A Cross-Sectional Study of the Frequency of Rhesus Factor in the Population of Islamabad

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ABSTRACT

Background: Rh factor is called the "Rhesus factor" because it was first discovered in the blood of Rhesus monkeys. Rh factor is an antigen, a substance that stimulates the production of antibodies to fight foreign agents such as viruses, bacteria, and transplanted organs. Besides its role in blood transfusion, the D antigen is used to determine the risk of hemolytic disease of the newborn (or erythroblastosis fetalis) for Rh disease management.

Method: After obtaining informed consent from the couple presented to the National Institute of Health Islamabad, blood grouping was carried out using standardized agglutination techniques. Blood samples were drawn aseptically and transferred to ethylenediaminetetraacetic acid-containing tubes. Slide agglutination testing was performed to determine Rh factor D (RhD).

Results: A total of 111 of 116 couples had the same Rh factors; 105 couples were Rh-positive, and six couples were Rh-negative.

Key words: Rh Factor, Rhesus Factor, ABO.

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Introduction

Of the 400 blood groups reported, the most important groups are ABO and Rh.[1] The Rhesus (Rh) antigens commonly recognized on the red cell include D, C, c, E, and e.[2] Both Landsteiner and Wiener discovered Rh (D) antigen.[3,4] The genes of ABO and Rh (D) are located on chromosome 9 and 1, respectively. The reported prevalence of the different Rh group antigens varies with race. The most common Rh haplotype in Caucasians, Asians, and Native Americans is DCe. In Blacks, the Dce haplotype is slightly more common.[2] In the past seven years, several studies have demonstrated that Rhesus-positive and Rhesus-negative subjects differ in resistance to the adverse effects of parasitic infections, aging, fatigue, and smoking.[3-8] Consanguineous marriages limit the gene pool, and 61% of marriages in Pakistan are consanguineous[9]; this is one of the higher proportions in the world.[10,11] Alloimmunization of the mother to erythrocyte antigens of her newborn can lead to major complications in subsequent pregnancies, therefore, determining the maternal and paternal Rh factor can help prevent complications. The knowledge of the distribution of ABO and Rhesus (Rh) blood group is essential for effective management of blood bank inventory. Our objective was to find out the frequency of Rh factor positive individuals and Rh-negative individuals. The current data calls for routine screening of pregnant women to avoid the potential risk

of erythroblastosis fetalis in the study area. In fact, both women and men are required to be tested before having a child. But this is rarely practiced in Pakistan and this study would be helpful in creating awareness. Moreover, since the Rh-negative blood group is very scarce in many populations it is rarely available in blood banks. The Rh-negative group individuals may be approached, encouraged, and convinced to donate blood to make this blood group more available in blood banks.

Materials & Methods

Selection of subjects

Heterosexual couples exhibiting normal semen profiles and menstrual cycles were included in the study. The 116 couples selected were subjected to blood group analysis.

Blood Grouping

After obtaining informed consent, blood grouping was carried out using standardized agglutination techniques. Blood samples were drawn aseptically and transferred to ethylenediaminetetraacetic acid-containing tubes. Slide agglutination testing was performed to determine the presence of RhD factor using immunoglobulin M and G monoclonal reagents. Antisera from Bio Laboratory (Gwinnett County, Georgia USA) were used in this study.

Results

Of the 116 couples evaluated, 111 (96%) had the same Rh factors: 105 couples were Rh-positive, and six couples were Rh-negative (Table 1, Table 2). Only five couples (4%) had different Rh-groups, and of those, the men were Rh-negative, the women were Rh-positive.

Discussion

The prevalence of RhD antigen varies in different parts of the world, with the highest rate in the Japanese and Burmese populations (99% to 100%) and the lowest rate in southern France and northern Spain (60% to 80%).[12] In the current study, only one couple had different Rh antigens. In this case, the man was Rh-negative, and the woman was Rh-positive. We noted Rh negativity in 9% of the men and 5% of the women. This suggests that the expected frequency of Rh isoimmunization would be lower in our population than the British population. Khattak et al reported B-blood group Rh-positive women were the majority (28.06%) in Swat, Khyber Pakhtunkhwa Province.[13] In the USA, 85% of the population are Rh-positive[14], while 95% of the British population are Rh-positive.[15]

Conclusion

Our findings align with other studies done in different regions of Pakistan. The blood group RhD-positive is the predominant group. Knowledge of one's blood group is important for the health of an individual and useful for informing medical diagnoses, genetic counseling, and forensic medicine needs. Prevention is essential because once immunized, the mother will remain so for life. This information would be useful to geneticists and clinicians in blood transfusion programs because they play an integral role in the genetic profile of the Pakistani population. Moreover, since the Rh-negative blood group is very scarce in many populations it is rarely available in blood banks. The Rh-negative group individuals may be approached, encouraged, and

convinced to donate blood to make this blood group more available in blood banks.

References

1. Hoffbrand AV: Post Graduate Haematology. Heinemann Professional Publishing, Ltd; 198. 270–350. 10.1002/9781118853771.index
2. Reid ME, Lomas-Francis C: The Blood Group Antigen Facts Book, 2nd ed. New York: Elsevier Academic Press; 2004. 10.1046/j.1365-3148.1998.00127.x
3. Novotná M, Havlíček J, Smith AP, et al.: Toxoplasma and reaction time: role of toxoplasmosis in the origin, preservation and geographical distribution of Rh blood group polymorphism. Parasitology, 2008, 135:1253-61. 10.1017/S003118200800485X
4. Flegr J, Novotná M, Lindová J, Havlíček J: Neurophysiological effect of the Rh factor. Protective role of the RhD molecule against Toxoplasma-induced impairment of reaction times in women. Neuro Endocrinol Lett. 2008, 29:475-81.
5. Flegr J, Klose J, Novotná M, Berenreitterová M, Havlíček J: Increased incidence of traffic accidents in Toxoplasma-infected military drivers and protective effect RhD molecule revealed by a large-scale prospective cohort study. BMC Infectious Dis. 2009, 9:72. 10.1186/1471-2334-9-72.
6. Flegr J, Novotná M, Fialová A, Kolbeková P, Gašová Z: The influence of RhD phenotype on toxoplasmosis- and age-associated changes in personality profile of blood donors. Folia Parasitol (Praha). 2010, 57:143-150. 10.14411/fp.2010.018
7. Kaňková Š, Šulc J, Flegr J: Increased pregnancy weight gain in women with latent toxoplasmosis and RhD-positivity protection against this effect. Parasitol. 2010, 137:1773-9. 10.1017/S0031182010000661
8. Flegr J, Geryk J, Volny J, Klose J, Cernochova D: Rhesus factor modulation of effects of smoking and age on psychomotor performance, intelligence, personality profile, and health in Czech soldiers. PLoS ONE. 2012, 7:e49478. 10.1371/journal.pone.0049478
9. Sathar Z, Ahmed T: Proximate determinants of fertility. In: Pakistan Demographic & Health Survey 1990/1991. Islamabad, Pakistan: National Institute of Population Studies; 1992, 85–96.
10. Bittles AH: Consanguineous marriage: current global incidence and its relevance to demographic research. In: Research Report No. 90-186. Ann Arbor, Michigan: University of Michigan Population Studies Center; 1990.
11. Bittles AH, Mason WM, Greene J, Roa NA: Reproductive behavior and health in consanguineous marriages. Science. 1991, 252:789. 10.1126/science.2028254
12. Sarkar RS, Philip J, Mallhi RS, Yadav P: Proportion of Rh phenotypes in voluntary blood donors. Med J Armed Forces. India, 2013, 330-4. 10.1016/j.mjafi.2013.05.004
13. Khattak ID, Khan TM, Khan P, Shah SMA, Khattak ST, Ali A: Frequency of ABO and rhesus blood groups in district Swat, Pakistan. J Ayub Med Coll Abbottabad. 2008, 20:127-9.
14. Frances TF: Blood groups (ABO groups). In Common Laboratory and Diagnostic Tests. 3rd edition. Philadelphia: Lippincott; 2002, 19–25.
15. Mollison PL, Engelfriet CP, Conteras M: The Rh blood Group system. In Blood Transfusion in Clinical Medicine. 9th edition. Oxford: Blackwell Scientific Publication; 1993, 2008–9.

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