Sensitivity of Immuno-diffusion technique for determination of species of origin from dried blood stains

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ABSTRACT

Blood as evidence gives many clues to forensic investigation. Determining origin of species from blood is one of the primary concern to procedd for individualization, because it may loose its integrity quickly. The paper demonstrate the sensitivity of absorption elution technique in adjudging the species of origin from dried blood stains on different surfaces over 5 years of time period. Absorption-Elution test was found most successful in cloth substrate and showed effectiveness with impact of years during examination.

I. Introduction

The major role of forensic scientist and forensic laboratory is to establish an identity, which may be of a person or a poisonous substance, or very often of a common source of one or more substances. Blood as a physical evidence helps in many cses like disputed paternity & maternity cases, adultery affiliation proceedings, inheritance disputes, immigration issues, based on family relationship, interchange of infants in the hospitals;identity of the source of blood and blood stains in crime such as violence, rape, murder[1-2].

Even if blood is detected, it's not directly bound that it came from a personality's being. To work out whether or not blood comes from a human being or associate animal one typically needs a antibody check that involves reacting the blood sample with antihuman antibodies the blood sample with antihuman antibodies, these are market available and are raised in rabbits [3-4]. The blood samples and the antisera (anti-human antibodies) are placed in wells punched into an agar gel that's contact a glass dish or slide. The samples move towards each other through the agar by diffusion or the method is accelerated by an electric current. Formation of white line called the precipitin line is the point at which the two samples meet this can be indicative of associate interaction between the antigens within the blood and antibodies within the rabbit antisera and so the blood is human. If no line forms suggests there's a suspicion that the blood belongs to an animal, then the procedure can be repeated using antibodies raised against the appropriate animal sera [5-7].

Once biological evidence has been identified, it is necessary to determine whether or not it is of human origin; and if of non- human origin, then to what species it belongs. The species specific proteins in the bloodstains or other body tissues may be identified with the help of species specific antibodies.

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BLOOD TYPE				
Characteristics	A	B	AB	O
Ag on RBC	A	B	Both A& B	Neither A nor B
Ab in Plasma	Anti B	Anti A	Neither anti A nor anti B	Both anti A & anti B

Table 1 – Summary of ABO blood group interactions(Ag =antigens, Ab =antibodies, RBC =red blood cells)

II. Results

(A) Figure 1 shows the effect of cloth surface bearing blood stains and years of lapse on origin of species examination an extremely significant difference were observed. As cloth is network of fibers and having good absorbent quality may be it can be the reason that antigens required for reaction were remains safe and long lasted and result also supports the findings that cloth is good absorbent for blood and can store properties of blood for long.

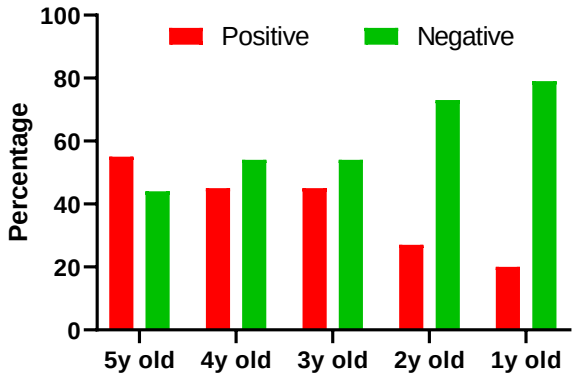

Figure 1- Percentage of positive and negative results of origin of species on cloth surface bearing blood stains

(B) Figure 2 shows the percentage of positive and negative results of origin of species on wood surface bearing blood stains of these 5 years - Wood surface bearing blood stains only give positive results with 1 year old (26.7%) and 2 year (12.5%) lapse evidences whereas evidence of later years showed 100% negative results and no positive results were found.

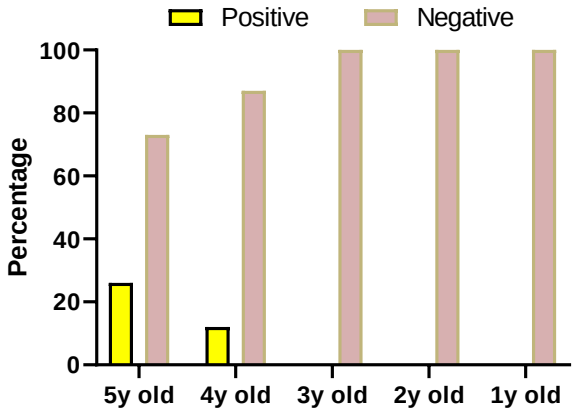

Figure 2- Percentage of positive and negative results of origin of species on wood surface bearing blood stains

(C) Figure 3 shows Percentage of positive and negative results of origin of species on metal surface bearing blood stains. It was observed that results were found similar with cloth surface bearing stains of blood. In 1 year old and 2 year old evidences positive results were found. 1 year old (20%) followed by in 2 year old (13.3%) lapsed evidences. In 3 year old no positive results were found whereas in 4 year old (4.3%) and five year old (6.7 %) percentage of positive results was low due to the reason that surface bearing the blood stains might get destroyed because of its unskilled way of collection and packing.

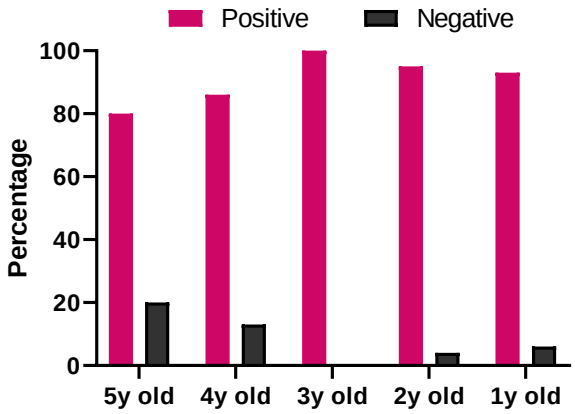

Figure 3 - Percentage of positive and negative results of origin of species on metal surface bearing blood stains.

(D) In Figure 4 Percentage of positive and negative results of origin of species on earthen surface bearing blood stains were observed. Positive results were observed on earthen surface bearing blood stains in all the years of evidences though lowest percentage were observed in 5 year old samples (5.3%) and highest in 3 year old samples (16.7). Frequency of positive results can be seen in all the years of earthen surface samples

because soil, brick and rock particles have tendency to conserve properties of blood for long.

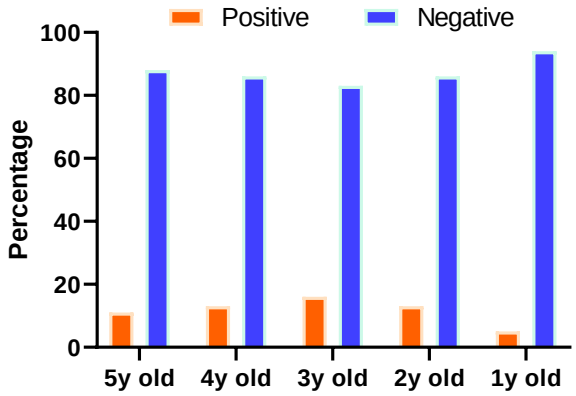

Figure 4- Percentage of positive and negative results of origin of species on Earthen surface bearing blood stains

III. Future Prospects

In future, we would like to broadly focus on effects of collection, packing, preservation and other environmental factors on identification of blood as an evidence to prepare a data which can help forensic examiners for trouble shooting.

IV. Conclusion

Absorbent materials such as fabric, carpeting, wood, soil etc., are fairly easy to analyze and stains on materials such as these can be analyzed successfully. Non-absorbent substrates such as glass, vinyl, porcelain, tile, and metal are more difficult to examine. The examiner should perform the examination as soon as they get possession on evidence [8]. Blood is an important biological fluid that when shed off from body experience enumerable environmental effects and get deposited on the surface with which it comes in contact. In the present study we tried to investigate the effect of various substrates and delayed in examination of dried blood stains on results of origin of species and Absorption-elution technique. During study it was found that dried blood stains only on fabrics have capable of being identified even after five years of time while all other substrates (metal, wood, earthen) have less potential towards sensitive immunological methods like Precipitin and Absorption-Elution though wood and earthen materials like soil, sand have good absorbent quality but they fail to assist in positive identification of blood [9]. These might be due to the reason that blood has capacity of clotting. When blood clotted on fabrics the serum get separated and deposited inside the fabrics and retains there for long. This cannot happen with other substrates because of environmental factors such as rain, humidity, microorganisms and delay in examination of dried blood stains on such substrates. Therefore, it can be concluded that surface bearing dried blood stains and delay in examination do affect the immunological properties of blood [10-11].

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