

LETTER TO THE EDITOR

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# Loss of fingerprints: forensic implications

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## Abstract

Fingerprints have been successfully used for identification purposes for more than a century and remained one of the most commonly recovered evidence at the scene of crime. Due to their uniqueness and individualistic characteristics, the fingerprints are considered as the most powerful and widely used biometric characteristic. 'Adermatoglyphia' is a very rare condition where loss of fingerprints occurs. The present communication attempts to discuss the details of adermatoglyphia and its implications in the identification and recognition of individuals.

**Keywords:** Fingerprints, Biometric technology, Adermatoglyphia, Forensic identification

## Introduction and background

Biometrics is an integral part of our lives because of their utility as identification technologies in civil matters and in criminal investigations. Among the various methods employed in biometrics, fingerprinting popularly known as dactylography is the most commonly employed method of identification. Fingerprints are unique to individuals and no two individuals have been found to have similar fingerprints. Fingerprints appear in the intrauterine life and it is widely believed that they do not change during the life time of an individual. High degree of sensitivity and specificity thus, makes it the most popular method of identification in the modern day. In the times when fingerprint identification is used for attendance of the employees and secure entry into offices, immigration and security check for entry into another country, in financial transactions, and in identification by law enforcement agencies etc., loss of fingerprints can have serious implications. It is desirable that medical practitioners and investigators are made aware of the medical conditions where in fingerprinting as a reliable method of identification can appear to be imperfect.

## Adermatoglyphia and alterations of fingerprints

Absence or loss of fingerprints has been reported as a very rare condition called 'adermatoglyphia', often referred to as 'immigration delay disease' (Villacorta 2011). Loss of fingerprints is associated with Hand-foot syndrome (palmar-plantar erythrodysesthesia or

palmoplantar erythrodysesthesia or Chemotherapy-induced acral erythema), a common adverse effect of various chemotherapeutic agents (Al-Ahwal 2012). Cohen (2017) reported a drug associated adermatoglyphia in two women suffering from breast cancer who were treated with Capecitabine, an oral 5-fluorouracil prodrug. A similar case was reported by Chavarri-Guerra and Soto-Perez-de-Celis (2015) where a breast cancer patient treated with Capecitabine was denied authorization to perform a banking transaction due to loss of fingerprints. In another such case (Mazza et al. 2017); a 60 years old man suffering from rectal adenocarcinoma and liver metastasis developed adermatoglyphia when treated with Capecitabine. This European resident was unaware of the loss of his fingerprints, and was detained at the US airport for several hours. Other complicated syndromes such as Naegeli syndrome; an inherited skin disorder and dyskeratosis congenital; a bone marrow disease are also shown to be associated with adermatoglyphia (Groeger 2011). Nousbeck et al. (2011) discovered a gene SMARCAD1 associated with the loss of fingerprints and suggested that absence of fingerprints is autosomal-dominant phenomenon that occurs due to a mutation of the skin specific isoform of SMARCAD1.

Apart from adermatoglyphia, epidermal ridge atrophy and alterations may be seen in many cases of coeliac diseases, dermatitis, leprosy and after exposure to radiation (Reddy 2003).

## Forensic implications and conclusion

Adermatoglyphia and alterations of fingerprints can have serious medicolegal implications. In such a scenario,

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certification of the condition by the treating physician appears to be the way out to save the patient from any inconvenience. At the same time, the medical practitioners and forensic experts need to be cautious especially in the times when lawbreakers are known to make every effort to alter their fingerprints in an endeavor to conceal their identity. Whether the loss of fingerprints is temporary or permanent in these medical conditions is also important and something to closely watch for.

In situations of adermatoglyphia, occupational disappearance of fingerprints (in case of bricklayers and people whose job involves working with calcium oxide or lime) and intentional alterations of fingerprints by any means such as burning of fingertips and deeper cuts, surgical means etc. (Harmon 2009), the forensic practitioners need to be extra vigilant and watch whether these alterations have gone deep under the skin and damaged the fingerprint ridges or is it a temporary damage where the fingerprints/ridges will readily emerge on the finger balls after few days of the momentary damage. The forensic scientists should also rely upon alternative methods for identification like face recognition, iris or retinal scans can be utilized for identification in cases where fingerprint identification is difficult/ questioned. In the present world, where fingerprints as a biometric technology has been in use in a variety of government and private organizations, aviation and immigration, office access, military, operation of bank accounts, computers and mobile phone access and so on; the loss of fingerprints may have serious implications.

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#### Consent for publication

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