

Over reporting of congenital syphilis in Guangzhou, China

Xingdong Ye^{A,C}, Shao-Kai Tang^A, Xiangnong Dai^B, Wanping He^A, Huilan Zhu^A
and Xibao Zhang^A

^ADepartment of Health Care, Guangzhou Institute of Dermatology, Guangzhou, Guangdong, 510095, China.

^BDepartment of Dermatology, Guangzhou Institute of Dermatology, Guangzhou, Guangdong, 510095, China.

^CCorresponding author. Email: yxingdong@qq.com

Abstract. The purpose of this study was to evaluate the rationality of congenital syphilis (CS) cases reported by physicians in hospitals of various levels in Guangzhou, China. The over-reporting rate was calculated. The results suggested that 49.1% (54 out of 110) of the CS cases reviewed were identified as cases that should be reported; 18 of the 54 CS case were confirmed CS cases and 50.9% (56 out of 110) were identified as over reported. Factors associated with CS case misclassification were analysed. To decrease the incidence of CS, antenatal care management and rapid plasma reagin titres should be provided and the follow up for children should be raised.

Additional keywords: case report, child, epidemiology, neonate, review, STIs.

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The congenital syphilis (CS) incidence in China increased from 0.01 per 100 000 live births in 1991 to 19.7 per 100 000 live births in 2005,¹ resulting in an average of more than one syphilitic neonatal birth per hour in 2008.² The Chinese Ministry of Health recently announced a comprehensive 10-year National Syphilis Prevention and Control Plan (NSCP), which aimed to reduce the number of newly reported CS cases to less than 30 per 100 000 live births by 2015 and continuously reduce the number to 15 per 100 000 live births by 2020.³ Guangzhou, the capital of Guangdong province in southern China, has experienced a dramatic CS increase from 38.19 per 100 000 live births in 2000 to 243.61 per 100 000 live births in 2011.⁴ However, owing to the different professional backgrounds of the clinicians from various hospitals, the diagnostic misclassification was inevitable and the current incidence of CS may not be accurate. Data on evaluating the reported syphilis cases are limited in China. The present work aimed to evaluate the evidence based on which CS cases were diagnosed and reported.

The data pertaining to the 110 CS cases in Guangzhou in 2012 were obtained from National Notifiable Disease Reporting System (NNDRS) and reviewed by sexually transmitted diseases (STD) experts using both clinical and laboratory parameters according to both syphilis case definition and case reporting guidelines issued by the Ministry of Health, China.⁵ Briefly, reported CS cases are divided into CS case probable and CS case confirmed. The CS case probable is defined as an infant, who was born from a mother with untreated syphilis or incompletely treated syphilis, or a child who had sera reactive non-Treponema antibodies regardless of clinical syphilitic findings. The CS case confirmed is defined as a child who is

a probable CS case with a four-fold higher non-specific *Treponema pallidum* antibody in the blood than that of the child's mother, or a neonate with *T. pallidum* isolated from lesions, placenta, umbilical cord or autopsy material, or a baby with a reactive immunoglobulin M (IgM) antibody test or a child with positive syphilitic findings on a bone X-ray and an abnormal cerebrospinal fluid (CSF) venereal diseases research laboratory test or cell count/protein. Data on evaluating rationality of reported syphilis cases are limited in China. A form was designed to collect characteristics of both mothers with syphilis during their pregnancy and children with CS. The over reporting of CS cases was defined as reporting a CS case that did not meet the CS definition or that had already been previously reported. The over-reporting rate (%) = number of CS case overstated/total 'CS' cases reviewed. Significant factors associated with CS misclassification were analysed by using SPSS 17.0 (SPSS, Chicago, IL, USA) with χ^2 test, and *P* values less than 0.05 were considered statistically significant.

Of the 110 'CS' cases reviewed, none of the cases were confirmed by laboratory identification of *T. pallidum*; only three babies had the classic sign of CS at the time of birth and 49.1% (54 out of 110) of CS cases, including 18 confirmed CS cases and 36 probable CS cases, were determined as cases that should be reported. Of the 18 CS confirmed cases, 61.1% (11 out of 18) were early CS and 38.9% (seven out of 18) were late latent CS. Of all the cases, 50.9% (56 out of 110) CS cases were identified as being over reported because of serum negative RPR and of these cases, 33 of their mothers were RPR negative and 23 had RPR titres of equal to or lower than 1 : 4. In addition, all of their mothers had experienced at least three positive syphilis screening tests during gestation. None of

Table 1. Characteristics of 110 pairs of maternal and child syphilis cases and related factors associated with the rate of congenital syphilis (CS) classification confirmed in 2012 in Guangzhou, China

χ^2 -test is for the rate of CS confirmed analysis. Bold font indicates statistically significant results by χ^2 test analysis; OR, odds ratio; CI, confidence interval; RPR, rapid plasma reagin; TPPA, *Treponema pallidum* particle agglutination; NA, not available

Characteristic	No. of reported cases (%)	No. of CS cases confirmed (%)	χ^2	χ^2 -test <i>P</i>	OR (95% CI)
Hospital level					
District level and lower	75 (68.2)	6 (33.3)	4.15	<0.05	3.34 (1.02–11.16)
Municipal level and above	35 (31.8)	12 (66.7)	1.0		
Major background of clinician					
Dermatology	6 (5.5)	2 (11.1)	0.51	0.14	0.21 (0.02–2.48)
Non-dermatology	104 (94.5)	16 (88.9)			1.0
RPR titre levels of mother					
Negative or NA	54 (49.1)	5 (27.8)	0.32	0.45	1
RPR \leq 1:4	45 (40.9)	2 (11.1)	40.08	<0.05	1.16 (1.02–1.31)
RPR \geq 1:8	11 (10.0)	11 (61.1)			4.25 (1.80–10.01)
Frequency of syphilis screening during antenatal care					
\geq 3 times	86 (78.8)	1 (27.8)	31.04	<0.05	1.0
\leq 2 times	24 (21.2)	17 (72.2)			3.43 (5.64–63.33)
Therapeutic regimen for maternal syphilis					
Penicillin-based	91 (82.7)	1 (5.6)	40.53	<0.05	1.0
Not penicillin	19 (17.3)	17 (94.4)			289 (24.40–3416.90)
TPPA for neonate					
Positive	77 (70.0)	12 (55.6)	0.26	>0.05	1.79 (0.47–6.74)
NA	33 (30.0)	6 (44.4)			1.0
RPR titre levels of the child					
Negative	56 (50.9)	0 (0.0)	49.6	<0.05	–
RPR \leq 1:4	37 (33.6)	1 (5.6)			0.03 (0.00–0.12)
RPR \geq 1:8	17 (15.5)	13 (94.4)			1

the mothers had any evidence of syphilis manifestation around the time of delivery. Of the 110 pregnant patients with syphilis, four delivered prematurely at 34–36 weeks of gestation and 9.1% (10 of 110) of mothers were only *T. pallidum* particle agglutination positive. The characteristic distribution of clinical and serum results for both children and mothers, and factors associated with accurate CS case reporting are listed in Table 1.

Furthermore, we found in the survey that 93.7% of the CS cases were reported to the Centres for Disease Control and Prevention within 6 months of birth. Ten children whose mothers did not receive antenatal care and had RPR titres higher than 1:8 around the time of delivery showed serum RPR titres equal to or higher than 1:8 as well. Significantly associated factors protected CS cases from misclassification, including CS cases reported from municipal hospital levels and above, maternal serum RPR titres of equal to or higher than 1:8, neonatal serum RPR titre levels equal to or higher than 1:4, less than three syphilis screens during antenatal care and maternal syphilis without penicillin treatment.

In summary, although the CS incidence in Guangzhou is rising, it may be overestimated. The majority of CS cases were established based on both incomplete maternal and children data, such as the incomplete following up of serologic RPR titre levels. This implied that enhancing antenatal care management and providing RPR titre follow up for infants who were with sera non treponema antibodies positive at birth would help to decrease the number of CS cases.

Conflicts of interest

None declared.

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References

- Chen ZQ, Zhang GC, Gong XD, Lin C, Gao X, Liang GJ, Yue X-L, Chen X-S, Cohen MS. Syphilis in China: results of a national surveillance programme. *Lancet* 2007; 369: 132–8. doi:[10.1016/S0140-6736\(07\)60074-9](https://doi.org/10.1016/S0140-6736(07)60074-9)
- Tucker JD, Chen XS, Peeling RW. Syphilis and social upheaval in China. *N Engl J Med* 2010; 362: 1658–61. doi:[10.1056/NEJMp0911149](https://doi.org/10.1056/NEJMp0911149)
- National Health and Family Planning committee. National syphilis prevention and control plan (2010–2020). Available online at: <http://www.nhfp.gov.cn/bgt/s10788/201006/910725223b02457ab0f81cd1773779fc.shtml> [verified 26 October 2014].
- Ye X, Liu Y, Dai X, He W, Gao K, Tang S, *et al.* Analysis of the characteristic of syphilis epidemic in Guangzhou from 2000 to 2011. *Chin J AIDS STD* 2013; 19: 198–200.
- National Health and Family Planning Committee. Diagnostic criteria for syphilis (WS273–2007). Beijing: China Center for Disease Control and Prevention; 2007. pp. 1–19.