



Original Article

A Retrospective Study of Evaluation of Fetomaternal Outcome of Antenatal Syphilis Treated with three Doses of Injection Benzathine Penicillin in Tertiary Care Centre

Dr P.S. Mohanasundari¹, Dr Saranya Selvam², Dr J Balaji ganesh³, Dr Ponselvaraj Pooaipandian⁴

 OPEN ACCESS

Corresponding Author:

Dr Ponselvaraj Pooaipandian

Received: 07-03-2026

Accepted: 27-03-2026

Available online: 12-04-2026

Copyright © International Journal of
Medical and Pharmaceutical Research

ABSTRACT

Introduction: Syphilis is sexually transmitted disease caused by bacterial spirochete which has systemic involvement, while syphilis during pregnancy can transmit vertically to the unborn child results in various distressing factors and congenital syphilis when untreated. Here we reporting a fetomaternal outcome of 22 cases of antenatal early syphilis who were treated with three doses of injection benzathine penicillin 2.4 million IU as per the recent NACO guidelines.

Materials and methods: A retrospective observational study was conducted in the Department of Dermatology, Thanjavur Medical College and Hospital, from November 2022 to October 2025. The study analyses a total of 22 antenatal women diagnosed with early syphilis during pregnancy by reactive non-treponemal (RPR) and confirmed by treponemal (TPHA) tests who were treated with 3 doses of injection benzathine penicillin. Data were analysed using descriptive statistics and chi-square test.

Results: Among the 22 patients, 86.4% had a full-term delivery, while 13.6% experienced a spontaneous abortion within one month. Of the 19 patients who delivered, 73.6% delivered non-reactive RPR neonate, while 26.4% remained reactive. Among those with reactive neonate RPR (n=5), titres were distributed as follows: 1:2 (20%), 1:4 (20%), 1:8 (40%), and 1:16 (20%). Mothers of 72.7% had a non-reactive RPR after delivery, while 27.2% remained reactive. Within those with reactive postpartum RPR (n=6), titres were distributed as follows: 3(13.6%) mother was 1:8, 2(9.1%) mother was 1:4 and 1(4.5%) mother was 1:1 in titre.

Conclusion: This retrospective study underscores the efficacy of a three-doses benzathine penicillin regimen in antenatal syphilis management, achieving full-term delivery in 86.4% of cases with neonatal seroreactivity limited to 26.4%, thereby demonstrating the critical importance of completing this protocol to optimize fetomaternal outcomes.

Keywords: Fetomaternal, Antenatal, Syphilis, Injection, Benzathine Penicillin.

INTRODUCTION

Syphilis is curable sexually transmitted bacterial infection. Syphilis, while potentially severe across all age demographics, is generally well-controlled in young adults due to efficacious antimicrobial therapies. In contrast, maternal syphilis, particularly when unrecognized or inadequately treated results in poses significant risks to fetus which include spontaneous abortion, foetal demise, preterm labour, intrauterine growth restriction, and vertical transmission can take place at any period of time during pregnancy or delivery, with highest risk appreciated in primary or secondary stages relative to latent stages resulting in congenital syphilis (CS). Neonates with CS often present asymptotically at birth; however, untreated infection may manifest later with irreversible sequelae. Universal antenatal screening protocols have been instituted worldwide to detect maternal syphilis timely and initiate therapeutic interventions. The serologic tests for syphilis may not become positive until approximately 10–45 days after acquisition, an initial negative result does not exclude recent infection. Consequently, pregnant individuals with a negative early

pregnancy screen should undergo repeat serologic testing later in gestation (28th week) and/or at the time of delivery to reduce the risk of missed maternal infection and congenital syphilis. As per the previous guidelines, the dose of penicillin is based on the stage of syphilis (early or late) either single dose or three dose. The standard treatment regimen now comprises three intramuscular injections of benzathine penicillin G, each 2.4 million international units (IU) administered weekly, to ensure optimal prevention of foetal infection and adverse outcomes⁽¹⁾.

MATERIALS AND METHODS

Study design

A retrospective observational study was conducted in the Department of Dermatology, Thanjavur Medical College and Hospital, timeline from November 2022 to October 2025. The study was approved by the institutional ethical committee.

Study population

The study included a total of 22 antenatal women diagnosed as early syphilis during pregnancy by reactive non-treponemal (RPR) and confirmed by treponemal (TPHA) tests.

Inclusion criteria

1. Antenatal mother diagnosed with syphilis during evaluation by laboratory tests
2. Seropositive mothers who received 3 doses of benzathine penicillin.
3. Neonates born to treated mothers.
4. Deliveries conducted and records available at the tertiary care centre from the specified study period (November 2022- October 2025).

Exclusion criteria

1. Neonates born to mothers co-infection with HIV and other STI during pregnancy.
2. Mothers who were treated with non-penicillin regimen
3. Pregnancies complicated by other infections, comorbidities and co-existing condition which requires different treatment protocols.
4. Mothers with incomplete treatment records such as delivery/treatment outside.

Clinical examination

A comprehensive physical examination was performed, encompassing:

1. General and dermatological assessment.
2. Detailed evaluation of the genital and mucosal regions.
3. Careful inspection of the palms, soles, nails, and hair.
4. Focused anogenital examination to identify any ulcers, discharges, growths, rashes, or scars.

Data collection

Data were extracted from hospital records and included demographic details, maternal age, gestational status at diagnosis were documented. A detailed clinical and sexual history was documented, scrutinizing on:

1. sexual history.
2. HIV co-infection status.
3. timing of syphilis diagnosis.
4. History of previous syphilis treatment.
5. Maternal therapy details (drug regimen, dosage, and timing) and treatment adequacy.
6. Documentation of partner treatment.
7. Pregnancy outcomes, such as spontaneous abortion, stillbirth, and neonatal RPR and TPHA results.

Follow up

Mothers were followed from the time of syphilis detection until the delivery and postnatal evaluation of the neonate.

Definition

For our primary analysis, adequate treatment/completion was defined as three injections of benzathine penicillin G (2.4 million units intramuscularly) with an interval of 7-8 days between each injection as per the NACO's STI treatment guidelines⁽¹⁾.

Statistical analysis

Statistical analysis:

The data were entered in MS office excel sheet and analysed using SPSS version 16. Continuous data with normal distribution was expressed as mean with standard deviation. Categorical data were expressed as frequency with %.

Result description:

Baseline Characteristics: The study included 22 antenatal syphilis patients who received three doses of benzathine penicillin. The majority of participants (59.1%) were aged 26–30 years, with a mean age of 27.7 ± 3.9 years. Most patients had an antenatal RPR titre of 1:8 (36.4%) or 1:16 (27.3%). All patients (100%) had a non-reactive ICTC result. In terms of obstetric history, 40.9% were primigravida, 36.4% were gravida-2, and 22.7% were gravida-3. A history of previous abortion was reported by 27.3% of participants, while 72.7% had no such history. (bar chart)

Clinical Characteristics: Syphilis was most frequently diagnosed in the second trimester (59.1%), followed by the first trimester (31.8%) and third trimester (9.1%), with a mean diagnosis month of 4.6 ± 1.9 . Regarding spouse serology, 40.9% had a non-reactive RPR, while reactive titres ranged from 1:2 to 1:32. All spouses (100%) had a non-reactive ICTC. All patients (100%) completed the three-dose benzathine penicillin regimen. Spouse treatment varied: 59.1% received one dose of benzathine penicillin, and the remainder received non penicillin regimens (table1).

Fetomaternal Outcomes: Among the 22 patients, 86.4% had a full-term delivery, while 13.6% experienced a spontaneous abortion within one month. Of the 19 patients who delivered, 73.6% delivered non-reactive RPR neonate, while 26.4% were reactive. Among those with reactive neonate RPR (n=5), titres were distributed as follows: 1:2 (20%), 1:4 (20%), 1:8 (40%), and 1:16 (20%). Postpartum mothers of 72.7% had a non-reactive RPR after delivery, while 27.2% remained reactive. Within those with reactive postpartum RPR (n=6), titres were distributed as follows: 3(13.6%) mother was 1:8, 2(9.1%) mother was 1:4 and 1(4.5%) mother was 1:1 in titre(TABLE2).

DISCUSSION

Congenital syphilis occurs when a foetus is infected with *T. pallidum* while in utero. This can lead to severe outcomes such as stillbirth, neonatal death, developmental delays, or physical deformities. Early detection and treatment with penicillin during pregnancy can effectively prevent transmission and protect the baby's health. The previous guidelines stated maternal treatment involves either a single dose of intramuscular (IM) penicillin (2.4 million units benzathine penicillin G) in the early stages of infection (primary, secondary, or early latent) or three weekly doses of penicillin for late latent or tertiary syphilis⁽⁹⁾. The current guidelines implemented by NACO irrespective of stages, all the antenatal syphilis patient should be taken a three dose of injection benzathine penicillin⁽¹⁾. The treated women should undergo a follow-up testing for RPR/VDRL titres at 3 months/ 32ndweek of pregnancy or labour, whichever is earlier.

The world health organization target to reducing the vertical transmission to below 0.05%⁽¹⁰⁾. Unlike this study, Kaminiów K et al; published a Single versus three doses of benzathine penicillin G for early syphilis in pregnancy which revealed no added benefits of three dosed over 1 dose benzathine penicillin [5]. Similarly Hook EW 3rd et al; concluded in their study that treatment with one dose of 2.4 million unit of benzathine penicillin G was non inferior to treatment with three doses with regard to serologic response six after treatment in early syphilis [6]. Our study analysed antenatal syphilis patients treated with a standard three-dose benzathine penicillin regimen, revealing key baseline, clinical, and fetomaternal outcome characteristics. All the pregnant women in this study comes under stage of early syphilis. The majority of participants were in the 26–30 years age group, consistent with reproductive age demographics commonly affected by syphilis in pregnancy. The prevalent antenatal RPR titres of 1:8 and 1:16 suggest moderate disease activity at diagnosis, aligning with typical serological profiles observed in similar cohorts. Syphilis diagnosis predominantly occurred during the second trimester, highlighting the critical window for screening and intervention to prevent adverse outcomes. The variation in spouse serology and treatment adherence underscores potential gaps in partner management, which may influence reinfection risk and overall treatment success. Notably, 27.2% of spouses received non penicillin treatment[Table2], which could contribute to persistent maternal seroreactivity postpartum. Fetomaternal outcomes were largely favourable, with 86.4% of patients achieving full-term delivery, indicating effective maternal treatment. However, the spontaneous abortion rate of 13.6% underscores the continued risk of adverse pregnancy outcomes despite treatment.

All the antenatal syphilis patient was completed 3 dose of penicillin in which the Postpartum RPR results of mother revealed that out of 22(n) antenatal mother 16(72.7%) came out to be negative and 6(27.2%) remained reactive out of which 3(13.6%) mother was 1:8, 2(9.1%) mother was 1:4 and 1(4.5%) mother was 1:1 in titre [Barchart1]. Antenatal mother of 3(13.6%) had spontaneous abortion at one month of gestational period [Table3]. Neonates RPR results showed that out of n=19(86.4%), most neonates (73.6%) had serological cure (non-reactive RPR) which is 14 of 19 neonates, a significant minority of only 5 neonates (26.4%) remained reactive, with varying titres [Table3]. As per NACO recent guidelines, 3 out of 5 congenital syphilis neonates were needed treatment based on scenarios in which, 2 patient comes under scenario 3 of congenital syphilis and they were given prophylactic treatment because patient were diagnosed at third trimester and delivered baby within 4 weeks period of time (Benzathine penicillin G 50,000 units/kg body weight/dose IM in a single dose) and 1 neonate comes under scenario 1 of congenital syphilis who needed curative treatment due to 4 fold increase in titre from mothers titre (Aqueous crystalline penicillin G 100,000–150,000 units/kg body weight/day, administered as 50,000 units/kg body weight/dose IV every 12 hours during the first 7 days of life and thereafter every 8 hours for 3 days to complete a total of 10 days treatment).

In our study all the offspring were in follow up until neonatal period, there were all in normal growth, development and no sign of malnutrition noted. Overall, these findings emphasize the importance of timely diagnosis, comprehensive partner treatment, treatment in antenatal syphilis patients and efficacy of three dose injection benzathine penicillin and fetomaternal outcomes. This study reinforces the effectiveness of the standard benzathine penicillin regimen in managing antenatal syphilis as per the latest NACO guidelines.

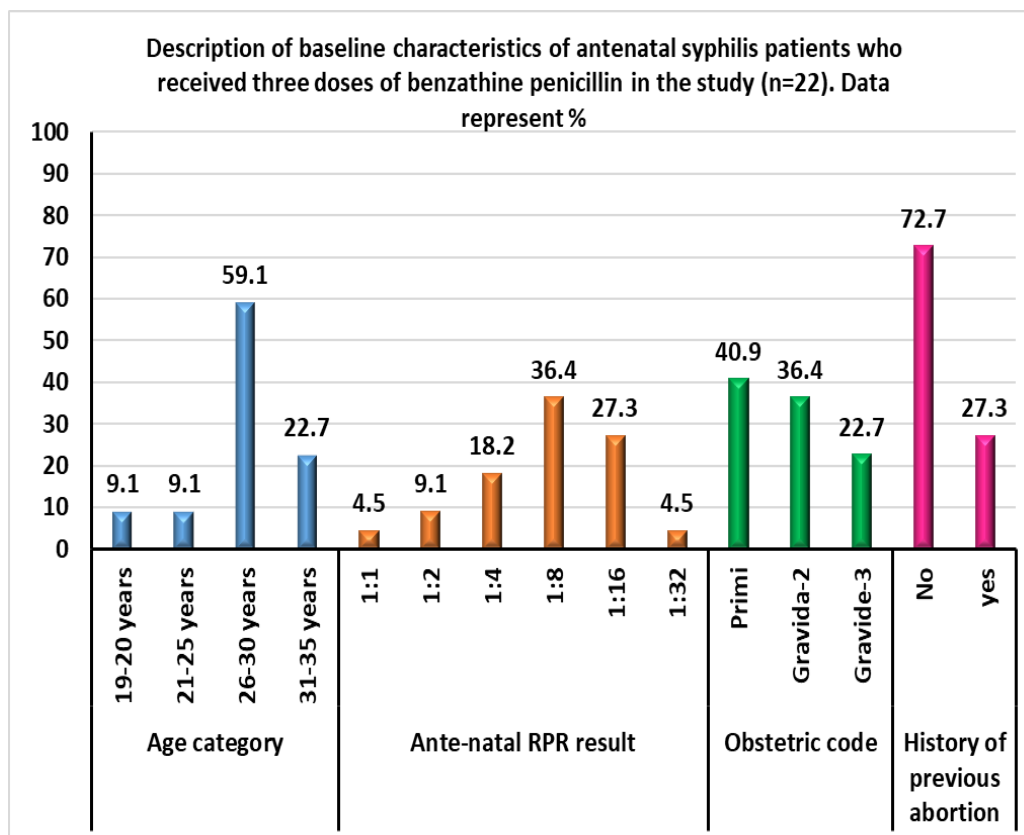


Figure 1

Table 2. Description of clinical characteristics of antenatal syphilis patients who received three doses of benzathine penicillin in the study (n=22)

S.No	Characteristics	n	%	
1	Month of diagnosis of syphilis in antenatal period	First trimester	7	31.8
		Second trimester	13	59.1
		Third trimester	2	9.1
2	Spouse RPR	Non reactive	9	40.9
		1:2	1	4.5
		1:4	2	9.1
		1:8	6	27.3
		1:16	3	13.6
		1:32	1	4.5
3	Spouse VCTC	Non reactive	22	100
4	Treatment completion of three doses of benzathine penicillin	Completed	22	100
		Not completed	0	0
5	Treatment status of spouse	Not taken	0	0
		One dose of benzathine penicillin	13	59.1
		Three doses of benzathine penicillin	1	4.5
		Kit 4 given D/T reaction	1	4.5
		Oral treatment given N/W	6	27.2
		Treated outside	1	4.5
		Mean \pm SD	Median (IQR)	
6	Diagnosis month of antenatal syphilis	4.6 \pm 1.9	4 (3 – 6)	

Table 3. Description of fetomaternal outcomes observed in antenatal syphilis patients who received three doses of benzathine penicillin in the study (n=22)

S.No	outcome	n	%	
1	Delivery outcome	Spontaneous abortion at one month	3	13.6
		full term delivery	19	86.4
2	Newborn RPR reactive (n=19)	Non-reactive	14	73.6
		Reactive	5	26.4
3	Newborn RPR reactive category (n=5)	Reactive 1:2	1	20
		Reactive 1:4	1	20
		Reactive 1:8	2	40
		Reactive 1:16	1	20
4	Mother RPR reactive after delivery (n=22)	Non-reactive	16	72.7
		1:1	1	4.5
		1:4	2	9.1
		1:8	3	13.6

CONCLUSION

This study of 22 antenatal syphilis patients demonstrates the effectiveness of complete three-dose regimen of benzathine penicillin. However, the persistence of reactive titres in a subset of mothers and the occurrence of spontaneous abortions highlight the need for vigilant follow-up and reinforce the importance of timely diagnosis and comprehensive partner treatment to optimize maternal and foetal outcomes. Here we reinforce the effectiveness of the standard benzathine penicillin regimen in managing antenatal syphilis as per latest NACO guidelines.

ABBREVIATION

RPR (rapid plasma reagent), TPHA (treponemal hemagglutination assay), VCTC (volunteer counselling and testing centre), CS (congenital syphilis), NACO (national aids control organisation), CDC (centers for disease control and prevention).

REFERENCES

1. National Technical Guidelines on Sexually Transmitted Infections and Reproductive Tract Infections 2024
2. Treatment Completion With Three-Dose Series of Benzathine Penicillin Among People Diagnosed With Late Latent and Unknown Duration Syphilis, Maricopa County, Arizona
3. The global elimination of congenital syphilis: rationale and strategy for action by WHO
4. Syphilis in pregnancy: A practical guide for prenatal care providers; <https://doi.org/10.1002/ijgo.70511>
5. Kaminiów K, Kotlarz A, Kiołbasa M, Pastuszczak M. Single versus three doses of benzathine penicillin G for early syphilis in pregnancy: no added benefit in serological response or neonatal outcomes.
6. Hook EW 3rd, Dionne JA, Workowski K, McNeil CJ, Taylor SN, Batteiger TA, Dombrowski JC, Mayer KH, Seña AC, Hamill MM, Wiesenfeld HC, Zhu C, Perlowski C, Mejia-Galvis JE, Newman LM. One Dose versus Three Doses of Benzathine Penicillin G in Early Syphilis.
7. Yang C-J, Lee N-Y, Chen T-C, Lin Y-H, Liang S-H, Lu P-L, et al. (2014) One Dose versus Three Weekly Doses of Benzathine Penicillin G for Patients Co-Infected with HIV and Early Syphilis: A Multicenter, Prospective Observational Study.
8. Roberto Andrade, Maria C. Rodriguez-Barradas, Kosuke Yasukawa, Erick Villarreal, Michael Ross, Jose A. Serpa, Single Dose Versus 3 Doses of Intramuscular Benzathine Penicillin for Early Syphilis in HIV: A Randomized Clinical Trial.
9. <https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021>.
10. World Health Organization . The global elimination of congenital syphilis: rationale and strategy for action. Accessed November 5, 2024. <https://www.who.int/publications/i/item/9789241595858>