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SEROLOGICAL PHENOTYPING OF BLOOD DONORS FROM THE STATE OF AMAZONAS

ACS Castro [a,b], EMC Silva [c], LA Santos [a,d], MR Nascimento [a,d], NR Silva [c], IPC Tavares [a], JSV Campelo [d], SRL Albuquerque [a,b], MS Gonçalves [e], JPM Neto [a,b,d,f]

[a] *Programa de Pós-Graduação em Imunologia Básica e Aplicada (PPGIBA), Universidade Federal do Amazonas (UFAM), Manaus, AM, Brazil*
[b] *Programa de Pós-Graduação em Ciências Farmacêuticas (PPGCF), Universidade Federal do Amazonas (UFAM), Manaus, AM, Brazil*
[c] *Fundação Hospitalar de Hematologia e Hemoterapia do Amazonas (HEMOAM), Manaus, AM, Brazil*
[d] *Programa de Pós- graduação em Ciências Aplicadas à Hematologia (PPGH), Universidade do Estado do Amazonas (UEA), Manuas, AM, Brazil*
[e] *Instituto Oswaldo Cruz (IOC/FIOCRUZ), Salvador, BA, Brazil*
[f] *Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora, MG, Brazil*

Introduction: The D antigen is of particular significance in field of transfusion medicine due to its high immunogenicity. The complexity of the Rh locus has been demonstrated to result in the ocorrence of D variant phenotypes such as weak D and partial D. These have been shown to compromise the accuracy of conventional serological methods, thereby increasing the risk of alloimmunization in patients. This is a matter of concern in genetically heterogeneous populations, such as that of the Amazonas region. Allelic diversity has been show to favor the expression of D variants with atypical phenotyping. **Objectives:** To utilize a range of different monoclonal anti-D reagents to identify atypical D phenotypes in blood donors at the Fundação de Hematologia e Hemoterapia do Amazonas (HEMOAM). **Material and methods:** Samples were collected from repeat blood donors (defined as individuals who had donated blood on more than three occasions) at the HEMOAM Foundation between August 2024 and July 2025. D antigen phenotyping was performed using a gel card technique, which involved the use of anti-D IgG/IgM clones P3 × 290, P3 × 35, P3 × 61 and P3 × 21223B10). A tube technique (anti-D IgM-MS26 and IgG-MS201) was employed to detect D variants. **Results:** A total of 1,830 samples from D-positive blood donors were phenotyped. Among these, eight (0.44%) samples showed atypical D phenotyping: Seventy-five percent of the samples exhibited showed agglutination exclusively with IgM (MS26), while no reactivity was observed with IgG (MS201), and weak agglutination (2–3+) was detected in the antihuman globulin (AHG) phase. The remaining 25% of samples demonstrated the inverse pattern:, characterized by the absence of reaction with anti-D IgM (MS26) and the presence agglutination with IgG (MS201). **Discussion and conclusion:** The frequency of atypical D serological typing in our donors was lower than that observed in donors from the Southeast region of Brazil (0.79%). This discrepancy may be ascribed to the genetic heterogeneity among the study populations, particularly in light of highly admixed population of the Amazonas and to variations in the screening methods used. The majority of samples demonstrated reactivity exclusively with monoclonal anti-D IgM reagents, while anti-D IgG a negative response, a pattern consistent with the presence of weak D. A select number of samples agglutinated solely with anti-D IgG, a behavior compatible with partial D variants. It is noteworthy that each clone exhibits distinct recognition patterns for the D antigen, which can be exploited to discern the presence of variants. A lack of reactivity with a specific monoclonal clone can be indicative of these variants.The reactivity of monoclonal anti-D antibodies is directly related to their concentration and avidity. The necessity of employing multiple antibodies, particularly in admixed populations such as those found in the Northern Region of Brazil, is reinforced by the observation of different agglutination intensities (1 to 3+), especially when isolated. The study detected a low frequency of atypical D phenotypes in HEMOAM blood donors, which could be clinically relevant. A substantial body of evidence indicates a pattern consistent with weak D. Our data underscores the significance of employing multiple monoclonal anti-D reagents for serological screening and the identification of D variants in D-positive donors. These findings highlight the need for standardized testing protocols, coupled with genotyping, to ensure transfusion safety in regions with high ethnic diversity.

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SOCIODEMOGRAPHIC PROFILE OF BLOOD DONORS WITH ATYPICAL D PHENOTYPING IN THE STATE OF AMAZONAS

ACS Castro [a,b], EMC Silva [c], LA Santos [a,d], MR Nascimento [a,d], NR Silva [c], IPC Tavares [a], FLO Gomes [d], SRL Albuquerque [a,d], MS Gonçalves [e], JPM Neto [a,b,d,f]

[a] *Programa de Pós-Graduação em Imunologia Básica e Aplicada (PPGIBA), Universidade Federal do Amazonas (UFAM), Manaus, AM, Brazil*
[b] *Programa de Pós-Graduação em Ciências Farmacêuticas (PPGCF), Universidade Federal do Amazonas (UFAM), Manaus, AM, Brazil*

[c] *Fundação Hospitalar de Hematologia e Hemoterapia do Amazonas (HEMOAM), Manaus, AM, Brazil*
[d] *Programa de Pós-Graduação em Ciências Aplicadas à Hematologia (PPGH), Universidade do Estado do Amazonas (UEA), Manuas, AM, Brazil*
[e] *Instituto Oswaldo Cruz (IOC/FIOCRUZ), Salvador, BA, Brazil*
[f] *Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora, MG, Brazil*

Introduction: The sociodemographic profile of blood donors in Brazil has evolved over time, directly influenced by the high level of admixture in the population. The D antigen is considered to be among the most immunogenic in the field of transfusion medicine, and accurate identification is essential to prevent alloimmunization. Consequently, the accurate characterization donors with D phenotypes and their variants is critical for ensuring the safety and efficacy of the blood supply. The analysis of sociodemographic variables, including age, sex, and ethnicity, has been demonstrated to facilitate the identification of donation patterns and the detection of potential gaps in screening admixed populations, particularly among individuals expressing atypical D variants. **Objectives:** To describe the sociodemographic profile of D-positive blood donors at the Amazonas State Hematology and Hemotherapy Foundation (HEMOAM) who exhibited atypical serological D phenotypes. **Material and methods:** Samples were collected from repeat donors at HEMOAM between August 2024 and July 2025. Serological D phenotyping was performed using gel-card and tube techniques. The sociodemographic variables analysed included sex, age, self-declared ethnicity, place of birth, and ABO blood group. **Results:** A total eight cases (0.44%) of atypical D antigen typing were identified. The majority of donors were male (87.5%), with a mean age of 32 ±12 years old (range: 21–40 years). The self-declared ethnicity of the subjects was as follows; 62.5% mixed-race, 25% white, and 12.5% black. It is important to note that all donors were native to the Amazonas state. With regard to the ABO blood groups, an equal proportion of the population was observed to be either O or A, with a proportion of 50% for each blood group. **Discussion and conclusion:** The profile of donors exhibiting atypical D phenotypes in our study demonstrates a notable predominance of male and mixed-race donors, a finding that aligns with observations reported from other regions, including São Paulo, Minas Gerais, Pernambuco, Rio de Janeiro, and Pará. The age of donors corresponds to trends observed in the Central-West region of Brazil, with a notable concentration of younger donors (18-34 years old), reflects patterns seen in Minas Gerais and Pernambuco. This demographic profile mirrors the typical young male Brazilian donor demographic. The observed predominance of blood group O and A exceeds national averages (O: 45%, A: 42%, B: 10%, AB: 3%) and also surpasses figures reported from Mato Grosso and São Paulo. The elevated frequency of the group O blood type in the State of Amazonas may be indicative of contributions from the genetic heritages of indigenous populations, African communities, and European settlers. These findings emphasize the necessity of incorporating regional genetic particularities into serological testing protocols. This study identifies a predominant sociodemographic profile of adult mixed-race men in Amazonas, capturing both regional admixture and broader national donation patterns. The disproportionate representation of blood groups O and A further suggests a strong Amazonian genetic component. These results underscore the necessity for bespoke serological protocols to ensure transfusion safety in admixed populations and reinforce the value of region-specific epidemiological studies in characterizing D variant frequencies.

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TRANSFUSÃO DE CONCENTRADO DE HEMÁCIAS RHD POSITIVA EM PACIENTE COM AUTOANTICORPO ANTI-D: RELATO DE CASO

FAA Almeida [a,b], AAG Cortes [a,b], RF Lima [a,b], JCSG Rodrigues [a,b], LE Apparicio [a,b], CY Nakazawa [a,b], TAO Paula [a,b]

[a] *Hospital Municipal Dr Gilson de Cássia Marques de Carvalho, São Paulo, SP, Brasil*
[b] *Hospital Israelita Albert Einstein, São Paulo, SP, Brasil*

Introdução: O antígeno RhD, pertencente ao sistema Rh (ISBT 004), é o mais imunogênico após os antígenos ABO na prática transfusional. Sua expressão é determinada pelo gene RHD, que possui mais de 170 alelos descritos, essa diversidade gênica resulta de mecanismos moleculares como: polimorfismos de nucleotídeo único (SNPs), conversões gênicas, alelos híbridos com gene homólogo RHCE, inserções e deleções de nucleotídeos. Essas variações geram fenótipos conhecidos como RhD fraco e RhD parcial. A maior parte desses fenótipos não é identificada pelos testes sorológicos convencionais de tipagem para o antígeno RhD. Nesses casos, é necessário o emprego de ferramentas de biologia molecular, associadas a testes sorológicos complementares, para uma correta caracterização do antígeno RhD. A seguir, apresentamos um relato de caso em que foi detectada a presença de anticorpo anti-D no soro de um paciente cuja tipagem sanguínea indicava RhD positivo, sem qualquer discrepância sorológica. **Descrição do caso:** Paciente do sexo masculino, 72 anos, com diagnóstico de adenocarcinoma gástrico Bormann III e síndrome coronariana aguda. Apresenta histórico de transfusão de 6 unidades de Concentrado de Hemácias (CH) O RhD positivo, com resposta satisfatória em todas as transfusões (incremento de hemoglobina superior a 1 g/dL) e sem alterações nos testes imuno- hematológicos. Em 12/2024, foi solicitada a transfusão de 1 unidade de CH devido à hemoglobina de 6,8 g/dL. Nos testes imuno-hematológicos realizados, o paciente apresentou tipagem sanguínea O RhD positivo, utilizando clones monoclonais MS-201 e MS-26. O Teste da Antiglobulina Direto (TAD), realizado por metodologia em gel (IgG e C3d) negativo. A fenotipagem Rh+Kell revelou o perfil R1r; K-. A Pesquisa de Anticorpos Irregulares (P.A.I) apresentou resultado positivo e, na Identificação de Anticorpos Irregulares (I.A.I), foi detectado o anticorpo anti-D. O anticorpo