



# Adolescent In Blood Donation:

## *Demographic Trends and Deferral Pattern*

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**Abstract:** Blood donation is essential to global healthcare, with over 100 million blood units donated annually. Ensuring blood safety begins with a safe blood donor who has been rigorously screened and selected based on stringent national blood donor selection criteria. A retrospective cross-sectional study was done from January 2023. The study aims to evaluate the Voluntary blood donor demographic trends and deferral pattern among adolescents. Overall, 3782 Voluntary donors, of which 2391 (63.22%) donors were donated blood, 1391(36.88%) were deferred. The majority of the donors were Young Adults (20-39 years) 53.8% followed by Adolescents (18-19 years) 41.2%. The most common cause of adolescent deferral was Medical Causes 41.6% and Anaemia 40%, among the females highest at 84.12%. Lifestyle factors were 16.1%, including underweight 7.6%, and body piercing 5.1% males were higher in rate 7.94%. The majority of deferrals are transient in nature. Consistent follow-up of donors can contribute to the expansion of the donor pool.

**Keywords:** Adolescent Blood Donor, deferral causes, demographic trends.

## I. INTRODUCTION

Blood and blood products are a unique and precious national resource because they are obtainable only from individuals who donate blood or its components [1]. Blood donation is an essential procedure that serves as a lifeline, sustaining and saving lives. 118.5 million blood donations collected globally, 40% of these are collected in high-income countries. Based on samples of 1000 people, the blood donation rate is 31.5 donations in high-income countries, 16.4 donations in upper-middle-income countries, 6.6 donations in lower-middle-income countries, and 5.0 donations in low-income countries. (World Health Organization - 2023) [2]. Joy John Mammen et al., 2022 conducted a study that aims to estimate the disease-specific clinical demand, supply, and utilization of whole blood and components in India. According to the study, India faces a demand-supply gap of 2.5 donations per 1,000 eligible persons, equating to roughly one million units.[3]. Demographic information of blood donors is important for formulating and monitoring recruitment strategies. The age profile of blood donors shows that, proportionally, more young people donate blood in low- and middle-income countries than in high-income countries [2]. In India, every fifth person is an adolescent (10-19 years), and every third, is a young person (10-24 years) approximately 253 million adolescents [3]. Blood donor deferral is part and parcel of this commitment as it is based on assuring not only the safety of the health of the participant potential blood donor but also the safety of the unknown recipient of the blood or blood component[6]. Hence, the present study focuses on evaluating Voluntary Blood Donor Deferral patterns among adolescents in Tamil Nadu.

## II. METHODOLOGY

A single-center retrospective cross-sectional study was done to evaluate the demographic trends in blood donation and deferral pattern mainly focused on contributing lifestyle factors on the selection and rejection of Adolescent Voluntary Non remunerated Blood Donor from January 2023 to December 2023 at the Department of Transfusion Medicine, The Tamil Nadu Dr. MGR Medical University, Chennai, Tamil Nadu. The objective of the study was to evaluate the Voluntary blood donor demographic trends and deferral patterns among adolescents.

In this study, deferral donor refers to an individual who intends to donate blood but is temporarily or permanently ineligible due to specific criteria or conditions set by the Standard Operating Procedures of our Department. The data of Blood Donors were collected from the Master Record and Deferral Register maintained by the Department. Blood Donors from the Camp and in-house donors were included. The blood center medical officer screened the blood donors using Blood Donor forms. The forms were prepared in accordance with the recent guidelines of the AABB (American Association of Blood Banks), the Drugs and Cosmetic Act, 1940, and the 2017 guidelines for blood donor selection issued by the National AIDS Control Organization (National Blood Transfusion Services), Ministry of Health and Family Welfare, Government of India. The age criteria for blood donation are 18-65 years, a weight of at least 45 kg, and a hemoglobin level of at least 12.5 gm/dl in India, although in some countries blood donors must be at least 16 years old [4, 5].

In this study, Adolescent blood donor deferral is categorized as follows;

1. Low Haemoglobin [Haemoglobin<12.5 mg/dl, tested by Copper sulphate method],
2. Medical Causes [Co-morbidities, dental procedures, and present medical condition, including both temporary and permanent deferral cases]
3. Surgical causes [previous surgeries]
4. Lifestyle factors [lack of sleep, nutrition i.e, underweight, Alcohol intake for the past 24 hours, Fasting, and body piercing are temporary deferral]

## III. RESULTS

The data were entered in Microsoft Excel, and the descriptive statistics frequency and percentage were used for data analysis.

### 3.1 Age and Sex Distribution Trends of Voluntary Blood Donors Donated blood

Overall, 3782 Voluntary donors registered from January 2023 to December 2023 in the Camp and in-house blood center. Of which 2391 (63.22%) donors were donated blood, 1391(36.88%) were deferred. Regarding the age distribution of the Blood donor Majority were Young Adulthood (20-39 years) 1286 (53.8%) followed by Adolescents (18-19 years) 986 (41.2%) depicted in Table 1.

Table 1: Age distribution among Voluntary Blood Donors donated Blood

Age and Sex Distribution	Male n (%)	Female n(%)	TotalN(%)
Adolescent (18 - 19)	929 (38.9)	57(2.4)	986 (41.2)
Young Adult (20 - 39)	1199 (50.1)	87 (3.6)	1286 (53.8)
Middle Adult (40 - 59)	112 (4.7)	6 (0.3)	118 (4.9)
Oldage (60- 65)	1 (0.04)	0	1 (0.0)
<b>TOTAL</b>	<b>2241(93.7)</b>	<b>150 (6.3)</b>	<b>2391</b>

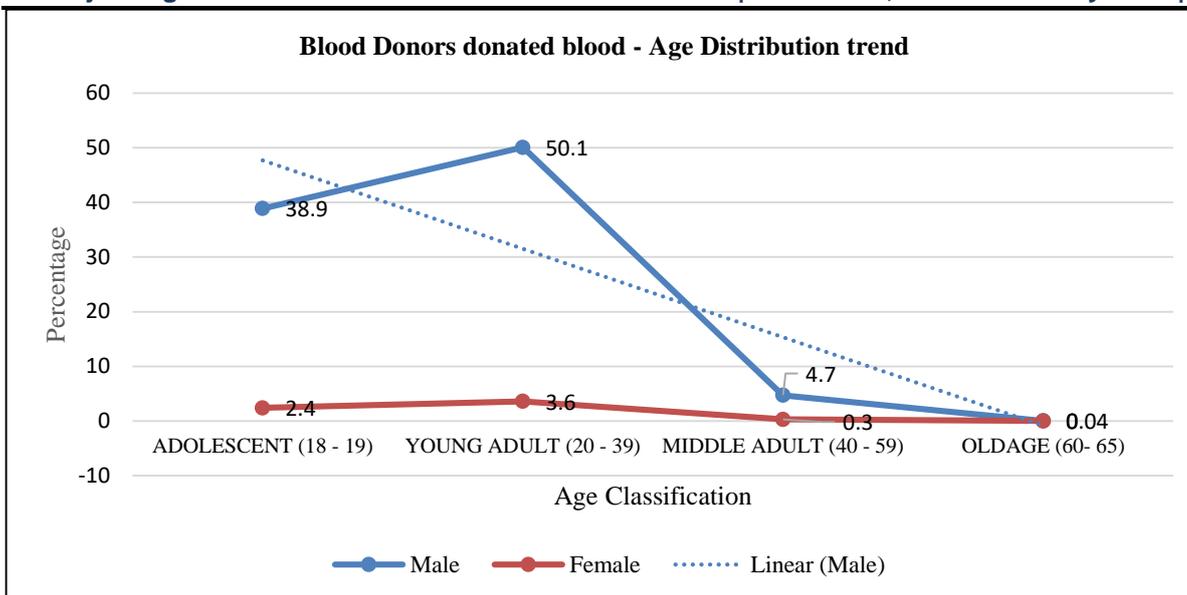


Fig:1 Age distribution trend of Voluntary Blood Donors donated blood

### 3.2 Deferral Pattern of Voluntary Blood Donors

The total deferral is 1391(36.88%). The highest Deferral is among adulthood in the age of 20 – 59 years n=944 (67.9%) and The Adolescent Deferral is 447 (32.1%) among males 276(19.8%), Female 171(12.3%) shown in Fig 2.

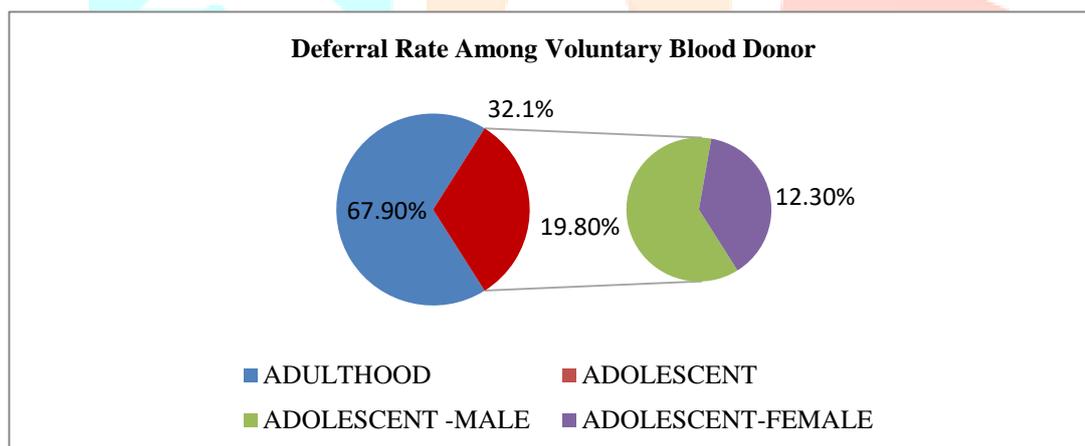


Fig: 2 Distribution of Deferral pattern among Voluntary Blood Donors

### 3.3 Causes of Blood Donor Deferral among Adolescent

The present study shows the most common cause of adolescent deferral was Medical Causes [n=186(41.6%)] among males with higher deferral [n=174 (62.82%)] along with the second most common cause for deferral rate was Anaemia [n=179 (40%)], among the females were highest in [n=143 (84.12%)]. Followed by lifestyle factors were [n=72(16.1%)] underweight [n=34(7.6%)] among adolescent males [20(7.22%)], female [14(8.24%)], body piercing [n=23(5.1%)] males were higher in rate [22(7.94%)], regarding alcohol intake for the past 24 hours males were [1(0.36%)].

Table 2: Causes of Blood Donor deferral among Adolescent

Causes	Male n (%)	Female n (%)	Deferred donors N(%)
Low haemoglobin	36(13)	143(84.12)	179 (40)
Medical causes	174(62.82)	12(7.06)	186 (41.6)
Surgical causes	3(1.08)	0(0)	3 (0.7)
Others	7(2.53)	0(0)	7 (1.6)
Lifestyle Factors	57(20.58)	15(8.82)	72 (16.1)
<b>Total</b>	<b>277(100)</b>	<b>170(100)</b>	<b>447 (100)</b>

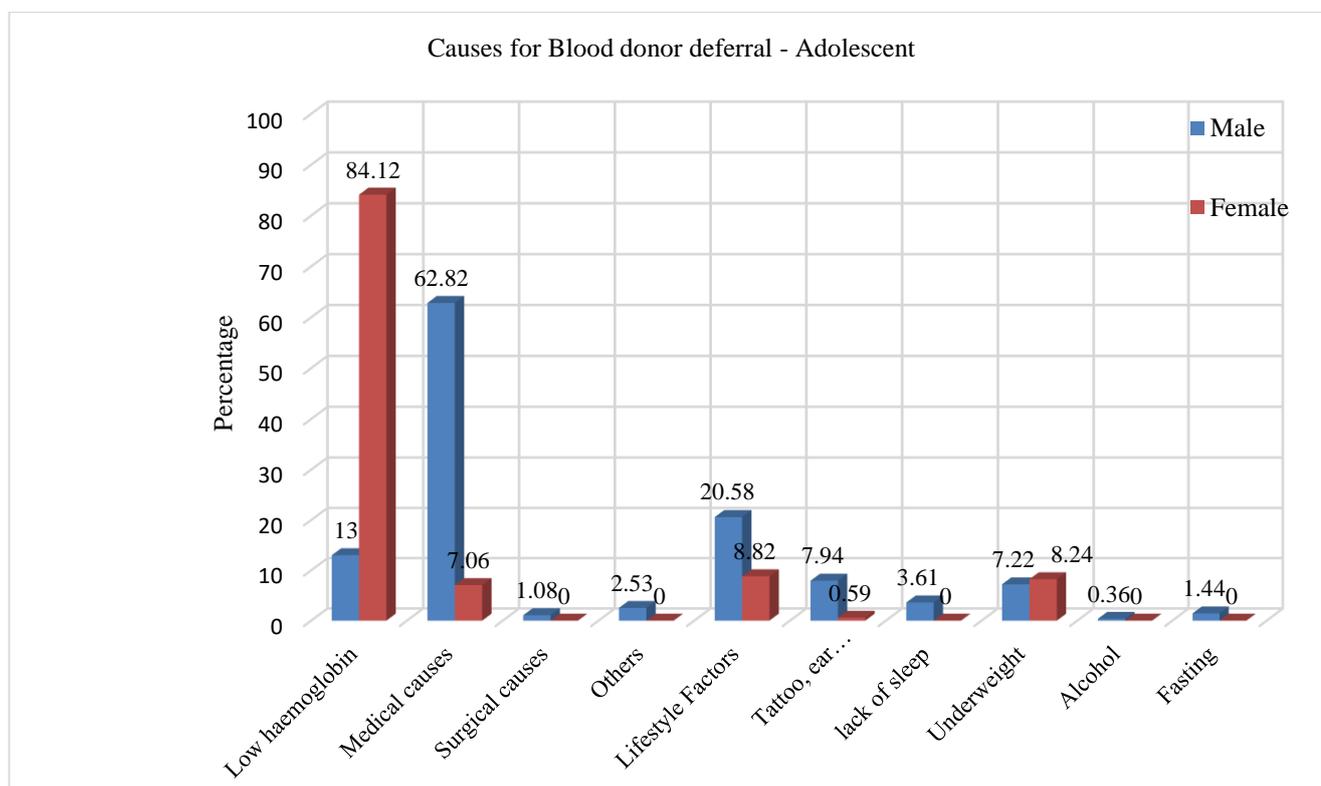


Fig: 3 Causes of Blood Donor Deferral

Table 3: Causes of Blood Donor deferral among Adolescents due to Lifestyle factors

Causes	Male n (%)	Female n (%)	Deferred donors N(%)
Body piercing	22(7.94)	1(0.59)	23 (5.1)
Lack of sleep	10(3.61)	0(0)	10 (2.2)
Underweight	20(7.22)	14(8.24)	34 (7.6)
Alcohol intake	1(0.36)	0(0)	1 (0.2)
Fasting	4(1.44)	0(0)	4(0.9)
<b>TOTAL</b>	<b>57(20.58)</b>	<b>15(8.82)</b>	<b>72 (16.1)</b>

#### IV. DISCUSSION

Globally, 1.3 billion Adolescents, totaling one-sixth of the global population. This number is expected to rise through 2050, particularly in low- and middle-income countries where close to 90% of 10- to 19-year-olds live [7]. India is home to a fifth of the world's youth population. India's 1.3 billion people make it the second most populous country in the world, but with an average age of 29, it has one of the youngest populations globally [8].

The present study, regarding the age of the blood donors adolescents, was 41.3%, and the donation rate increased during the young adulthood period by 53.8% after that, there was a decline in the number of donations during the middle adulthood and old age period. Fig.1 illustrates the Blood Donor age trend during the one year. Similar studies reported that more blood donations happened during the adulthood period Salah H Elsafi in Saudi Arabia 46.8% [9], Trends et al, 2022 in Germany reported that most of the Blood donations by the age of 18- 30 per 1000 inhabitants 125.6 [10]. Chideme et al., in Zimbabwe, reported that younger donors (16 – 29 years) were 89.2% [11]. Hence, adolescents are the utmost important age in the blood donation and deferral process. According to NACO, 34.3 per 1,000 eligible population (3.43% of eligible population) must donate blood once in a year to address the estimated clinical demand. The proportion can be reduced in the event of the promotion of repeat voluntary non-remunerated blood donation [12]. The motivational strategies and awareness programmes are meticulously planned and thoughtfully constructed to increase the number of Non-remunerated Voluntary Blood Donors.

The total deferral of the present study is 36.88%. compared with other studies done by Wang Feng, china 2023 deferral rate 12.60% [13], Dr Mitali Sharma 2024 11.25% [14] and Saravanan et al. 13.81% [15]. There is a variable deferral rate in different studies due to differences in donor selection criteria, endemicity of transfusion-transmitted diseases, and socioeconomic, demographic, regional, and local variations [16]. Based on the age group the present study shows the adolescent deferral rate is 31.2% and adult rate is 60.7%. these findings are consistent with other studies conducted by Gaikwad et al., 2022 deferral rate of 65% in the age group of 18-30 years [17] and Bassi et al, 2024 deferral rate of 48% in the age group of 18-30 years [16].

The present study reveals the highest deferral rate was 84.12% low haemoglobin among female adolescent donors as depicted in Table: 2. This finding is similar to the studies done by Ahmad et al, 2020 in Delhi 84% [18]. Since the Government of India implemented the Anaemia Mukta Bharat programme in 2017 to focus on children, adolescents, and women, and it was implemented at the school level through the school health programme, it can be extended to the college level to reach adolescents and young adults.[19].

In our study, lifestyle factors such as sleep quality, nutritional status, body piercing, recent alcohol intake, and fasting were revealed as significant determinants among adolescents. A total of 20.58% of participants were temporarily deferred due to these lifestyle factors. Since adolescents constitute a paramount portion of the donor pool, it's crucial to educate them about donor eligibility criteria, deferral periods, and the importance of blood donation through Behavior Change Communication (BCC). Retaining these donors through follow-up is also essential. The School Health and Wellness Programme, implemented in 2020 under the Ayushman Bharat programme by GOI could be extended to the college level to improve lifestyle patterns and promote health-seeking behavior among adolescents. As this age group undergoes significant physical and psychological changes, they require nutrition, education, counseling, and guidance to develop into healthy adults [20]. Temporary deferral itself negatively impacts donor return. Sensitive groups such as first time donors, younger donors had deferred unnecessarily are more unlikely to return for a subsequent donation[21]

#### V. LIMITATION

- The present study is a single-center study
- The majority of blood donations were collected through blood donation camps held at the college level.

#### VI. CONCLUSION

The study concluded that the majority of blood donors were adolescents and young adults. With regard to deferral patterns, the highest deferral rate was due to medical causes, anemia, and lifestyle factors. Since lifestyle factors are modifiable, adolescents, who constitute a significant portion of the prospective donor pool, should be encouraged to adopt healthy lifestyle practices through health awareness campaigns. Periodic and rigorous monitoring of health programs and health policies could potentially reduce anemia rates among adolescents. By increasing the number of female blood donors, we can help bridge the gap between blood demand and supply.

#### Conflict of interest

None

#### Funding resource

Nil

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