E92 Association of Foot With Footwear: A Study of the Characteristic Features of Rubber Slipper Insoles

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After attending this presentation, attendees will understand the usefulness and methodology of associating footwear with the perpetrators in crime scene investigations and of conducting further research in this area.

This presentation will impact the forensic science community by presenting standards to identify the weight-bearing marks created and darkened by pressure, heat, and perspiration that may be left by the sole on the insole of the rubber slippers, which is helpful in matching the footwear evidence encountered at the crime scene.

Foot impressions are found as evidence and collected from almost all types of crime scenes and link the crime and the perpetrator. Comparison of the shape, size, or morphology of a foot impression has been successfully used in criminal investigations and in the administration of justice in the past. Due to the uniqueness of an individual's footprint, the impressions left on the insoles of the footwear can also be individualistic to that person. The impression on the insoles of the footwear depends on the pressure distribution under feet. This can be further correlated with the shape, size, angulation, interspaces of the toes, humps, creases, overall length of the foot, the contour of the ball, the shape and placement of the toe pads, the contour of the arch, accidental characteristics, deformities, corns, instep region, inner and outer margins of the foot, a particular habit of the person, and the body weight of the person. Due to the highly individualistic nature of the gait and foot morphology of a person, it can also be observed that the combination of gait and foot morphology should make the forces and areas of contact beneath the foot correspondingly highly individualistic.

Limited studies are available on the characteristic impressions of the sole of the foot on the insoles of the footwear. In the absence of any set standards of characteristic features of the foot inside the footwear, the identification of the criminal becomes difficult. This problem has prompted the present research. The main objective of the investigation was to identify the weight-bearing marks created and darkened by pressure, heat, and perspiration that may be left by the sole of the foot, including the toe pads on the insole of the rubber slipper. The study also compares the pattern on the insoles of the rubber slippers with the footprints of the person for identification purposes. The study is based on a random sample of 200 subjects and their rubber slippers (100 males, 100 females). The study has been conducted as a part of a major research project funded by the University Grants Commission, New Delhi, India. The target group was identified and a pair of rubber slippers was given to each subject for five months in the summer season. The subjects were instructed regarding the proper use of the slippers and certain precautions. After five months, the rubber slippers were collected from the subjects who were studied for various individual insole characteristics. Standing footprints were also taken from each participant, using the inking method for comparison purposes. Upon examination, in most cases, the ball and the heel regions displayed maximum weight-bearing areas of the foot and, consequently, a clear mark was left on the insole of the slipper. In many cases, the big toe and the instep region also revealed a variety of weight-bearing marks that may be well correlated with the foot impression of the person. Overall, the study concluded that the weight-bearing marks on the insole of the footwear may be helpful to a great extent in associating the footwear found at the crime scene with the perpetrator; however, while conducting this study, certain precautions were followed in the controlled conditions that will be discussed in this presentation.

Crime Scene Investigation, Footwear, Identification