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Original Article

Transfusion Medicine Section

Distribution of ABO and Rh Blood Groups among Patients Admitted to a Gynaecology, Obstetrics and Children Hospital in Konya, Turkey

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ABSTRACT

Introduction: ABO and Rh-blood groups vary among different populations in the world. Also, this variability of blood groups has been observed in different geographical regions and populations within a country. Determination of ABO and Rh-blood group distribution in a country plays an important role in blood transfusion and many fields of medicine.

Aim: To determine distribution of ABO and Rh-blood groups among patients admitted to gynaecology, obstetrics and children Hospital in Konya, Turkey.

Materials and Methods: A total of 30291 patients were included to this retrospective study between September 2015-December 2017 for a period of 27 months. Patients were divided into two major groups according to age. There were 29548 (97.5%) women in the age group of 17-75 and they admitted to gynaecology and obstetrics departments. The number of children in the age group of 0-16 were 743 (2.5%) and they were admitted to paediatrics departments. ABO and Rh-blood group tests were performed by gel centrifugation method on fully automated immunohematology analyser. Data analyses were performed by using chi-Square and Monte Carlo exact test.

Results: A Rh-positive had the highest rates (37% and 35.4%) among women and children, respectively and was followed by O Rh-positive (28.4%, 29.8%), B Rh-positive (16.1%, 16.9%) and AB Rh-positive (7.3%, 6.8%). AB Rh-negative had the lowest frequency as its rate was under 1%. The rate of Rh positivity was 89% and that of Rh negativity was found to be 11% in both study groups. Distribution of blood groups according to gender among children population was not found statistically significant (p>0.05).

Conclusion: The present results were similar to data obtained from previous studies in Turkey, but indicated a different ABO and Rh-blood group profile compared to many studies worldwide because of genetic and ethnic factors. Authors think the present study will contribute to literature by reporting the knowledge of blood group distribution in different populations and creating a database for blood banks in our country.

Keywords: Blood transfusion, Gel centrifugation method, Rhesus factor

INTRODUCTION

The ABO blood groups discovered in 1900 by Austrian scientist Karl Landsteiner consist of four main groups A, B, AB and O which are determined on the basis of presence or absence of A and B antigens on the surface of erythrocytes. In 1941, Rhesus (Rh) blood group was defined by Landsteiner and Wiener [1-3]. A and B antigens are complex oligosaccharides located on extracellular surface of erythrocyte membrane and also expressed on surface of other cells and tissues [4]. O group which has neither A nor B antigens, was firstly identified as C and later renamed as O. O was meaning “Ohne” in German; “without”, or “Zero” in English [3,5,6]. Other blood groups are Lewis, P, I, MNSs, Kell, Duffy, Kidd, Bombay (oh) phenotype and many more [7]. In Rh system which contains more than 44 different antigens, blood groups are named as Rh-positive or Rh-negative according to presence or absence of Rh (D) antigens on erythrocyte surface. Rh antigens are determined by genes located on the first chromosome while A, B and O antigens are under the control of genes situated on the ninth chromosome [2,4].

In transfusion medicine, ABO and Rh-blood groups have clinical and immunological importance owing to their capacity for stimulation of antibodies which lead to intravascular haemolysis. By contrast with A and B antigens, Rh antigen is present on erythrocyte membrane but not on other cells and tissues [8]. In case of sensitisation of Rh-negative mothers due to previous pregnancies, subsequent or incompatible transfusions, they develop Rh antibodies against Rh-positive erythrocytes of fetus and cause haemolysis of fetal erythrocytes which is called haemolytic disease of newborn. Because of this, Rh incompatibility is an urgent and important situation [3,6].

Blood groups play crucial role in transfusion safety, genetic researches, inheritance pattern, paternity testing and susceptibility to some diseases like duodenal ulcer, diabetes mellitus, urinary tract infections, gastric cancer and predisposition to have fewer levels of von Willebrand Factor [9-11]. Data of distribution of ABO and Rh-blood groups is essential for effective management of blood bank reserves and reducing the morbidity and mortality rate in blood transfusion [12]. Therefore, the present study aimed to determine the distribution of ABO and Rh-blood groups in patients admitted to gynaecology, obstetrics and children hospital in Konya, Turkey, that constitute database of the present hospital and compare data with other countries.

MATERIALS AND METHODS

Study Design and Population

A total of 30291 patients admitted to Konya Dr Ali Kemal Belviranlı Gynaecology, Obstetrics and Children Hospital between September 2015-December 2017 for a period of 27 months were included in this retrospective study. Records of patients were reviewed retrospectively from laboratory and hospital information system digitally.

Inclusion and Exclusion Criteria

While analysing the records of patients retrospectively, only one blood group test result of a patient was included in this study.

When patients had different or incompatible blood group results in records, these patients were excluded from study. Blood samples with haemolysis, clotted and insufficient were excluded from the study.

Ethical consideration: The study was approved by Review Board and Ethics Committee of Konya Necmettin Erbakan University Meram Faculty of Medicine (Ref No: 2018/1475).

Sample collection and processing: Blood samples were collected by antecubital veno-puncture into the Ethylene Diamine Tetra Acetic acid (EDTA) anticoagulant bottle and centrifuged at 4000 rpm for 10 minutes at room temperature for reverse grouping. ABO and Rh-blood group tests were performed by gel centrifugation method on fully automated immunohematology analyser (Autovue Innova, Ortho Clinical Diagnostics, USA). Forward reverse (cell and serum grouping) and forward (only cell grouping) cards were used in gel centrifugation method according to procedure described by Mujahid A and Dickert FL, and manufacturer's instructions [13]. These cards have microtubes on each of the cards and there is buffered gel solution containing specific antibodies such as anti-A, anti-B, anti-A/B, anti-D and anti-C/D/E in microtubes. The agglutination occurs when erythrocyte antigens react with corresponding antibodies present in the gel solution or in the serum or plasma sample. The gel column acts as a filter that catches agglutinated erythrocytes as they pass through the gel column during the centrifugation of the card. The gel column separates agglutinated erythrocytes from non-agglutinated erythrocytes based on size. Positive result occurs when any agglutinated erythrocytes are captured at the top or along the gel column. Non-agglutinated erythrocytes reach the bottom of the microtube forming a pellet and yielding negative result.

STATISTICAL ANALYSIS

Data analyses were performed by Statistical Package for the Social Sciences (SPSS version 20.0). Chi-Square test was used to compare distributions of ABO blood groups and Rh-factor across gender. Monte Carlo exact test was used to estimate exact significance as the data set is too large to compute exact significance. A probability value <0.05 (p<0.05) was considered to be statistically significant.

RESULTS

A total of 30291 patients were included in the present study. Patients were divided into two major groups according to age. There were 29548 (97.5%) women in the age group of 17-75 and they were admitted to gynaecology and obstetrics departments. The number of children in the age group of 0-16 was 743 (2.5%) and they were admitted to paediatrics departments. Out of 743 children, 466 (62.7%) were females and 277 (37.3%) were males. Out of 29548 women, 19635 (66.5%) were pregnant admitted to obstetrics departments and their age was ranged between 17-45 years (27.2±8.2 years).

A Rh-positive was the most common blood group among women and children with the rates of 37% and 35.4% respectively and followed by O Rh-positive (28.4%, 29.8%), B Rh-positive (16.1%, 16.9%) and AB Rh-positive (7.3%, 6.8%). AB Rh-negative had the lowest frequency as its rate was under 1%. Rh positivity was predominant with the rate of 89% while Rh negativity was 11% in both study groups [Table/Fig-1,2]. The proportional difference of distribution of blood groups A and B is significant (p<0.05) and there was a significant association between the distribution of A, B, O blood groups and Rh-factor in the age group of 17-75 (p<0.05) [Table/Fig-1].

Frequencies of ABO blood groups were identical among males and females among children. Rh negativity rate in males (12%) was a little higher than that of females (10.7%). The distribution of ABO blood groups according to gender and the difference between Rh negativity rates were not statistically significant (p>0.05) [Table/Fig-3].

Among pregnant, A Rh-positive (37%) was the most frequent and followed by O Rh-positive (28.8%), B Rh-positive (16.6%) and AB Rh-positive (7.5%). The proportional difference of distribution of blood groups A and B was statistically significant (p<0.05). The majority of pregnant had Rh positivity with the rate of 90% [Table/Fig-4].

ABO blood group**	A*		O		B*		AB	
n (%)	12385 (41.9)		9458 (32)		5288 (17.9)		2417 (8.2)	
Rh-factor**	**Rh-positive**				**Rh-negative**			
n (%)	26290 (89)				3258 (11)			
	A Rh+	**A Rh-**	**O Rh+**	**O Rh-**	**B Rh+**	**B Rh-**	**AB Rh+**	**AB Rh-**
n (%)	10948 (37)	1437 (4.9)	8409 (28.4)	1049 (3.6)	4772 (16.1)	516 (1.8)	2161 (7.3)	256 (0.9)
p-value***	**p<0.05**							

[Table/Fig-1]: Distribution of ABO and Rh-factor in the age group of 17-75.
*The proportional difference of distribution of blood groups A and B is significant p<0.05
**Significant association between the distribution of A, B, O blood groups and Rh-factor p<0.05
***Chi-Square and Monte Carlo exact test

ABO blood group	A		O		B		AB	
n (%)	301 (40.5)		250 (33.6)		135 (18.2)		57 (7.7)	
Rh-factor	**Rh-positive**				**Rh-negative**			
n (%)	660 (89)				83 (11)			
	A Rh+	**A Rh-**	**O Rh+**	**O Rh-**	**B Rh+**	**B Rh-**	**AB Rh+**	**AB Rh-**
n (%)	263 (35.4)	38 (5.1)	221 (29.8)	29 (3.9)	126 (16.9)	9 (1.2)	50 (6.8)	7 (0.9)
p-value	**0.318**							

[Table/Fig-2]: Distribution of ABO and Rh-factor among children.

Gender	A Rh+	A Rh-	O Rh +	O Rh-	B Rh+	B Rh-	AB Rh+	AB Rh-	Rh+	Rh-	Total
Female (n) (%)	165 (35.4)	23 (5)	140 (30)	20 (4.3)	77 (16.5)	4 (0.9)	34 (7.3)	3 (0.6)	416 (89.3)	50 (10.7)	**466 (62,7)**
	A Rh+	**A Rh-**	**O Rh+**	**O Rh-**	**B Rh+**	**B Rh-**	**AB Rh+**	**AB Rh-**	**Rh+**	**Rh-**	**Total**
Male (n) (%)	98 (35.4)	15 (5.4)	81 (29.2)	9 (3.2)	49 (17.7)	5 (1.9)	16 (5.8)	4 (1.4)	244 (88)	33 (12)	277 (37,3)
p-value	**0.715**										

[Table/Fig-3]: Distribution of ABO and Rh-factor according to gender among children.

ABO blood group	A*		O		B*		AB	
n (%)	8147 (41.5)		6271 (32)		3578 (18.2)		1639 (8.3)	
Rh-factor	**Rh-positive**				**Rh-negative**			
n (%)	17652 (90)				1983 (10)			
	A Rh+	**A Rh-**	**0 Rh+**	**O Rh-**	**B Rh+**	**B Rh-**	**AB Rh+**	**AB Rh-**
n (%)	7275 (37)	872 (4.4)	5641 (28.8)	630 (3.2)	3257 (16.6)	321 (1.7)	1479 (7.5)	160 (0.8)
p-value	**0.037**							

[Table/Fig-4]: Distribution of ABO and Rh-factor among pregnant women in the age group of 17-45.
*The proportional difference of distribution of blood groups A and B is significant p<0.05

DISCUSSION

This is the first report about the distribution of ABO and Rh-blood groups among children, women and pregnant population in central Anatolia, Konya, Turkey. This retrospective study was carried out in gynaecology, obstetrics and children hospital and gave a detailed information about frequencies of ABO and Rh-blood groups among children, women and pregnant population. A Rh-positive was the most common blood group among both women and children population with the rates of 37% and 35.4% respectively and followed by O Rh-positive (28.4%; 29.8%), B Rh-positive (16.1%; 16.9%) and AB Rh-positive (7.3%; 6.8%). In a study including neoanatal population born at a private hospital in İstanbul, Turkey, blood group frequencies were investigated and A Rh-positive (38.7%) was found to be the most common blood group followed by O Rh-positive (30.%), B Rh-positive (14.2%) and AB Rh-positive (6.6%) [11]. Balcı YI et al., from Denizli, Turkey reported the frequencies of the blood groups A, O, B, and AB as 42.6%, 33.3%, 16.8% and 7.4% respectively in a study conducted with male and female population [14]. These results were in line with the results of the present study. Authors think that findings obtained from the studies which analyse common blood groups in different populations were important for effective management of critical stock levels in transfusion centres and blood banks in a country.

A lot of studies detected that ABO and Rh-blood groups vary among different geographic regions, ethnic and socio-economic groups worldwide [1,2,4,11]. A population-based cross-sectional study including 3.8 million adults in China reported ABO and Rh-blood group distribution in different ethnic groups. Blood group A (30.5%) was determined as the most common phenotype and followed by O (30.4%), B (29.4%) and AB (9.7%) [15]. These findings were consistent with the present results. Unlike these findings, Odokuma et al., and Eru et al., carried out studies including university students in South and North central region of Nigeria and reported the predominance of blood group O with the rates of 57.2% and 52.5% respectively [16,17].

The ABO and Rh-blood group antigens are related to many fields of medicine and genetics as well as blood transfusion [11,18]. Some diseases are found to be associated with blood groups [11]. A study from Ethiopia reported the significant association between ABO blood groups and malaria infection as high rates of asymptomatic malaria parasitemia were detected in donors with O blood group [19].

Previous reports from different countries of the world emphasised predominance of O blood group among British, American, Malaysians and Saudi Arabian. A study from Nigeria reported that blood group O was the most common (57.2%) among blood donors as similar to other studies involving blood donors from Ethiopia (42.1%) and Uganda (50.3%) [2,8,19]. On the other hand, the most common blood group was found to be B (35.9%) and followed by O (30.9%), A (22.5%) and AB (10.5%) respectively in a retrospective study conducted by Chaurasia RK et al., from India [3]. Studies carried out in different parts of India by Gupta R et al., and Rajshree B and Joshi YR et al., revealed same results as Chaurasia RK et al., and reported B was the most frequent blood group (37%; 36.4%) and followed by O (26.3%; 31.7%), A (25.6%; 22.2%) and AB (11.1%; 9.4%) respectively [3,9,12]. Moreover, Rh-positivity among blood donors is documented as 91.7% in India, 92.8% in Ethiopia, 94.8% in Nigeria and >95% in Uganda [2,8,12,19]. These findings confirmed the trend of high prevalence of Rh positivity in African and Indian population. The rates of Rh positivity in Turkey were a little lower than these populations and ranged between 83.7%-88% [18,20-22]. The present results were similar to data reported from Turkey as Rh positivity rates were 89% in women and children and 90% in pregnant.

Rh incompatibility causes perinatal morbidity and mortality. Because of this, determination of ABO and Rh-blood groups in pregnant women is important [23]. The prevalence of Rh-negative pregnant women in the present study was 10%. This rate was higher than the rates obtained in previous studies done in India (4.2%) and Nigeria (4.5%) [23,24]. This might be attributed to the differences among ethnic and genetic characteristics of populations.

In a study from Istanbul province of Turkey, it was seen that the distribution of A, O, B, and AB blood groups were 43.4%, 33%, 15% and 8.5%, respectively [18]. A study from Kayseri, reported blood group A was the most frequent (44%) followed by O (30.3%), B (16.2%), and AB (6.5%). These rates were parallel with the rates detected in a study carried out in Yozgat city of Turkey [21,22]. In the present study, the frequencies of blood group A among women and children populations were 37% and 35.4%, respectively and a little lower than those obtained from these studies but the rates of other blood groups were similar to these studies. In contrast to these data, in Rize province which is located in Eastern Black Sea region of Turkey, the rate of blood group O (44.07%) and A (44.07%) was found to be significantly higher and blood groups B (9.2%) and AB (2.6%) were significantly lower than the rates found in other cities of Turkey [20]. These differences could be due to the fact that some cities like Rize are prone to immigration rather than emigration.

In the present study, AB Rh-negative had the lowest frequency among both women and children population with the rate of 0.9%. Similar prevalence for AB Rh-negative blood group is emphasised in studies carried out by Özkasap S et al., (0.4%) and Kader C et al., (0.8%) in Turkey [20,22]. Also, these findings were consonant with results obtained from studies performed among students in various regions of Nigeria [1,5,6,16,17]. This data is vital for blood banks and transfusion centres in order to detect and update their critical stock level for this rare blood group.

A study carried out by Apecu RO et al., from Uganda reported a significantly higher rate of Rh negativity among males than females [2]. Khan MN et al., detected statistically significant difference in ABO blood group prevalence between males and females and found blood group B was the most prevalent (37.4%) in males but blood group O (32.6%) was the most common in females [25]. However, in the present study, A Rh-positive was the most frequent blood group in both male and female children population and there was no statistically significant association between the distribution of ABO-Rh-blood groups and gender. This similar pattern was observed in previous reports and it was indicated that the distribution of ABO blood groups according to gender was not statistical significant [11,16,19]. Apecu RO et al., found that the distribution of blood groups according to age of blood donors was not statistically significant [2]. Contrary to this, the present results revealed that the proportional difference of distribution of blood groups A and B among women in the age group of 17-75 was significant (p<0.05).

There were differences between the present results and data reported from other countries worldwide. [2,3,15-17,19] These differences can be associated with ethnic and genetic factors of populations from different geographic regions of world. On the other hand, the present results indicate a similar trend of ABO and Rh-blood group profile compared to some studies carried out in Turkey [11,14,18,20-22] [Table/Fig-5].

Data of studies from Turkey (%)						
Author	A	O	B	AB	Rh+	Rh-
Kayiran SM et al., [11]	38.7	30.2	14.2	6.6	89.6	10.4
Balcı YI et al., [14]	42.6	33.3	16.8	7.4	89.9	10.1
Salduz ZİY et al., [18]	43.4	33	15	8.5	85.95	14.05
Özkasap S et al., [20]	44.07	44.07	9.26	2.60	83.7	16.3
Torun YA et al., [21]	44	30.3	16.2	6.5	88	12
Kader C et al., [22]	44.3	31.7	15.9	8.1	88	12
Our study (among women/ children)	41.9/40.05	32/33.6	17.9/18.2	8.2/7.7	89/89	11/11
Data of studıes from other countries (%)						
Apecu RO et al., [2] (Uganda)	25	50.3	20.3	4.2	98.61	1.39
Chaurasia RK et al., [3] (India)	22.52	30.9	35.9	10.5	95.4	4.6
Liu J et al., [15] (China)	30.5	30.4	29.4	9.7	99.08	1.02
Odokuma EI et al., [16] (South of Nigeria)	22	57.2	18.7	2.1	98	1.8
Eru EU et al., [17] (North of Nigeria)	18.4	52.5	24.5	2.2	96.7	3.3
Alemu G et al., [19] (Ethiopia)	32.7	42.1	20.9	4.3	92.8	7.2

[Table/Fig-5]: Data of studies from Turkey and other countries.

LIMITATION

The study was conducted within a specific population of women, children and pregnant and no males were included in the study. The results cannot be generalised to entire population of Konya. Even if the study was carried out at one centre as gynaecology, obstetrics and children hospital, a good number of patients attended to the study.

CONCLUSION

Authors think that further studies should be performed in other geographic regions of Turkey to obtain big data about frequencies of ABO and Rh-blood groups for Turkey. Knowledge of distribution of ABO and Rh-blood groups in a country is important for effective management of blood banks and transfusion centres. Also, this would help to provide suitable blood storage and to access to safe blood for people in need.

REFERENCES

[1] Akinnuga AM, Bamidele O, Amosu AM, Ugwah GU. Distribution of ABO and Rh-blood groups among major ethnic groups of medical students of Madonna University Teaching Hospital, Elele, Nigeria. Asian J Med Sci. 2011;3(3):106-09.
[2] Apecu RO, Mulogo EM, Bagenda F, Byamungu A. ABO and Rhesus (D) blood group distribution among blood donors in rural South western Uganda: A retrospective study. BMC Res Notes. 2016;9:513-16.
[3] Chaurasia RK, Sharma P, Bharosey VV, Haritwal A, Rana S, Sawke GK, et al. A study of distribution of ABO and Rh-blood groups system among blood donors at a tertiary care hospital. J of Evolution of Med and Dent Sci. 2015;4(18):3138-42.
[4] Anifowoshe AT, Owolodun OA, Akinseye KM, Iyiola OA, Oyeyemi BF. Gene frequencies of ABO and Rh-blood groups in Nigeria: A review. Egypt J Med Hum Genet. 2017;18:205-10.
[5] Bamidele O, Arokoyo DS, Akinbola AO. Distribution of ABO and rhesus blood groups among medical students in Bowen University, Iwo, Nigeria. Annals of Biological Research. 2013;4(11):1-6.
[6] Egesie UG, Egesie OJ, Usar I, Johnbull TO. Distribution of ABO, Rhesus blood groups and haemoglobin electrophoresis among the undergraduate students of Niger Delta State University, Nigeria. Niger J Physiol Sci. 2008;23(1-2):5-8.
[7] Sharma DC, Rai S, Iyenger S, Jain B, Sao S. Prevalence and distribution of ABO and Rh-D antigens along with its subgroups & rare types in Greater Gwalior Region. Open Journal of Blood Diseases. 2013;3(2):69-73.
[8] Chima OK, Mohammed TB, Aisha KG, Alhaji SA, Muhammad BM, Kwaru AH. ABO and Rhesus blood groups among blood donors in Kano, North-Western Nigeria. Niger J Basic Clin Sci. 2012;9:11-13.
[9] Gupta R, Dewan D, Suri J, Padha UK. Frequency and distribution of ABO and Rhesus blood groups in blood donors in a provincial hospital of Jammu. Indian Journal of Pathology and Oncology. 2016;3(2):212-15.
[10] Hassan FM. Frequency of ABO, subgroup ABO and Rh (D) blood groups in major Sudanese Ethnic Groups. Pak J Med Res. 2010;49(1):21-24.
[11] Kayiran SM, Oktem O, Kayiran PG, Paloglu E, Gurakan B. Frequency of ABO and Rhesus blood groups among neonates born at a private hospital in Istanbul. Southeast Asian J Trop Med Public Health. 2012;43(2):467-70.
[12] Rajshree B, Joshi YR. Distribution of ABO blood group and Rh(D) factor in Western Rajasthan. Natl J Med Res. 2013;3(1):73-75.
[13] Mujahid A, Dickert FL. Blood group typing: from classical strategies to the application of synthetic antibodies generated by molecular imprinting. Sensors(Basel). 2015;16(1):E51.
[14] Balcı YI, Ovet G, Covut İE, Goncu F and Yılmaz M. ABO and Rh-blood groups frequency in Denizli province. UHOD. 2010;20(2):103-05.
[15] Liu J, Zhang S, Wang Q, Shen H, Zhang Y, Liu M. Frequencies and ethnic distribution of ABO and Rh D blood groups in China: A population-based cross-sectional study. BMJ Open. 2017;7(12):e018476.
[16] Odokuma EI, Okolo AC and Aloamaka PC. Distribution of ABO and Rhesus blood groups in Abraka, Delta State, Nigeria. Niger J Physiol Sci. 2007;22(1-2):89-91.
[17] Eru EU, Adeniyi OS, Jogo AA. A-B-O and Rhesus blood group distribution among students of Benue State University Makurdi, Nigeria. Afr J Biomed Res. 2014;17(1):49-52.
[18] Salduz ZİY, Cetin G, Karatoprak C, Ozder A, Bilginc M, Gultepe I, et al. ABO and Rh-blood group distribution in İstanbul Province (Turkey). İstanbul Med J. 2015;16:98-100.
[19] Alemu G, Mama M. Assessing ABO/Rh-blood group frequency and association with asymptomatic malaria among blood donors attending Arba Minch Blood Bank, South Ethiopia. Malar Res Treat. 2016;2016:8043768.
[20] Özkasap S, Dereci S, Şahin K, Dilek AR, Kalyoncuoglu E, Zengin T, et al. Analysis of ABO and Rh-blood groups distribution in East Karadeniz region of Turkey. Dicle Med J. 2013;40(1):100-04.
[21] Torun YA, Kaynar L, Karakukcu C, Yay M. Phenotype frequencies of blood group systems and alloantibodies to red blood cells in blood transfusion recipients in Kayseri (Turkey). J Turgut Ozal Med Cent. 2017;24(4):434-36.
[22] Kader C, Yolcu S, Doğan B, Pınarbaşlı M, İlanbey B, Erbay A. ABO and Rh-blood groups distribution in Yozgat City, Turkey. J Clin Exp Invest. 2014;5(2):169-72.
[23] Nagamuthu EA, Mudavath P, Prathima P, Bollipogu S. Prevalence of Rhesus negativity among pregnant women. Int J Res Med Sci. 2016;4(8):3305-9.
[24] Okeke TC, Ocheni S, Nwagha UI, Ibegbulam OG. The prevalence of Rhesus negativity among pregnant women in Enugu, Southeast Nigeria. Niger J Clin Pract. 2012;15(4):400-02.
[25] Khan MN, Khaliq I, Bakhsh A, Akhtar MS, Amin-ud-Din M. Distribution of ABO and Rh D blood groups in the population of Poonch district, Azad Jammu and Kashmir. East Mediterr Health J. 2009;15(3):717-21.

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