ORIGINAL ARTICLE

Syphilis Trends in Thai Pregnant Women: 2011–2020

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Objective: To determine the prevalence of syphilis in Thai pregnant women and congenital syphilis from 2011 to 2020.

Materials and Methods: A retrospective study was conducted in Vajira Hospital, Bangkok, Thailand, comprising 10 years from January 2011 to December 2020.

Results: A total of 23,503 pregnant women were enrolled in the present study. Two hundred three women had seropositivity to syphilis. The mean age of the infected women was 22.3±6.7 years. The percentage of seropositive syphilis in pregnant women dramatically increased from 0.4% in 2011 to 2.22% in 2020. There were 31 cases (15.3%) of congenital syphilis. The percentage of congenital syphilis also followed the same trend, rising sharply from 0.03% in 2011 to about 0.21% in 2020.

Conclusion: Syphilis infection is a major public health problem that causes serious complications and sequelae in maternal and fetal conditions. During the past decade, the rate of seropositive syphilis increased notably in pregnant women, and the trends of congenital syphilis were correlated with gestational syphilis.

Keywords: Congenital syphilis; Pregnant women; Prevalence; Syphilis

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Syphilis infection is caused by Treponema pallidum, which is transmitted from person to person. This infection passes from the mother to the fetus during pregnancy or delivery, resulting in congenital syphilis. During the perinatal period, congenital syphilis is one of the vital infection causes of morbidity and mortality. During pregnancy, the consequences of this infection include spontaneous abortion, stillbirth, and congenital syphilis[1]. Fetal infection occurs in about 70% of cases of pregnant women with untreated syphilis infection.

Trends of maternal syphilis have been rising over the past decade. In 2012, it was estimated that the worldwide prevalence of maternal infection was nearly one million[2]. According to the World Health Organization (WHO), the goal toward the elimination of congenital syphilis is to achieve fewer than 50 cases per 100,000 live births by 2030[3].

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The authors aimed to determine the trends in syphilis infection among Thai pregnant women and associated congenital syphilis. Decreasing the prevalence of infection improves the quality of life of pregnant women and reduces the consequences of infection during the perinatal period.

Materials and Methods

Study setting and participants

A 10-year retrospective study was conducted to assess the seroprevalence of maternal and congenital syphilis at Vajira Hospital, Navamindradhiraj University, Bangkok, Thailand, between January 2011 and December 2020. The study was approved by the Institutional Review Board Faculty of Medicine Vajira Hospital (certificate of approval No. 250/64 E).

Eligible subjects included pregnant women who attended the antenatal clinic at Vajira Hospital from January 2011 to December 2020. The exclusion criteria included incomplete data.

Data on maternal characteristics included age, number of pregnancies, syphilis stage, gestational age at syphilis diagnosis, HIV co-infection, and treatment were collected. Moreover, newborn data including gestational age at delivery, birth weight, and infant syphilis status were obtained.

Test methodology

All pregnant women who attended the antenatal clinic

at Vajira Hospital underwent blood testing for syphilis at the first antenatal care visit and at 28 to 32 weeks of gestational age using a rapid plasma reagent (RPR) test for screening. If the RPR test was positive, treponema pallidum hemagglutination assay (TPHA) was performed to confirm infection. Seropositivity by both tests was considered syphilis infection.

Treatment protocol for maternal syphilis

Pregnant women diagnosed with syphilis infection were categorized by stage of syphilis divided into primary, secondary, early latent, and late latent syphilis. According to the WHO guideline on syphilis screening and treatment for pregnant women[4], the treatment depended on the stage of the disease. Infected women classified with primary, secondary, or early latent syphilis received a 2.4 million units intramuscular injection of benzathine penicillin G. For those with late latent syphilis, benzathine penicillin G 2.4 million units intramuscularly weekly for three consecutive doses were administered. Completing a penicillin-based regimen appropriate for the stage of infection was defined as complete treatment[5].

Case definitions

All Newborns born with maternal syphilis were tested with a non-treponemal test (RPR). Following the criteria of the Centers for Disease Control and Prevention surveillance case definitions[5], all infected newborns were classified as confirmed congenital syphilis and probable congenital syphilis. Infants with mothers who had untreated or inadequately treated syphilis at delivery or infants with clinical findings suggesting congenital syphilis were defined as probable congenital syphilis. Confirmed congenital syphilis included cases with laboratory confirmation.

Sample size calculation and statistical analysis

The sample size was calculated using the following formula:

$$n = \frac{Z_{\alpha/2}{}^2\, p(1-p)}{d^2}$$

where p is the prevalence of maternal syphilis based on the literature, resulting in 0.5%[6], and using a confidence interval of 95%. Therefore, the minimum sample size for this study was 1,561 pregnant women per year.

Demographic data are presented as mean and percentage (%). Categorical data are presented as frequency and percentage. Continuous data are reported as mean.

Results

A total of 23,503 pregnant women were enrolled in this study ranging from 1,886 to 3,434 cases per year, and 203 women had syphilis seropositivity. The mean age of patients with maternal syphilis was 22.3 years (SD = 6.7 years). The majority of the women were 20 to 35 years old, and 41.4% were younger than 20 years. More than half of the subjects were primigravida. Almost all infected women had late latent syphilis. The gestational age at diagnosis of syphilis was 49.3% in the first trimester, 43.3% in the second trimester, and 7.4% in the third trimester. Of the total 203 infected women, 7 women (3.4%) reported HIV infection. In terms of treatment completion, the majority of infected pregnant women completed treatment, as shown in Table 1.

Table 1. Maternal characteristics

	203, n (%)
Age (years)	
<20	84 (41.4)
20-35	106 (52.2)
≥35	13 (6.4)
Number of pregnant	
Primigravida	112 (55.2)
Multiple gravida	91 (44.8)
Syphilis stage	
Primary syphilis	0 (0)
Secondary syphilis	1 (0.5)
Early latent syphilis	0 (0)
Late latent syphilis/ unknown duration	202 (99.5)
Gestational age at diagnosis of syphilis	
First trimester	100 (49.3)
Second trimester	88 (43.3)
Third trimester	15 (7.4)
HIV co-infection	
Yes	7 (3.4)
No	196 (96.6
Treatment	
Complete	180 (88.7)
Incomplete	23 11.3)

Of all the newborns who were delivered from infected women, 5.9% and 94.1% were preterm and term, respectively. Most newborns had a normal birth weight. As shown in Table 2, congenital syphilis was reported in 31 cases (15.3%).

Notably, the percentage of seropositive syphilis in pregnant women increased dramatically from 0.4% in 2011 to 2.22% in 2020. Between 2011 and 2015, the percentage of infected women ranged from 0.2% to 0.53% and increased dramatically from 1% to 2.22% in the last 5 years, as shown in Figure 1.

From 2011 to 2014, the percentage of congenital syphilis ranged from 0% to 0.08%. The authors observed a

Table 2. Newborn characteristics

	203, n (%)
Gestational age at delivery	
<37 weeks	12 (5.9)
≥37 weeks	191 (94.1)
Birth weight	
<1,500 g	1 (0.5)
1,500 to 2,499 g	14 (6.9)
≥2,500 g	188 (92.6)
Syphilis status	
Not infected	172 (84.7)
Congenital infection	31 (15.3)

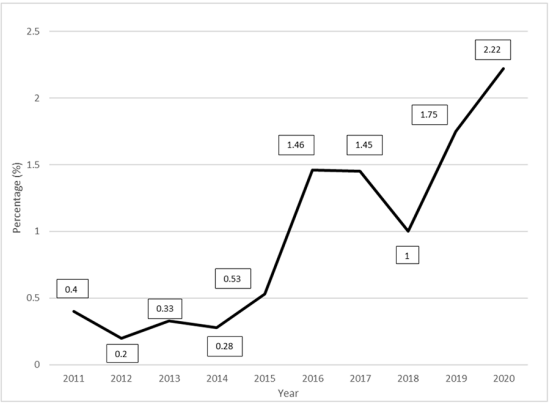

Figure 1. Prevalence of maternal syphilis.

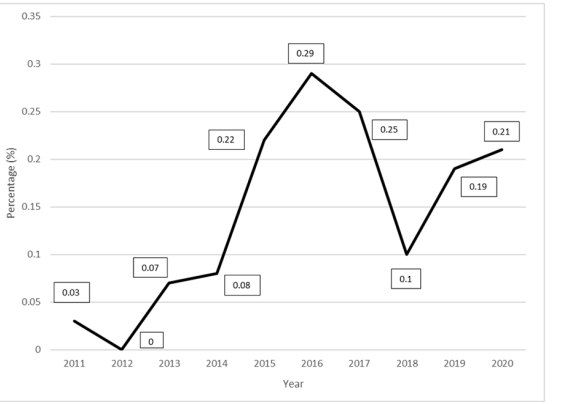

Figure 2. Prevalence of congenital syphilis.

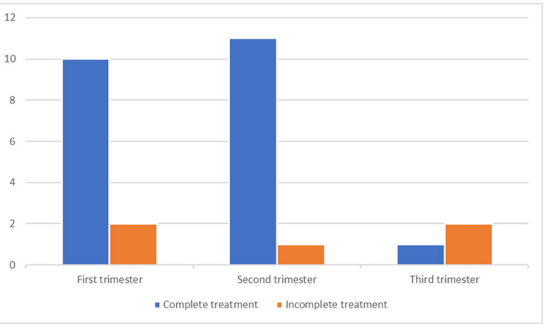

Figure 3. Congenital syphilis regarding the maternal diagnoses in each trimester and treatment.

remarkable increase in congenital syphilis between 2015 and 2020. The percentage of congenital syphilis also followed the same trend, rising sharply to about 0.2% between 2015 and 2020, as shown in Figure 2.

In congenital syphilis, regarding the number of maternal diagnoses in each trimester was 12 cases in the first trimester, 12 cases in the second trimester and 3 cases in third trimester. A total of 27 cases of congenital syphilis, incomplete treatment was 2, 1 and 2 cases in the first, second, and third trimester respectively, as shown in Figure 3.

Discussion

Syphilis infection is a major public health problem that results in serious complications and sequelae in maternal and fetal conditions. Although syphilis is a preventable and curable disease, it remains an ineradicable infection in pregnant women. In 2012, the WHO reported an estimated 18 million cases of syphilis and an estimated 0.5% global prevalence[4]. Various studies have reported the prevalence of syphilis. Our study revealed the trend of gestational and congenital syphilis that coincides with the previous study.

A systematic review of the prevalence of sexually transmitted infection in pregnant women by DL Joseph Davey et al.[7] from 2010 to 2015 and a review article by Chico et al.[8] in 2012 found that the prevalence of syphilis among pregnant women was 4.6% and 3.5%, respectively, which was higher than found in the present. Because seroprevalence is affected by socioeconomic status, the burden of disease is highest in low- and middle-income countries, especially in the African region[4]. In addition, rural areas of Eastern Europe and Central Asia showed an increase in the incidence of seropositivity[9]. In contrast, the prevalence of maternal syphilis was reported to range from 0.02% in developed countries in Europe to 4.5% in the United States[10]. Moreover, complete regimen treatment and gestational age at syphilis diagnosis had an effect on perinatal infection. Our study showed that about half of the infected women were diagnosed in the first trimester and nearly 90% had completed treatment.

The present study was conducted in a tertiary care hospital in Bangkok, Thailand. The data in the present study correlated with those of the previous study in Asia[2,6,7,11]. A 10-year retrospective descriptive study conducted from 2006 to 2015 by Yada et al.[6] reported a sharp increase in maternal syphilis, from about 0.1% during 2006 to 2013 to 0.5% in

2015, which correlated with the trends of the present.

The authors observed the highest incidence of syphilis in 2020 when the incidence increased dramatically to 2.2%. Moreover, the percentage of congenital syphilis also followed the same trend, rising sharply to about 0.2% between 2015 and 2020. Despite the increase in the prevalence of syphilis in pregnant women in 2020, the number of affected infants remained stable at about 0.2%. Thus, it seems that early screening and effective treatment are productive tools for reducing mother-child transmission[12]. An analysis of syphilis trends from 2010 to 2019 by S. García-Cisneros et al.[13] revealed the reemergence of syphilis in women.

Because nearly half of the seropositive pregnant women received inadequate treatment[14], and one-fifth of seropositive pregnant women did not present for antenatal care[11], early screening and effective treatment are crucial strategies to decrease global syphilis infection.

During the past decade, the rate of seropositive syphilis notably increased in pregnant women, and trends of congenital syphilis were correlated with gestational syphilis. Our study identified 203 infected pregnant women in the past decade, with the highest percentage occurring in 2020. From 2011 to 2020, there has been a noticeable upward trend in maternal and congenital syphilis cases. Between 2011 and 2016, infection rates increased quite steadily with a particularly sharp rise observed in 2016. However, from 2017 to 2018, there appears to be a decline in infection rates. In the most recent two years (2019 to 2020), there seems to be a reemergence of maternal and congenital syphilis with maternal infection rates increasing from 1 in 2018 to 2.22 in 2020, the highest rate during this 10-year period, and congenital infection rates rising from 0.1 in 2018 to 0.21 in 2020. The increase in congenital syphilis cases during 2019 to 2020 is somewhat less severe.

The most cases of congenital syphilis in our study, maternal syphilis was diagnosed in the first and second trimesters and only 5 cases had incomplete maternal treatment. It was surprising that although maternal treatment was complete, the newborn was diagnosed with congenital syphilis. Despite benzathine penicillin G is extremely efficient in eliminating congenital syphilis, the timing and optimal dosing regimen have not been definitively established[15,16]. The risk factors of congenital treatment such as regimen, timing at diagnosis and start treatment, timing at complete treatment, RPR titer in maternal status should be studied in the future.

To achieve the goal of eliminating syphilis[17], all pregnant women should receive early syphilis screening at the first antenatal visit and between 28 and 32 weeks of gestational age. To overcome syphilis infection, it is important to ensure universal access to early screening and effective treatment. Screening for syphilis in pregnant women and the timely administration of appropriate therapy are requisite for preventing congenital syphilis.

Conclusion

The prevalence of maternal syphilis rose sharply from 2011 to 2020, which correlated with the prevalence of congenital syphilis.

The strength of this study

A recent study involved syphilis in pregnancy in Asia was rare, this study was the recent trends of maternal and congenital syphilis. This report will emphasize the awareness of early screening and effective treatment.

Limitations of this study

Because the retrospective study was conducted in a single tertiary hospital, there was limited generalizability, incomplete data, and too few cases to determine reliable associated factors. Therefore, the further data collected are a prerequisite to confirming the rising trends.

What is already known on this topic?

Syphilis infection passes from the mother to the fetus during pregnancy or delivery and is one of the vital infection causes of morbidity and mortality.

What this study adds?

The percentage of pregnant women with seropositive syphilis increased dramatically from 2011 to 2020. The percentage of infants with congenital syphilis also followed the same trend, rising sharply in correlation with gestational syphilis.

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Conflicts of interest

The authors declare no conflicts of interest.

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