

## Epidemiological profile of cases with microcephaly served in high-risk maternity in Sergipe

## Perfil epidemiológico dos casos com microcefalia atendidos em maternidade de alto risco em Sergipe

Andria Silveira Almeida<sup>1</sup> 

Elaine Ferreira da Silva<sup>2</sup> 

Ravena dias Figueredo Rodrigues dos Santos<sup>3</sup> 

Thaynara Fontes Almeida<sup>4</sup> 

Fernanda Kelly Fraga Oliveira<sup>5</sup> 

Lourivânia Oliveira Melo Prado<sup>6</sup> 

<sup>1</sup>Corresponding author. Universidade Tiradentes (Aracaju). Sergipe, Brazil. andria-almeida@hotmail.com

<sup>2-6</sup>Universidade Tiradentes (Aracaju). Sergipe, Brazil.  
enfa.elaineferreira@hotmail.com, ravena07@hotmail.com, thaynarafontess@gmail.com, fernadadaponte@hotmail.com, loriorado@bol.com.br

**ABSTRACT | OBJECTIVE:** To outline the epidemiological profile of cases treated with microcephaly in high-risk maternity in the state of Sergipe in 2015. **MATERIALS AND METHODS:** This is a quantitative descriptive study of microcephaly cases in live births of mothers living in the state from Sergipe. It was developed in public maternity of reference for pregnant women and high-risk newborns in Aracaju- Sergipe's municipality. The convenience-selected sample consisted of 57 medical records of cases of microcephalic newborns. **RESULTS:** Regarding the profile of the newborns, 56.14% were female, 85.96% had head circumference <32 cm, 82.45% Ápgar1 ` ≥ 7, 92.98% Ápgar 5 ≥7 and 82, 45% normal weight (2500-3999g). As for the mothers' sociodemographic characteristics, 49.12% were between 21 and 30 years old, 96.49% race/brown color, 26.3% incomplete elementary school, and 77.19% occupation of housework. During prenatal care, 8.77% underwent STORCH tests, 7.01% underwent Zika virus testing, 8.77% underwent chikungunya, and 3.50% serology for dengue. In 2015, microcephaly in the state was considered an emergency of national importance. **CONCLUSION:** There was a predominance of female newborns with head circumference <32. Most of the mothers were adults and had low socioeconomic conditions.

**DESCRIPTORS:** Epidemiology. Microcephaly. Zika virus. Mothers. Newborn.

**RESUMO | OBJETIVO:** Delinear o perfil epidemiológico dos casos atendidos com microcefalia em uma maternidade de alto risco no estado de Sergipe no ano de 2015. **MATERIAIS E MÉTODOS:** Trata-se de um estudo descritivo quantitativo dos casos de microcefalia em nascidos vivos de mães residentes no estado de Sergipe. Foi desenvolvido em uma maternidade pública de referência para gestantes e recém-nascidos de alto risco do município de Aracaju - Sergipe. A amostra selecionada por conveniência foi composta por 57 prontuários de casos de recém-nascidos microcefálicos. **RESULTADOS:** Em relação ao perfil dos recém-nascidos, 56,14% eram do sexo feminino, 85,96% tinham perímetro cefálico <32 cm, 82,45% Ápgar1 ` ≥ 7, 92,98% Ápgar 5 ≥7 e 82,45% peso normal (2500-3999g). Quanto às características sociodemográficas das genitoras, 49,12% tinham entre 21 a 30 anos, 96,49% raça/cor parda, 26,3% ensino fundamental incompleto e 77,19% ocupação de doméstica. Durante o pré-natal, 8,77% realizaram exames de STORCH, 7,01% o exame de zika vírus, 8,77% exame para chikungunya e 3,50% sorologia para dengue. Em 2015, a microcefalia no estado foi considerada emergência de importância nacional. **CONCLUSÃO:** Houve predomínio de recém-nascido do sexo feminino e com perímetro cefálico <32. A maioria das genitoras eram adultas e com baixas condições socioeconômicas.

**DESCRITORES:** Epidemiologia. Microcefalia. Zika vírus. Mães. Recém-nascido.

## Introduction

The Zika virus belongs to the genus flavivirus and is transmitted by the mosquito *Aedes Aegypti*. In 2015, an outbreak was identified in the Northeast of Brazil<sup>1,2</sup>. In September 2015, there was an increase in the number of newborns with microcephaly in areas affected by this arbovirus<sup>3</sup>.

Microcephaly is defined by changes in physical and functional structure at birth. According to the World Health Organization (WHO) and international scientific literature, a case is considered microcephaly when the head circumference (CP) has less than two or more standard deviations (SD) than the reference for sex, age, or gestation time<sup>4</sup>.

According to the Pan American Organization (PAHO), from January 2015 to 2018, there were 3,720 confirmed cases of Congenital Zika Virus Syndrome in the Americas<sup>1</sup>. Between 2015 and 2018, the Ministry of Health (MS) reported 16,348 suspected cases with changes in growth and development, possibly related to infection. Of these, 3,226 (19.7%) were confirmed<sup>2</sup>.

In Brazil, up to February 2016, 5,909 cases of microcephaly were reported, of which, 641 were confirmed for some anomaly, 139 evolved to fetal or neonatal death, 96 remained under investigation, 31 confirmed, and 12 had the diagnosis of microcephaly discarded<sup>5</sup>. The highest prevalence is concentrated in the Northeast (59.3%), followed by the Southeast (24.7%)<sup>6</sup>. At the state level, Pernambuco leads with 21.3%, Bahia 14.3%, Paraíba 9.0%, São Paulo 8.1% and Rio de Janeiro 7.8%<sup>7</sup>.

There were 150 reported cases per year in the country, and today, the suspected cases total 13,835; of these, 2,753 (19.9%) have been confirmed<sup>8</sup>, comparing data on microcephaly cases from 2010 to 2014 with data between 2015 and 2016.

In Sergipe, 274 suspected cases of congenital Zika-related syndrome were reported between 2015 and 2017, of which 129 were confirmed. The region of Aracaju appears with the highest number of reported

cases (98), followed by the regions of Nossa Senhora do Socorro (43), Estância (37), and Itabaiana (29)<sup>2-9</sup>.

The association between Zika and microcephaly arose from findings of the virus in the brain tissue of newborns through imaging tests. In Brazil, in 2015, the rapid spread has focused the attention of health authorities on the possible diagnosis and early intervention in infected pregnant women and newborns<sup>10</sup>.

It is noteworthy that the epidemiological profile of the mother-child binomial with the congenital Zika virus syndrome is important, as it allows a better understanding of the patterns of occurrence of the disease and the gaps in prevention, allowing a better basis for strategies for health care<sup>6</sup>.

Thus, the research was motivated to delineate the epidemiological profile of cases treated with microcephaly in high-risk maternity in Sergipe in 2015 due to the high incidence of microcephaly records in newborns because it presents itself as a serious public health problem in the state.

## Materials and methods

That is a descriptive study with a quantitative approach to cases of microcephaly in live births of mothers living in the state of Sergipe.

The study was carried out in a maternity hospital in Aracaju-Sergipe and constituted the only public reference in the state for pregnant women and high-risk newborns. Since its inauguration in December 2007, it has been an official contributor to the Latin American Collaborative Study of Congenital Malformations (ECLAMC). It served patients in the 75 municipalities in the state through referrals or spontaneous demand and was chosen because it is a population reference database for Sergipe.

The related research is part of an umbrella project entitled "Clinical and Epidemiological Analysis of

Microcephaly cases that occurred in a public maternity hospital in Sergipe," approved by the Ethics and Research Committee (CEP) of Universidade Tiradentes under protocol number 2,583.623 and the Certificate of Presentation / Ethical Appreciation (CAAE) 8334518.3.0000.5371. The study follows the guidelines and regulatory standards of Resolution 466/2012 of the National Health Council, which talks about research involving human beings.

The convenience-selected sample consisted of 57 medical records of cases of microcephalic newborns during 2015. The medical records of newborns who presented notified and confirmed cases of microcephaly born in 2015 filed in the archival sector were included in the medical research (SAME) of the institution. Medical records that did not include the variables described in the research were excluded. The data were collected through the compulsory notification form standardized by the Ministry of Health and the registration form for assessing the health conditions of the child with microcephaly adapted from the Ministry of Health's guidance protocol.

Data collection took place between August and December 2018. The average time for analysis was 15 minutes for each medical record due to the illegibility and interpretation of the data. Among the variables to carry out this research are: variables of the NB (gender, Ápgar<sup>1</sup>, Ápgar<sup>5</sup>, weight, head circumference, alterations in the image exams) and the mothers (age group, race/color, education, occupation, marital situation, and place of birth), home).

A descriptive analysis was performed using absolute frequency and relative percentage. The software used for statistical analysis was the R Core Team2018.

## Results

The profile and clinical conditions of the 57 microcephalic newborns in 2015 are described in Table 1. It was observed that there was a predominance of females 32 (56.14%). Apgar1 'with values  $\geq 7$  had a prevalence of 47 (82.45%) and Apgar 5' with a value  $\geq 7$  of 53 (92.98%). Regarding anthropometric data, it was identified that 47 (82.45%) had normal weight (2500-3999g). It was observed that 49 (85.96%) had CP  $< 32$  cm and 32 (56.1%) microcephaly found by imaging exams.

**Table 1.** Profile and clinical conditions of microcephalic newborns in 2015, Aracaju/SE

Variables		
<b>Sex</b>	<b>n</b>	<b>%</b>
Female	32	56,14
Male	25	43,85
<b>Ápgar1`</b>		
<7	10	17,54
$\geq 7$	47	82,45
<b>Ápgar5`</b>		
<7	04	7,01
$\geq 7$	53	92,98
<b>Weight</b>		
Very low weight (1000-1499g)	02	3,50
Low weight (1500-2499g)	08	14,03
Normal (2500-3999g)	47	82,45
<b>Cephalic perimeter</b>		
<32	49	85,96
>32	08	14,03
<b>Changes in imaging exams</b>		
Microcephaly	32	56,14
Other malformations	19	33,33
No changes	06	10,52

Source: Maternidade Nossa Senhora de Lourdes (2018).

Regarding the sociodemographic characteristics of the mothers, correlated to the age group, most were aged between 21 and 30 years old 28 (49.12%). They declared themselves of brown race (pardo/a) 55 (96.49%). As for the level of education, the most prevalent was an incomplete elementary school, with 15 (26.31%). Concerning occupation, the housemaid option was predominant with 44 (77.19%), and the other sociodemographic characteristics are described in table 2.

**Table 2.** Description of the sociodemographic characteristics of the mothers of newborns with microcephaly in 2015, Aracaju/SE

<b>Variables</b>	<b>n</b>	<b>%</b>
<b>Age range</b>		
10-20 years old	16	28,07
21-30 years old	28	49,12
31-40 years old	12	21,07
Over 41 years old	01	1,75
<b>Race/color</b>		
Parada	55	96,49
Black	01	1,75
White	01	1,75
<b>Education</b>		
Complete Elementary School	07	12,28
Incomplete Elementary School	15	26,31
Elementary I	02	3,50
Elementary II	11	9,29
Complete High School	10	17,54
Incomplete Middle School	08	14,03
Incomplete High School	03	5,26
Ignored	01	1,75
<b>Occupation</b>		
Housemaid	44	77,19
Student	03	5,26
Others	10	17,54
<b>Marital status</b>		
Single	38	66,66
Stable union	12	21,05
Married	07	12,28
<b>Place of residence</b>		
Capital	47	82,45
Countryside	10	17,54

Source: Maternidade Nossa Senhora de Lourdes (2018).

Table 3 describes the findings on the laboratory performance tests during prenatal care. It was found that only 5 (8.77%) underwent STORCH exams, 4 (7.01%) underwent Zika virus exam, 5 (8.77%) underwent chikungunya, and 2 (3.50%) underwent serology for dengue.

**Table 3.** Laboratory tests performed during prenatal care, Aracaju/SE in 2015

<b>Exams</b>	<b>N</b>	<b>%</b>
Zika virus	04	7,01
STORCH	05	8,77
Chikungunya	05	8,77
Dengue	02	3,50

Source: Maternidade Nossa Senhora de Lourdes (2018).

## Discussion

The clinical conditions of newborns and the evidence found in this study concern a study carried out between 2015 and 2016 in Piauí, that was published in 2018, where 21% of this population were female. The CP measured 48 hours after delivery had a median of 33 centimeters (IIQ = 3). The median weight was 2,372 grams (IIQ = 712). According to MS, the following criteria for identifying at-risk newborns are the low socioeconomic status of the family, teenage mother (<20 years old), newborn with low birth weight (<2,500g), the mother with low education (<eight years of study), NB with severe asphyxia at birth (Apgar <7 in the 5') and NB with other serious diseases<sup>11</sup>.

Children with asphyxia are considered to have a lower Apgar score <7 in the 5'. In this study, the highest prevalence was among Apgar  $\geq 7$ , with 92.98% (53); therefore, it is not considered a risk of suffocation. However, the Apgar score reflects the vital functions of the newborn and, in isolation, is no longer acceptable to define asphyxia<sup>12</sup>. Even so, the Apgar score is considered an important indicator for its easy applicability. When <7 in the 5' is found, it demonstrates the need for special attention<sup>13</sup>.

As for the PC, it was revealed by the research that the majority has a measurement <32 cm. According to the WHO, microcephaly is termed with CP less than -2 standard deviations (CP <-2DP). It is described as a CM of neurological impairment with the conditions not to develop the brain properly, and the CP measured in newborns is lower than expected for gestational age and the corresponding sex<sup>14</sup>.

The present study showed that, according to the sociodemographic characteristics of the mothers of newborns with microcephaly in 2015, there was a predominance of mothers aged 21 to 30 years with 49.12% (n 28), while the percentage of teenage mothers under the age of 20 was 28.07% (n 16), a period that coincides with the woman's reproductive age.

Regarding education, women with less education had a higher number of newborns with microcephaly, with (26.31%)(n 15). It is noteworthy that the least educated women were the most prominent victims, evidencing

a solid relationship with the socioeconomic standard since they belong to lower social classes, which may compromise pregnancy and the baby's development due to various conditions<sup>15</sup>. It is noted that the level of education directly interferes in the discernment of the pertinent information about pregnancy, including the prenatal period as recommended by the Ministry of Health, with a minimum of six consultations, and the fulfillment of the guidelines regarding the prevention of congenital anomalies, mainly microcephaly.

Based on the assumption that Brazil is a country of intense social inequality, poverty can be considered as a social determinant in the configuration of the Zika virus epidemic in the country. Social inequalities in health are explained by the theory of social determination of the health-disease process. Social characteristics are studied, such as income, occupation, race, ethnicity, gender and conditions of the place of residence. The social organization defines the disease and its distribution based on the class position and social reproduction that come to be seen as determinants of the health and disease profile<sup>16</sup>.

Another determining factor is the restricted access to health services, especially for those mothers who live in cities in the interior of the state, where it does not apply to the result found in the research, with the capital as the highest prevalence 47 (82.45%), enabling greater quality in assistance<sup>16</sup>. This number may also represent the fact that the capital has a referral health network that cared for women referred from the interior, who may have been wrongly registered as residents in the capital of Sergipe.

As for the occupation of these mothers, the majority are domestic workers, which shows that they dedicate themselves entirely to the care of the child, which can be configured in situations of abandonment of their professional or educational activities. A study highlights the role of women as the main caregiver<sup>17</sup>. Regarding this problem, when one of the parents, especially the mother, needs to leave work to dedicate herself to the child's care, it worsens the socio-economic condition of the family group. Given this reality, these conditions are decisive in human development, making it necessary to know the family and social context in which the child is inserted.

The present study showed a predominance for single mothers. In this sense, family and, especially, partner support is essential during pregnancy and the puerperium, as these are periods of intense hormonal changes in which women need psychological support, comfort, and support. A study by the medical students of the Catholic University of Brasília in 2013 also points out that women who do not have a partner had more cases of newborns with microcephaly<sup>18</sup>. There were also situations of abandonment by the man of the marital relationship after the child's diagnosis of microcephaly.

A child with microcephaly demands more care than a child born healthy. They need treatment and support from a multidisciplinary team to assist in their recovery and development. Therefore, the fact that most women are single in these situations is configured as a vulnerability to the child since the mother has her income compromised. They abandon work activities because they are overburdened with child care.

The highest prevalence of detection of this anomaly was diagnosed during pregnancy. According to a study carried out in Cambridge in 2013, the detection of microcephaly occurs before 36 weeks. That is due to the decrease or failure of neurogenesis, which are degenerative processes or aggressions that influence the development and function of the central nervous system<sup>19</sup>.

Currently, imaging diagnosis is made through transfontanelar ultrasound to recognize structural anomalies of the brain, is recommended when the fontanelle size is sufficient, being essential for the diagnosis of primary microcephaly, and computed tomography when there is a severe form, as it is more specific<sup>11</sup>.

In the case of early identification of a skull circumference smaller than expected for gestational age during the prenatal period, it is possible to achieve greater success in actions to clarify the epidemiological suspicions related to microcephaly, as well as to prepare better and guide in a way the family is suitable for the birth of a newborn with malformation<sup>4</sup>.

According to the Ministry of Health, prenatal care is a set of greater relevance for care aimed at maternal and fetal health, as it allows actions and guidelines

that promote a good experience during pregnancy and childbirth, reducing the risks of complications in childbirth. And puerperium. During prenatal care, it is possible to avoid, detect or treat most of the health problems of pregnant women through consultations<sup>4</sup>. The protocol of the MS recommends the collection of samples of umbilical cord blood, cerebrospinal fluid (CSF), and urine of the newborn at the time of birth to perform specific serologies for arboviruses and other diseases of the STORCH investigation protocol (syphilis, toxoplasmosis, rubella, cytomegalovirus, herpes simplex)<sup>2</sup>.

Due to the high incidence of microcephaly cases in 2015, the MS, in the face of this epidemic, declared a state of emergency of national importance and found that the first months of pregnancy of children born with this anomaly correspond to the period of greatest circulation of the Zika virus. It correlates with a history of genetic disease in the family or tests with patterns of infections for STORCH syndrome, justifying the need to order tests during prenatal care<sup>20</sup>.

According to a study carried out in a high-risk maternity hospital in Sergipe, in 2015, 22 children (38.59%) were admitted with a clinical outcome for microcephaly, the year with the highest incidence for this anomaly. Another study carried out in a high-risk maternity hospital in Pernambuco in the same year described 29 cases of hospitalized children with microcephaly, leading the Secretary of Health of the State of Pernambuco (SES-PE) to communicate the existence of the epidemic to the Ministry of Health. Therefore, the SES-PE teams, together with the Epidemiology Training Program Team Applied to the Unified Health System (EPISUS) Services, initiated a preliminary epidemiological investigation of the cases<sup>21</sup>.

Given the data collection regarding the epidemiological profile of the mother, it is noticed that there is the vulnerability of the mother-child binomial, making it necessary holistic and multidisciplinary assistance by the health network, with Primary Health Care as the main link in the actions of home visits focused on the promotion, prevention, and maintenance of the health-disease process.

The limitations were in relation to the medical records, as they were illegible, which hindered data analysis and interpretation.

## Conclusion

There was a predominance of female newborns with <32 cm of CP, and about the mothers, the majority are adults, pardas(brown), with incomplete elementary school and the majority being housemaids

It should be noted that newborns with microcephaly need the care of a multi-professional team to assist in their growth and development. The data obtained in the research can contribute to the scientific community and to the professionals who carry out the therapeutic follow-up of these children, providing information about the clinical conditions, sociodemographic, and family conditions. For this, it is considered relevant to carry out training courses for health professionals in the identification and notification, aiming to improve the information system and establish adequate health programs for their prevention and assistance.

The research is relevant since microcephaly is a public health problem, and as it is a recently discovered syndrome, it needs new research to be developed.

## Authors contributions

Silva EF and Santos RFR participated in the conception, design, analysis, and interpretation of data and writing of the article. Almeida TF and Oliveira FKF collaborated in the critical review. Almeida AS participated in the analysis and interpretation of data, writing the article, critical review, and approval of the version to be published. Prado LOM participated in the conception, design, analysis, and interpretation of data, critical writing of the article, and approval of the final version to be published.

## Competing interests

No financial, legal, or political conflicts involving third parties (government, companies and private foundations, etc.) have been declared for any aspect of the submitted work (including, but not limited to grants and funding, participation in advisory council, study design, preparation manuscript, statistical analysis, etc.).

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