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Study of Fingerprint Pattern in Relation to Gender and Blood Grouping amongst the Medical Students of GMC Srinagar

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Abstract

A study was conducted on MBBS students in GMC Srinagar. A total of 100 students was included in the study of both genders. A proper informed consent was taken from participants. For collection of fingerprint, a tabulated proforma was be used. Black printers ink was used for creating an imprint by rolling the finger on ink and then on paper (rolling method) A cello tape was used to seal the print and a magnifying lens was used for aiding in observation. Imprints from all ten fingers were collected. Information about blood groups was collected from student identity card. In a few cases where the information was not known, blood grouping and Rh typing was confirmed by slide agglutination method using antiserum A, antiserum B and anti serum D. The aim of the study was to find out the correlation between gender, fingerprint and blood grouping in students of GMC. Results: We noted that majority of the subjects belonged to blood group O (37.2%), followed by B+ve(24.5%) and A+ve(23.5. Maximum subjects (97%) were Rh positive. The rest were Rh negative. Females had highest percentage of loops (44%) followed by whorls (41%). Males had the highest percentage of whorls (55.5%) closely followed by loops (39.4%).Blood group O-ve is correlated to fingerprint whorl followed by AB+ve with whorls and B+ve with loops. A+ve is correlated to whorls and O+ve with whorls and B-ve with whorls. Blood group A showed highest whorls (45.4%) followed by loops (41.25%) and arches (10.42%). Also males had predominantly whorls (44.2%) followed by loops (39.4%) and females had predominantly loops(44.29%) followed by whorls (41.7%). the purpose of this study is to correlate the relationship between various patterns of fingerprints, gender and "ABO" blood groups and "Rh" blood types in students of GMC Srinagar. Conclusion: blood group, fingerprint and gender can only be assessed independently to secure identity if an individual.

Keywords: fingerprint, ABO blood grouping, identification, gender.

Introduction

Unique identification has numerous personal, social and legal applications. There are various methods of unique identification i.e anthropometry, cheiloscopy and handwriting.

Several researchers from India and abroad have tried to establish a relationship between the fingerprints and an array of genotypic and phenotypic features in the hope that fingerprints can assist in the correct identification for medico legal reasons.[1]

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The term identity, also called sameness is defined as whatever makes an entity definable and recognizable. The various methods by which identity of a person can be known which includes DNA profiling, Iris imaging, Bite marks, Lip prints, Foot prints, Fingerprints etc. Finger print is the most unique and reliable feature of human body. For years now, it has been considered as primary method of identification of a person. No two fingerprints are alike, even in monozygotic twins.

A blood type (also called a blood group) is a classification of blood based on the presence or absence of inherited antigenic substances on the surface of RBC's. A total of 32 human blood group systems are now recognized by the International Society of Blood Transfusion. The two most important ones are ABO and Rhesus system. The ABO type is further divided into A, B, AB and O groups. The Rh type is divided into Rh positive and Rh negative based on presence of D antigens.[2]

The term dermatoglyphic was coined by Harold Cummins in 1926, which is used for the study of epidermal ridges on the non hairy parts of palm, fingers, toe and soles. He found that the configuration of ridge pattern are determined partly by heredity and partly by accidental or environmental influence, which produce stress and tension in their growth during fetal life. It has been accepted and adopted internationally. It is based on the principle that the individual peculiarities of the patterns formed by the arrangements and distribution of the papillary or epidermal ridges on the fingerprints are absolutely constant and persistent throughout life, from infancy to old age, and the pattern of two hands do not resemble each other. Even the fingerprints of twins are not similar. The pattern of dermal papillae determines the early development of the epidermal ridges. Early in the fetal period, proliferation of the corium forms papillary projections into the epidermis forming papillary ridges. The pattern of papillary ridges in the hands is complete by 11^{th} to 24^{th} weeks of gestation. These features once formed remain permanent throughout the life of an individual except in their dimensions, to commensurate the growth of an individual post nataly.[3]

Blood group system was discovered by Karl Landsteiner. A blood type also called blood group is a classification of blood based on presence or absence of corresponding antigens in plasma. Rhesus system is classified into Rhesus positive and Rhesus negative according to the presence and absence of D antigen.[4]

Some of the earliest works on the use of fingerprints for personal identification were carried out in India more than a century ago. With an ever increasing population and limited resources, the incidence of various types of crimes are increasing, yet tools available for crime detection seem not to be increasing considerably to counteract the erupting challenges. Most of the times fingerprints and blood samples are the only evidences at the place of crime.[5]

Fingerprints are temporary or permanent impressions of the curved lines of skin at the end of a finger that is left on a surface. Each fingerprint has a unique characteristic, mark or pattern that enable us to identify one particular human.[6]

The present study deals with the correlation of fingerprints with blood group. Various studies have been conducted which show the correlation between blood group and fingerprint. So if we obtain blood stain from the crime scene which can be further matched with stain from crime scene which can be further matched with the fingerprint which is already available in the crime branch records so as to catch the accused.

Aim and objectives

1. To find the relationship between fingerprints and ABO blood grouping
2. To identify the relationship between fingerprint and gender of a person

Materials and Methods

A total of 100 students were included in the study of both genders. A proper informed consent was taken from participants.

For collection of fingerprint, a tabulated proforma was be used. Black printers ink was used for creating an imprint by rolling the finger on ink and then on paper (rolling method) A cello tape was used to seal the print and a magnifying lens was used for observation. Imprints from all ten fingers were collected.

Information about blood groups was collected from student identity card. In a few cases where the information was not known, blood grouping and Rh typing was confirmed by slide agglutination method using antiserum A, antiserum B and anti serum D.

Exclusion criteria:

1. Individual with any deformity like permanent scars on fingers which maybe congenital or acquired.
2. Individuals suffering from any chronic skin disease.
3. Individuals with deformed fingerprints or bandaged fingers.

Inclusions criteria:

1. Students of GMC Srinagar of age group 18-25 years.
2. Subjects should be cooperative and readily give valid consent to participate in the study.
3. Participants having fingertips free of disease and deformity.

Results

For the purpose of data collection, we approached a total of 105 students, of which three didn't give consent and two had a deformity and hence were excluded from the study.

Table 1 shows correlation of age with gender. Maximum females being of age 22 (50%) and males 43% at age of 22.

Table no 1: shows correlation of gender with age in participants

Age	female	male	Total
20	3.57	2.17	2.94
21	3.57	21.74	11.76
22	50	43.48	47.06
23	32.14	10.87	22.55
24	5.36	6.52	5.88
25	5.36	15.22	9.88

Table 2 shows prevalence of each blood group in sample size. O+ve being the most prevalent (37.25%) and O –ve being the least common

Table no 2: shows prevalence of different blood groups

Blood group	Percent
A+ve	23.53
AB+ve	9.80
B+ve	24.51
B-ve	1.96
O+ve	37.25
O-ve	2.94

Table no 3 shows prevalence of different fingerprint types. Whorls being the highest(47.99%) and composite the least(2.45%)

Table no 3: shows percentage of different types of fingerprints

N	Percent
Whorl	47.99
Loop	42.1
Arch	7.46
Composite	2.45
Total	100

Table no 4 shows correlation of each blood group with the fingerprint type

Table no 4: shows correlation of blood group with fingerprints

Blood group	whorls	Loop	Arch	composite	Total
A+ve	45.4	41.25	25	7	240
AB+ve	67	26	4	3	100
B+ve	37.3	53.4	5.62	3.61	249

Blood group	whorls	Loop	Arch	composite	Total
B-ve	16	3	1	0	20
O+ve	47	43	8.1	1.5	380
O-ve	83.3	13.3	3.3	0.0	30
Total	47.99%	42.10%	7.46%	2.45%	1019

Person chi2 (15)=59.8853 Pr=0.00

O-ve is correlated to fingerprint whorl followed by AB+ve with whorls and B+ve with loops. A+ve is correlated to whorls and O+ve with whorls and B-ve with whorls.

Discussions

The present study has been conducted on the medical students of GMC Srinagar to correlate fingerprints, gender and ABO typing as to whether the following parameters can be assessed independently to secure the identity of an individual.

In the present study we noted that majority of the subjects belonged to blood group O (37.21%) followed by B +ve (24.5%) and A+ve (23.5%) respectively.

Results are consistent with Sudikshya KC [2017][3] which shows the similar incidence of blood groups as O (96%) followed by B+ve (95%) and A+ve (71%).

Similar results were reported by Bhardwaja et al [2004][7] and Prateek and Pillai[2010][8].

In this study there was significantly higher incidence of Rh positive subjects (97%) as compared to Rh negative which is only 3%. The present study is consistent with Sudikshya KC [2017][3] study.

In the present study, females had higher incidence of Loops (44%) followed by Whorls (41.7%) while in male whorls show higher incidence (55.56%) followed by Loops (39.43%).

Similar to our study, Narahari et al [2006][11] observed the highest frequency of whorls (47.07%) in males and loops (60%) in females among the Khond community of AP.

In present study, it was observed that the percentage of whorls (47.11%) was highest in blood group O+ve and lowest is B-ve (16.1%). Present results were nearly consistent with Shashikala and Ashwini study [2010][10].

While highest incidence of Loops is also seen in O+ve (43.16%), blood group with lowest in B-ve. Our study is slightly consistent with A.A Mehta study[2011][9] who reported highest incidence of Loops in blood group O (61.80%) while least percentage in blood group AB which is contrary to present study.

In present study the incidence of Arches is highest in O+ve and least in O-ve and B-ve. Results are consistent with Sudikshya KC (2017) study as it shows highest incidence of Arches in blood group AB and lowest in blood group A.

In present study, the incidence of Whorls is highest (47.99%) followed by Loops (42.10%) and Arches (7.46%).

Our study shows that majority of blood groups are correlated to fingerprint Whorls out of all blood groups O-ve possesses 83.3% Whorls followed by AB+ve (67), O+ve (47), A+ve (45.4%) and least B-ve (16).

Recommendations

A database of fingerprints and blood grouping should be created for all the criminals especially the ones with persistent criminal record so that these identification tools can be put to their best use as evidence to trace the offender.

Training and workshop of medical and police personnel should be conducted to highlight upon importance of collection of samples of fingerprints and ABO blood grouping in dead bodies and from scene of crime so that trace evidences located at scene of crime can be cross matches to victims accused for legal purpose.

Ethical clearance: The present study was approved by institutional ethical committee GMC Srinagar in 2021.

Conflicts of interest: none

Source of funding: self

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