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SEROLOGICAL PHENOTYPING OF BLOOD DONORS FROM THE STATE OF AMAZONAS

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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

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