%)	1 (14.3%)	0 (0%)		
I'	0 (0%)	0 (0%)	1 (6.3%)	1 (50%)	0 (0%)	0 (0%)	0 (0%)		
II	0 (0%)	0 (0%)	7 (43.8%)	0 (0%)	1 (50%)	2 (28.6%)	0 (0%)	χ^2= 15.142	^{MC}p= 0.734
III	0 (0%)	3 (100%)	6 (37.5%)	1 (50%)	1 (50%)	4 (57.1%)	0 (0%)		
IV	0 (0%)	0 (0%)	1 (6.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
Blood groups									
A	0 (0%)	1 (33.3%)	7 (43.8%)	2 (100%)	1 (50%)	3 (42.9%)	0 (0%)		
B	0 (0%)	1 (33.3%)	4 (25%)	0 (0%)	1 (50%)	3 (42.9%)	0 (0%)	χ^2= 8.183	^{MC}p= 0.977
AB	0 (0%)	0 (0%)	1 (6.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
O	0 (0%)	1 (33.3%)	4 (25%)	0 (0%)	0 (0%)	1 (14.3%)	0 (0%)		

TABLE IV
DISTRIBUTION OF THE MALAYSIAN MALES (N=30) ACCORDING TO THE LIP PRINTS, FINGERPRINTS PATTERNS AND ABO BLOOD GROUPS

	Right index								p
Studied quadrant	**Plain arch (n=1)**	**Tented arch (n=1)**	**Ulnar loop (n=12)**	**Radial loop (n=0)**	**Double loop (n=5)**	**Plain whorl (n=11)**	**Central pocket whorl (n=0)**	**Test of significance**	
Q1									
I	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)		
I'	1 (100%)	0 (0%)	0 (0%)	0 (0%)	1 (20%)	1 (9.1%)	0 (0%)		
II	0 (0%)	0 (0%)	4 (33.3%)	0 (0%)	2 (40%)	1 (9.1%)	0 (0%)	χ^2= 23.238*	^{MC}p=0.049*
III	0 (0%)	0 (0%)	7 (58.3%)	0 (0%)	0 (0%)	6 (54.5%)	0 (0%)		
IV	0 (0%)	1 (100%)	1 (8.3%)	0 (0%)	2 (40%)	2 (18.2%)	0 (0%)		
Q2									
I	0 (0%)	0 (0%)	1 (8.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
I'	0 (0%)	0 (0%)	2 (16.7%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)		
II	1 (100%)	0 (0%)	2 (16.7%)	0 (0%)	0 (0%)	3 (27.3%)	0 (0%)	χ^2= 18.640	^{MC}p= 0.415
III	0 (0%)	0 (0%)	6 (50 %)	0 (0%)	5 (100%)	6 (54.5%)	0 (0%)		
IV	0 (0%)	1 (100%)	1 (8.3%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)		
Q3									
I	0 (0%)	0 (0%)	2 (16.7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		
I'	0 (0%)	0 (0%)	1 (8.3%)	0 (0%)	0 (0%)	4 (36.4%)	0 (0%)	χ^2= 20.889	^{MC}p= 0.113
II	0 (0%)	0 (0%)	3 (25%)	0 (0%)	5 (100%)	2 (18.2%)	0 (0%)		
III	1 (100%)	1 (100%)	5 (41.7%)	0 (0%)	0 (0%)	4 (36.4%)	0 (0%)		
IV	0 (0%)	0 (0%)	1 (8.3%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)		
Q4									
I	0 (0%)	0 (0%)	2 (16.7%)	0 (0%)	0 (0%)	1 (9.1%)	0 (0%)		
I'	0 (0%)	0 (0%)	1 (8.3%)	0 (0%)	1 (20%)	0 (0%)	0 (0%)		
II	0 (0%)	0 (0%)	5 (41.7%)	0 (0%)	2 (40%)	4 (36.4%)	0 (0%)	χ^2= 13.907	^{MC}p= 0.883
III	0 (0%)	1 (100%)	3 (25.0%)	0 (0%)	1 (20%)	4 (36.4%)	0 (0%)		
IV	1 (100%)	0 (0%)	1 (8.3%)	0 (0%)	1 (20%)	2 (18.2%)	0 (0%)		
Blood groups									
A	0 (0%)	0 (0%)	4 (33.3%)	0 (0%)	0 (0%)	3 (27.3%)	0 (0%)		
B	0 (0%)	0 (0%)	3 (25%)	0 (0%)	3 (60%)	4 (36.4%)	0 (0%)	χ^2= 13.081	^{MC}p= 0.533
AB	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (20%)	0 (0%)	0 (0%)		
O	1 (100%)	1 (100%)	5 (41.7%)	0 (0%)	1 (20%)	4 (36.4%)	0 (0%)		

χ^2: Chi square test , F: F for ANOVA test, MC: Monte Carlo, p: p value for relation between RT index and different parameters in the female Egyptian group,
*: Statistically significant at $p \leq 0.05$.

TABLE V
DISTRIBUTION OF THE MALAYSIAN FEMALES (N=30) ACCORDING TO THE LIP PRINTS, FINGERPRINTS PATTERNS AND ABO BLOOD GROUPS

	Right index								p
Studied quadrant	**Plain arch (n=2)**	**Tented arch (n=0)**	**Ulnar loop (n=10)**	**Radial loop (n=1)**	**Double loop (n=7)**	**Plain whorl (n=10)**	**Central pocket whorl (n=0)**	**Test of significance**	
Q1									
I	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (10%)	0 (0%)		^{MC}p=0.969
I'	0 (0%)	0 (0%)	1 (10%)	0 (0%)	1 (14.3%)	1 (10%)	0 (0%)		
II	0 (0%)	0 (0%)	2 (20%)	1 (100%)	2 (28.6%)	2 (20%)	0 (0%)	χ^2= 12.594	
III	1 (50%)	0 (0%)	4 (40%)	0 (0%)	2 (28.6%)	5 (50%)	0 (0%)		
IV	1 (50%)	0 (0%)	3 (30%)	0 (0%)	2 (28.6%)	1 (10%)	0 (0%)		
Q2									
I'	0 (0%)	0 (0%)	2 (20%)	0 (0%)	3 (42.9%)	3 (30%)	0 (0%)		^{MC}p= 0.662
II	0 (0%)	0 (0%)	1 (10%)	0 (0%)	1 (14.3%)	0 (0%)	0 (0%)	χ^2= 10.772	
III	0 (0%)	0 (0%)	1 (10%)	0 (0%)	1 (14.3%)	4 (40%)	0 (0%)		
IV	2 (100%)	0 (0%)	6 (60%)	1 (100%)	2 (28.6%)	3 (30%)	0 (0%)		
Q3									
I	0 (0%)	0 (0%)	2 (20%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		^{MC}p= 0.238
I'	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1 (10%)	0 (0%)	χ^2= 18.164	
II	0 (0%)	0 (0%)	5 (50%)	0 (0%)	4 (57.1%)	2 (20%)	0 (0%)		
III	2 (100%)	0 (0%)	2 (20%)	0 (0%)	2 (28.6%)	4 (40%)	0 (0%)		
IV	0 (0%)	0 (0%)	1 (10%)	0 (0%)	1 (14.3%)	3 (30%)	0 (0%)		
Q4									
I	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1 (10%)	0 (0%)		^{MC}p= 0.039*
II	0 (0%)	0 (0%)	7 (70%)	0 (0%)	3 (42.9%)	7 (70%)	0 (0%)	χ^2= 17.487*	
III	0 (0%)	0 (0%)	2 (20%)	0 (0%)	3 (42.9%)	2 (20%)	0 (0%)		
IV	2 (100%)	0 (0%)	1 (10%)	0 (0%)	1 (14.3%)	0 (0%)	0 (0%)		
Blood groups									
A	0 (0%)	0 (0%)	2 (20%)	0 (0%)	2 (28.6%)	4 (40%)	0 (0%)		^{MC}p= 0.212
B	0 (0%)	0 (0%)	3 (30%)	0 (0%)	4 (57.1%)	3 (30%)	0 (0%)	χ^2= 14.952	
AB	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)		
O	2 (100%)	0 (0%)	5 (50%)	0 (0%)	1 (14.3%)	3 (30%)	0 (0%)		

χ^2: Chi square test , F: F for ANOVA test, MC: Monte Carlo, p: p value for relation between RT index and different parameters in the female Egyptian group,
*: Statistically significant at $p \leq 0.05$.

The main purpose of this study is to establish whether any significant inter-ethnic variation related to lip print and fingerprint patterns exist amongst the populations Egypt and Malaysia.

The participants in the current study were selected in the age group 20 to 25 years, to rule out any chance of error in the interpretation of sex and race of an individual related to a specific age.

By analyzing the fingerprint pattern, the current study demonstrated that ulnar loop was predominant among the Egyptian and Malaysian populations. This agrees with the result obtained by Namouchi on the Tunisian population [13] and Bansal et al. in India [14].

Among Egyptian participants in the study, the frequency of blood group A was higher followed by group O. This is in contrast with the results declared by Bashwari et al. in Saudi Arabia, where the most common was blood group O [15]. Fayrouz et al. [16] reported that blood groups O and A were the predominant among the Libyan population.

Differences between results of various researchers may be attributed to the sample size in each study.

In the present study, blood groups O and B were of the highest percentage among Malaysians. This finding is in accordance with the study conducted by Maatoghi et al. in Iran [17], as they reported that blood group O was the most frequent followed by blood group B.

The current work revealed that the ulnar loop was the most frequent among Egyptians with blood group A, which is in accordance with the results of Fayrouz et al. [16].

While, for Malaysians, the ulnar loop was commonly associated with blood group O, a high percentage of whorl pattern was observed among individuals having blood group O, which is in partial agreement with the results of Susmiarsih et al. in Jakarta, Indonesia. In their study, the frequency of loop types (60.36%) was highest in B blood, whorl type was highest in O blood (40.45%) and arches in AB blood were higher (5.12%) as compared to other groups [18].

Bharadwaja et al. reported an association between finger print pattern and blood group among Indians, where blood group A showed more loops and blood group AB had more whorls [19]. The study conducted by Karim et al. in Saudi Arabia revealed no significant correlation between lip prints and blood groups [20].

In addition, lip print patterns do not show any correlation with ABO blood groups in the study conducted by Ashwinirani et al. [7]. The discrepancy in results obtained from different populations support the value of lip print in population identification.

A statistical significant relation was found in the present work between the lip print pattern and the finger ridge configuration. For Egyptian males, in the second quadrant, significant relation was observed between lip print pattern and fingerprint.

For Malaysian males, a statistically significant relation was reported in Q1; more than half of ulnar loop was associated with type III lip print, and 54.5% of plain whorl was linked to type III. Similarly, Adamu et al. [11] in their study on the Nigerian population, reported a statistically significant association between left thumb prints and lip prints, where loop was associated with type III lip print pattern in the first quadrant. This could be attributed to the fact the two prints have the relationship of been controlled by genetic factors.

X. Conclusion

The current study revealed an association between lip print patterns and that of fingerprints. In addition, an association was also declared between ABO blood grouping and fingerprint pattern, adding further data for identification.

XI. Recommendations

Based on the results of the present study, the following recommendations are proposed:

1) Further studies on a larger sample with different age groups are required to validate the findings of this study.
2) Similar studies need to be carried out on different races to find the pattern of lip print and fingerprint distribution.
3) Finding the relationship between lip prints pattern and fingerprint minute as well as total ridge count.

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