



ROLE OF EDGEOSCOPY IN SEX DETERMINATION – A STUDY OF LATENT FINGER PRINTS OF FIRST YEAR MBBS STUDENTS OF BHOPAL REGION.

Anatomy

Mahesh Dhoot

Phd Scholar, Department of Anatomy, RKDF Medical College Hospital & Research Center, Bhopal (M.P).

**Dr. Vivekanand
Murlidhar
Gajbhiye***

Professor & Head, Department of Anatomy, RKDF Medical College Hospital & Research Center, Bhopal (M.P). *Corresponding Author

ABSTRACT

INTRODUCTION: Edgeoscopy is the study of edges of ridges of finger prints. Ridges are present on the friction ridge skin on the distal end of digits, palms and soles in the hands and feet.

MATERIALS AND METHODS: The present study is carried out with a sample size of 400 undergraduates of first year MBBS students of Bhopal region of both sexes. Under the age between 18 to 23. Left side thumb finger print would be taken with printer's ink (Kores ink) on executive bond paper and the above prints are subjected with chemical (Ninhydrin) and studied under microscope (latent prints). The microscopic findings are recorded and examined carefully. Concave edges of left side are studied under microscope and images were taken.

RESULTS: According to our findings the concave edges present in 1 cm ridge of left side thumb impression in both male and females. We found the highest number concave edges are 1 in 1 cm ridge. Out of 200 males 160 males shows 1 concave edge in 1 cm ridge. Which is higher than the females? Out of 200 females 126 female shows 1 concave edge in 1 cm ridge. So the study of concave edges may helpful in sex determination.

CONCLUSION: study of shapes of ridges on thumb impressions is the best method for determination of sex. Edgeoscopy can also helpful in anthropology forensic medicine, anatomy of finger prints, and forensic sciences.

KEYWORDS

Edgeoscopy, Anatomy, Latent prints, Dermatoglyphic, Forensic medicine.

INTRODUCTION:

Finger prints are the imprints left on any substance by the skin over the volar surface of the fingers. They are identified by alternate strips of raised dermal ridges and furrows present in the variety of patterns with minute sweat pores appearing along the surface of the dermal ridges.¹ These ridges can help in identification even when epidermis get eroded by damage due to burns or long term submerged in water.²

Ridgeology is the examination of two parts of ridges of the friction skin surface i.e. pores and the edges. The study edge is known as edgeoscopy. In 1962 edgeoscopy first came in light with the paper of chatterjee from India. He studied that the characteristics of edges are unique and permanent like ridges and pores. He named the method as edgeoscopy. According to his classification edges of ridges are divided in to seven types. Straight edge, peaked edge, table edge, concave edge, angular edge, pocket edge and convex edge.³

Finger prints start to develop between fifth and sixth week of embryonic life.¹ Finger print features can be divided in to three categories, level one represent ridge flow pattern and general morphological information, level two features represent the minutiae information such as ridge endings and bifurcations, level three features obtained from the sweat pores and ridges present on the fingerprints. In a single fingerprint more than 1400 pores can be found.⁴

Finger print patterns start to develop between fifth and sixth week of gestation and fully formed by the twenty first week, and the sweat glands start to develop around fourteenth week of gestation and acquire adult morphology by the twenty fourth week.¹ Edgeoscopy can be studied with the help of latent prints (the prints which is not visible to naked eye) which was developed by various standard methods using powder dusting methods and chemicals such as ninhydrin.⁵

MATERIALS AND METHODS:

The study will be carried out on 400 undergraduates (first year MBBS students) both male and female of Bhopal region. This present research performed by making left side thumb finger print. Those who are participating in this research we requested them to wash their hands thoroughly with Dettol soap solution and clean with napkin so that remove of any dust particles before taking finger prints. Thumb would be covered with ink and then the inked thumb finger shall be rolled from side- to-side on bond papers. The age, sex and name of each individual would be recorded in a separate register along with prints

Prints of left side thumb impressions would be taken with printer's ink (Kores ink) and the above prints are subjected with chemical (Ninhydrin) and studied under microscope (latent prints) on Royal

executive bond paper.

The following items and procedure shall be used for taking left thumb finger prints from donors:

- Printer's ink (Kore's ink)
- Chemical – Ninhydrin (Best method for print on bond paper)
- Royal executive bond paper.
- Binocular compound microscope with light source.

The rubber roller was used to spread the ink on glass as per suggestion of forensic medicine department.⁶

A dettol soap was used to clean the hands before collecting thumb impressions and after collecting impression to clean the stain. The napkin was used to dry the hands of a person before spreading ink.

NINHYDRIN METHOD:

The forensic use of ninhydrin for latent print development was first advocated by Oden and Von Hofsten. This method is based on the mechanism that α - amino acids, polypeptides and proteins in the fingerprint residue react with ninhydrin producing Ruhemann's purple. Ninhydrin solution is applied by various techniques like spraying, swabbing or dipping and thereafter, the process is accelerated by using heat at 80° Fahrenheit in 80 % relative humidity.⁷

MICROSCOPIC STUDY OF LEFT SIDE THUMBS FINGER PRINTS.

The following edge characteristics were examined under microscope under 10 x magnifications.

1. Concave shaped edges of ridges studied in a microscopic field; the concave shape edges of left thumb which are seen on 1 cm ridge in both males and females.
2. Highest number of concave shaped edges is observed in both sexes and later least number of concave edges was studied.

RESULT:

Fig No 1: Concave edge of left side thumb impression

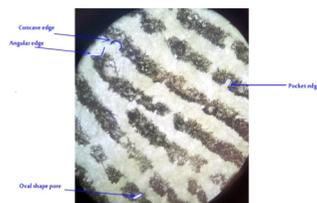
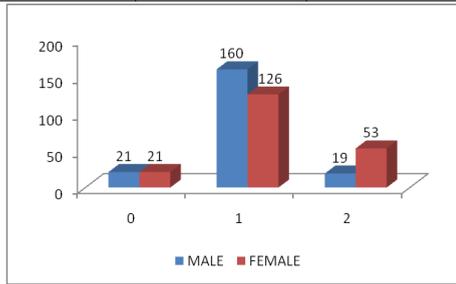


TABLE 1: Concave edge of left side thumb impression.

	MALE	FEMALE
0	21	21
1	160	126
2	19	53
Total	200	200



In the above table we observed the concave edges present in 1 cm ridge of left side thumb impression in both male and females. We found the highest number concave edges are 1 in 1 cm ridge. Out of 200 males 160 males shows 1 concave edge in 1 cm ridge. Which is higher than the females? Out of 200 females 126 female shows 1 concave edge in 1 cm ridge. we also observed that out of 200 males 19 males shows 2 concave edges compare to females this ratio is lower in males because out of 200 females 53 females shows the ratio of 2 concave edges. We also noted that in 21 males out of 200 and 21 females out of 200 concave edges are completely absent.

Table No: 2 comparison between male and female left side thumb impression

variable	male		female		P VALUE	SIGN.
	Mean	Std. Deviation	Mean	Std. Deviation		
Concave edge	0.99	0.448	1.16	0.588	<0.05	0.01

In the present study we found that the concave edges in males are mean and SD 0.99±0.488 and in females are mean and SD 1.16±0.588.

Table No 3: correlation left side pores (Paired Samples Correlations)

	N	Correlation	Sig.
Concave & concave	200	025	724

DISCUSSION:

Finger prints has received its importance in forensic medicine, anatomy, forensic science, and anthropology. Because of its unique nature of an individual's fingerprint which remain unchanged throughout life. Even in identical twins they are not identical. Shapes of edges are used for identification of an individual. Even the information related to edgeoscopy is limited but the knowledge of edgeoscopy will allow us to add strength to low ridge count identifications⁸.

Study of edges of ridges is known as edgeoscopy and study of ridges is known ridgeology⁹. If sufficient points are not present while studying poroscopy, then the edge characteristics can also be added. The edge characteristics (edgeoscopy) have certain advantage over the poroscopy i.e. the shape of the pore changes with the pressure, but edges of ridges are less affected by pressure¹⁰.

In the present study we observed that the highest number of concave shaped edges 1 in 1 cm ridge and out of 400 samples 286 samples of both sexes showed the average number of edges is 1 in 1cm ridge and average range is 71.5%. We also observed that highest number of concave edges is 1 in 1 cm ridge. In males this ratio is more when compare to females. Present study may be helpful in sex determination.

According to study of haroon neem khan 2.27 concave edges are seen per photomicrograph³ and range of concave edges per photomicrograph is 0-5. Which is higher than present study³? Amit Chauhan and SK Shukla observed that females have more number of ridges in females compare to males¹¹.

CONCLUSION:

In the present study of shapes of edges which is known as edgeoscopy

study of concave shaped edges on thumb impressions is the best method for determination of sex. By studying average number of edges may helpful in gender determination. Edgeoscopy can also helpful in forensic medicine, anatomy of finger prints, anthropology, crime investigation and forensic sciences.

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