HNSJ Humanitarian & Natural Sciences Journal
ISSN: (e) 2709-0833
www.hnjournal.net
مجلة العلوم الإنسانية والطبيعية
مجلة علمية محكمة
معامل التأثير العربي للعام 2020م = 0.44

RESEARCH ARTICLE

A STUDY TO COMPARE & EVALUATE GEL CARD AND SALINE TUBE TECHNIQUES FOR BLOOD CROSS MATCHING AT NIMS HOSPITAL, JAIPUR

Mahamat Ahmat Aboussakine[1] **Prof (Dr). Kalpana Sankhala[2]**

[1] MSc MLT(Blood Transfusion Technology), Ministry of Health, Chad
Email: abouammar2020@gmail.com

[2] Department of Pathology, NIMS Medical collage, NIMS University, Jaipur, Rajasthan, INDIA

Published at 01/05/2021 **Accepted at 25/04/2021**

Abstract

Background: Before a blood transfusion, there are a series of proceedings pulled out to make sure proper blood from the patient, cross-hatching is the end of this series is done to ensure that a particular unit of blood may be safely transfused to a patient. A total of 120 blood samples attending the blood bank of NIMS hospital, from 26 February 2018 to 15 April 2018 crossmatched, evaluated by gel card technique and saline tube method.

Aim: The main aim of the research is to compare the accuracy and sensitivity of the gel card technique (LISS/COOMBS) and the saline tube technique.

Methods: All samples included were subject to crosshatched by the following techniques:

1. ABO and Rh (D) grouping using monoclonal anti-A, anti-B, and polyclonal IgG, IgM.

2. The gel card system used was ID-Card "LISS/Coombs micro typing system containing polyspecific Antihuman globulin with Anti IgG, C3d activity, manufactured by Bio-Rad diagnostics P Ltd;

3. A saline tube technique at room temperature (RT) and 37℃ using polyspecific AHG Reagent and monospecific manufactured by Eryclone.

Results: The results show that the highest number of case studies based on blood groups was B+ (33.3%) followed by O+ (30%), A+ (28.3%), AB+ (5%), A-(1.7%), O-(0.8%), and B- (0.8%) respectively. All samples were negative (compatible) 100% by gel card technique and saline tube method at room temperature (RT). As well the saline tube method at 37℃ (Indirect Antiglobulin test) also shows the same result 120 samples negative (compatible) 100% while sensitivity and accuracy 100% in both techniques.

5. Conclusion: During the techniques carried out in the study, the procedures used for both method shows that gel card is easier to use and the factors affecting the results are less. The time-consuming in two methods also put the gel card first method in favor.

Key Words: Gel Card, Saline Tube, Cross-matching, Antiglobulin.

Introduction

Before a blood transfusion, there are a series of actions pulled out to ensure proper blood for the patient. These procedures try to establish the compatibility between donor and recipient ABO and Rh systems and to rule out the existence of antibodies in the recipient's serum that could react with transfused red cells. To establish the ABO and Rh compatibility between donor and recipient, both the recipient and the blood to be transfused are typed to rule out the existence of antibodies (other than anti-A or anti B) [(1)].

The terms compatibility test and crossmatching are sometimes used interchangeably it is a part of a compatibility test, a crossmatch is carried out to ensure there are no antibodies present in the patient`s serum that will react with donor cells when transfused. [(2)] Even if the blood groups of the donor and patient are known, it is necessary to perform a cross-match as the final serological test of compatibility as this will also show if any mistakes have been made in the ABO grouping of the patient or donor, remember that it is ABO incompatibility between the patient's plasma and donor red cells that causes fatal hemolytic transfusion reactions. Whenever possible, an indirect Antiglobulin test should be used for the cross-match. [(3)]

The gel card method introduced by Lapierre et al is used for crossmatching of blood along with the saline tube method. In the gel card method washing steps are not required and the time taken is only 30 min. [(4)] The gel test is a reliable and advantageous method and is suitable for routine use for detection and identification of alloantibodies in a community hospital transfusion service laboratory. [(5)]

Saline tube technique crossmatch has been the mainstay for antibody detection for a long
Period, it is still considered the gold standard in pretransfusion testing, it still has various disadvantages and depends on the accurate hand-to-eye work of the laboratory personnel, therefore, it is greatly recommended to be used routinely in pretransfusion testing. [(6)]

Material & Method

A total of 120 samples was included in the study. These samples were referred to Blood bank NIMS hospital for crossmatching. All samples included were subject to crossmatch by the following techniques:

1. ABO and Rh (D) Grouping using monoclonal anti-A, anti-B, and polyclonal IgG, IgM
2. The gel card system used was ID-Card "LISS/Coombs micro typing system containing polyspecific Antihuman globulin with Anti IgG, C3d activity. Manufactured by Bio-Rad diagnostics P Ltd The Microtubes of the ID-Card "LISS/Coombs" contain polyspecific AHG, to be used for cross-matching, patient serum, and donor red cells are added to the Microtubes. The card is incubated at 37℃ for 15 minutes and then centrifuged for 10 minutes Washing and check cells are not required[(7)].
3. A saline tube technique using polyspecific AHG Reagent and monospecific. Manufactured by Eryclone. The saline tube technique is done both for IgM and IgG antibodies Patient serum or plasma and reagent red cells are combined, then centrifuged, and observed for agglutination.

Incubated at 37°C

The tubes are incubated at 37°C for 30-60 minutes, depending on the enhancement media used. After the incubation period, the tubes are centrifuged and observed for agglutination. The cells are washed 3-4 times to remove any unbound antibody. This is an important step in the tube method. Improper washing may lead to false-negative results.

Indirect Antiglobulin test or Anti-human globulin (AHG)

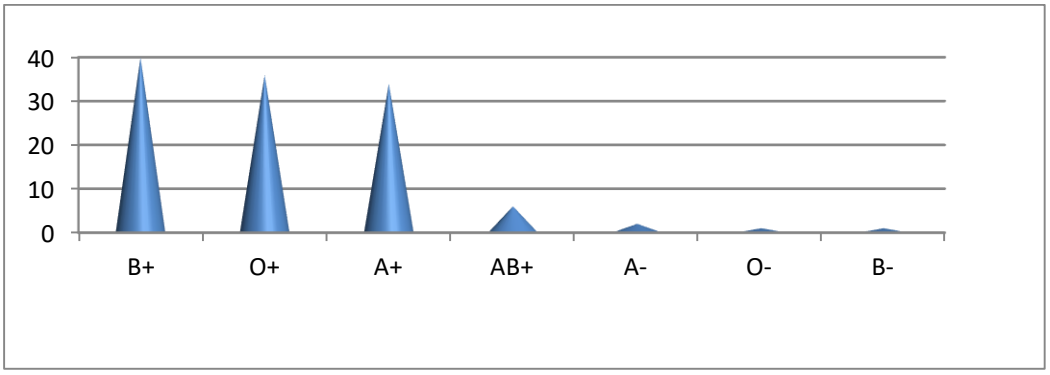
AHG is then added, the tubes are centrifuged, and are observed for agglutination. Cheek cells are added to all negative tubes. Cheek cells are cells coated with IgG and should react positively with the AHG in the tube. If check cells are negative, the procedure was not performed correctly and should be repeated [8].

Results

The present study was carried out in the Blood Bank of NIMS hospital during the period from 26 February 2018 to 15 April 2018. A total number of 120 blood units were crosshatched with 80 patient samples requesting blood. All samples were evaluated by gel card technique and saline tube techniques. The highest number of case studies based on blood groups was B+ (33.3%) followed by O+ (30%), A+ (28.3%), AB+ (5%), A-(1.7%), O-(0.8%), and B- (0.8%) respectively. (Table 1) (Graph 1).

Blood group type	Number of samples	Percentage %
B+	40	33%
O+	36	30%
A+	34	28.3%
AB+	06	5%
A-	02	1.7%
O-	01	0.8%
B-	01	0.8%
Total	120	100%

Table 1 Case studies based on blood groups

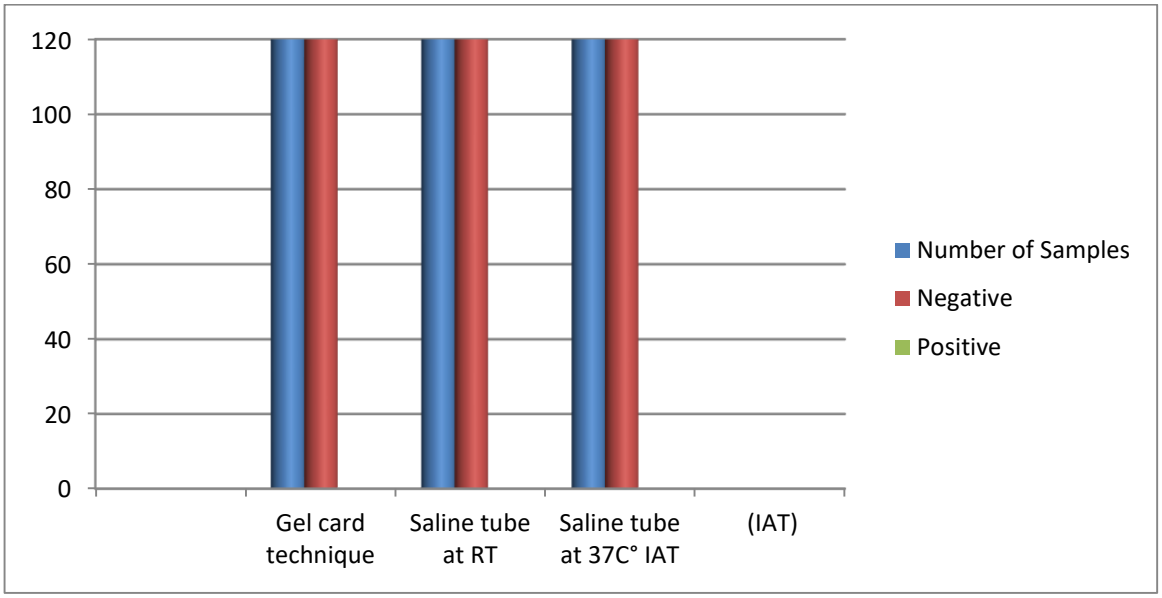


Graph 1: Showing Case studies based on blood groups

120 samples were negative (compatible) 100% by gel card technique and saline tube method at room temperature (RT), as well the saline tube method at 37℃ (Indirect Antiglobulin test) also show the same result 120 samples negative (compatible) 100% (Table 2) (Graph 2).

Technique use	Number of Samples	Negative (Compatible)	Positive (Incompatible)
Gel card technique	120	120	00
Saline tube at RT	120	120	00
Saline tube at 37℃ (IAT)	120	120	00

Table 2 Result of techniques used in studies



Graph 2 Showing Result of techniques used in studies

Discussion

The crossmatch test has traditionally meant the testing of the patient's serum with the donor RBCs, including an Antiglobulin phase or simply an immediate spin phase to confirm ABO compatibility and. It may detect the presence of an antibody in the patient's serum that will react with antigens on the donor RBCs, but that was not detected in antibody screening because the corresponding antigen was lacking from the screening cells. [9]

The Gel technique has been introduced to simplify the technique and interpretation. It was initially introduced in the developed country and has now become popular in several blood banks. [10] The gel card systems have now been adopted and widely used for antigen detection, alloantibody screening/ identification, and cross-matching. [11] [12]

In the present study, the results showed the number of men more than females in patient samples

requesting blood, where the number of men 57 and female 23 in the rate of (71.5%) men and (28.75%) female, the approximate number of blood request per patient is 2 units per patient, it is similar to the result of a study conducted by Nidhi et al found 1.47:1. [13]

The results of a recent study showed the compatibility of the gel card technique with saline tube technique, all samples crosshatched by both technique gel card and saline tube show 100% compatibility that means the sensitivity and specificity is 100%, that may be related to select the similar blood group in crossmatching and this may increase the chance of matching or compatibility. Therefore the result of the present study similar to some other study conducted by Singh et al in Etawah, India. [14]

Another study followed and Gond et al demonstrated the sensitivity and specificity of gel card and saline tube method they found 100%, also match with the result of a study conducted by Hitesh et al. [4] [15]

In the present study, the results are close to some other conducted in South Carolina by John et al demonstrated the sensitivity of gel card 95% and saline tube technique 99,1%. [5] While the study conducted in Maharashtra, India by Bhagwat et al demonstrated the sensitivity of 95.1% .[16] And a study conducted by Varshney and Gupta showed the sensitivity in gel card 100%, while was 63% in saline tube technique. [6]

The gel card method is better than the Spin saline tube method because of its simplicity, the stability of results, better handling, the longtime recorded, the dispensation of controls with a comparable procedure which is followed by both techniques. [15]

In the present study, the saline tube method at room temperature showed 100% compatibility did not find cold antibodies this may be due to the absence of cold antibodies in the study samples. The saline tube technique is also sensitive and able to detect warm antibodies, but the factor affecting the test such as incubation frequent cell wash makes the test need good experience to do it. [2]

Conclusion

During the techniques carried out in this study, the procedures used for both method shows that gel card is easier to use and the factors affecting the results are less. The time-consuming of the two methods also put the gel card first method in favor. The advantages of gel card as an easy reading of Microtube, easily recording the results for a long time, handling, and disposal. By gel card technique can detect the ABO incompatibility; also the gel card essay appears to be an excellent method for detecting agglutination better than the saline tube method and easy to read weak agglutination. The performance of the saline tube technique requires more experience and high accuracy due to its long stages and multiple washing. But gel card method is costly due requirement of the costly and separate incubator and centrifuge.

REFERENCES

[1] Virella, G. Medical Immunology. Fifth Edition. Marcel Dekker, Inc. All Rights Reserved.2001.P436.

[2] , R.N. Principal, and Practice of Transfusion Medicine. Kongposh Publications Pvt. Ltd.2 014.P152

[3] World Health Organization, reprint Ed. Safe Blood and Blood Products. Module 3 Blood Group Serology. 2009.

[4] Hits KK, Sangeeta G, Venkat S and, Hayath SM. Gel Card Technique a New Method of Crossing Match of blood for International Journal of Recent Scientific Research Vol. 7, Issue, 10, pp. 13585-13586, October 2016.

[5] John C, Cate IV, Reilly N. Evaluation and Implementation of the Gel Test for Indirect Antiglobulin Testing in a Community Hospital Laboratory. Archives of Pathology & Laboratory Medicine: August 1999, Vol. 123, No. 8, pp. 693-697.

[6] Varshney L, Gupta S. Comparison between conventional tube technique and column agglutination technique for antibody screening and identification of MGM blood bank, Navi Mumbai. J. Evolution Med. Dent. SCI Vol. 6/ Issue 92/ Dec. 04, 2017, Page 6551.

[7] Mehdi S.R. Essentials of Blood Banking, Second Edition, Jaypee Brothers Medical Publishers (P) Ltd, 2013.

[8]. Sara KR. Transfusion Medicine Technical Manual. Ministry of the health and family welfare, Government of INDIA. Second Edition 2003.P 122

[9] Roback, J. (Ed): Technical Manual, 16th Ed. American Association of Blood Banks, Bethesda, MD, 2008, p 453

[10] Nathalang O, Kuvanont S, Suwanasit T, Yensuang K, Sriphaisal T, Krutvacho T (1993) A preliminary study of gel test for crossmatching in Thailand. J Med Assoc Thailand 21:101–106

[11] Tiwari AK, Aggarwal G, Ravi C. Arora D, Gupta GK, and Ranina V. First Indian study to establish safety y of immediate-spin crossmatch for red blood cell transfusion in antibody screen-negative recipients. Asian J Transfus Sci. 2017 Jan-Jun; 11 (1): 40–44.

[12] Raja KA, Dobariya GH, Unagar CH, Pandya AN, Patel JN, Wadhwani SJ. Frequency and distribution of ABO and Rh blood groups among blood donors in tertiary care hospital of South Gujarat, India. Int J Res Med Sci. 2016 Dec; 4 (12): 5377-5381.

[13] Bhatnagar NM, Soni S, Gajiar M, Shah M, Shah S, and Patel V. Performance indicators: A tool for continuous quality improvement. Asian J Transfus Sc. 2016 Volume 10 Issue 1 Page: 42-47

[14] Singh N, Singh N, Josef R, Gautam AK, Tandon N. Evaluation of Methodology and Comparative Study Between Spin Saline Tube and Matrix Gel Card Technique for Blood Compatibility. International Journal of Current Research., Vol.9, Issue, 07, pp.53800, Jully, 2017.

[15] Gond SK, Mishra SK, Garg A, Mishra P. A Comparative Study of Blood Crossmatch Using Newly Introduced Gel Technique and Conventional Tube Method. Indian Journal of Basic

And Applied Medical Research; September 2016: Vol. -5, Issue- 4, P. 128-131.

[16] Bhagwat SN, Sharma JH, Jose J, Modi C J, compares the results of manual and automated techniques for blood grouping and crossmatching so as to validate the automated system effectively. Journal of Laboratory Physicians / Jul-Dec 2015 / Vol-7 / Issue-2.