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RESEARCH ARTICLE

A STUDY OF FINGERPRINTS IN RELATION TO GENDER :A STUDY DONE ON MEDICAL STUDENTS OF SKIMS MEDICAL COLLEGE SRINAGAR.

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Abstract

Study of finger prints as a method of identification is known as Dactylography or Dactyloscopy or Dermatoglyphics. Sex is among the most important information that discriminates individuals. Researchers addressed the use of fingerprint for gender identification which will be more helpful in short listing the suspects.

Material and Method: A prospective cross sectional study was carried out over a period of one month among 80 medical students of SKIMS medical college, Srinagar. Students were asked to press their fingertip on the stamp pad and then to the paper to transfer the fingerprint impression.

Results And Conclusion: Loops were the most common pattern, followed by whorls while arches were present in a smaller percentage of the study group and composites were least common. Finger prints show gender discrimination. Frequency of loops was found to be higher in females than in males whereas whorls were more frequent in males as compared to females. Arches were found more in females as compared to males.

Introduction:-

Identity is a set of physical characteristics, that defines an individual. Recently, there has been an increasing interest in biometric technologies for human identification based on one's individual features.[1] Fingers have specific patterns of ridges and furrows over them which are determined genetically. These patterns are formed in embryonic stage and remain unchanged till death.[2] Study of finger prints as a method of identification is known as Dactylography or Dactyloscopy or Dermatoglyphics.[3]

Human finger prints fall into three main groups: loops, whorls and arches. Loops are the most common type, accounting for approximately 65% of all fingerprints, Whorls account for approximately 30%, while arches are least common, accounting for 5%.[4]

Sex is among the most important information that discriminates individuals. Researchers addressed the use of fingerprint for gender identification which will be more helpful in short listing the suspects.

The aim of this study is to examine the most prevalent fingerprint pattern in the north Indian population of India and to observe the gender variations in structures of ridge impressions.

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Material and Method:-

A prospective cross sectional study was carried out over a period of one month among 80 medical students of SKIMS medical college,Srinagar. Students with permanent scars on their fingers or thumbs, with any hand deformities due to injury, birth defect or disease, those having worn fingerprints, extra, webbed or bandaged fingers, were excluded from the study.

Prior written informed consent for the voluntary participation in the research work was obtained from the subjects. The fingerprints of the study subjects were procured by rolling over method which provides an inflated area for the display of the more important ridge impression in each finger pattern.

Each subject was asked to wash his hands thoroughly with soap and water and dry them using a towel. For collection of fingerprint, the participant was asked to keep his arm relax and not to voluntarily roll the fingers to avoid smearing. The finger bulbs were rolled on the ink pads in such a way that the ink will be applied to the tips evenly by rolling the thumbs toward the subject's body and other fingers were rolled away from the body, i.e. thumb in fingers out method. By the similar fashion of thumb in fingers out method the rolled impressions of each finger were obtained on paper in the allotted space for the finger. In this way, the plain fingerprints of all the ten digits were taken separately. Care was taken to avoid sliding of fingers to prevent smudging of the print. After the fingerprints were acquired, sex and age were noted. Each subject was assigned a serial number. The fingerprint patterns were studied with the help of a magnifying lens and were identified as: Loops, Whorls and Arches based on the appearance of ridge lines according to Henry's system of classification. This system assigns each finger a number according to the order in which is it located in the hand, beginning with the right thumb as number one and ending with the left little finger as number 10. The distribution of dermatoglyphic fingertip patterns in both hands of individuals and its relationship with gender was evaluated and analyzed statistically. [5]

Results:-

A total of 80 subjects participated in the study out of which 40 were males and 40 were females from 18- 25 years of age. Fingerprint pattern analysis of 800 fingers (80 subject X 10 fingers of right and left hand)

Table 1:-Combined results of males and females.

S.NO	Pattern of finger prints	Number (%)
1	Loops	457 (57.12)
2	Whorls	297 (37.12)
3	Arches	35 (4.37)
4	Composite	11 (1.37)
5	Total	800 (100)

Table 1 showed combined results of both hands of males and females , loops were the most common pattern 57.12% , followed by whorls which came to 37.12 % while arches were present in a smaller percentage of the study group i.e 4.37% and composites were least common (1.37%).

Table 2:-Distributions of Pattern of fingerprints among Males and Females

S.NO	TYPE	Males (%)	Females (%)
1	Loops	181 (45.25)	276 (69)
2	Whorls	201 (50.25)	96 (24)
3	Arches	12 (3)	23 (5.7)
4	Composites	6 (1.5)	5 (1.25)
5	Total	400 (100)	400 (100)

Frequency of loops was found to be higher in females (69%) than in males (45.25%) whereas whorls were more frequent in males (50.25%) as compared to females (24%). Arches were found more in females (5.7%) as compared to males (3%),While percentage of composite was very less and almost similar in both males and females.

Discussion:-

Fingerprint is found to be the most reliable criteria used for the purpose of identification. The various classification systems used throughout the world are based on the patterns of friction ridges seen on pulp of terminal part of

fingers. [6]These patterns fall into three general classes these are loops, whorls and arches. Arches are the simplest patterns and also the rarest while combination of these patterns are known as composite.

Fingerprints are one of the most mature biometric technologies and are considered legitimate proofs of evidence in courts of law all over the world. Based on the varieties of the information available from the fingerprint we are able to process its identity along with gender, age and ethnicity. Fingerprints have some important characteristics that make them valuable evidence in crime scene investigations:

1. An individual's fingerprint ridges are formed during fetal life before birth and remain unchanged even after death.
2. Its nature is an individual characteristic that no two persons have been found to be the same, even identical twins.
3. Fingerprint classification systems permit the development of file of systematically classified fingerprints and the ability to retrieve a particular file rapidly.[5]

Aim of this study was to study various patterns of fingerprints and their distribution in the North Indian population.

Most common pattern seen in present study was loop, followed by whorls, arches and least prevalent was composite.

Prevalence of fingerprint patterns as given by other authors (Mathiharan K and Patnaik AK [7], Dikshit PC[8], Nandy A[3], Vij K[2], Basu R[9]) and that obtained in the present study were compared. When we compare the previous data with the present study, it is found that

1. Prevalence of loop pattern is between 60 - 70% according to other authors, whereas it is lesser in this study (57.12%) which is comparable to a study done by Nithin MS , Rema P, Venugopalan NB[10].
2. The prevalence of Whorls in present study is 37.12% , which is almost similar to previous studies[7,8,3,9] where the results are around 25-35%.
3. The prevalence of arches in our study in 4.7%, which is lesser than previously done studies where it is around 6%
4. Prevalence of composite pattern is quoted to be between 1 and 4% by other authors, which is similar to our study. But its much higher in study done by Nithin MS (6.4%).[10]
5. When comparing the sexual difference in finger prints , our study is comparable to study done by Karki RK, Singh PK[5] done on students of Kathmandu and Dr. Prateek Rastogi, Ms. Keerthi R Pillai[11] done on medical students of Mangalore , where males show higher incidence of whorls and females show higher incidence of loops, while it differs from the study done by Nithin Mathew Sam on south Indians , which shows loops are predominant in both males and females. Arches were present more in females then in males which is comparable to a study done by D Deopa et al[6] on medical students of Uttarakhand.

Conclusion:-

Fingerprints is a effective method of identification and an attempt was made in the present work to analyze their correlation with gender of an individual. The findings of this study concluded that fingerprint ridge patterns can be an indicator to establish the gender. Finally, this study provides information which is useful for forensic science to assist the fingerprint examiners to direct their search to a particular gender.

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