

Comparative Study of Dermatoglyphics among the students of Ziauddin University

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ABSTRACT

Objective: To determine the distribution of finger print pattern among students of Ziauddin University belonging to different ethnic origins specifically pertaining to different ABO blood groups and also to correlate any relation between fingerprint pattern with ethnicity and ABO blood groups.

Study Design: Cross sectional study.

Place and Duration of Study: This study was conducted at Ziauddin University Karachi from 1st Jan. 2010 to 30th June, 2010.

Materials and Methods: This comparative study was carried out at Ziauddin University Karachi. 250 students, 50 students each from 1st year to 5th year were included by simple random technique. Students within age range of 19-24 years, belonging to any gender, ethnic group or any ABO blood groups were included in this study. Students suffering from eczema, chronic dermatitis, leprosy were excluded from study. Also students with permanent scars on their fingers and thumbs and deformities on finger either due to acquire or congenital traumas were also excluded. Fingers prints of both hands including thumbs were taken on a plain paper with a stamp pad by plain method. ABO Blood grouping of each student was performed. A Performa was made in which name, age, gender, ethnicity, type of blood group and type of finger print pattern were tabulated.

Results: 138 students were males and 112 were females with ratio of 1:2:1. Age range was between 19-24 years. Loop pattern were predominant (48.8%), followed by whorl pattern (32%) and then arch (19.2%). Blood group B was most frequent (47%), followed by O group (27%), A group (18.8%) and AB Group (6.8%) respectively. Applying chi square test the p value obtained in variables i.e. finger prints with blood groups and fingerprints with ethnicity, no significant correlation was found.

Conclusion: No significant association was found in types of finger prints with ABO blood groups and type of ethnic origin respectively. This study requires to be done at larger scale with larger sample size representing true indicator of population.

Key words: Finger prints, Dermatoglyphics. ABO Blood Groups.

INTRODUCTION

Dermatoglyphic is a term applied to the study of patterns of the surface of hands and feet.¹ This science is very old and has been used by Chinese as a signature few thousand years ago.² A fingerprint is an impression of the friction ridges of all part of finger. A friction ridge is a raised portion of the epidermis on the digits or on the palmer and planter skin, consisting of one or more connected ridge units of fraction ridge skin. Fingerprints may be deposited due to natural secretions from exocrine glands present in friction ridge skin.³ Fingerprint patterns are genetically determined and remain unchanged from birth till death.⁴ Fingerprints develop, between approximately 13th and 18th week of gestation and in the absence of trauma, remain essentially unchanged throughout life.⁵ The types of fingerprint are unique, based on the genital characteristics of each individual. After extensive studies, researchers have recently found that the a palm print is some what related with nationality, geological distribution, character, temperament, health and intelligence.¹ There are three basic finger print patterns;

Arch, Loop and whorl.⁶ Arch can further be classified into tented and loop arches with further subdivisions into Radial and ulnar variety. The plain whorls type is divided into five sub groups – simple, central packed loop, twinned loop, lateral packed loop and accidental.⁷ The pattern area is the part of a loop or whorl which contains the core delta and ridges. Total finger ridges count is the most inheritable feature in dermatoglyphics. It is related to two different timed events, the timing of onset of volar pad regression versus the timing of the onset of primary ridge formation. It is also affected by the external factors like, diet, chemical intake of mother, hormone levels and radiation levels.⁹ The most common pattern, a simple loop (60-70%) is characterized by single triradius, is not advantageous for tactile perception and precession group. Whorl has two triradi yielding two central, while simple arches have no true triradi, resulting in zero count.^{1,10,11} In recent years digital dermatoglyphics has been found useful in Forensic Medicine especially in identification purposes.⁵ It is also useful in medical diagnosis of genetically inherited diseases and in detection of crimes. Finger prints collected at a crime

scene can be used to identify perpetrator of crime, victims and other persons who touched the surface. Fingerprint scans can be used to validate electronic registration, cashless catering, library access especially in schools and colleges and office attendance. The secretions in the fingerprints contain residues of various chemicals and metabolites which can be detected and used for the forensic purposes.³ A considerable improvement has been achieved in the concept of relation between the type of patterns of lines on the fingers and some individual disorders.^{8,9,10,11} Thus this study was aimed at determining and establishing the dermatoglyphic pattern among the students of Ziauddin University belonging to different ethnic groups and determining (association) in pattern of fingerprints with type of blood group and ethnicity.

MATERIALS AND METHODS

This comparative study was conducted on the Medical students of Ziauddin University, Karachi 50 students each were taken from 1st year M.B.B.S to final year M.B.B.S were included in this study. The study design was cross-sectional study students were selected by simple random technique.

Inclusion Criteria

1. Students of either sex from 1st -5th year M.B.B.S enrolled in Ziauddin University, Karachi.
2. Subjects belonging to any ethnic group.
3. Subjects belonging to any ABO blood group.

Exclusion Criteria

1. Students suffering from any chronic skin disease e.g. eczema, leprosy and chronic dermatitis
2. Students having scars, congenital or acquired anomalies due to trauma on fingers were excluded from this study.

A Performa was designed in which data including name, age, gender, ethnicity, and ABO blood groups were entered. Impression of all fingers and thumbs of both hands were taken. The impressions were taken by simple plain and rolling method. Screening of finger prints were done by using magnifying lens and scanner. Students were divided into five groups (1st year M.B.B.S to 5th year M.B.B.S) according to their class. Each group was further divided according to gender, ethnicity, and blood group and type of finger print pattern. Ethical review committee guide lines were followed.

Statistical analysis of the data was done using SPSS version 11. Being and observational study descriptive statistics were used for determining frequency of types of finger prints and proportion of ethnicity and ABO blood group with each type of finger prints. Chi square test was used. P value >0.05 was considered significant.

RESULTS

There were total of 250 students with 138 males (55%) and 112 females (45%) with male to female ratio of

1:2:1. The age range of subjects was from 19-23 yrs. The most prevalent pattern in this study was loop 48.8% followed by whorl 32% and then arch 19.2% as shown in table No.1. In the types of blood groups Antigen B was the most frequent type 47% followed by O antigen 27%, A antigen 18.8% and AB 6.8% respectively as shown in Table No 1. The blood group B was most common 28.4% in people who have loop type of finger print pattern followed by O group and A group respectively. Similarly in whorl type of finger print pattern B group antigen was most common but peoples who have arch type of finger print blood B and O antigen are equally common as shown in Table No 1. When the dactyl glyphic patterns were studied with relation to the ethnicity among people of Karachi no significant association was found as shown in Table No 2. The loop pattern was most common in all the Ethnic groups' i.e. Punjabi, Pathan, Balochi, Sindhi and Urdu speaking followed by whorl and arch type of patterns respectively.

Table No. 1: % age of different blood groups in finger prints.

Finger-prints types	Blood group types							
	A		B		O		AB	
	N	%	N	%	N	%	N	%
Loop	16	31.4	71	61	31	45	4	31
Whorl	20	39.2	30	26	22	32	6	46
Arch	15	29.4	16	13	16	23	3	23
Total	51	100	117	100	67	100	13	100

Using chi square test p value 0.98

Table No. 2: %age of different finger prints in Punjabi, Pathan, Balochi, Sindhi and Urdu speaking

Ethnicity	Type of Finger printing					
	Loop		Whorl		Arch	
	n	%	n	%	n	%
Punjabi	36	28	27	35	14	31.11
Pathan	20	16	7	9	5	11.11
Balochi	8	6	3	4	2	4.44
Sindhi	22	17	17	22	5	11.11
Urdu Speaking	42	33	23	30	19	42.22
Total	128	100	77	100	45	100

Using chi square test p value is 0.95

DISCUSSION

Dermatoglyphics is a scientific method for anthropological, medico legal and genetic studies. The role of fingerprint patterns is of particular importance in forensic sciences. The fingerprint patterns are unique to every individual and have been used in identifying individuals in air crashes and mass disasters. Also these

patterns play an important role in detection of criminals by matching finger prints collected from scene of crime. In this study the most common prevalent pattern is loop followed by whorl and arch respectively. These studies are largely in conformity with studies done previously, one national and some international studies on this subject.^{10,11} Where as in another study done in Karachi, whorl pattern is predominant 48% followed by loops 42.5% and then arches 4.8%¹², which is similar to the study results done in India.³ A change in external environment is not a factor which might be attributed to this difference of pattern as has been suggested by some studies.¹³ The difference in results of these two studies of Karachi suggests that a study should be conducted with larger sample size indicating true representative of population in Karachi. Further there is an imminent need that this study should be conducted at national level which would represent the true incidence of finger print patterns in Pakistan. It is imperative to state a data based bank having full record of fingerprint pattern and foot print pattern along with bio data of all the new born be established which would be of great help in identification purposes and in detection of suspect from scene of crime. The most frequent blood group antigen is B followed by O, A an AB respectively. These results are in conformity with studies in other parts of Pakistan.^{14, 15, 16, 17} where as in study in India O blood group is the most prevalent group.^{3, 18} There is divergence in the results of studies in India when the association in variables i.e. types of finger print patterns and types of ABO blood were studied. In one study whorl were common in AB blood group while in another study whorls are common in subjects having O blood group.^{3,18,19} When the correlation between the two variables i.e. blood group types and types of finger print pattern were tabulated using chi-square test, the P value obtained was 0.9856124 which is insignificant. Studies from other parts of the world also show no such linkage.²⁰ There had been no statistically significant difference of ABO distribution of blood groups among various ethnic groups except that blood group B is most common in Arian group. The reason for such type of results might be due to sampling fluctuation, or the sample size is not adequate, sampling error or these two variables are independent and do not effect each other. Similar studies should be conducted on a larger sample size so as to increase the accuracy of prediction. Another reason put forward is since fingerprint asymmetry has a significant hereditary component, but there is no increased or decreased asymmetry in subgroups of any admixture, this suggests that genetic adaptation in humans involves the species as a whole and not based on racial groupings.²¹ The disparities may be due to environmental factors as has been reported they gets influenced by environmental, physical and topological factor.¹

Fingerprint patterns are related to genetic predisposition to various disorders. In one study it was found that in absence of risk factors for myocardial infarction dermatoglyphic pattern study can help in detection of patients susceptible to infarction.^{7, 22} similarly with the help of dermatoglyphic patterns bronchial asthma and its genetic predisposition can be detected. Similarly digital dermatoglyphic patterns are governed by polygenes with additive effect (without dominance) which may be autosomal.²³ Thus it is proven that fingerprints are closely related in predicting familial disorders. There is a need that dermatoglyphic patterns should be studied with autosomal and hereditary disease and their genetic predisposition may be found.

CONCLUSION

No significant association was found in types of finger prints with ABO blood groups and type of ethnic origin respectively. This study requires to be done at larger scale with larger sample size representing true indicator of population.

Recommendations

1. Birth records with palmer and foot prints may be maintained in data base bank at national level.
2. For consistency of results a study at national level be conducted to find exactly which of the patter are prevalent and their incidence.
3. Dermatoglyphic patterns should study in relation to genetic and hereditary diseases and their genetic predisposition be researched.

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