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Incidence and prevalence of microcephaly in the State of Pernambuco between 2015 and 2016

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Abstract: In the second half of 2014, a new febrile illness was recorded in some cities in northeastern Brazil. The Zika virus has caused febrile illness, accompanied by mild occurrence of other general symptoms, such as headache, exanthema, edema and joint pain. To analyze the incidence and prevalence of microcephaly in the state of Pernambuco in the face of secondary data extracted from the health surveillance system of the State of Pernambuco. Secondary data extracted from the health surveillance system of the State of Pernambuco was used as an investigation tool. In the period from August 2015 to November 2016, 2,179

cases of microcephaly were recorded/reported in the State of Pernambuco, with 325 cases confirmed in 2015 and 59 cases in 2016 (so far). Constant surveillance and evaluation of new cases is important to describe the phenotypic extent of possible congenital infections associated with zika virus.

Keywords: Microcephaly. Zika Virus. Arbovirus Infections

1. Introduction

In the second half of 2014, a new febrile illness was recorded in some cities in northeastern Brazil (1). The clinical manifestations of this disease did not meet the criteria for a classic exanthemata disease, such as measles, rubella, scarlet fever or sudden rash. Although the Northeast region is an endemic area for dengue virus (DENV), some serological evaluations for DENV were negative (2). The suspected cases were present in the cities of Natal, capital of Rio Grande do Norte, and Recife, capital of the state of Pernambuco, among other smaller localities. After extensive investigation of these cases, the circulation of zika virus (ZIKV) in this region of the country (1,2) was confirmed.

Zika virus is a flavivirus (family Flaviviridae) transmitted by Aedes aegypti and was originally isolated from a febrile Rhesus monkey female in the Zika Forest (hence the virus's name), located near Entebbe in Uganda, on April 20, 1947(3,4). The genome consists of an RNA molecule, simple chain and positive sense. ZIKV is mainly transmitted by aedes aegypti and Aedes albopictus mosquitoes. There is also the possibility of transmission through the sexual route, by blood and neonatal transfusion, although it is not known the real protagonist of these transmission routes in the spread of infection (1).

In addition to fever, Zika is accompanied by a mild occurrence of other general symptoms, such as headache, exanthema, which is more pronounced than in other arboviruses, with conjunctival hyperemia, but without significant alteration in joint involvement and leukocytes and platelet count. In general, the disappearance of symptoms occurs between 3 and 7 days after their onset (5,6). However, despite the apparent benignity of the disease, more recently in French Polynesia and Brazil, more severe conditions, including central nervous system involvement (Guillain-Barré syndrome, transverse myelitis and meningitis), associated with Zika have been commonly recorded, which shows how little known this disease is (2-7-8).

Brazil was the first country to identify a possible relationship between Zika virus infection during pregnancy and the occurrence of microcephaly in newborns (NB). From the establishment of a national task force, among the first 35 cases of NB with microcephaly reported in eight states of the country (August and October 2015), all mothers lived or visited areas infected by the virus during pregnancy (9). Since October 2015, the number of cases of neonatal microcephaly, possibly related to the Zika virus, has grown significantly in The Brazilian territory, including cases detected in approximately 724 municipalities in the country (4).

Microcephaly is the dissolution of neurological development causing the fetus or newborn to present head circumference (CP) below 2 standard deviations (PD) of the limit of normality of gestational age and sex (10,11). Mild microcephaly is considered to have a measurement of CP between 2 or 3 SD below average and severe microcephaly when cp is below 3 SD (12). According to its causes, microcephaly may be considered malformation or disruptive injury. This is the first when the cause is intrinsic, that is, genetic cause and disruptive injury when its cause is extrinsic, as per some infections (5).

Microcephaly can also be detected in the uterus by imaging, such as ultrasound (US) performed during pregnancy. Other imaging tests such as transfontanelar ultrasonography (US-TF) and computed tomography (CT) are used after framing the NB as microcephalic (12). There is no treatment for fetal microcephaly, however the pregnant woman should have prenatal and psychotherapeutic follow-up from a multidisciplinary team in primary care that helps her to overcome fears and expectations (13).

The Early Stimulation Program benefits children with microcephaly and impairments in neuro psychomotor development, such program aims to stimulate the child by expanding their competencies, addressing stimuli that interfere in their maturation, thus favoring motor and cognitive development. The child should be inserted in this program as soon as a baby, extending to 3 years of age. At this stage the brain develops more rapidly, thus constituting the opportunity to establish functions that will bring greater independence and better quality of life in the future (14).

Given the worrying increase in daily reported cases of microcephaly in the country, it is important to deepen the knowledge about the Zika virus during pregnancy and its possible neonatal consequences, so that we can outline actions to prevent infection, monitor prenatal care for infected pregnant women, as well as offer adequate care for the health promotion of mothers and newborns with microcephaly.

2. Methodology

This is a literature review-like study, in the descriptive format in order to approach a broader review of the methodology, in which it allows the integration of the theoretical literature. On the physiotherapeutic resources used in patients with FM and TMD. As well as studies with different approaches. The review was developed through a full analysis of the articles.

Scientific articles were used in electronic bases of scientific publication, identified from the following: Science Direct, Scientific Electronic Library Online (SciELO), Latin American and Caribbean Literature on Health Sciences (Lilacs)

and US National Library of Medicine (PUBMED).

The search in the database was performed using the following key words: fibromyalgia, temporomandibular dysfunctions, rehabilitation, physical therapy resources. The *uni* terms or descriptors were previously identified in the Descriptors in Health Sciences (DeCS) and Medical Subject Heading (MeSH), being: 'fibromyalgia', 'temporomandibular joint dysfunction syndrome', 'rehabilitation'.

Next, a combination was made by means of the Boleyn connectors: physiotherapy resources AND Rehabilitation of patients AND fibromyalgia AND temporomandibular joint dysfunction syndrome. The articles selected for the review were published in the period from 2015 to 2021.

Data analysis was performed in September 2021, where it was organized into tables.

3. Results and Discussion

According to the health surveillance system of the State of Pernambuco, cases of microcephaly associated with Arbovirus Zika Virus began to emerge in mid-August 2015 and 325 cases were confirmed in the respective year; 59 cases of microcephaly were confirmed in 2016 (so far). In previous years and between 2011 and 2014, cases of microcephaly associated with other causes such as toxoplasmosis, syphilis, Cytomegalovirus were confirmed.

From August 1, 2015 to November 12, 2016 through the CIEVS-PE Platform, 2,179 reported cases of microcephaly were registered to the Health Department of Pernambuco state, classified according to Table 1.

Table 1. Classification of cases and deaths of microcephaly. Pernambuco 2015-2016

Classification	N	%
Confirmations *	394	18,1
Discarded **	1441	66,1
Investigation		
Cases	252	11,6
	92	4,2
Total:	**2179**	**100,0**

Source: CIEVS/GIEVE/DGIAEVE/SEVS/SES. Of the 394 confirmed we have a total of 9 deaths. Of the 1441 discarded we have a total of 2 deaths.

Regarding the characteristics of the newborns, 1,344 (61.7%) were female, the mean head circumference was 30.9 cm with a standard deviation of 2.1. The births occurred in greater proportions in the municipality of Recife, highlighting the following Hospitals: Instituto de Medicina Integral Professor Fernando Figueira - IMIP (9.7%), Hospital Agamenon Magalhães - HAM (9.5%) and Hospital Barão de Lucena - HBL (7.3%). Table 2 shows the distribution of reported and confirmed cases of microcephaly according to the definitions established by the WHO.

Table 2. Classification of microcephaly cases according to the parameters defined by the WHO. Pernambuco, 2015 - 2016.

Classification	Notified	Confirmed
	%	%
Microcephaly	618	91
	28,3	23,1
Microcephaly Severe	385	216
	17,7	54,8
They do not meet the WHO Settings	1107	73
	50,8	18,5
Unrated	69	14
	3,2	3,6
Total	2179	394
	100,0	100,0

Source: CIEVS/GIEVE/DGIAEVE/SEVS/SES-PE

Analyzing the temporal evolution of the prevalence rate of microcephaly cases per 10,000 live births (LB) according to epidemiological week. There is a progressive increase since epidemiological week (SE) 33/2015, with a peak in SE 48/2015, reaching 197.8 cases/10,000 live births (LB). As of SE 49/2015, the rate increased from 178.1 to 40.2 cases/10,000 LB in SE 47/2016, representing a reduction of 77.4%. Observing the evolution of prevalence rates due to microcephaly over the last three SE (43 to 45/2016), there was an increase of 43.9% in the prevalence rate of microcephaly in Pernambuco, from 21.4 to 30.8 cases/10,000 LB.

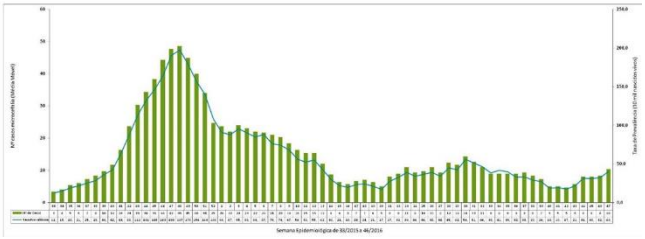

Figure 1. Moving average of cases of microcephaly (3 weeks) and prevalence rate (10,000 live births) per epidemiological week. Pernambuco, 2015-2016. **Source**: CIEVS/GIEVE/DGIAEVE/SEVS/SES-PE

When analyzing the geographic distribution of the 2,179 records, a concentration of cases was observed in the I Health Region.

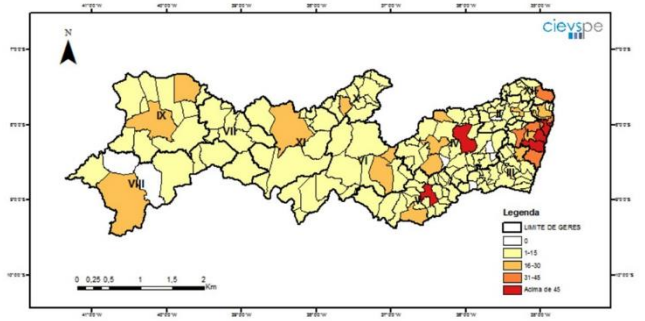

Figure 2. Distribution of reported cases of microcephaly according to the

municipality of residence. Pernambuco 2015-2016. **Source**: CIEVS/GIEVE/DGIAEVE/SEVS/SES-PE

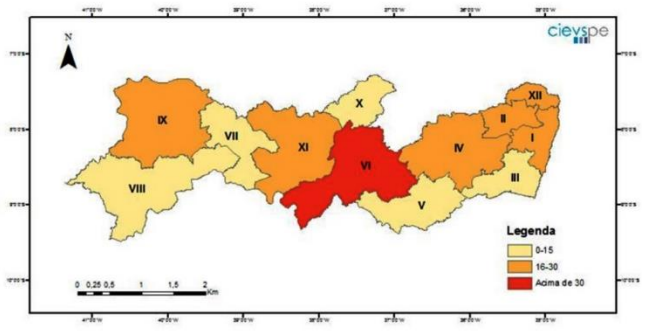

Figure 3. Distribution of the prevalence rate of live births with microcephaly by 10,000 LB in Pernambuco 2015-2016. **Source**: CIEVS/GIEVE/DGIAEVE/SEVS/SES-PE.

Analyzing the reported cases of microcephaly, a downward trend was observed from epidemiological week 47/2015. Cases whose head circumference does not meet WHO definitions correspond to the majority of notifications, followed by cases considered microcephaly and severe microcephaly.

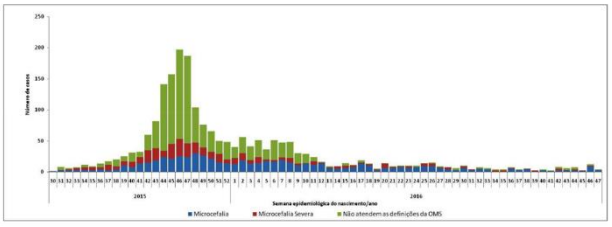

Figure 4. Temporal distribution of reported microcephaly cases, according to their classification. **Source**: CIEVS/GIEVE/DGIAEVE/SEVS/SES-PE.

In relation to the 394 confirmed cases of microcephaly, over this time, there was a predominance of confirmation of cases of severe microcephaly, when the newborns presented a head circumference lower than minus 3 standard deviations below the mean for gestational age and sex.

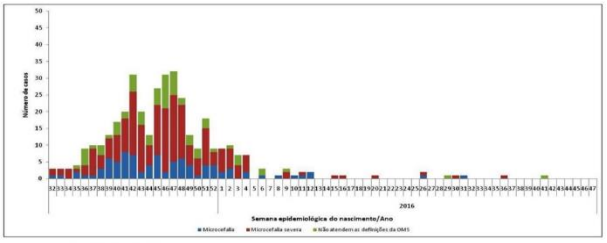

Figure 5. Temporal distribution of cases confirmed according to the classification of microcephaly. Pernambuco 2015-2016. **Source**: CIEVS/GIEVE/DGIAEVE/SEVS/SES-PE.

Analyzing recent studies, they demonstrate that fetuses of mothers proven to be infected by ZIKV have more severe CNS damage different from other known congenital infections. Moreover, the concentration of ZIKV in brain tissue, more than in any other organ or tissue, evidences its neurotropism, and still has an unknown cause (15). The infection being often asymptomatic or even being associated with symptoms of other viruses and/or arboviruses, does not make clear the extent of this disease. Microcephaly usually results from abnormal brain development, its consequence takes into account fundamental brain abnormalities and can range from mild developmental delays to intellectual and motor deficit, cerebral palsy (15).

The investigations that have been seeking proof of ZIKV as another cause of microcephaly are extremely important for the real recognition of the damage and potential of this new virus. Thus, it contributes to the team detaining new prevention strategies and care to be provided to families affected by the disease (16). This epidemic has emerged and has been challenging public health since the research, promotion, prevention and rehabilitation of the health of the affected population. The birth of microcephalic children will need all the commitment, dedication and support of a multidisciplinary team and government investments for rehabilitation and social reintegration of these (17).

The prevention strategies established by the Ministry of Health include efforts to permanently remove foci of mosquito reproduction, being containers of standing water, care of household waste, being as important as, is also the orientation to pregnant women for constant use of repellents, clothes that can protect them and use of mosquito nets. Community awareness and mobilization are also measures to prevent arboviruses (18). This new challenge arises at a particularly delicate moment, of political and economic fragility, which further accentuates social vulnerabilities, restricts more intensely the contribution of resources needed to the SUS and compromises the financing of research, which is certainly one of the essential components of an adequate response to the emergence of new health problems.

The results of this study are subject to some limitations. Before the second half of 2015, the prevalence rate was 0.5 cases in 10,000 live births, indicating a low clearance of microcephaly in Brazil. However, in mid-August 2015 there were more than 3,000 suspected cases of microcephaly, approximately 20 cases per 10,000 live births. These cases were recorded through a special notification protocol, thus suggesting a marked increase in the number of cases and in the prevalence rate (19). Since the Ministry of Health alert and media coverage, surveillance and the number of professionals reporting suspected cases have increased. Before the alert, even if there are a description of records of other congenital anomalies, the head circumference may not receive such attention, consequently it is possible that cases of mild microcephaly have not been recorded (20).

Another factor to be observed is that Zika virus infection in children and mothers who had no laboratory confirmation, history of nonspecific rashes during pregnancy, or even those asymptomatic cases, suggests underreporting, thus generating an incidence rate far below what the virus's

potential represents (20).

4. Conclusions

The relationship of zika virus and microcephaly is in a growing worldwide study, and there are some studies associating the virus with microcephaly, where there are several challenges, among them is to clarify and prove the risks during pregnancy and to trace an effective treatment in case of an infected pregnancy. Constant surveillance and evaluation of new cases is important to describe the phenotypic extent of possible congenital infections associated with zika virus. It is also essential to monitor a multidisciplinary health team with newborns with microcephaly, starting early stimulation to favor motor and cognitive development

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