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Background

Karl Landsteiner & Weiner discovered the Rh blood group system. Due to the immunogenicity of the Rh antigen, Rh D antigen testing was mandated in the **pre-transfusion testing** along with A & B antigen. The most important irregular red blood cell alloantibodies are directed toward **Rh (Anti D, c, c, E, e) & Kell (Anti K, k)** blood group antigens.

Objectives

To determine the **Phenotype frequencies of Rh & Kell blood group systems** among voluntary blood donors attending the **Blood center, PIMS, Jalandhar, Punjab.**

Prospective cross-sectional study

500 donors were selected as per The Drug & Cosmetic Act 1940 & Rules 1945 & NACO guidelines.

Antigen & phenotype frequencies of the Rh & Kell blood groups among 500 blood donors at a tertiary care center in Punjab

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Methods

The antigen typing was carried out using the **Galileo fully automated immunohematology analyzer (Immucor, Germany)** which uses the **Microplate hemagglutination technique** for antigen typing. The Rh (D, C, c, E, e) & Kell (K) antigen typing was done using **IgM monoclonal antisera** from Immucor.

Results

Out of 500 donors, **491 (98.2%) were male & 9 (1.8%) were female donors. 88 (17.6%) donors were first-time donors & 412 (82.4%) were non first-time donors.** **e** antigen was most common (98.2%) followed by **D** (96.8%), **C** (88%), **c** (57%), **E** (12.4%), and **K** (1.8%). In order of descending frequency, the phenotypes were **DCcEe** (42.4%), **DCcEe** (38%), **DCcEe** (7%), **DccEe** (4%), **dccee** (3.2%), **DccEe** (3%), **DccEE** (1.8%), and **DCCEe** (0.6%).

Prevalence of ABO blood groups

Blood Group	No. of Donors	(%)	Percentage
A+	126		25.2
B+	153		30.6
O+	149		29.8
AB+	56		11.2
A-	04		0.8
B-	05		0.1
O-	06		1.2
AB-	01		0.2

Antigen prevalence of Rh (D, C, c, E, e) & Kell (K) blood group antigens

Rh & Kell antigens	No. of Donors	Percentage (%)
D	484	96.8
C	440	88.0
c	285	57.0
E	62	12.4
e	491	98.2
K	9	0.18

Rh phenotype in blood donors of Punjab

Phenotype	Most probable Genotype	No. of Donors	Percentage
DCcEe	DcE/DcE (R1R1)	212	42.4%
DCcEe	DcE/DcE (R1R0)	190	38%
DCcEe	DcE/DcE (R1R2)	35	07%
DccEe	DcE/DcE (R2R0)	15	03%
DccEE	DcE/DcE (R2R2)	09	1.8%
DccEe	DcE/DcE (R0R0)	20	04%
DCCEe	DCE/DCE (R1Rz)	03	0.6%
dccee	Dce/dce (rr)	16	3.2%

Conclusion

The **most prevalent Blood group** among all the donors was **B+ve**. The most prevalent Rh phenotype was **DCcEe (R1R1)**. This study helps to make a **phenotype-matched blood donor registry** to issue blood to **multi transfused patients** or **patients with multiple alloantibodies**.