Original Research Paper

Role of Foot Impressions and Boot Marks A Comparative Evaluation on Soft and Hard Materials

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Abstract

The foot print of a suspected person is valuable Forensic evidence along with other evidences at the place of crime scene investigation. The foot print can be studied by anatomists, anthropologists, physicians, podiatrists and orthopaedicians. Foot can be studied by foot prints and shoe prints. Present study conducted to ascertain the foot impressions and boot marks as means of identification of individuals, to compare dimensions of foot impression and boot mark on papers and POP casts and to know the value of POP cast footprint. The foot prints are lifted by POP cast from the crime scene. The foot prints of suspects can be taken on soft and hard materials for comparison. The evidence on a hard material is difficult to carry as compared to soft materials however both are equally important. Foot prints are found more common in the rural areas mainly in the fields because of mud. It is difficult to find foot print on the cemented structures in urban areas.

Key Words: Foot prints, Crime scene, POP cast, Shoe prints, Evidence, Rural areas

Introduction:

Crime scene investigation requires positive identification of the foot prints evidence left at the crime scene by the criminals. Forensic experts should lift the foot print evidence from the scene of crime, and then they should be able to match the foot sprints taken from suspects to make a logical and scientific opinion regarding the evidence. The foot print of a person from a fresh foot mark should be lifted and then compared with the suspected person for identification. During examination careful note should be made regarding flat foot, scars from wounds or callosities. In case of boot mark the arrangement of nails and holes in the sole are important. Foot prints produced while walking are larger than the foot prints while standing.

The skin pattern of the toes and heels and flexion creases are permanent and distinct so some maternity homes take the foot print on paper of newly born for a permanent record. [1]

The footprints records are maintained for all air force flying personnel in most countries since feet often resist destruction by air craft accidents and fire etc. [2]

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Aims and Objectives:

- To ascertain the foot impressions and boot marks as means of identification of individuals,
- To compare dimensions of foot impression and boot mark on papers and POP casts and
- To know the value of POP cast footprint.

Material and Methods:

Present study was conducted on the foot impressions of 60 students' bare footed and same 60 students with shoe studying in Maharishi Markandeshwar University, Mullana. Students of both sexes and with any abnormality of foot/lower limb were included in this study

Materials which were used in the study were plaster of Paris having consistency of cream, Mud, Black painters ink, Paint brush, White sheet, Metal scale, Lab tray and Tissue paper. The procedure was explained to the subject and consent was taken. Subject was asked to stand on mud with both feet straight and leave the impression. (Fig. 1)

The prepared POP of consistency of cream was gently poured over the impression, after 10-15 minutes cast was set completely and then POP cast was removed. (Fig. 2)

The same subject was asked to give the second impression. Black painters ink was applied over the both feet uniformly and subject was asked to stand on the white sheet with both feet straight to leave a clean impression. (Fig. 3)

The same procedure was repeated with the subject wearing shoes. (Fig. 4-6) Now the dimensions of POP casts and impressions taken on white sheet of both subjects (with shoes and without shoes) were measured in centimeters, compared and analyzed statistically.

Results:

In this study, Out of total 60 subjects, maximum subjects were 18 years of age comprising 28.3% of total subjects and minimum subjects were of 26 years age, comprising 5% respectively. Mean age of the subjects was 21.22 ± 2.847 years. (Table 1) In our study 50% of total subjects were male and same 50 percent were females whose samples of foot were taken with shoes and without shoes on POP cast and paper. (Fig. 7) Our study showed positive correlation (Table 2)

- Between the length of right foot taken on paper print and length of right foot taken on pop cast. (Correlation = 98.5%)
- Between the length of left foot taken on paper print and length of left foot taken on pop cast. (Correlation = 99%)
- Between the breadth of right foot taken on paper print and length of right foot taken on pop cast. (Correlation = 94.3%)
- Between the breadth of left foot taken on paper print and length of left foot taken on pop cast. (Correlation = 94.1%)
- Between the length of right foot with shoes taken on paper print and length of right foot with shoes taken on pop cast. (Correlation = 99.6%)
- Between the length of left foot with shoes taken on paper print and length of left foot with shoes taken on pop cast. (Correlation = 97.1%)
- Between the breadth of right foot with shoes taken on paper print and breadth of right foot with shoes taken on pop cast. (Correlation = 97.3%)
- Between the breadth of left foot with shoes taken on paper print and breadth of left foot with shoes taken on pop cast. (Correlation = 92.2%)

Discussion:

Foot pints present at crime scene are helpful in knowing the age, sex and height of the criminal. Kennedy studied the uniqueness of bare foot impressions. He constructed a computer data base using inked bare foot prints from volunteers.

The data consisted of 19 different measurements and tracing of impression of each foot. The data base consisted of 4000 impressions. [3]

Kersholt concluded that trace evidence was more important in legal cases. He investigated shoe print examination and found the differences that exist between beginners and experienced examiners. 12 examiners assessed between a shoe print and a shoe for 8 different cases. A complex case was that when the perpetrator rotated his foot and a simple case was that impression was clear. [4]

Zeybek studied stature and gender estimation in foot measurements. Gender estimation formulas were made from 249 subjects using the length, width, malleoli height, navicular height and measurements of right and left foot. Gender estimation formula was developed with accuracy 95.6% for right foot and 96.4% for left foot. [5]

Sen and Ghosh studied the foot prints of 350 adults Rajbhanshi and 100 adults Meche individuals for estimation of stature from foot length and foot breath. [6]

Krishan analyzed 2080 bare foot prints of 1040 adult male Gujjars of North India ranging the age from 18 to 30 years. [7]

Kanchan et al studied the stature, foot length and foot breath of 200 subjects comprising 100 males and 100 females. [8] Moorthy studied the foot prints of Malaysian athletes and non athletes for application during Forensic comparison.

It indicated that the parameters such as foot print length, inter-metatarsal distances and flat index are somewhat different between athletes and non athletes. [9]

References:

1. **Mathiharan K and Patnaik AK**. Modi's Medical jurisprudence and toxicology.23rd edition. New Delhi, Lexis Nexis Butterworths; 2005. P. 323-324.
2. **Parikh CK**. Parikh's textbook of Medical Jurisprudence, Forensic Medicine and Toxicology. 6th edition. New Delhi. CBS publishers and distributors Pvt. ltd; 2011; p 2.16
3. Kennedy **RBA.** Uniqueness of bare feet and its use as a possible means of identification. **Forensic Science International** 1996 Sep; 82(1):81-87.
4. **Kerstholt JHA, Paashuis R, Sjerps M**. Shoe print examinations: Effects of expectation, complexity and experience. **Forensic Science International** 2007 Jan; 165(1):30-34
5. Zeybek **GA,** Ergur **I,** Demiroglu **ZA**. Stature and gender estimation using foot measurements. **Forensic Science International** 2008 Oct;181(1):54
6. **Sen J, Ghosh S**. Estimation of stature from foot length and foot breath among the Rajbanshi; An indigenous population of north Bengal. **Forensic Science International** 2008 Oct;181(1):55
7. **Krishan K**. Estimation of stature from foot print and foot outline dimensions in Gujjars of north India. **Forensic Science International** 2008 March;175(2):93-101
8. **Kanchan T, Menezes RG, Moudgil R, Kaur R, Kotian MS, Garg RK**. Stature estimation from foot dimension. **Forensic Science International** 2008 Aug; 179(2):241
9. **Moorthy N, Samsudin WNZWM, Ismail MS**. A study of foot prints of Malaysian athletes and non athletes for application during Forensic Comparison. Malaysian Journal of Forensic Sciences 2011; 2(1):29.

Fig. 1: Foot Impressions on the Mud Bare Feet

Fig. 2: Foot Impressions by POP CAST with Bare Feet

Fig. 3: Foot Impressions on the Paper Bare Feet

Fig. 4: Shoe Impressions on the Mud

Fig. 5: Shoe Impressions by POP CAST

Fig. 6: Shoe Impressions on Paper

Fig. 7: Sex Wise Distribution of the Study Subjects

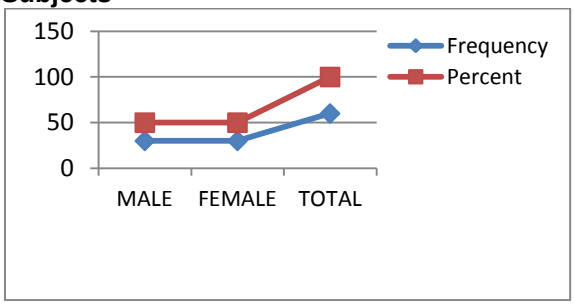

Table 1: Age Wise Distribution

Age (in years)	Frequency	Percent
18	17	28.3
19	10	16.7
20	2	3.3
22	6	10.0
23	7	11.7
24	9	15.0
25	6	10.0
26	3	5.0
Total	60	100.0