



ANALYSIS AND CORRELATION OF FINGER PRINTS WITH BLOOD GROUPS AMONG PEOPLE OF VISAKHAPATNAM DISTRICT, ANDHRAPRADESH-INDIA

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ABSTRACT

INTRODUCTION: Crime scene has a specific identity, so are the criminals. Forensic medicine smells the criminal from scene of crime. It shows the role-play of criminals in the event of crime through detecting certain evidences. Finger prints are genetically inherited and are immutable from birth to death, hence considered as the best tools of identification. Literature states that there is a correlation between the physical characters and blood groups. Identification of finger prints along with the blood groups which are most common evidences in the crime areas, would drive the forensic scientist towards more reliable, accurate and definitive investigation.

AIM OF THE STUDY:

A. To Determine The Incidence Of Different Patterns Of Finger Prints Among Abo Blood Groups.

B. To Ascertain The Correlation Between Finger Prints And Blood Groups.

MATERIALS AND METHOD: The present study was carried out among 200 people aged 20-25 years in Visakhapatnam district, Andhra Pradesh using simple random sampling technique. Blood groups of all the subjects were determined in the pathology lab of the college. The finger prints were analyzed by two authors with the help of powerful hand magnifying lens. The observations were categorized accordingly and correlated with the blood groups.

RESULTS & CONCLUSION: The study disclosed higher incidence of distribution with loop pattern followed by whorl pattern in O blood group subjects. Comparing the finger prints with blood groups there was no significant correlation though the entities had their own significance when analyzed individually.

KEYWORDS : Finger prints, ABO blood groups, Dermatoglyphics, Crime

INTRODUCTION

Identity and recognition in the present dynamic world has paved importance to the society. General public are around this capricious term so are the forensic investigators. Human identification is a crucial and exigent task in forensic medicine. The purpose for identifying a person is critical for social as well as legal aspects.

Several investigatory tools like DNA profiling, iris matching, lip marks and bite marks, paternity testing, anthropometry, sex determination, dactyloscopy, estimation of age, measurement of height, post-mortem reports and differentiation of blood groups made the task effortless. In addition the most recent advancement is made through lip prints which are known as Cheiloscopy.¹

Finger Print A Constant, Individualistic, Reliable, Interesting And Unique Feature Of Human Body Is Considered As Primary Method Of Identification And Referred As Dactyloscopy. No Two Fingers Of Same Or Different Individuals Will Have The Identical Mark. These Prints Follow The Locard's Principle Of Exchange.² Finger Prints Can Effectively Be Used For Corroborative Identification Of An Individual In Mass Disasters As Well As In Other Forensic Applications. The Study Of Fine Ridge Pattern On Fingers, Palms And Soles Is Known As Dermatoglyphics (derma-skin+glypics=curves), Coined By Cummins.^{3,4}

The Different Patterns Observed Are Classified According To Henry's System Of Classification Which Includes Loops, Whorls, Composites And Arches.⁵ Examiner Must Look To The Next Level Of Detail In Pattern Type Like Specific Path Of Ridges Known As Minutiae. Other Identifying Features Such As Creases, Incipient Ridges And Shapes Of Ridge Edges Are Also Useful For Identification Purpose.⁶

Blotterogel And Blotterogel Expressed A Correlation Between Physical Characters And Blood Groups.⁷ The Blood Group System Was Discovered By Karl Landsteiner In 1901. Clinically Abo And Rhesus Groups Have Major Importance. The Abo Is Further Divided Into A, B And O Groups While Rhesus Type As Rh+ve And Rh-ve Based On The Presence Of D Antigen.⁸

Blood groups and finger print patterns have genetic inheritance. Retrieving and examination of them is non-invasive, economical, less time consuming, easy to conduct large sample studies to enhance reliability thereby validity of the investigation. Hence the present study is designed to evaluate finger print patterns, blood groups and their correlation to adjuvant the investigation team at the crime scene.

Materials And Method

The present study was carried out among 200 people aged 20-25 years in Visakhapatnam district, Andhra Pradesh. Subjects without hand deformities, injuries, permanent scars on their palms or finger tips were included in the study. The study design, protocol and purpose were explained to subjects and attained their informed consent.

The materials used for the study were blood grouping kit, magnifying lens and ink pad. Each subject was asked to clean his or her hands before the procedure is initiated and was informed to press the fingers on the ink pad then imprint on the paper to transfer the prints. Finger prints of all 10 digits were recorded separately on a single sheet with left hand finger prints on upper section depicted as 'L' and right hand finger prints on lower section depicted as 'R' for easy identification. Every effort is made to prevent the smudging of finger print.

Specific identity was given to each finger like T for thumb, I for index, M for middle, R for ring and L for little fingers respectively for both

right and left hands. After obtaining the finger prints other details such as age, sex and blood groups were noted. Blood groups of all the subjects were tested in the pathology lab of the college.

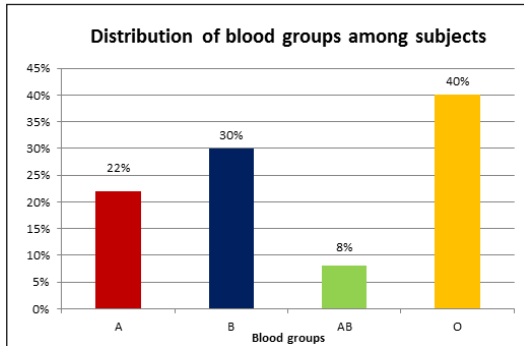
The finger prints were carefully observed by two observers to avoid bias with the help of powerful hand magnifying lens. The ridge lines that flew from one side, swept up in the centre like a tent and then curve back on the same side where they entered was classified as Loop. Similarly, as the central core was surrounded by number of ridge lines to form a circle or spiral, that pattern was classified as Whorl.

Arch was coded when the ridge lines flew from one side, rose in the middle of the pattern and flew to next side. When more than one of the above pattern was seen in the same fingerprint, it was distinguished as Composite⁹. The prints were classified and correlated with different blood groups. Variables were evaluated and analyzed statistically using ANOVA and considered significant when P value is <0.05.

RESULTS

The present study included 200 subjects from whom a total of 2000 (10 prints x 200 peoples) finger prints were obtained and analyzed.

Among 200 subjects, ABO blood groups were determined which showed a prevalence in the order of O (40%), B (30%), A (22%) and AB (8%). The dominant blood group in the study was O followed by B, A and AB blood groups. (Graph 1)

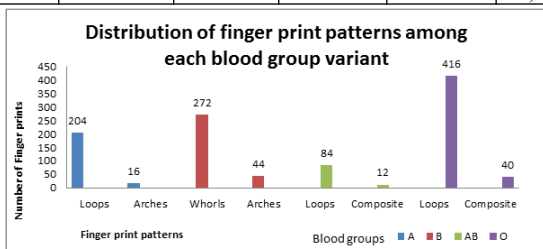


Graph 1: Distribution Of Blood Groups Among Subjects In The Study

Out of the 2000 finger prints, 940(47%) were of loop pattern, 812(40.60%) were of whorl pattern, 124(6.20%) were of arch pattern and 124(6.20%) were of composite pattern. The general distribution pattern of finger prints followed the same sequence among all the blood group with loop having higher proportion followed by whorl, arches and composite. Within blood groups, loop pattern was observed predominantly in O, A and AB blood groups whereas whorl pattern had greater proportion among B blood group. (Table 1)

Table 1. Distribution Of Fingerprint Patterns Among Different Blood Groups.

Finger prints	Blood group A=44 (22%)	Blood group B=60 (30%)	Blood group AB=16 (8%)	Blood group O=80 (40%)	Total 100%
Whorls	196(44.13%)	272(33.49%)	48(5.91%)	296(36.45%)	812(40.60%)
Loops	204(21.70%)	236(25.10%)	84(8.94%)	416(44.25%)	940(47%)
Arches	16(12.90%)	44(35.48%)	16(12.90%)	48(38.70%)	124(6.20%)
Composite	24(19.35%)	48(38.70%)	12(9.67%)	40(32.25%)	124(6.20%)



Graph 2: Representation Of Higher And Lower Proportion Of Finger

Print Pattern Among Each Blood Group Variant

Comparing higher and lower proportion of patterns among each blood group variant, loops had higher proportion among A, AB and O blood groups while whorls dominated in B blood group. Arches had lower proportions in A and B blood groups whereas composites were lower in AB and O blood groups. (Graph 2)

On correlating finger print patterns and ABO blood groups there was no significant correlation between them. (Table 2)

Table 2. Comparison Of Fingerprint Patterns Among Different Blood Groups

Finger prints	Blood groups	N	Mean	Std. Deviation	F value	P value
whorls	A	44	17.818	11.3650	0.445	0.722
	B	60	18.133	12.72716		
	AB	16	12.000	13.46600		
	O	80	14.800	11.68716		
	Total	200	16.240	11.86068		
loops	A	44	18.5456	10.47248	0.562	0.643
	B	60	15.733	12.94776		
	AB	16	21.000	11.01516		
	O	80	20.800	12.07696		
	Total	200	18.800	11.80108		
arches	A	44	1.4544	2.69680	0.409	0.747
	B	60	2.9330	5.54804		
	AB	16	4.0000	5.65684		
	O	80	2.4000	3.97888		
	Total	200	2.4800	4.34360		
composite	A	44	2.1820	3.73680	0.308	0.819
	B	60	3.2000	4.82848		
	AB	16	3.0000	3.82972		
	O	80	2.0000	3.30868		
	Total	200	2.4800	3.86632		

DISCUSSION

Finger print is an impression of the curved lines of skin at the end of finger and is unique to identify a person.¹ Certain physical characteristics and diseases can elucidate through analyzing ABO blood groups.¹⁰ Literature revealed strong association between these two physical factors through which a person's identity is determined and confirmed to investigation.

The present study revealed that among ABO blood groups, O blood group was dominant in the subjects which was followed by B, A and AB (Graph 1). Studies of Bharadwaja et al, Rastogi P et al, Shrestha R et al showed the same sequence of ABO blood groups in their studies.^{4,5,11} However studies of Ashih Tyagi, Amit patil et al, Urvik kukadiya et al, Usha Verma et al illustrated B to be the dominant blood group among their subjects.^{3,7,12,13} Though Mehta AA et al disclosed O blood group as the predominant, the other blood groups followed a sequence of A, B, AB which is in slight disparity with the present study.

Finger print patterns among different blood groups were determined, of which loop pattern predominant among all the groups. O blood group revealed majority of subjects with loop pattern followed by B, A and AB. Subsequent to the loop pattern, whorl pattern had preponderance with arches and composites having less prevalence comparatively.^{2,3,14} (Table 1) (Figure 1).



Figure 1: Finger Print Patterns

Results of the present study are in accordance with studies conducted by several authors in the literature.^{15,16,17,18} Conversely Mahajan et al, desai et al, Usha verma et al, Kshirsagar et al in their studies determined that whorl pattern was most commonly observed in O blood group.^{2,13,18,19}

Within respective blood groups, percentage of whorls was higher in only B blood group while others depicted highest loop patterns. Similar observations were made by Mehta AA et al and Shrestha et al, Sangam et al studies contradicted the present study with higher percentage of arch pattern in B blood group.^{5,15,20}

On comparing the highest and lowest percentage of finger print patterns among each blood group variant the authors found higher proportion of loops in A, AB, O blood groups while whorls in B blood groups. Arches represent lowest proportion in A, B blood groups and composites in AB, O blood groups (Graph 2).

Significant association was not observed between finger print patterns and ABO blood groups in the present study (Table 2). Bharadwaja A et al, Mehta AA et al, Deopa D et al, Usha verma et al, Amit Patil et al studies are in contrary to the present study which showed significant association between the finger prints and blood groups.^{4,7,13,17,20} However Dennis E et al, Shrestha DB et al and Shrestha R et al studies had comparable results with our study which did not show any significant association between the two physical variables.^{1,5,21}

CONCLUSION

The study emphasizes that though finger prints and blood groups enhance the authenticity of identifying a criminal individually, when collaborated could not contribute remarkable correlation. It is evident that finger prints and blood groups substantiate consistent evidence in investigation where there is sparsely any clue in exploring the crime. To enhance association between them other variables that associate finger prints to blood groups has to be evaluated. Also advanced imaging of both finger prints and blood groups using digital imaging techniques could rule out the bias in analysis which brings out accurate results and affirmation.

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