Journal of Forensic Research and Criminal Investigation
JFRCI, 1(1): 13-18
www.scitcentral.com

Original Research Article: Open Access

Efficacy of Benzidine Test in the Identification of Blood Stains Found on Different Fabrics after Washing for Consecutive Days

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Received May 09, 2019; Accepted May 13, 2019; Published January 22, 2020

ABSTRACT

The purpose of the study is to investigate the **Efficacy of Benzidine Test in the Identification of Blood Stains Found on Different Fabrics after Washing for Consecutive Days** and also to study the impact of benzidine on natural and Man-made Fibres washed with and without detergent in connection with other parameters in the study. The research design employed is experimental and explorative .The findings of the study revealed that benzidine is found effective in determining the blood stains from washed fabrics and there is an impact of detergent washing among natural and man-made fibres. The study also provides information on how many days blood stains could be detected from the samples and their variations when washed with and without detergent. The study also helps the investigating officer in finding out the fact that a particular fibre or fabric is used in crime commission or not.

Keywords: Blood stained fabrics, Detergents, Benzidine, Consecutive washing

NEED FOR THE STUDY

The study has been conducted to give more number of literatures on the topic and If the investigating officer gets any washed fabric to the scene of crime, in order to test the efficacy of benzidine on washed fabric helps the investigator to decide whether the particular fabric was used in the crime or not.

Research question

Is benzidine effective in finding out blood stains from washed fabrics?

Methodology

- Study is experimental and explorative.
- The study comprised 1000 samples including all factors.
- The study was to check the effectiveness of benzidine on washed fabrics and their varied effects when different factors like type of fabric , mode of washing, type of detergent and also the temperature is concerned.

Findings and significance

The findings of the study showed that benzidine as presumptive test is advisable in case of washed fabrics and the effect of reagent such as the extend of coloration and the time of reaction is marked by different factors like the type of fabric used, the detergent type and also consecutive washed do affect the reaction.

From the study it is possible to understand that stains could be detected even after washing for consecutive days and also it helps in finding out the differences in reaction when types of fabrics and mode of washing is concerned.

BACKGROUND

Forensic serology

The branch of forensic science dealing with the identification and examination of body fluids.

Benzidine test

Preliminary test for blood stain identification. Other examinations, like UV examination and other serological examinations like blood grouping and species identification.

Fibre

The smallest unit of fabric and important physical evidence at the scene of crime and the classification include natural

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Citation: D'Souza S & Menon PV. (2020) Efficacy of Benzidine Test in the Identification of Blood Stains Found on Different Fabrics after Washing for Consecutive Days. J Forensic Res Criminal Investig, 1(1): 13-18.

and manmade fibres.

Detergents

Detergents are alkyl benzene sulfonates that shows cleansing properties in dilute solutions.

REVIEW

The main three reviews that helped my study:

"Enhancement of bloodstains on Washed Clothes Using Luminol Reagent and LCV reagent" by Adair and Shaw in 2005.

Firiyal et al. conducted a study on the "Detection of Dry Blood Stains on Different Fabrics after Washing with Commercially Available Detergents" in 2015.

Oldfield et al. conducted a study on the "Efficacy of Luminol in Detecting Blood Stains that have been Washed with Sodium per Carbonate and Exposed to Environmental Conditions" in 2018.

AIM

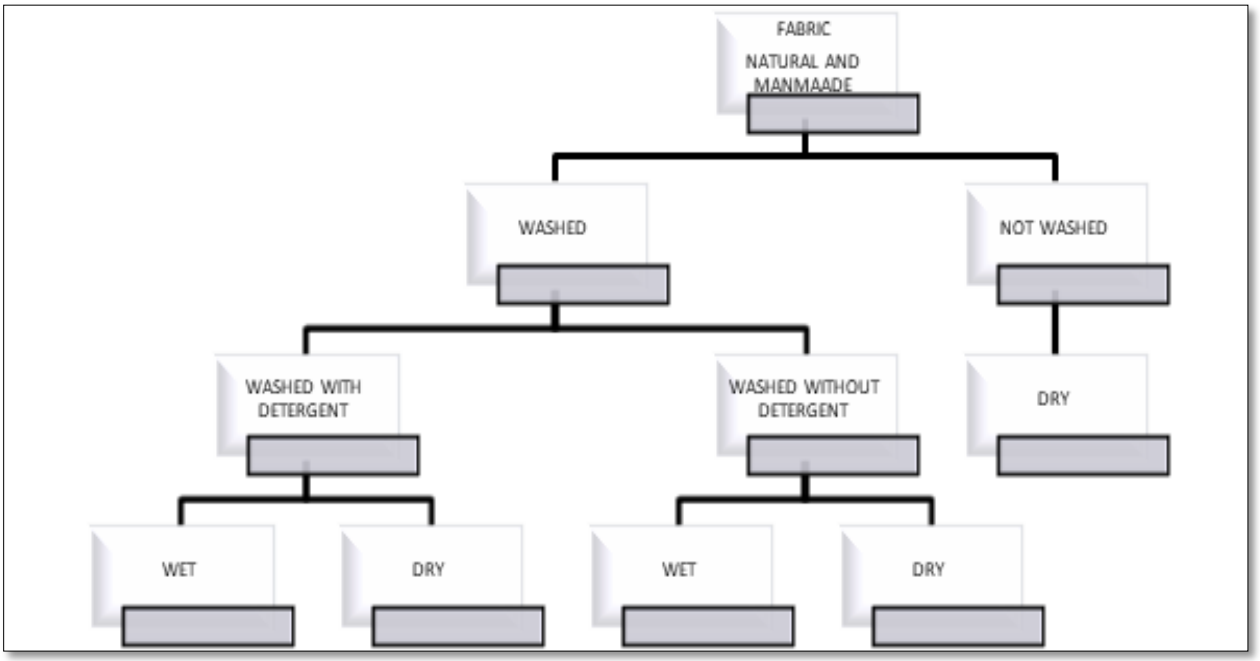
To know the efficacy of Benzidine on different types of dried blood stained fabrics by repeatedly washing with and without detergent for consecutive days.

OBJECTIVES

- To know the efficacy of Benzidine on different dried blood stained fabrics.
- To know the impact of Benzidine on blood stained fabrics on consecutive days.
- To find out the impact of Benzidine on dried and wet samples in consecutive days.
- To differentiate the impact of Benzidine in blood stained fabrics with and without detergent.
- To determine the sensitivity of Benzidine test on natural and manmade fabrics.
- To determine the number of days where the blood stains could be detected from specific fabrics.

RESEARCH DESIGN

An experimental and explorative research design was employed **(Flowchart 1)**.



Flowchart 1. Types of fabrics- Natural and man-made.

Pilot study

1. The effect of detergents on blood stained fabrics and other substances using benzidine reagent.
2. Efficacy of benzidine on blood stained fabrics after washing at regular intervals of time.

Samping technique

The method through which the samples (fabrics both natural and man-made) have been categorized and this gives the total number of samples.

Total number of sample for 25 days was 1000.

Materials required

- Blood (Goat)
- Fabrics in natural Fibres (cotton, silk, wool, khadi, jute) and manmade fibres (spun, nylon, synthetic, polyester, chiffon)
- Commercially available detergent (Ariel)
- Benzidine
- Glacial acetic acid
- Hydrogen peroxide
- UV light
- Microscope
- Beakers
- Droppers
- Scissors
- Measuring tape
- Different coloured plastic mugs
- A plastic rope
- Paper clips
- A4 sheets and colour charts
- Writing materials

Procedure

Sample preparation:

- Types of fabrics of natural and manmade origin were cut in the dimension 15 × 20 and was soaked in blood and dried for a period of 24 h.

Preparation of benzidine reagent:

- 10%benzidine in glacial acetic acid
- Hydrogen peroxide-3% solution

Conduction

- After 24 h the clothes were hand washed using a table spoon of detergent and without using detergent for a period of 3 min.
- After washing immediately a small portion (3 cm) of the fabrics has been cut and was tested using the Benzidine reagent (wet samples).
- Later, the samples were dried at room temperature on a plastic rope and after 24 h the samples from each piece of fabric has been cut and tested (dry samples) using the Benzidine reagent.
- The samples were then washed again and the procedure was continued for consecutive days and the results like the coloration, reaction time and the temperature has been noted.

Figure 1 is showing the method of conduction that is the fabrics (both natural and manmade) were cut and marked as washed with and without detergent along with the control samples (unwashed).

Figure 1. Shows the method of conduction on both the fabrics- natural and manmade.

Figure 2 is the use of benzidine reagent on the above marked fabrics for the result like the extension of coloration and the time of the reaction.

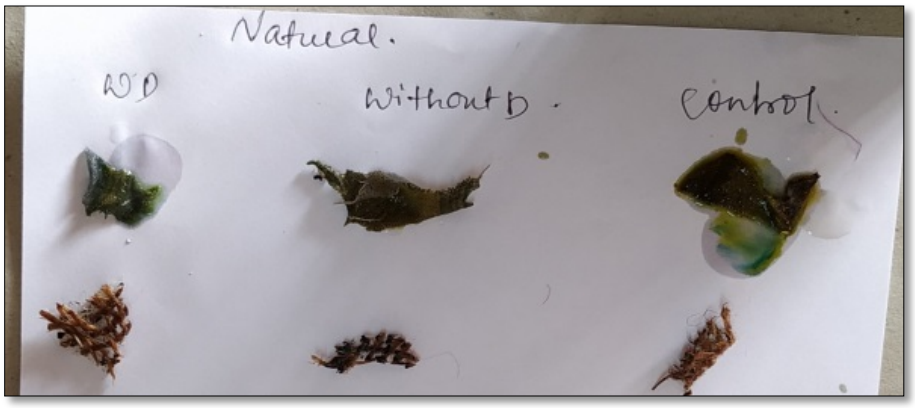


Figure 2. Shows the use of benzidine on both the fabrics- natural and manmade.

The **Figures 1 and 2** shows:

- For the fibres listed above microscopic examination and UV examination has been done as the stains were not visible on the fabric as a result of consecutive washing. The fabrics polyester and nylon were giving florescence under the UV light and there were no changes found under microscopic examination. Both the examinations were done with the control samples and unstained fabrics for comparison purpose.

LIMITATIONS

- Time constraint
- Less number of samples were used
- Liquid blood has been used
- The study was limited to a few type of fabrics
- Washing variations were not considered
- Only one type of detergent was used
- Time consuming
- The sampled fabric was not sufficient to continue the study
- Benzidine test is not a confirmatory test for blood

MAJOR FINDINGS

- Benzidine reagent was found effective in determining blood stains on both natural and manmade fibres.
- There was a noticeable impact of consecutive washing on blood stained fabrics.
- As the fabrics were washed daily the rate of the reaction and the color was found different.
- There was no noticeable impact of benzidine on wet and dry samples as the reaction showed same extend of coloration within the same time.
- There was a noticeable impact of benzidine on the blood stained fabrics washed with and without detergent because fabrics washed using detergents showed reaction for less number of days as compared to the fabrics washed with water.
- The sensitivity of benzidine was different for natural and manmade fabrics.
- Natural fabrics for example cotton and khadi showed positive results for more number of days even after washing with detergent as compared to other natural fabrics.
- Manmade fabrics are less absorbents and they discharge the stains faster than natural fiber on consecutive washes. Thus natural fibres are more sensitive compared to manmade fibres.

SUGGESTIONS

- The study could use different fabrics other than those used in the study like other natural fibers and man-made fibres.
- The extend of washing for example the time taken for washing could be increased.
- The mode of washing of the fabrics like for example using brush or the use of machines could be employed.
- The difference in properties of fibre could be verified using other sophisticated instruments.
- Reaction on different surfaces could be studied.
- Different climatic conditions and also different drying times could suggest.

- Different types of detergents could be employed for the study to know the reaction of the reagent towards different detergents as the composition of detergents is different.
- Other reagents like luminol, LMG or hemastix strips could be employed as the presumptive tests.

CONCLUSION

From the study it could be made possible to identify the blood stains from the suspect's clothes even after washing it repeatedly for a number of days or though the case is registered after a long time since the crime has been committed. And there are differences in reaction with respect to the composition of the fibres. To be more conclusive serological examinations like blood grouping and origin determination can also be done to make the report more strong and evident. Thus the study gives information on the above areas of practice.

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