ORIGINAL ARTICLE

THE RELIABILITY OF DENTAL PULP IN HUMAN BLOOD GROUP IDENTIFICATION

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ABSTRACT

Dental tissues play a very Important role for forensic purposes, because it is the hardest of all human tissues and can be preserved for a prolonged duration even subsequent to death, The aim of the this study was to determine the ABO blood grouping from the pulpal tissue of extracted teeth and to correlate the same with blood group details obtained from the study subjects.

This descriptive cross sectional study was conducted on 50 subjects. Blood group was determined on blood which was obtained from blood already taken for Hepatitis screening. To determine association Goodman Kruskal Gamma test was applied between blood sample from dental pulp and control in SPSS 20.0.

Out of total participants, 29(58%) were females and 21(42%) were males. The mean age was 25.56±5.17 years, ranging from 18 to 38 years. All the correlation (association) was very high and statistically significant. Overall correlation was very (r=0.99, P=0.00). The correlation was ranging from 0.87(blood group B) to 1.00 (blood AB & O). Similarly, the correlation among Rh^+ and Rh^- was also very high i.e. 0.98 and 0.88 respectively and was statistically significantly.

The finidngs of this investigation showed that there is high correlation of the pulpal blood group with venous blood. So the blood group of this population can determined from dental pulp.

Key Words: *ABO blood group, Dental pulp, Identification.*

INTRODUCTION

Forensic identification by its nature is a multi-disciplinary field and dealing with the recognition of the deceased. It is based on assumption that every contact leaves its impression.[1] Forensic odontology has established itself as an important and often indispensible science in medicolegal matters and identification of the dead.[2] As the dental tissue is the hardest of all human tissue so it is important for Forensic purposes. They are well preserved for a prolong duration even subsequent to death, hence dental remains are the one of the powerful biological evidence found in criminal cases and provide valuable information.[3,4]

The presence of blood group substances and other genetic markers such as enzymes in soft and hard dental tissues makes it possible to assist in the identification of highly decomposed bodies. Pulpal tissue being contained within dental hard tissues and post-mortem changes occur after a long period.5 Since tooth pulp is highly vascular, antigens associated with blood group are most surely present. In dentin, it is supposed that these substances are located in the dentinal tubules. The possible supply of ABO antigens from the wall of the pulpal chamber to the dentin margins and to the enamel steadily diminishes due to less potential of diffusion of antigens from both saliva and blood.[3,6]

Ramnarayan et al (2013) compared blood group from dental pulp with venous blood sample. They reported that dental Pulp blood group in fresh teeth had high correlation with venous blood but was little low with long-standing teeth.[7] Aswath et al in a study using finger-prick method to obtained blood from sixty participant and the samples from the pulp. The ABO blood group, Rh blood group was performed by absorption-elution (AE) method. They reported that 57 teeth out of 60 showed positive results for both types of blood groups.[1]

Studies have been done and more studies are needed to add to the literature. No study have traced to determine blood group from dental pulp purely conducted on Pakistani population. Hence, this study was conducted to evaluate the role of dental pulp in the identification of human blood group. The aim of the present study was to determine the ABO blood grouping from the pulpal tissue of extracted teeth and to correlate the same with blood group details obtained from the study subjects.

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METHODOLOGY

This descriptive cross sectional study was conducted at Peshawar Dental College and Hospital. After history and explanation to participants about purpose of the study, informed consent was taken. The control blood was obtained from blood already taken for Hepatitis screening. The blood groups of all participants were determined by slide agglutination method and used as control.

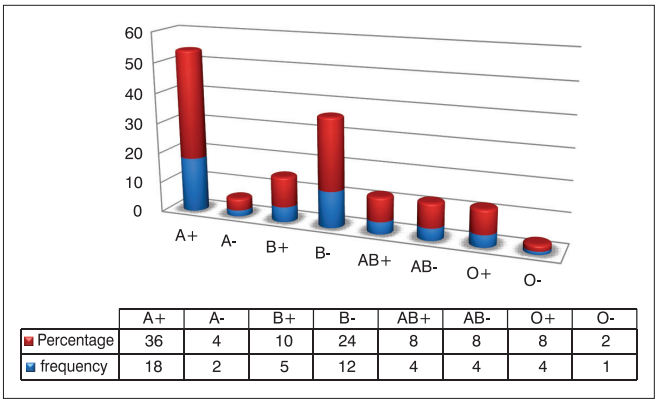
Teeth extracted for periodontal, and orthodontic purposes were included in the study. Teeth that were grossly carious were excluded. The extractions were done using local anesthesia under aseptic condition in the Department of Oral and Maxillofacial Surgery. The extracted teeth were dried and sectioned into two longitudinal parts using a carborundum disc in handpiece. The pulp was removed with spoon excavator. The blood group was determined for teeth pulp by absorption elution test. Blood from pulp were divided into three equal parts and were taken into six sterile test tubes containing 2 ml of saline and labeled, respectively. Three drops of antiserum A, B, D was to each of these test tube, and the test samples were adequately soaked with antiserum for 2.5 hours at normal temperature. Washing was done for each sample using cold saline solution by centrifuging it at 3000 rpm for 5 minutes. Then two drops of fresh saline were added to the sample, and the test tubes were heated in a water bath at a temperature of 50–55°C for 10 min to elude the antibodies.

A drop of 0.5% red cell suspension of known blood group A, B and O was freshly prepared and immediately put into respective test tubes. To enhance agglutination the incubation was done of samples at 37°C for 30 minutes followed by centrifugation at 1500–2000 rpm for one minute. Whether the RBC agglutinate or not it was tested by gentle shaking of the test tube, macroscopically and microscopically at a magnification of ×4.

Data were analyzed using SPSS version 20.0. Frequencies and percentages were calculated for categorical variables like blood groups and genders. To determine association, Goodman kruskal Gamma test was applied between blood sample from dental pulp and control. Two-tailed P < 0.05 was considered as statistically significant.

RESULTS

In this study the total participants were 50 in which 29(58%) were females and 21(42%) were males. The mean age was 25.56±5.17 years, ranging from 18 to 38 years. The most common blood group was A^+ (36%) and B-(24%) and least common was O^-(2%) and O^+(8%). The details are shown in Fig 1.



	A+	A-	B+	B-	AB+	AB-	O+	O-
Percentage	36	4	10	24	8	8	8	2
frequency	18	2	5	12	4	4	4	1

Fig 1: Distribution of overall blood group of the whole sample

TABLE 1: CORRELATION OF ABO SYSTEM OF PATIENT'S CONTROL AND DENTAL PULP BLOOD

Blood Group	Control (n=50)	Pulp (n=50)	P-Value	Goodman kruskal Gamma
	N (%)	N (%)		
A	20(40)	19(38)	0.000	0.86
B	17(34)	18(36)	0.000	0.87
AB	8(16)	8(16)	0.000	1.00
O	5(10)	5(10)	0.000	1.00
Overall	—	—	0.000	0.99

TABLE 2: CORRELATION OF RH BLOOD GROUP OF PATIENT'S CONTROL AND DENTAL PULP BLOOD

Blood	Control (n=50)	Pulp (n=50)	P-Value	Goodman kruskal Gamma
	N (%)	N (%)		
Rh Positive	31(61)	30(60)	0.00	0.98
Rh Negative	19(38)	20(40()	0.00	0.88
Overall	—	—	0.00	0 .98

All the correlation (association) was very high and statistically significant. Overall correlation was very high (r=0.99, P=0.00). The correlation was ranging from 0.87 (blood group B) to 1.00 (blood group AB & O). Individual's correlation along with their statistical significant are shown in the Table 1. Similarly, the correlation among Rh^+ and Rh^- was also very high i.e. 0.98 and 0.88 respectively and was statistically significantly. (Table 2)

DISCUSSION

In 1900 Land Steiner discovered ABO blood group system which create a new intricate decipline of re-

search. This system is in use from last century for medico-legal purposes. The blood group of an individual will never change in life so have prime role in medico-legal investigations.[8] Lattes have rightly said "the fact that belonging to a definite blood group is a fixed character of every human being and can be altered neither by lapse of time nor by intercurrent disease." Blood group like fingerprint is an unalterable primary character.[8]

Human dentition have for long been known to be resistant to environmental variations and have thus been used reliably for identification in calamity circumstances.[9] In an attempt to increase such reliability, this study was conducted. In the current study females were more than males. This may due to the reason that we included only dental patient mostly orthodontic, the females are more cautious about esthetic and have more presentation for dental treatment.[10]

In this study the most common blood group was A^+ and B^- and least common was O^- (2%) and O^+. Although this is small sample size study and may not very appropriate to survey the blood group of Peshawar population, but knowledge about patterns of the various blood groups in Peshawar is of great importance for blood banks and transfusion service policies. To know the phenotype distribution of blood group is also of paramount importance to conduct clinical research (e.g. disease association), as well as for epidemilogic studies. Bashwari et al[11] conducted a study on Saudi population and reported that the most prevalent blood group in Saudis population is O-positive. Lowest frequency was for Blood group A. The results of Bashwari et al are totally opposite to the current one. The reason may be genetic difference.[11] However, another study conducted on 400 patients in district swat, Pakistan reported that the most blood group was A and least was O group.[12] These results are in consistent with the current study.

In the current study the correlation was very high between the blood obtained from patient's finger and dental pulp and was statistically significant. Ballal et al conducted a study on Indian population to determine the ABO blood group from control (venous) and pulp. They used similar methodology as we had in this study but they stored teeth upto six months and then determined the blood group. They reported a high correlation between control and pulp blood group.[3] These resutls are in consistent with our findings. Similar results were also reported in a study of Ramnarayan B et al.[7]

In the present study Rh blood group also showed high correlation. Kumar et al conducted a study on Indian population to determine of ABO blood group and Rhesus factor from tooth material. They reported a high correlation of Rhesus factor form control and tooth and their results showed as the time passes on tooth outside the body the their sensitivity for blood Rhesus factor diagnosis decreases. His study consist of 9 month follow up.[5] These results are similar to the current study except we studied only fresh teeth.

CONCLUSION

The findings of this investigation showed that there is high correlation of pulpal blood group with venous blood. So the blood group of this population can determined form dental pulp and it may a valuable tool in Forensic Sciences.

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CONTRIBUTIONS BY AUTHORS

1 Farhan Dil: Execution of the study, title, abstract writing, introduction, methodology, discussion.

2 Asfandyar Ahmed: Laboratory procedure, data collection, data analysis, results and tabulation.