ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 10 | October - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

TRENDS AND PREVALENCE OF SYPHILIS INFECTION AMONGST VOLUNTARY BLOOD DONORS AT A STAND-ALONE BLOOD CENTRE-AN ANALYSIS

Microbiology

Palak Panchal Swarrnim Startup and Innovation University

Dr. Archana Pandey Swarrnim Startup and Innovation University

Dr. Jhalak Patel Deputy Director-Medical, Transfusion Medicine Specialist, Indian Red Cross Society, Ahmedabad District Branch

ABSTRACT

Public health is at risk due to the ongoing threat of syphilis. While diagnostic advances and public health efforts have reduced incidence in many regions, re-emergence in certain populations remains a concern. This study aimed to determine syphilis prevalence among voluntary blood donors in a district with a large urban and peri-urban population. Over the period of three years, 1,74,190 voluntary donations were screened as per standard donor selection criteria. A total of 1,065 donors were syphilis-reactive—335,372 and 358 in 2022,2023 and 2024 respectively. The rise in prevalence was observed in the 26-35 years age group, underscoring the need for targeted awareness and screening within this demographic. Given the consequences of syphilis, even low prevalence is significant.

KEYWORDS

Syphilis Prevalence, Voluntary Blood Donors, Public Health Surveillance, Transfusion-Transmitted Infections

INTRODUCTION

Blood transfusion is a life-saving treatment for critical conditions involving significant blood loss, such as hemophilia, hemolytic anemia, major trauma, and various surgeries [1, 2, 3]. Globally, approximately 118.2 million donations are made yearly, with the greatest percentage coming from developing countries [4]. Although much needed, blood transfusion is a potential route for various transfusion-transmitted infections (TTIs) of public health concern [3, 5]. Transfusion transmitted infection screening is the public health impact of syphilis is significant. Although sexual contact is the primary mode of transmission, it is also possible to transmit the disease via blood transfusion [6]. Modern blood services are concerned about the ability of the spirochaete to survive up to 72 hours in blood [7].

Universal screening for syphilis has mitigated this risk in many countries [8]. However, the danger of undetected stages of syphilis remains in donor populations where awareness and risk reporting may be less than optimal [9]. Blood donors are an important indicator of hidden community-level transmission of venereal disease, and they reflect the overall safety of the blood supply [10].

In low-prevalence settings, it is crucial to remain vigilant for the re-emergence of syphilis [11]. The importance of maintaining vigilance and continuously improving screening practices is underscored by the detection of syphilis-positive blood donors [12].

OBJECTIVES

The aims of the present study are as follows:

- To determine the prevalence of Syphilis among voluntary blood donors over a period of three-years.
- To examine the demographics of donors, with particular attention to their age and gender distribution.
- By using data from a large group of voluntary blood donors, this study aims to fill existing knowledge gaps and support ongoing efforts to ensure a safe and reliable blood supply.

MATERIALS AND METHODS

The current study is conducted at Indian Red Cross Society (IRCS), Ahmedabad District Branch situated in Ahmedabad District of Gujarat. All the donors donated blood are 100 % voluntary thus the assessment is done solely on voluntary blood donors replacing the biasness of replacement donations which are often associated with false history, peer pressure and high positive trend.

This is a retrospective analysis done over a period of three years. Multi-year analysis allows for the identification of potential seasonal variations, emerging trends, and the impact of public health interventions or demographic changes.

All individuals who donated blood at the IRCS blood centre were included.

Data from syphilis-reactive donors were extracted in detail for further analysis. Demographic variables such as donor age and gender were captured to enable subgroup analysis.

The difference in syphilis prevalence between gender and age groups was determined using the Chi-square test. The p-value of less than 0.05 was considered statistically significant with 95% confidence interval.

RESULTS

Over the three-year study period, 1,74,190 voluntary blood donations were screened for syphilis accounting to 54,997, 59,701and 59,492 blood donations in 2022, 2023 and 2024 respectively.

Overall Syphilis Prevalence (2022–2024)

A total of 1065 cases of syphilis were found to be reactive. The year wise annual prevalence rate is as per Table-1.

Table 1: Syphilis Prevalence Rate

Year	Total Donations	Syphilis Reactive Cases	Prevalence (%)
2022	54,997	335	0.61%
2023	59,701	372	0.62%
2024	59,492	358	0.60%
Total	1,74,190	1065	0.61%

The trend is relatively stable with only marginal changes. There is no strong indication of worsening or improving prevalence. [Table-1].

On statistical analysis, there is no statistically significant difference in syphilis prevalence across the years. The observed variations (0.60–0.62%) are likely due to random fluctuation, not a true trend.

Gender-wise Syphilis Prevalence: Out of the total 1,74,190 donations; 1,63,411 (93.8%) and 10,779 (6.2%) were male and female donors respectively. 1034 (0.63%) and 31 (0.29%) were reactive cases found in males and females respectively. [Table-2]

Table 2: Gender-wise Syphilis Prevalence

Gender	Total Donations	Reactive Cases	Prevalence (%)
Male	163,411	1034	0.63%
Female	10,779	31	0.29%
Total	174,190	1065	0.61%

On statistical analysis, the p-value is far below 0.05, indicating a statistically significant difference in syphilis prevalence between males and females.

Males have a significantly higher prevalence (0.63%) compared to females (0.29%). This may be because of higher number of male donors in comparison to female donors.

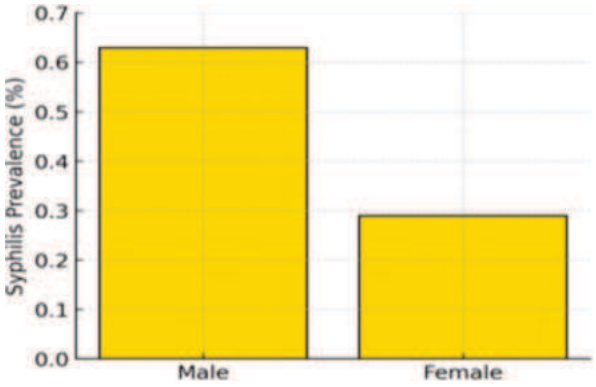

Figure 1: Syphilis Prevalence % by Gender

Age-wise Syphilis Prevalence:

On comparison of cumulative reactive cases over three years in different age-groups, it is observed that 46-55 years showed maximum reactive cases followed by 56-65 years and least in 26-35 years of age [Table-3].

Table 3: Age-wise Syphilis Prevalence

Age Group (years)	Total Donations	Reactive Cases	Prevalence (%)
18–25	27,241	137	0.5%
26–35	71,950	307	0.43%
36–45	45,972	274	0.6%
46–55	19,890	260	1.31%
56–65	9137	87	0.95%
Total	1,74,190	1065	0.61%

On statistical analysis p value being essentially zero, confirms there is a highly statistically significant difference in syphilis prevalence across age groups.

Significant age-related difference in syphilis prevalence exists. Targeted awareness or risk- reduction interventions may be needed for older donor populations.

Table-4 Trends of Syphilis Across 3 Years

	2022		2023		2024	
Age	Male	Female	Male	Female	Male	Female
18-25	48	00	43	00	44	02
26-35	94	02	93	02	116	00
36-45	83	03	95	06	84	03
46-55	76	04	91	03	83	03
56-65	23	02	38	01	23	00
Total	324	11	360	12	350	08

No statistically significant difference in gender distribution over years ($p > 0.05$) was noted.

The peak was noted in 2023 followed by decline in 2024 Decline in 2024, possibly due to intervention or natural decline.

On analysis of age wise trend, sharp rise in reactive cases is seen in 26-35 years especially in male donors while fluctuating rise is seen in 36-65 years. [Table-4, Figure-2,3]

This observation is different from cumulative total based on age groups [Table-3].

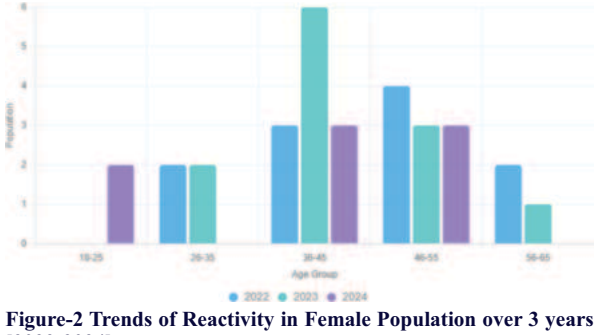

Figure-2 Trends of Reactivity in Female Population over 3 years [2022-2024]

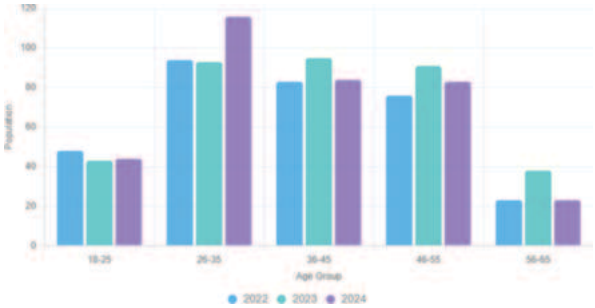

Figure-3 Trends of Reactivity in Male Population over 3 years [2022-2024]

DISCUSSION

The study provides valuable insights into the prevalence of syphilis among voluntary blood donors. The syphilis prevalence in this large donor age group is consistent with other Indian studies. The prevalence rate remained stable over the three-year period. The current screening and donor selection practices appear effective in maintaining blood safety. There have been no significant year-to-year fluctuations reported in India [13]. The prevalence trend in Gujarat may reflect improvements in voluntary donor recruitment, public awareness, and consistent implementation of advanced screening technologies.

There is a clear gender disparity in venereal disease prevalence. Male donors had a higher prevalence than female donors. This pattern is similar to previous Indian studies [14]. Several factors may contribute to this disparity: men in India are more likely to engage in riskier sexual behaviours [15]. Female donors constitute a smaller proportion of the donor base, and those who do donate may represent a particularly low-risk subgroup due to more stringent selection and self- deferral practices.

The need for targeted awareness and prevention initiatives among the male donor population is underscored by the observed male dominance in syphilis prevalence.

The prevalence of syphilis is related to age. Age group of 26–35 years has witnessed a sharp rise in 2024 while age group of 36–65 years is fluctuating, but not as steep as 2024.The 26-35 year of age groups may be more at risk due to different patterns of sexual behavior. It is possible for individuals with limited access to screening and treatment to remain undiagnosed for years [16]. Blood centres should consider enhancing pre-donation counselling for male donors. The prevalence of syphilis in this study is similar to or slightly lower than other Indian findings. Trivedi et al. reported a 0.72% prevalence in Ahmedabad during 2012–2015 Table-5 [14]. Studies from Maharashtra have reported prevalence rates ranging from 0.64% to 0.71% [9]. The state's progress in strengthening blood safety practices aligns with the lower to intermediate range of syphilis prevalence observed in India.

Table 5: Reported Syphilis Prevalence Among Indian Blood Donors

Study Location	Sample Size	Study Period	Prevalence (%)
National review (India)	Multiple	2000–2015	0.1–1.6
Ahmedabad (Trivedi et al.)	13,541	2012–2013	0.72
Vadodara (Patel et al.)	8,932	2016–2017	0.68
Pune (Pawar et al.)	25,600	2015–2016	0.64
Nagpur (Deshmukh et al.)	18,312	2017–2018	0.71
Rajasthan (Sharma et al.)	20,435	2014–2015	0.5–1.2
Present Study	1,74,190	2022-2024	0.61%

The prevalence in Ahmedabad is higher than in high-income countries, but lower than in sub- Saharan African nations [17]. While further improvements are needed, it appears that blood safety strategies are yielding positive results.

Blood centres should adopt advanced screening technologies. Pre-donation counselling may improve donor selection and education strategies. Data from blood donors should be integrated into broader public health efforts, in accordance with World Health Organization recommendations and National Guidelines.[11]

CONCLUSION

This study highlights the prevalence of syphilis among voluntary blood donors in the region, offering valuable insights into the current state of blood safety. Over the three-year period, syphilis prevalence remained stable, indicating the effectiveness of current donor selection protocols, public awareness initiatives, and screening practices.

Demographic analysis revealed important trends, particularly the higher prevalence of syphilis among male donors and its steep rising trend in 26-35 years age group.

Furthermore, integrating syphilis data from blood donors into broader public health surveillance systems would enable early identification of emerging trends and inform timely interventions. Periodic epidemiological studies with enriched demographic and behavioural data are also necessary to better understand the underlying risk factors and support evidence-based policymaking. Together, these measures will help sustain and improve the safety of the blood supply while contributing to broader efforts in public health and disease prevention.

REFERENCES

1. Pallavi P, Ganesh CK, Jayashree K, Manjunath GV. Seroprevalence and trends in transfusion transmitted infections among blood donors in a university hospital blood bank: A 5 year study. Indian J Hematol Blood Transfus. 2011;27(1):1–6.
2. Priya T, Sumathi V. Seroprevalence of transfusion transmitted infections in blood Donors-A 6 year experience in tertiary care hospital. Int J Pharm Clin Res. 2022;14(10):652–9.
3. .Madhavi P, Anuradha P, Rajani Kumari K, Swaroop P. A study on prevalence of transfusion related infections amongst voluntary blood donors in a tertiary health care centre. Int J Toxicol Pharmacol Res. 2022;12(8):248–56.
4. World Health Organization. Blood safety and availability fact sheet. [Internet]. 2020.
5. Ghazanfar S, Hassan S, Shahid Z, Khan MS, Malik AR, Bhutta HS, et al. Frequency of transfusion transmissible infections among blood donors of Rawalpindi district, Pakistan. Afr Health Sci. 2022;22(3):590–8.
6. World Health Organization. Screening donated blood for transfusion-transmissible infections: Recommendations. WHO Press; 2010.
7. Kitchen AD, Barbara JA, Hewitt PE. The survival of Treponema pallidum in blood components. Transfusion Medicine. 1994;4(3):209–14.
8. Patel RM, et al. Syphilis seroprevalence in voluntary blood donors: A tertiary center study. Gujarat Medical Journal. 2018;73(2):35–40.
9. Pawar PM, et al. Prevalence of syphilis in Pune blood donors. Journal of Evolution of Medical and Dental Sciences. 2016;5(13):554–8.
10. Deshmukh AA, et al. Transfusion-transmissible infections in blood donors of Nagpur. Indian Journal of Pathology and Microbiology. 2019;62(1):136–40.
11. World Health Organization. Universal Access to Safe Blood: WHO Policy Guidelines. WHO Press; 2015.
12. Ministry of Health and Family Welfare, Government of India. Operational Guidelines for Blood Banks in India. NBTC; 2017.
13. Bhattacharya P, et al. Syphilis among blood donors: A review of Indian trends. Transfusion Medicine Reviews. 2017;31(3):145–52.
14. Trivedi HB, et al. Seroprevalence of syphilis among donors in Western India. Journal of Clinical and Diagnostic Research. 2013;7(7):1288–91.
15. Bhattacharya P, et al. Behavioral risk correlates of syphilis in Indian blood donors. Indian Journal of Public Health. 2022;66(2):214–9.
16. Narayanan S. Syphilis risk factors among Indian blood donors. Indian Journal of Sexually Transmitted Diseases and AIDS. 2011;32(1):40–1.
17. O'Brien SF, et al. Trends in transfusion-transmitted infections among Canadian blood donors. Transfusion. 2019;59(8):2633–40