

Determination of Blood Group From the Tooth Material - An Medico Legal Investigative Procedure

Sunitha S^{1*} and Vidya GD²

¹Department of Public Health Dentistry, Jagadguru Sri Shivaratreshvara Dental College and Hospital, Mysore, India

²Department of Oral Pathology and Microbiology, JSS Dental College and Hospital, Mysore, India

Research Article

Received: 19/11/2017
Accepted: 27/11/2017
Published: 04/12/2017

*For Correspondence

Sunitha S, Department of Public Health Dentistry, Jagadguru Sri Shivaratreshvara Dental College and Hospital, Mysore 270015, India, Tel: 91-9986226392.

E-mail: drsunitha_s@rediffmail.com

Keywords: Blood group, Tooth material, Forensic dentistry

ABSTRACT

In medico legal investigations, the blood group could play a vital role in determining the identity of the victim and the criminals behind the act.

Aims and objectives:

1. To determine blood groups on dental tissues using Adsorption-Elution technique.
2. Comparison with blood group of blood stained compress of the respective patient.

Methodology: *In vitro* experimental study design.

Results and discussion: In the teeth, the presence of blood group antigens is based on infusion sedimentation theory i.e., infusion of water soluble antigens from saliva and blood vessels invading the pulp could be the agents. In our study, we found that the pulp tissue was accurate in the interpretation of A B O blood group, but limited for the hard tissues of the tooth.

INTRODUCTION

In majority of the times the blood grouping tests are conducted to know the health status of an individual or prior to blood transfusion and surgeries ^[1]. Whereas in medico legal investigations, the blood group could play a vital role in determining the identity of the victim and the criminals behind the act. This is of paramount importance not only in the medico legal aspects but also in social and emotional views of their kith and kin ^[2].

The routine method of investigating the blood group of an individual is by drawing of fresh blood from a live person and subjecting it to agglutination test using anti ABO antigens. But in certain situations, where the victim's body has been totally mutilated or decomposed, such as in cases of fire accidents, disasters and natural calamities, it becomes difficult to carry out the routine method of blood grouping ^[3].

In such a case, a method called adsorption-elusion technique is being used. This method has been tested successfully in grouping the bones, clotted blood and blood-stains on cloth, weapons and other articles ^[4].

Need for the Study

Teeth being the hardest of all body parts can withstand lot of torture. It remains intact even when exposed to heat up to 500°C. Thus could be the source to derive blood group information in forensic odontological practice. Not many studies are reported to date.

AIMS AND OBJECTIVES

1. To determine blood groups on dental tissues using Adsorption-Elution technique.
2. Comparison with blood group of blood stained compress of the respective patient.

METHODOLOGY

In vitro experimental study design was followed. Samples were ten teeth extracted for non-carious reasons and the blood stained gauze compress of the same individuals age of participants varied between 18-60 years. Ethical clearance was obtained from ethical clearance committee of JSS dental college and hospital, Mysore and informed consent was obtained from the participants of the study. Permission was obtained from the assistant director of district forensic laboratory to carry over the experiments in the regional forensic laboratory Mysore.

PROCEDURE

Pre lab procedures were carried out at JSS Dental College and hospital, Mysore. Extracted tooth collected from the department of oral and maxillofacial surgery they were washed under tap water and dried in room temperature. The teeth are sliced using carborandum disc and pulp was extirpated using endodontic broach and stored in a sterile container with saline. The remaining hard tissue parts of the teeth are wrapped in cloth crushed using hammer to obtain coarse powder and stored in plastic zip pouch.

Lab Procedures

For the experiments on tooth material and pulp tissue: Three test tubes for each sample are taken and the material is divided equally. In to them anti A, B, O are added respectively and kept in room temp for 30 min. They are later refrigerated at 4°C overnight.

Similarly, threads separated from the blood stained gauze compress. And cut in to 2 cm pieces and fixed on to 1 mm depth welled slide to which Anti A, B, O are added respectively and refrigerated at 4°C overnight. On the following day all the refrigerated samples are washed with ice cold saline and 2% indicator cells obtained from the local blood bank is added to them and incubate at 56°C for 15-20 min followed by which they are shaken in a serological shaker and kept for 1 hr in room temperature. Later they are shaken well and observed macroscopically for agglutination, and later mounted on slide and observed under compound microscope for their reaction and positive ness of the results.

RESULTS

On completion of the study, the observations were tabulated based on positiveness of the coagulation as in **Table 1** and the blood groups as in **Table 2**. The positiveness was gauged on scales of – for negative, + for weak positive, 2+ for positive, 3+ and 4+ for strong positive and NR for not recorded [5].

Table 1 shows the observations of the coagulation which clearly depicts greater strong positive results are observed in the pulp tissues in comparison with the hard tissues of the teeth [6].

In sample number 9 the test could not be carried out for the pulp tissue due to lack of insufficient pulp tissue.

Table 2 shows the correctness of match with that of the control.

It can be observed that, the pulp tissue was accurate in depicting the blood group of the individual (9/9 of the tested samples) when compared with that of the hard tooth material. (7/10 tested samples) sample no 7 showed negative for A, B and O and thus was not interpreted [7].

Figure 1 shows the correctness of the blood groups and the positive ness of the samples in percentile. The pulp tissue shows 100% correctness in comparison with the hard tissue i.e., 70% [8].

The strong positive results were observed more in pulp tissue 60% than the hard tissues of teeth 10%.

Table 1. Observations of coagulation.

	Gauze compress (control)			Enamel/dentine/ cementum			Pulp		
	A	B	O	A	B	O	A	B	O
1	2+	2+	-	3+	+	-	3+	3+	-
2	-	-	3+	-	+	2+	-	-	4+
3	2+	-	-	2+	-	-	3+	-	-
4	2+	-	-	2+	-	-	3+	-	-
5	-	-	2+	-	+	-	-	-	+
6	3+	-	-	+	-	-	2+	-	-
7	2+	3+	-	-	-	-	3+	2+	-
8	3+	2+	-	+	+	-	3+	2+	-
9	2+	3+	-	2+	2+	-	NR		
10	-	-	3+	-	-	+	-	-	2+

Table 2. Blood groups comparison with the control.

Tooth number	Compress (control)	Enamel/dentine/ cementum	Pulp
1	AB	AB	AB
2	O	B,O	O
3	A	A	A
4	A	A	A
5	O	B	O
6	A	A	A
7	AB	-	AB
8	AB	AB	AB
9	AB	AB	NR
10	O	O	O

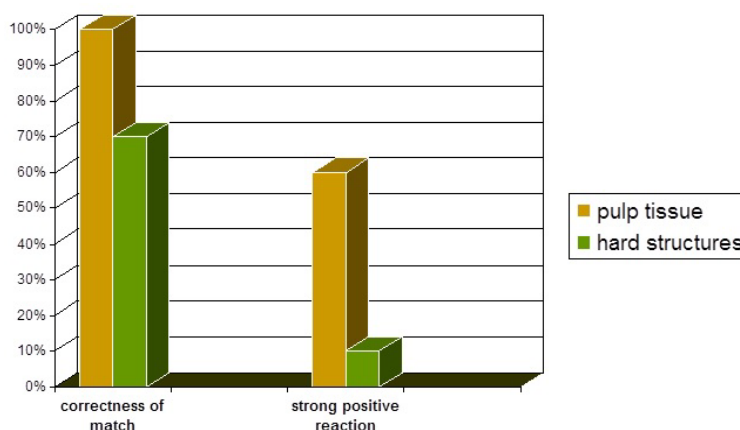


Figure 1. Depicting correctness of match and strong positive reaction of pulp tissue and the hard tissues of teeth.

DISCUSSION

This adsorption-elution technique has been successfully used in testing the blood stains on cloth, body parts and non-absorbent articles like glass, plastic or metal. In all these situations there is direct blood available for testing [9].

When it comes to the teeth, the presence of blood group antigens is based on infusion sedimentation theory i.e., infusion of water soluble antigens from saliva and blood vessels invading the pulp could be the agents [10].

In our study, we found that the pulp tissue was accurate in the interpretation of A B O blood group, but limited for the hard tissues of the tooth. The results obtained by Smeets et al. [1] of Kalthotieke University of Belgium in their study, also found similar results. Xingzhi X et al. [2] of Shanghai Medical University, China experimented on 25 permanent teeth including eight carious teeth also found a high rate of correct grouping and no false positive results with respect to the pulp tissue. The present study too found no false positive reaction with respect to pulp tissue

Both the above mentioned authors did not get completely correct results with the hard tissues of teeth which was similar in our study also [11].

Sharma AK et al. [7] blood group and enzyme types from human teeth where they could successfully determine the correct blood groups from pulp as well as hard tooth. We found the hard tooth part 3 of the samples gave incorrect results. The incorrect result may be due to failure of technique or absence of sufficient concentrate of antigen.

In present experiment the tooth were extracted from living persons and kept in sterile conditions, but in the forensic situations the conditions would be quite different, possibility of antigen contamination to be kept in mind. Infinite retention of antigenic property of teeth structures.

CONCLUSION

Pulp tissue of the teeth could give correct blood group of the individuals. Hard tissues of the teeth had certain limitations. Blood grouping using tooth material especially pulp could be of great help in crime detection. It could be the source of information in forensic odontological practice.

RECOMMENDATIONS

Different parts of the tooth separately have different conditions of tooth-like caried teeth. Un-sterile conditions of teeth. Duration of tooth extraction and efficacy of this method Application in anthropological/archeological studies.

REFERENCES

1. Ranganathan K, et al. Forensic deontology: A review. *J Forensic Odontol.* 2008;1:4-13.
2. Smeets B, et al. ABO grouping on tooth material. *Forensic Sci Int.* 1991;50:277-282.
3. Xingzhi X, et al. ABO blood grouping on dental tissues. *J Forensic Sci.* 1993;38:956-960.
4. Procedure manual on forensic serology. Bureau of police research and development ministry of home affairs. Government of India, New Delhi. 2010.
5. Gururaj PV. Forensic medicine. Orient Longman Publication, India. 1982;252-267.
6. Chowdhuri S. Examination of biological stains. Controller of Publications, Government of India, Delhi. 1980.
7. Sharma AK and Chattopadhyay PK. Blood groups and enzyme types from human teeth. *J Forensic Sci.* 1993;33:155-154.
8. Neiders ME and Standish SM. Blood group determination in forensic dentistry. *Dent Clin North Am.* 1977;21:99-111.
9. Pramod K. Dayal text book of forensic odontology. Paras Publications, India; 1998.
10. Reddy KSN. Essentials of forensic medicine and toxicology. 1994;346-356.
11. Krishanan MKR. Handbook of forensic medicine including toxicology. Paras Medic Books, India; 2014.