



## Development of Latent Fingerprints on Various Substrates under Wet Conditions by Powder Method (Rangoli Powders)

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### Abstract

#### Background

Latent Fingerprints or chance prints are found at crime scene on various substrates and one among them is wet conditions. There is an urgent need for the development methods as well as studies related to their persistency on wet conditions.

**Methods** The development of fingerprints by powder method was adopted for fingerprints found in various substrates.

#### Results

It is clear from the figures that on all the surfaces fingerprints could be developed after one day whereas on glass the fingerprints could not be developed after one day.

#### Conclusions

There are numerous techniques available for the development of fingerprints from various substrates under different conditions but hardly there are methods for development of fingerprints found in wet conditions. The present study deals with a powder method (rangoli colours) for the development of fingerprints found under wet conditions. The advantage of rangoli powders are that they are less expensive, non-toxic, and simple methodology of the development of latent fingerprints that can be employed on different substrates. Out of the five surfaces taken for study it has given successful results in all of them in which latent prints development was possible though found in wet conditions.

**Keywords:** Fingerprints, Rangoli powder, Development, Substrates

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### Background

The reproduction of patterns of the friction ridges on the distal phalanges of the finger and thumb is known as fingerprints [1]. Fingerprints are a positive way to prove that suspect was at the crime scene. Despite all the scientific advancements we have had, more so during the last couple of decades, no branch of science could even come close to fingerprints as far as identification of person is concern. There are different types of fingerprints recovered from crime scene, but the most common is latent fingerprints. Different types of powders have been used in the development of fingerprints like silica gel [10], turmeric powder [9], robin blue [8], fuller's earth [7], synthetic food & festival colors [6]. Latent fingerprints are invisible and they are the result of contact of the sweat pores located on the ridge surface. The simplest and the most common used procedure for latent print development is powder dusting. Powder dusting is the method of physical enhancement that relies on the mechanical adherence of latent fingerprint which renders the latent visible [2]-5]. The adhesive character of the powder is also another important factor to be considered in the selection of the powder. The powder selected should be fine grained, and of a colour that gives contrast with the background. In the present study authors have tried to develop latent fingerprint through rangoli powders in wet conditions. This type of work is not reported earlier and can be highly useful for the investigators encountering the cases or exhibits in wet conditions.

## Methods

Five surfaces have been chosen for the study. On each surface four latent fingerprints have been collected from different individuals. The subjects were asked to touch his/her forehead and face and then their fingerprints / and prints were taken. Four sets of five surfaces, impinged with latent fingerprint were immersed in water for one hour and then they are allowed to dry. Four sets for every surface is prepared to study the development of latent prints in various time intervals i.e. development is done after the prints are 30 min , 45 min, 60min and one day old.

The types of surfaces used were:

1. Glass
2. Polished iron plate
3. Deodorant can
4. Tile
5. Lock

Rangoli powders are finely crushed and sieved through fine cloth for getting fine powder. The method used here in the development of latent prints is powder dusting without using the brush as preliminary studies. Application of powder to the print by brushing is a simple and an easy technique but it also has disadvantage like the brush on coming in contact with the surface having the print, destroys the print and hence the ridge characteristics. In order to develop latent fingerprints with rangoli powder, few grams (10–50) of powders were

taken. The powder (as available in the market) is sprinkled over a surface and then excess of powder is removed by tapping in order to get a clear print. After this very lightly brush is applied on the print in the direction of print to enhance its clarity [6-9].

In order to develop fingerprint from rangoli powders three types of rangoli powders pink colour , green colour and yellow colour powders are taken from market having major component as calcium and silica with various minor substituent.

## Results and discussion

The result obtained from the present study using different rangoli colours on various surfaces (glass, polished iron plate, deodorant can, tile and lock) are shown in fig [1-9].

The results as shown in below figures are obtained when powder dusting method have been applied on different substrates using rangoli powders.

Different results are shown when development is done on various substrates depending upon the time of development. Initially after drying the sample the results were good on each surface but later on ridges are not clear depending upon the surface. It is clear from the figures that developed prints are of good quality and can be easily analyzed. It is clear from figures that on all the surfaces fingerprints could be developed after 1 day, whereas on glass the fingerprints could not be developed after 60 min and thereafter.



Fig.1:Developed Print on Tile after 30 Min



Fig. 2:Developed Print on Tile after 45 min

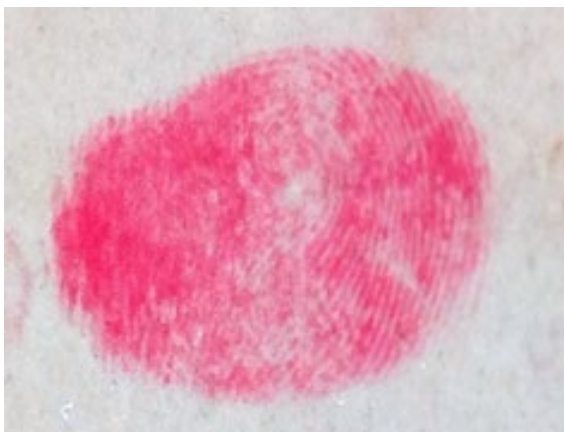
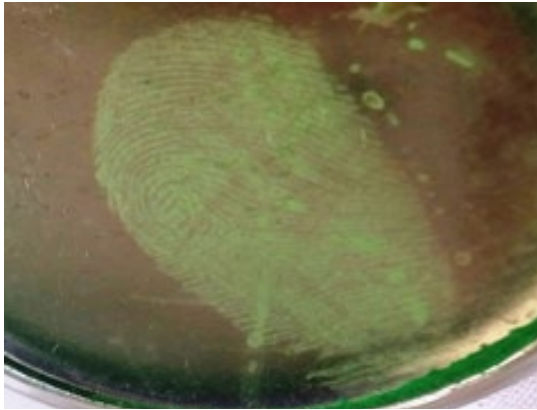


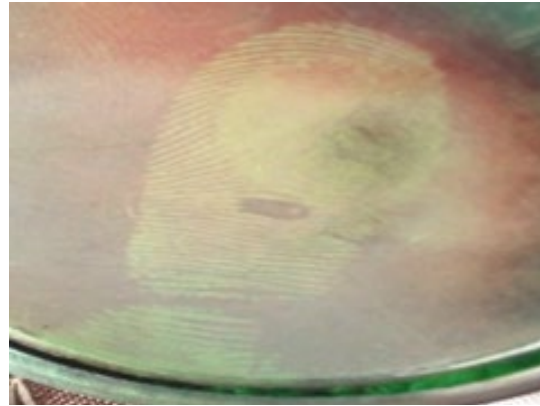
Fig.3:Developed Print on Tile after 60 Min



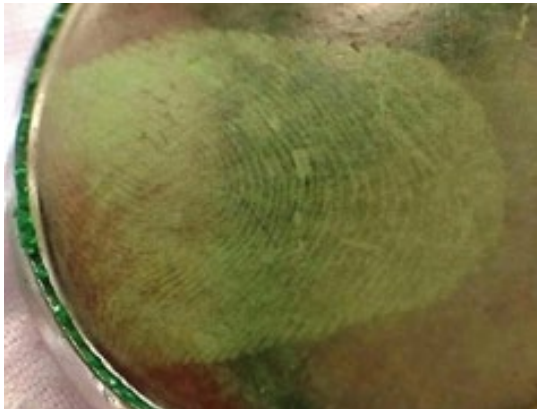
Fig.4:Developed Print on Tile after 1 Day



**Fig.5:**Developed Print on Lock after 30 Min



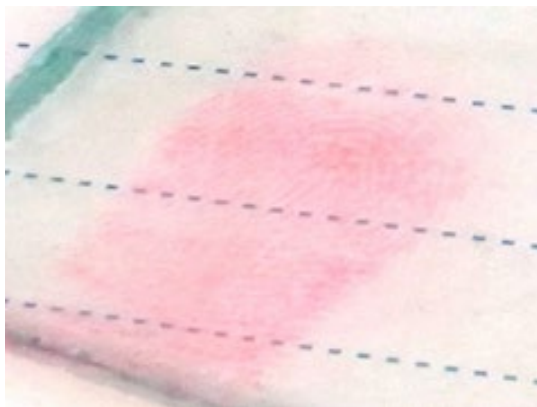
**Fig.6:**Developed Print on Lock after 45 Min



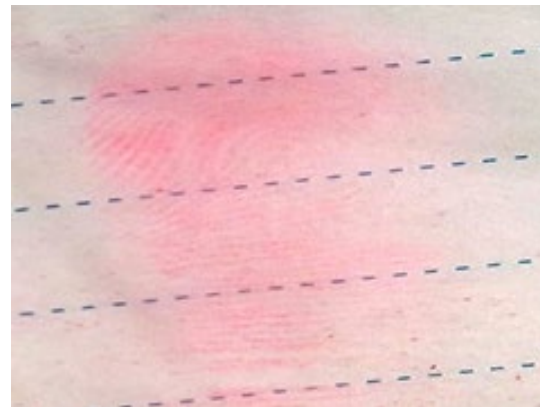
**Fig.7:**Developed Print on Lock after 60 Min



**Fig.8:**Developed Print on Lock after 1 Day



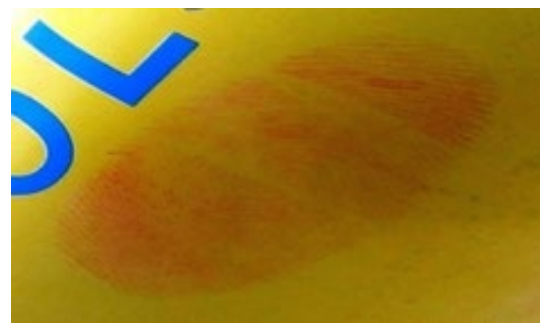
**Fig.9:**Developed Print on Glass after 30 Min



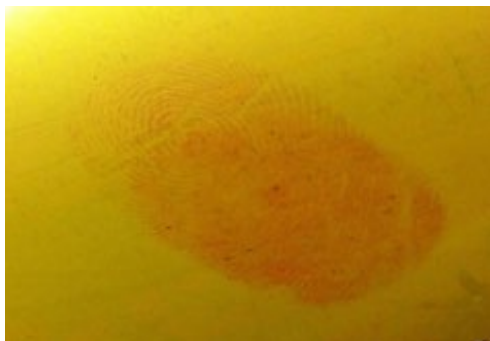
**Fig.10:**Developed Print on Glass after 45 Min



**Fig.11:**Developed Print on Glass after 60



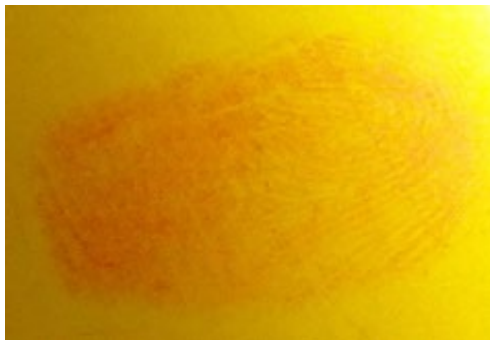
**Fig. 12:**Developed Prints on Deodorant Can after 30 Min



**Fig. 13:**Developed Prints on Deodorant Can after 45 Min



**Fig.14:**Developed Prints on Deodorant Can after 60 Min



**Fig.15:**Developed Print on Deodorant Can after 1 Day



**Fig.16:**Developed Print on Polished Iron Plate after 30 Min



**Fig. 17:**Developed Print On Plate after 45 Min



**Fig.18:**Developed Print on Polished Iron Plate after 60 Min



**Fig.19:**Developed Print on Polished Iron Plate after 1 Day

This preliminary observation indicates that the common agents like rangoli powders can also be used for the visualization of latent fingerprint in wet conditions on different substrates (tile, lock, glass, can and polished iron plate).

S.No.	Types of Surfaces	Development of prints after :			
		30 min	45 min	60min	1 day
1	Tile	Developed	Developed	Developed	Developed
2	Lock	Developed	Developed	Developed	Developed
3	Glass	Developed	Developed	Developed	Not developed
4	Tin can	Developed	Developed	Developed	Developed
5	Polished iron plate	Developed	Developed	Developed	Developed

**Table.1:** Developed Fingerprint on Various Substrates Under Wet Conditions

In the above experiment it is observed that these powders gave clear results on all the surfaces for one day except for glass. But still it is a good technique as even on glass it gave results for starting hour. It is a physical method of enhancement of latent print and works on mechanical adherence of fingerprint powder particles to the oily components of the skin ridge deposition. Further study with the respect of development of prints needs to be explored. It is expected that these findings will provide useful information as these agents are less expensive and easily available and can serve as a useful substituent.

### Conclusion

It can be concluded from the present study that rangoli powders can be used to develop latent prints from various substrates under wet conditions and gave considerable good results equivalent to the powders used by the standard method. Thus infallible evidences such as fingerprints should not be overlooked on physical evidences found in drainage water, pool, river, etc.

This study shows that fingerprints are common and easily available evidences at most of the crime scenes. Moreover it requires meager and less expensive techniques therefore it could be most useful methodology for the decipherment of latent prints deposited on different surfaces and found in wet conditions.

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