



Sleep in children with microcephaly due to Zika virus infection: a systematic review

Sono em crianças com microcefalia por infecção do Zika vírus: revisão sistemática

Sueño en niños con microcefalia debido a la infección por el virus Zika: revisión sistemática

How to cite this article:

Santos EMS, Reis MCS, Feitosa ALF, Medeiros AMC. Sleep in children with microcephaly due to Zika virus infection: a systematic review. Rev Esc Enferm USP. 2021;55:e20200507. DOI: <https://doi.org/10.1590/1980-220X-REEUSP-2020-0507>.

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ABSTRACT

Objective: To review the literature on sleep changes and brain function in children with microcephaly due to Zika virus. **Method:** Systematic review conducted in the databases MEDLINE (*PubMed*), *Scopus*, *Web of Science*, CINAHL, EMBASE, LILACS, and SciELO and the grey databases *Google Scholar* and *OpenGrey*. **Results:** Ten Brazilian primary studies with observational research design were included. These were published between 2017 and 2020 with 516 children with microcephaly due to Zika virus infection aged 4 months to 4 years. Out of these, 4 investigated qualitative aspects of sleep using the questionnaires Brief Infant Sleep Questionnaire or Infant Sleep Questionnaire and 6 investigated changes in brain activities during sleep using the Electroencephalogram or Video-Electroencephalogram exams. The children's quality of sleep was not compromised in most studies. Changes in brain activity during sleep were frequent, with epileptogenic activity being a common finding among the studies. **Conclusion:** The quality of sleep of children with microcephaly due to Zika virus has shown to be similar to that of children with typical development and the presented behavioral changes may be related to changes in electric brain activity.

DESCRIPTORS

Sleep; Microcephaly; Zika Virus Infection; Systematic Review.

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Received: 11/23/2020
Approved: 05/21/2021

INTRODUCTION

The increase of live births with microcephaly between 2015 and 2016 in Brazil, subsequently associated to the Zika virus infection (ZikV), configured a severe problem of national and international public health emergency, impacting the quality of life of children and families⁽¹⁾. The main neurological findings include severe microcephaly with cortex atrophy and malformations, cortical, brainstem and subcortical calcifications, abnormal gyral patterns, ventriculomegaly, cerebellar hypoplasia, cerebellar vermis, and corpus callosum, delayed myelination, and peripheric changes, such as macular scarring, and focal pigmentary retinal mottling⁽¹⁻³⁾.

The neurological findings and changes presented in the neuropsychomotor development of these children, described in follow-up studies of this population, characterized the Congenital Zika virus syndrome (CZS), including delayed motor, cognitive, and speech development, visual and auditory changes, epilepsy, and brain paralysis⁽⁴⁾. Although epilepsy has been described as an important clinical finding in children with CZS⁽⁵⁻⁶⁾, sleep changes were not included as a clinical symptom within the scope of this syndrome's characterization.

Sleep involves complex interaction of physiological and behavioral processes and depends on the integrity of various neurological structures. The development of sleep and wake states is started during fetal life and are closely related with maturation of the Central Nervous System⁽⁷⁾. Sleep problems damage child development and negatively impact learning and quality of life, having been reported in children with neurological impairments⁽⁸⁻¹⁰⁾.

Considering the brain anomalies present in children with CZS and the neurological vulnerability for sleep-wake regulation⁽¹¹⁾, these children are more likely to be prone to presenting sleep problems. Changes in sleep and behavior have been reported in some studies, influencing the early development, according to data signaled by mothers and caregivers of children with microcephaly⁽¹²⁻¹³⁾. The objective of this study was thus to perform a systematic literature review, gathering studies that assessed sleep changes and brain function in children with microcephaly due to Zika virus infection.

METHOD

DESIGN OF STUDY

A systematic literature review, a type of secondary study which has its source of data in primary studies, was performed; reviews must be broad, unbiased, and focus on a well-defined question with the objective of identifying, selecting, assessing, and synthesizing the available evidence⁽¹⁴⁾. The recommendations of the Preferred Reporting Items for Systematic reviews and Meta-Analyses – PRISMA⁽¹⁵⁾ method were used to enhance the results of this review.

To assess the prevalence of sleep and brain function changes, the mnemonic CoCoPop⁽¹⁶⁾ (acronym of Co: Condition – sleep and brain function change; Co: Context –microcephaly

due to Zika virus infection; Pop: Population – infants or children over one month old) was used to elaborate the guiding question, which was: What is the prevalence of sleep and brain function change in children with microcephaly due to Zika virus infection?

DATA COLLECTION

The databases used for the electronic search were MEDLINE (via PubMed), Scopus, Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medical database (EMBASE), *Literatura Latino-Americana e do Caribe em Ciências da Saúde* (LILACS), and Scientific Electronic Library Online (SciELO). Bibliographic research was conducted in the grey databases Google Scholar and OpenGrey.

The descriptors used for the elaboration of search strategies were Sleep and Zika Virus Infection, in addition to the corresponding synonyms/keywords combined with one another through the Boolean operator OR. The Boolean operator AND related the two strategies.

The search was performed in September 2020, with no language and period of publication restrictions. After their identification, the articles were exported to the reference manager software Mendeley, aiming at identifying the duplicated articles and gathering all the found publications. The list of all eligible studies and reviews was manually digitalized in a Microsoft Excel[®] spreadsheet so as to identify additional studies for inclusion. The electronic database search strategies are illustrated in Table 1.

SELECTION CRITERIA

The studies were considered eligible if satisfying the following criteria: (I) children with microcephaly due to ZikV infection; (II) studies which analyzed the quality of sleep through exams or used a psychometric instrument for assessing sleep. The following exclusion criteria were defined: review articles, case reports, editorials, book chapters, and articles with no specification of the assessment instrument used or those unrelated to the theme.

Study selection was performed by two independent researchers (MCSR and EMSS), who selected the studies based on reading their titles and abstracts, a procedure which configured the first selection phase. The relevant studies were read thoroughly and selected according to the eligibility criteria. Disagreements between the two reviewers were solved through consensus or by a third reviewer (ALFF).

DATA ANALYSIS AND TREATMENT

Data extraction and risk of bias assessment were performed independently by the two researchers and then compared. The studies were extracted using a protocol which was predefined by the researchers with the objective of extracting, organizing, and summarizing information. The interest topics approached in the instrument were information on the study (author, year of publication, country), methodological aspects (design of study, objective, sample size and age, assessment instrument), and main results.

Table 1 – Number of articles retrieved from the databases upon search strategy application – Maceió, AL, Brazil, 2020.

Database	Strategy	Number of articles
PubMed	(Zika Virus Infection OR ZikV Infection OR Zika Fever OR Zika Virus Disease OR Congenital Zika Syndrome OR Congenital Zika Virus Infection) AND (Sleep OR Sleep Wake Disorders OR Sleep Wake Disorder OR Sleep Disorders OR Sleep Disorder)	20
Scopus	TITLE-ABS-KEY ((zika virus infection OR zikv infection OR zika fever OR zika virus disease OR congenital zika syndrome OR congenital zika virus infection) AND (sleep or sleep wake disorders or sleep wake disorder or sleep disorder))	4
Web of science	((Zika Virus Infection OR ZikV Infection OR Zika Fever OR Zika Virus Disease OR Congenital Zika Syndrome OR Congenital Zika Virus Infection) AND (Sleep OR Sleep Wake Disorders OR Sleep Wake Disorder OR Sleep Disorders OR Sleep Disorder))	13
CINAHL	(Zika Virus Infection OR ZikV Infection OR Zika Fever OR Zika Virus Disease OR Congenital Zika Syndrome OR Congenital Zika Virus Infection) AND (Sleep OR Sleep Wake Disorders OR Sleep Wake Disorder OR Sleep Disorders OR Sleep Disorder)	36
EMBASE	('zika virus infection'/exp OR 'zika virus infection' OR (zika AND ('virus'/exp OR virus) AND ('infection'/exp OR infection)) OR 'zikv infection'/exp OR 'zikv infection' OR (('zikv'/exp OR zikv) AND ('infection'/exp OR infection)) OR 'zika fever'/exp OR 'zika fever' OR (zika AND ('fever'/exp OR fever)) OR 'zika virus disease' OR (zika AND ('virus'/exp OR virus) AND ('disease'/exp OR disease)) OR 'congenital zika syndrome'/exp OR 'congenital zika syndrome' OR (('congenital'/exp OR congenital) AND zika AND ('syndrome'/exp OR syndrome)) OR 'congenital zika virus infection' OR (('congenital'/exp OR congenital) AND zika AND ('virus'/exp OR virus) AND ('infection'/exp OR infection)) AND ('sleep'/exp OR sleep OR 'sleep wake disorders'/exp OR 'sleep wake disorders' OR (('sleep'/exp OR sleep) AND wake AND ('disorders'/exp OR disorders)) OR 'sleep wake disorder'/exp OR 'sleep wake disorder' OR (('sleep'/exp OR sleep) AND wake AND ('disorder'/exp OR disorder)) OR 'sleep disorders'/exp OR 'sleep disorders' OR (('sleep'/exp OR sleep) AND ('disorders'/exp OR disorders)) OR 'sleep disorder'/exp OR 'sleep disorder' OR (('sleep'/exp OR sleep) AND ('disorder'/exp OR disorder)))	51
LILACS	(Zika Virus Infection OR ZikV Infection OR Zika Fever OR Zika Virus Disease OR Congenital Zika Syndrome OR Congenital Zika Virus Infection)	152
SciELO	(Zika Virus Infection OR ZikV Infection OR Zika Fever OR Zika Virus Disease OR Congenital Zika Syndrome OR Congenital Zika Virus Infection)	220
Google scholar	(Zika Virus Infection OR ZikV Infection OR Zika Fever OR Zika Virus Disease OR Congenital Zika Syndrome OR Congenital Zika Virus Infection) AND (Sleep OR Sleep Wake Disorders OR Sleep Wake Disorder OR Sleep Disorders OR Sleep Disorder)	631
OpenGrey	(Zika Virus Infection OR ZikV Infection OR Zika Fever OR Zika Virus Disease OR Congenital Zika Syndrome OR Congenital Zika Virus Infection) AND (Sleep OR Sleep Wake Disorders OR Sleep Wake Disorder OR Sleep Disorders OR Sleep Disorder)	0

The methodological quality of the articles was analyzed through consensus by the researchers and was based on the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies of the National Institutes of Health (<https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools>). For each criterion, the available answers are “yes”, “no” or another answer (“Undetermined”, “not applicable” or “unreported”).

The results were analyzed descriptively and gathered in tables which describe the summarized information of the studies and of the quality analysis.

RESULTS

The initial search found 1,127 studies in the electronic databases, except for OpenGrey, in which no study was found. Out of these, 1,052 studies were excluded after title and abstract assessment. After a thorough reading, 10 published studies were included in this review for meeting the inclusion conditions described in the methodology. A flowchart of the study selection process followed the recommendation of the PRISMA model (Figure 1).

CHARACTERISTICS OF THE STUDIES

The included primary studies were conducted in Brazil and presented a design reporting results of observational

cross-sectional studies, case series, and cohorts. All participants were recruited from a convenience sample, totaling, in this systematic review, an analysis of data of 516 children with microcephaly due to ZikV. The age of the participants of the included studies varied from four months to four years of life. Some of the studies included results of Electroencephalogram (EEG) or Video Electroencephalogram (VEEG) exams, performed to assess the patterns of brain activity during sleep; in others, the questionnaires Brief Infant Sleep Questionnaire (BISQ) or Infant Sleep Questionnaire (ISQ) were used to assess sleep quality. In most studies, sleep quality in children with microcephaly due to Zika virus was not compromised and, in the exams, brain activity changes were related to the diagnosis of epileptogenic activity. A summarization of study information is presented on Table 2.

METHODOLOGICAL QUALITY OF THE STUDIES

Table 3 presents the Quality Assessment Tool for Observational Cohorts and Cross-Sectional Studies of the NIH, used to assess the quality of individual studies (internal validity) and the assessment of each study. The studies' limitations were related to participant selection, since most of them used convenience samples, adjustments for confounding variables to strengthen observational evidence

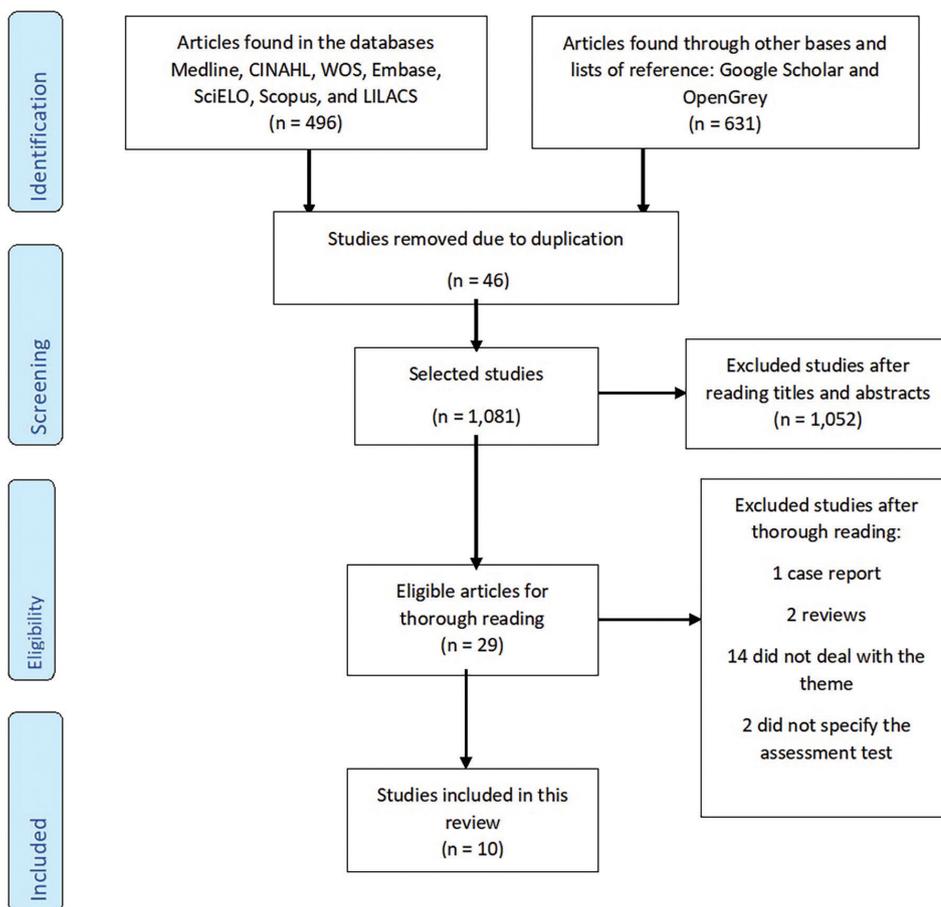


Figure 1 – Flowchart representing the number of articles selected and excluded in the different databases.

Table 2 – Analyzed studies on sleep changes associated to microcephaly due to ZikV – Maceió, AL, Brazil, 2020.

Authors/Year	Design of study	Objective	Sample size and age	Assessment instrument	Results
Wheeler et al., 2018 ⁽¹⁷⁾	Cohort	To describe the early development profiles of babies with CZS, focusing on abilities related to solving very early problems, communication, motor and socioemotional development.	Sample: 47 children Age: 13 to 22 months	Brief Infant Sleep Questionnaire (BISQ)	Sleep duration was 9 hours at night, 2.3 hours during the day; sleep latency had a mean of 32 minutes. Sleep problems affected 18%.
Pinato et al., 2018 ⁽¹⁸⁾	Cross-sectional	To investigate the sleep characteristics of 136 babies and young children.	Sample: 88 children with CZS and 38 with typical development (TD) Age: 5 to 24 months, mean of 15.9 months	Brief Infant Sleep Questionnaire (BISQ)	Children with CZS: 34.1% were poor sleepers; 15% stayed awake at night for longer than one hour; 24% slept less than 9 hours. Short total sleeping time, short duration of sleep at night and no correlation between age and being awake at night in relation to TD. 77% had an epilepsy diagnosis.
Lage et al., 2019 ⁽¹⁹⁾	Retrospective cross-sectional	To describe the clinical, neurophysiological and neuroradiological characteristics of children with congenital microcephaly diagnosed upon birth and potentially associated to congenital infection with ZikV.	Sample: 102 children Age: mean of 4.1 months VEEG Sample: 96 children	Unspecified standardized assessments VEEG	Irritability/impatient cry in 27.5%, sleep difficulties in 9.8% and epileptogenetic activity in 56.3%.

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Authors/Year	Design of study	Objective	Sample size and age	Assessment instrument	Results
Kanda et al., 2018 ⁽²⁰⁾	Retrospective cross-sectional	To describe the findings of electroencephalogram (EEG) on the sleep of epileptic children who were born with microcephaly in areas of Brazil with active transmission of Zika virus between 2014 and 2017.	Sample: 23 children Age: 4 to 48 months	EEG	A distinct pattern of EEG was observed in ZikV (5 cases) and rhythmic activity was associated to hypsarrhythmia or slow background, with long periods of rhythmic generalized activity or focal of 4.5 to 24 Hz being common in the EEG of ZikV.
Ferreira et al., 2018 ⁽²¹⁾	Cross-sectional	To describe the functional profile of children with microcephaly associated to ZikV in two states of the Brazilian northeast.	Sample: 34 children Age: mean of 21.2 months	Infant Sleep Questionnaire (ISQ); the results were directly converted into qualifiers of the International Classification of Functioning (ICF).	47.1% reported no disability and 20.6% severe problem in sleep functions (category b134).
Carvalho et al., 2017 ⁽²²⁾	Cohort, case series	To describe the EEG sleep patterns of newborns and children with microcephaly due to congenital Zika virus (ZikV) syndrome.	Sample: 37 children Age: 1 to 5 months	EEG	Different types of EEG abnormalities have been found in CSZ with a predominance of epileptogenic interictal activity and hypsarrhythmia.
Lima, 2017 ⁽²³⁾	Cross-sectional, case series	To assess the functional performance and sleep of children with CSZ between 6 and 18 months of age and describe the health network used by children with CSZ in inland Pernambuco.	Sample: 79 children Age: 6 to 11 months: mean of 10,3 months; 12–18 months: mean of 14.46 months	Brief Infant Sleep Questionnaire (BISQ)	75.9% of the mothers did not consider the sleep of their children a problem. 88,5% of the sample did not awake or awaked only once during sleep at night and 67% slept between 8 and 12 hours per night.
Krueger et al., 2020 ⁽²⁴⁾	Case series	To assess the clinical and neurophysiological characteristics of patients with congenital Zika virus syndrome who presented a pattern of electric epileptic state during slow-wave sleep (ESES).	Sample: 4 children Age: 4 years	VEEG	Epilepsy diagnosed between one month and 18 months of age, presenting an ESES pattern at three years of age. The children presented a wide range of epileptic symptoms, but all experienced tonic convulsions.
van der Linden et al., 2020 ⁽²⁵⁾	Longitudinal	To describe the evolutive patterns of EEG after the second year of life in a long series of cases of patients with confirmed CZVS.	Sample: 55 children Age: mean of 50 months	EEG and VEEG	Continuous epileptic discharges during non-rapid eye movement sleep were identified in 40% of the children; in 90.1%, this pattern was symmetrical, with a previous predominance of epilepsy-like activity; with severe epilepsy in 68.2%. Subcortical calcification and multi focal EEGs in previous ages occurred more frequently in patients with this pattern. Other unspecified interictal EEG patterns were epilepsy-like focal discharges in 41.8% and multi-focal activity in 10.9%.
Sequerria et al., 2020 ⁽²⁶⁾	Cross-sectional	To present perceptive correlations between the occurrence of epilepsy-like discharges and rhombencephalon malformation, prosencephalon volume and oscillations related to sleep.	Sample: 47 children Age: unspecified	EEG Computerized tomography	Epilepsy diagnosis for 62% of the sample, with epileptic-like discharges, including interictal unilateral peaks (90%), bilateral synchronous and asynchronous interictal peaks (72%) and hypsarrhythmia (41%). 58% of children with clinical epilepsy were born with rhombencephalon malformations associated to epilepsy. The presence of interictal epileptic-like discharges (IED) was associated to smaller brain volumes. 25% presented sleep spindles associated to the presence of IED.

Table 3 – Methodological quality assessment of the included studies – Maceió, AL, Brazil, 2020.

Author, year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Wheeler et al., 2018 ⁽¹⁵⁾	Y	Y	Y	Y	Y	NA	NA	N	Y	N	CD	N	NA	N
Pinato et al., 2018 ⁽¹⁶⁾	Y	Y	Y	Y	CD	NA	Y	Y	Y	N	NR	N	NA	N
Lage et al., 2019 ⁽¹⁷⁾	Y	Y	Y	Y	CD	NA	NA	N	Y	NR	NA	N	NA	NR
Kanda et al., 2018 ⁽¹⁸⁾	Y	Y	Y	Y	CD	NA	NA	Y	Y	N	N	N	NA	NR
Ferreira et al., 2018 ⁽¹⁹⁾	Y	Y	CD	Y	CD	NA	Y	N	Y	N	Y	N	NA	CD
Carvalho et al., 2017 ⁽²⁰⁾	Y	Y	Y	Y	CD	N	Y	N	Y	N	N	N	NA	NR
Lima, 2017 ⁽²¹⁾	Y	Y	Y	Y	Y	NA	Y	N	Y	N	Y	N	NA	CD
Krueger et al., 2020 ⁽²²⁾	Y	Y	NR	Y	Y	Y	Y	N	N	N	N	N	N	NR
van der Linden et al., 2020 ⁽²³⁾	Y	Y	Y	NR	Y	Y	Y	N	N	N	N	N	N	N
Sequeira et al., 2020 ⁽²⁴⁾	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	NR

Y, Yes; N, No; CD, Cannot determine; NA, Not applicable; NR, Not reported. (1) Clearly stated research question or objective; (2) The study population was clearly specified and defined; (3) The participation of eligible individuals was at least 50%; (4) Did all selected or recruited individuals originate from the same population or similar populations, including the same period of time? The inclusion and exclusion criteria for study participation were pre-specified and applied uniformly among the participants; (5) Sample size rationale, statistical strength calculation, variance, and effect estimates were described; (6) For the study's analysis, exposures of interest were measured before the assessed outcomes; (7) The duration of the study was sufficient to establish an association between exposure and outcome, if existent; (8) For exposures which may vary in quantities and levels, the influence of these characteristics in relation to the assessed outcomes was assessed; (9) The definition of the exposure measures (independent variables) were clear, valid, reliable, and implemented consistently among the participants; (10) The exposure was assessed more than once throughout the study; (11) The definition of the outcomes (dependent variables) was clear, valid, reliable, and implemented consistently among the participants; (12) The reviewers were blinded regarding patient exposure; (13) There was loss to follow-up after baseline of 20% or less; (14) An adjustment was made for the main confounding factors in the calculation of association between exposure and outcomes.

related to quality of sleep in children with microcephaly due to ZIKV and the fact that the sleep pattern as per EEG or VEEG has not been reported in the studies. Most studies presented a cross-sectional methodological design with a cohort or case series.

DISCUSSION

The objective of this study was to perform a systematic literature review of studies which assessed sleep and brain function changes in children with microcephaly due to Zika virus infection. All included studies are observed to be Brazilian. As a whole, the investigations about sleep in this population were focused on young ages, mainly the first two years of life.

Four studies^(17–18,21,23) had sleep as the research outcome and investigated qualitative aspects using the BISQ and ISQ questionnaires. The duration of sleep at night varied from 8 to 9 hours and the total time of sleep between 11 and 13 hours, showing that the assessed infants with microcephaly due to ZikV presented healthy sleeping habits. Sleep from childbirth is present during the day and at night and, as they age, daytime sleep tends to reduce. For newborns, the duration of sleep ranges between 14 and 17 hours, reducing to 11 and 14 hours between the first and second year of life. This reduction in the total time of sleep results from the reduction of daytime sleep⁽²⁷⁾.

The Brief Infant Sleep Questionnaire (BISQ) and the Infant Sleep Questionnaire (ISQ) are some of the instruments translated and validated used to assess sleep problems in infants and children up to three years of age^(28–30) from self-report by parents or caregivers. In the sample for ISQ validation, children with Brain Paralysis were included, and they were observed to tend to present more sleep behavior changes in relation to healthy children⁽³⁰⁾.

Although these instruments are reliable, strengthening the importance of subjective instruments for screening and identification of these difficulties^(29–30), they do not base sleep problems on a standardized system of classification for sleep disorders⁽³¹⁾. Among the studies which were included in this review using these assessment instruments, only one study⁽²¹⁾ adapted its results to qualifiers of the International Classification of Functioning.

Six studies^(19–20,22,24–26) have investigated neurological changes through EEG or VEEG, in which changes in brain activities during sleep were demonstrated and with most diagnosed with epileptogenic activity, which suggests that this behavior may be associated to undiscovered or uncontrolled crises. A study including children with congenital microcephaly related to ZikV⁽³²⁾ has observed that, in cases of epileptic encephalopathy, hypsarrhythmia was not a frequent finding in EEG and focal epilepsy was the most common type for children in their second year of life. A case series study about child spasm including 22 children with CZS in their first year of life⁽³³⁾ has found an EEG pattern of interictal hypsarrhythmia.

A literature review including CSZ⁽³⁴⁾ has identified that sleep disorders may be directly related to anatomical brain differences and that, in most disorders, a thorough investigation is required to clarify the relationship between malformation and the sleeping problem. The need for studies relating the impacts of structural brain changes and Zika virus infection in sleep abnormalities and in EEG is emphasized⁽¹¹⁾.

Although behavioral characteristics of cry and irritability have been observed, they do not seem to have affected quality and quantity of sleep in this population. This is possibly due to sleep changes presented in this population being more related to neurological changes, whose changes in brain

activities, such as epileptic crises, a symptom frequently reported in the included studies, may have been controlled through medication. This is possibly the cause of behavioral changes and does not constitute a new problem to be reported in these children's development⁽³⁵⁾.

Sleep problems are reported in children with development changes⁽³⁶⁻³⁷⁾. Changes in heart rate, increased pain perception, stress, irritability, and crying were reported in premature newborns with sleep deprivation⁽³⁸⁾. In children with brain paralysis, changes in the sleep-wake pattern may also be present, given the factors related to motor disorders, lesions in pathways or structures related to biological rhythm control and resulting from ZikV infection⁽³²⁾. Respiratory disorders and sleep hyperhidrosis were the most frequent symptoms in individuals with brain paralysis, which directly affects physical and emotional well-being⁽³⁹⁾.

Neuromotor changes, such as muscle spasms and changes of tonus in this population^(40,28), may hinder spontaneous child mobility and change of posture, leading to crying and irritability, impairing sleep. Severe visual changes may also affect sleep, since a lack of perception of light, which is related to melatonin secretion, changes the sleep-wake cycle, impacting sleep time and maintenance⁽⁴¹⁾.

Sleep problems may lead to damages to child development, which may be potentially more severe in infants with microcephaly due to Zika virus. Understanding

sleeping habits and possible changes enables the development of a professional support network for these children and families.

Despite the relevant results, the scientific literature up to this point is observed to lack studies investigating the relation between quality of sleep changes in children with microcephaly and ZikV infection, which may be justified by the severe epidemiological situation of the time and consequent difficulty to understand its diverse implications, whose changes in quality of sleep were not reported or considered a problem⁽¹⁷⁾. In addition, the limitations of the different methodological study designs have demonstrated the importance of studies with cohort designs or longitudinal follow-up with bigger samples and age groups, including comparison groups and controlled variables, so as to present conclusions about sleep of this population in their living context, generating better evidence through studies conducted with methodological rigor.

CONCLUSION

Quality of sleep of children with microcephaly due to ZikV was demonstrated to be similar to that of children with typical development and behavioral changes may be related to changes in electrical brain activity.

RESUMO

Objetivo: Revisar a literatura sobre a alteração do sono e da função cerebral em crianças com microcefalia por Zika vírus. **Método:** Revisão sistemática realizada nas bases de dados MEDLINE (*PubMed*), *Scopus*, *Web of Science*, CINAHL, EMBASE, LILACS e SciELO e nas bases de dados cinzentas *Google Scholar* e *OpenGrey*. **Resultados:** Foram incluídos 10 estudos primários brasileiros com delineamento de pesquisas observacionais, publicados entre 2017 e 2020, com 516 crianças com microcefalia por infecção do Zika vírus com idades entre 4 meses e 4 anos. Destes, 4 investigaram aspectos qualitativos do sono utilizando os questionários *Brief Infant Sleep Questionnaire* ou *Infant Sleep Questionnaire* e 6 investigaram alterações nas atividades cerebrais durante o sono utilizando os exames Eletroencefalograma ou Vídeo-Encefalograma. A qualidade do sono das crianças não estava comprometida na maioria dos estudos. Alterações na atividade cerebral durante o sono foram frequentes, sendo a atividade epileptogênica um achado comum entre os estudos. **Conclusão:** A qualidade do sono em crianças com microcefalia por Zika vírus demonstrou ser semelhante à de crianças com desenvolvimento típico e as alterações comportamentais apresentadas podem estar relacionadas a alterações na atividade elétrica cerebral.

DESCRITORES

Sono; Microcefalia; Infecção por Zika vírus; Revisão Sistemática.

RESUMEN

Objetivo: Revisar la literatura sobre la alteración del sueño y de la función cerebral en niños con microcefalia por infección del virus Zika. **Método:** Revisión sistemática realizada en las bases de datos MEDLINE (*PubMed*), *Scopus*, *Web of Science*, CINAHL, EMBASE, LILACS y *SciELO* y en las bases de datos de literatura gris *Google Académico* y *OpenGrey*. **Resultados:** Se incluyeron 10 estudios primarios brasileños con diseño de investigación observacional, publicados entre 2017 y 2020, con 516 niños con microcefalia debido a la infección por el virus Zika con edades comprendidas entre los 4 meses y los 4 años. De ellos, 4 investigaron los aspectos cualitativos del sueño mediante el *Brief Infant Sleep Questionnaire* o el *Infant Sleep Questionnaire* y 6 investigaron los cambios en las actividades cerebrales durante el sueño mediante exámenes de Electroencefalograma o Video-Encefalograma. La calidad del sueño de los niños no estaba comprometida en la mayoría de los estudios. Las alteraciones de la actividad cerebral durante el sueño fueron frecuentes, siendo la actividad epileptogénica un hallazgo común entre los estudios. **Conclusión:** La calidad del sueño en los niños con microcefalia por el virus Zika resultó similar a la de los niños con desarrollo típico. Los cambios de comportamiento presentados pueden estar relacionados con cambios en la actividad eléctrica cerebral.

DESCRIPTORES

Sueño; Microcefalia; Infección por el Virus Zika; Revisión Sistemática.

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