ISSN 2278-2540 | DOI: 10.51583EMAS | Volume XV, Issue X, October2026

A Case Study on the Distribution of ABO and Rh Blood Groups and Health Awareness Gap in the Urban Population of Chhindwara, Madhya Pradesh, India

Ritu Sharma[*1], Doshita Dass[2]

[*1]Assistant Professor, Department of Zoology, Pradhan Mantri College of Excellence, Government Autonomous Post Graduate College, Chhindwara, Madhya Pradesh, India

[2]Research Scholar, Department of Zoology, Raja Shankar Shah University, Chhindwara, Madhya Pradesh, India

DOI: https://doi.org/10.51583/IJLTEMAS.2026.151000057

Received: 23 October 2026; Accepted: 28 October 2026; Published: 06 November 2026

ABSTRACT

Knowledge of blood group distribution and the Rh factor is essential for inventory management in blood banks, emergency transfusion procedures, and understanding population genetics. This study aims to evaluate the distribution of ABO and Rh (D) blood groups and assess blood group awareness among the population in Chhindwara, Madhya Pradesh. A cross-sectional survey was conducted involving N = 500 individuals across Chhindwara city. We collected and analysed primary data on self-reported or laboratory-verified blood groups and Rh factors using percentage-based descriptive statistics. Out of 500 participants surveyed, 19% (n = 95) were completely unaware of their blood group type, highlighting a critical health awareness gap. Among the remaining 81% (n = 405) who reported their blood group, the distribution analysis showed that O Positive was the most prevalent (33.58%), while AB Negative was identified as the rarest (0.49%). Overall, 95.06% of the individuals were Rh-positive, and 4.94% were Rh-negative. The findings emphasise the need for regular voluntary blood donation and typing drives to close the 19% awareness gap and maintain an adequate supply of rare blood groups in regional blood banks.

Keywords: *ABO Blood Group, Rh Factor, Public Health Awareness, Chhindwara, Blood Transfusion*

INTRODUCTION

The ABO and Rh blood group systems are clinically the most critical antigen systems in human blood transfusion, organ transplantation, and medico-legal research (Agrawal et al., 2014; Chandra & Gupta, 2012; WHO, 2023). Beyond clinical settings, knowledge of one's blood group is significant during medical emergencies, maternal health management to prevent erythroblastosis fetalis, and unexpected surgical procedures (Garg et al., 2014).

In India, blood group frequencies vary significantly across different geographical, ethnic, and regional populations (Das et al., 2001; Periyavan et al., 2010). Chhindwara, situated in the Satpura range of Madhya Pradesh, possesses a unique demographic profile. While primary health infrastructure has expanded in recent years, baseline data regarding blood group awareness and prevalence in this region remain limited. The present study aimed to assess the awareness of personal blood group status among the general public in Chhindwara and to determine the prevalence of ABO and Rh (D) blood types among individuals aware of their blood group.

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MATERIALS AND METHODS

Study Design & Setting: A cross-sectional observational survey was conducted in the urban areas of Chhindwara, Madhya Pradesh.

Study Duration: July 2026 to September 2026.

Sample Size: N = 500 participants from diverse age groups and backgrounds.

Data Collection Methodology: Data were gathered using a structured questionnaire survey. Participants were queried on two primary aspects:

1. Awareness of their own blood group type (aware vs. unaware).
2. Specific ABO blood type and Rh (D) factor (positive/negative) for those who knew their status.

Data Analysis: Collected data were tabulated, categorized, and analyzed using descriptive statistics (frequencies and percentages) in Microsoft Excel.

RESULTS

Blood Group Awareness Level

Out of the total 500 participants surveyed, 81% (n = 405) were aware of their blood group, while 19% (n = 95) were completely unaware.

Observation: Nearly one out of every six respondents (19%) in the survey area did not know their blood group, indicating a significant need for public health education and accessible blood-typing camps.

ABO and Rh (D) Distribution (N = 405)

Among the 405 participants who knew their blood group, the frequency distribution was analyzed as follows:

Table 1: Prevalence of ABO and Rh Blood Groups in Chhindwara Population (N = 405)

Blood Group	**Rh Positive (+)**	**Rh Positive (+)**	**Rh Negative (-)**	**Rh Negative (-)**	**Total**	**Total**
	Count	**%**	**Count**	**%**	**Count**	**Phenotype %**
O	136	33.58%	8	1.98%	144	35.56%
B	124	30.62%	6	1.48%	130	32.10%
A	85	20.99%	4	0.99%	89	21.98%
AB	40	9.88%	2	0.49%	42	10.37%
Total	**385**	**95.06%**	**20**	**4.94%**	**405**	**100.00%**

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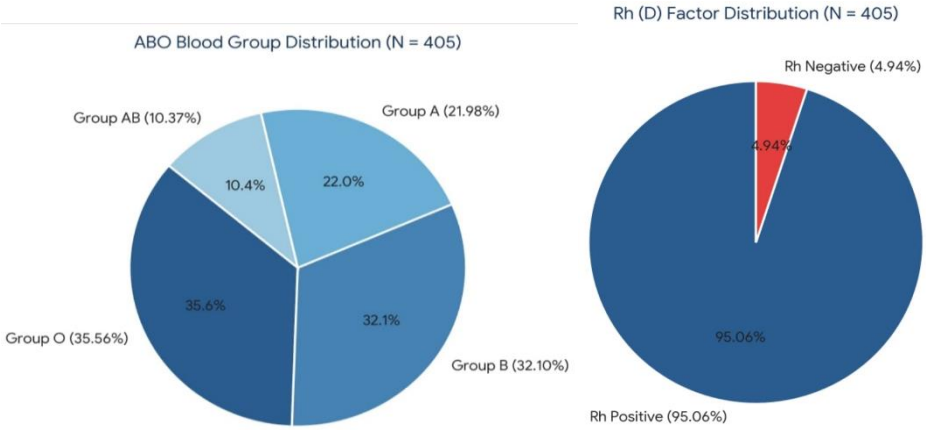


Figure 1: Proportional distribution of ABO phenotypes and Rh(D) Factor in the surveyed population (N=405).

Most Common Blood Group: O Positive (n = 136), with 33.58% prevalence.

Rarest Blood Group: AB Negative (n = 2), with 0.49% prevalence.

Overall Distribution of Rh Factor: Rh Positive: 95.06% (n = 385); Rh Negative: 4.94% (n = 20).

DISCUSSION

The results of this study offer key insights into the genetic diversity and healthcare literacy of the population in Chhindwara.

Awareness Gap Analysis: The finding that 19% of participants were unaware of their blood group is critical. In emergency clinical scenarios, a lack of prior knowledge delays donor identification and puts additional stress on emergency blood typing services.

ABO Prevalence Comparison: In the present study, blood group O was the most predominant (35.56%), followed by B (32.10%), A (21.98%), and AB (10.37%). This pattern aligns closely with regional demographic trends reported across Central India, where blood groups O and B dominate over A and AB (Agrawal et al., 2014; Batav et al., 2019; Saluja & Sharma, 2015).

Rh Factor Distribution: The vast majority of the population was found to be Rh-positive (95.06%), while Rh-negative phenotypes remained low (4.94%). This finding is consistent with general trends in Indian and Asian populations, where Rh-negativity typically ranges between 3% and 8% (Chandra & Gupta, 2012; Wadhwa et al., 1998).

CONCLUSION & RECOMMENDATIONS

Conclusion

This case study successfully establishes baseline data for ABO and Rh blood group distribution in Chhindwara. Although 81% of the surveyed population demonstrated awareness of their blood group, a notable 19% gap remains. Group "O Positive" was the most frequent type, while "AB Negative" was the least common.

Recommendations

Community Screening Camps: Local health authorities and educational institutions should organize routine blood grouping camps to resolve the 19% awareness deficit.

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Rare Donor Registry: Blood banks in Chhindwara (e.g., District Hospital Blood Bank) should maintain a specialized digital registry for individuals identified with rare groups (such as Rh-negative types) for emergency call-outs.

Student and Youth Engagement: Integrating blood typing awareness into college and school health check-ups can ensure 100% awareness among the youth.

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