Study of Correlation between Different Fingerprint Patterns, Blood Groups, and Social Behavior among Medical Students (Nepalese Citizens).

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ABSTRACT

Fingerprints are impressions of ridges of the finger ball, which is highly individualistic. It is a method of identification of the subject and has role in crime scene investigation and in the court of law. This non-interventional, descriptive study is conducted on medical students of the first two batches of Nepalese Army Institute of Health Sciences (NAIHS), College of Medicine of age 18-25 years over one-month duration. We have taken fingerprints and assessed behavior based on a semi-structured questionnaire and correlated the findings.

Objectives of the study were to study the pattern of fingerprint distribution in relation to blood groups and describe the social behaviors among specific fingerprint patterns. Maximum fingerprint distribution was found to be loop (52.9%), followed by whorl (30%), arch (10.8%), and composite (6.1%). A majority of them were of blood group O. The distribution pattern of the fingerprints was similar in all blood groups (i.e., high frequency of loops, followed by whorls, arches, and composite). The correlation between fingerprint patterns and blood groups either in ABO system or in Rh system is insignificant. The behavioral aspects among specific fingerprint patterns also revealed more or less similarity except with a few variables.

The study concludes loop as dominant fingerprint pattern with no relation between fingerprint pattern and blood group. Beside many common characteristics, loop pattern holders abandon leadership and are shy. Whorl pattern subjects are well determined and do not change their ideas once they present it. Arch pattern people do not like to socialize and wish to be free of work. Composite as a predominant pattern are careless people. They dislike living in a group.

(Keywords: fingerprint pattern, Nepal, correlation, blood group, behavior)

INTRODUCTION

Fingerprints are impressions of epidermal friction ridges of finger ball. Fingerprints are the method of identification using the impression made by the minute ridge formations or patterns found on the fingertips. No two persons have exactly the same arrangement of ridge patterns and the patterns of any one individual remains unchanged throughout their life.(1) Since fingerprints are highly individualistic, they are an effective method of identification of the subject living or deceased and have a role in criminal identification by comparing fingerprints at the scene of crime or in the court of law.(1,2,3,4,6). Statistically, “only once during the existence of our solar system will two human beings be born with similar finger markings” (Harper’s headline, 1910)(5).

Establishment of epidermal ridge patterns occurs from the 6th to 19th week of intrauterine life.(7) Fingerprint patterns of an individual are genetically determined and are primarily of four types; namely loop (65%), whorl (25%), arch (7%), composite (2-3%) in the whole population of world.(1,2)

In contrary, a study of finger and palmer dermatoglyphics among the Sunni Muslims of West Bengal shows predominant whorl patterns(8). Frequency of loop is also highest in Rh-positive and Rh-negative subjects of ABO

blood group except O negative where whorls predominate[4].

There is no sufficient study based on the Nepalese population regarding fingerprints; so this study will provide information regarding pattern of distribution of fingerprints and their correlation with different blood groups and behavioral patterns.

MATERIALS AND METHODS

This non-interventional, descriptive study was conducted on medical students of first two batches of NAIHS, College of Medicine with proper informed written consent. Students of age 18-25 years having clear prints and giving consent for study are included. Foreign medical students, those having deformed print and students not giving consent for study are excluded.

Among 200 students 187 met the inclusion criteria. We conducted behavioral assessments of students through input from well-known friends who stayed in the student hostel with the subject, sharing the same environment over the last three years based on semi structured questionnaire.

Blood groups of the students were taken (referencing their identity card for which they have been tested their blood group during their enrollment). Fingerprints were taken over clean white paper after washing hands with soap and water and properly drying. Interpreted blood group and behavioral findings of the students were correlated with predominant finger patterns based on majority of response (>50%). All the findings of the study were analyzed and interpreted using SPSS version 22 and MS Office Excel 10.

RESULTS

Out of 187 medical students included for the survey, 128 were male and 59 were female. Considering all ten fingertip prints of both hands (2x5x187= 1870, total prints) of all subjects, maximum patterns were found to be in the loop characteristic (991, 52.9%), followed by whorl (562, 30%), arch (202, 10.8%), and least was that of composite (115, 6.1%). The distribution frequency is in same sequence as shown by different studies but percentage distribution differs.

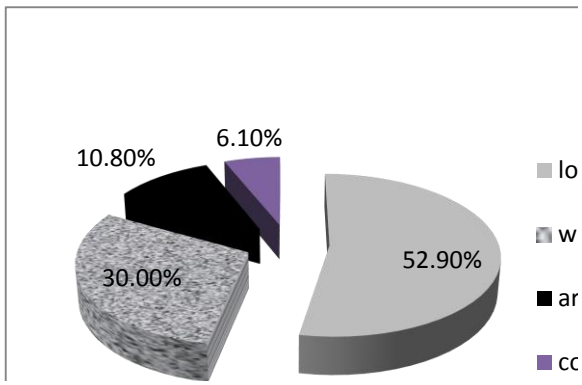

Figure1: Fingerprint Pattern Distribution among Students.

It has been found that particular type of patterns is comparatively more common in one of the genders. Though commonest pattern in both gender is loop. The loop and composite patterns are commoner in female while whorl and arch patterns have been found to be predominant among male students (Table 1).

Table 1: Fingerprint Pattern Distribution by Gender.

Type of Fingerprint	Male		Female	
	N	%	N	%
Loop	705	55.08	286	48.47
Whorls	369	28.83	193	32.71
Arch	108	8.44	94	15.93
Composite	98	7.66	17	2.88
Total	1280	100	590	100

Majority of subjects, 31.55% were blood group 'O' irrespective of sexes followed by B; 30.48%, A; 28.87%, AB; 9.0%. Similarly, among total students 181 had Rh factor positive remaining 6 were Rh factor negative (Table 2).

Table 2: Distribution of Subject According to Blood Group and Rh Factor.

ABO Blood Group Distribution			Rh Factor Distribution		
Blood Group	**N**	**%**	**Rh Factor**	**N**	**%**
A	54	28.87	Negative	6	3.2
B	57	30.48	Positive	181	96.7
AB	17	9.00	Total	187	100
O	59	31.55			
Total	187	100			

We have analyzed data through two different methods; one by distribution frequency of pattern in respective blood groups, next distribution of blood group as to respective finger patterns. Essentially each blood group has same sequence of fingerprints patterns starting with loop as most predominant through whorl, arch, with least predominant being the composite type (Table 3).

Table 3: Association of Blood Group with Finger Patterns.

Group	Loop	Whorl	Arch	Composite	Total
'A'	34	17	2	1	54
'B'	34	14	7	2	57
'AB'	11	4	2	0	17
'O'	40	13	2	4	59
Total	119	48	13	7	187

Calculated chi-square(X^2) for blood group=8.78, degree of freedom (DF)=9; since calculated X^2 < table X^2(16.92). Statistically, correlation between pattern of fingerprint and blood group seems insignificant. Among all finger print most of the subject are Rh positive (Table 4). Calculated X^2 for Rh=1.23, degree of freedom (DF) =3 since calculated X^2 < table X^2(7.82). Statistically, correlation seems insignificant.

Table 4: Correlating with Rh Factor.

Rh Factor	Loop	Whorl	Arch	Composite	Total
Rh positive	114	47	13	7	181
Rh negative	5	1	0	0	6
Total	119	48	13	7	187

Table: 5 finding of behaviour pattern

Studied Behavioural Variables	Total		Loop		Whorl		Arch		Composite	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Ready to keep company	135	52	84	35	35	13	9	4	7	0
Tries to make an effort	158	29	105	14	40	8	9	4	4	3
Tries to be a leader	88	99	50	69	25	23	8	5	4	3
Not particular about anything	110	77	71	48	26	23	7	6	5	2
Knows how to refresh	158	29	101	18	39	9	11	2	7	0
Helps people they don't know	114	73	71	48	28	18	8	5	6	1
Tell jokes/funny things	126	61	81	38	32	16	9	4	4	3
Changes idea once they present it	102	85	67	52	22	26	10	3	3	4
Worried by what they are told to do	124	63	82	37	33	15	7	6	2	5
Has a lot of friends	134	53	82	37	36	12	10	3	6	1
Interests in rituals/ceremonies	128	59	84	35	35	13	5	8	4	3
Sometimes indulges in fancies	149	38	95	24	37	11	12	1	5	2
Good at getting along with others	130	57	88	31	33	15	6	7	3	4
Wants to have parties at home	131	56	85	34	32	16	10	3	4	3
Careful when doing something	134	53	87	32	35	13	8	5	4	3
Often moves to tears by slight discomfort	50	137	27	92	14	34	6	7	3	4
Has humility	139	48	89	30	34	14	12	1	4	3
Characterized as a "loser"	67	120	43	76	15	33	5	8	4	3
Preserves despite problems	138	49	87	32	39	9	6	7	6	1
Make merry whenever delighted	155	32	99	20	37	11	12	1	7	0
Shy personality	94	93	66	53	21	27	4	9	3	4
Bursts into rage more frequently than normal	66	121	40	79	19	29	4	9	3	4
Thinks alone more than to talks with others	134	53	90	29	32	16	8	5	4	3
Doesn't like to visit someone without present	72	115	47	72	16	32	5	8	4	3
Fond of busy life	135	52	72	47	27	21	4	9	5	2

Behavioural study of the students based on Table 5 showed the overall studied population to be friendly and ambitious of life giving efforts. Most of them don't like leadership. Field of interest were not clear and single. They are helpful and know how to entertain themselves. They are flexible in decision making processes, change ideas and action which have already been decided in one specific direction. Most of them obey their responsibilities in time. They obey and observe their cultural values and taboos. Loneliness is not liked by most. They like to attend parties at their own dwelling environments. They adjust to ordinary discomforts easily. They immediately apologize after doing harm to others. Individuals are optimistic. Feelings of shyness towards the opposite gender or strangers was about fifty-fifty. They are calm minded and try to solve their problems on their own.

All loop dominated individual showed their behaviour more or less similar to total subject other than they feel a bit uncomfortable with strange and opposite gender.

In contrast to total participants, individuals with whorl dominated fingerprint patterns seem ready to take leadership when needed. They are firm in decision making process and do not change once decided to do. It seems they behave comfort with strangers, too. They seem cool minded and search for solution themselves rather asking with other buddies. Other characteristics are more or less similar to total subject population.

Arch dominated individuals seem ready to take leadership when needed. Though they seem friendly and wish to have celebration among members in own dwellings but do not like to entertain cultural ceremonies. They behave comfortably with strangers. They do not like to be busy. Other variables matched to the total participant population.

Contrast to total participants: composite pattern dominant subjects don't care what they have been told to do. Whenever they get time out of their busy life, they indulge in fancies. Other features are the same as that of total participants.

DISCUSSION

The fingerprints fall into four general classes called arches, loops, whorls, and composite. Arches are the simplest and the rarest pattern and can be plain arches and tented arches. In both types the ridge lines flow into the print from one side, rise in the middle of the pattern, and flow out to the other side of the print. Loop; the commonest pattern is formed by ridge lines that flow in from one side of the print, like a tented arch, then curve back around and flow out. Loop pattern can be radial or ulnar, depending on which side of the finger the lines enter. Whorl patterns can be plain, central pocket or double loop. The composite pattern is any pattern or combination of patterns that does not fit into any of the above classifications.

This study shows an association between distribution of fingerprint patterns, blood groups, gender and social behavior of individual with predominant pattern. The general distribution pattern of the fingerprints was of the same order in individuals with A, B, AB and O blood groups (i.e., high frequency of loops, moderate of whorls and low of arches and composite) as of the study conducted by Bharadwaja et al. [9] and Rastogi[4]. Similar findings were seen in Rh positive and Rh-negative individuals.

This study showed that the loop characteristic was more common in all blood groups which is not consistent with the findings of previous studies. Likewise, Rh positive was predominant in all patterns. We have conducted behavioral assessment of students based on semi structured questionnaire filled out by close friends of the students who are residing in hostel together for more than 2 years considering. We were unable to correlate our finding with previous studies due to an absence of any such research. We have interpreted our finding qualitatively based on majority of response ($>50\%$) and interpreted the behavioral finding of students correlating with predominant finger pattern.

CONCLUSION

The above study concludes that there is no significant relation between fingerprint patterns and blood group either in ABO system or in Rh system. We find the same order of predominant finger print pattern as in general population. The behavioral aspects among specific fingerprint patterns also reveal more or less similarity with excepts to a few parameters. Loop pattern holders abandon leadership and have shy behavior. Whorl pattern subjects have well determined personality and do not change their

idea once they have framed it. Arch pattern people are less social and do not like to live in group. They do not want busy schedule of work. Composite fingerprints as a predominant pattern tend to be more careless people. They do not prefer to live in a group. Many times they have failure in daily activities. But they are cautious regarding present which they take along with when visiting relatives.

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