“STATISTICAL DATA OF FOOTPRINT FOR GENDER DETERMINATION”

A Project Report submitted in partial fulfilment of the requirements for the award of the degree of

BACHELOR OF SCIENCE

IN

FORENSIC SCIENCE

Submitted by

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(Affiliated to AdiKavi Nannaya University)
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DEPARTMENT OF FORENSIC SCIENCE

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(Affiliated AdiKavi Nannaya University)

CERTIFICATE

This is to certify that the project report entitled "**STATISTICAL DATA OF FOOTPRINT FOR GENDER DETERMINATION"** is a bonafide record of work carried out by **SHWETA KUMARI** (190377700090) student submitted in partial fulfilment of requirement for the award of degree of Bachelors of Science in Forensic Science.

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Principal

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Shweta kumari

DECLARATION

I, Shweta kumari hereby declare that the project report entitled "**STATISTICAL DATA OF FINGERPRINT FOR GENDER DETERMINATION**" is an original work done in the Department of Forensic Science, Aditya Degree College (Affiliated to AdiKavi Nannaya University) submitted in partial fulfilment of the requirements for the award of the degree of B.Sc. in Forensic Science. The work has not been submitted to any other college or University for the award of any degree or diploma.

Date:

SHWETA KUMARI **190377700090** **Signature**

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ABSTRACT

Identification of human being is very important who is included in crime scene. The forensic investigation use the forensic technology to indentify the person. This forensic technology include DNA fingerprinting bite mark, tool mark, fingerprint , lip print, etc. This evidences plays an important role to identify the person. These evidences provide the individual characteristics of person for identification. Footprint plays an important role to identify the person. Similar to the fingerprint, footprint is also unique to every individuals. Various types of characteristics of footprint can be analyzed which plays an important role in crime scene investigation. Analysis of footprint characteristics can be done for gender determination by statistical data. This footprint of any person linked to the crime scene. There are total 20 samples are taken, 10 from males and 10 from females and 5 samples from unidentified gender.

KEYWORDS:- Identification, statistical data, unique, gender determination.

CHAPTER I

INTRODUCTION

Fingerprint

It is an impression which is made by ridge pattern on the tip of the finger. Fingerprint is used for the identification of because of the following reasons are (i)unique ridge characteristics (ii)consistency throughout person's lifetime etc. The fingerprint remains as it is throughout its whole lifetime. The ridge pattern is found on the palms of hand, toes and soles of the feet. This friction ridges is used for the gripping, that's why it is found at that portions. Friction ridge skin has many tiny ridges, furrows and covering the surface.

Footprint is one of the most common types of physical evidence recovered at a crime scene. The forensic footprint evidence plays an important role in establishing the identity of a person; therefore, its examination is of prime importance. A link may be established by observing and comparing the morphological features of footprints with the perpetrator. These barefoot prints may be present as a two-dimensional print or a three-dimensional imprint depending on the substrate upon which they have been impressed upon and accordingly different methods and techniques are implemented in order to identify the questioned prints. After the execution of appropriate procedure, these prints are then compared with the exemplar prints, i.e., prints of the suspects to narrow down the process of identification. The analysis of bare footprints has been used to offer a wide range of knowledge about different print patterns. Thus, the present work extends an overview of the different methods and indices that are being used to evaluate footprints for comparison and identification purposes. The evaluation and interpretation of footprints is not only of prime importance in forensic examination but also help in clinical examinations and elucidation of various podiatric disorders. The paper also focuses on the occurrence of footprint evidence, forensic podiatric training and education, reliability and accuracy of the footprint analysis methods and their intra-rater and inter-rater discrepancy.

The practice of fingerprint analysis in solving crimes has been in use for a long period of time, but offenders or the convicts are becoming shrewder with time by avoiding their fingerprints from being part of the physical evidence at the scene of a crime. The masking of the footprint is yet to become prevalent amongst the criminals thus, some of them still go unshod while committing a crime.1 Along with fingerprints, footprints at the crime scene have become an integral part of the investigation. These

are unique to every individual in the same way as the fingerprints are. One can deliberately wipe off the fingerprints after committing the crime, but he/she may forget to clear the prints made while walking or standing. Sometimes, a series of footprints are recovered from the crime scene, giving an idea about the movement of the criminal and hence a clue towards the modus operandi. Since all crime scenes are impregnated with footprints, therefore, there is a strong possibility of recovering them. These prints (visible or latent prints) may be found indoor or outdoor depending on the movement of the persons involved. Once the prints are recovered, the foremost job to be done is to preserve them as they are the most fragile and sensitive to modification. The imprints or impressions found at the site depend upon the type of preservation, substrate and the substance of which they are left. These footprints form a certain kind of "pattern" that is unique to every individual that may be two dimensional i.e. prints due to a harder substrate or three dimensional, i.e. impressions formed due to a soft substrate.

The use of foot related evidences in criminal investigations dated back to 1862 when Jessie Mclanchlan's footprints placed her at the scene of woman's murder for which Mclanchlan was subsequently convicted. In modern time, Forensic Podiatrists have assisted law enforcement in investigation since the 1970's. In 1989, the author published the journal article "Forensic Method and the Podiatric Physician" in which he suggests the need for a forensic podiatry organisation. Forensic podiatrist 'John DiMaggio' founded the American society of forensic podiatry in 2003 and for now the organisation has 55 members.[6] Footprints obtained from the scene of crime and analysis of footprints help in the estimation of stature, weight, sex, holding weight, number of perpetrators, direction of movement and the speed at which an individual was moving.

The main purpose of the present investigation is to find out the individual characteristics like shape, size, alignment of toes, toe shapes, ball line, heels, shape of toe line, humps, phalanges marks, creases, cuts, cracks, pits etc. of the foot.

Creases Mark

Creases marks occur on the planter surfaces of the foot with distinct features of their own. Crease marks or lines are caused by skin folds of the plantar surface of the foot. Some of these folds are long lasting but some of the temporary. These types of the creases are useful to identify the individual. Crease traits like dermatoglyphics traits are controlled by polygenic factors and stand a chance to be used in the study of ethnic and geographic distribution. The present study shows that in certain cases, there are no creases but in some cases there are one or more creases. These creases may be horizontal,

vertical or crossed or may be in different directions. The present study shows that numerous crease marks are found more often in female footprints when compared to male footprints. The male footprints mostly show just one or two or almost zero crease marks in their footprints. The presence of vertical crease marks is found to be comparatively higher in females than males.

Formation Of Fingerprint

In the third and fourth month of the fetal development the ridge pattern of fingerprint is formed and it is completed by the end of sixth months.

The ridge formation during the fetal development do not change throughout the life of the individual. It is changed or destroyed only by the decomposition of skin, after death.

Footprint

It is the impression which is produced by the foot. The friction ridge of the foot is also used for the identification of the individuals. The footprint plays an important role for investigation of the crime scene. The Forensic Analyst examine the crime scene and collect the evidences and marks which is left by the victims at the crime scene. Footprint is very common mark which is generally left by the victims. In the country like India, the culprit do not take precaution at the time of burglary and they enter without any foot wear to avoid any noise created by the foot wear. In that case there is highly chances to get footprint by the culprit which is used to identify the person by the analysis of footprint. The different types of characteristics patterns are found in the foot which is used for the analysis for the individuality. Every individual has different shapes and size of foot which is used for the identification of persons. The development of friction ridges and creases takes place at the age of 6 to 18 weeks. The different types of ridge characteristics are bifurcation, eye, short ridge, bridge, crossover, dot, delta etc.

History

The barefoot evidence was introduced in the court in France in 1888, when a LeDru criminal was identified by the analysis of footprint. Due to the uniqueness of footprint early cases are assumptioned.

In 1909, G.W. Gayer said that the footprint can distinguished the individuality. In 1981, New Jersey, USA, a case in which the partial bloody socked foot impression is evolved at a homicide case, that is compared with the two suspects. First suspect was eliminated as having created the impression at the

crime scene and the others's impression were found to be such that expert declared a high probability that the impression belongs to another one.

Types of Footprint

(i) Visible Footprint- This type of footprint can be seen by the naked eye without additional aids. When any transfer of material takes place from shoe to the surface then the print is visible. Example:- Bloody shoe print left on the floor and muddy footprint.

(ii) Latent Footprint- In this type of print, it is not visible to naked eye. For the visibility of print additional developers are used such as black powder, white powder, iodine fuming etc.

(iii) Plastic Footprint- It is the three dimensional impression left on the soft surface. Example:- Print left in the snow sand and mud.

Plastic Footprint

Visible Footprint

Latent Footprint

Footprint At The Crime Scene

Generally the individual entered into the crime scene in the barefoot, so the impression of the foot is developed on the surface which helps in the analysis of individual. The forensic examiners examine the various characteristics pattern of footprint for the identification of the individuals.

The footprint which is found at the crime scene should be recorded and collected for further examination. The first forensic investigator who entered at crime scene should determine whether the impression is present and then collect it. The photographed should be taken with the scales without any disturbances of footprint.

Methods Of Development Of Latent Footprint

Physical Methods

1. Powder method- There are different types of powder is used for the development of fingerprint are Black powder, White powder, Magnetic powder.
   These powder sticks with the substances which is present in the sweat. In the black surface white powder is used and in the white surface black powder is used.
2. Iodine fuming- When it is applied, iodine reacts with the fingerprint secretion which produces dark brownish to blackish appearance.
   The iodine reacts with fatty acid and lipid which is contained in the fingerprint.

Chemical Methods

1. Ninhydrin technique:- It is the solution that reacts with amino acid which is present in the fingerprint. When this solution chemically reacts with fingerprint, it produces purple color.
2. Silver Nitrate Method:- In this method, Sodium Chloride present in the precipitation in the latent fingerprint reacts with silver nitrate solution to form silver chloride which is the light sensitive.
   When it is exposed to the light it breakes into its component silver and chloride. The reddish brown color is visible in the print.

Footprint Analysis

A foot print in a crime scene can be extremely useful to detectives on that crime scene. Prints can tell which way a suspect may have come from of the direction they left. The print tells what shoe size and what type of shoe they were wearing. If the print is good enough and the sole of the shoe isn't very worn even brand names and designs can be seen, making easier to catch a suspect. Sometimes gender can even be decided based on the size and shoe type of the impression. It is important to analyze footprints quickly since weather condition or other impressions could disturb the print. If a forensics expert does not have time to analyze the print right away they will make a mold of it and analyze it later.

In class we split into groups of about three or four and filled a large rectangle container with dirt/sand. Make sure the dirt is not too moist or else the print will not stay intact for analysis.

Preparing soil sample

Each member have to provide their footprint in the dirt/sand. Now all the characteristics of footprint are studied and it is later analyzed by the expert.

The first print we analyzed was a boot with a small slanted heel and we concluded that the person probably wore about a size eight shoe size and may have worn the shoes often since the bottom was so worn that no markings or treads could be distinguished. They were also most likely female because of the size and shape of the shoe.

Footprint on soil sample

The second shoe was a boot with a short chunk heel. We decided that the person wears about a size nine in women's shoes and nothing can be distinguished from the soles since they were so worn.

The last print was from a flat shoe which was about a size eighteen women's and was not very worn since we could see distinct impressions of a flowery vine pattern between the ball and heel of the print.

Measuring the footprint on soil sample

Although similar in shape the male and female foot mostly differs in size. The male shoe is usually larger than a female shoe since the feet of males are generally bigger than female's. We noticed that the dimensions of a boy's footprint were larger in dimensions than the dimension we collected of girl's footprints.

Evaluation of Print

Evaluation and comparison of impression evidence should be performed by a good trend footwear and tyre marks examiner. Evidence detection recovery handling and examination procedures laboratory and photography equipment and procedures. It is well established that every footmark has an individual entity that cannot be duplicated even with the best of human skill and scientific techniques the individual Liberty is given marks is established from the following features:

a) Dimension

b) Shapes

c) Patterns

d) Peculiarities

The dimensions of the cost vary due to nature and quality of the surface, expansion of foot footwear real monks and costing materials the mode of imparting the mark and nature of the creation mode but the variations and dimensions are within limits. Analysis of footprint impression can reveal much about the activities of an individual at the Crime scene. Impression allowed their number to be counted footwear can make an additional mark, as well as print evidence of scuffs or dragging of feet, can tell an alert. Investigator about the activities of individuals at the Crime scene. Footprint/ footwear impression is allowed overlap by those of others that can be demonstrated to be associated with the crime. Naked-eye footmarks are frequently found in the investigation at the crime scene in India they

sometimes provide positive evidence. The marriage in consists of an outline of the heel and the inner and the outer boundary line of the food on the hill may be oval or round. Some deformed feet may live separate marks for hills and soles. The inner and outer margins and continuous in such cases. The shape and size of the toes vary greatly. Many characteristics identification features, Riding toes, long and short toes, missing toes, partially cut toes and the damaged toes sometimes offer useful characteristics and may be sufficient by themselves for identification purposes. Phalange marks are created by the phalange of the toes their presence position shapes and sizes are usually identifying features. they are found in the foot mark frequently. The identification of a footwear mark is possible even when the same of incomplete because it carries several identifying features. Hill marks alone may identify the shoe sometimes. The damage to a shoe, like the cut and cracks of the chipping portion of the sole, also confers individuality on the sole. Individualization of the bookmark is difficult. Often the nature of the animal alone can be given sometimes damage to the hoof for wear and tear of the iron shoes of the shod animal permit individual identification of the animal. The most important evaluation of footprint a gate pattern is identified for the direction line the walk line, the food line, the food angle, the step angle disturb length the steps with step and another special feature of the foot or footwear.

Importance Of Footprint In Forensic Science Identification

The print left behind at a crime scene can give vital evidence to the perpetrator of the crime. Shoes have many different prints based on the sole design and the wear that it has received – this can help to identify suspects. Photographs or castings of footprints can be taken to preserve the finding. Analysis of footprints and shoeprints is a specialist part of forensic science.

Footprints can also allow the detective to find the approximate height from, footprint and shoeprint. The Foot tends to be approximately 15% of the person's average height. Individualistic characteristics of the footprints like numerous creases, flatfoot character, horizontal and vertical ridges, corns, deformities etc. can help the forensic scientist in cases pertaining to criminal identification. In some forensic cases, the need may also arise to estimate body weight from the size of the footprints.

Footprints have been shown to have determine the height and the sex of the individual. Footprints are a source of forensic evidence used in criminal investigations. It is hard to avoid leaving behind impressions of footprint or shoeprint for a culprit at the scene of a crime, therefore, footprints are likely to be present at the scene. These impressions can be examined by a forensic analyst and used to identify the culprit. Just like fingerprints, the footprint of every individual is unique due to the

difference in ridges and patterns and can be used for identification. It provides valuable information about the biological traits of the culprit, like gender, stature, gait, or any possible deformity. Shoeprints can be studied to provide information regarding the ridges, cuts, or any associated sign of wear on the shoe to match the shoe of the possible culprit. Analyzing footprints may even provide information about the number of culprits, the activities that have taken place (dragging an individual or carrying something heavy), the direction and speed of movement of the individuals present, and a possible time frame.

i. Footprints are the impression or image left behind by a person walking or running. The print left at a Crime scene can give vital evidence to the perpetrator of the crime.

ii. At Crime, scene shoe has many different prints based on the sole design and the wear that the has received this a help to identify the suspect.

iii. Footprint present in a crime scene take photography for the casting of footprints can be taken to preserve the finding analysis of footprints a specialist part of forensic science.

iv. Footprint can also find the approximate height from footprints and shoe prints. The foot tends to be approximately is of the person's average height.

v. The number of individuals person at the Crime scene is often difficult to determine unless separate footwear/ print impressions allowed their number to be counted.

vi. A shoe print can be unique because of many variables. Wear Pattern can show how long it was worn and sometimes the walking pattern of the owner of the shoes.

vii. Analysis of footprint impression can be revealed much about the timing of activities of an individual at the Crime scene.

viii. Footprints have found us other two-dimensional trends for three-dimensional impressions. Prince is made by depositing (blood, soil) or removing (dust, blood) material from a hard surface.

CHAPTER- II

Literature Review

In a comparative research carried out by Gottesman, 2012 to compare the relationship between toe prints and fingerprints it was revealed that, the most fingerprint on the left side are mirrors of the right side. This research is also rejected my initial hypothesis that if the fingerprint of the group of individuals are similar, then there must be similarity between their toe prints. This data does not displayed strong correlation between an individuals's fingerprint and toe's print. By this it is proved that it cannot be predicted fingerprint from the footprint.

Kanchan et al. 2012; established that estimation of sex of footprints can help in establishing the biological profile of potential suspects. This research attempts to study the sex differences in the ridge density in four different areas of a footprint. after analysis using standardized techniques; including the upper portion of the medial border of the great toe (F1), the ball of the great toe (F2), the ball of the 5th toe below the triradius point (F3) and the central prominent part of the heel (F4). Male-female differences in footprint ridge density were statistically analyzed for each designated area and compared between right and left sides. The mean footprint ridge density was significantly higher among females than males in all designated areas ($p<0.05$) in both feet. No right left differences were apparent in the analyzed areas. Variations in footprint ridge density between different areas in right and left feet were evident among males and females. This study observes that sex differences exist in footprint ridge density among humans. Maximum sex differences were observed for ridge density in medial ball area, followed by great toe, lateral ball and minimum sex differences were observed in the heel region. It is observed that sex can be estimated from footprint ridge density with reasonable accuracy. The sexing potential of total footprint ridge density was 82.6% from the right and 83.6% from the left footprints respectively.

Desai et al. 2013 in their research carried out in Hubli-Dharwar, Karnataka, India, where all the 10 fingerprint patterns were divided into Loops, Whorls and Arches. Results show that Loops are most commonly found fingerprint patterns and Arches are least common. Loops dominated in all the

Blood groups of both Rh positive and Rh negative individuals but Whorls were found to be dominating in O negative blood group. The only association between gender and finger print patterns in this study is that Loops and Arches were found in higher frequency in Females compared to Males and whorls were found to be high in males compared to females.

Rahman et al. 2014, in their research on sexual dimorphism in footprint, obtained from the staff and undergraduate students of Government Medical College Aurangabad. Maximum Length and Maximum Breadth were calculated. The Footprints Ratio (FPR) for both left and right foot prints of each individual in the study group was calculated separately and values obtained were analyzed statistically. Statistical analysis showed that Foot Print Ratio have a significant difference in the mean values for both feet in both sexes. There is a low coefficient of variation. The P values are also are significant. A standard FPR value was derived. Utilizing these values sex determination was done by comparing it with the each of the already calculated FPR values. The percentage accuracy of establishing sex by this method is 80% which is significant. The Footprints Ratio (FPR) for both left and right foot prints of each individual in the study group was calculated separately and values obtained were analyzed statistically. It was discovered that, sex identity by deriving the Foot Print Ratio FPR is simple, inexpensive and easy to perform, requiring no special training. A Standard Foot Print Ratio (SFPR) for left and right foot prints were derived to be 0.368 and 0.3683 respectively. All FPR values up to these limits predicted as female sex and those values beyond these limits predicted as male sex. The percentage accuracy of establishing sex by this method is 80% which is significant. It is a reasonably reliable method of sex identification.

Rastogi and Keerthi. 2015, in their research among students of Kasturba Medical College, Mangalore, India. Indicated that each finger print is unique; loops are the most commonly occurring fingerprint pattern while arches are the least common. Males have a higher incidence of whorls and females have a higher incidence of loops. Loops are predominant in blood group A, B, AB and O in both Rh positive and Rh negative individuals except in O negative where whorls are more common. We can conclude that there is an association between distribution of fingerprint patterns, blood group

and gender and thus prediction of gender and blood group of a person is possible based on his fingerprint.

Determination of sex from footprint Dimensions in Contemporary Indian Bengali Population: A Pilot Study; June 2018 Partha Pratim Mukhopadhyay Soumeek Chowdhuri. The objective of the present study are to examine the sexual dimorphism of footprint dimensions in adult of an Indian Bengali sample and determine the sex from those measurements. The study was done on 100 adults volunteers of ethnic Bengali origin of West Bengal. Footprints were taken on glossy papers with blue stamp pad ink and then measurements were taken to the nearest mm. Discriminant functions analysis was conducted using several linear measurements, and discriminant function was obtained. Sex determination was successful in 82.0% of the samples. This study provides useful baseline morphometric data of footprints of the Indian Bengali population, which will aid in forensic investigations. Discriminant function analysis was performed using five variables (F1,F2,F3,F4, and F5) as predictors of sex. All the variables were entered together. The predictors were the linear dimension of the foot, namely F1 through F5. The classification groups were male and female. On discriminant function, calculated with Wilks' Lambda was equal to 0.46, chi square(x2) equal to 73.536, degree of freedom 5 and p-value of .000. Because p-value is less than 0.05, we could say that the data.

CHAPTER III

Aims And Objectives

AIM

To identify the gender by footprint.

OBJECTIVES

1. To determine minutes in different samples

2. To determine the gender by minutes

3. To analyze the characteristics of footprint

CHAPTER IV

Materials And Methodology

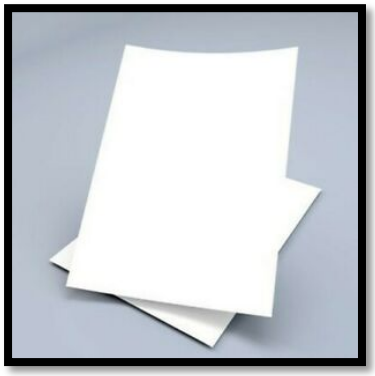
Materials

- Paper
- Glass slide
- Black ink
- Ink roller

Glass Slab

Black ink

Ink roller



Paper

Methodology

All the students of different places (Kerala, Andhra Pradesh, west Bengal, Orissa etc).All the students are from Indian origin. The age of the students vary from 20 to 22. The total number of students of known gender is taken as 20 (10 males, 10 females). All the individuals are healthy and free from any deformities of foot and any foot allergy.

First of all, all the boys students are collected at the fingerprint lab. All the individuals remove their shoes and socks and then clean their foot for proper footprint. The age of the male students are 20, 21, and 22. They had creases in their foots. The footprint of right foot is taken from each individuals.

The glass slide is kept on the floor so that due to more pressure of individual, it will balance on the floor. The ink is applied on the glass slide properly in each side of the glass so that the ink will distributed equally on the glass slide. The ink is rolled on the glass slide. Paper was kept on the floor for taking footprint. Each individual put their foot on the glass slide and applied some pressure so that the print will be imprinted on the paper properly. After taking footprint name is written on the paper with his gender. This whole procedure is done for each individual with their name and gender. Total 10 samples are obtained from males for further analysis.

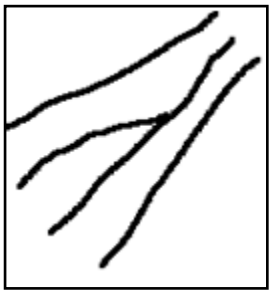
After taking footprint of males, all females are collected at the fingerprint lab. All the females students remove their shoes and cleaned their foots to prevent any dust and soil. The age of females group are 20, 21, and 22. They had also creases in their foot. The footprint of right leg is taken from each individuals.

The glass slide is put down on the floor and the ink is applied on the glass slide. The ink is equally distributed on the glass slide that is ink is properly mixed on the glass slide. The roller was used for the ink distribution on the glass slide. The paper was kept down on the floor for taking the footprint. One female put her foot on the glass slide and apply some pressure for proper footprint. After she kept her foot on the paper and apply appropriate pressure. Then remove her foot from the paper so that it will not disturb the footprint. This same procedure is done for each individual. By this process the samples of females are obtained.

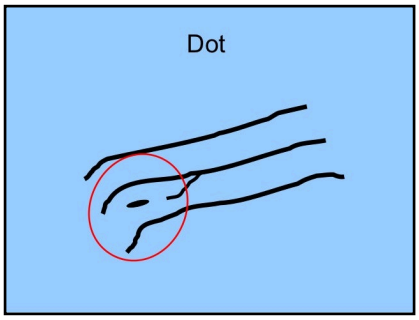
This both samples are taken from the known gender for the further analysis. In each samples the characteristics of the samples are analyzed.

Now the samples are collected from unknown gender. Again the glass slide is kept on the floor and ink is applied on the glass slide. The footprint of 5 individuals are taken without knowing theirs gender. They put their foot on the glass slide and applied pressure on the glass slide for taking footprint. After they kept their foot on the paper and imprint their footprint on the paper. In these five samples, the names and gender are not noted down on the paper.

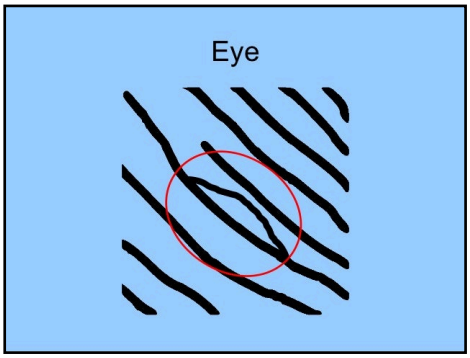
Now the samples are analyzed from both known and unknown samples. For the analysis of footprint, various characteristics of footprint are taken. The characteristics of footprint are taken for the analysis of this samples are BIFURCATION, DOT, EYE, SHORT RIDGES, BRIDGE, CROSS OVER, DELTA etc.



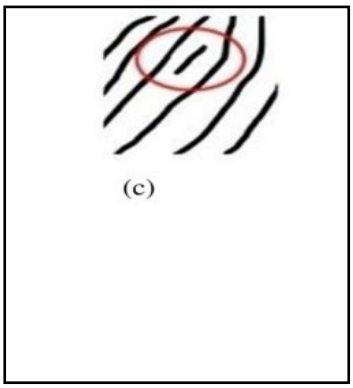
Bifurcation



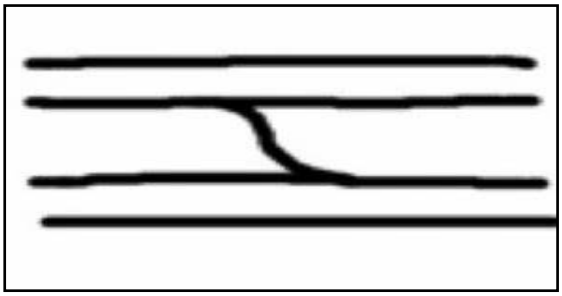
Dot



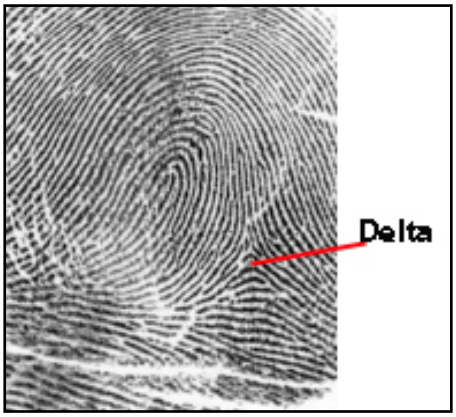
Eye



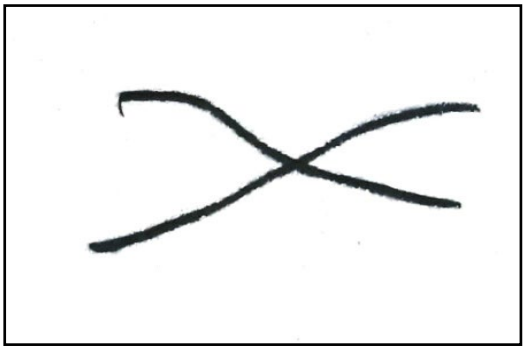
Short ridge



Bridge



Delta



Cross over

CHAPTER V

Observation

Observation Table :-1: Male Footprint Details

MALE	Bifurcation	Eye	Dot	Bridge	Short Ridge	Cross over	Delta
1	26	11	5	8	6	2	2
2	30	13	35	4	22	2	5
3	23	11	6	6	25	0	5
4	32	6	4	9	0	1	4
5	24	5	9	4	12	1	4
6	33	6	4	1	4	1	4
7	23	7	13	3	17	1	4
8	26	7	2	1	2	0	1
9	30	6	14	3	39	1	4
10	32	11	3	5	4	1	4
AVERAGE	**27.9**	**8.3**	**9.5**	**4.4**	**13.1**	**1**	**3.7**

Observation Table-2: **Female Footprint Details**

FEMALE	Bifurcation	Eye	Dot	Bridge	Short ridge	Cross over	Delta
1	29	12	11	5	12	3	2
2	36	14	3	2	7	3	3
3	23	9	8	5	8	3	3
4	20	12	5	3	10	0	5
5	31	12	6	5	8	2	2
6	27	10	8	3	7	4	3
7	19	10	8	1	4	0	3
8	31	9	5	3	7	2	3
9	37	11	8	2	18	2	2
10	34	8	17	2	10	3	3
AVERAGE	**28.7**	**10.7**	**7.9**	**3.1**	**9.1**	**2.2**	**2.9**

Observation Table -3: Unknown Gender Details

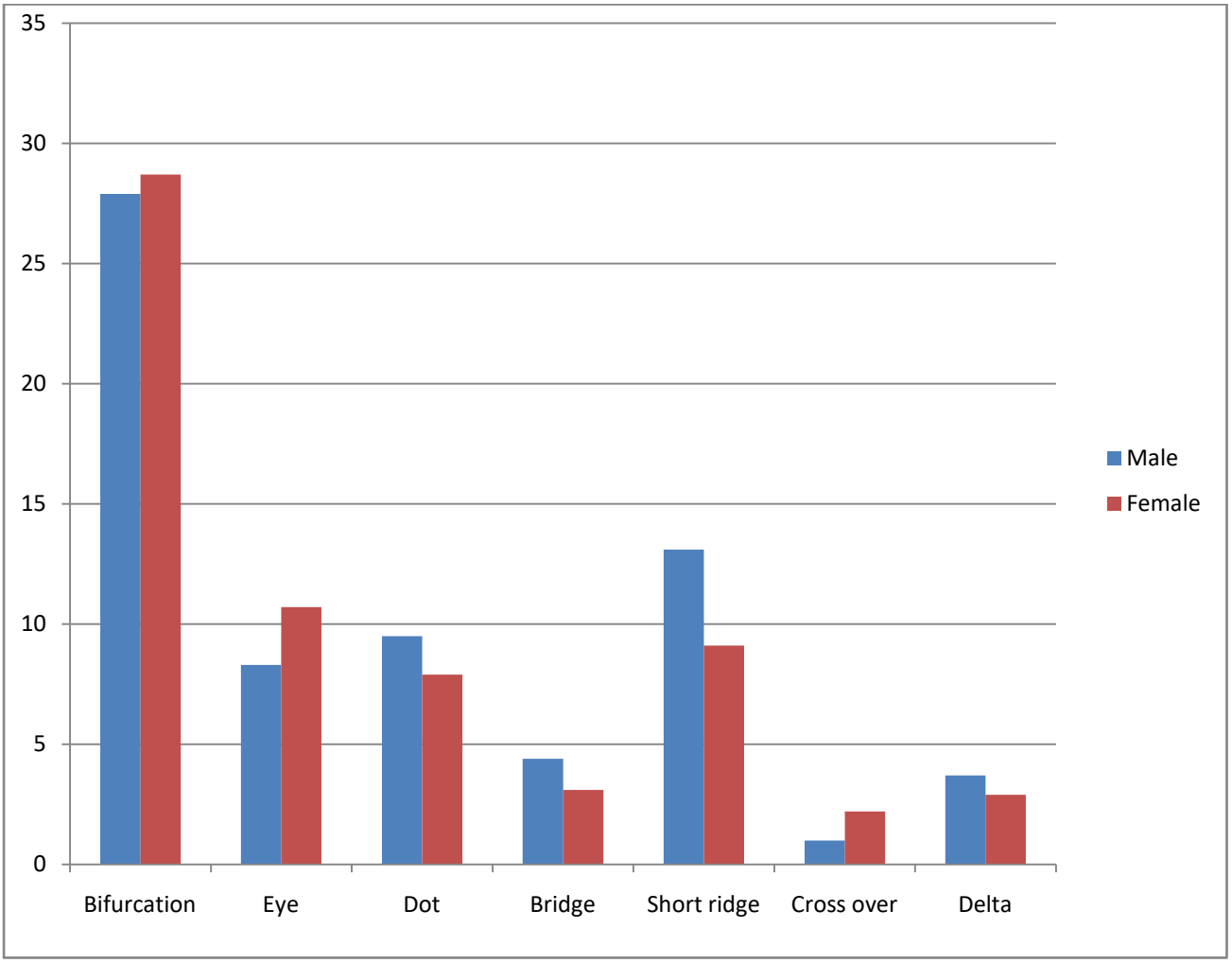
UNKNOWN GENDER	Bifurcation	Eye	Dot	Bridge	Short ridge	Cross over	Delta
1	28	7	5	2	7	2	4
2	42	7	11	1	8	3	6
3	16	9	3	0	2	1	4
4	19	4	5	1	6	1	2
5	21	3	4	2	5	2	4

Observation Table- 4: Gender Determination of Unknown Samples

Sample	Bifurcation	Eye	Dot	Bridge	Short ridge	Cross over	Delta	Gender
1	F	M	F	F	F	F	M	F
2	F	M	M	F	F	M	M	M
3	M	M	F	F	F	M	M	M
4	M	M	F	F	F	M	F	F
5	M	M	F	F	F	F	M	F

F= Female

M= Male



Graph:- Blue color represents the footprint characteristics of male.

Red color represents the footprint characteristics of female.

Sample 1 Sample 2 Sample 3 Sample 4 Sample 5

Sample 6 Sample 7 Sample 8 Sample 9 Sample 10

Figure.1:- Male footprint

Sample 1 Sample 2 Sample 3 Sample 4 Sample 5

Sample 6 Sample 7 Sample 8 Sample 9 Sample 10

Figure.2:- Female footprint

Sample 1

Sample 2

Sample 3

Sample 4

Sample 5

Figure.3:- Unknown Sample

CHAPTER VI

Result And Conclusion

Result:

The various characteristics of footprint are analyzed of different students of known gender. All the footprint characteristics are counted in each members of known and unknown gender. The following characteristics are BIFURCATION, EYE, DOT, BRIDGE, SHORT RIDGE, CROSS OVER, DELTA. The number of Bifurcation in males are 27% , while in female it is found as 28%. So it is concluded that the bifurcation pattern in males are less than females. The number of Eye pattern in males are as 6%, while in female it is found as 10.5%. Therefore, it is decided that eye pattern in male is less than female.

Dot pattern has 9.8% in males and 7.1% in females. So, the number of dot pattern in males is high than females. The Bridge pattern has 4.8% in males and 3.9% in females. Therefore, the number of bridge pattern is more in males than females.

The number of Short ridge pattern in males is 13.8% and 9.5% in females. It is concluded that short ridge pattern is more in males than females. The number of cross over characteristics in footprint is 1.5% in males and in females it is found as 3.5%. Therefore, the number of cross over pattern is less in males than females.

The last characteristics in this project which is Dot characteristics found to be 4.5% in males and similarly in females it is found to be 3.8%. Therefore, total number of delta pattern in males is more than females.

In the above graph, few of the characteristics of footprint are analyzed and statistical data are represented for the gender determination on the basis of number of foot characteristics are found in each individuals and then the average of all the characteristics of footprint of both males and females are calculated.

All the samples are analyzed individuals on the basis of their characteristics of footprint. It is found that number of Bifurcation in more in males and the number of eye is more in females. The other

Characteristics of footprint also vary from male to female. The unknown samples are analyzed by the comparing from the average value of the characteristics of known footprint. Each footprint characteristics are individually compared with the known characteristics of footprint. By the analysis of five unknown samples, the number of characteristics of footprint vary from male to female. Hence 3 samples are female and 2 samples are from males.

Conclusion:

The conclusion of this practical is that we can determine the sex of the gender from the footprint. The number of characteristic of footprint vary from gender to gender. By the analysis of sex determination of footprint we can determine any footprint of gender which can found at the crime scene. The identification of gender can be done by footprint.

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