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ORIGINAL ARTICLE

FINGER PRINT ANALYSIS - A FORENSIC TOOL IN HUMAN IDENTIFICATION: A CLINICAL STUDY

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ABSTRACT:
Background: Human identification based on different features has emerged as a newer technology. The different identification tools are finger-prints, bite marks, DNA fingerprinting etc. Study of finger prints as a method of identification is known as Dactylography or Dactyloscopy. This article aims at assessing the finger print pattern among ABO blood groups in study population. **Materials & Methods:** This is a cross sectional study conducted in the department of forensic medicine in collaboration to department of physiology in year 2015. It consisted of 440 subjects which involved 200 males and 240 females. Subjects in the age range 18-26 years were included in the study. Finger print were taken on unglazed paper and analyzed into 4 types whorls, loops, composite and arches classification given by Michel & Kucken. Blood group analysis was done into A+ve, B+ve, O+ve, AB+ve, A-ve, B-ve, O-ve and AB-ve. **Results:** This study comprised of 440 subjects, males (200) and females (240). The difference was non significant (P-0.2). Loop was seen in 60% (264), whorl in 30% (132), composite in 7% (30) and arch in 3% (14). The difference among different patterns was highly significant (P-0.01). Loops were seen in 55% (110) in males and 50% (120), whorls were seen in 32% (62) in males and 29% (70) in females, composite patterns were seen in 8% (16) in males and 6% (14) in females and arch was seen in 5% (10) in males and 15% (36) in females. The difference was non significant among males and females. Maximum subjects belonged to blood group O+ve (32%) followed by B +ve (30%), A +ve (22%), AB +ve (11%). 2% subjects belonged to B-ve while 1% subjects each belonged to A-ve, AB –ve and O-ve. Blood group A+ve showed maximum of whorl pattern (270), blood group B+ve showed loop (350), blood group AB+ve showed composite (130) and blood group O+ve whorl pattern (270). Blood group A-ve showed maximum of whorl (22), blood group B-ve showed loop (34), blood group AB-ve showed whorl (20) and blood group O-ve showed whorl (16) pattern. **Conclusion:** Author concluded that finger print analysis is useful forensic tool in human identification. It aids in identification of suspect in case of crimes and mass disaster.
Key Words: DNA fingerprinting, Human identification, Loop

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INTRODUCTION

Identity is a set of physical characteristics, functional or psychic, normal or pathological that defines an individual. Human identification based on different features has emerged as a newer technology. The different identification tools are finger-prints, bite marks, DNA fingerprinting etc. Study of finger prints as a method of identification is known as Dactylography or Dactyloscopy. The word Dactylography is derived from two Greek words, daktylos meaning 'finger' and graphein meaning 'to write'.[1]

It is the study of the impressions of patterns formed by the papillary ridges on the bulbs of fingers and thumbs. It is taken with the help of printer's ink on unglazed paper.

Fingerprints are constant, remains same throughout life and individualistic and form the most reliable criteria for identification.[2] Fingerprint patterns are genotypically determined. They start appearing during third or fourth month of pregnancy. They remain even after the death of the individual, till the epidermal skin is destroyed by fire, putrefaction or is eaten by insects or other creatures.[3]

Identification of suspects, victims and other persons can be done with fingerprints collected at a crime scene. Specularity of fingerprints are that no two person can have

same finger prints. Even to identical twins can have same finger print patterns. This makes identification of suspect useful especially in crime scenes. This pattern remains uninfected by any disease process. Three main types whorl, loop, arch and composite form. Different fingers of same individual can have any pattern and that is unique for that finger.[4]

This article aims at assessing the finger print pattern among ABO blood groups in study population.

MATERIALS & METHODS

This is a cross sectional study conducted in the department of forensic medicine in collaboration to department of physiology in year 2015. It consisted of 440 subjects which involved 200 males and 240 females. All subjects were informed regarding the study in his/her language and written consent was taken. Patient information regarding name, age, sex etc was recorded in performa. Subjects in the age range 18-26 years were included in the study. Subjects with deformity of fingers and any birth defect were excluded from the study.

All subjects were asked to wash his hands thoroughly with soap and water. Blue ink was then applied on all fingers of subjects using stamp pad and asked to applied on unglazed paer by applying slight pressure. Finger prints of all ten fingers of both hands were taken on paper. Finger print pattern not possible to identify or distorted one was discarded and same procedure was repeated again. After obtaining all finger print patterns, cellophane tape was applied to prevent distortion of patterns and for keeping it safe. Finger print patterns were examined by using magnifying glass, classified, and analyzed by following classification given by- Michael and Kucken[5] into 4 types- Arches, Loops, Whorls and composite.

Blood group of all subjects was identified using "ABO" grouping using – ABD agglutinating antisera kit by arkray healthcare pvt. Ltd. Blood group was classified into A+ve, B+ve, O+ve, AB+ve, A-ve, B-ve, O-ve and AB-ve.

Data obtained was tabulated and analyzed using chi- square test. P value <0.05 was considered significant.

RESULTS

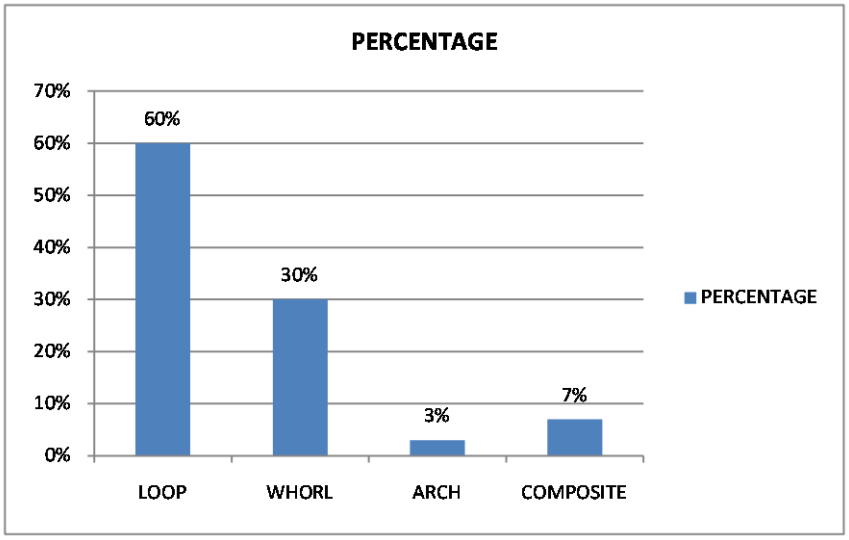
This study comprised of 440 subjects, males (200) and females (240). The difference was non significant (P-0.2). We evaluated different finger print patterns among subjects. Loop was seen in 60% (264), whorl in 30% (132), composite in 7% (30) and arch in 3% (14). The difference among different patterns was highly significant (P-0.01) (Graph I). Graph II shows distribution of finger print patterns in males and females. Loops were seen in 55% (110) in males and 50% (120), whorls were seen in 32% (62) in males and 29% (70) in females, composite patterns were seen in 8% (16) in males and 6% (14) in females and arch was seen in 5% (10) in males and 15% (36) in females. The difference was non significant among males and females. We classified subjects on the basis of blood groups. Maximum subjects belonged to blood group O+ve (32%) followed by B +ve (30%), A +ve (22%), AB +ve (11%). 2% subjects belonged to B-ve while 1% subjects each belonged to A-ve, AB –ve and O-ve. The difference was significant and depicted in table II). Table III shows distribution of finger print pattern in subjects with different blood groups. Blood group A+ve showed maximum of whorl pattern (270), blood group B+ve showed loop (350), blood group AB+ve showed composite (130) and blood group O+ve whorl pattern (270).

Blood group A-ve showed maximum of whorl (22), blood group B-ve showed loop (34), blood group AB-ve showed whorl (20) and blood group O-ve showed whorl (16) pattern.

TABLE I: Distribution of subjects

Total - 440		
Gender	**Male**	**Female**
Number	200	220

GRAPH I: Different finger print patterns



GRAPH II: Distribution of finger print patterns among males & females

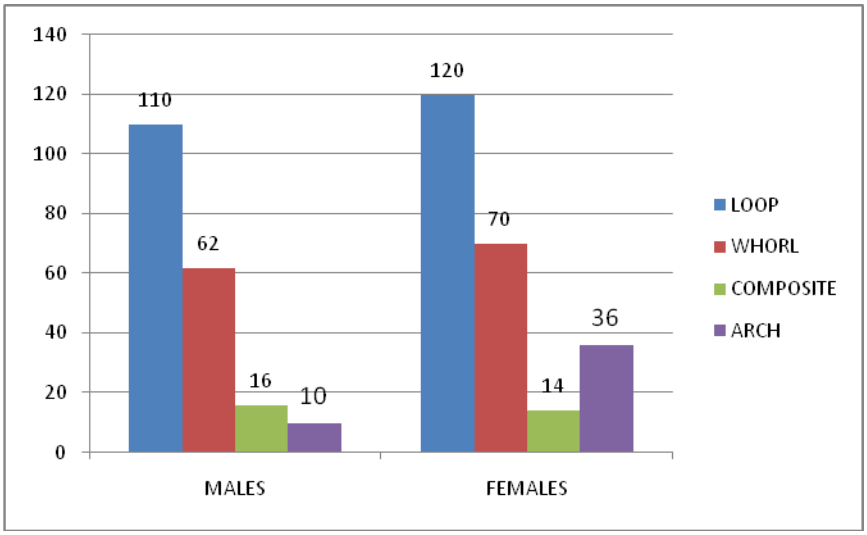


TABLE II: Distribution of subjects on basis of blood groups

Blood Groups	Rh+ve	Rh -ve	P Value
A	97 (22%)	5 (1%)	0.02
B	132 (30%)	8 (2%)	0.01
AB	49 (11%)	4 (1%)	0.03
O	140 (32%)	5 (1%)	0.01
TOTAL	**95%**	**5%**	

TABLE III: Distribution of finger prints in different blood group

Pattern	BLOOD GROUP A		BLOOD GROUP B		BLOOD GROUP AB		BLOOD GROUP O	
	Rh+ve	Rh-ve	Rh+ve	Rh-ve	Rh+ve	Rh-ve	Rh+ve	Rh-ve
Loop	250	10	350	34	125	5	350	14
Whorl	270	22	340	14	110	20	370	16
Composite	214	10	290	22	130	8	320	6
Arch	236	8	340	10	125	7	360	14
Total	970	50	1320	80	490	40	1400	50

DISCUSSION

Each human being is annotated by specific identity determinants, which makes them unique. Determining an accurate and positive identification has been the foundation for the development of forensic sciences. Though the use of dental tissues has been well documented, the role of forensic dentistry as a field to contend with has come to fore more in the past few decades. Human identification is of paramount importance.[6] Notification of family to allow for emotional closure, settlement of estates and insurance claims. Completion of official records (e.g. death certification, closure of police records). Medicolegal investigation to allow questioning of potential witnesses and known associates of the deceased, criminal and civil legal proceedings. This study aims at assessing the finger print pattern among ABO blood groups in study population.

This study comprised of 440 subjects, males (200) and females (240). We evaluated different finger print patterns among subjects. Loop was seen in 60% (264), whorl in 30% (132), composite in 7% (30) and arch in 3% (14). Similar results were obtained in study done by L.Harsha et al.[7] However Mehta et al[8] found composite in maximum number.

Loops were seen in 55% (110) in males and 50% (120), whorls were seen in 32% (62) in males and 29% (70) in females, composite patterns were seen in 8% (16) in males and 6% (14) in females and arch was seen in 5% (10) in males and 15% (36) in females. A study by Bansal et al[9] found that males showed predominance of loop pattern in

all the fingers except ring finger which showed whorl pattern in both the hands. Females showed prevalence of loop pattern in all the fingers respectively. We classified subjects on the basis of blood groups. Maximum subjects belonged to blood group O+ve (32%) followed by B +ve (30%), A +ve (22%), AB +ve (11%). 2% subjects belonged to B-ve while 1% subjects each belonged to A-ve, AB –ve and O-ve.

We analyzed finger print pattern in subjects with different blood groups. Blood group A+ve showed maximum of whorl pattern (270), blood group B+ve showed loop (350), blood group AB+ve showed composite (130) and blood group O+ve showed whorl pattern. Blood group A-ve showed maximum of whorl (22), blood group B-ve showed loop (34), blood group AB-ve showed whorl (20) and blood group O-ve showed whorl (16) pattern.

Hunasgi S et al (2014)[10] in their study, found blood Group O as predominant blood group among all the subjects. N. Srelekha et al (2014)[11] in their study concluded that loop finger print pattern were predominant among individual with O +ve blood groups. B +ve blood group showed loop finger print pattern.

CONCLUSION

Author concluded that finger print analysis is useful forensic tool in human identification. It aids in identification of suspect in case of crimes and mass disaster.

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