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Determination of Persistence and Quantification of the DNA from Blood Stained Fabrics

Peta Pavan Kumar* and Dr. Jaskaran Singh

Forensic Department, Lovely Professional University, India

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***Corresponding author:** Peta Pavan Kumar, M.Sc Forensic Science, Lovely Professional University, India

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Introduction

A crime scene is a place where an offense has been committed and forensic evidence may be gathered. In the crime scene there will be the struggle of the victim and perpetrator will lead to leaving traces of shreds of evidence. The most common biological evidence found in the crime scene is blood, which needs identification and confirmation. During the struggle blood may transfer to the perpetrator's cloth. Type of washing and number of washings will alter in the original color of the bloodstain on fabrics. If a single drop of blood is found that will be identifiable with other body fluids, then it can link to the crime scene or the weapon used during the crime can be identified. The blood is composed of plasma, WBC and RBC. Most of the RBC cells don't contain the nucleus/ absence of nucleus, but in the erythropoietin, cells contain a nucleus. WBC's have the nucleus in their cells. When cytoplasm is released into the surrounding fluids, hemolysis may occur in vivo or vitro. WBC can't be lysed as they are having the granules, so to lyse the WBC we use buffers (ex: TEN buffer), from this DNA is isolated. In different civil and criminal proceedings, DNA plays a crucial/ important role in the certitude or vindication of suspects. When compared to other verdict-based analysis, DNA analysis is more acceptable because of its statistical methodology which is having minute errors. DNA plays a major role in investigating to individualize and identification purpose. A small quantity of the samples plays a major role in solving the cases. Biological evidences found in small quantity useful in obtaining DNA profiling. When the blood is present in the suspected fabrics and it was washed, they are detected by using the Luminol reagent. The Luminol is the oldest method utilized for detecting blood stains on fabrics, floors, etc. The Luminol reacts with iron present in the blood and oxidizes to visualize the color in dark. Luminol is highly sensitive, nanograms of blood can be detected. As the years pass the criminal's way of sensible will change to hide, remove, the blood evidence on fabrics. Recovery of DNA will depend on the type of fabric and type of washing. This study is most important because this provides strong DNA evidence recovered after washing the fabrics and that recovered DNA from different washing and different fabrics may be possible [1].

Material and Methods

A blood sample was preserved, and different fabrics were taken. The blood is randomly poured on the fabrics and dried in the laboratory at room temperature. They were washed with different time intervals. Chelex 100 extraction method used for the isolation of DNA, for quantification.

Sample Preparation

The fabrics which are easily available in the market are selected. Those fabrics are treated with the blood by using a calibrating pipette. The blood-stained fabrics are dried in the laboratory at room temperature for 24 hours. They are hung to the thread and clipped and dried. On the next day fabrics were removed, and two types of washings were performed. They are firstly washed under running tap water for 5 minutes and 10 minutes, secondly washed with detergent for 5 minutes and 10 minutes. After washing and drying the fabrics, Luminol reagent is poured on the suspected areas. The areas were blood is present will appear brown and remaining part of the bluish color. As Luminol is a very sensitive test it will show the color for minute drops of the bloodstains also. Until DNA extraction all the fabrics were collected and rolled in an envelope and stored at -20oc [2,3].

DNA extraction and quantification

a) The sample was cut into pieces by using the sterilized forceps, by using forceps those pieces were placed in the centrifuge tubes.

b) Add 1ml of distilled water and vertex it for 30-35 minutes. The centrifuge tubes were incubated for 40 minutes at room temperature, in between the incubation shake the tubes gently.

c) This is centrifuged at 6000 rpm for 10 mins to separate two layers, the supernatant is removed.

d) Repeat the process for two more times, and after 40-50 minutes centrifuge at 6000rpms for 10 minutes.

e) The supernatant was removed carefully so that the lower aqueous layer is taken into another tube.

f) 5% chelex 100 is added and shaken well along with proteinase k

g) The tubes were incubated overnight at room temperature.

h) On the next day, the sample is incubated at 550c for 10 minutes

i) Tubes are vertex after the incubation and centrifuge at 6000 rpm for 10 minutes

j) The supernatant which is white fluid is separated into another tube and stored at -200c

k) Equal volumes of alcohol is taken and centrifuged at 6000 rpm for 15-20 minutes and remove the upper layer carefully.

l) The tubes are air-dried and stored by adding TE buffer or distilled water.

Quantification of the DNA will be done by using a spectrophotometer. Absorbance readings were performed at 260 nm, the light is absorbed more strongly by the DNA. This was used to determine the difference in the concentration of DNA among different methods of washing.

Result

The results show that in spite of the nature of the fabrics. Whether it is semi-synthetic, natural or synthetic the recovery of DNA will be possible. The natural fibers will provide the best results of the recovered DNA when semi-synthetic and synthetic fibers will give the results moderately. The number of washings will effect on the recovery of DNA [4,5].

Conclusion

During the investigation, the investigator may not find the shreds of evidence. The perpetrator may wash the fabrics and the bloodstains may be removed. They are no visible in the normal light unless we use the chemical for visualizing the bloodstains. When the Luminol is added on the fabrics those latent bloodstains will be visualized. Those parts are marked and photographed, further will go for the extraction of the DNA. The type of washing and number of washings will affect on the recovery of DNA. Even the small traces of DNA will connect the perpetrator to the victim and plays a major role in solving the case.

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