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Research Article

**ANALYSIS OF THE RELIABILITY OF DENTAL PULP IN  
HUMAN BLOOD GROUP IDENTIFICATION**<sup>1</sup>Dr. Fatima Iftikhar, <sup>2</sup>Dr. Hafiz Ghulam Karim, <sup>3</sup>Dr. Syed Siraj Ahmad<sup>1</sup>Demonstrator at Bakhtawar Amin Medical & Dental College, Multan<sup>2</sup>Dental Surgeon at Rural Health Center, Marot, Bahawalnagar<sup>3</sup>Punjab Dental Hospital, Lahore**Abstract:**

**Introduction:** Teeth, by their very nature, are preserved through many physically damaging events and therefore can play an important role as remains for identification as they are resistant in nature. Hence, this study was conducted to evaluate the role of dental pulp in the identification of human blood group. **Aims and Objectives:** 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. **Methodology of the study:** This cross sectional study was conducted at Bakhtawar Amin Medical & Dental College, Multan during July 2018. 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. **Results:** Sensitivity of blood groups among the study samples which were documented from the study subjects and those verified by absorption-elusion method illustrated that out of total study sample, 24 teeth showed positive results for ABO blood group from dental pulp and 6 showed negative results. Hence, the sensitivity (ability to measure) of pulp in establishment of blood group was found to be 80%. **Conclusion:** It is concluded that Blood grouping from tooth pulp might be of great help in identification even after storing for relatively long periods.

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**INTRODUCTION:**

Teeth, by their very nature, are preserved through many physically damaging events and therefore can play an important role as remains for identification as they are resistant in nature. Hence, this study was conducted to evaluate the role of dental pulp in the identification of human blood group. Forensic identification by its nature is a multi-disciplinary field and dealing with the recognition of the deceased<sup>1</sup>. It is based on assumption that every contact leaves its impression. Forensic odontology has established itself as an important and often indispensable science in medicolegal matters and identification of the dead. As the dental tissue is the hardest of all human tissue so it is important for Forensic purposes. They are well preserved for a prolonged duration even subsequent to death, hence dental remains are one of the powerful biological evidences found in criminal cases and provide valuable information<sup>2</sup>. 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. Since tooth pulp is highly vascular, antigens associated with blood group are most surely present<sup>3</sup>. 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. Blood grouping has been one of the cornerstones of identification of biological material. The term blood group is applied to inherited antigens detected on the red blood cell surface by specific antibodies<sup>4</sup>. The ABO blood group system, first described by Karl Landsteiner in the year 1900, remains the bulwark of forensic blood group investigation. The reasons for this are manifold. It is the primary, most common, conspicuous and easily detectable system. Teeth can survive for a long time even after soft and skeletal tissues have been destroyed. Blood grouping from teeth could be a source of personal identification<sup>5</sup>. The use of blood group substance in the medicolegal examination is based on the fact that once a group is established in an individual, it remains unchanged throughout life. Absorption-elution (AE) technique was devised by Siracusa in the year 1923 and has been refined by Kind who employed it almost exclusively for blood typing of teeth in forensic science laboratory. It was thought to be of interest to apply the method to calcified tissue such as dentine. Dentine was chosen as it has a higher ratio of cell substance to matrix than bone and is easier to obtain

blood [6]. The presence of ABO blood group from soft and hard dental tissues makes it possible to assist in human identification even in decomposed bodies. Mostly, teeth and bones are the only significant tissues remaining in mass disasters such as aircraft crash or, bomb blasts and hence, used in human identification [7].

**Aims and Objectives**

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.

**METHODOLOGY OF THE STUDY:**

This cross sectional study was conducted at Bakhtawar Amin Medical & Dental College, Multan during July 2018. 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.

**Source of data**

Patients coming to the outpatient department of the institution for extraction of teeth due to periodontal or, orthodontic purposes were selected for the study.

**Sample size**

Sixty patients were selected randomly.

**Inclusion criteria**

- Both male and female patients in the age group of 13–70 years
- Teeth which were extracted for periodontal or, orthodontic purposes; and
- Only permanent teeth

**Exclusion criteria**

- Age groups below 13 years and above 70 years were excluded
- Carious teeth, root canal-treated teeth; grossly destructed teeth with exposed pulp cavity were excluded; and
- Deciduous teeth were excluded.

**Detection of blood group from the patient**

Anti-coagulant (EDTA) was added to the socket blood, and one drop of this blood was placed on the slide, and a drop of anti-serum-A was added. If agglutination occurred on the addition of anti-serum-A, blood group was recorded as an A blood group and vice-versa.

**Statistical analysis**

The statistical analysis was carried out using Statistical Package for Social Sciences version 19 (SPSS Inc., Chicago, USA). Descriptive statistics such as mean, standard deviation, and proportion were used.

**RESULTS:**

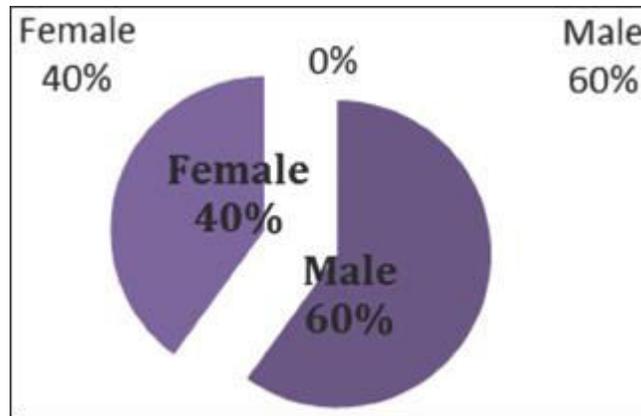
Sensitivity of blood groups among the study samples which were documented from the study subjects and those verified by absorption-elusion method illustrated that out of total study sample, 24 teeth showed positive results for ABO blood group from dental pulp and 6 showed negative results. Hence, the sensitivity (ability to measure) of pulp in establishment of blood group was found to be 80%.

**Table 01:** Sensitivity of blood groups among the study samples

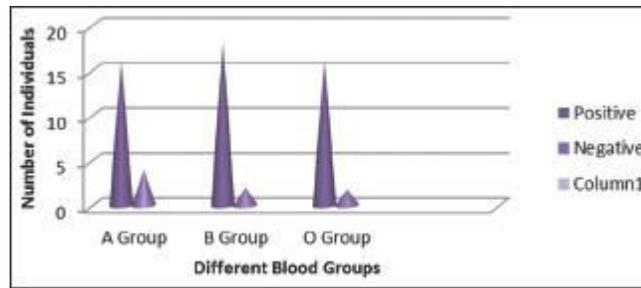
Blood groups	Blood group documented	Blood group verified
<b>A</b>		
+ve	9	7
-ve	2	3
<b>B</b>		
+ve	6	5
-ve	3	4
<b>AB</b>		
+ve	2	2
-ve	1	1
<b>O</b>		
+ve	3	3
-ve	1	2
<b>Total</b>	<b>30</b>	<b>30</b>

Sensitivity of pulp in blood group establishment= $24/30=80\%$

The study was conducted to identify blood groups from dentine and pulp. The study group included sixty patients, among whom 16 patients were <20 years of age, 11 were in between 21 and 40 years and 33 belonged to the age group of 41–60 years while 24 (40%) were females and 36 (60%) were males, requiring extraction due to periodontal or, orthodontic purposes [Graph 1].

**Graph 1:** Distribution of male and female patients**ABO blood grouping based on pulp**

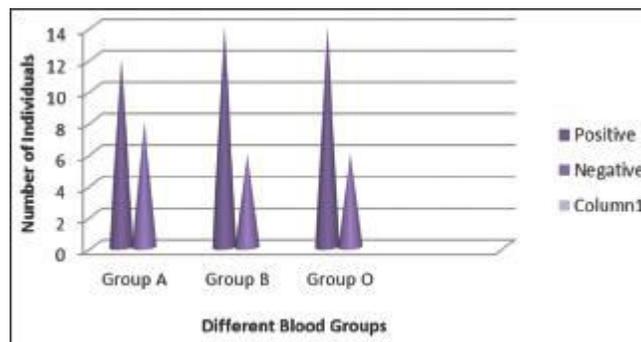
When ABO Blood Grouping was done based on pulp, 16 (80%) out of twenty samples were found to be positive for blood group A while 4 (20%) were found negative; 18 (90%) out of 20 samples were found to be positive for blood group B while 2 (10%) were found negative; 16 (80%) out of twenty samples were found to be positive for blood group O while 4 (20%) samples were found negative.



**Graph 2: Determination of ABO blood group from the pulp**

#### ABO blood grouping based on dentine

In the same way, when ABO blood grouping was done based on dentine, 12 (60%) out of twenty samples were found to be positive for blood group A while 8 (40%) were found negative; 14 (70%) out of twenty samples were found to be positive for blood group B while 6 (30%) were found negative.



**Graph 3: Determination of ABO blood group from the dentine**

#### DISCUSSION:

The present study was conducted to evaluate the credibility of dental pulp in human blood group identification. In this study, it was observed that the sensitivity of pulp in determining blood groups was 80%<sup>8</sup>. This was in accordance with the study conducted by Shetty and Premalatha in which ABO blood grouping was conducted from tooth material and they suggested that sensitivity of pulp in determining blood grouping is significantly high (96.7%) even after storing dry for 6 months. Ballal and David in their study to determine ABO blood grouping from dentine and pulp showed a statistically significant positive results (90%) in determining ABO blood groups from dental pulp which is in unison with the present study<sup>9</sup>. This level of high sensitivity can be attributed to the very nature of teeth being preserved through many physically damaging events and hence serving as an effective tool in provision of pulpal tissues. Another study by Ramnarayan *et al.* also showed similar results in which ABO blood grouping from hard and soft tissues of teeth by modified absorption-elution technique showed a very high sensitivity of dental pulp in both fresh and long-standing teeth (83.3%)<sup>10-11</sup>.

Limitations of this study can be attributed to the fact that tooth with obliterated canals and regressive alterations do not provide sufficient pulpal tissue<sup>12</sup>. This is also a time consuming procedure and costly. Moreover, the fresh red cell suspension has to be prepared every day to produce more accurate results.

#### CONCLUSION:

It is concluded that Blood grouping from tooth pulp might be of great help in identification even after storing for relatively long periods. ABO blood groups obtained from dental pulp can be used to establish identity, where teeth happen to be the only remnants available for personal identification especially as in mass disasters.

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