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Effect of Cellophane Tape on The Quality of Fingerprints in Gender

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Structured Abstract

Background: Fingerprint evidence is widely used in forensic investigations due to its uniqueness and permanence, with identification success highly dependent on latent fingerprint quality. Cellophane tape is commonly used for lifting because it is practical and cost-effective, but differences in tape properties can affect print clarity. In addition, gender-related biological factors may influence ridge characteristics. Therefore, this study evaluates the effect of different cellophane tapes and gender on fingerprint quality to improve forensic reliability.

Methods: This study was conducted to compare the quality of fingerprints lifted using different types of cellophane tape and to determine whether gender influences fingerprint quality. Six donors (three males and three females) aged 20–25 years were selected, using the right thumb for consistency, and a total of 180 fingerprint samples were collected across different tape types, aging periods, and replicates. Fingerprints were deposited on ethanol-cleaned mirror surfaces and stored in an air-conditioned laboratory at 22°C for aging periods ranging from immediate processing to 28 days. The prints were developed using black powder and lifted with cellophane tape by the same person to ensure consistency. Fingerprint quality was scored from 0 to 5 based on ridge clarity and pattern visibility, and statistical analysis was performed to compare fingerprint quality between genders and between the two tape types.

Results: The findings demonstrated that different types of cellophane tape produced varying levels of fingerprint quality. Tape A showed better ridge clarity, while tape B resulted in partial ridge transfer or reduced visibility. In terms of gender comparison, fingerprints obtained from male showed better ridge detail retention across the lifting process than females. These variations may be influenced by differences in ridge structure and fingerprint residue composition.

Conclusion: In conclusion, the findings of this study indicated that tape A is slightly superior in preserving fingerprint quality compared to Tape B over a long-term period. This is evidenced by its lower rate of degradation and better data stability during the mid-phase (Day 7 to Day 21). Using the same adhesive, male samples yield more consistent forensic results when exposed to environmental factors over time.

Keywords: Cellophane Tape, Gender, Latent fingerprint, Male Fingerprints, Female Fingerprints

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