

An Investigation of the Effect of Leather on Blood Stains

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DERİ KUMAŞ PARÇALARININ, ÜZERİNDEKİ KAN LEKELERİNE YAPTIĞI ETKİLER

Özet

Tanik asid ile muamele edilmiş deri parçaları üzerine hazırlanmış 65 kan lekesinde kimyasal, immunolojik ve serolojik testler yapılmıştır.

Kimyasal testlerle kan idantifikasyonuna gidilmiş, immunolojik testlerle tür belirlenmeye çalışılmış ve her iki şekil çalışmada da, her denekte pozitif sonuç alınmıştır.

ABO(H) antijenlerinin aranması absorpsiyon-elüsyon ve absorpsiyon-inkibisyon yöntemleriyle yapılmıştır. Absorpsiyon-elüsyon yönteminin idaha iyi sonuç verdiği gözlenmiştir.

Elde edilen bulgulara göre, deride kullanılan tanik asidin kan lekelerinde hatalı pozitif sonuç vermediği, etkisinin de minimum olduğu gözlenmiştir.

Summary

Sixty five bloodstains prepared on tanned leather of unknown origin has been examined for chemical, immunological and serological tests within one and half month of their preparation. The chemical and species origin tests were positive in all the samples. The ABO(H) antigens detection could be better performed by absorption elution method than the absorption- inhibition technique employed in the present investigation. Tannin present in the leather has been observed to effect the results of bloodstains to the minimum.

Key words: *Leather - Chemical - Species origin - ABO(H) antigens*

INTRODUCTION

Bloodstains often are encountered in almost all types of crimes on various types of substrates associated with them including wood and leather. They are affected to a different degrees depending upon the nature of the substrate and other external factors. Tannic acid is a protein precipitant and it has been reported that some kinds of bark and leather due to the presence of tannic acid may simulate a positive test by precipitation of protein in the antiserum (1-3). Therefore, the tannic acid contained in the wood and tanned leather may interfere in the analysis of bloodstains (4-6). Studies relating to the investigation of bloodstains on different substrates have been made by different workers (7-10), In the present investigation an endeavour has been made to examine the effect of tanned leather on the analysis of bloodstains from forensic point of view.

MATERIAL and METHOD

Blood from sixty five individuals was collected by finger prick method and stains prepared by dropping 3-5 drops on the serially marked tanned leather pieces of unknown origin purchased from the local market (Approx. size 5 x 5 cms). Alongwith each sample preparation a drop of fresh blood was also procured in n-saline (0.85%) and analysed for ABO(H) typing for comparison (11). Bloodstains on leather pieces were allowed to dry at room temperature and examined within one and half month of their preparation in the summer season (May-July).

The bloodstains were analysed according to the procedure adopted by Seema et al. (1989). The saline wet cotton cloth pieces were placed on the stain portion and allowed to absorb the blood for a minimum of 2 hours and dried before analysis. The cotton cloth pieces were subjected to the conventional tests of identification (Benzidine, Phenolphthalein, Teichmann and Takayama) and species origin (Gel diffusion and counter-immuno electrophoresis). The ABO(H) blood group antigens were detected by the application of absorption- elution (12) and absorption-inhibition (13). Along with each of the test performed unstain portion of the leather was also examined. The anti-human, anti-cow, anti-dog, anti-sheep and anti-fowl sera were obtained from the Serologist of the Government of India, Calcutta having a titre of 1:20,000. Anti-II was prepared in the laboratory from the seeds of *Ulex-europaens* (11). Anti-A and anti-B sera were obtained from the Haffkeine, Institute, Bombay. The chemicals used for identification were of analytical grade.

RESULTS and DISCUSSION

The results of the identification and species origin tests were observed to be positive in all the samples examined. It was further observed that in the tests applied for species origin determination, counter-immuno electrophoresis technique was more sensitive and reliable as compared to the double diffusion technique.

Table I. Results of ABO(H) blood group typing from blood stain on leather.

Blood group type	No. of samples tested (%)	Technique used			
		<i>Absorption Elution</i>		<i>Absorption Inhibition</i>	
		Positive	Negative	Positive	Negative
A	17 (26.15)	17 (26.15)	-	12 (18.50)	5 (7.65)
B	20 (30.77)	18 (27.77)	2 (3.00)	16 (24.61)	4 (6.16)
AB	9 (13.85)	9 (13.85)	-	6 (9.25)	3 (4.60)
O	19 (29.23)	13 (20.00)	6 (9.23)	10 (15.38)	9 (13.85)

Figures in parenthesis indicate percentage

The results of the ABO(H) antigens typing on leather is given in Table I. Absorption-elution technique gave higher percentage of positive results as compared to absorption-inhibition. The percentage of positive results was 88 in absorption elution and 67.44 in absorption-inhibition. The reaction intensity varied in absorption-elution method. The lower percentage of the ABO(H) blood group antigen detection in absorption-inhibition can be attributed to the cause of the fast drying or fixation of the

blood stain to the leather on account of which it did not come into solution as the temperature varied during the period of analysis. The negative results may have occurred due to the small amount of the antigens present or the antigens has not been transferred to the cloth pieces during the absorption phase. It has also been observed by other workers (7,14,15) that the exposure of bloodstains to heat fixes the stains and renders the protein increasingly insoluble. The testing of control material (unstained leather) did not give any false activity in the present investigation and it is of great significance to perform these tests as sometimes the homologous sources or adventitious substances may interfere (16-18). In overall, it has been observed that the effect of tannin present in the leather is minimum on the analysis of bloodstains if it is analysed within one and a half month of their formation particularly in summer season (temperature range 25 to 40±5°C). Further studies on the effect of aged bloodstains on leather is in progress. It is estimated that the study will provide a useful information to the forensic scientists.

Acknowledgements

We have to thank each and every individual who very kindly donated their blood samples for the study. Thanks are due to Dr.P.K.Chattopadhyay, Professor of Forensic Science, Punjabi University, Patiala, for his kind help. Thanks are also due to Mr. Anil Sharma, Research Fellow and Mr. Kapoor Singh and Mr. Telu Ram of Forensic Science for the assistance given. This work was submitted as a special report in M.Sc. degree.

REFERENCES

- 1 Cappa, M. (1953) *Minerva Medicolegale Arch. Antropol. Criminale*, **73**, 1.
- 2 Gram, S., Sanger, F. (1903) *J. Hyg.*, **3**, 258-291, 354-363.
- 3 Schochherr, K. (1957) *Z. Immunitätsforsch.*, **108**, 109.
- 4 Vollmer, O. (1949) *Z. gerichtl. Med.*, **39**, 628-637.
- 5 Schleyer, F. (1962) in *Methods of Forensic Science*, (Lundquist, F. ed.), pp.291-333, Interscience Publishers, New York, London.
- 6 Kirk, P.L. (1974) 2nd ed. pp. 91, John Wiley and Sons Inc.
- 7 Sharma, A.K., Dhindsa, A.S., Chattopadhyay, P.K. (1989) *Act. Crim. Japan*, **55**, 28-30.
- 8 Seema, B.L., Garg, R.K., Dhindsa, A.S. (1989) *J. Ind. Acad. Forensic Sci.*, **28**, 46-49.
- 9 Denault, G.C., Takimoto, H.H., Kwan, Q.Y., Pallos, A. (1980) *J. Forensic Sci.*, **25**, 479-498.
- 10 Kaur, G. (1987) *Ph. D. Thesis*, Punjabi University, Patiala (Unpublished).
- 11 Dunsford, I., Bowley, C.C. (1967) 2nd ed. Oliver and Boyd. Vol. I and II, London.
- 12 Kind, S.S. (1960) *Nature*, **187**, 789-790.
- 13 Outteridge, R.A. (1965) *J. Forensic Sci. Soc.*, **13**, 33-36.
- 14 Garg, R.K. (1983) *Ph. D. Thesis*, Punjabi University, Patiala (Unpublished).
- 15 Schleyer, F.C. (1948) *Dtsch. Z. Gesante Gerichtl. Med.*, **39**, 167-185.
- 16 Kind, S.S., Lang, B.G. (1976) *J. Forensic Sci. Soc.*, **16**, 155-161.
- 17 Jenkins, G.C., Brown J., Lincoln, P.J., Dodd, B.E. (1972) *J. Forensic Sci. Soc.*, **12**, 597.
- 18 Pereira, M. (1973) *J. Forensic Sci. Soc.*, **13**, 33-36.

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