Saliva in identification of ABO Blood Grouping & Rhesus Factor

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Abstract

Aim: To assess the efficacy and reliability of saliva in identification of ABO blood grouping.

Materials and Method: The study was conducted in the outpatient department of Oral Medicine and Radiology. The serum and saliva of 50 participants were collected and the blood group of the individual from serum was identified by the slide agglutination method and from saliva by the absoption elution method.

Results: Data obtained were subjected to statistical analysis using Paerson's chi square test and it showed high significance (P = <0.001).

Conclusion: The outcome of the present study showed that saliva can be used as an aid in forensics for identification of ABO blood grouping of an individual.

***Key word**: ABO blood grouping, Saliva, Identification.*

Introduction

Karl Landsteiner discovered ABO blood grouping in early 1900. After his invention many other investigators like MN, Lutheran, Kell, Lewis, Duffy, Kidd, Diego, Dombrock have also described other types of blood grouping system, but till now ABO and Rh groups are in practice and considered as Gold standard method. The blood groups remain the same throughout the life of an individual and this forms the basis for the use of blood groups in medico-legal examination [1].Besides blood these antigens are secreted in various other body secretions such as saliva, semen, gastric juice, nasal secretions, vaginal secretions, sweat, tear, urine etc. Individuals could be classified as "secretors" and "non-secretors" according to their ability to secrete ABO blood group antigens in saliva[2].

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Saliva was first analysed for the presence of anti-A and anti-B hemagglutinins in 1928[3]. In some criminal cases like robbery, rape and hanging, saliva may be found in some form or other and may be the most important source in detecting blood group of a victim or suspected culprit in forensics [4].

There are two main methods for detecting ABO blood group in saliva. The Absorption-Inhibition method and the Absorption-Elution method. In this study an attempt has been taken to find the efficacy and reliability of saliva in identification of ABO blood groups through absorption elution method.

Method and Materials:

A cross sectional study was conducted in the outpatient department of Oral Medicine and Radiology after the approval of the Institutional ethical committee (ECR/761/Inst/TN/2015). The study consisted of 50 participants to whom the nature of the study was explained and written consent was obtained. Participants with haematological disorders were excluded from this study.

For ABO blood grouping in serum, slide

agglutination method was followed where blood was collected by capillary puncture method and placed over three glass slides to which Anti serum A, B and D were added and observed for Agglutination.

For ABO blood grouping from saliva whole saliva was collected by suction method and it was transformed to 3 test tubes to which Antiserum A,B and D were added and left for two and half hours at room temperature. This was kept in hot water bath for 10 minutes and after that 2 drops of fresh saline was added to it. Each sample was washed 3 times with cold saline solution (ie. centrifuged and excess removed by pipette sucking). A drop of patient`s blood (known blood group) was added and incubated for 15 mins at 37 degree centigrade and the test tubes were then centrifuged for 1 minute at 2000rpm. Then presence or absence of agglutination was observed in microscope.

Table 1.Blood groups determined from serum and saliva.

Sample no	Serum	Saliva
1	O+	O+
2	B+	B+
3	B+	B+
4	B+	B+
5	B+	B+
6	A+	A+
7	B+	B+
8	B-	B-
9	O+	O+
10	A+	A+
11	AB+	AB+
12	O+	O+
13	A+	A+
14	AB+	AB+
15	O+	O+
16	A+	A+
17	A+	A+
18	B+	B+
19	B+	B+
20	AB+	AB+
21	B+	B+
22	B-	B-
23	A+	A+
24	AB+	AB+
25	B+	B+
26	B+	B+
27	O+	-
28	A+	A+
29	B+	B+
30	AB+	AB+
31	O+	O+
32	O+	O+
33	AB+	AB+
34	B+	B+
35	A+	A+
36	A+	A+
37	B+	B+
38	B+	B+
39	O+	O+
40	B+	B+
41	B+	B+
42	B-	B-
43	A+	A+
44	B+	B+
45	A+	A+
46	A+	A+
47	A+	B+
48	B+	B+
49	B+	B+
50	O+	O+

Table 2. Statistical analysis using Pearson chi square test

Serum		Saliva					Total	Pearson Chi Square Test		Contingency Coefficient	
		A+	B+	O+	AB+	B-		Chi^2 Value	P-Value	Chi^2 Value	P-Value
A+	Count	12	1	0	0	0	13	185.168	<0.001	0.887	<0.0001
	Row%	92.3	7.7	.0	.0	.0	100.0				
B+	Count	0	19	0	0	0	19				
	Row%	.0	100.0	.0	.0	.0	100.0				
O+	Count	1	0	8	0	0	9				
	Row%	11.1	.0	88.9	.0	.0	100.0				
AB+	Count	0	0	0	6	0	6				
	Row%	.0	.0	.0	100.0	.0	100.0				
B-	Count	0	0	0	0	3	3				
	Row%	.0	.0	.0	.0	100.0	100.0				
Total	Count	13	20	8	6	3	50				
	Row%	26.0	40.0	16.0	12.0	6.0	100.0				

Table 3. Correlation between the Genders

Sex			Saliva										Pearson Chi Square Test		Contingency Coefficient	
			A +		B +		O +		AB +		B -					
			n	%	n	%	n	%	n	%	n	%	Chi^2 Value	P-Value	Chi^2 Value	P-Value
Male	Serum	A +	6	100.00	0	.00	0	.00	0	.00	0	.00	88.000	< 0.001	0.894	<0.001
		B +	0	.00	8	100.00	0	.00	0	.00	0	.00				
		O +	0	.00	0	.00	3	100.00	0	.00	0	.00				
		AB +	0	.00	0	.00	0	.00	2	100.00	0	.00				
		B -	0	.00	0	.00	0	.00	0	.00	3	100.00				
Female	Serum	A +	6	85.71	1	14.29	0	.00	0	.00	0	.00	70.571	< 0.001	0.846	<0.001
		B +	0	.00	11	100.00	0	.00	0	.00	0	.00				
		O +	1	16.67	0	.00	5	83.33	0	.00	0	.00				
		AB +	0	.00	0	.00	0	.00	4	100.00	0	.00				

Results

Out of 50 participants, 22 were male and 28were female. The blood groups determined from serum and saliva are shown in (Table 1).The blood groups B+, AB+, B- have high secretor levels compared to other blood groups.The correlation of blood groups between serum and saliva were statistically analysed using Pearson chi square test.(Table 2) It was seen that there was high statistical significance between serum and salivary ABO blood grouping (P<0.001). Pearson chi square test value was 185.16 and the coefficient value was 0.887.The correlation between Genders is shown in Table 3.

Discussion

Determination of blood group is useful in identification of a subject especially in medicolegal cases like those involving child abuse, rape and murder, etc. In some situations blood may be absent at the scene [5]. In such conditions an alternative is required for identification of an individual. Although ABO and Rhesus factor in serum is the gold standard method, blood group specific antigens can also be found in other body secretions. Saliva is a biological fluid which not only helps in identification of systemic problems but also in forensic for identification. Saliva might be found on different substances at the scene of a crime.

Yamakami discovered the presence of A and B antigens in saliva [6]. In 1963, Outride compared the absorption elution and absorption inhibition method and concluded that the former is more sensitive [7] and the studies done by Kaur et al.,[8] and Aye et al.,[9] were in accordance to this. So in this study absorption elution method is followed in identification of ABO blood grouping in saliva. According to the study conducted by Igbeneghu C et al.,[10] frequency of secretor was common in blood group O followed by A, B and AB. Emeribe et al. [11] and Jaff[12] reported similar findings in their studies. Saboor M et al.,[13] conducted a study to evaluate the ABH blood group among 101 healthy adult students and concluded that the frequency was highest in blood group B which was in accordance with our study. It is also seen that out of 50 subjects, 48 of them showed the secretor level similar to the study conducted by Pereira M et al.,[14] Kimura A et al.,[15] Parekh P et al.,[16] and Pawan Motghare et al [4]. This study also shows that the ability to secrete ABO blood group antigens in saliva was more common in males than in females.The correlation (Table 2) proves that saliva can be used in identification of ABO Blood grouping and Rh factor ($p < 0.001$.

The limitation of the study is that it has a small sample size and the segregation of secretors and non-secretors also play a significant role in determining the accuracy of the tests [17].

Conclusion

Saliva plays a major role not just in oral cavity but it also as a mirror of our body system. The outcome of the present study showed that saliva can be used in identification of ABO blood group but further studies on large sample size should be done to ascertain the diagnostic value of saliva in forensic.

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References

1. Neiders ME, Standish SM. Blood group determinations in forensic dentistry. Symposium on the Forensic Dentistry: Legal Obligations and Methods of Identification for the Practioner. Dental Clinics Of North America. 1977;21(1):99–111.
2. Watkins WM. The ABO blood group system: historical background. Transfus Med. 2001;11(4):243-265.
3. Harrington J, Martin R, Kobilinsky L. Detection of hemagglutinins in dried saliva stains and their potential use in blood typing. J Forensic Sci 1988;33(3):628-37.
4. PawanMotghare, Lata Kale, Aarti S Bedia, SonalCharde. Efficacy and accuracy of ABO blood group determination from saliva. Journal of Indian Academy of Oral Medicine and Radiology, July – September 2011;23(3):163-167.
5. Priyam R Velani, Preetam Shah, LaxmiLakade. Determination of ABO blood groups and Rh typing from dry salivary samples. Int J ClinPediatr Dent 2018;11(2):100-104.
6. Thaler R, Froum S, Chuba JV, Scopp IW. A quantitative study on the relationship of salivary blood group substances to periodontal disease. J. Periodontal Res. 1976;11:116–20.
7. Outride RA. Bloodstain grouping-elution vs inhibition. J Forensic SciSoc 1963;4:87-90.
8. Kaur G, Sharma VK. Comparison of absorption

inhibition and absorption elution methods in the detection of ABO(H) antigens in sweat stains. CurrSci 1988;57:1221-3.

9. Aye UT. ABO blood grouping of blood stains on sweaty garments by the absorption elution method. Forensic Sci 1977;16:8-12.
10. Igbeneghu C, Chebudum S, Olisekodiaka J.M, Albi T, Onuegbu J.A, Adesiyan A, Adaibo A.B. IJMBR 2015;(3): 6-10.
11 Emeribe A. O., Igweagu C. A. &Ossim E. E. (1992). ABH secretors status in saliva of Calabar municipal residents. East Afr. Med. J. 69(1):27-30.
12. Falusi A. G., Ademowo C. A., Latunji C. A., Okeke A. C., Olatunji P. O., Onyekwere T. O., Jimmy E. O. &Raji Y. (2000). Distribution of ABO and Rh Genes in Nigeria. Afr. J. Med. Med. Sci. 29:23-26.
13. Saboor M, Ullah A, Qamar K, Mir A, Moinuddin. Frequency of ABH secretors and non secretors. A cross sectional study in Karachi. Pak JMed Sci. 2014;30(1);189-93.
14. Pereira M, Martin PD. Determination of Lewis Secretion in body fluids and dries stains of body fluids. Sci Justice 1977;17:135-38.
15. Kimura A, Matsumura F, Sodesaki K, Tsuji T. ABO blood grouping of saliva from mixed body fluids by sandwich methods using monoclonal antibodies to tissue specific epitopes on blood group substance in saliva. Int J Legal Med 1991;104(4):189-92.
16. Parekh P, Sansare K, Malwankar AG, Gore PG. ABO blood group determination from dental pulp and saliva for its use in forensic odontology. J Indian Acad Oral Med Radiol1994;(1-2):17-20.
17. Manu Prasad Sen, M. Vanishree, Santosh Hunasgi, R. Surekha, AnilaKoneru, VardendraManvikar. A comparison of absorption inhibition and absorption elution methods for estimation of ABO blood groups in saliva.Journal of Medicine, Radiology, Pathology &Surgery (2015), 1, 1–4.