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RESEARCH ARTICLE

EMERGING DONOR PATTERN AT WESTERN INDIA: EARLY TRENDS AND PROFILE INSIGHTS FROM INITIAL YEAR OF DONATION ACTIVITY

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Abstract

Background- Blood Transfusion Services (BTS) are a vital component of the modern health care system, without which efficient medical care is impossible. BTS play a central role in ensuring the availability of a safe, adequate, and timely supply of blood and blood products for patients in need**.**

Aims and Objective-
The aim of this study was to document the current rate and reasons for donor deferral in our tertiary care centre's blood center over a defined period, and to understand how these patterns can inform strategies to improve donation and retention.

Methodology- This retrospective record based study was carried out for whole blood donors at blood Center of AIIMS Rajkot.

Results- A total of 1241 participants registered for blood donation during the study period; 1066 (85.89%) were male and 175(14.10%) were female. Among all registered donors, 13.65 **%** (145) of males and 61.14 (107)**%** of females were deferred from donating. Among causes of donor rejection, anemia (Hb < 12.5 g/dL) was the predominant reason134 (53.17**%**), followed by a history of medication use 97 (38.49**%**) as deferral. The distribution of ABO blood groups showed that group B was the most frequent370 (37.41**%**), followed by O 325 (32.86%)**,** A 208 (21.03%)**,** and AB 86 (8.69%)**.** 15 (1.51%) out of 989 donors serostatus reactive for transfusion-transmissible infections.

Conclusion- Donor deferral rates and the reasons for deferral are important to highlight for blood donors,the public,and health professionals because they directly impact the safety and effectiveness of blood donation services. Deferrals protect both donors and recipients by ensuring that only eligible, healthy individuals donate, reducing risks of harm or transfusion-transmissible infections.

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Introduction:-

Blood Transfusion Services (BTS) are a vital component of the modern health care system, without which efficient medical care is impossible [1]. The primary objective of blood transfusion services worldwide is to ensure the availability of a safe and adequate supply of blood and blood products.Blood donation is a vital act that directly contributes to saving lives and improving patient outcomes. From the donor's perspective, voluntary blood donation supports the continuous availability of safe blood for patients requiring transfusion due to trauma, surgery, obstetric emergencies, hematological disorders, and chronic illnesses. Regular blood donors play a crucial role in strengthening blood transfusion services by ensuring a reliable and sustainable blood supply. In addition to its humanitarian value, blood donation promotes a sense of social responsibility and community participation among donors, reinforcing the ethical foundation of modern health care systems.

According to the Drugs and Cosmetics Act, not every individual who presents to a blood bank or donation camp qualifies as a blood donor. A donor is defined as a person who, after a complete medical examination by a qualified medical officer, is declared fit to donate blood. To ensure the safety of blood donation and to enhance public confidence in voluntary blood donation, several safety measures have been implemented by the blood transfusion community. Among these, donor selection is the most critical. Stringent, meticulous, and systematic donor screening is essential to protect both blood donors and recipients [2].Blood donors may be deferred for various reasons. The rate and causes of donor deferral vary across regions and among blood transfusion centers. Individuals who are temporarily or permanently disqualified from donating blood are referred to as "deferred" donors [3].Hence, a detailed analysis of the various causes of blood donor deferral may help medical personnel and clinicians identify and address barriers that impede blood donation [4].

The proportion of male and female blood donors is an important indicator of donor demographics and reflects sociocultural, physiological, and awareness-related factors influencing blood donation practices. Globally, blood donation is predominantly contributed by male donors, while female participation remains comparatively low in many regions. Factors such as anemia, low body weight, pregnancy, lactation, and sociocultural barriers contribute to higher deferral rates among female donors. Understanding the gender distribution of blood donors is essential for developing targeted strategies to improve female donor participation and to ensure a safe and adequate blood supply. Knowledge of blood group prevalence and transfusion-transmissible infection (TTI) serostatus among blood donors is essential for effective blood transfusion services. The distribution of ABO and Rh blood groups varies across different populations and regions, influencing blood inventory management and transfusion planning. Understanding local blood group prevalence helps blood banks maintain an adequate and balanced supply of blood components to meet clinical demands.

Equally important is the assessment of donor serostatus for transfusion-transmissible infections, including human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis, and malaria. Monitoring seroreactivity among blood donors serves as an indirect indicator of the safety of the blood supply and the prevalence of these infections in the general population. Regular evaluation of blood group distribution and serostatus among donors aids in identifying trends, strengthening donor selection strategies, and improving transfusion safety.According to the National AIDS Control Organization (NACO), the annual blood donation rate in India is 7.4 million units, with a shortfall of 2.6 million units.[5]

Methodology:-

Place and type of study: This is a retrospective record based study done at blood center of AIIMS Rajkot. The blood donors data from 16 th april 2025(opening day of blood center) to December 2025 was collected.

This study focused on analysis of the initial demographic characteristics of blood donors, including age , gender distribution, Donor deferral pattern, Major blood group distribution , sero status of donors which is crucial for understanding donor patterns and planning targeted donor recruitment strategies. A structured questionnaire was used to collect information on these sociodemographic characteristics in relation to blood donation. Statistical analyses were performed using SPSS software (version 22). The chi-square test was applied to determine the significance of observed differences between demographic groups.

Inclusion criteria-

1. All whole blood donors who visited the AIIMS Rajkot Blood Bank and camp organized by them during the study period. 2. Donors who completed the full donation process, including screening, blood collection, and post-donation care.

Exclusion criteria:-

1. Voluntary donors <18years and >65 years.
2. Pregnant women.

Standard operating Procedures based on the Directorate General of Health Services [DGHS](6) guidelines, Ministry of Health & Family Welfare used for donor selection and deferral.

Results:-

This study was conducted by collecting and analyzing data of initial year of donation activity from the blood center, from 16 April 2025 to 31 December 2025. A total of 1241 participants registered for blood donation during the study period; 1066(85.89%) were male and 175(14.10%) were female. [Figure 1] 989 (79.69%)donors eligible for blood donation out of 1241 and 252(20.30%) donors differ for blood donation.[Figure 2] Out of 989 donors 921 (93.12%)were male and 68(6.87%) were female donors.[Figure3] Among all registered donors, 13.65 % (145) of males and 61.14% (107) of females were deferred from donating.[Figure 4] Among causes of donor rejection, anemia (Hb < 12.5 g/dL) was the predominant reason134 (53.17%), followed by a history of medication use 97 (38.49%) as a temporary deferral.[Figure 5] 564(57.02%) donors donated at our blood center and 435(43.98) donated at camp site which was organized by us.[Figure 6] The distribution of ABO blood groups showed that group B was the most frequent370 (37.41%), followed by O 325 (32.86%), A 208 (21.03%), and AB 86 (8.69%). [Figure 7] Rhesus (Rh) factor analysis revealed that 932 (94.23)% of donors were Rh positive, and 57(5.76 %) were Rh negative.[Figure 8] 15 (1.51%) out of 989 donors serostatus for transfusion-transmissible infections, including human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis, and malaria were reactive . Hepatitis C virus 06 (0.60%), syphilis 05 (0.50%) and Hepatitis B Virus 04(0.004%) . [Figure 9]

Table 1: Gender Distribution of Registered Blood Donors (n = 1241)

Gender	Number (n)	Percentage (%)
Male	1066	85.89
Female	175	14.10
Total	**1241**	**100**

Table 2: Eligibility Status of Registered Donors

Donor Status	Number (n)	Percentage (%)
Eligible	989	79.69
Deferred	252	20.30
Total	**1241**	**100**

Table 3: Gender Distribution of Eligible Donors (n = 989)

Gender	Number (n)	Percentage (%)
Male	921	93.12
Female	68	6.87
Total	**989**	**100**

Table 4: Gender-wise Donor Deferral

Gender	Deferred (n)	Percentage (%)
Male	145	13.65
Female	107	61.14

Gender	Deferred (n)	Percentage (%)
Total	**252**	—

Table 5: Causes of Donor Deferral (n = 252)

Cause of Deferral	Number (n)	Percentage (%)
Anemia (Hb <12.5 g/dL)	134	53.17
History of medication use	97	38.49
Other causes	21	8.34
Total	**252**	**100**

Table 6: Place of Blood Donation (n = 989)

Donation Site	Number (n)	Percentage (%)
Blood center	564	57.02
Blood donation camp	435	43.98
Total	**989**	**100**

Table 7: Distribution of ABO Blood Groups (n = 989)

Blood Group	Number (n)	Percentage (%)
B	370	37.41
O	325	32.86
A	208	21.03
AB	86	8.69
Total	**989**	**100**

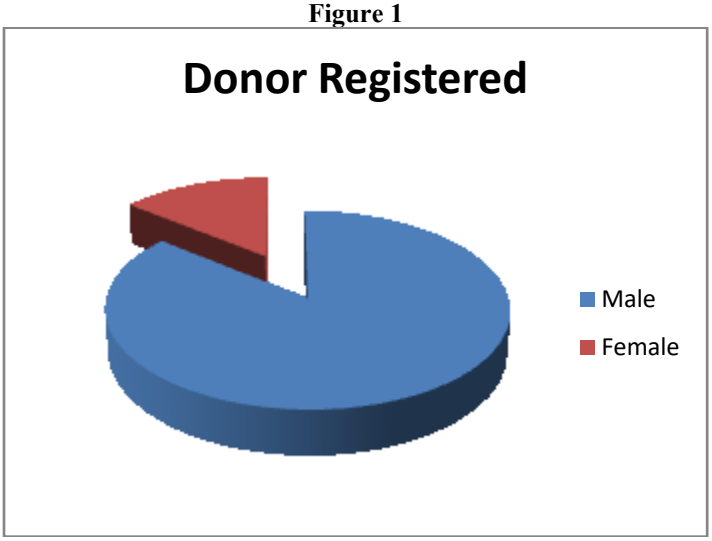
Table 8: Distribution of Rh Factor (n = 989)

Rh Factor	Number (n)	Percentage (%)
Rh Positive	932	94.23
Rh Negative	57	5.76
Total	**989**	**100**

Table 9: Seroreactivity for Transfusion-Transmissible Infections (n = 989)

Infection	Number (n)	Percentage (%)
Hepatitis C Virus (HCV)	6	0.60
Syphilis	5	0.50
Hepatitis B Virus (HBV)	4	0.40
HIV	0	0.00
Malaria	0	0.00
Total reactive	**15**	**1.51**

Figure 1



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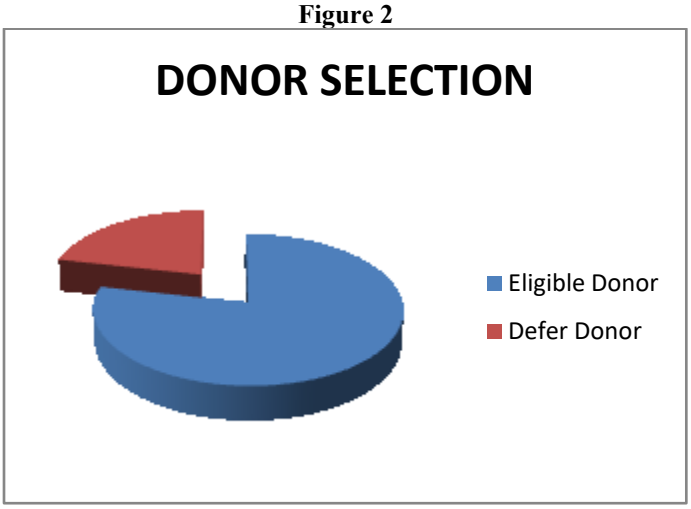
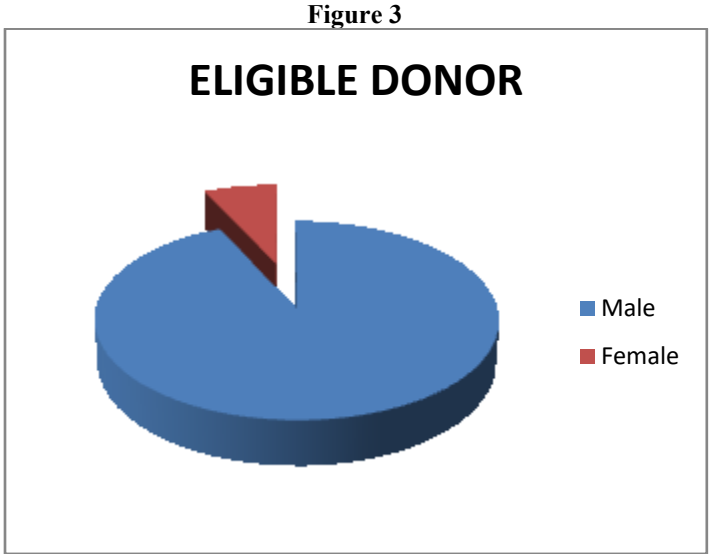


Figure 3



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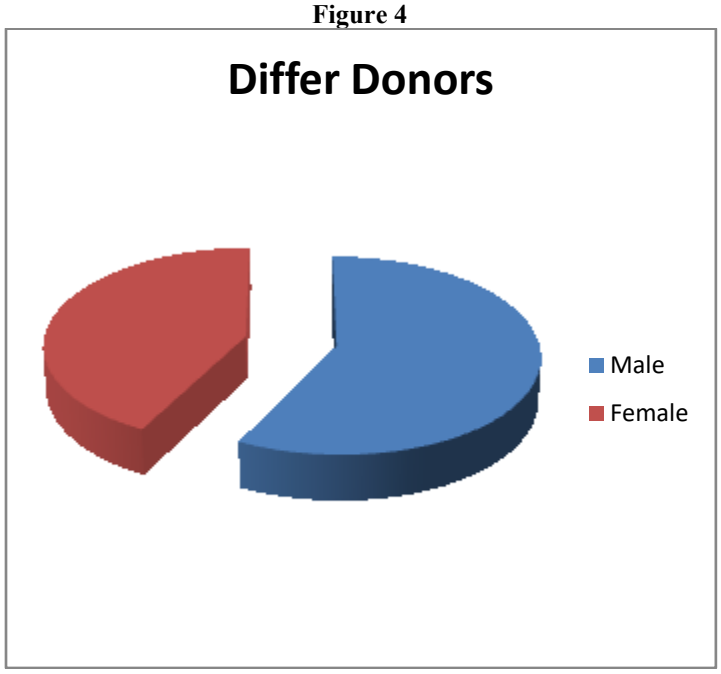

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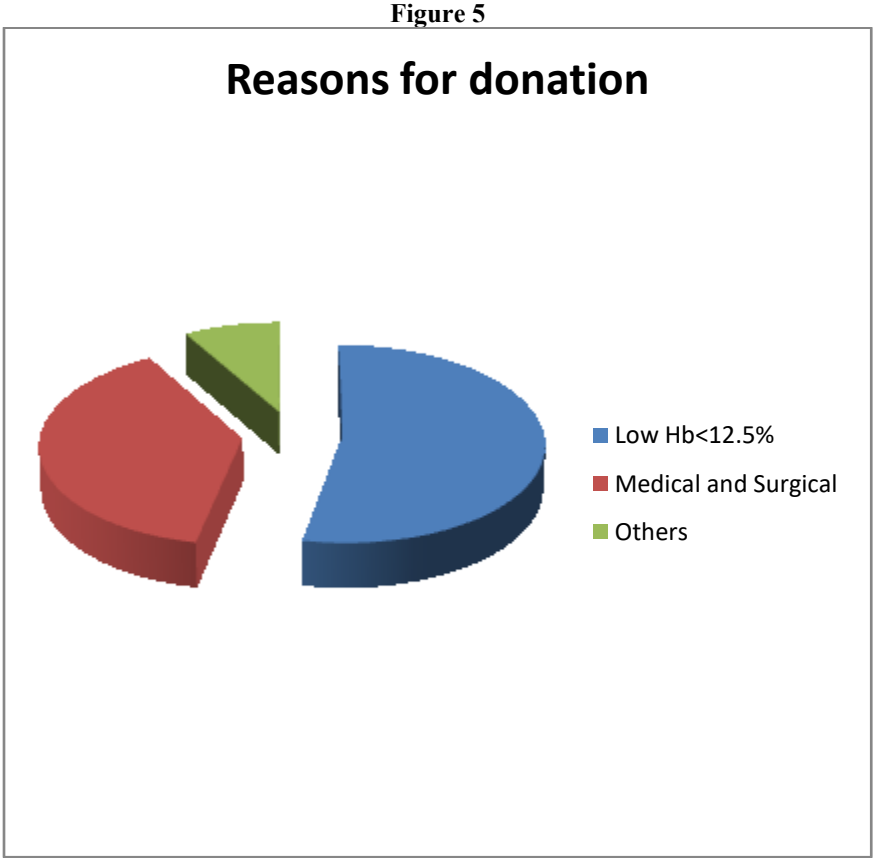


Figure 6

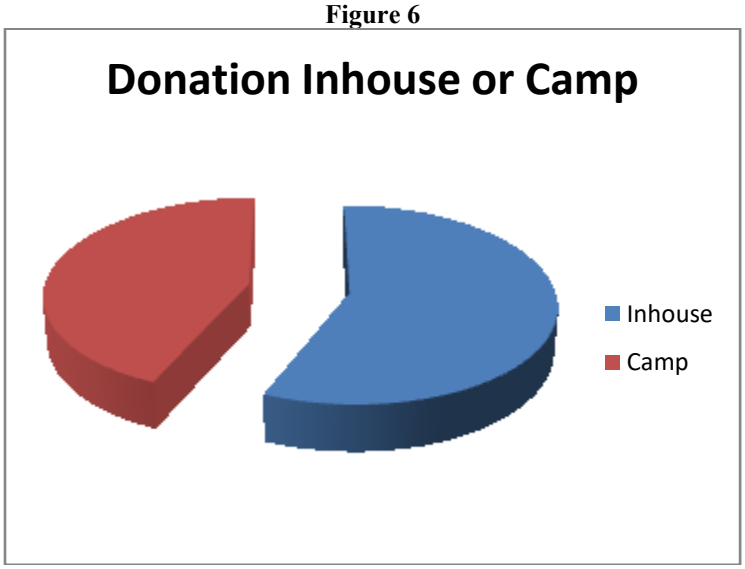


Figure 7

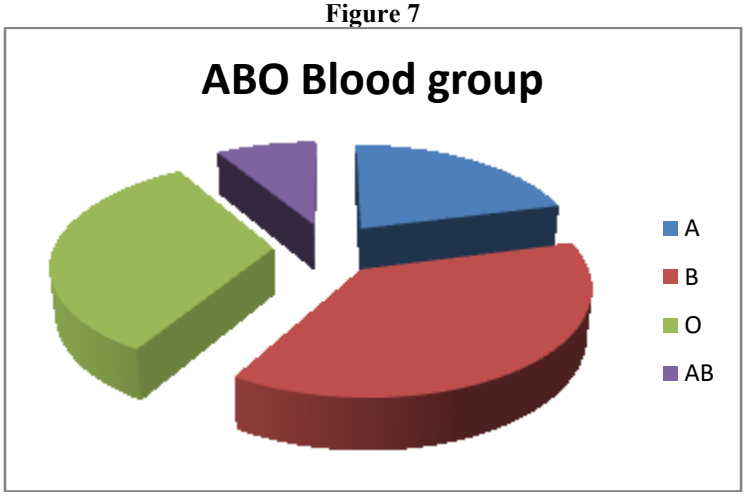


Figure 8

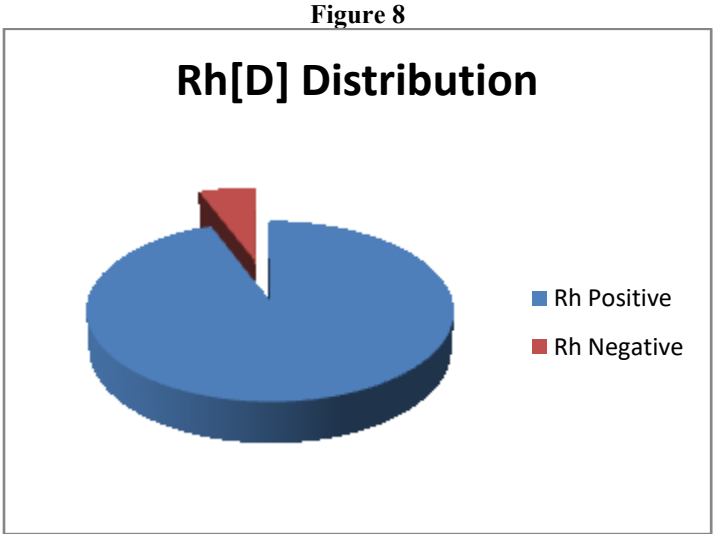
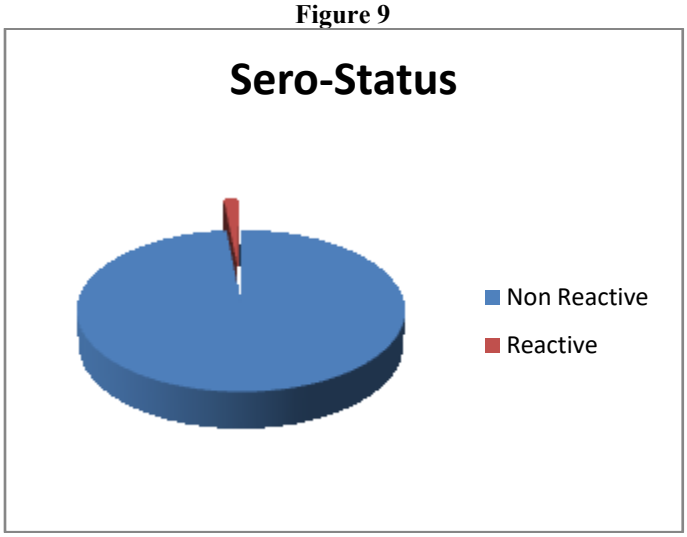


Figure 9



Discussion:-

Transfusion of blood and blood products plays a vital role in modern medicine, particularly in emergency settings where timely blood transfusion can be life-saving for patients. However, while blood donation is an essential component of healthcare, the process must be carried out in a manner that ensures the safety and well-being of both the donor and the recipient[7]. The primary goal of safe donor selection is to protect the donor from harm during the donation process and to ensure that the collected blood is safe for transfusion. Comprehensive pre-donation assessment—including medical history, physical examination, and risk evaluation—helps identify individuals who are suitable to donate and excludes those with potential health risks, thereby safeguarding public health. Safe donor selection is widely recognized as the first and one of the most crucial steps towards ensuring safe transfusion services."The results of this study highlight several trends that can inform effective donation strategies in the region. In our study, the majority of donors were men (93.12%) compared to women (6.87%). These findings are similar in direction but show a slightly higher male predominance compared to previous studies. For example, Al Shaer et al. reported 95.89% male and 4.1% female donors[8], Birjandi et al. found 95.6% male and 4.4% female donors[9], and Unnikrishnan et al. observed 95.13% male and 4.8% female donors[10]. These studies collectively indicate a marked gender disparity in blood donation, with women consistently underrepresented.

Targeted awareness campaigns and improved access to donation sites are evidence-based approaches that can help overcome barriers unique to women, thereby increasing their participation in blood donation.[11]In our study low hemoglobin 134cases (53.17%) which leads to anemia is being reported as the main cause of temporary deferral in males and females followed by medication history 97cases (38.49%). Low hemoglobin was the commonest cause of deferral in most of studies by Charles et al. and Agnihotri N. [12,13]. The minimum cut-off hemoglobin level for blood donation is >12.5 gm% irrespective of sex. In many studies it is observed that the most common cause for deferral is anemia, even in western studies. In Canada, 2% of all blood donors do not meet minimum hemoglobin standard, whereas in developing countries the number is more as pointed by this study (more than 21%) [14].
In our study distribution of ABO blood groups showed that group B was the most frequent370 (37.41%), followed by O 325 (32.86%), A 208 (21.03%), and AB 86 (8.69%). Rhesus (Rh) factor analysis revealed that 932 (94.23)% of donors were Rh positive, and 57(5.76 %) were Rh negative. Approximately 96% of donors were Rh-positive and 4% were Rh-negative. These findings align with studies by Garg et al. in Maharashtra [15], Chandra and Gupta in North India [16], Singh et al. [17], Kaur et al. [18] and Haldar et al. [19].In our study we found 15 (1.51%) out of 989 donors serostatus reactive for transfusion-transmissible infections.A total of 1241 participants registered for blood donation during the study period, of whom 1066 (85.89%) were males and 175 (14.10%) were females. Chi-square analysis showed a statistically significant difference in donor registration between males and females ($p < 0.05$). Among the registered donors, 145 (13.65%) males and 107 (61.14%) females were deferred from donation. The association between gender and donor deferral status was found to be statistically significant on chi-square testing ($p < 0.05$), indicating a significantly higher deferral rate among female donors. Regarding causes of donor deferral, anemia (Hb < 12.5 g/dL) was the predominant cause, accounting for 134 cases (53.17%), followed by a history of medication use in 97 cases (38.49%). Chi-square analysis demonstrated a statistically significant association between gender and causes of donor deferral, with anemia being the leading cause in both sexes (p <

0.05). The distribution of ABO blood groups among donors showed that blood group B was the most frequent (370; 37.41%), followed by group O (325; 32.86%), group A (208; 21.03%), and group AB (86; 8.69%). The variation in ABO blood group distribution was found to be statistically significant using the chi-square test ($p < 0.05$). Out of 989 eligible donors, 15 (1.51%) were found to be seroreactive for transfusion-transmissible infections. Chi-square analysis showed no statistically significant association between donor gender and seroreactivity status ($p > 0.05$).

Conclusion:-

This study provides a comprehensive profile of blood donors at our blood center. The donor population was predominantly male, with a marked gender imbalance, and the most common blood group observed was "B," followed by "O," "A," and "AB." The vast majority of donors were Rhesus positive. Deferral due to anemia and other temporary causes highlights ongoing challenges in donor eligibility. These findings underscore the importance of targeted awareness and recruitment strategies — particularly to increase female participation and improve donor retention. Understanding donor demographics, blood group distribution, and reasons for deferral can help inform effective planning, inventory management, and outreach interventions to ensure a safe, diverse, and sustainable blood supply for the region.

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