

# Foot Pressure Distribution Variation in Pre-obese, Obese and Non-obese Individuals – Forensic Implications

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**Abstract:** The present commentary refers to recent research on the plantar pressure distribution variation in pre-obese, obese and non-obese adult individuals. While the studies observe significant changes in the contact area in the mid foot region i.e. instep region, no statistically significant differences were observed in the pressure distribution of the fore-foot and hind-foot region among the pre-obese and non-obese groups. Thus, the pressure distribution of the sole of the individuals depends upon the body weight of the individuals. In this commentary, we emphasize that the results of these studies; besides their clinical implications, have applications in forensic sciences especially in the field of forensic podiatry too which is concerned with the examination of pedal evidence recovered at the crime scene.

**Keywords:** Plantar pressure distribution, Forensic podiatry, Personal identification.

## COMMENTARY

Plantar pressure distribution is likely to provide useful information in clinical as well as forensic practice. This commentary refers a recent research on the plantar pressure distribution in pre-obese, obese and non-obese adult individuals [1-4]. While these studies observe significant changes in the contact area in the mid foot region i.e. instep region, no statistically significant differences were observed in the pressure distribution of the fore-foot and hind-foot region among the pre-obese and non-obese groups. In a study conducted by Cousins *et al.* [5], the foot patterns show significantly greater loading at the midfoot and 2nd-5th metatarsals in children. Arnold *et al.* [6] also conducted a similar study where impact of increasing body mass has been investigated under four different loading conditions i.e. 0, 5, 10, and 15 kg. They observed statistically significant increases in peak pressure between the 10 and 15 kg load conditions compared to the control (0 kg) within the heel and second to fifth metatarsal regions. It can be well interpreted from the above mentioned studies that the obese individuals showed flatter foot pattern, larger foot axis angle and differences on dynamic plantar pressures compared to the non-obese individuals (Fig. 1). In other words, in case of pre-obese and obese individuals, the instep region is more impressed than those of the non-obese individuals. Thus, the pressure distribution of the sole of the individuals depends upon the body weight of the individuals.

The results of these studies; besides their clinical implications, have applications in forensic sciences

especially in the field of forensic podiatry which deals with the examination of pedal evidence recovered at the crime scene. Various kinds of bare foot impressions are often recovered at the crime scenes. These impressions are inadvertently left in the blood, water, mud, and freshly made floors etc. The results of the study can be of significance in analysis of footprints for predicting the body size of the perpetrator. In this regard, the effect of additional weight on the footprints has been studied by researchers [7]. The dimensions of the footprints were significantly affected when the individuals were given additional weight of 20 kilograms. Significant changes in the contact area in mid foot regions between the pre-obese and obese groups as observed in the studies on plantar pressure distribution can give a clue to the body size from a footprint.

At times, footwear may be recovered from the crime scenes. The foot impressions on the insoles of the footwear are also studied during criminal investigations. These impressions available on the insoles of the footwear can be matched with the footprints available at the crime scenes. These patterns found on the insoles of the footwear are also individualistic to a person who wore this footwear [8]. The findings of research on plantar pressure distribution may be helpful in understanding the pattern on the insole of the footwear, and also supportive in interpreting the body size of the holder of the footwear.

The observations of the published literature on plantar pressure distribution pertain to static footprints since these studies were conducted on standing individuals. Since dynamic footprints are encountered frequently in real forensic situations, further studies on dynamic footprints are proposed. We propose that in future researches, foot pressure distribution of the non-obese, pre-obese and obese individuals can be compared and the results be interpreted in

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**Fig. (1).** Footprints showing impression of the plantar surface of the obese and non-obese individuals.

forensic terms. These studies would be helpful in predicting the body size of the individuals from the footprints, which may prove to be helpful during the criminal investigations.

### CONFLICT OF INTEREST

The author confirms that this article content has no conflict of interest.

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