

Common Contaminants of Blood Group Factors and its Effect on Blood Groups in Blood Samples, Collected at Scene of Crime

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Abstract

For detection of crime in Forensic medicine blood group studies & its application plays an important role. The study of blood grouping gives important information regarding identification and details of Crime Investigation. The most common trace evidence is blood which is obtained from the crime scene. Blood grouping & typing can point to a group of people that have the same blood type rather than pointing particular person. When blood is properly collected and preserved, blood as an evidence can establish a strong link between a criminal and the criminal act. We can trust the blood grouping of blood stains in detection of crime. Randomly A, B, AB, Rh positive blood samples were taken in duplicates and rusted pins, dust particles, detergent, staphylococci are added to it respectively. The common contaminants in blood stains are dust, rust, bacteria and detergent. So an effect of these on blood groups was studied in detail.

Keywords: medico-legal ground, Blood groups factors, contaminants, trace evidences,

Introduction

Blood is considered to be the most common trace evidence obtained from the scene of crime. Blood grouping reveals vital information regarding identification, in relation to Crime Investigation. Blood is considered to be the most common trace evidence obtained from the scene of crime^[3]. In addition to the ABO group antigens, there is another blood group antigen located on red blood cell surfaces known as the Rhesus factor or Rh factor, this antigen

may be present or absent from red blood cell^[1]. Blood stain collected from scene of crime and victim and suspect can relate the crime with weapon of offence, place of occurrence and also the criminal.

The blood is usually found to be contaminated with i) dust ii) rust on steel or iron weapon iii) bacteria iv) detergent (when stains in clothing are washed with detergent powder). Also stored blood contaminated may also yield erroneous results with passage of time. These results will be definitely of value in medico legal cases^[3].

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Aims and objectives

We tried to observe the fact that whether contamination of common contaminants may cause any effect, on detection of blood group during passage of time, and reliability of such tests. Such study was conducted by Prabhas Chandra Chakraborty*, Saurabh Chattopadhyay**Professor[] Shiv Ranian Kumar[1] [7]. As per their opinion rust did not show any effect on blood group factors and hence recovery of the weapon of offence for blood stain has more value than stains collected from old washed wearing apparels or the soil. our study showed it can be considered with caution

Material and Methods

This study was done in the Department of forensic medicine and toxicology, Mahavir institute of medical college Vikarabad. Randomly 5 ml of blood sample of different blood groups were collected from blood bank. attached to the hospital of Mahavir Medical college Vikarabad. In sterile vacutainers, A, B, AB, O and Rh positives blood samples were taken in 6 duplicates.

(blood bank permission was taken on 27 feb2024. IEC/proposal/2024/127/Feb/2024).

The blood samples of A, B, AB, Rh positive were taken randomly in duplicates. Controls: One tube was kept as control in refrigerator at 4-8 °C and second tube at room temperature. and rusted pins, dust particles, detergent, staphylococci bacteria were added to remaining tubes respectively. All the tubes were kept at room temperature for 20 days. except

the controls., Grouping was done on first day and results were noted. Again on regular intervals on 5th day, 10th and 17th and 20th day, blood grouping was done and results were noted.

Observations

The control sample and the test sample marked rust retained agglutonogenic activity even after 3 weeks where as the other test samples showed negative results by the 17th day. The samples stored at room temperature and the one contaminated with staphylococcus aureus are affected earlier.

On 10th day A and B groups showed negative results in the tubes marked dust, while Rh was weekly positive. The reverse was observed in tube marked detergent.

Results

Blood samples in dust after 10 days incubation had changed from A, B, AB to O blood group with Rh negativity.

Blood samples in rust had retained with original ABO group but Rh positive were converted to Rh negative.

Detergent tubes had also changed Rh positive to negative retaining original ABO.

There was no change in either ABO or Rh blood groups in tubes with staphylococcal bacteria. So there were lots of changes in blood groups after 10 days of incubation in all tubes with contamination.

Table 1: Results of Blood Grouping of various samples with passage of time: Observed changes.

Day	Group	Control	Room temperature	Rust	Dust	Bacteria	Detergent
Day-1	A	+	+	+	+	+	+
	B	+	+	+	+	+	+
	Rh	+	+	+	+	+	+
Day-5	A	+	Weakly+	+	+	+	+
	B	+	Weakly+	+	+	+	+
	Rh	+	Weakly+	+	+	+	+
Day-10	A	+	-	+	-	-	+
	B	+	-	+	-	-	+
	Rh	+	-	+	Weakly+	-	-
Day17 and+	A	+	-	+	-	-	-
	B	+	-	+	-	-	-
	Rh	+	-	+	-	-	-

Discussion

In the present study the sample stored at room temperature was weekly positive at day 4 and the earliest to show negative as rapid decomposition of blood occurred.

Enticknap [1] states that the standard techniques give valid results for grouping of ABO and Rh group from red cells extracted from cadavers many hours after death.

Our study supports the findings of Gettler and Grammar [2] who strongly advised against the use of blood grouping of decomposed and contaminated stains as the results may be inconclusive.

Rust (ferric oxide) did not show any effect on the RBC or the agglutogenic capacity and grouping could be satisfactory done up to third week.

Here also the dust contaminated sample gave negative result for A and B on the 10th day where as the Rh factor showed negative result much later on 17th day.

In the sample marked detergent the Rh was negative at 10 today while A and B group showed positive result. Subsequently all the results were negative by 17th day.

Conclusion

Stains contaminated with common agents like dust, rust, bacteria and detergent give inconclusive results by mixed agglutination method with passage of time. The results may be accepted with caution as the opinion might be medico legally significant.

Blood grouping though is an important identity in identifying crime it is not reliable if it is contaminated with dust detergent test etc

Older stains in crime will be usually contaminated so have to be very careful while identifying blood groups in case of medical legal issues

Ethical clearance: taken

Conflict of interest: None

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