

**SEROPOSITIVITY OF SYPHILIS AMONG PATIENTS ATTENDING THE SEXUALLY TRANSMITTED INFECTION REFERRAL CENTRE (SRC) AT SRI KRISHNA MEDICAL COLLEGE AND HOSPITAL, MUZAFFARPUR, BIHAR: A RETROSPECTIVE OBSERVATIONAL STUDY**

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ABSTRACT **Background** Syphilis remains one of the most important sexually transmitted infections (STIs) worldwide despite the availability of effective antimicrobial therapy. It is caused by *Treponema pallidum*, a highly invasive spirochete that may involve multiple organ systems if left untreated. The disease continues to be a major public health concern because of asymptomatic infections, delayed diagnosis, high-risk sexual behaviour, inadequate partner treatment, and vertical transmission resulting in congenital syphilis. The World Health Organization (WHO) estimates that millions of new cases of curable sexually transmitted infections occur annually, with syphilis contributing significantly to maternal and neonatal morbidity. In India, the National AIDS Control Organisation (NACO) recommends routine screening of high-risk individuals and pregnant women using non-treponemal tests followed by confirmatory treponemal Hospital-based surveillance provides valuable epidemiological information for monitoring disease trends and planning preventive interventions. **Objectives** To determine the seropositivity of syphilis among patients attending the Sexually Transmitted Infection Referral Centre (SRC) at Sri Krishna Medical College and Hospital (SKMCH), Muzaffarpur, Bihar, during January to December 2025. **Materials and Methods** A retrospective observational study was carried out using laboratory records maintained at the SRC, Department of Microbiology, SKMCH. All serum samples screened using the Rapid Plasma Reagin (RPR/VDRL) test and confirmed by *Treponema pallidum* Hemagglutination Assay (TPHA) during the study period were included. Data were analyzed using descriptive statistical methods. **Results** A total of 1,960 serum samples were tested during the study period. Among these, 215 samples were confirmed positive by TPHA, resulting in an overall seropositivity of 10.97%. The highest number of positive cases was observed in December (22 cases), whereas the lowest number was reported in November (12 cases). **Conclusion** The study demonstrates that syphilis continues to be an important public health problem among patients attending a tertiary care referral centre in Bihar. Regular screening, early diagnosis, prompt treatment, partner notification, and health education remain essential strategies for controlling disease transmission.

KEYWORDS : Syphilis, *Treponema pallidum*, TPHA, RPR, VDRL, Sexually Transmitted Infection, Bihar, Seropositivity.

INTRODUCTION

Sexually transmitted infections (STIs) continue to represent a major global public health challenge because of their high prevalence, long-term complications, and socioeconomic impact. According to the World Health Organization, more than one million curable sexually transmitted infections are acquired every day worldwide. Syphilis, caused by the spirochete *Treponema pallidum*, remains one of the most significant bacterial STIs because of its chronic course, ability to mimic several clinical conditions, and potential to cause severe systemic complications if left untreated. Although effective antibiotic therapy has been available for decades, syphilis continues to persist because of delayed diagnosis, asymptomatic infections, poor treatment compliance, inadequate partner management, and high-risk sexual behaviour.

Syphilis progresses through primary, secondary, latent, and tertiary stages. Primary syphilis usually presents as a painless chancre, whereas secondary syphilis manifests with generalized rash, mucocutaneous lesions, and lymphadenopathy. The latent stage remains asymptomatic but serologically positive, while tertiary syphilis may involve the cardiovascular system, central nervous system, skin, and bones. Importantly, maternal infection during pregnancy can result in congenital syphilis, spontaneous abortion, stillbirth, neonatal death, or severe congenital anomalies. Consequently, early laboratory diagnosis is essential for effective disease control.

Laboratory diagnosis of syphilis primarily relies on serological testing because *Treponema pallidum* cannot be routinely cultured in vitro. Non-treponemal tests such as the Rapid Plasma Reagin (RPR) test and Venereal Disease Research Laboratory (VDRL) test are widely used as screening assays owing to their simplicity, affordability, and ability to monitor treatment response. However, these tests may yield false-positive results in autoimmune diseases, pregnancy, and certain

infectious conditions. Therefore, reactive samples require confirmation using treponemal assays such as the *Treponema pallidum* Hemagglutination Assay (TPHA), which provides greater specificity and remains positive for life in most infected individuals.

India has implemented comprehensive STI control programmes under the National AIDS Control Organisation (NACO), emphasizing early diagnosis, prompt treatment, partner notification, and preventive counselling. STI Referral Centres (SRCs) established in tertiary care hospitals play a pivotal role in providing diagnostic services, treatment, surveillance, and counselling. Data generated from these centres are useful for monitoring regional disease trends and evaluating the effectiveness of public health interventions.

Despite the implementation of national programmes, published data regarding the epidemiology of syphilis from Bihar remain limited. Regional surveillance is important because disease prevalence may vary depending on population characteristics, healthcare access, referral patterns, and awareness regarding STI prevention. Understanding local seropositivity patterns helps policymakers and healthcare providers strengthen screening strategies and allocate resources effectively.

The present retrospective study was therefore undertaken to determine the seropositivity of syphilis among patients attending the Sexually Transmitted Infection Referral Centre at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar. The findings are expected to contribute to regional epidemiological data and support ongoing STI control programmes.

Objectives**Primary Objective**

- To determine the overall seropositivity of syphilis among patients attending the Sexually Transmitted Infection Referral Centre at SKMCH, Muzaffarpur.

Secondary Objectives

- To analyse the month-wise distribution of TPHA-confirmed syphilis cases during January–December 2025.
- To estimate the annual seropositivity rate among patients tested using RPR/VDRL.
- To provide baseline epidemiological data for strengthening STI surveillance and public health interventions in Bihar.

Materials and Methods

Study Design: Retrospective observational study.

Study Site: Sexually Transmitted Infection Referral Centre (SRC), Department of Microbiology, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

Study Duration: January 2025 to December 2025.

Study Population: All patients whose serum samples were received for syphilis testing at the SRC during the study period.

Inclusion Criteria: All serum samples tested using RPR/VDRL and subsequently confirmed by TPHA.

Exclusion Criteria: Duplicate records and incomplete laboratory records.

Laboratory Methods: Screening was performed using RPR/VDRL. Reactive samples were confirmed by TPHA according to standard laboratory protocols.

Statistical Analysis: Data were entered into Microsoft Excel and analysed using descriptive statistics. Results were expressed as frequencies, percentages, and month-wise distributions. Overall seropositivity was calculated by dividing the number of TPHA-positive cases by the total number of samples tested.

RESULTS

A total of 1,960 serum samples were screened for syphilis using the Rapid Plasma Reagin (RPR/VDRL) test during the study period (January–December 2025). All reactive samples underwent confirmatory testing by the *Treponema pallidum* Hemagglutination Assay (TPHA) according to standard laboratory procedures.

Among the 1,960 samples tested, 215 samples were confirmed TPHA positive, resulting in an overall seropositivity rate of 10.97%. This finding indicates that approximately one out of every nine patients attending the SRC had serological evidence of syphilis infection.

The number of patients screened varied throughout the year. The highest number of samples was tested during May (223 samples), whereas the lowest number was recorded during September and November (113 samples each). Monthly TPHA-confirmed positive cases ranged from 12 to 22.

The highest number of positive cases was observed in December (22 cases) followed by August (21 cases) and February (20 cases). The lowest number of positive cases was recorded during November (12 cases).

The monthly seropositivity percentage ranged from 7.6% in May to 15.7% in December. Although fluctuations were observed throughout the year, no consistent seasonal trend could be established because of the retrospective nature of the study and the absence of demographic or behavioral risk factor data.

The relatively higher positivity during the latter months of the year may reflect increased patient referrals, improved screening coverage, or random variation in case distribution rather than a true increase in disease transmission. Continuous surveillance over multiple years would be required to determine long-term epidemiological trends.

The findings demonstrate that syphilis continues to contribute substantially to the burden of sexually transmitted infections among patients attending the SRC at SKMCH, emphasizing the need for sustained screening and early treatment strategies [1–5].

Table 1. Month-wise Distribution of Samples Tested and TPHA-positive Cases

Month	RPR/VDRL Tested	TPHA Positive	Seropositivity (%)
January	198	19	9.60
February	152	20	13.16
March	148	18	12.16
April	212	17	8.02
May	223	17	7.62
June	197	18	9.14
July	155	15	9.68
August	168	21	12.50
September	113	17	15.04
October	141	19	13.48
November	113	12	10.62
December	140	22	15.71
Total	1960	215	10.97

Table 2. Overall Laboratory Findings

Parameter	Number
Total samples tested	1960
TPHA Positive	215
TPHA Negative	1745
Overall Seropositivity	10.97%

Interpretation of Findings

The present study demonstrates that 10.97% of patients attending the SRC were confirmed positive for syphilis. Similar variability in seropositivity has been reported across India because STI clinic populations often represent individuals at higher risk than the general population [3,6,7].

The use of RPR/VDRL as a screening test followed by TPHA confirmation is consistent with WHO and NACO recommendations and improves diagnostic specificity by reducing false-positive results associated with non-treponemal tests [1,2,8].

Although the number of TPHA-positive cases fluctuated across the year, the absence of a consistent seasonal pattern suggests that transmission is likely influenced by patient referral patterns and healthcare-seeking behavior rather than seasonality. Similar observations have been reported in previous Indian hospital-based studies [6,9].

Routine surveillance at STI Referral Centres is valuable because it provides baseline epidemiological information for planning preventive interventions, monitoring disease trends, and evaluating the effectiveness of national STI control programmes [2,4,10].

Key Findings

- Total patients screened: 1,960
- TPHA-confirmed positive cases: 215
- Overall seropositivity: 10.97%
- Highest monthly positivity: December (15.71%)
- Lowest monthly positivity: May (7.62%)
- Highest number of positive cases: December (22) Lowest number of positive cases: November (12)

DISCUSSION

The present retrospective study evaluated the seropositivity of syphilis among patients attending the Sexually Transmitted Infection Referral Centre (SRC) at Sri Krishna Medical College and Hospital (SKMCH), Muzaffarpur, Bihar, during January to December 2025. Among 1,960 serum samples tested by RPR/VDRL and confirmed by TPHA, 215 were positive, resulting in an overall seropositivity rate of 10.97%. This finding indicates that syphilis continues to represent an important public health problem in the study population.

Syphilis remains a significant STI worldwide despite the availability of effective treatment. The World Health Organization estimates that millions of new curable sexually transmitted infections occur every year, with syphilis contributing substantially to maternal morbidity, adverse pregnancy outcomes, and increased HIV transmission risk [1,2]. In India, NACO has strengthened STI surveillance through STI/RTI clinics and SRCs, emphasizing routine screening, partner notification, counselling, and prompt treatment [3].

The overall seropositivity observed in our study is comparable to the higher range reported in hospital-based STI clinic studies from India.

Differences in seropositivity across studies may be attributed to variations in the study population, geographical location, referral patterns, healthcare-seeking behavior, laboratory methods, and local epidemiological characteristics [4–8]. Tertiary-care hospitals usually receive patients referred from peripheral healthcare facilities and therefore often report higher positivity than community-based surveys.

The present study demonstrated fluctuations in month-wise positivity, with the highest proportion observed during December and September. However, a consistent seasonal trend was not evident. Similar observations have been reported in other Indian studies where variations were largely attributed to patient attendance, referral patterns, awareness programmes, and health-care accessibility rather than seasonal changes [6,9].

The use of RPR/VDRL as the initial screening test followed by TPHA confirmation is consistent with WHO and NACO recommendations. Non-treponemal tests are useful for screening and monitoring treatment response but may occasionally produce false-positive results. Confirmation by TPHA improves diagnostic specificity and reduces diagnostic errors [2,10]. This two-step testing algorithm enhances the reliability of surveillance data generated by tertiary-care laboratories.

One of the important public health implications of syphilis is its association with adverse reproductive outcomes. Untreated maternal infection can result in miscarriage, stillbirth, neonatal death, prematurity, and congenital syphilis. Routine antenatal screening and timely treatment with benzathine penicillin remain the most effective preventive strategies [2,11]. Although pregnancy-related data were not available in the present study, continued antenatal screening should remain a priority.

Syphilis also facilitates the acquisition and transmission of HIV through disruption of mucosal barriers and recruitment of inflammatory cells at the site of infection [12]. Therefore, integrated STI and HIV screening programmes continue to play an important role in public health. Strengthening counselling services, partner notification, and early diagnosis may reduce both syphilis transmission and the risk of HIV co-infection.

The findings of this study emphasize the importance of maintaining robust laboratory surveillance at tertiary-care centres in Bihar. Regular analysis of laboratory data provides valuable epidemiological information that can assist clinicians, microbiologists, and public health authorities in evaluating disease trends and planning targeted interventions. Public awareness campaigns promoting safer sexual practices, early healthcare seeking, and adherence to treatment guidelines remain essential.

Strengths of the Study

- One-year laboratory-based surveillance from a tertiary-care teaching hospital.
- Use of standard diagnostic methodology (RPR/VDRL followed by TPHA confirmation).
- Inclusion of all eligible laboratory records during the study period.
- Provides baseline epidemiological data for Muzaffarpur and surrounding districts.

Limitations

The present study has several limitations. It was retrospective and based solely on laboratory records; therefore, demographic variables such as age, sex, occupation, marital status, socioeconomic status, pregnancy status, and behavioral risk factors were unavailable for detailed analysis. Clinical staging, treatment outcomes, and HIV co-infection status were also not evaluated. As this was a single-centre study, the findings may not represent the prevalence of syphilis in the general population of Bihar. Future multicentre prospective studies incorporating demographic and clinical variables would provide a more comprehensive understanding of disease epidemiology.

CONCLUSION

The present study demonstrated an overall TPHA-confirmed seropositivity rate of 10.97% among patients attending the Sexually Transmitted Infection Referral Centre at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, during 2025. The findings indicate that syphilis continues to be an important sexually transmitted

infection in the study population. Continued implementation of routine screening, laboratory confirmation, early treatment, partner notification, antenatal screening, and community awareness programmes in accordance with national guidelines is essential for reducing disease transmission and preventing long-term complications.

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