

## Original Research Article

**Assessment of Visualization of Fingerprints on Different Soft Surfaces: An Observational Study****Anis Ahmed<sup>1\*</sup>, Arun Sharma<sup>2</sup>, Jitendra Kumar Gupta<sup>2</sup>**<sup>1</sup> *Professor & Head, Department of Forensic Medicine, Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan, India*<sup>2</sup> *PG Resident (3rd Year), Department of Forensic Medicine, S. P. Medical College, Bikaner, Rajasthan, India***Received: 28-05-2021 / Revised: 15-06-2021 / Accepted: 04-08-2021****Abstract**

**Background:** Soft surfaces have very diverse chemical and physical types that allows for variation when being seen by forensics method. Fingerprints that are lifted with gel lifters can be seen using photography techniques for a thorough evaluation. The aim of present study is to assess the Visualization of Fingerprints on Different Soft Surfaces. **Materials and Methods:** The study included 5 different soft surfaces with variable composition. Some of the samples had more moisture while others dried easily. All of the samples were put upon the translucent sheet on the same day so that they were subjected to same time interval. The photographs were taken using alternate light setting. The materials that were used were adhesive Caulk, dentifrice, nail color, clay and Crafter's Acrylic. All the data was analysed using SPSS software. **Results:** The photographs were immediately visualised after initial deposit of fingerprinting. The caulking surface was seen, it was not uniform as the drying time was difficult to assess. The color was white and texture was thick. The paint was also not uniformly distributed due to physical properties. It was best seen under normal flood light. **Conclusion:** The VSC works on majority of the surfaces while gel lifters work on surfaces that retain moisture.

**Keywords:** Photographs, Fingerprints, Moisture, Visualisation.

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

**Introduction**

Soft surfaces have very diverse chemical and physical types that allows for variation when being seen by forensics method[1]. The differentiation is because of the difference in reaction of surface under different techniques and decreases the bias during the evaluation. As all the materials contain diverse properties, they undergo dissimilar methods of visualization. Gel lifters are mostly used to lift forensic proofs like fingerprints for easier carrying to the laboratory[2]. The contents of the gel lifters allow for lifting from most of the surfaces encountered, even porous materials like paper or cardboard. Fingerprints that are lifted with gel lifters can be seen using photography techniques for a thorough evaluation. The Video Spectral Comparator instrument is used to take photographs after the initial deposition of the thumbprint and after two weeks. The VSC is commonly used for documentation of investigations. The instrument allows lighting examination of the documents[3]. In the initial literature resource, the paper shows a non-destructive method for collecting and chemical identification of the latent prints[4]. In the second research by Simon Bunter it shows the amount of time a fingerprint can be stored on an exterior surface[5]. The research indicated that few prints in substances from food and linseed oil can be retained for over 2.5 years on a non-porous exterior. The aim of present study is to assess the Visualization of Fingerprints on Different Soft Surfaces.

**Materials and methods**

The present study was conducted in the department of forensic medicine over a period of 1 year. The study included 5 different soft surfaces with variable composition. Some of the samples had more moisture while others dried easily. The liquid component was evenly distributed in all except for modelling clay. All of the samples were put upon the translucent sheet on the same day so that they were subjected to same time interval. They were distributed uniformly with clean popsicle sticks. They were then dried to retain the print. Right thumb impression was taken, and it was dried and cleaned every time. A control print was taken with ink on paper and photo was taken with iphone. The samples were then analysed by Video Spectral Comparator. The photographs were taken using alternate light setting. The materials that were used were adhesive Caulk, dentifrice, nail color, clay and Crafter's Acrylic. All the data was analysed using SPSS software.

**Table 1: Materials used for examination**

S.no	Material
1	Caulk
2	clay
3	Nail Polish
4	Paint
5	Toothpaste

**Table 2: Light used to visualize thumbprints in different media**

S.no	Material	Light
1	Caulk	Oblique and transmitted light
2	clay	oblique left light
3	Nail Polish	UV light
4	Paint	normal flood light
5	Toothpaste	transmitted light

\*Correspondence

**Dr. Anis Ahmed**

Professor &amp; Head, Department of Forensic Medicine, Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan, India

E-mail: [aanisahmed9461@gmail.com](mailto:aanisahmed9461@gmail.com)

### Results

The materials that were used were adhesive Caulk, dentifrice, nail color, clay and Crafter's Acrylic. All the surfaces were visualised with Video Spectral Comparator. For, visualization, different alternating light sources were used. (Table 1)

The photographs were immediately visualised after initial deposit of fingerprinting. The caulking surface was seen, it was not uniform as the drying time was difficult to assess. The color was white and texture was thick. It was visible under both under both oblique and transmitted light. The clay surface print was best observed in the oblique left light after the deposit. The nail polish had white colour with reflective properties and so was difficult to capture and observed with UV light. The paint was also not uniformly distributed due to physical properties. It was best seen under normal flood light. The toothpaste had blue color and was easily placed on sheet. It was visualised under transmitted light. (Table 2)

### Discussion

The surface that has the fingerprint is very crucial as it can allow for quick and better techniques to be used when a fingerprint is found from a crime scene. The initial paper formed chemical structures of latent fingerprints that were collected by gel lifters from the different surfaces. The images were obtained at different depths with ATR-FT-IR with a differential angle ATR accessory to decrease disturbance from the surface. The research indicated a great potential for forensic investigations of things of interest.<sup>4</sup> In another study, the prints were able to be analysed without fingerprint powder enhancers indicating good quality and suitability for the identification procedures[6]. The results showed that various prints can be seen despite the weather and environmental situation they undergo[5]. In our study, the caulking surface was seen, it was not uniform as the drying time was difficult to assess. The colour was white, and texture was thick. It was visible under both under both oblique and transmitted light. The clay surface print was best observed in the oblique left light after the deposit. The nail polish had white colour with reflective properties and so was difficult to capture and observed with UV light. The paint was also not uniformly distributed due to physical properties. It was best seen under normal flood light. The toothpaste had blue colour and was easily placed on sheet. It was visualised under transmitted light. All of the materials used can be seen using the Video Spectral Comparator machine. This machine is commonly used for documentations in forensic science whereas this study has indicated the device can be used to examine prints on different soft structures with many of the alternating light things it pertains[6]. This will be of great usage when forensic investigations find a print on a surface that is not frequently seen at crime scenes. It will allow for better contrast and recognition of unknown to known prints.

### Conclusion

The VSC works on majority of the surfaces while gel lifters work on surfaces that retain moisture. Not much research has been done using techniques visualizing fingerprints on different the surfaces. The evaluation depends on the material used and their composition.

### Referneeces

1. Gray, Tosha. "Impact of Time, Weathering and Surface Type on Fingerprinting." Proceedings of The National Conference On Undergraduate Research (NCUR), 29 Mar. 2012, pp. 1–9.
2. "Gel Lifters - Black - 5.2' x 7.2' - 10/Pk." Arrowhead Forensics, 2018 Arrowhead Forensics, [www.arrowheadforensics.com/a-2915-gel-lifters-black-5-2-x-7-2-10-lifters.html](http://www.arrowheadforensics.com/a-2915-gel-lifters-black-5-2-x-7-2-10-lifters.html).
3. "Video Spectral Comparator - Eurofins Scientific." Eurofins UK, Eurofins Scientific 2017, 23 Nov. 2017.

4. Ricci, Camilla, et al. Spectroscopic Imaging of Latent Finger marks Collected with the Aid of a Gelatin Tape. Analytical Chemistry, 2007;79(15):5771–5776
5. Bunter, Simon. How Long Can an Identifiable Fingerprint Persist on an Exterior Surface?. pp. 1–21. CS Eye, Apr. 2014.
6. Ridamjeet Kaur, Komal Saini, N.C. Sood. Application of Video Spectral Comparator (Absorption spectra) for establishing the chronological order of intersecting printed strokes and writing pen strokes. Science & Justice 2013 ; 53(2): 212-9.

**Conflict of Interest:** Nil **Source of support:** Nil