

Acceptance date: 23/10/2024
Submission date: 21/10/2024

INCIDENCE OF HIV+ PREGNANT WOMEN IN THE AMFRI REGION BETWEEN 2010 AND 2020. EPIDEMIOLOGICAL STUDY

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Abstract: Objective: This study aimed to analyze the incidence of HIV+ pregnant women in the municipalities belonging to the Association of Municipalities at the Mouth of the Itajaí River (AMFRI) - SC, between 2010 and 2020 and to describe the epidemiological profile of this population. As well as elucidating whether there was an increase in HIV+ pregnant women in the region during the period analyzed. **Methods:** A cross-sectional, retrospective, descriptive cohort study of a quantitative nature, carried out between 2021 and 2022 in the municipality of Itajaí, SC. The information contained in the SINAN files of all HIV+ pregnant women notified from 2010 to 2020 in the AMFRI municipalities was analyzed. After this, the annual incidence was calculated, using data from Itajaí and Balneário Camboriú as a basis, and finally the epidemiological profile was drawn up. **Results:** Among the ten years analyzed, there was a predominance of the epidemiological pattern of recent diagnoses and correctly treated prenatales. As for the incidence of cases, Balneário Camboriú saw an increase of 11.6% in documented cases, while Itajaí saw a decrease of 38.9% over the period. However, it remains five times higher than the national average of cases. **Conclusion:** It is therefore understood that in the AMFRI municipalities there was a significant decrease in HIV cases in pregnant women from 2010 to 2020, however, in the last two years analyzed there has been a tendency for cases to increase.

Keywords: HIV; Pregnancy; Cohort Studies; Health Profile; Disease Notification;

INTRODUCTION

Sexually transmitted infections (STIs) generate economic and social problems and constitute a serious public health problem, with a negative impact mainly on women and children.²² Among STIs, the Human Immunodeficiency Virus (HIV) stands out. HIV belongs to the Retroviridae family (retroviruses) and the Lentivirinae subfamily. It is transmitted sexually, congenitally and through breastfeeding. The virus reproduces in the human body in TCD4+ lymphocytes, multiplies and spreads, making the body vulnerable to infection by opportunistic diseases.^{2,16}

According to the Ministry of Health's 2021 Epidemiological Bulletin, from 2007 to June 2021, 381,793 cases of HIV in the Brazilian population were notified by the Information System for Diseases and Notifications (SINAN), with the southeast region accounting for 43.3%, followed by the northeast 19.8% and the south 19.7%. Of these, 266,360 (69.8%) cases were in men and 115,333 (30.2%) in women. In 2020, the sex ratio was 28 men for every 10 women.³

In the entire historical series of HIV notifications in pregnant women, the southern region has had the highest detection rates. In 2020, the detection rate was 5.2 cases/thousand live births, almost twice the national rate. Of the 11 states that had an HIV detection rate in pregnant women higher than or equal to the national rate in 2020, two of them are from the south, Santa Catarina (5.5 cases per thousand live births) and Rio Grande do Sul (8.1 cases per thousand live births).¹⁵

According to data from the Santa Catarina Epidemiological Surveillance Department (DIVE), the detection rate of HIV infection in the state of Santa Catarina follows the national pattern of a decrease in the number of notifications. The Greater Florianópolis and Foz do Rio Itajaí regions have the highest rates, but Greater Florianópolis is falling and Foz do Itajaí is rising slightly.⁶

In relation to the HIV detection rate in pregnant women, the Foz do Rio Itajaí region had the highest detection rate in the state in 2010, with more than 14 HIV+ pregnant women for every 1,000 live births. In 2020 there was a decrease to 7.1 HIV+ pregnant women per 1,000 live births. However, it remains among the two regions with the highest rates, second only to the Greater Florianópolis region (DIVE SC, 2021).⁶

With this in mind, analyzing the great expressiveness that the southern region represents in relation to this problem, and especially the Foz do Rio Itajaí region, the study aims to analyze the incidence of HIV+ pregnant women in the municipalities belonging to the Association of Municipalities of the Foz do Rio Itajaí (AMFRI) - SC, during the years 2010 to 2020, as well as to list the main characteristics of the epidemiological profile of this population.

METHODS

This is a cross-sectional, retrospective, descriptive cohort study of a quantitative nature carried out from October 2021 to December 2022 in the municipality of Itajaí, SC. This study took place in two stages and was based on two methodologies: firstly, a literature review, searching for information on the disease (HIV) on the Scielo and Pubmed platforms and Ministry of Health manuals. Secondly, an observational study, in which data was collected from the compulsory notification forms of HIV-positive pregnant women in the AMFRI municipalities, made available by the Notifiable Diseases Information System (SINAN).

The information was collected through the registry of HIV+ cases in pregnant women, identified through SINAN, via the Regional Health Department. The study population consisted of all pregnant patients with a positive HIV test reported in the AMFRI municipalities of Balneário Camboriú, Balneário Piçarras, Bombinhas, Camboriú, Ilhota, Itajaí,

Itapema, Luiz Alves, Navegantes, Penha and Porto Belo between 2010 and 2020.

Records of all pregnant women who tested HIV-positive at any time during pregnancy or at the time of delivery were included. Records with missing data and records outside the collection period were also excluded. Information was collected on age, race/color, stage of pregnancy at which HIV was diagnosed, information on prenatal care and childbirth for all pregnant women who met the inclusion criteria for the study.

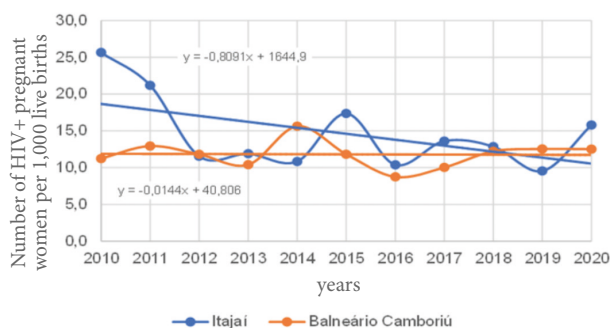
After collecting the data, they were grouped and reallocated according to their municipality of origin, in order to draw up an epidemiological profile of this population in the region studied. The municipalities used as parameters for the incidence analysis were Itajaí and Balneário Camboriú due to their greater population representativeness. Confidentiality was ensured with regard to the personal details of the notifications. The graphical resources of the Excel platform were also used to help analyze the data collected. This study was approved by the Research Ethics Committee of the Universidade do Vale do Itajaí on March 4, 2022, under CAAE number 53181321.9.0000.0120.

RESULTS

HIV INCIDENCE BASED ON THE MUNICIPALITIES OF BALNEÁRIO CAMBORIÚ AND ITAJAÍ

In the municipality of Balneário Camboriú there were 198 notifications of HIV+ in pregnant women between 2010 and 2020. In the same period, 527 pregnant women were notified in Itajaí. Not all of these women live in the municipality, and many come from other cities and states. Of the total number of notifications in Itajaí, 86.1% are residents of the municipality, 10.8% come from other municipalities belonging to AMFRI, 1.7% come from other regions of Santa Catarina

and 1.3% come from other states. The graph below shows the incidence of HIV+ pregnant women per 1000 live births in Balneário Camboriú and Itajaí.



Graph 1 - Detection curve of HIV+ pregnant women per 1000 live births between 2010 and 2020 in Itajaí and Balneário Camboriú.

Source: Notifiable Diseases Information System (SINAN), 2022.

EPIDEMIOLOGICAL OVERVIEW OF HIV IN PREGNANT WOMEN IN AMFRI MUNICIPALITIES

Between 2010 and 2020 there were 1,050 notifications of HIV+ pregnant women in all the municipalities belonging to AMFRI, with 1,044 HIV+ pregnant women living in the municipalities of the association. The municipality of Itajaí is home to the majority of HIV+ pregnant women, with 473 (45.3%), followed by Camboriú with 158 (15.1%) and Balneário Camboriú with 140 (13.4%). The municipalities with the lowest number of HIV+ pregnant women are Luiz Alves and Ilhota, with 3 cases each and together representing 0.6%.

Laboratory evidence is predominantly obtained before prenatal care, i.e. 66.6% of pregnant women start prenatal care already diagnosed. During prenatal care, 30.8% receive the diagnosis and after prenatal care, 2.3%. During the same period, 97.4% of HIV+ pregnant women adhered to prenatal care. The use of antiretroviral therapy (ART) during pregnancy followed a similar pattern, with 91% adherence. Pre-delivery prophylaxis

was carried out by 74.7% of pregnant women, 12.6% did not carry it out and in 12.6% of cases the information was not filled in on the notification form.

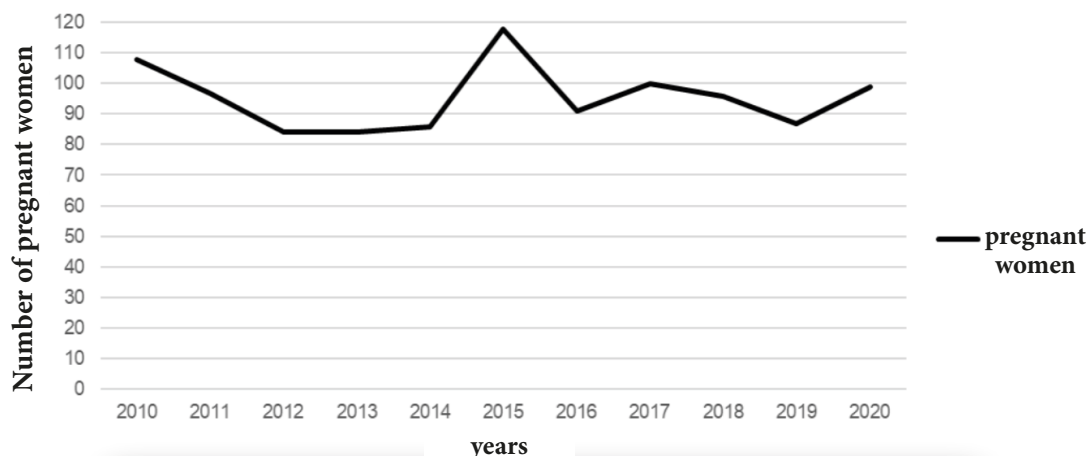
The predominant type of delivery was elective caesarean section (41.6%), followed by vaginal delivery (31.6%) and emergency caesarean section (9.3%). As for the outcome of the pregnancy, 80.2% of the children were born alive, 4.7% were aborted, 1.5% were stillborn and 13.6% of the pregnancies did not specify their outcome.

With regard to the social profile of pregnant women, the most frequent age of being pregnant and having HIV was 30. The 24-34 age group accounted for 55.3% of the total. The self-designated race was predominantly white, accounting for 78.1%. The area of residence was 96% urban. As for the children, 78.9% were given ART in the first 24 hours after birth and only 0.9% were not given ART and 0.2% were given ART after 24 hours of birth. Graph 2 shows the laboratory evidence of HIV+ pregnant women by year in AMFRI.

VERTICAL TRANSMISSION FROM THE PERSPECTIVE OF ITAJAÍ

Between 2010 and 2020, 34 vertical transmissions were reported in Itajaí. However, this number does not only refer to those born during the period analyzed. Many of these were born in previous years, but were only notified after 2014 with the implementation of Ordinance No. 1,271, of June 6, 2014, for compulsory notification. Of this number, only 6 were born between 2010 and 2020 to mothers living in Itajaí. The table below shows the frequency of notifications per year of this aspect.

Laboratory evidence of HIV+ pregnant women in AMFRI municipalities from 2010 to 2020



Graph 2 - Evolution by year of HIV+ notifications in pregnant women in the municipalities belonging to AMFRI from 2010 to 2020.

Source: Notifiable Diseases Information System (SINAN), 2022.

VERTICAL TRANSMISSION	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
	2	2	0	0	1	1	0	0	0	0	0	6

Table 1 - Vertical transmission in Itajaí-SC by year.

Source: Notifiable Diseases Information System (SINAN), 2022.

DISCUSSION

Balneário Camboriú and Itajaí remain the two municipalities with the largest populations in the AMFRI region, with 149,227 and 226,617 inhabitants respectively. Together they account for 69% of all notifications. Therefore, due to their large numbers, they were chosen as the basis for calculating the incidence of HIV+ pregnant women in the AMFRI region.

Regarding the HIV+ detection rate in pregnant women, the year with the highest number of detections in Itajaí was 2010, with 25.7 cases/thousand live births. In Balneário Camboriú, the highest number was in 2014, with 15.6 cases/thousand live births. In 2010 the national average was 2.1 cases/ thousand live births and in 2020 it rose to 2.7 cases/ thousand live births, an increase of 28.5%. In 2010, Itajaí had a rate approximately 10 times higher than the national average, falling to 15.7

cases/ thousand live births in 2020, a decrease of 38.9%. However, it is still approximately 5 times higher than the national average. Balneário Camboriú, on the other hand, had 11.2 cases/ thousand live births in 2010 and 12.5 cases/ thousand live births in 2020, an increase of 11.6%.

In absolute numbers, from 2019 to 2020 Itajaí saw an increase in cases of HIV+ pregnant women, from 9.5 cases/ thousand live births to 15.8 cases/ thousand live births, an increase of 39.8% in 1 year. However, this increase may reflect the fact that in recent years there has been an increase in the detection of HIV in pregnant women. This is mainly due to the increase in rapid testing in Basic Health Units.¹⁴

In addition, according to the Ministry of Health, there is a change in the behavior of pregnant women, with an increase in the number of women who become pregnant having already been diagnosed with HIV before prenatal care. This is evident in the two mu-

municipalities evaluated, where the diagnosis is made before prenatal care (70.4% and 64.1%) in Itajaí and Balneário Camboriú, respectively. Both figures were higher than the national average in 2018, when 61% of women became pregnant knowing they had HIV.¹⁹

Even with this increase from 2019 to 2020, linear regression analysis shows that each year there is a decrease of 0.8 cases/thousand live births in Itajaí, while in Balneário Camboriú there is a more stable situation over time, i.e. a decrease of 0.01 cases/thousand live births per year.

Another important factor is adherence to ART. In the study by Faria, *et al* 2014⁷, in the city of Porto Alegre 2014, adequate adherence to treatment considering CV HIV undetectable in the last trimester, was around 51.7%, however, still lower than the adherence of the HIV population in general (65%). In contrast, in Itajaí, from 2018 to 2020 all women used ART during pregnancy and from 2019 to 2020 in Balneário Camboriú, that is, 100% adherence to ART.

This improvement in pregnant women's adherence to treatment may be due to an improvement in the reception of pregnant women as a collective commitment to exchange knowledge, both in the hospital environment and in primary care. As well as participation in pregnant women's groups and a strong investment in active search by primary care, respecting the patient's autonomy and confidentiality.²⁰

In the AMFRI region, from 2010 to 2020, there were 1,044 HIV-positive pregnant women, 815 (78.1%) of whom were white. According to the latest IBGE Census in 2010, approximately 84% of Santa Catarina's population is white. This shows that the race of these pregnant women is similarly preponderant to the race of the state.¹⁰ As for where they live, 1,002 (96%) of them live in urban areas, which is higher than the state's urbanization rate of 84%.⁷

From 2010 to 2021, in Brazil, the 20-24 age group predominated among HIV-infected

pregnant women notified on SINAN.² It is therefore known that in Santa Catarina, from the first reported case in 1984 until 2011, the age group most affected by the virus was between 30-39 years old.⁸ This is similar to what was found in AMFRI between 2010 and 2020, where the predominant age group was 24-31, followed by 32-38. Thus, the age profile in the region is higher than the national figure and similar to the state figures.

At state level, from 2012 to 2021, 95.5% of pregnant women had prenatal care.¹⁰ In the Foz do Rio Itajaí region, between 2007 and 2012, 75.95% of pregnant women had prenatal care.¹⁸ Thus, in this region, there was a significant increase in the number of prenatal care sessions carried out between 2010 and 2020, in which 1,017 (97.4%) HIV-positive pregnant women did so. According to the literature, pregnant women who adhere to prenatal care also tend to have higher levels of adherence to antiretroviral medication.¹ Both contribute to better maternal and fetal health.

As for when the infection was diagnosed, 695 (66.6%) were diagnosed before and 322 (30.8%) during prenatal care. This was followed by 20 at the time of delivery and 4 after delivery. In Santa Catarina, from 2012 to 2021, 65.7% were diagnosed before prenatal care and 32% during.¹⁰ Therefore, the municipalities in the region were diagnosed earlier. It is known that when HIV infection is diagnosed during pregnancy, there is less time between the start of treatment and delivery to achieve virological suppression and prevent vertical transmission.¹³

In Santa Catarina, from 2012 to 2021, 87.1% of pregnant women used antiretrovirals during pregnancy.¹⁰ In AMFRI, 91% of pregnant women used antiretrovirals during pregnancy. 5.6% of them did not report this on their notification forms. Despite this progress, between 1 and 9% of pregnant women with an established diagnosis of the disease did not take the treatment. Given these fin-

dings, the need to establish care strategies that increase adherence to antiretroviral drugs during pregnancy is reinforced.

As for the type of delivery, 330 (31.6%) were vaginal, 434 (41.6%) elective caesarean sections and 97 (9.3%) emergency caesarean sections. 183 (17.5%) forms did not contain an answer to this item. In this context, it is congruent with the data from this decade in Santa Catarina, where 41% were elective caesarean sections, 27.7% vaginal deliveries and 9.7% emergency caesarean sections.¹⁰ From this perspective, it can be seen that elective caesarean sections continue to be the most frequent route, with vaginal delivery in second place. This suggests that there is a proportion of pregnant women who are unable to adjust their viral load by 34 weeks of pregnancy.¹¹

Since 2001, the World Health Organization has recommended the use of zidovudine alone or in combination with lamivudine and nevirapine during pregnancy and labor, as prophylaxis of vertical transmission and puerperal death.⁴ Of the pregnant women studied, 85.5% used intrapartum prophylaxis, due to various conditions (excluding the 132 women who did not respond to this item). This rate is higher than the state rate in the years 2012-2021, of 70%.¹⁰

Early diagnosis of the infection and the use of antiretroviral therapy have allowed viral suppression, making HIV a chronic condition, and therefore enabling greater survival and quality of life for those infected. These measures allow HIV-infected women to become pregnant without necessarily having intrauterine exposure to the virus, as long as the clinical protocols are followed properly. On the other hand, when not treated correctly, it leads to vertical transmission, stillbirths and even miscarriages.⁵

Thus, with regard to the births evaluated, 837 (92.7%) were live births, 16 (1.77%) stillbirths, 49 (5.4%) abortions and the rest

were not reported. As a result, at least 6.2% of the pregnancies analyzed resulted in death. This is higher than the state rate of 5.4% in this decade, according to DIVE data.¹⁰

As for vertical transmission, in 2017 the average vertical transmission rate for Itajaí was 6.28%, which at the time was above the national average of 2%.¹² Currently, no cases of vertical transmission have been reported in the municipality since 2016. This is due to coping measures such as the use of antiretroviral prophylaxis before childbirth, indication of cesarean delivery if VL >1000 copies/ml and guidance on replacing breastfeeding with infant formula.²¹ In addition, the 2022 Clinical Protocol of Therapeutic Guidelines states that family planning and prenatal and postnatal care can reduce vertical transmission to less than 2%, otherwise the risk is around 15 to 45%.¹⁷

CONCLUSION

It is therefore understood that in the municipalities belonging to AMFRI there was a significant decrease in HIV cases in pregnant women from 2010 to 2020, however, in the last two years analyzed there has been a tendency for cases to increase. There was also an epidemiological profile of these pregnant women, the majority of whom were white, aged between 24 and 31, living in urban areas. The majority had been diagnosed with HIV before pregnancy. Almost all of them had prenatal care and used antiretroviral drugs during pregnancy. The most common mode of delivery was elective caesarean section. As for the end of the pregnancy, the majority resulted in live births and used ART within the first 24 hours after birth.

The data analyzed shows that the AMFRI region has the second highest rate of pregnant women with HIV in Santa Catarina. However, it manages to assist more pregnant women than the state average.

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