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## IgA Deficiency Frequency in Zahedan Blood Transfusion Services Donors

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This study was performed to examine the prevalence of IgA deficiency in blood donors in Zahedan Province of Iran. Following transfusion of IgA containing blood or its components to an IgA deficient individual, antibody will be produced against received IgA and causes sever allergic reaction. Therefore it's worth nothing to have, IgA deficiency frequency even at a low level in blood donors of different races to plan for safe blood. In this experimental study, blood samples were collected from 3837 volunteer blood donors during one year. 3449 (89.9%) of the 3837 blood donors screened were males and 388 (10.1%) were females. 1464 (38.18%) were single and 2373 (61.82%) married. The demographic questioner was filled out for each donor by a physician. Then the serum samples were tested for IgA titer by nephelometry and SRID techniques and IgA level in positive samples were analyzed by ELISA (RADIM, Italy). Finally data were analyzed by Chi-square and t-test. According to present results only, one donor (0.03%) was found to have IgA less than 5 mg dL<sup>-1</sup> and 11 (0.3%) cases had IgA between 5-30 mg dL<sup>-1</sup> while 3825 (99.67%) had IgA more than 30 mg dL<sup>-1</sup>. Present results showed a low prevalence rate of IgA deficiency in Sistan and Baluchestan region of Iran. Therefore, anaphylactic reactions could probably be due to other factors in the individuals that receive blood products. In the other hand the results from this study help blood transfusion services directors and managers to find high risk families and individuals with IgA deficiency to receive safe blood and blood components in case of need.

**Key words:** IgA, nephelometry, blood donors, anaphlaxy and SRID

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**INTRODUCTION**

Anaphylactic reactions are one of the most important transfusion reactions (Gilstad, 2003). Immunodeficiencies are most causes of anaphylaxis which varies from defect in one or more immunoglobulin isotypes and mostly defect is in IgA (Immunoglobulin A) (Horn *et al.*, 2007). IgA deficiency is an autosomal dominant or recessive trait and some times the disorder is not genetic and may happen due to congenital measles or as the side effect of some medications (Glocker *et al.*, 2007). Most of carriers are phenotypically healthy, however, they can some time suffer from diarrhea or pulmonary infections (Glocker *et al.*, 2007). These days due to the increased demand and consume of blood and its components, the transfusion related reactions are important, hence, IgA deficiency is a problem for blood transfusion services. Evaluation of anaphylactic related factors is one of the main tasks of blood transfusion services, therefore, producing of safe blood and blood components for IgA deficient people needs demographic information related to the disorder carriers (Shelly *et al.*, 2006). So, because of that, if an IgA deficient carried receive IgA containing blood or its components shift to anaphylactic reaction, these individuals might use IgA free components (Marwaha, 2006). And one of the ways to solve this problem is to identify people who suffer from the disorder. Based on these data blood transfusion services can establish information bank for them to plan the desire amount of safe blood and blood components for their demand in blood transfusion services. Therefore, this study was aimed to find out the prevalence of IgA deficiency in Balooch and Fars races in South-east of Iran.

**MATERIALS AND METHODS**

This cross-sectional, experimental study has been performed in Zahedan blood transfusion services in South-east of Iran during 2006-2007. Total of 3837 samples were selected blood donor volunteers based on  $n = z^2 p (1-p)/d^2$  formula among. 3449 (89.9%) cases were male and 388 (10.1%) female. 1464 (38.18%) single whereas 2373 (61.82%) were married. For each volunteer a questioner including demographic information and physical examinations results were filled out by an expert physician. The blood IgA level was measured by nephelometry (MININEPH, USA) and immunodiffusion gel methods. Data was analyzed using  $\chi^2$  and t-test. (IgA deficient (partially or totally) cases were analyzed by ELISA (RADIM, Italy).

**RESULTS**

Present findings showed that only one case (0.03%) of studied population had IgA level less than 5 mg dL<sup>-1</sup> while 11 (0.3%) had IgA level between 5-30 mg dL<sup>-1</sup> and the level of IgA in 3825 cases (the sum of IgA>30 mg dL<sup>-1</sup>) were more than 30 mg dL<sup>-1</sup>. Table 1 shows serum IgA level based on sex and marriage status. Comparison of data based sex, showed that there is not a significant difference between male (194.1 and 195.2 mg dL<sup>-1</sup> in male and female, respectively which is not referred in results) serum IgA levels but there is a significant difference between marriage status.

Analysis of present data showed that there is a significant difference in serum IgA level in different races (Fars, Balooch and other races).

We also found that there is a significant difference between age and IgA serum level so that with increasing of age, IgA is also increased while there was not a significant difference between vaccination history and serum IgA levels. As shown in Table 2 donors were grouped by age and the number of donors with IgA level more than 30 mg dL<sup>-1</sup> is higher in 15-30 years old and lower in the other groups (31-45 and 46-65 years). The history of vaccination, transfusion and infection is also showed in Table 2 which regarding the results there is not any significant relation between these items and IgA serum level (Table 2).

Table 1: Comparison of serum anti-IgA level based on sex and marriage status

Variables	IgA<5	IgA: 5-30	IgA>30
	----- (mg dL <sup>-1</sup> ) -----		
<b>Sex</b>			
Male	1 (0.033)	11 (0.29)	(89.57) 3437
Female	-	-	388 (10.1)
<b>Marriage</b>			
Single	-	5 (0.13)	(37.99) 1459
Married	1 (0.033)	6 (0.16)	(61.63) 2366

Table 2: Comparison of serum anti-IgA level based on age, infection history, vaccination and transfusion history

Variables	IgA<5	IgA:5-30	IgA>30
	----- (mg dL <sup>-1</sup> ) -----		
<b>Age</b>			
15-30	-	6 (0.16)	(62.6) 2402
31-45	1 (0.033)	4 (0.098)	1110 (28.94)
46-65	-	1 (0.033)	313 (8.13)
<b>Infection history</b>			
Yes	-	-	4 (0.1)
No	1 (0.033)	11 (0.3)	3821 (99.57)
<b>Vaccination history during the year</b>			
Yes	-	-	178 (4.6)
No	1 (0.033)	11 (0.3)	3647 (95)
<b>Transfusion history</b>			
Yes	-	-	15 (0.4)
No	1 (0.033)	11 (0.3)	3810 (99.27)

## DISCUSSION

IgA deficiency defined as a serum concentration level of IgA less than  $5 \text{ mg dL}^{-1}$  (Latiff and Kerr, 2007; Grazyna *et al.*, 2003; Shelly *et al.*, 2006). Present results showed that based on IgA deficiency definition in all studied cases only one was totally IgA deficient (0.03%) while 11 (0.3%) had partially IgA deficiency. Earlier studies showed that some of IgA deficient cases produce antibody against IgA (anti-IgA antibody) (11 and 12) and this could happen without history of transfusion (Marwaha, 2006). More ever IgA deficient may produce anti-IgA antibody during pregnancy and after blood transfusion pregnant female will react with blood and blood components IgA. Present results are almost in agreement with results obtained by Feng (1992) in France (one in 3040 population) and China (one in 2600 to one in 5300), respectively (Feng, 1992). The prevalence of the disorder is higher in American and European countries. In USA, Clark *et al.* (1983) showed that one in 320 of blood donors are IgA deficient (Clark *et al.*, 1983) while this rate is different in European countries from 1/163 in Spain (Luis *et al.*, 1997) to 1/455 in Greece (Leontini *et al.*, 2002) and 1/522 in West of England (Holt and Tandy, 1977). In contrast to the American and European countries, in South-East Asian countries such as Japan the prevalence of IgA deficiency is reported as 1/14850 to 1/18500 (Kano *et al.*, 1986). Regarding this difference in IgA deficiency in different races and regions of the world, it seems that it is essential that blood transfusion services plan special programs to produce safe blood and components for IgA deficient consumers. Analysis of present data showed that there is not a significant difference between sex and IgA level but most of our studied cases were male (89.9% male and 10.1% female). So we can not rely on this part of findings and further studies with equal number of different sexes are needed to find out the exact relation between sex and IgA level and of course comparison of IgA deficiency prevalence in both sexes. We also showed that there is not a significant relation between history of infection and IgA levels. An important finding of present study is the relation of IgA level with race and we found a significant difference between IgA level in Fars and Balooch races. We also find that with increasing of age IgA level is increased which is in agreement with other research group findings (Weber *et al.*, 2004) which are probably related to enhance number of memory lymphocytes and/or long life plasma cells of peripheral blood. In this study we only found one IgA deficient case and because 30-40% of these cases spontaneously produce anti-IgA (Alberti *et al.*, 2006) possibly 26 per 100000 population are IgA deficient and if 8-10 cases produce anti-IgA, this will increase the risk of

anaphylactic reactions in blood receiving consumers. Therefore, to reduce and prevent transfusion reactions in IgA deficient blood and blood component of consumers it is necessary that blood transfusion services use IgA free products or wash blood cells many times before transfusion to lessen the risk in recipient. Authors also suggest to blood transfusion services that in all transfusion anaphylactic reactions, detect the level of IgA and anti-IgA in reacted recipient.

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## REFERENCES

- Alberti, S., E. Cevenini, R. Ostan, M. Capri and S. Salvioli, 2006. Age-dependent modifications of type I and type II cytokines within virgin and memory CD<sup>4+</sup> T cells in humans. *Mech. Ageing Dev.*, 127: 560-566.
- Clark, J.A., P.A. Callicot and N.A. Brenner, 1983. Selective IgA deficiency in blood donors. *Am. J. Clin. Pathol.*, 80: 210-213.
- Feng, L., 1992. Epidemiological study of selective IgA deficiency among 6 nationalities in china. *Zho. YiXue Za. Zhi.*, 72: 88-90.
- Gilstad, C.W., 2003. Anaphylactic transfusion reactions. *Curr. Opin. Hematol.*, 10: 419-423.
- Glocker, E., S. Ehl and B. Grimbacher, 2007. Common variable immunodeficiency in children. *Curr. Opin. Pediatr. Dec.*, 19: 685-692.
- Grazyna, M.S., A. Daria and A. Adam, 2003. Assessment of IgA subclasses synthesis in children with selective and partial IgA deficiency. *Centr. Eur. J. Immunol.*, 28: 110-118.
- Holt, P.D.J. and N.P. Tandy, 1977. Screening of blood donors for IgA deficiency: A study of the donor population of south west England. *J. Clin. Pathol.*, 30: 1007-1010.
- Hom, J., V. Thon, D. Bartonkova, U. Salzer and K. Warnatz, 2007. Anti-IgA antibodies in common variable immunodeficiency (CVID): Diagnostic workup and therapeutic strategy. *Clin. Immunol.*, 122: 156-162.
- Kano, T., T. Mizumoto and N. Yasuds, 1986. Selective IgA deficiency in Japanese blood donors: Frequency and statistical analysis. *Vox. Sang.*, 50: 81-86.

- Latiff, A.H. and M.A. Kerr, 2007. The clinical significance of immunoglobulin A deficiency. *Ann. Clin. Biochem., Mar., 44: 131-139.*
- Leontini, F.P., T. Vana, E.S. Konstantinos and P.K. Kyriakos, 2002. Prevalence of IgA deficiency in Greek blood donors. *Haema, 5: 330-332.*
- Luis, F.P., M.S. Ana and A. Javier, 1997. Prevalence of selective IgA deficiency in Spain: More than we thought. *Blood, 90: 893-893.*
- Marwaha, N., 2006. IgA deficiency: Implications for transfusion. *Indian J. Med. Res., 123: 591-592.*
- Shelly, C., K. Dheeraj and C. Rajendra, 2006. Low prevalence of IgA deficiency in north Indian population. *Indian J. Med. Res., 123: 653-656.*
- Weber-Mzell, D., P. Kotanko and A.C. Hauer, 2004. Gender, age and seasonal effects on IgA deficiency: A study of 7293 Caucasians. *Eur. J. Clin. Invest., 34: 224-228.*