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Study of Fingerprint Patterns & Blood Groups among Medical Students

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Abstract: *Finger print (dactylography / dermatoglyphic) is considered as the best tool of identification. Fingerprint evidence is undoubtedly the most reliable and acceptable evidence till date in the court of law. Due to the immense potential of fingerprints as an effective method of identification an attempt has been made in thepresent work to analyze their correlation with gender and blood group of an individual. This prospective study was carried out over a period of 6 months among 300 medical students belonging to the agegroup of 18-25 of College of Medicine &Sagore Dutta Medical College, West Bengal, India. Results show that each finger print is unique; loops are the most commonly occurring fingerprint pattern while arches are the least common. Males have a higher incidence of whorls and females have a higher incidence of loops. Loops are predominant in blood group A, B, AB andO in both Rh positive and Rh negative individuals except in O negative where whorls are more common.*

KEY WORDS: *Finger Print, Dermatoglyphic, Dactylography, Identification.*

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I. Introduction:

Cummins coined the term dermatoglyphic (derma=skin + glyphs=curves) to the dermal ridge configurations on the digits, palm and sole.[1]They develop between 13th to 19th weeks of prenatal life, Faulds mentioned that the pattern of these papillary ridges remain unchanged in an individual throughout life.[2] Herschel used finger prints for personal identification in India. Galton classified the types of finger prints depending upon their primary pattern as loops, whorl and arches.[3, 4]Fingerprint patterns are genotypically determined and remain unchanged from birth till death. Fingerprints collected at a crime-scene can be used to identify suspects, victims and other persons who touched the surface, fingerprints can be used to validate electronic registration, cashless catering and library access especially in schools and colleges.

II. Materials and Methods:

After obtaining clearance from institutional ethics committee, thisprospective study was carried out over a period of six months among medical students of College of Medicine & Sagore Dutta Medical College, West Bengal, India. Total 300 students belonging to the age group 18- 25 voluntarily participated in the study. Students with permanent scars on their fingers or thumbs, with any hand deformities due to injury, birth defect or disease, those having worn finger- prints, extra, webbed or bandaged fingers, were excluded from the study.Each subject was asked to wash his/her hands thoroughly with soap and water and dry them using a towel. He/she was then asked to press his/her fingertip on the stamp pad and then to the paper to transfer the fingerprint impression. The same method was repeated for all the fingers of both hands. In this way, the plain fingerprints of all the ten digits were taken separately on the respective blocks on the same sheet of paper. Care was taken to avoid sliding of fingers to prevent smudging of the print. After the fingerprints were acquired, details such as name, sex and age were noted. The details of their blood group were noted from their college identity cards. Each subject was assigned a serial number. The fingerprint patterns were studied with the help of a magnifying lens and were identified as: Loops, Whorls and Arches and composites, based on the appearance of ridge lines according to Henry's system of classification. The distribution of dermatoglyphic fingertip patterns in both hands of individuals and its relationship with gender and different ABO and Rh blood groups was evaluated and analysed statistically.**Sex and Blood Group (Table - 1)**

Males outnumbered the females in this study, the male: female ratio being 2.4:1. Majority of cases 115 (38.33%) in the study belonged to blood group O; followed by blood group B, A and AB which were 110 (36.67%), 50 (16.67%) and 25 (8.33%) respectively.

Rh Blood Group (Table - 2)

287 (95.67%) cases in the study had Rh- positive factor, of which 108 (36.0%) each belonged to blood group O and B. 47 (15.67%) cases were having A. Blood group with Rh-positive factor and almost half this number 24 (8.0%) belonged to AB positive blood group. Most of the Rh-negative cases
7 (2.33%) were of blood group O

Table: 1 Distribution of cases according to sex and blood groups

Sex	Blood group				Total
	A	B	AB	O	
Male	35 (11.67%)	75 (25.0%)	18 (6.0%)	84 (28.0%)	212 (70.7%) Female
15 (5.3%)	35 (11.67%)	7 (2.33%)	31 (10.33%)	88 (29.33%)	
Total (n)	50 (16.67%)	110 (36.6%)	25 (8.33%)	115 (38.33%)	300 (100%)

Table: 2 Distribution of cases according to Rh blood groups. Blood

group	Rh - positive	Rh - negative
A	47 (15.67%)	03 (01 %)
B	108 (36.0%)	02 (0.67%) AB
24 (8.0%)	01 (0.33%) O	108
(36.0%)	07 (2.33%)	
Total (n)	287 (95.67%)	13 (04.33%)

Table: 3 General distributions of primary finger print patterns in all fingers of both hands

Pattern of finger print	Total	Percentage
Loops	1556	51.87
Whorls	1075	35.83
Arches	369	12.30
Total	3000	

Table: 4 Distribution of pattern of finger prints among subjects of A, B, O and Rh blood groups (n = 3000)

Type of Finger print	Blood gr. A		Blood gr. B		Blood gr. AB		Blood gr. O	
	Rh +ve	Rh -ve	Rh +ve	Rh -ve	Rh +ve	Rh -ve	Rh +ve	Rh -ve
Whorl	169	8	36	07	104	6	400	21
	(35.96%)	(26.67%)	(33.33%)	(35.0%)	(43.34%)	(60.0%)	(37.04%)	(30.0%)
Loops	255	18	579	9	125	3	528	39
	(54.26%)	(60.0%)	(53.61%)	(45.0%)	(52.08%)	(30.0%)	(48.09%)	(55.71 %)
Arches	46	4	141	4	11	1	152	10
	(9.78%)	(13.33%)	(13.06%)	(20.0%)	(4.58%)	(10.0%)	(14.07%)	(14.29%)
Total (n)	470	30	1080	20	240	10	1080	70

Table: 5 Distribution of pattern of finger prints in different fingers of both hands of subjects (n = 300 x 2) (I = loops, W = whorls and A = arches)

Individual	Blood groups											
Finger	A (n = 50x2)			B (n = 110x2)			AB (n = 25x2)			O (n = 115x2)		
	I	W	A	I	W	A	I	W	A	I	W	A
Thumb (t)	53	38	9	133	73	14	22	28	0	133	79	18
	53%	38%	9%	60.4%	33.1%	6.3%	44%	56%	0%	57.8%	34.3%	7.8%
Index (i)	41	41	18	79	75	66	16	26	8	74	91	65
	41%	41%	18%	35.9%	34.1%	30%	32%	52%	16%	32.1%	39.5%	28.2%
Middle (m)	64	20	16	141	41	38	30	18	2	128	61	41
	64%	20%	16%	64.1%	18.6%	17.2%	60%	36%	4%	55.6%	26.5%	17.8%
Ring (r)	35	61	4	73	127	20	20	28	2	65	144	21
	35%	61%	4%	33.1%	57.7%	9.1%	40%	56%	4%	28.2%	62.6%	9.1%
Little (l)	80	17	3	162	51	7	40	10	0	167	46	17
	80%	17%	3%	73.6%	23.2%	3.2%	80%	20%	0%	72.6%	28%	7.3%

Table: 6 Total finger ridge counts in A, B, O blood groups

Blood group	Total finger ridge count		Total
	Right hand	Left hand	
A	3330	3766	6496
B	6557	6873	13430
AB	1782	1637	3419
O	6011	5803	11814

III. Discussion:

The present study reveals that there is an association between distribution of finger print (dermatoglyphic) pattern and blood groups. The general distribution pattern of the primary finger print was of the same order in individuals with A, B,AB and O blood group i.e. High frequency of loops, moderate of whorls and low of arches . The same findings were seen in Rh-positive and Rh-negative individuals of ABO blood group. The correlation is more consistent for blood group A and loops, arches were more in blood group AB in present study. Tile distribution pattern in individual fingers had high frequency of loops in thumb and little finger whereas ring fingers had more whorls and index and middle fingers presented higher incidences of arches in subjects of A, B and O blood groups. Individuals of blood group AB had high frequency of whorl in thumb, index and ring fingers while middle and little fingers showed more number of loops.

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