COMPARISON OF ABSORPTION-INHIBITION AND ABSORPTION-ELUTION METHODS IN THE DETECTION OF ABO(H) ANTIGENS IN SWEAT STAINS

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ABSTRACT

Seventy-two sweat stain samples have been analysed for the determination of ABO(H) blood group specific substances by the absorption-inhibition and absorption-elution techniques. Papain-treated A, B and O cells were used in absorption-elution technique. The results were correlated with the secretor status of the individual from fresh saliva. It was found that the secretors of ABO(H) substances in saliva need not necessarily secrete in sweat as well. Absorption-elution method has been found to be more suitable in grouping sweat stains in comparison to absorption-inhibition method.

INTRODUCTION

Sweat stains are often encountered in many forensic problems like murders, sexual assaults, scuffles, etc., and can be found on shirts, undergarments, etc. The typing of genetic markers like cell surface antigens can serve as an important corroborative evidence in linking the suspect with the victim or the scene of crime.

The presence of blood group specific substances in the body fluids (other than blood) using different techniques has been shown by various workers. However, not much information is available on the detection of ABO(H) blood group specific substances from sweat stains[1-3]. Even the concentration of these substances is very low in sweat, urine and tears[3]. In the present study, an attempt has been made to determine the blood group specific substances from sweat stains by absorption-inhibition and absorption-elution techniques and also to find out the best technique.

MATERIALS AND METHODS

Sweat stains from 72 individuals were collected on serially marked and previously washed dry white cotton cloth pieces (10 × 10 cm). The stains were dried at room temperature and kept closed in clean and dust-free envelopes. Samples of blood and saliva of the same individuals were also collected in serially marked test tubes, and were analysed for the ABO blood groups and secretor status respectively according to Dunsford and Bowley[4].

Sweat stains were analysed for ABO(H) antigens by absorption-inhibition according to Harley[5] and Kind[6] with slight modifications. The stains were extracted overnight and after adding appropriate antisera, four hours absorption was allowed.

Absorption-elution technique of Kind[7,8] and Nickolls and Pereira[9] with some modifications was used for the detection of ABO(H) antigens in sweat stains. The stain samples were kept in a refrigerator at 4°C for overnight, 0.5% suspensions of papain treated A, B and O cells were used. All the results were recorded macroscopically and microscopically.

RESULTS AND DISCUSSION

Of 72 samples analysed, 18 were of blood group A, 31 of blood group B, 17 of blood group O and the remaining 6 were of blood group AB (table 1).

The results of the secretor status (table 2) reveal that 87.50% of the individuals were secretors, while the rest were non-secretors in saliva. The number of secretors in sweat stains was 81.94% using absorption-inhibition technique, whereas, using absorption-elution technique, 95.84% were secretors. Tests for ABO(H) antigens by the absorption-

Table 1 *Distribution of ABO blood groups in fresh blood samples*

Blood group	Total number of samples	Percentage
A	18	25.00
B	31	43.06
O	17	23.61
AB	6	8.33
Total	72	100.00

Table 2 *Determination of secretor status from saliva and sweat stains*

Body fluid	Method used	Secretors					Non-secretors				
		A	B	AB	O	Total	A	B	AB	O	Total
Saliva	Absorption–inhibition	15 (20 83)	28 (38 89)	5 (6 94)	15 (20.83)	63 (87.50)	3 (4.17)	3 (4.17)	1 (1.39)	2 (2.78)	9 (12 50)
Sweat stains	–do–	14 (19.49)	26 (36.11)	4 (5.55)	15 (20.83)	59 (81.94)	2 (2.78)	4 (5.55)	2 (2.78)	2 (2.78)	10 (13.85)
–do–	Absorption–elution	16 (22.22)	30 (41.67)	6 (8.33)	17 (23.61)	69 (95.84)	2 (2.78)	1 (1 39)	–	–	3 (4.16)

Total samples tested in all the cases was 72. Figures in parentheses indicate percentage values.

elution method during the initial stage were either negative or weak. Subsequently, a modified technique using papainized cells as indicator cells yielded better results. The results clearly indicate that some of the individuals who are secretors in saliva are non-secretors in tears and vice versa. This agrees with earlier findings that secretors of ABO(H) substances in a particular body fluid need not necessarily secrete in other body fluids[10 14].

It was observed earlier[3 10,15] that despite the high concentration of group specific substances in saliva and other body fluids of secretors, there are serious problems involved in group determination[16 17].

It was also reported that a small proportion of individuals of group A and O exhibit B activity and some people of group B and O exhibit A activity[16 18]. This spurious A and B activity was attributed to bacteria or bacterial enzymes, that may convert a small proportion of the terminal sugars of the group specific substance. On account of difficulties arising from spurious reactions, the use of absorption-inhibition and absorption-elution has been recommended[3 10 15] in parallel for grouping both fluid samples and dried stains.

In the present study, using absoption-inhibition technique, one sample of blood group A was typed as B and another was typed as AB whereas one of the samples of blood group B was typed as O (table 3). These may be due to the presence of some bacteria or bacterial enzyme which might have changed the nature of the blood group.

In grouping dried stains, the highly sensitive elution technique can serve to confirm that the negative reactions obtained by absorption-inhibition are caused by the absence of antigens and not by the presence of insufficient material[3 10].

It is evident from the present results (table 3) that absoption-elution gives better results than absorp-

Table 3 *Comparison of results of determination of ABO(H) substances in sweat stains by absorption–inhibition and absorption–elution techniques*

Blood group	No. of samples tested	Absorption–inhibition		Absorption–elution	
		Correctly typed	Incorrectly typed	Correctly typed	Incorrectly typed
A	18	16 (88.89)	2 (11.11)	18 (100.00)	–
B	31	30 (96.74)	1 (3.23)	31 (100.00)	–
AB	6	6 (100.00)	–	6 (100.00)	–
O	17	17 (100 00)	–	17 (100.00)	–
Total	72	69 (95.83)	3 (4.17)	72 (100.00)	–

Figures in parentheses indicate percentage values.

tion-inhibition and hence should be a useful method for detection of ABO(H) substances in sweat stains.

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ANNOUNCEMENTS

INTERNATIONAL SYMPOSIUM ON "PRESENT AND FUTURE PERSPECTIVES IN PTERIDOLOGY"

The Indian Fern Society is organising the above symposium, at the University of Rajasthan, from August 4–6, 1989, Jaipur 302 004, India. The main themes on which the participants will deliberate will be as follows: i. Morphology, anatomy, cytogenetics and species relationships; ii. Taxonomy, phylogeny, phytochemistry and biosystematics; iii. Reproductive biology, palynology and experimental studies; iv. Interrelationships of Indian flora with African, Malesian and Chinese floras; v. Environmental relationships, distribution patterns and fern conservation.

Persons desirous of participation may please contact for working details, the convener, Dr. T. N. Bhardwaja, Department of Botany, University of Rajasthan, Jaipur 302 004, India.

SEMINAR ON THE USE OF ULTRASONOGRAPHY IN PRENATAL CARE

The above seminar wil be held at the Institute of Genetics on 9th April, 1989. The scientific programme includes invited lectures and contributed papers. Active workers who wish to participate may send their abstracts latest by 28th February, 1989 along with the registration fee of Rs. 50.- to Dr C. Kusuma Kumari, Organizing Secretary or to Dr Madhuchandra, Scientific Secretary, Institute of Genetics and Hospital for Genetic Diseases, (Osmania University), Hyderabad 500 016.