



E106 Analyzing Bare Footprints in Criminal Cases — Interpreting a Large-Scale Footprint Study in India

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After attending this presentation, attendees will understand the value of distinctive characteristics found in bare footprints and will help attendees comprehend the basics of analysis of bare footprints in criminal investigations in regard to linking (or unlinking) a footprint to a suspect.

This presentation will impact the forensic science community by presenting the detailed analysis of the bare footprints in terms of distinctive (and, at times, unique) characteristics studied on a large North Indian sample.

Bare footprints found at crime scenes may be impressed in various types of substrates and surfaces, such as rain-covered surfaces, newly carpeted and cemented floors, oil, mud, blood, dust, paint, sand, etc. These footprints may provide useful clues in the investigation of a crime. Previous studies have shown that footprints have distinctive characteristics that allow them to be matched to an individual and may have unique characteristics.¹ This distinctiveness is based on various, and, at times, unique, features in bare footprints.² This presentation is an outcome of studies conducted on adult male Gujjar populations inhabiting the Sub-Himalayan region of north India and on the students of Panjab University, Chandigarh, India, as part of major research project funded by University Grants Commission, New Delhi, India. The main objective of the research was to study the bare footprints of adults and describe the importance and utility of distinctive features of bare footprints in personal identification.

The study was conducted on 700 adults (500 males, 200 females) ranging in age from 18 to 30 years old. Various features of the bare footprints were analyzed, such as distinctive features of toes, humps in the toeline, phalange marks, flatfoot condition, pits, crease marks, cracks, corns, deformity, etc. The study also evaluated relative lengths of the toes, which provide valuable information on their morphology and divides bare footprints into different categories based on the relative morphological lengths of the toes: when $T1 > T2$, when $T2 > T1$, and when $T1 = T2 > T3$. The data indicates that the majority have type $T1 > T2$ (males: 55.0% on the left side and 51.4% on the right side; females: 57.0% on the left side and 60.0% on the right side), the next most common type is $T2 > T1$ (males: 39.4% on the left side and 38.8% on the right side; females: 34.5% on the left side and 33.5% on the right side); and the least common type is $T1 = T2 > T3$ (males: 5.6% on the left side and 9.8% on the right side; females: 8.5% on the left side and 6.5% on the right side). The study concludes that these characteristic features of bare footprints and relative lengths of toes can provide useful clues to help establish personal identity when complete or partial footprints are recovered at crime scenes and may assist with including or excluding the presence of an individual at the scene of the crime.

Reference(s):

1. Krishan K. Individualizing characteristics of footprints in Gujjars of north India. *Forensic Sci Int.* 2007; 169:137–144.
2. DiMaggio J.A., Vernon W. *Forensic Podiatry-Principles and Methods.* Springer, New York, Dordrecht Heidelberg, London: Humana Press, 2011.