Levels of Serum IgA in Healthy Blood Donors

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Abstract: *Objectives*: We evaluate that the prevalence of immunoglobulin A deficiency in Turkish blood donors. The most of authors describe an IgA concentration of<5 mg/dL^{-1} as IgA deficiency and has been broadly studied in different ethnic groups. The patients with IgA deficiency may form specific antibodies against IgA. The antibodies against IgA can cause an anaphylactic response when the patient receives an IgA-containing blood transfusion.

Methods: The blood samples were taken after blood donation. These serum samples stored at -20ºC until analysis. The amount of serum IgA was measured using the Dade Behring assay with automated Dade Behring Nephelometer (Dade Behring Marburg GmbH, Marburg, Germany).

Results: Of the total 1077 healthy blood donors screened, none of the donors was found to be selective IgA deficiency.

Conclusion: The incidence of IgA deficiency in Turkish blood donors is very low. But, anaphylaxis risks exist in performing blood transfusion to IgA-deficient individual, and measures should be taken to reduce IgA anaphylaxis.

Keywords: IgA deficiency, blood donors, transfusion reaction.

INTRODUCTION

The selective immunoglobulin A deficiency (SIgAD) is the most common primary immunodeficiency and its widespread in healthy populations varies between different ethnic groups [1]. The majority of individual with SIgAD are asymptomatic, however those who suffer from clinical findings often also have miscellaneous complications, which allergic disorders, recurrent respiratory infections, autoimmune diseases. Also, the SIgAD can be seen in healthy persons [2]. The prevalence of SIgAD varies from 1: 223 to 1: 1000 in community studies and from 1: 400 to 1: 3000 in normal blood donors [3]. Some of patients with SIgAD have anti-IgA antibody in their plasma. The anti-IgA antibody can cause anaphylactic events after blood transfusion of IgA-comprising blood products [4]. The persons may be transfused blood and components deficient in IgA. It may be taken from known IgA deficient blood donors or using blood content which its IgA has been physically removed [5].

Hence, SIgAD blood donors looks like a better alternate for these cases and all the blood transfusion center should have a blood donor record of IgA deficient blood donors depending on the incidence of IgA deficiencyin the population for the preparation of compatible blood components for these patients. But, SIgAD patients are generally asymptomatic and thus are occasional diagnosed. It is very significant to know its incidance as it helps the blood centers to assess the need to have IgA deficient blood contents. In the present study IgA deficiency is evaluated in Turkish blood donors.

MATERIALS AND METHODS

The thousand seventy-seven healthy voluntary blood donors aged 17-56 years (1024 males and 53 females) in Konya city were included in this study. The bloods donors choose were based on an exhaustive medical history. The physical exam performed by an internal specialist. Also laboratory examinations were done in the in microbiology laboratories for viral infections including HIV, HBV and HCV which were normal in all selected cases. Immunologic test including serum IgA was done for this group.

Serum Collection and Analysis

The blood samples were taken after blood donation. These serum samples stored at -20ºC until analysis. The levels of serum IgA were measured using the Dade Behring assay with automated Dade Behring Nephelometer (Dade Behring Marburg GmbH, Marburg, Germany). The SIgAD was defined as the IgA value less than 5 mg/dL^{-1}, in the presence of normal serum instruction and results were compared to normal ranges.

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Statistical Analysis

SPSS 16 software was used for statistical analysis. Pearson correlation test was used to calculate the correlation between laboratory findings of IgA deficient cases. P<0. 05 was considered statistically significant.

RESULTS

Among 1077 blood donors, 1024 cases were males (95. 07%), 53 cases were females (4. 92%). The mean (±SD) age of male cases was 32. 3±8. 7 years. The mean (±SD) age of female cases was 33. 4±10 years. In this study, none of the donors was found to be SIgAD. The individual demographic characteristics and IgA levels were shown in Table **1**. The distributions of IgA levels according to the age were shown in Figure **1**.

Table 1: The Individual Demographic Characteristics and IgA Levels

		Age (years)	IgA level (g/L)
Male (n: 1024)	Mean	32.38	1.1885
	Std. Deviation	8.726	0.53030
	Minimum	17	0.25
	Maximum	56	3.42
Female (n: 53)	Mean	33.45	1.2102
	Std. Deviation	10.051	0.47125
	Minimum	17	0.40
	Maximum	54	3.00
Total (n: 1077)	Mean	32.44	1.1895
	Std. Deviation	8.794	0.52738
	Minimum	17	0.25
	Maximum	56	3.42

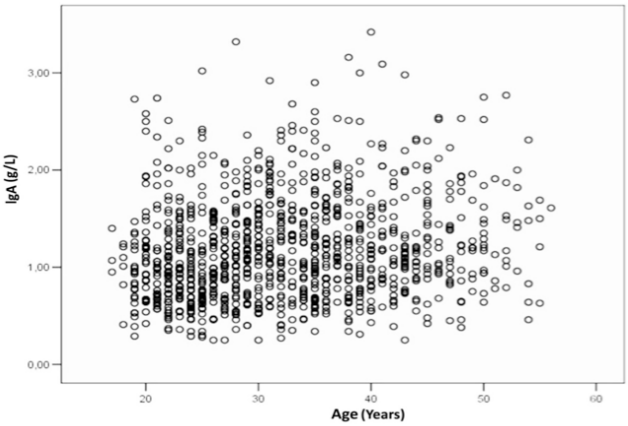

Figure 1: The distributions of IgA levels according to the age.

DISCUSSION

The selective IgA deficiency (SIgAD) is the most common immunoglobulin deficiency. The prevalence of SIgAD differs depending on the ethnic origin and clinical symptoms of investigated persons [6-8]. The incidence of SIgAD varies significantly in different areas in Table **2** [15-20]. The difference in incidence of SIgAD may be due to different ethnicities in these countries. However, differences in the methods and criteria used may also be responsible for the diverse data observed in different races. The anaphylactic reaction is a significant immune transfusion adverse reaction that is mainly caused by immunodeficiency, particularly SIgAD [9,10].

Table 2: Prevalence of IgA Deficiency among Different Ethnic Healthy Blood Donors

Country	Method	Prevalence
England [15]	Double diffusion	1 : 522
	Haemagglutination inhibition assay	1 : 875
Australia [16]	Double diffusion	1 : 442
France [17]	Passive haemagglutination inhibition assay	1 : 1300
United States [18]	Double diffusion	1 : 328
Japan [19]	Double diffusion	1 : 18 500
	Single radial immunodiffusion	1 : 31 800
India [20]	ELISA	0

The identification of SIgAD and determination of anti-IgA antibody levels in these persons is an efficient and safe. However, the mechanism of anti-IgA antibody production remains unknown. The certain studies have shown that patients with IgA-deficiency have had anti-IgA antibody associated with history of pregnancy. Patients who have never been exposed to IgA can also develop anti-IgA antibody [11]. Identification of individuals as SIgAD with anti-IgA antibody is critical in preventing adverse transfusion reactions since they must either receive blood products from donors known to be IgA deficient or receive products derived from normal and healthy individuals that have been processed in a manner shown to substantially reduce IgA levels [12]. The most of SIgAD individuals has no clinical problems, however SIgAD persons without detectable anti-IgA antibody may form antibodies against IgA with sensitisation, will be at risk of IgA anaphylactic reaction whenreceived multiple transfusions. The SIgAD patients with antibodies to IgA require transfusions with IgA-deficient blood components to either prevent or reduce the frequency of adverse reactions. The individuals with normal IgA level as recipients transfused with IgA-deficient blood containing anti-IgA antibody are not taken into consideration for estimation of the risk because of recipient plasma dilution of the antibodies [13,14].

The SIgAD individuals readily develop anti-IgA antibody after multiple transfusions, which may induce to occurrence of adverse reactions (even shock and death). Therefore, development of the strategies has been needed to prevent and reduce the risk of anaphylaxis. The physicians are recommended to measure IgA levels and anti-IgA antibody in IgA-deficient recipients before transfusion. In conclusion, we suggest that the screening for IgA-deficient blood donors in case of need for IgA-poor blood products in the future.

Our study evaluate the prevalence of SIgAD in a Turkish population by screening healthy blood donors, and estimate the risk of transfusion reaction induced by anti-IgA antibody.

These results showed that the SIgAD is not a clinically significant problem in Turkish blood donor population. However, such studies need to be done in all parts of Turkey with a much larger sample size to know the exact prevalence of SIgAD in Turkey.

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