

Prevalence of Palm-Print Patterns and their Association with ABO Blood Group

Ravindrakumar Boddeti¹, Dr. Vimal Modi²,

¹PhD Research Scholar, Department of Anatomy, Index Medical College, Hospital & Research Centre, Indore (MP) Malwanchal University.

²Professor and Head, Department of Anatomy, Index Medical College, Hospital & Research Centre, Indore (MP) Malwanchal University.

Corresponding Author: Ravindrakumar Boddeti

Abstract

Introduction: Dermatoglyphics is the science that deals with studying the epidermal ridges found on the surface of the palms, fingers, soles, and toes. The fingerprints develop in relation to the volar pads which are fully developed during the third to the fifth month of the foetal life and once formed never change in the life of an individual. The study of fingerprints is constant and individualistic and is a biometric method that it can be used to identify humans according to the ABO blood group and thus can be useful in forensic medicine and identification purpose. Fingerprints collected from the crime scene and from the items of evidence of crime have been successfully used to identify suspects, victims or any other person who had touched the surface in question.

Material and Methods: This is a Prospective, Observational and case-control study conducted in the Department of Anatomy and Medicine, Index Medical College over a period of 2 Years. All healthy individuals 18-65 years of age both Gender. Many methods are employed in dermatoglyphic study. The dermatoglyphic patterns remain unchanged from birth and are under genetic control. Gouard Bidloo gave an account of detailed drawings of employed are the standard ink method, inkless method, transparent adhesive method and photographic method. Some of the methods: Standard ink method was first used by Cummins and Bidloo¹³. The same method of ink method was employed in this study.

Results: Percentage of loops was highest in O blood group (42.05%) and lowest in AB blood group (11.2%) Similarly, it was observed that percentage of whorls was highest in B blood group (27.87%) and lowest in AB blood group (16.16%). Also, percentage of arches in B blood group was highest (30.9%) as compared to lowest in AB blood group (10.5%). The thumb, middle and little fingers of A, B and O blood group showed high frequency of loops i.e. Blood group A (t-214, m-245 and l-328); blood group B (t-309, m-254 and l-376%) and blood group O (t-398, m-315 and l-312). Whorls were more in ring fingers (blood group 'A' 262, 'B' 276 and 'O' 399). Total Finger Ridge Counts (TFRC) In Different Blood Groups. TFRC was highest in blood group B (14550) followed blood group O (12256). In blood group A the TFRC was about half (8312) and in blood group AB it was about one fourth (4578) of the number of counts in blood group B and O. TFRC was almost equal in both hands.

CONCLUSION: Our research established no specific relation between fingerprint patterns and ABO blood groups of the subjects. So, we concluded that there exist no relation between finger impression of an individual and blood group. Hence it does not aid for personal identification.

Keywords: ABO Blood Group, Palm-Print Patterns, Dermatoglyphics.

Introduction

Dermatoglyphics is the science that deals with studying the epidermal ridges found on the surface of the palms, fingers, soles, and toes. The fingerprints develop in relation to the volar pads which are fully developed during the third to the fifth month of the foetal life and once formed never change in the life of an individual.^[1] Any abnormalities due to genetic or other factors express their effect before the end of the fifth month of foetal development.^[2]

Dermatoglyphics are constant and idiosyncratic even in monozygotic twins from birth till demise. Fingerprint is personal identification of a human being.^[3] Fingerprint are helpful in medico-legal case for recognition of suspect, victims and another person who touches the surface and for the diagnosis of inheritable disease. Fingerprint scans also used in digital mission of India, biometric, validate electronic registration, cashless, library access, and forensic purpose.^[4]

The interesting story of the development and use of fingerprints in the last hundred years will only be properly appreciated if the reader is informed with some knowledge of dactyloscopy; therefore I will briefly outline the basic details of this science.^[5] The inside surfaces of the hands from fingertips to wrist and bottom surfaces of the feet from the tip of big toe to the rear of the heel contain minute ridges of skin, with furrows between each ridge.^[6]

Fingerprint is a mark impression, it is a sign received from a person. It is most commonly used to deals with the criminal cases. Fingerprint is a impression left by the friction ridges of human finger. These are different characteristics of each individual.^[7] It moisture and grease on a finger result in fingerprint on surfaces. Fingerprint are unique patterns made by friction marking which appear on the line of the thumb and fingers. Prints from palms ,toes and feet are also Seened. These are used frequently for identification in criminals.^[8]

We can get these prints even if we want them where. When we touch a place ,it causes my fingerprint to fall off. Fingerprints are increasingly being used in crime investigations .As part of this, a variety of techniques are used. Not only that, scientist are finding different types of technique to detect fingerprints.^[9] Criminal have a special kind of ability to hide the print. The fingerprint of each person's off is different there is a big difference between the print of an ill person. There is a lot of difference. you can see different friction ridges line, different shape and sweat pores. Even if the skin on our hand is broken, then skin comes backs to us, so is the fingerprint.^[10]

The study of fingerprints is constant and individualistic and is a biometric method that it can be used to identify humans according to the ABO blood group and thus can be useful in forensic medicine and identification purpose. Fingerprints collected from the crime scene and from the items of evidence of crime have been successfully used to identify suspects, victims or any other person who had touched the surface in question.^[11]

According to recent study asserted that blood group O is associated with more loops and less whorls than blood group A. Herch^[12] found high frequency of loops in blood group A. Recently in India in their study on Gowda Saraswat Brahmin community of south Kannada district (Karnataka) reported high frequency of loops with moderate whorls and low arches in the individuals of A, B and O blood group. They also found significantly greater number of loops in Rh-Positive and whorls in Rh-negative subjects in their study total finger ridge count (TFRC) were higher in blood group A.

Material and Methods

This is a Prospective, Observational and case-control study conducted in the Department of Anatomy and Medicine, Index Medical College over a period of 2 Years. All healthy individuals 18-65 years of age both Gender.

Many methods are employed in dermatoglyphic study. The dermatoglyphic patterns remain unchanged from birth and are under genetic control. Gouard Bidloo gave an account of detailed drawings of employed are the standard ink method, inkless method, transparent adhesive method and photographic method.

Some of the methods: Standard ink method was first used by Cummins and Bidloo¹³. The same method of ink method was employed in this study.

The materials used in this study were:

1. White paper
2. Sponge rubber
3. Black duplicating ink, (Bombay, Kores)
4. Slab for metal inking or glass
5. Scale
6. Pencil
7. Magnifying lens
8. Needle used for counting of ridges.
9. Protractor for measurement of angle.

Steps taken in recording the finger ridge patterns:

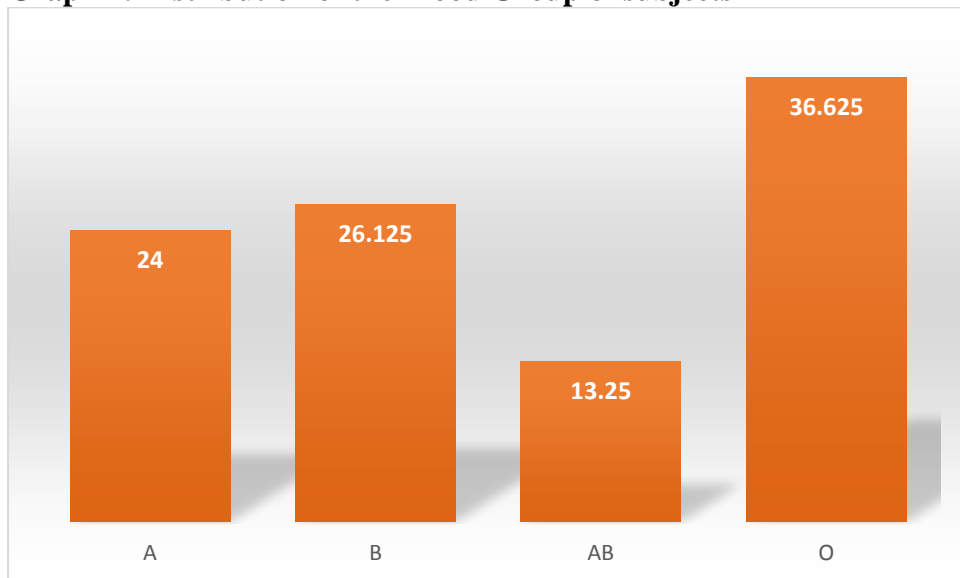
1. Before starting the procedure, the hands of the cases and controls were thoroughly cleaned with soap and dried completely.
2. The palm and the palmar surface of the finger were then fully dabbed with black duplicating ink. Care to be taken to apply the optimal quantity of ink.
3. Then the ink is uniformly spread over the palm and fingers including the hollow of the palm.
4. Then the uniformity of the ink is thoroughly examined, if certain areas are left out, ink is spread into that area using cotton balls.
5. Firstly, the right hand is pressed from proximal to distal aspect, starting at inter metacarpal groove onto the root of the fingers and also on the thenar and hypothenar areas on the dorsal side. Then, the hand is lifted from the paper from distal to proximal aspect. Rolling of the fingers is done to record the finger prints from radial to ulnar side.
6. The same procedure is repeated on the left side.
7. The sheets are immediately encoded with name, age and sex for case and control groups.
8. The prints are then subjected to detailed dermatoglyphic analysis.
9. The analysis is then done with magnifying hand lens.
10. The ridge counting is done with a sharp needle.

RESULTS

Graph 1: Distribution of Gender of subjects

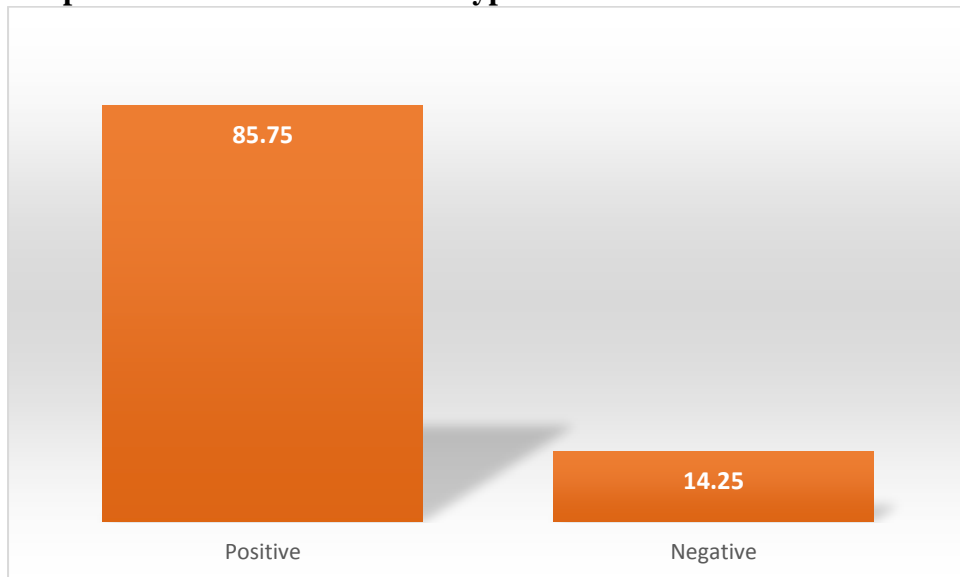
In **Graph 1**, of the 800 samples, 487 were males and 313 females, which correspond to 60.87% of male and the rest female.

Graph 2: Distribution of the Blood Group of subjects



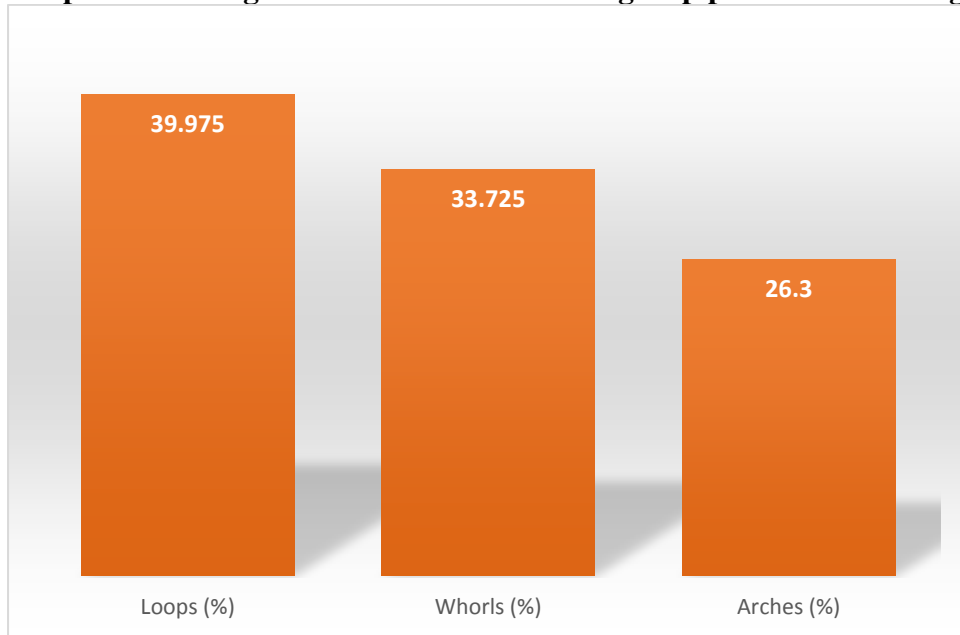
In our study, the most of subjects had „O“ Blood Group 36.62% (n =293) and least were AB Blood Group 13.2% (n = 106) in **Graph 2**.

Graph 3: Distribution of the Rh Type of blood donors



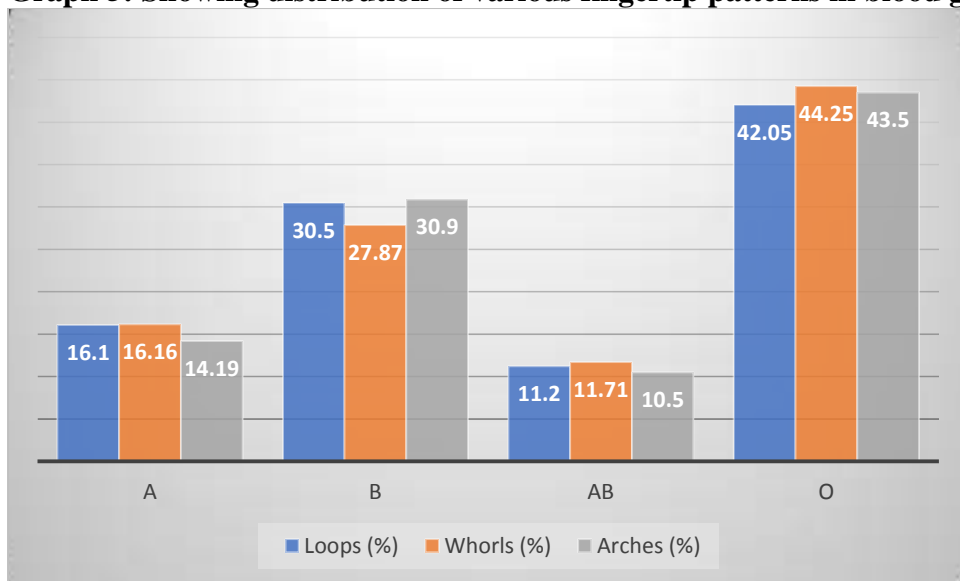
In **Graph 3**, the most of subjects had Rh Positive 85.75% (n =686) and least were Negative 14.2% (n = 114).

Graph 4: Showing distribution of various fingertip patterns in blood groups.



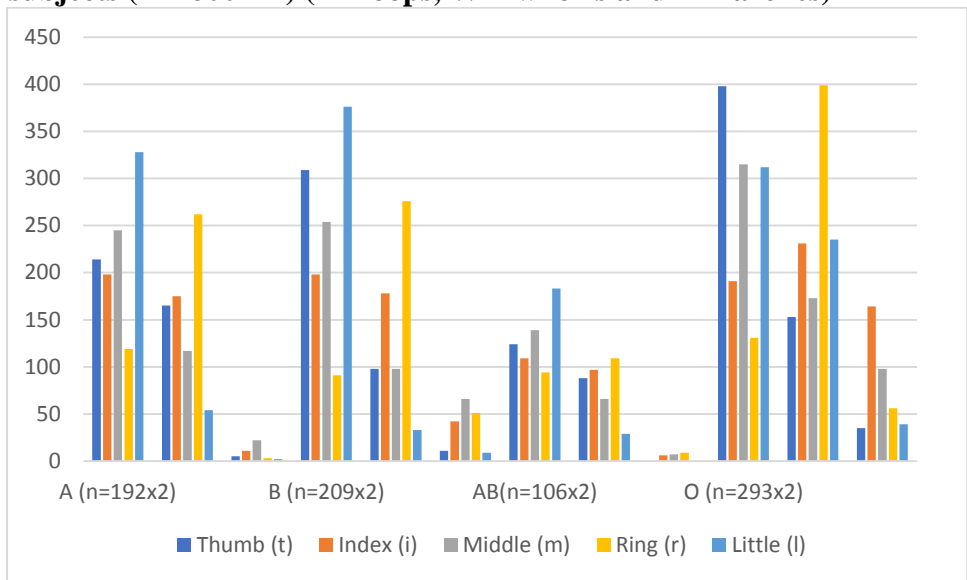
Type of Finger Print (**Graph - 4**) Loops were the most common pattern, registering 39.97% frequency in the study; followed by whorls (33.72%) and arches (26.3%).

Graph 5: Showing distribution of various fingertip patterns in blood groups.



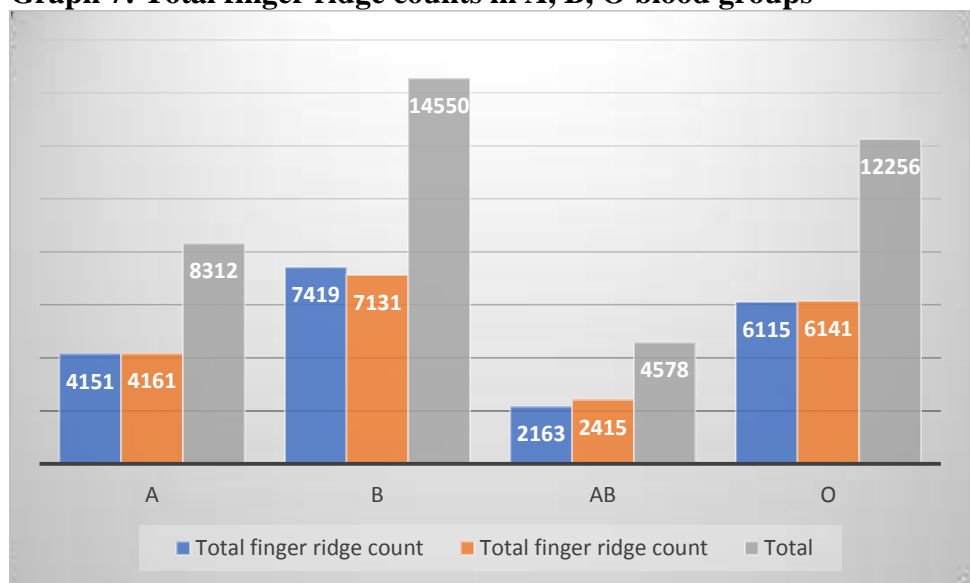
In **Graph 5**, percentage of loops was highest in O blood group (42.05%) and lowest in AB blood group (11.2%) Similarly, it was observed that percentage of whorls was highest in B blood group (27.87%) and lowest in AB blood group (11.71%). Also, percentage of arches in B blood group was highest (30.9%) as compared to lowest in AB blood group (10.5%).

Graph 6: Distribution of pattern of finger prints in different fingers of both hands of subjects (n = 800 x 2) (I = loops, W = whorls and A = arches)



In **Graph 6**, the thumb, middle and little fingers of A, B and O blood group showed high frequency of loops i.e. Blood group A (t-214, m-245 and l-328); blood group B (t-309, m-254 and l-376%) and blood group O (t-398, m-315 and l-312). Whorls were more in ring fingers (blood group ‘A’ 262, ‘B’ 276 and ‘O’ 399). Individuals of AB blood group also presented more whorls in their thumbs (124), index (109) and ring (94) fingers whereas; their middle and little fingers have 139 and 183 loops respectively. Frequency of arches were least in majority of cases but index and middle fingers of blood group A, B and O individuals showed comparatively high frequency.

Graph 7: Total finger ridge counts in A, B, O blood groups



Total Finger Ridge Counts (TFRC) In Different Blood Groups (**Graph – 7**) TFRC was highest in blood group B (14550) followed blood group O (12256). In blood group A the TFRC was about half (8312) and in blood group AB it was about one fourth (4578) of the number of counts in blood group B and O. TFRC was almost equal in both hands.

DISCUSSION

Dermatoglyphics as a diagnostic aid used from ancient eras and now it is well established in number of diseases which have strong hereditary basis and is employed as a method for screening for abnormal anomalies. Fingerprint minutiae patterns of ridges are determined as unique through the combination of genetic and environment factors. Person identification using fingerprint algorithms are well sophisticated and are being established all over the world for security and authentication.^[13]

In our study, type of Finger Print, Loops were the most common pattern, registering 39.97% frequency in the study; followed by whorls (33.72%) and arches (26.3%). which correlates with the study of Singh et al., Mahajan and while Kshirsagar et al.^[14] found the highest percentage of loops in AB blood group. Comparative and chronological studies of dermatoglyphic according to ABO Blood group among the various study of the world showed.

In the loop pattern, the commonest pattern was an ulnar loop, which was measurably huge right now. Blood bunch O positive was the most well-known and AB negative was the rarest. Rh-positive blood groups were more contrasted with Rh-negative blood groups, which is demonstrated right now and critically dependent on the information too.^[16] Blood bunch B was the most widely recognized among Rh-positive blood groups followed by O, An and AB blood groups. Among Rh-negative B and A blood groups were similarly predominant followed by O and AB. Loops were most elevated in guys, whorls and arches were most noteworthy in females.^[17]

Loops were prevalent in all the blood groups with the exception of A positive where whorls were prevailing. The most elevated number of the considerable number of patterns was found in blood bunch O and least in AB among Rh-positive blood groups and factually demonstrated critical right now. Composites were least generally found in all the blood groups.^[18]

In this study, percentage of loops was highest in O blood group (42.05%) and lowest in AB blood group (11.2%) Similarly, it was observed that percentage of whorls was highest in B blood group (27.87%) and lowest in AB blood group (16.16%). Also, percentage of arches in B blood group was highest (30.9%) as compared to lowest in AB blood group (10.5%).

The general circulation example of the essential fingerprint was of a similar request in people with ABO; Rh blood groups for example high recurrence of loops, moderate of whorls and low of arches. The discoveries of the examination can be finished up as the Loops are the most normally happening unique mark example and Arches are the least normal, Blood bunch O positive is the most well-known and A negative is the rare, Loops are prevalent in blood bunch A, B, AB and O in both Rh positive and Rh-negative people aside from in O antagonistic where whorls are increasingly normal and Males have a higher occurrence of whorls and females have a higher frequency of loops.^[19]

Total Finger Ridge Counts (TFRC) In Different Blood Groups (Table – 8) TFRC was highest in blood group B (14550) followed blood group O (12256). In blood group A the TFRC was about half (8312) and in blood group AB it was about one fourth (4578) of the number of counts in blood group B and O. TFRC was almost equal in both hands. In this study, remarkable and statistically significant differences of palm-print patterns distribution were

observed between females and males as well as right and left hands (P value of right hand – 0.012 and of left hand – < 0.001). A few could not give a definite reason for such association of category of palm-print patterns with gender and sides but pointed toward its correlation with levels of strength in palm flexion.^[20,21]

CONCLUSION

Dermatoglyphics is the branch of forensic science which deals with the study of fingerprints. The fingerprint is an impression left by the friction ridges of a human finger. From the results we obtained that loop has the highest frequency in common which was followed by whorls and arches respectively and blood groups of each participant was determined. Our research established no specific relation between fingerprint patterns and ABO blood groups of the subjects. So we concluded that there exist no relation between finger impression of an individual and blood group. Hence it does not aid for personal identification.

References

1. Ramani P, Abhilash PR, Sherlin HJ, Anuja N, Premkumar P, Chandrasekar T, et al. Conventional dermatoglyphics -revived concept: A review. *Int J Pharma Bio Sci.* 2011;2(3):446–58.
2. Reddy BM, Chopra VP, Karmakar B, Malhotra KC, Mueller H. Quantitative dermatoglyphics and population structure in Northwest India. *Am J Hum Biol* 2000; 12:315-26.
3. Prabhu N, Issrani R, Mathur S, Mishra G, Sinha S. Dermatoglyphics in Health and Diseases-A Review. *J Res Adv Dent* 2014; 3: 20-26.
4. Ahmed RH, Mohammed A, Hassan R, Mohammed NR. Dental fillings and its correlation to apoptosis that induced by using dental fillings. *Nature and Science* 2010; 8(10):54-57.
5. Verma U, Singroha R, Malik P. A Study to Find Correlation Between Dermatoglyphic Patterns and Abo Blood Groups. *Int J Anat Res.* 2015;3(3):1293–7.
6. Krishan K, Kanchan T, Ngangom C. A study of sex differences in fingerprint ridge density in a North Indian young adult population. *J Forensic Leg Med.* 2013; 20(4):217–22
7. Bharadwaja A, Saraswat PK, Agarwal SK, Banerji P, Bharadwaja S. Pattern of finger-prints in different ABO blood groups. *J Forensic Med and Toxi.* 2004; 21(2): 49-52.
8. Kshirsagar S V, Burgul SN, Kamkhedkar SG. Study of fingerprint patterns in ABO blood group. *J AnatSoc India.* 2003; 52.1: 82-115.
9. Shivhare PR, Sharma SK, Ray SK, Minj A, Saha K. Dermatoglyphic Pattern in Relation to ABO, Rh Blood Group and Gender among the Population of Chhattisgarh. *Int J Sci Study.* 2017;4(11):61–5.
10. Singh B, Jafar S, Dixit RK. Role of finger print pattern in relationship with blood group and gender. *J Med Sci Clin Res.* 2016; 4:9651-5.
11. Blanka S and Mitton A. Dermatoglyphics in medical disorders. New York Springer Verlag, Berlin. 1976: 27- 87 12. Park JS, Shin DS, Jung W, Chung MS. Improved analysis of palm Creases. *Anat Cell Bio.* 2010; 43: 169- 177.
12. Mehta AA, Mehta AA. Palmardermatoglyphis in ABO, RH blood groups. *Int J Bio. Med Res.* 2011; 2(4): 961 – 964.
13. Deopa D, Prakash C, Tayal I. A study of fingerprint in relation to gender and

- blood group among medical students in Uttarakhand region. *J Ind Acad Forensic Med.* 2014; 36(1). 23–27.
14. Bharadwaja A, SaraswatP.K., Aggarwalv,Banerji P, Bharadwaja S. Pattern of Finger-Prints In Different ABO Blood Groups. *JIAFM*, 2004; 26(1): Page 6-9.
 15. Bharadwaja A, Saraswat PK, Aggarwal SK, Banerji P, Bharadwaja S. Pattern of fingerprints in different ABO blood groups. *J Indian Acad Forensic Med.* 2004;26(1):6–9.
 16. Rastogi P, Pillai KR. A study of fingerprints in relation to gender and blood group. *J Indian Acad Forensic Med.* 2010;32(1):11–14.
 17. Kshirsagar SV, Burgul SN, Kamkhedkar SG, Maharastra A. Study of fingerprint patterns in ABO blood group. *J Anat Soc India.* 2003;52(1):82
 18. Gowda MST, Rao CP. A Study to evaluate relationship between dermatoglyphic features and blood groups. *J Anat Soc of India.* 1996;45:39.
 19. Salmani D, Purushothaman S, Gopalakrishna, Ravindran L, SanthiRN, Pushkar B. A study of Dermatoglyphics in relation with blood groups among first year MBBS students in Malabar Medical College. *Indian J of Clin Anat and Physiol.* 2016; 3(3): 352-4.
 20. Mehta AA, Mehta AA. Palmar dermatoglyphics in ABO, Rh blood groups. *Int J Biol Med Res.* 2011;2:961-4.
 21. Shivhare PR, Sharma SK, Sudhakar KR, Minj A, Koushik S. Dermatoglyphic Pattern in Relation to ABO, Rh Blood Group and Gender among the Population of Chhattisgarh. *Int J of Scientific Study.* 2017;4(11):61-5.