A SURVEY OF THE STATUS OF COMMON RHESUS PHENOTYPES IN PORT HARCOURT

DR. C.A NWAUCHE, DR. O.A. EJELE

DEPARTMENT OF HEMATOLOGY, UNIVERSITY OF PORT HARCOURT TEACHING

HOSPITAL, PORT HARCOURT.

ALL CORRESPONDENCE: DR. C.A NWAUCHE

DEPT. OF HEMATOLOGY, UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL PORT HARCOURT.

ABSTRACT

AIM: To generate requisite data of the common Rhesus phenotypes that would assist in the provision of safe and efficient blood transfsion service in the Niger Delta.

METHOD: Random sampling of adult blood donors and pregnant women presenting to the UPTH using potent commercially prepared Rhesus antisera (Anti-CD,anti-DE,anti-C,anti-anti-c and anti-E).

RESULTS:65 samples (35 pregnant women and 30 blood donors) were screened .The commonest Rhesus phenotype was c(100%),followed by D,C,E with 95.38%,21.53% and 16.92%.The prevalence of Rh D negative in this study was also found to be 4.6%.

CONCLUSION:The finding that the c phenotype is the most common Rhesus phenotype is at variance with previous studies which indicate that the D phenotype is the most common subtype.This may be attributed to the small size of the sample poulation,increased inter-tribal marriages,rural-to-urban migration and the heterogeneous population of the cosmopolitan city of Port Harcourt.

KEY WORDS: SURVEY, COMMON, RHESUS, PHENOTYPE, PORT HARCOURT.

INTRODUCTION

In resource poor countries such as Nigeria, the practice of Transfusion medicine is still rudimentary, being characterized by such inadequacies as lack of requisite epidemiologic data relating to the incidence of the clinically important blood groups in the population such as ABO, Rhesus, Kell, Kidd and Duffy and a functional National and local Blood Transfusion Services)[1,2] in clinical practice, the Rhesus (Rh) D antigen is highly immunogenic and is the leading cause of Haemolytic Disease of the Newborn (HDN) and other clinical sequelae which include Haemolytic transfusion reactions.[3-6] Hence, Rh activity in clinical practice has been arbitrarily classified into Rh "D" positive and Rh "D" negative. It has also been shown that the other common Rh phenotypes such as c, C, E and e are important causes of both HDN and Haemolytic transfusion reactions.[7-9]

The Rh proteins carry Rh antigens but are only expressed on the erythrocyte surface if (RhAG a glycosylated homolog) is also present. Thus, the RhD protein expresses the D antigen, while the RhCcEe protein carries either C or c antigens together with E or e antigens on the same protein and are both located on chromosome 1 with 30-32 and 32 34 Kd respectively. The most frequently occurring forms of RHD and RHCE encode 8 haplotypes: Dce, dCe, Dce, dCe, DcE, dcE, DCE and dCE, known in short, respectively as Ro, r, R_1, r^1, R_2, r^{11}. R_z and r_y (The upper case "R" is used when RcD antigen is expressed, lower case "r" when it is not)[10].

In Nigeria and most developing countries, routine Rh antigen typing is restricted to only Rh D phenotype screening for several reasons which include the unavailability of the relevant Rh antisera: anti-C, anti-c, anti-E and anti-e. What therefore follows is not only the almost non-existence of the necessary database of the incidence and activities of these Rh antigens/antibodies but the occurrence of life-threatening and sometimes fatal cases of HDN and Haemolytic transfusion reactions.

In this environment apart from the classic studies of Worlledge et al[11] not much work has been in this field most of the studies have been concentrated on the ABO and RhD antigens.[12-19]. In this study therefore, we have set out with the aim of carrying out a pilot screening of adults in Port Harcourt, which is not only cosmopolitan city but the hub of oil-related activities in the Niger Delta; with an attendant large population who require Health Care Services including safe blood transfusion. It is hoped that the results of this study would not only stimulate further research in this field but also provide the necessary data that would assist in the provision of safe and efficient blood Transfusion Service in the Niger Delta.

MATERIALS AND METHOD

SAMPLING: The subjects utilized in this study consist of two categories: Pregnant women and blood donors presenting to the antenatal clinic and blood bank of the University of Port Harcourt Teaching Hospital in 2002.

METHOD: About 3mls of blood was collected from each subject by venepuncture into 10mls sterilin containers and the red cells were then separated from the serum and subsequent Rhesus antigen typing was carried out by the standard tube technique according to Dacie and Lewis, [20] using potent commercially prepared Rhesus antisera (Anti-CD, anti DE, anti-C, anti-c and anti-E). Anti-e was not included in this protocol as it was unavailable. All the antisera were controlled appropriately.

Typing was carried out by mixing one drop of 20% red cell suspension to two drops of the respective anti-sera (cell to antisera) tubes at 37°C (Saline) with Albumin and Anti-Human Globulin (AHG). They were all incubated for 1hr. Negative and positive controls were set up at this stage. All samples that showed agglutination both visually and microscopically were read as being positive while those who did not show any agglutination were read as being Negative.

RESULTS

A total of 65 subjects (30 pregnant women and 35 blood donors) were randomly entered into this study. The results show that the c antigen was the most common, being present in all 65 samples (100%), followed by the D antigen with 62 (95.38%). The value for the C and E antigens were 14(21.53%) and 11)16.92%) respectively as shown by Table I:

Table I: COMMON RHESUS PHENOTYPES AMONGST ADULTS IN PORT HARCOURT

	CD Pos%	CD Neg%	DE Pos%	DE Neg%	C Pos%	C Pos%	C Neg%	C Pos%	E Neg%	E Neg%
Pregnant Women	28 43.07	2 3.07	27 41.54	3 4.62	7 10.77	-	30 46.15	-	7 10.77	-
Blood Donors	34 52.30	1 1.54	31 47.69	1 1.54	7 10.77	-	35 53.85	-	4 6.15	-
Total	**62 95.38**	**3 4.6**	**58 89.23**	**4 6.16**	**14 21.53**	**-**	**65 100**	**-**	**11 16.92**	**-**

The results from Table I show that RhD positivity was 62(95.38%) while RHD negative in this study was 3(4.6%).

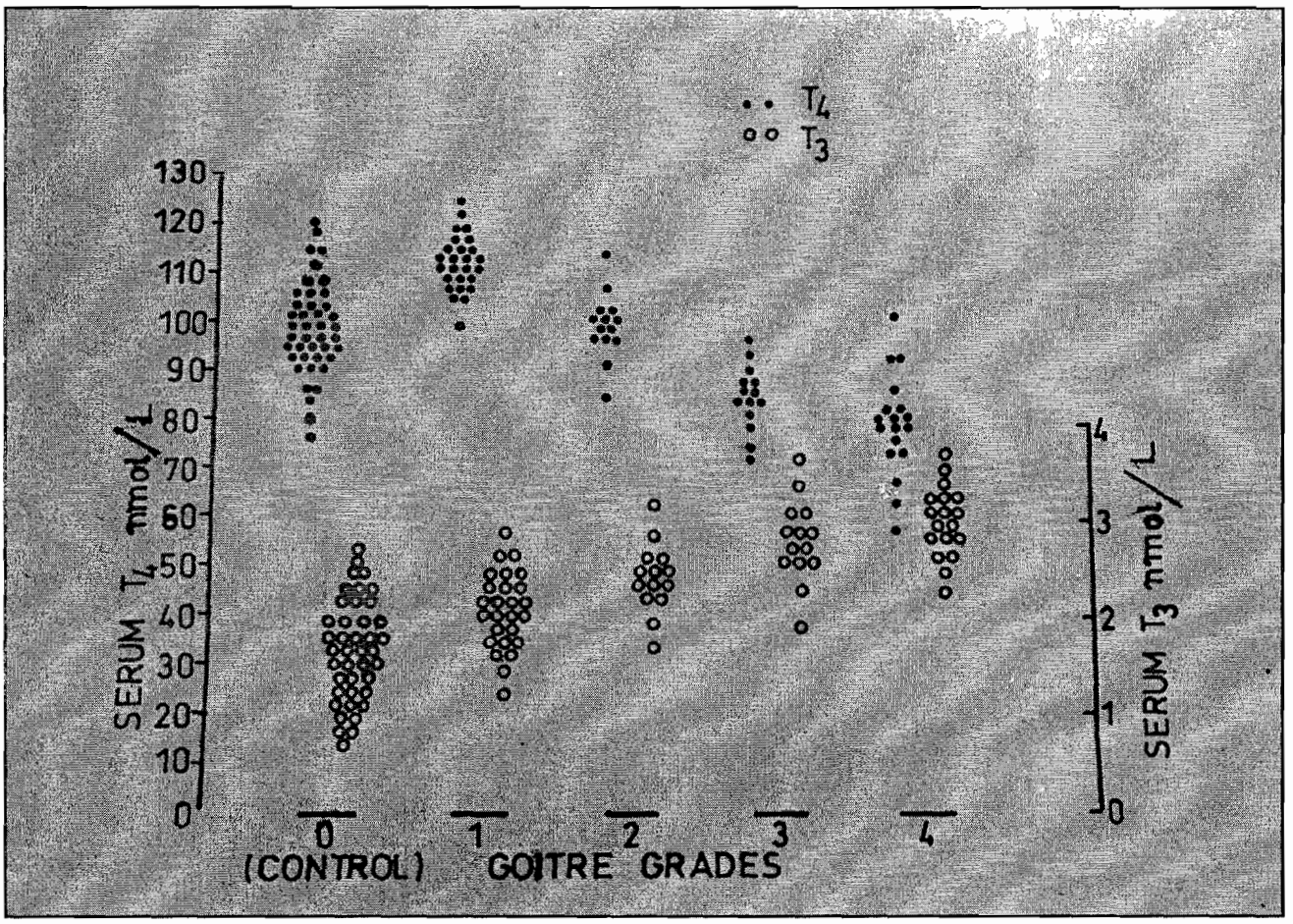
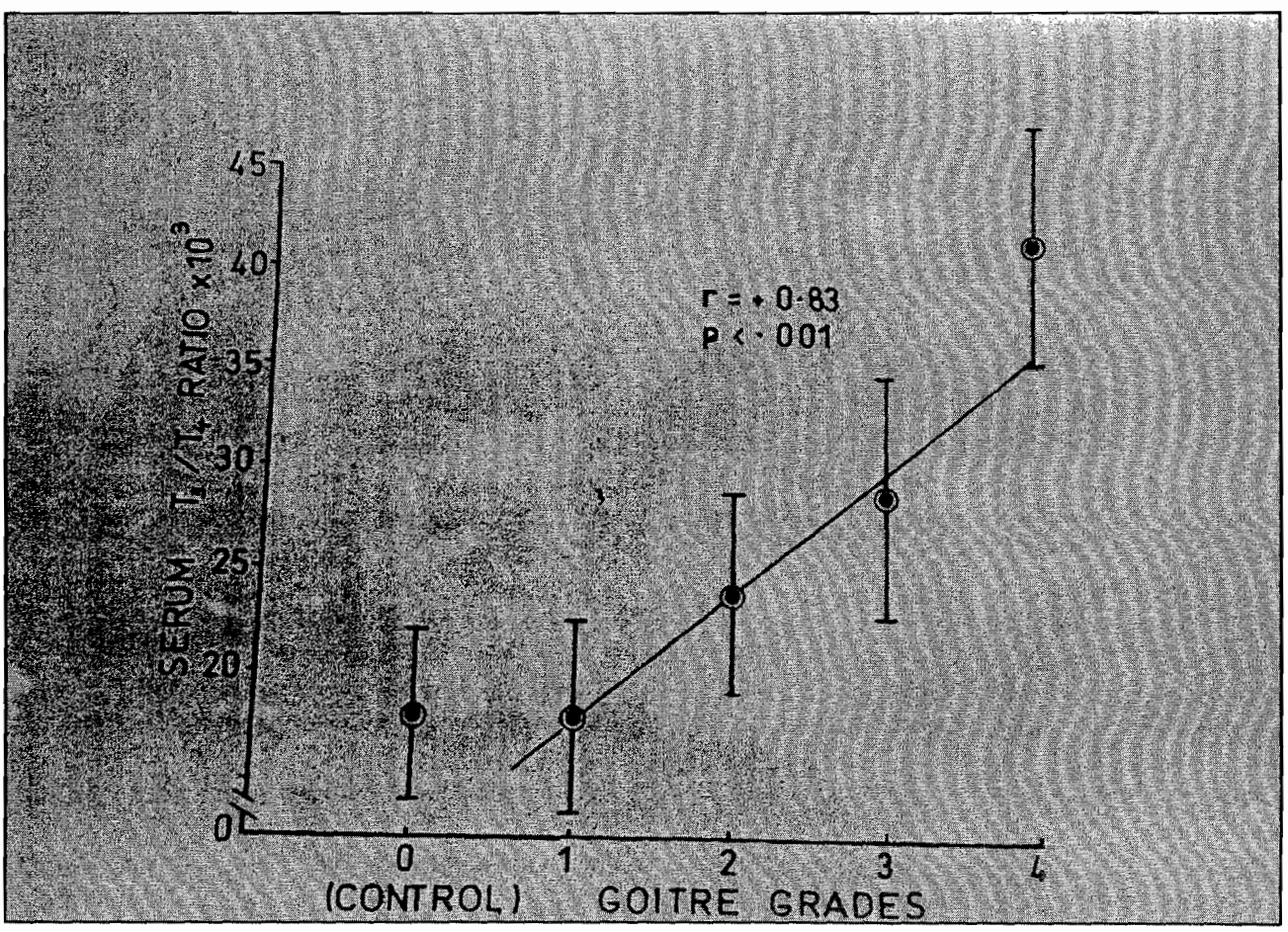


Table II shows a breakdown of the findings amongst the pregnant women in this study.

Table II: COMMON RHESUS PHENOTYPES AMONGST PREGNANT WOMEN IN PORT HARCOURT.

	Total	CD	CD	DE	DE	CC	C	C
	%	Pos%	Neg%	Pos%	Neg%			
Ijam	13 37.5	12 34.3	1 2.9	7 31.4	1 2.9	3 8.6	13 37.5	1 2.9
Ibo	15 42.9	15 42.9	-	13 37.5	-	3 8.6	15 42.9	2 5.7
Ikwerre	2 5.7	2 5.7	-	1 2.9	-	1 2.9	2 5.7	-
Ogoni	-	-	-	-	-	-	-	-
Edo	3 8.6	3 8.6	-	3 8.6	-	-	3 8.6	1 2.9
Efik-Ibibio	-	-	-	-	-	-	-	-
Yoruba	2 5.7	2 5.7	-	2 5.7	-	-	2 5.7	-
Total %	35 100	34 97.1	1 2.9	31 88.6	1 2.9	7 31.4	35 100	4 11.4



These figures illustrate the distribution of the Rh phenotypes amongst the major ethnic groups in the cosmopolitan city of Port Harcourt. Here, the most common phenotype is the C antigen with 35 (100%), followed by D, C and F with 34 (97.%), 7 (31.4%) and 4 (11.4%) respectively. The results alto show that Rh D positivity amongst the pregnant women was high 34 (97.1%) while Rh D negativity was low 1 (2.9%).

Furthermore, the above data depicted in table II shows that the Ibos made the highest contribution to the values of the C and of the D antigens with 15 (42.9%), followed by the Ijaws with 13 (37.5%) and 12 (34.3%) and the Edos with 3 (8.6%) respectively. It is also noteworthy that the only Rh D negative finding 1 (2.9%) was from the Ijaws.

DISCUSSION

In the past, most of the studies carried out on Rhesus antigens were essentially limited to the Rh D antigen [12-19] except the notable classic work of Worlledge et al[11] in Ibadan, amongst a somewhat homogeneous population of Yorubas. In this study, we found that the Rh C antigen was Rhesus phenotype with 100% reactivity in all 65 samples. This was followed by the D, C and E with 95.38%, 12.53% and 16.92% respectively. This finding is at variance with previous reports such as the Ibadan series by Worlledge et al[11] in which the Rh D antigen was the most common Rhesus phenotype.

The reasons for this disparity may be due to a number of factors which include the small sample size and the somewhat heterogeneous cosmopolitan nature of the target population. Other factors including increased inter-tribal marriages and rural to urban migration. However, it is pertinent that this observation should be confirmed and authenticated by further studies utilizing a larger sample size.

It is also noteworthy that Rh D negativity in this study was 4.6%. This finding is within the range of low Rh D negative in Nigeria which has been previously reported to be between 0-9.5% [11-15,17-19]. This observation is significant as it highlights the danger of the occurrence of Rhesus immunization, Haemolytic Disease of the newborn and Haemolytic transfusion reactions of which the Rh D antigen (with its high prevalence) is the leading cause in this environment. Furthermore since the other Rhesus phenotypes such as c, C, and E can also precipitate the above clinical seguelae, it may be beneficial to incorporate them into the testing protocol especially for pregnant mothers. Equally important is the fact that some of the Rh negative samples may be weak D or D^u meaning that they are falsely negative. This brings into focus the need to establish the true Rh negative individual particularly in areas of high D^u prevalence such as western Nigeria[5,11,19]. This would prevent the wastage of scarce Rh D negative blood and the administration of Human immune globution (Rhogam) on such individuals thereby helping to conserve resources within the context of our health care system that is already over-burdened:

The results of the distribution of the Rhesus antigens amongst the various ethnic groupings shows the Ibos to have made the highest contribution with 42.9% for Rh D positive, 42.9% for c positive and 8.6% 5.7% for C and E positive respectively. They are followed by the Ijaws which are the largest indigenous group within the Niger Delta with 34.3% for Rh D positive, 37.5%, 8.6% and 2.9% for c, C and E respectively. Again this result highlights the ethnic and cultural mix that has taken place in a cosmopolitan city and culture such as Port Harcourt and may account for the trend of the results obtained in this study. Finally, it would be advisable to carry out this study in a larger scale as this would provide the opportunity to confirm the findings of this study.

REFERENCES

1. Mvere DA. A strategy for blood safety in the Africa region. Afr Health. 2002, 24 (5): 9-11.
2. Esan F. The Quest for safe blood. Guest Lecture, 30th Annual Conference, Nigerian Society of Haematology and Blood Transfusion, Enugu. August 2002.
3. Wagner FF, Frohmajer A, Ladewig B, Eicher NI, Lonica CB, Muller TH, Siegel MH and Flegel WA. Weak D alleles express distinct phenotypes. Blood 2000; 950:2699-2708.
4. Wagner FF, Gassner C, Muller TH, Schonifzer D, Schunter f and Flegel WA. Molecular basis of weak D phenotypes. Blood 1999; 93:385-393.
5. David-West AS. Blood transfusion and blood bank management in a tropical country. Clin Haematol 1981 10 (3): 1013-1028.
6. Curran M. Management of 1so - immunization. Obfocus (Online). January 1999.
7. Tippett PJ, Lomas Francis C and Wallace

M. The Rh antigen D: Partial D antigens and associated low incidence antigens. Vox sang 1996; 70: 123 131.

8. Contreras M, and Lubenko AL. Antigens in Hyman blood. In: Hoffbrand AV, Lewis SM and Tuddenham EGD (Eds). Postgraduate Haematology 2001. Fourth Edition. Oxford (Arnold) PP 182 214.
9. Calhoun L and Petz LD. Erythrocyte antigens and antibodies. In Beutler E, Litchman MA, Coller BS and Kipps KJ (Eds) Williams Haematology. Fifth Edition, 1995, New York. McGraw Hill, inc. PP 1595 1610.
10. Avent, ND and Reid ME. The Rhesus blood group system: a review. Blood, 2000g 95:375-387.
11. Worlledge S, Ogiemudia SE, Thomas CO, Njoku BN and Luzzato L. Blood group antigens and antibody in Nigeria. Ann Trop Med parasito. 1974, 68(3): 249-264.
12. Udeozo IOK. Haematological studies of Igbos of East Central State, Nigeria III. Nig Med J 1974, 4 (2): 127.
13. Odaibo F, Omada J and Fleming AF. Blood groups and Rhesus of blood donors in Kaduna. Nig Med J 1974, 4(2): 127
14. Odunaiya OA. A Serological study of ABO and Rhesus blood groups of 11, 120 pregnant women in Lagos. Nig Med J 1976, 6(3): 279-280
15. Onwukeme KE. Blood group distribution in blood donors in a Nigerian population. Nig J physiol Sci 1990, 6(1): 67-70.
16. Amed OA, Agomo PU, Olukoya DK and Esan GJF. The prevalence of ABO blood group antigens and antibodies in Lagos State, Nigeria. Afr J Med med Sci 1993, 22 : 49-53
17. Ahmed SG and Obi SO. The incidence of ABO and Rhesus-D blood groups in North Eastern Nigeria. Nig J med 1998, 7 (2): 68-70.
18. Nwauche CA and Ejele OA. ABO and Rhesus antigens in a cosmopolitan Nigerian population (IN PRESS).
19. Nwauche CA, Ejele OA and Okpani AOU. The prevalence of D^u phenotype amongst Rhesus Negative females in Port Harcourt, Nigeria Afr J Reprod Health 2003, 7 (1): 27-31.
20. Waters AH and Lloyd EE. Red cell blood group antigens and antibodies, and laboratory aspects of blood Transfusion. In Dacie JV and Lewis SM (Eds). Practical Haematology. Eight Edition. Edinburgh. Churchill Livingstone 1995 PP 481-487.