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(RESEARCH ARTICLE)

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Examination of drying of fake blood vs original blood on different types of fabric

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Abstract

This study investigates the drying characteristics of synthetic and genuine blood on different kinds of fabric in order to comprehend the forensic consequences. Cotton, polyester, silk, rayon, and other textiles were treated with samples of both natural and artificial blood. To document variations in stain morphology, evaporation rate, and absorption was monitored in a controlled atmosphere. The findings show that while synthetic fibers like polyester dry more quickly because of their water-repellent qualities, natural fibers like cotton take longer to dry because of their higher absorption. It was also observed that actual and fake blood differed in visual traits such color, form, and clotting patterns. These results improve the precision of bloodstain interpretation by providing insightful information about crime scene analysis.

Keywords: Fake Blood; Fabric Absorption; Bloodstain Analysis; Natural Fibers; Synthetic Fibers

1. Introduction

Bloodstain analysis is a crucial piece of evidence in forensic science that helps reconstruct crime scenes [1]. The kind of fabric, the makeup of the blood, and the surrounding environment all affect how stains develop and change over time, and these factors all affect blood drying patterns. It's important to distinguish between real and artificial blood [7], especially since synthetic alternatives may be used in theatrical or staged crime scenes.

With an emphasis on absorption and visual stain attributes, this study attempts to assess the drying characteristics of real and artificial blood on various types of fabric. Forensic investigators can increase the accuracy of their investigations by better estimating the timing and authenticity of blood deposition by knowing how these fluids interact with fabrics.

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2. Materials and Methods

2.1. Research Design

The drying properties of artificial and genuine blood on different textiles were investigated using an experimental comparative approach [3]. The study was carried out in an environment with regulated humidity and temperature.

- Real Blood: Human blood ethically sourced from a certified lab [8].
- Fake Blood: Alta
- Fabric Types: Jute, Jegging, Rayon, Cotton Coir, Nylon, Denim, Cotton, Polyester, Silk, Net
- Swatch Size: 10 cm x 10 cm for uniform testing.
- Variables
  - Independent Variables: Type of blood (real/fake), type of fabric.
  - Dependent Variables: Color, Size, Shape/Pattern, Transmitting
  - Controlled Variables: Volume of blood applied

2.2. Methodology

- Swatches of fabric were spread out on a surface that wasn't absorbent.
- A dropper was used to drop equal amounts of fake and real blood
- Until the stains were dry to the touch, the drying time was tracked.
- We noted the stain's diameter, color, form, and clotting.
- Photographs were taken to record the observations.
- The mean and standard deviation were used in the statistical analysis [2].

3. Results

Table 1 Drying Time and Absorption Patterns

fabric	Blood type	Drying time	Absorption	Stain Appearance
Jute	Real	Long	High	Dark red, oval,crusted
	Fake	Moderate	Low	Light red, ellipse
Jegging	Real	Short moderate	Medium	Brown, irregular pattern
	Fake	short	Low	Red, circular, no transfer
Rayon	Real	Long	High	Wide spread, uneven
	Fake	Moderate	Moderate	Even drying, oval shape
Cotton coir	Real	Long	High	Maroon, circular, moderate transfer
	Fake	Moderate	Medium	Red cylinder-shaped
Nylon	Real	Short	Low	Slight spread, circular
	Fake	Very short	Low	Glossy, surface-level stain
Denim	Real	Moderate	Medium	Brown, circular, no transfer
	Fake	Moderate	Low	Orangish red, oval
Cotton	Real	Long	High	Dark, crusted, irregular
	Fake	Moderate	Moderate	Pink, uniform
Polyester	Real	Short	Low	Small, clotting observed
	Fake	Very short	Very low	Bright orange, blob shape
Silk	Real	Moderate	Moderate	Irregular, dark maroon
	Fake	Moderate	Moderate	Pinkish red, circular

Net	Real	Moderate	Low medium	Maroon, irregular shape
	Fake	Short	Low	Dark red, circular

3.1. Visual Morphology

- Real Blood: Showed crust formation, darker colors over time, and clotting.
- Fake Blood: Maintained gloss for a longer period of time and dried evenly with minimal texture alteration.

3.2. Transmitting Property

- The weave and fiber density had a minor impact on the transferability of both blood types.
- While tighter natural fibers better contained blood, the majority of synthetic fabrics displayed blood transfer

4. Discussion

4.1. Natural vs. Synthetic Fabrics

- Natural fabrics with porous structures, such as cotton absorbed more blood and dried more slowly [8]. Real blood had crusty textures and irregular edges because it clots and penetrated deeper. In contrast, fake blood dried more quickly but distributed more evenly since it lacked clotting qualities.

- Blood penetration was limited by the water-repellent properties of synthetic materials like polyester and nylon [9]. This led to quick-drying, superficial stains. Only real blood showed clotting, but synthetic blood produced glossier, smoother surfaces [10].

- The behavior of semi-synthetic materials, such as rayon and silk, was in between. Whereas silk restricted stains to limited regions, rayon permitted a wider spread. Visual clues for blood type identification were supplied by variations in stain size and shape.

4.2. Significance for Forensics

- Time Estimation: Reconstructing a criminal timeline is aided by longer drying durations in natural fibers [11]. which indicate earlier deposition.
- Differentiating Real from Fake Blood: Forensic specialists can determine authenticity by examining variations in clotting, color changes, and stain texture [12].
- Fabric-Specific Interpretation: Bloodstain pattern analysis (BPA) is improved by understanding how different materials affect blood behavior.

5. Conclusion

This study shows that the kind of cloth and blood composition have a substantial impact on the drying behavior of blood. Because they are more absorbent, natural fibers change the morphology of stains by forming crusts and clotting, which further delays drying. Because of their limited absorption, synthetic textiles dry more quickly. Key forensic indicators are provided by the noticeable differences in texture and appearance between real and synthetic blood.

The results highlight how crucial it is for forensic investigations to comprehend blood-fabric interactions. This information helps to improve the accuracy of BPA, identify fictitious crime scenes, and estimate the time of incidents. For more thorough understanding, future studies should examine wider environmental variances, bigger sample sizes, or various fake blood formulations

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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