



DEVELOPMENT AND COMPARISON OF LATENT FINGERPRINT WITH THE HELP OF VARIOUS NATURAL PRODUCTS LIKE (MEHNDI, DRY ASH, FULLER'S EARTH POWDER) AT VARIOUS TIME INTERVAL

Swati Pathak and Munish Kumar Mishra

Department of Forensic Science, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj-211007, U.P, INDIA

ARTICLE INFO

Article History:

Received 10th July, 2019

Received in revised form 2nd

August, 2019

Accepted 26th September, 2019

Published online 28th October, 2019

Key Words:

Natural mehndi, Dry ash, Fingerprint, Forensic Science.

ABSTRACT

Fingerprint evidence is undoubtedly the most reliable and accepted evidence till date in the court of law. An examination was done to investigate the best suited method to recover fingerprint from glass and steel surface. This prospective study was conducted in the Department of Forensic Science, SHUATS and carried out over a period of thesis work. In this work physical method like, Natural mehndi powder, Fuller's earth powder and Dry ash powder was investigated. Donors intentionally placed fingerprint on the different non-porous surfaces like glass and steel surface. The result had shown that for the development of fingerprint steel was the best surface as it gave consistent result up to 60 days and the powder which gave best result on these surfaces was natural mehndi powder compared to dry ash and fuller's earth powders. The study has shown that the method selected for the development of fingerprint on non-porous surface had an influence on the quality of fingerprint developed and the result shown by these powders are satisfactory.

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INTRODUCTION

A fingerprint in its narrow sense is an impression left by the friction ridges of a human finger. The recovery of fingerprints from a crime scene is an important method of forensic science. Fingerprints are easily deposited on suitable surfaces (such as glass, metal, or polished stone) by the natural secretions of sweat from the eccrine glands that are present in epidermal ridges. These are sometimes referred to as "Chanced Impressions".

Types of Fingerprints

Patent Prints - are visible prints that occur when a foreign substance on the skin of a finger comes in contact with the smooth surface of another object.

Plastic Prints - are visible, impressed prints that occur when a finger touches a soft, malleable surface resulting in an indentation. Some surfaces that may contain this type of fingerprint are those that are freshly painted or coated, or those that contain wax, gum, blood or any other substance that will soften when hand held and then retain the finger ridge impressions.

Latent Prints - are fingerprint impressions secreted in a surface or an object and are usually invisible to the naked eye. These prints are the result of perspiration which is derived from sweat pores found in the ridges of fingers.

Types of Surfaces

Porous Surfaces: A surface that contain pore is refer to as porous surfaces. Objects containing porous surfaces have empty spaces or pores that allow external matter like water, air and particles to penetrate into the objects (Trozzi *et al.*, 2000).

Semi Porous Surfaces: The surfaces that absorb water and absorb soluble deposits in the sweat slowly after deposition are called as semi porous surfaces. These semi porous surfaces should be treated with processes intended for both porous and non-porous surfaces (Lennard *et al.*, 2005).

Non-Porous Surfaces: The surfaces that do not absorb sweats are called as non-porous surfaces. The fingerprint deposited on the surface will remain on the surface for the very long time.

Different Techniques used to Visualize Fingerprint

Powder Method: Fingerprint powder are used primarily for dusting non-porous surfaces such as glass and polished metal, most commonly to reveal latent fingerprints on immovable objects at crime scenes. Visualization will occur via reflected light, absorbed light, luminescence (florescent powder) & magnetic powder method (Lee and Gaensslen (2011). The black powder composed of black carbon or charcoal is applied

*Corresponding author: Swati Pathak

Department of Forensic Science, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj-211007, U.P, INDIA

to white or light-coloured surfaces. The grey powder is used on dark coloured surfaces. Magnetic powder is used to non-porous surfaces such as leather, wood, paper and cardboard. Some of the natural products like- natural mehndi, dry ash, fuller’s earth powder they can also show significant result in development.

In the present scenario, various types of modus operandi for committing crime have been emerged very high in our society. Although, the modern and advanced technologies have facilitated us for investigation and identification of the suspect. The investigative techniques evolve the modern or synthetic methods for the succession of cases and exists in the tradition of practice.

Natural product can also be used for the development and can give good result as their chemical composition have something in it which helps them to give colour to the latent fingerprint on non-porous surface. Secondly the time interval up to which the development of fingerprint took place was only up to 7 to 10 days by the household powder no work was extended up to 60 days by natural or household powder, so this also helps in getting a better result for a longer period of time and can help the investigator to solve the criminal cases of older time.

METHODOLOGY

Sample Collection

In this study, fingerprint from fingerprint donor was taken on the non-porous surface i.e. on glass and steel surface. A total of 144 fingerprint was taken from the donor simultaneously on the surfaces.

Sample Examination

With the help of camel hair brush fingerprint was developed for the interval of 60 days by using natural powder i.e. fuller’s earth powder, natural mehndi powder, dry ash powder on non-porous surface i.e. glass surface and steel surface. Fingerprint were developed at the interval of 10 days i.e. up to 60 days. The developed latent print was examined using magnifying glass and photographed. All prints were examined, assessed, scored and compared according to fingerprint quality assessment scale means on the basis of visibility of developed fingerprint (Castello’et al. (2013)., Soltyszewski et al. (2017).

RESULTS AND DISCUSSIONS

This work has been carried out in the department of forensic science. After experiment the result obtained was as follows:



Fig 1 Fingerprint developed on glass surface by one of the natural products.



Fig 2 fingerprint developed on steel surface by one of the natural products

Table 1 showing developed fingerprint on glass surface on the basis of visibility

S.no	No. of days of development	Score for natural mehndi	Score for dry ash	Score for fuller’s earth powder
1.	10 th day	3	2	2
2.	20 th day	3	2	2
3.	30 th day	2	2	1
4.	40 th day	2	1	1
5.	50 th day	1	1	0
6.	60 th day	1	0	0

Table 2 showing developed fingerprint on steel surface on the basis of visibility

S.no	No. of days of development	Score for natural mehndi	Score for dry ash	Score for fuller’s earth powder
1.	10 th day	5	5	5
2.	20 th day	5	5	5
3.	30 th day	5	4	3
4.	40 th day	4	4	2
5.	50 th day	3	3	1
6.	60 th day	2	1	1

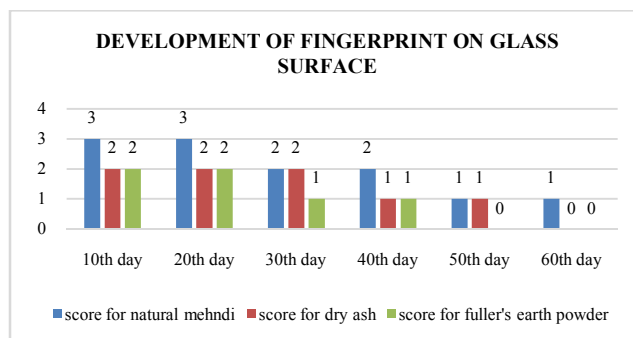


Fig 3 Combine graph showing development by Natural mehndi, Fuller’s earth powder, Dry ash powder on Glass surface

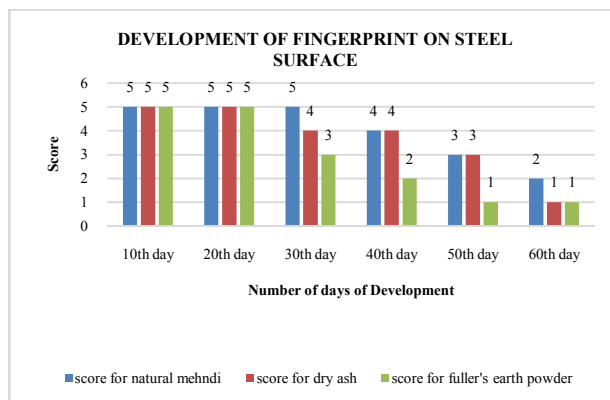


Fig 4 Combine graph showing development by Natural mehndi, Fuller’s earth powder, dry ash powder on steel surface

DISCUSSION

Fingerprint are considered to be a key role and the most valued tool in the crime scene investigation. The detection of latent fingerprint is practically a challenging analytical problem. Consequently, the current study was conducted to evaluate the possibility of development of latent fingerprint on non-porous surface like steel, glass using various natural products like natural mehndi, Fuller's earth powder, Dry ash powder.

The reduced quality of developed fingerprints with increasing the time elapsed since deposition may be explained in the light of the fact time; fingerprint composition changes through various chemical, biological and physical processes resulting in the aged composition (Cadd *et al.*, 2015).

Initial compounds are lost through various processes including degradation, metabolism, migration, oxidation and polymerization. The longer aging periods may result in greater degradation of fingerprint components (Girod *et al.*, 2012). The composition of fingerprints also changes over time that may affect the efficiency of development techniques (Girod *et al.* (2012)., Archer *et al.* (2005)., Croxton *et al.* (2010).

In the present study various fingerprint donors were asked to deposit their fingerprints on steel, glass surfaces. The fingerprint was taken at the same time on both the surfaces for all the natural powder taken for the development of the fingerprint. The development period is from 10th day to 60th day i.e. the first development was on 10th day then 20th, 30th, 40th, 50th up to 60th day. Scores from 1-5 were allotted as per the appearance of ridges and their clarity. As per the law of progressive change, fingerprint degrade by passing time due to various environmental factors so the score will also drop down as per the passing weeks. It was observed that maximum score was observed from 10 to 20 days and minimum score was observed in 50 to 60 days of print development by natural powder method.

CONCLUSION

This study was carried out with an objective to develop the latent fingerprint on non-porous surface at different time interval with the natural product taken to observe the time interval up to which the development took place. It was concluded that the natural mehndi powder come up with the best powder for the development of latent fingerprint compared to dry ash and fuller's earth powder and steel surface showed the developed fingerprint with clear ridges and good visibility compared to glass surface.

Acknowledgement

With an utmost degree of sincerity, I avail this opportunity to express my heartfelt thanks to my able and worthy Advisor-Dr. Munish Kumar Mishra, Assistant Professor, Department of Forensic Science, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, for this kind guidance and valuable suggestions in the completion of my work despite his schedule. My deep and sincere appreciation to my Chairman, Prof. Dr. P.W. Ramteke, Head of the Department of Biological Sciences, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, for taking keen interest in my work and giving his precious time in correcting and editing the thesis and encouragement. My duty is bestowing my deep and heartfelt sense of gratitude to my Co- Advisor Dr. Lav Kesharwani, Assistant Professor,

Department of Forensic Science, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, for his valuable suggestions and encouragement in the course of study. I am sincerely thankful to my first member Dr. Sunil Zacharia, Assistant Professor, Department of Plant Pathology, Sam Higginbottom University of Agriculture Technology Sciences and Technology, Prayagraj, for his keen interest and suggestions which were required for the completion of this thesis work. With the profound sense of gratitude, I offer my sincere thanks to my second member Dr. Poonam Prakash, Head, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, for her valuable guidance, consideration, suggestion and encouragement throughout the thesis work.

I don't have words to express my feelings and my whole hearted gratitude to my father, mother, brother and my dear friend for their external wealth of love blessings, the kind of support which they provided through my study

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