Congenital syphilis in a philanthropic maternity of the state of Sergipe: still a challenge

Sífilis congênita em maternidade filantrópica do estado de Sergipe: ainda um desafio

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ABSTRACT

Introduction: Syphilis is a bacterial disease whose main means of contamination are the transplacental and sexual pathways. Its high prevalence in pregnancy in Brazil makes it a national public health issue. **Objective:** To evaluate the positivity of the mandatory testing recommended by the Brazilian Ministry of Health (MoH) in children of VDRL-positive mothers, using data from a congenital syphilis clinic in a Philanthropic Maternity of Aracaju, Sergipe (SE). **Methods:** Observational, longitudinal and descriptive design, following the MoH' congenital syphilis elimination program protocol (2006). Live births of VDRL-positive mothers were included from January 2010 to December 2014. Data analysis was performed using SPSS v21.0. **Results:** A total of 428 newborns (NB) were evaluated; 395 long-bone r-rays were carried out, of which, 7.3% had radiological alterations. VDRL positivity was found in cerebrospinal fluid (2.7%) and in peripheral blood (70.3%). The ear testing was altered in 3.0% and the examination of the eye fundus altered in 2.5%. The chance of having bone changes was greater in those who were born weighing from 1 to 2.5 kg and in those who presented with syphilis symptoms. Cerebrospinal fluid positivity was higher in those who had bone changes, were symptomatic, and whose partners were not treated. Maternal treatment decreased the chance of bone changes in infants. **Conclusion:** The non-treponemal test, VDRL, in peripheral blood was the most significant in the identification of the vertical transmission, corresponding to 70.3% of the identified samples, suggesting that its use had a greater diagnostic sensitivity, being the long bones radiography, ear test, and eye fundus test complementary in screening children of VDRL-positive mothers. In addition, the outpatient follow-up was statistically significant ($p<0.01$) in reducing the patients' morbidity and mortality. This reinforces the importance of updating the guidelines for Congenital Syphilis management by the Ministry of Health, used in the institution at the time of the study, aiming to eradicate this disease that still persists despite almost seven decades of penicillin usage.
Keywords: syphilis, congenital; infant, newborn; mandatory testing.

RESUMO

Introdução: A sífilis é uma doença bacteriana que tem como principais meios de contaminação a via transplacentária e a sexual. Sua alta prevalência na gestação no Brasil a torna um problema de saúde pública. **Objetivo:** Avaliar a positividade dos exames preconizados pelo Ministério da Saúde (MS) em filhos de mães *Venereal Disease Research Laboratory* (VDRL) positivo, mediante dados do ambulatório de sífilis congênita numa maternidade filantrópica de Aracaju (SE). **Métodos:** *Design* observacional, longitudinal e descritivo, seguindo o protocolo do programa de eliminação de sífilis congênita do MS de 2006. Foram incluídos nascidos vivos de mães VDRL positivo, no período de janeiro de 2010 a dezembro de 2014. Na análise de dados, utilizou-se o *software* SPSS® versão 21.0. **Resultados:** Foram avaliados 428 recém-nascidos (RN); 395 realizaram radiografia de ossos longos, dos quais 7,3% tinham alterações radiológicas. O VDRL foi positivo no liquor em 2,7% e no sangue periférico em 70,3% deles. O teste da orelhinha e o exame de fundo de olho foram alterados em 3,0 e 2,5%, respectivamente. A chance de ter alterações ósseas foi maior naqueles que nasceram com peso entre 1 e 2,5 kg e naqueles que apresentaram sintomas de sífilis. A positividade do liquor foi maior naqueles que tinham alterações ósseas, eram sintomáticos e cujos parceiros não foram tratados. O tratamento materno diminuiu a chance de alterações ósseas nos bebês. **Conclusão:** O teste não treponêmico, o VDRL, em sangue periférico foi o mais significativo na identificação da transmissão vertical, correspondendo a 70,3% das amostras identificadas, sugerindo-se que sua utilização teve maior sensibilidade diagnóstica, tendo a radiografia de ossos longos, o teste da orelhinha e o exame de fundo de olho um papel complementar no rastreio dos filhos de mães VDRL positivo. Além disso, o acompanhamento ambulatorial dos pacientes foi estatisticamente significativo ($p<0,01$) para redução de morbimortalidade dos pacientes avaliados. Isso reforça a importância da manutenção das *guidelines* para manejo de sífilis congênita do MS, utilizadas na instituição na época do estudo, objetivando erradicar essa doença que ainda persiste apesar de quase sete décadas do uso da penicilina.
Palavras-chave: sífilis congênita; recém-nascido; exames obrigatórios.

INTRODUCTION

The Ministry of Health (MoH) defines as a carrier of congenital syphilis every newborn (NB) with a Veneral Disease Research Laboratory (VDRL) positive mother, untreated or with inadequate treatment in pregnancy, even without confirmatory test for *Treponema pallidum*. This is a bacterial disease, transmitted from the mother to the baby, at any time of pregnancy, by hematogenous dissemination, birth canal, amniotic fluid and breastfeeding if there are lesions in the areola of the breast[1].

The elimination of congenital syphilis is a commitment of the Pan American Health Organization (PAHO) and the United Nations Children's Fund (UNICEF) — the goal is to reach the rate of 0.5 cases or less per thousand live births. To this end, VDRL was established in the first and third trimesters of pregnancy and in childbirth, aiming for 95% or more of the pregnant women to be treated[2].

The *Rede Cegonha* was launched by the Federal Government in 2011 to ensure the right of women and children to humanized care during prenatal care, delivery and birth in all services of the Unified Health System (*Sistema Único de Saúde* – SUS). Through this strategy, the rapid test for the diagnosis of syphilis during pregnancy was implemented, showing an increase in the detection rate of the disease in pregnant women due to improved diagnosis and epidemiological surveillance. The MoH increased the distribution of rapid syphilis tests by 5.5 times — evolution was observed from 1,126,235 to 6,169,145 tests[3].

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When the pregnant woman is properly treated in pregnancy, the risk of contaminating the fetus and the newborn with congenital syphilis reduces to less than 1%. In the current protocol at the time of the study[1], the pregnant woman would be considered adequately treated if she had used benzathine penicillin according to the clinical phase of the disease, concomitant with the partner's treatment and condom use during the treatment period, completed 30 days before the delivery — it was also necessary to present a document that proves her and her partner's treatment and the VDRL performed monthly from its positivity[4-6].

Today, newer protocols consider treatments as "inadequate therapy" when performed with a non-penicillin antimicrobial agent for less than four weeks before delivery or at a dose inappropriate to the disease stage. It may also be called "inadequate documentation of maternal treatment" when there is no good performance of serial titers of non-treponemal tests or no documentation of therapy. In addition, there is an "inadequate response to therapy" when titers of non-treponemal tests have a drop less than four times the previous value (two dilutions) after treatment or when treponemal titers suggest reinfection or reactivation and titer rise above four times the value of the previous non-treponemal test titer.

Transmission occurs for 70 to 100% of pregnant women not treated or inadequately treated if they are in the primary or secondary stage of the disease. Because of its high transmissibility, its difficult diagnosis — 70% are asymptomatic at birth —, the impossibility to grow *Treponema pallidum* and the presence of maternal antibodies in the child until 18 months of age, it is difficult to confirm the diagnosis of congenital syphilis. For the management of infants born to VDRL-positive mothers, laboratory tests are performed, such as VDRL in peripheral blood and cerebrospinal fluid (CSF), long-bone radiography and blood count, in order to reduce the probability of not diagnosing congenital syphilis[1].

After discharge from the maternity ward, these NB, the offspring of a positive VDRL mother, should be followed monthly in the first semester of life, bi-monthly in the second and twice in the second year of life. The VDRL must be requested at 1, 3, 6, 12 and 18 months of life, and stop being performed after two consecutive negative VDRLs[3].

Risk factors are related to the vulnerability of health systems, the demographic situation of some municipalities, as well as the socioeconomic and behavioral conditions of the population[4]. The quality of prenatal care, low schooling, being young, being of reproductive age, low income, being licit and illicit drug users, being sexually promiscuous, having untreated partners, among others are factors related to the increase of congenital syphilis[7,8].

Despite all the measures being undertaken, the incidence of congenital syphilis has increased globally, especially in developing countries. Although Sergipe is the smallest state in the federation, with good accessibility among municipalities, it is in third place in incidence of the disease[3].

OBJECTIVE

In view of the above, an observational, longitudinal and descriptive study of the positivity of the VDRL peripheral and CSF examinations, long-bone radiography, the ear test and background examination of the children of VDRL positive mothers was carried out.

METHODS

This is a longitudinal and descriptive observational study carried out in a philanthropic maternity clinic associated to SUS. It attends to maternal risk and neonatal high risk, with an average of 800 monthly deliveries, of pregnant women from all municipalities in the state of Sergipe, where a third of the population is born, as well as patients from other states. Data from the records of the congenital syphilis outpatient clinic were used with inclusion criteria for all live births of positive VDRL mothers in the years 2010 to 2014. These were included in the 2006 MoH Congenital Syphilis Elimination Program[1]. The research was approved by the Committee of Ethics in Research with Human Beings under number 525.002.

For data collection, pregnant women with positive VDRL were interviewed and classified as adequately or inadequately treated. They are considered to be adequately treated in pregnancy when they use benzathine penicillin according to the clinical stage of the disease, concomitant to the partner, and a condom during the treatment period, completed 30 days before delivery, and present a document proving her treatment, as well as her partner's, and the VDRL performed monthly, from their positivity, with record of results on the pregnant woman's card. The NB of mothers with VDRL positivity were treated as recommended by the MoH[1]. Radiographs of the long bones, VDRL in peripheral blood and CSF, the ear test and the fundus examination were evaluated. The NB were discharged from the program when they had two consecutive negative peripheral blood VDRLs, did not present the signs and symptoms of the disease, the CSF had turned out to be negative and the radiological alterations had disappeared.

Student's *t*-test for independent samples — for the mean between two groups —, the χ^2 test for frequency data — used to detect statistical significance of the difference between two independent groups — and the *odds ratio* (OR) as the ratio between two possibilities: the probability that congenital syphilis does not occur divided by the number of individuals who did not develop the disease. A significance level of 5% was considered for all tests. The statistical program used was the IBM SPSS® (Statistical Package for Social Sciences), version 21.0.

RESULTS

We evaluated 428 NB from mothers with positive VDRL. Of these, 33 (7.7%) did not perform the X-ray of the long bones and 32 (8.1%) presented bone alterations in this examination. They had positive VDRL in the peripheral blood at birth (70.3%) and in the CSF (2.7%). In the ear test, 3.0% of the NB did not respond to otoacoustic emissions and in the fundus examination, 2.5% presented keratitis. NB showed symptoms at birth in 19.6% of the cases (**Table 1**).

There was significance when bone changes were related to the weight of the NB and the number of abortions. CSF VDRL was also significant when related to the number of children with congenital syphilis (**Table 2**).

Symptomatic babies, weighing between 1.0 and 2.5 kg, and normal births were more likely to have bone changes. Symptomatic NB were also more likely to have VDRL positivity in the CSF (**Table 3**).

The increase in maternal and neonatal VDRL levels was statistically significant with the appearance of radiographic changes (p<0.001). Puerperas with VDRL≥1:8 are 7,11 times more likely that their NB will have bone radiographic alterations compared to VDRL≤1:4. Similarly, NB with VDRL≥1:8 are 11.1 times more likely to have bone changes compared to those with VDRL≤1:4.

Table 1 – Clinical, serological and radiographic variables of Venereal Disease Research Laboratory newborns positive at delivery, in a philanthropic maternity from Aracaju, SE, from 2010 to 2014.

Variables of the newborn	Tests performed	% (n)	95%CI
Symptomatic newborns	428	19.6 (84)	15.7–23.1
Radiography of long bones	360		
Periostitis		1.5 (6)	0.3–2.5
Metaphyseal osteochondritis		6.6 (26)	3.9–8.9
Positive VDRL in cerebrospinal fluid at birth	360	2.7 (10)	1.1–4.2
Positive VDRL in peripheral blood at birth	428	70.3 (301)	65.9–73.8
Altered eye fundus (interstitial keratitis)	161	2.5 (4)	0.6–3.7
Altered ear test (no response to otoacoustic emissions)	168	3.0 (5)	0.6–5.4

95%CI: 95% confidence interval; VDRL: Venereal Disease Research Laboratory.

Table 2 – Characteristics of the sample, bone alterations and neurosyphilis of Venereal Disease Research Laboratory newborn at the time of delivery, in a philanthropic maternity of Aracaju, SE, from 2010 to 2014.

	Altered X-ray	Normal X-ray	p-value
Age of the mother	25.42±6.958	24.96±6.273	0.722
Peso do RN	2,746.38±801.19	3,133.37±578.31	0.016
Number of children	2.57±1.399	2.33±1.548	0.451
Number of children with syphilis	0.95±0.498	0.82±0.55	0.257
Number of abortions/ miscarriages	0.14±0.359	0.37±0.724	0.013
Number of consultations	4.10±2.791	5.20±2.667	0.067
	VDRL (+) cerebrospinal fluid	**VDRL (-) cerebrospinal fluid**	**p-value**
Age of the mother	22.00±5.398	25.01±6.324	0.182
Weight of the NB*	2,824.44±508.751	3,116.03±604.988	0.152
Number of children	2.43±1.397	2.32±1.523	0.853
Number of children with syphilis	1.00±0.000	0.82±0.549	<0.001*
Number of abortions/ miscarriages*	0.14±0.378	0.37±0.718	0.413
Number of consultations	4.14±3.338	5.18±2.627	0.304

NB: newborn; VDRL: Venereal Disease Research Laboratory; *significant difference at 5%; Student's *t*-test for independent samples — values expressed as mean ± standard deviation.

When VDRL was non-reactive, 13.8% presented bone alterations. Neurosyphilis was present in 88.8% of NB when associated with titration of maternal VDRL greater than or equal to 1:8 (**Table 4**).

Among the puerperal women who returned for the first month's consultation with the baby, 73.6% received the correct treatment. This was a statistically significant protective factor for bone changes and for neurosyphilis (OR 0.30 / p<0.01).

There was no statistically significant association between alterations in the fundus examination and in the ear test with the bone alterations found in NB with congenital syphilis. The treatment was performed with crystalline penicillin in 89.7% of those who presented bone alterations, and 10.3% of them received treatment with procaine penicillin (**Table 5**).

DISCUSSION

Congenital syphilis is a marker of a country's development and its high incidence shows that there is a serious public health problem. In 2015, in Brazil, 18,938 cases of this disease were diagnosed, being 98.1% in NB; 96.4% in the first week of life. The World Health Organization (WHO) recommends reducing the incidence of this disease to 0.5 or fewer cases per thousand live births. In the year 2015, the national average was 6.5 cases/thousand live births. The state with the highest incidence was Rio de Janeiro, with 12.4 cases/thousand live births, followed by Rio Grande do Sul, with 11.5 cases/thousand live births, and in the third place, Sergipe, with 10.9 cases/thousand live births[3].

To define the diagnosis of congenital syphilis, in addition to the maternal epidemiological data, signs and symptoms of the disease in the NB, peripheral blood VDRL, blood count, hepatic profile and electrolytes, CSF puncture, long bone radiography and ophthalmologic and audiological evaluation should be analyzed[3].

In the present study, the infants of VDRL positive mothers were symptomatic at birth in 19.6%. Of these, 15.2% had prematurity or low birth weight and those without a risk factor for syphilis were 4.1%. These symptoms are the most prevalent in early congenital syphilis and their preponderance was three times higher, in the four years of the study, in those babies of VDRL-positive mothers in relation to all pregnant women without seropositivity for *Treponema pallidum*. Holanda et al.[9], in Natal, found 15.2% of the babies with prematurity or low birth weight; Campos et al.[6], in Fortaleza, 36.2%; and Magalhães et al.[10], in the Federal District, 6% — data showing the importance of adequate treatment of these mothers in prenatal care, with the intention of reducing prematurity and low birth weight of newborns of VDRL positive mothers .

The VDRL positivity of 2.7% in the babies' CSF was similar to the findings described by Holanda et al.[9], who found a value of 2.2%, and lower than that reported by Vanegas-Castillo et al.[11], 8.2%. When this test is positive in the CSF, babies are diagnosed as having neurosyphilis. Although they receive equal treatment for those babies who presented negative VDRL in the CSF during follow-up, they should undergo another CSF collection at six months of age. If this new collection remains positive, the baby should be hospitalized for a second treatment with crystalline penicillin for ten days. This examination is repeated every six months until it comes out negative[1].

In the present study, the CSF was collected in 84.1% of the NB, differing from the data from the National System of Notifiable Diseases (*Sistema Nacional de Agravos de Notificação* – SINAN), such as that of Holanda et al.[9], in which this collection was performed in 6.7% of them, and that of Magalhães et al.[10], in which this percentage was 42%. It is relevant that CSF collection should be performed on all babies born to VDRL-positive mothers when not treated properly in pregnancy, for diagnosis and treatment of NB at birth. In the work performed, the chance of presenting positivity in the CSF was increased in those who had bone lesions and when the partners of the pregnant women were not treated during pregnancy.

The ear test was performed in 39.2% of the sample and there was absence of otoacoustic emissions in only 3.0%. Research performed in São Paulo by Boscatto and Machado[12] estimated hearing loss in NB between 1 and 3 for every one thousand births of healthy babies and increases to 20 to 50 per thousand live births in NB with

Table 3 – Association of the sociodemographic characteristics and positivity of the Venereal Disease Research Laboratory with the radiographic changes and neurosyphilis of Venereal Disease Research Laboratory positive newborns at the time of delivery, in a philanthropic maternity of Aracaju, SE, from 2010 to 2014.

	Altered X-ray n=29*	Normal X-ray n=366*	Total n=395*	p-value	OR (95%CI)
Symptomatic NB	17 (58.6)	65 (17.8)	82	<0.001**	6.56 (2.99–14.4)
No	12 (41.4)	301 (82.2)	313		
Weight of the NB					
1 to 1.5 kg	3 (10.3)	3 (0.8)	6 (1.5)		
>1.5 to 2.5 kg	8 (27.6)	49 (13.4)	57 (14.4)	<0.001**	3.69 (1.65–8.26)
>2.5 kg	18 (62.1)	314 (85.8)	332 (84.1)		
Type of birth					
Normal	16 (55.2)	272 (74.3)	288 (72.9)	0.026**	0.42 (0.20–0.92)
Cesarean	13 (44.8)	94 (25.7)	107 (27.1)		
	VDRL (+)cerebrospinal fluid n=9*	**VDRL (-)cerebrospinal fluid n=393***	**Total n=402***	**p-value**	**OR (95%CI)**
RN***					
Symptomatic	6 (66.7)	74 (18.8)	80 (19.9)	<0.001**	8.62 (2.11–35.3)
No	3 (33.3)	319 (81.2)	322 (80.1)		
Weight of the NB***					
Very low	0 (10.3)	6 (1.5)	6 (1.5)		
Low	2 (22.2)	54 (13.7)	56 (13.9)	0.661	3.69 (1.65–8.26)
Appropriate	7 (77.8)	333 (84.7)	340 (84.6)		
Area					
Urban	6 (66.7)	349 (88.8)	355 (88.3)	0.041**	0.25 (0.06–1.04)
Countryside	3 (33.3)	44 (11.2)	47 (11.7)		
Education of the mother	n=7	n=335	n=342		
<8 years	3 (42.9)	201 (6.0)	204 (59.6)	0.446	0.50 (0.11–2.27)
>8 years	4 (57.1)	134 (40.0)	138 (40.4)		

OR: *odds ratio*; 95%CI: 95% confidence interval; NB: newborn; VDRL: Venereal Disease Research Laboratory; *standard n for most variables; **significant association at 5%; ***risk or protection factor; χ^2 test — values expressed by n (%).

Table 4 – Association of rates of Venereal Disease Research Laboratory with radiography and neurosyphilis of Venereal Disease Research Laboratory positive newborns at delivery, in a philanthropic maternity of Aracaju, SE, from 2010 to 2014.

	Altered X-ray n=29*	Normal X-ray n=366*	Total n=395*	p-value	OR (95%CI)
VDRL of the mother					
≥1:8	26 (89.7)	201 (54.9)	227 (57.5)	<0.001	7.11 (2.12–23.9)
≤1:4	3 (10.3)	165 (45.1)	168 (42.5)		
VDRL of the NB					
≥1:8	21 (72.4)	70 (19.1)	91 (23.0)	< 0.001**	11.1 (4.72–26.1)
≤1:4	4 (13.8)	188 (51.8)	192 (49.0)		
*NR	4 (13.8)	105 (28.9)	109 (27.8)		
	VDRL (+)cerebrospinal fluid n=9*	**VDRL (-)cerebrospinal fluid n=393***	**Total n=402***	**p-value**	**OR (95%CI)**
VDRL of the mother					
≤1:4	1 (11.1)	172 (43.8)	173.3 (44.0)	0.03**	
≥1:8	8 (88.8)	221 (56.3)	229 (56.8)		

OR: *odds ratio*; 95%CI: 95% confidence interval; VDRL: Venereal Disease Research Laboratory; NB: newborn; *standard n for most variables; **significant association at 5%; ***risk or protection factor; χ^2 test — values expressed by n (%).

risk factor for hearing disorders. When comparing these data with the present study, which has as risk factor the babies being children of VDRL-positive mothers, the alterations could have been found between 11.9 and 29.7%. However, in this study, the percentage was 3.0% of auditory changes, which is within the values observed in healthy babies.

The fundus examination was performed in 37.6% of the babies and the positivity was 2.5%. In a study conducted in Minas Gerais with examinations of 6,560 eyes — in which, when the red reflex was absent or altered, they were referred to the fundus of the eye —, there was a prevalence of 7% of changes in the retina and in the vitreous[13]. In the present study, this test also had the percentage below that found when there is a risk factor for retinal diseases probably due to the low adhesion of the mothers in getting this examination.

In the study, bone lesions, prematurity and/or low birth weight, hepatosplenomegaly, *pemphigus palmoplantaris* and jaundice were the signs found associated with early congenital syphilis and were present in 19.6% of NB. The radiographic changes in those symptomatic occur in 70 to 100% of the cases, and in 2 to 20% when they are asymptomatic[1].

These are symmetrical lesions, especially in long bones such as the radius, ulna, humerus, tibia, femur and fibula. The periostitis presents radiologically with cortical thickening of the diaphysis, being extensive, bilateral and symmetrical. Metaepiphysial osteochondritis is radiologically visible in the extremities, especially in the femur and humerus. There is the appearance of a shade of greater density, which is the calcified matrix, with a "cup" formation of the epiphysis. When the lesion is more severe, the function of the cartilage channel is impaired and, on the radiograph, a zone of rarefaction of the epiphysis line appears. A characteristic image is the Wimberg's sign, which consists of metaphyseitis of the upper lip of the tibia (inner border)[14,15].

Kucinskiene et al.[16] showed the presence of osteochondritis in all long bones and periostitis in the left humerus and forearm. Stephens et al.[17] described, in the United States, a child with destruction of the medial metaphysis of both tibias (Wimberger's sign) and diffuse periosteal reaction in tibia. Onesimo et al.[18], in Italy, presented an epiphyseal detachment in the left humerus as one of the main manifestations of congenital syphilis.

Moreira-Silva et al.[15] analyzed ten children with congenital syphilis with bone involvement and showed that periostitis is the most

Table 5 – Association of characteristics of treatment with CSF positivity and X-ray of Venereal Disease Research Laboratory positive newborns at delivery, in a philanthropic maternity of Aracaju, SE, from 2010 to 2014.

	VDRL (+)cerebrospinal fluid n=9*	VDRL (-)cerebrospinal fluid n=393*	Total n=402*	p-value	OR (95%CI)
X-ray***	n=9	n=378	n=387		
Altered	6 (66.7)	23 (6.1)	29 (7.5)	<0.001**	30.9 (7.2–131.4)
Normal	3 (33.3)	355 (93.9)	358 (92.5)		
Medication of the NB					
BP	0 (0.0)	118 (30.0)	118 (29.4)		
CP	9 (100.0)	269 (68.4)	278 (69.1)	0.181	
Follow-up	0 (0.0)	6 (1.6)	6 (1.5)		
Treatment of the mother	n=9	n=389	n=398		
Complete	5 (55.6)	289 (74.3)	294 (73.9)	<0.206	0.43 (0.11–1.64)
Incomplete	4 (44.4)	88 (25.7)	104 (26.1)		
Treatment of the partner	n=9	n=389	n=398		
Complete	0 (0.0)	112 (28.8)	112 (28.1)	0.058	
Incomplete	9 (100.0)	277 (71.2)	286 (71.9)		
Fundoscopy					
Altered	0 (0.0)	4 (1.0)	4 (1.0)		
Normal	5 (55.6)	151 (38.4)	156 (38.8)	0.534	
Not performed	4 (44.4)	238 (60.6)	242 (60.2)		
Ear test***					
Altered	0 (0.0)	4 (1.0)	4 (1.0)		
Normal	6 (66.7)	162 (41.2)	168 (41.8)	0.244	
Not performed	3 (33.3)	227 (57.8)	230 (57.2)		
	Altered X-ray n=29*	**Normal X-ray n=366***	**Total n=395***	**p-value**	**OR (95%CI)**
Medication of the NB					
BP	3 (10.3)	113 (30.9)	116 (29.4)		
CP	26 (89.7)	247 (67.5)	273 (69.1)	0.044**	
Follow-up	0 (0.0)	6 (1.6)	6 (1.5)		
Treatment of the mother***	n=29	n=362	n=391		
Complete	14 (48.3)	274 (75.7)	288 (73.7)	<0.01**	0.30 (0.14–0.64)
Incomplete	15 (51.7)	88 (24.3)	103 (26.3)		

VDRL: Venereal Disease Research Laboratory; OR: *odds ratio*; 95%CI: 95% confidence interval; NB: newborn; BP: benzathine penicillin; CP: crystalline penicillin; *standard n for most variables; **significant association at 5%; ***risk or protection factor; χ^2 test — values expressed by n (%).

frequent manifestation in these children, followed by osteomyelitis. This study showed that the most affected bone was the tibia, followed by the femur, the humerus, the radius and the ulna[15]. The present study corroborated the findings of Moreira-Silva et al.[15], since the most frequent manifestation was periostitis.

Fernandes et al.[19], whose study, in Brazil, analyzed 20 children born with congenital syphilis, found only 10% of bone changes on the radiographs, a frequency similar to that found in the present study, which was 8.1% — and when the mothers were adequately treated, this was a protective factor for the non-occurrence of bone changes in the NB.

CONCLUSION

The nontreponemal test, VDRL, in peripheral blood was the most significant in the identification of vertical transmission, corresponding to 70.3% of the identified samples, suggesting that its use had a greater diagnostic sensitivity, with long bone radiography, test of the ear and examination of eye fundus complementary roles in the screening of children of VDRL-positive mothers. In addition, outpatient follow-up of the patients was statistically significant ($p<0.01$) to reduce their morbidity and mortality. This reinforces the importance of maintaining guidelines for the management of congenital syphilis of MoH, used in the institution at the time of the study, aiming to eradicate this disease that still persists despite almost seven decades of penicillin use.

Conflict of interests

The authors declare no conflict of interests.

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