

Research Article

Determination of ABO Blood Group and Rhesus factor from Tooth Pulp

Saloni Sood¹, Manish Bhargava², Pallvi Rathore³

¹Postgraduate Student, Department of Oral Pathology & Microbiology, Manav Rachna Dental College, Faridabad, Haryana, India

²Professors, Department of Oral Pathology & Microbiology, Manav Rachna Dental College, Faridabad, Haryana, India

³Post Graduate student, Department of Oral Pathology & Microbiology, Manav Rachna Dental College, Faridabad, Haryana, India

***Corresponding author**

Dr Saloni Sood

Email: salonisood7852@yahoo.com

Abstract: Teeth can survive for a long time even after soft and skeletal tissues have been destroyed. The use of blood group substance in an individual remains unchanged throughout his life. The presence of ABO blood grouping makes it possible to determine the blood group and thereby assist in identifying even a highly decomposed body. To determine the ABO blood grouping from socket blood & extracted teeth by using absorption elution technique. Also To compare the blood group and Rhesus factor obtained from pulp with the blood obtained from extraction socket of respective patient.

In results blood group and rhesus factor obtained from pulp and blood obtained from extraction socket of respective patient showed positive correlation. In conclusion Blood group identification from hard tissues of teeth aids in the identification of an individual which has high importance in forensics.

Keywords: ABO, Absorption-elution technique, pulp, blood grouping.

INTRODUCTION

Forensic is a Latin word derived from “forensis” meaning public and forensic science refers to areas of endeavour that can be used in judicial setting and accepted by the court and general scientific community to separate truth from untruth [1]. Human identification is a mainstay of civilization and identification of unknown individuals has always been of paramount importance to society. The Forensic importance of dental tissue has been well recognized because of the fact that tooth is hardest of all human tissues and they can be preserved intact for a long period of time after death [2]. The use of blood group substance in medico legal examination is based on the fact that once a group is established in an individual it remains unchanged throughout his life [3]. Pulp tissue is one of the most protected of all the oral tissues and it contains lot of blood vessels, blood group antigens are most certainly bound to be present in tooth pulp [4]. Thus, the aim of this study was to determine blood group and Rhesus factor from tooth pulp as biological evidence and its importance in forensic odontology and the objectives were to determine the ABO blood grouping from socket blood and from pulp of extracted teeth. Also, to compare the blood group and Rhesus factor obtained from pulp with the blood obtained from extraction socket of respective patient.

MATERIAL & METHODS:

In this study 100 extracted teeth were collected from patients visiting Manav Rachna Dental College, Faridabad.

The inclusion criteria for this study used was Poor periodontal status, orthodontic extractions, impacted third molars. The exclusion criteria used was carious teeth, root canal treated teeth, restored teeth. The extracted teeth were washed under running water and debris was removed with the help of probe and wiped with gauze and kept in numbered bottles and the teeth were dried and stored for a span of 6months at the room temperature without any preservative. The blood grouping was performed by absorption elution technique using dental pulp, which was later, compared with the recorded blood group from the extracted socket.

Laboratory Procedure:

Modelling wax was folded and made into block. The tooth was than embedded on the modelling wax block. The tooth was split vertically with carborundum disc (Fig 1 & 2) and then the dental pulp was scooped with sterile spoon excavator which was placed in a test tube containing sterile thread and a drop of saline. (Fig 3)



Fig 1: Carborundum Disc



Fig 2: Vertically Split Teeth



Fig 3: Test Tubes with Sterile Thread

The test tubes were placed in the incubator at 56°C for 30 minutes for drying where the blood group antigens of dental pulp were absorbed on sterile cotton thread. Blood stained threads of 2 mm length were cut and placed in a drop of anti-A serum in a slide cavity. Similar pieces were placed in anti-B serum. The slides were then kept in moist chamber at 4°C for 2 hours for complete absorption. After absorption, the antiserum was pipetted off from the thread by capillary pipettes and then the thread was thoroughly washed 3 to 4 times in ice cold saline, for the complete removal of unreacted antibodies from it.

Slides were again placed in moist chamber and kept in an incubator at 56°C for 30 minutes to break the antibody- antigen bond (Elution). One drop of a 0.5% suspension of known RBC blood group was added and the samples were again placed in the humidified recipient and were incubated at 56° C for 15 minutes to enhance agglutination. The slides were then removed from the incubator to be kept at room temperature for 45 minutes to 1 hour and were observed under microscope at magnification of 100x for agglutination i.e. ABO blood groups. (Fig 4 & 5)

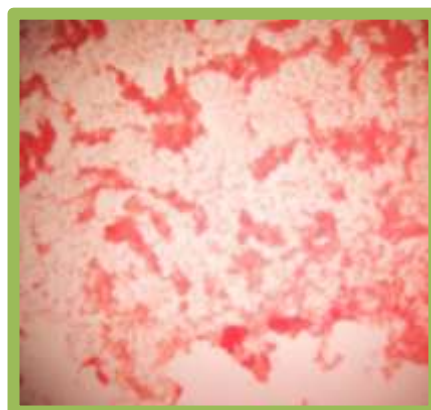


Fig 4: Agglutination of RBCs



Fig 5: No Agglutination of RBCs

RESULTS:

The blood grouping and Rhesus factor was attempted to establish from pulp and it was further confirmed with the control. 100 permanent teeth were collected from 100 subjects, 1 was female and 5 were males, age ranging up to 20 yrs. There were 9 males and 12 females, age ranging from 21 yrs to 40 yrs. There

were 24 females and 49 were males, age ranging from 41 yrs and above. (Shown in Figure-6). Rhesus factor belonging to positive was 89% and for negative were 11%. (Fig-7). Blood grouping on pulp was done after 180 days of extraction on 100 extracted teeth. 89 teeth showed positive results for ABO Blood group in pulp. 11 teeth showed negative results for ABO blood group.

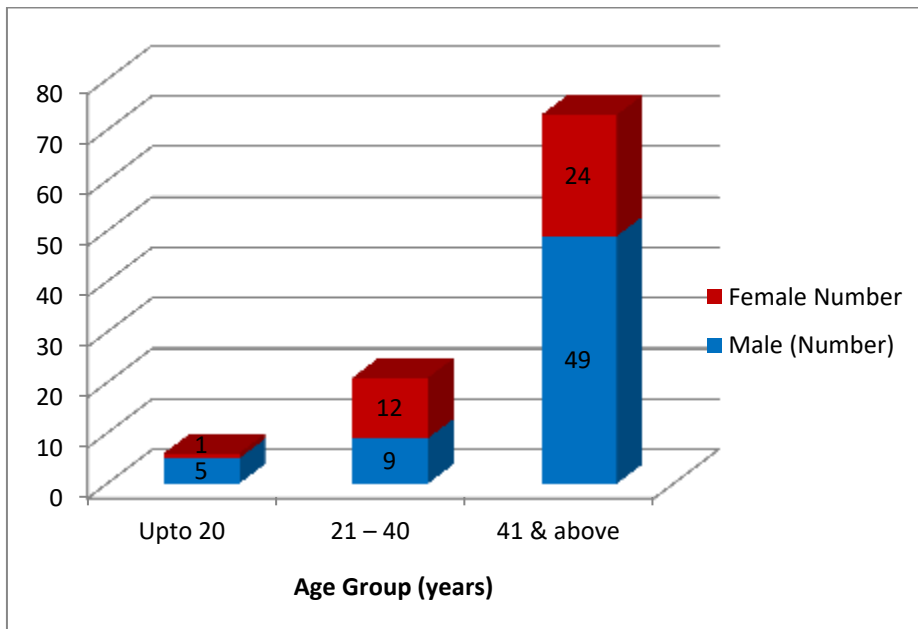


Fig - 6: Age & Sex wise distribution of subjects whose tooth samples were collected

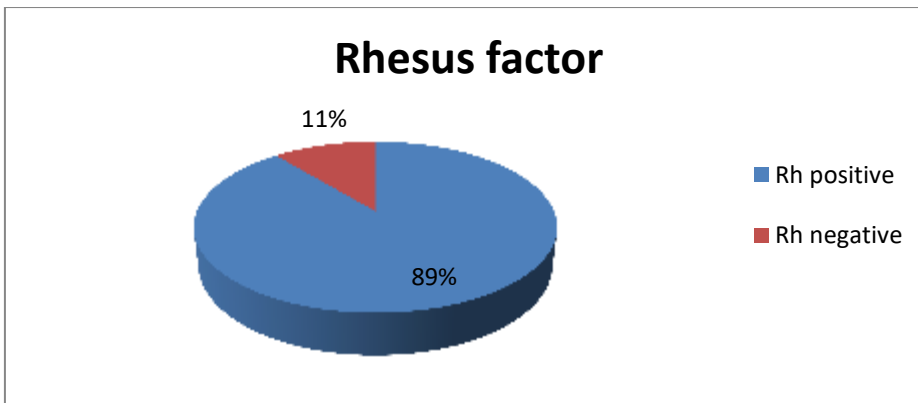


Fig-7: Distribution of the Rhesus factor

Table-1: Distribution of subjects according to ABO blood grouping & Rh factor from tooth pulp

Blood groups	Pulp		
	control	Rh positive	Rh Negative
O	39	32	7
A	16	15	1
B	29	27	2
AB	16	15	1
TOTAL	100		

DISCUSSION

Over the past three-quarters of a century, information from studies on blood groups has been applied to medico-legal application [5]. The use of blood group substances in medico-legal examination is based on the fact that once a blood group is established in an individual, it remains unchanged throughout his life [6].

Identification of a person is very important for the society to establish [7, 8]. Teeth are the most stable biological material which could be used for blood grouping for identification even in most adverse environmental condition. It is also considered the hallmark of identification biological material in forensic investigation [9]. The existence of blood group substances in both the hard and soft tissues and their nature has been a subject of debate for a long time. Hence, determination of blood group from pulp should be relatively straightforward [10].

In this study an attempt was made to determine blood group and Rhesus factor from teeth. This study consisted of 100 teeth, which were extracted from 100 different subjects ranging age groups from 20-70 yrs and kept for six months. The blood group determination was done six months after extraction, to examine if blood grouping on teeth remains possible after relatively long storing periods. Out of 100 subjects, 73% belongs to 40 years and above age group.

Blood group 'B' is most commonly seen in asian population with northern India as it is also seen in studies of Chandra T *et al.*; [11] and Jaggi S *et al.*;[12]. In our study, 89% individuals are Rh positive and 11 % are Rh negative which are consistent with the findings of Kushwaha KPS *et al.*; [13] and Yadav AS *et al.*; [14]. Blood group and Rhesus factor obtained from pulp and blood obtained from extraction socket of respective patient showed positive correlation.

Though blood grouping does not give a positive identity but only a positive non-identity, it has been used to positively identify individuals. In view of particularly significant positive results of ABO blood groups obtained from dental pulp in this study, it can be concluded that dental pulp can be used to establish identity, where teeth happen to be the only remnants available for personal identification [6].

CONCLUSION:

The blood grouping from tooth pulp has its significance in deceased individual identity and is of great help in identification even after a span of six months of death. Therefore it is a vital and integral part of forensic odontology.

REFERENCES:

1. Ballal S, David MP; Determination of ABO blood grouping from dentin and pulp. Pakistan Oral and dental journal 2011; 31(1):3-6.
2. Pretty I, Sweet D; A look at forensic dentistry – Part 1: The role of the teeth in the determination of human identity. Br. Dent. J. 2001; 190(7): 359-366.
3. Pai KR, Tellis R, Afreen S, Rekha PD; Blood group determination using DNA extracted from exfoliated primary teeth at various environmental conditions” –A PCR Study. Int J of Advanced Research 2014;2(11):639-47.
4. Smeets B, van de Voorde H, Hooft P; ABO Blood grouping on tooth material. Forensic science international 1991; 50(2): 277- 284.
5. Neiders ME, Standish SM; Blood group determinations in forensic dentistry. Dent Clin North Am.1977;21:99–111
6. Ramnarayan BK, Manjunath M, Joshi AA; ABO blood grouping from hard and soft tissues of teeth by modified absorption-elution technique. J Forensic Dent Sci 2013; 5(1): 28–34.
7. Vij K; Identification. In: Text book of Forensic Medicine and Toxicology Principles and Practice. 3rd edn. New Delhi: Elsevier India (P) Limited; 2005: 50-51, 83.
8. Pillay VV; Identification. In Handbook of Forensic Medicine and Toxicology, 14th edn. Hyderabad: Paras Medical publishers; 2004: 48, 78
9. Shetty M, Premalatha K.; ABO blood grouping from tooth material. J Indian Acad Forensic Med 2010;32(4):336-38
10. Xingzhi X, Ji L, Hao F, Ming L, Zhuyao L; ABO blood grouping on dental tissue. J Forensic Sci.1993;38:956–60
11. Chandra T, Gupta A; Prevalence of ABO and Rhesus Blood Groups in Northern India. J Blood disorders Transf 2012;3(5):1-3
12. Jaggi S, Yadav AS; Distribution of ABO and Rh allele frequency among four endogamous populations of Haryana. Int J of Research in Applied 2014;2(2):77-80
13. Kushwaha KPS, Gaur JR, Sangwan SK, Yadav AS, Thukral K, Kushwaha BP, *et al.*; ABO and Rh(D) blood groups among 19 Caste populations of Haryana. Bionature.1990; 10: 73-75
14. Yadav AS, Jain R; Distribution of ABO and Rh (D) allele frequencies among four endogamous groups of Haryana. J of Cytology and Genetics 2008; 3: 43-46.