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Research Article

Epidemiological analysis of syphilis in pregnant women and congenital syphilis in Porto Velho and Rondônia

Análise epidemiológica da sífilis em gestantes e da sífilis congênita em Porto Velho e Rondônia

Análisis epidemiológico de la sífilis en mujeres embarazadas y congénitas en Porto Velho y Rondônia

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Abstract

Introduction: Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum*, transmitted sexually or vertically from mother to fetus, potentially causing severe maternal and neonatal complications. Despite global efforts to eliminate vertical transmission, such as the WHO initiative, Brazil still shows high rates of gestational and congenital syphilis. **Objective:** To investigate the prevalence of gestational and congenital syphilis to assess the effectiveness of public health policies and actions, given its clinical relevance and maternal-infant consequences. **Methods:** This was an epidemiological, quantitative study. Data were collected from 2013 to 2023 from SINAN, maintained by DATASUS. Additionally, data from the Municipal Health Plan of Porto Velho between 2018 and 2021 were analyzed. **Results:** The results reveal a downward trend in transmission rates over the years, highlighting the importance of public health policies and the strengthening of primary care for early detection and treatment of the disease. However, persistent challenges remained, including a recent increase in transmission rates after 2021, especially in Porto Velho. This suggests the need for a more targeted and intensified approach in the region, with additional measures to improve prenatal coverage and ensure universal access to timely diagnosis and treatment. **Conclusions:** Therefore, an integrated and comprehensive approach is essential for controlling gestational and congenital syphilis in the state, emphasizing the need for coordinated and multifaceted efforts to eliminate vertical transmission and ensure optimal maternal and child health for all communities.

Keywords: Epidemiology; Pregnant women; Congenital syphilis.

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Resumo

Introdução: A sífilis é uma infecção sexualmente transmitida (IST) causada pela bactéria *Treponema pallidum*, transmitida por via sexual ou verticalmente da mãe para o feto, podendo causar graves complicações maternas e neonatais. Apesar de esforços globais para eliminar a transmissão vertical, como a iniciativa da Organização Mundial da Saúde (OMS), o Brasil ainda apresenta altas taxas de sífilis gestacional e congênita. **Objetivo:** Investigar a prevalência da sífilis gestacional e congênita para avaliar a eficácia das políticas e ações de saúde pública, dada sua relevância clínica e suas consequências materno-infantis. **Métodos:** Este estudo é uma pesquisa epidemiológica de natureza quantitativa. Os dados foram coletados no período de 2013 a 2023 do Sistema de Informação de Agravos de Notificação (SINAN), mantido pelo Departamento de Informática do Sistema Único de Saúde (DATASUS). Além disso, foram obtidos dados do Plano Municipal de Saúde de Porto Velho entre 2018 e 2021. **Resultados:** Os resultados revelam tendência de queda nas taxas de transmissão ao longo dos anos, destacando a importância das políticas de saúde pública e do fortalecimento da atenção básica na detecção e tratamento precoces da doença. No entanto, há desafios persistentes, incluindo o aumento recente nas taxas de transmissão após 2021, especialmente em Porto Velho. Isso sugere a necessidade de um enfoque mais direcionado e intensificado na região, com medidas adicionais para melhorar a cobertura do pré-natal e garantir o acesso universal ao diagnóstico e tratamento oportunos. **Conclusões:** É importante uma abordagem integrada e abrangente para o controle da sífilis gestacional e congênita no estado, enfatizando a necessidade de esforços coordenados e multifacetados para eliminar a transmissão vertical da sífilis e garantir uma saúde materno-infantil ótima para todas as comunidades.

Palavras-chave: Epidemiologia; Gestantes; Sífilis congênita.

Resumen

Introducción: La sífilis es una infección de transmisión sexual (ITS) causada por la bacteria *Treponema pallidum*, que se transmite sexualmente o de manera vertical de la madre al feto, pudiendo causar graves complicaciones maternas y neonatales. A pesar de los esfuerzos globales para eliminar la transmisión vertical, como la iniciativa de la OMS, Brasil aún presenta altas tasas de sífilis gestacional y congénita. **Objetivo:** Investigar la prevalencia de la sífilis gestacional y congénita para evaluar la eficacia de las políticas y acciones de salud pública, dada su relevancia clínica y sus consecuencias materno-infantiles. **Métodos:** Este estudio es una investigación epidemiológica de carácter cuantitativo. Los datos se recopilaron entre 2013 y 2023 del SINAN, administrado por el DATASUS. Además, se obtuvieron datos del Plan Municipal de Salud de Porto Velho entre 2018 y 2021. **Resultados:** Los resultados revelan una tendencia a la disminución en las tasas de transmisión a lo largo de los años, destacando la importancia de las políticas de salud pública y el fortalecimiento de la atención primaria en la detección y el tratamiento tempranos de la enfermedad. Sin embargo, persisten desafíos, incluido un aumento reciente en las tasas de transmisión después de 2021, especialmente en Porto Velho. Esto sugiere la necesidad de un enfoque más dirigido e intensificado en la región, con medidas adicionales para mejorar la cobertura prenatal y garantizar el acceso universal al diagnóstico y tratamiento oportunos. **Conclusiones:** Por lo tanto, es fundamental una estrategia integrada y completa para el control de la sífilis gestacional y congénita en el estado, enfatizando la necesidad de esfuerzos coordinados y multifacéticos para eliminar la transmisión vertical y garantizar una salud materno-infantil óptima para todas las comunidades.

Palabras clave: Epidemiología; Gestantes; Sífilis congénita.

INTRODUCTION

Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum*, which can be transmitted horizontally, through contact with lesions resulting from the infection, or vertically, from the pregnant woman to the fetus during pregnancy or childbirth. This latter form of transmission is one of the main causes of stillbirth and neonatal morbidity and mortality related to congenital syphilis. Although the disease has been considered eradicated in some countries such as Cuba since 2015 and Thailand since 2016, adequate screening and treatment during the perinatal period stand out as preventive measures to avoid complications and reduce mortality.[1]

During pregnancy, syphilis can manifest in various ways, from asymptomatic to causing serious complications such as prematurity and even death. The increase in the prevalence of the disease is alarming, and it is a notifiable disease in the National System of Information on Notifiable Diseases (SINAN).[2]

The World Health Organization (WHO) launched a global initiative in 2007 aimed at eliminating the vertical transmission of syphilis by increasing the number of tests in pregnant women as a essential strategy to identify and treat the disease early and thus prevent its transmission to fetus.[3]

Analyzing data from the Department of Informatics of the Unified Health System (DATASUS) platform for the period from January 2015 to July 2021, it was possible to observe an increase in the detection rate of gestational syphilis due to changes in diagnostic criteria and variations in the incidence of congenital syphilis in Brazil. Underreporting of cases, mainly related to failures in prenatal care, highlights the continuous need for improvement in this care and in public health policies.[4]

Low- and middle-income countries, such as Brazil, face high prevalence rates of the disease. Although there have been improvements in screening, the persistence of vertical transmission is evident. In 2019, Brazil registered rates of 20.8 cases of gestational syphilis and 8.2 cases of congenital syphilis per thousand live births, highlighting the importance of adequate treatment of pregnant women and their partners to prevent vertical transmission.[5]

Therefore, this study aimed to investigate the prevalence of gestational and congenital syphilis, considering its clinical relevance and maternal and infant consequences in the state of Rondônia and in the capital, Porto Velho.

METHODS

This study is a quantitative epidemiological research project. Data were collected from 2013 to 2023 from SINAN, maintained by DATASUS. In addition, data from the Municipal Health Plan of Porto Velho between 2018 and 2021 were obtained.

After data collection, the proportion of congenital syphilis cases in relation to syphilis cases in pregnant women was determined annually, both in the municipality of Porto Velho and in the state of Rondônia. The formula used for determining the proportion was:

Proportion $= N_{SC}/N_{SG}$

N_{SG} represents the number of syphilis cases in pregnant women and N_{SC} the number of cases of congenital syphilis. To express the proportion in percentage terms, the following formula was used:

Chance **(%)** $= (N_{SC}/N_{SG}) x\ 100.$

Furthermore, the congenital syphilis rate was calculated for every 100,000 inhabitants in both research scenarios. Population data were obtained from the Brazilian Institute of Geography and Statistics for the years 2010 and 2022, and according to the census, the respective population counts were 1,562,409 and 1,581,016. The formula used was:

Congenital syphilis rate: Number of congenital syphilis cases/Total population x 100,000

The calculations and graph creation were performed using spreadsheet software (Microsoft Excel).

RESULTS

The state of Rondônia still presents a high incidence of syphilis, mainly among pregnant women and congenital syphilis, and the capital, Porto Velho, stands out as the city with the highest number of

individuals affected by the disease (Table 1). The analysis of data from 2013 to 2023 on the incidence of syphilis in pregnant women and congenital syphilis in Rondônia, with emphasis on Porto Velho, recorded a total of 1,855 pregnant women and 601 infected newborns, with an average transmission rate of 32.4% in absolute numbers; the rate was 12.64 infected newborns per 100,000 inhabitants.

Table 1. Cases and proportion of congenital syphilis in relation to syphilis in pregnant women in Porto Velho and the state of Rondônia.

Year of diagnosis	Porto Velho				Rondônia			
	Syphilis in pregnant women	Congenital syphilis	Proportion	Chance (%)	Syphilis in pregnant women	Congenital Syphilis	Proportion	Chance (%)
2013	79	44	0.55	55.6	112	56	0.5	50
2014	138	58	0.42	42	181	73	0.4	40
2015	104	76	0.73	73	181	93	0.51	51.3
2016	131	72	0.54	54.9	240	89	0.37	37
2017	121	92	0.76	76	287	116	0.40	40.4
2018	173	96	0.55	55.5	345	119	0.34	34.5
2019	213	61	0.28	28.6	414	81	0.19	19.5
2020	166	14	0.08	8.4	453	26	0.05	5.7
2021	284	22	0.07	7.7	697	36	0.05	5.1
2022	296	53	0.17	17.9	750	75	0.1	10
2023	150	13	0.08	8.6	361	25	0.06	6.9
Total	1,855	601	0.32	32.4	4,021	789	0.19	19.6

In the state of Rondônia, there were 4,021 pregnant women registered with syphilis and 789 newborns with the bacteria, with an average transmission rate of 19.6% in absolute numbers. These data, in relation to the rate, indicated 4.07 infected newborns per 100,000 inhabitants.

The data presented show that both the capital and the state showed a trend of reduction in transmission rates from 2013 to 2021. In 2013, the risk was 10.26 newborns per 100,000 people in Porto Velho, while in Rondônia it was 3.13 newborns per 100,000 inhabitants (Figure 1). The year 2015 was one of the most

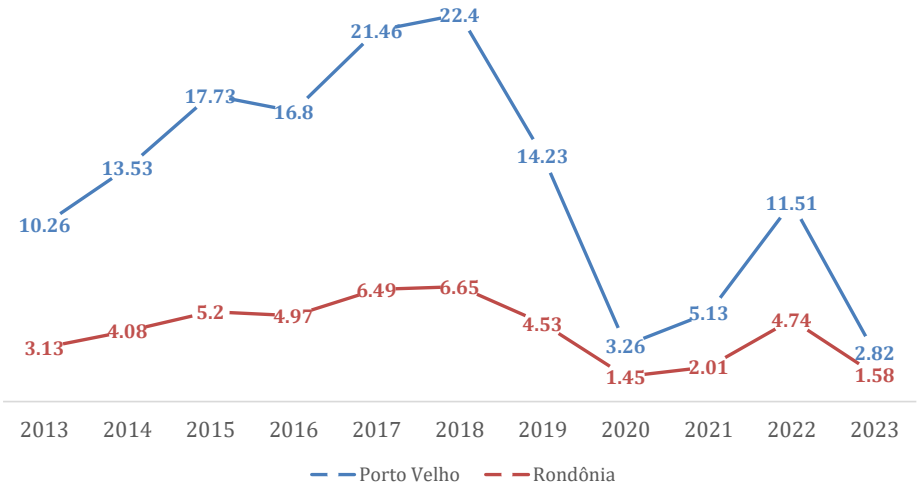

Figure 1. Congenital syphilis rate per 100,000 inhabitants in Porto Velho and Rondônia.

critical for the state (51.3%) and for Porto Velho (73%), and the capital had a peak in 2017, with 76% of newborns affected in absolute numbers (Table 1). From 2017 onwards, the rates began to decrease significantly, reaching a minimum risk per 100,000 inhabitants in 2020, with 3.26 in Porto Velho and 1.45 in Rondônia. However, between 2020 and 2022, an increase in the risk of transmission was observed, especially in Porto Velho, where the rate rose from 3.26 infected newborns per 100,000 inhabitants to 11.51 in 2022. The state also showed an increase during the same period, although on a smaller scale, going from 1.45 infected newborns per 100,000 inhabitants to 4.74 in 2022. Despite this, the results show a decrease in the transmission rate in the last year of the study, with a reduced rate of 8.69 in Porto Velho and 3.16 in Rondônia.

DISCUSSION

A study by Figueiredo revealed that in 2014 most family health teams in Brazil performed rapid syphilis tests, with a particular focus on the North Region. Furthermore, more than 50% of the teams administered benzathine penicillin G. Early diagnosis during prenatal care is highlighted as a cost-effective and decisive approach for health services.[6]

The effectiveness of interventions in primary care, such as rapid syphilis testing and the administration of benzathine penicillin G, was highlighted as a essential part of the control of gestational syphilis. According to the results of the study by Roncalli et al., [7] for every point increase in the rate of rapid tests per thousand live births in a given location, the detection of syphilis in pregnant women increases by an average of 0.02 per thousand live births. However, the persistence of higher transmission rates in Porto Velho suggests the need for a more targeted and intensified approach in this region, with additional measures to improve prenatal care coverage and ensure universal access to timely diagnosis and treatment.

Porto Velho, the capital of Rondônia and the main municipality of the Madeira Mamoré Region, shows a transmission rate 12.8% higher than in other municipalities of Rondônia, as observed in the study by Barth et al.[8] A similar scenario was identified in the state of Paraná, where a significant concentration of cases was also observed in the capital and metropolitan region. In Paraná, there was a decline in the incidence of the disease, with 867 diagnoses in 2019 and 351 cases in 2021, representing the highest and lowest values of the last decade, respectively.[8]

In southeastern Brazil, another study showed that between 2010 and 2019 there was an increase in syphilis detection rates for most of the period studied, accompanied by a reduction in stillbirths and abortions due to congenital syphilis. However, the study also pointed to an increase in deaths in children under one year of age due to complications from congenital syphilis.[9] These data show that congenital syphilis is not a public health problem exclusive to Porto Velho, but rather a concern for the entire country.

In Brazil, between 2010 and 2020, congenital syphilis rates increased from 1.4 to 7.7 cases per thousand live births.[10] In the North Region, the rates reported by the Ministry of Health reached 5.8 cases per thousand live births. A similar study in Acre found a rate of approximately five cases per thousand live births, with emphasis on the state capital, which registered 8.0 cases of congenital syphilis per thousand live births.[11] Given this, Rondônia showed similar behavior as Paraná in 2021, with a transmission rate of 5.1%, indicating a possible downward trend, which can be compared to the decline observed in other states.

The year 2018 marks a decline in syphilis transmission rates to newborns in Porto Velho, suggesting effectiveness in adequate diagnosis and treatment, especially in primary care. The municipality has 75 family health teams, covering approximately 49.81% of the population.[12] The strengthening of measures

in primary care has positively reflected in the detection and resolution of syphilis cases, resulting in lower transmission rates. By December 2020, Family Health Strategy (FHS) coverage in Brazil reached 63.62%, while in the North Region, coverage for the same period was 64.69%.[13] Although the FHS in Porto Velho has proven effective in reducing transmission rates, the municipality's coverage is approximately 15% lower than the national and regional averages. This raises the question: could greater FHS coverage result in an even greater reduction in congenital syphilis transmission rates?

Regarding the evolution of primary care in Porto Velho, data from the Municipal Health Department (SEMUSA) show that, in 2013, the municipality had 17 Basic Health Units (BHUs) in the urban area and 15 in the rural area. In 2023, these numbers increased to 20 and 19, respectively, reflecting the gradual expansion of the structural coverage of primary health care/FHS during the analyzed period. This network expansion suggests a strengthening of the installed capacity for prenatal care, diagnosis, and treatment of syphilis. However, even with the increase in the number of BHUs, FHS coverage in the municipality remains lower than the state and national averages, which may limit the impact of this expansion on reducing congenital syphilis transmission rates. The persistence of higher values in Porto Velho, when compared to the rest of the state, may demonstrate that the expansion of the network, although necessary, has not been sufficient to guarantee universal and timely access for pregnant women, requiring complementary strategies for improving the quality of care, monitoring, and active case finding.

This discussion is relevant because, despite the limited coverage, significant improvements in health indicators have already been observed. This suggests that expanding coverage could extend the positive impacts. Furthermore, a study conducted with indigenous people in Mato Grosso do Sul found that 45 out of 79 cases of syphilis in pregnant women were underreported in 2014, concealing the true magnitude of the situation.[14] Although there are no specific data on underreporting in Rondônia, it is possible that there are several unregistered cases, which may distort the actual prevalence of the disease in the areas studied.

A slight increase in the chances of transmission is observed after 2021, as pointed out by Nóbrega in his study conducted in Paraíba. The author relates this increase to the proportion of prenatal consultations and syphilis tests below the number recommended by the Ministry of Health, also suggesting the influence of the initial resurgence of the COVID-19 pandemic in 2021. Despite the pandemic, specific measures were proposed for pregnant women as a risk group for COVID-19, guaranteeing access to prenatal care and minimizing impacts on health outcomes and indicators.[15]

Pandemics have deleterious effects far beyond those visible in the morbidity and mortality statistics of the disease that led to the pandemic, causing impacts on other diseases. Through a population survey of 133 Brazilian cities at the beginning of the pandemic, it was possible to identify that a quarter of the respondents reported not seeking health care, even when feeling sick, and/or failed to attend routine or screening appointments in the first months of the pandemic.[16]

The observed increase in transmission rates after 2021 points to ongoing challenges in implementing preventive measures, especially in pandemic contexts, such as COVID-19. It is essential that health services adapt their strategies to ensure the continuity of prenatal care and syphilis testing, even during periods of health crisis.

Thus, comparing Porto Velho with data from the entire state of Rondônia, it was found that the capital tends to have higher rates of congenital syphilis transmission compared to the state rates over the years. Despite this, Rondônia shows an effective response in reducing transmission, which may indicate better health policies or more effective implementation of preventive treatments in other municipalities compared to Porto Velho.

CONCLUSION

Gestational and congenital syphilis continues to represent a significant public health challenge, especially in the states of the North Region, such as Rondônia, where incidence rates remain high. This epidemiological study revealed a downward trend in transmission rates over the years, particularly in Porto Velho, highlighting the importance of public health policies and strengthening primary health care in the early detection and treatment of the disease. Furthermore, expanding coverage and improving case reporting are crucial steps to more effectively address congenital syphilis.

Only with coordinated and multifaceted efforts can we achieve the goal of eliminating vertical transmission of syphilis and ensure optimal maternal and child health for all communities.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

GSRV: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. GASA: Conceptualization, Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing. EACM: Conceptualization, Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing. ISFP: Conceptualization, Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing. SVM: Conceptualization, Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing. TFMV: Conceptualization, Data curation, Formal analysis, Investigation, Resources, Software, Writing – original draft, Writing – review & editing. VTRSG: Project administration, Supervision, Validation, Visualization, Writing – review & editing.

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