Available online at www.jlls.org

JOURNAL OF LANGUAGE AND LINGUISTIC STUDIES

ISSN: 1305-578X

Journal of Language and Linguistic Studies, 18(4), 43-61; 2022

Impact Of Zika On Infants

Viviana Karina Hernández Vergel[1], Raúl Prada Núñez[2], César Augusto Hernández Suárez[3]

[1]Universidad de Santander, Cúcuta, Colombia, E-mail: vivi.hernandez@mail.udes.edu.co

[2]Universidad Francisco de Paula Santander, Cúcuta, Colombia, E-mail: raulprada@ufps.edu.co

[3]Universidad Francisco de Paula Santander, Cúcuta, Colombia. E-mail: cesarauguto@ufps.edu.co

Correspondence Author Viviana Karina Hernández Vergel

APA Citation:
Vergel, V.K.H., Núñez, R.P., Suárez, A.H., (2022). Impact Of Zika On Infants , *Journal of Language and Linguistic Studies, 18*(4), 43-61; 2022.
Submission Date: 09/08/2022
Acceptance Date: 07/10/2022

Abstract

Objective: To describe the level of impairment in performance skills and maturational age of children in the Valientes del Futuro program with neonatal Zika virus infection.
Materials and Methods: The research is framed with a quantitative approach of a correlational type supported by field research and non-experimental design, with a sample of 15 infants 3, 4 and 5 years old. The collection technique used was the Abbreviated Scale.
Results: Regarding the areas evaluated for the maturational age, it was found that the weighting of motor skills and praxis found a correlation coefficient of 0.601 (moderate) and in the sample of the execution skills of 3-year-old children with gestational zika a correlation of 0.853 (strong) was obtained.
Conclusions: There is a correlation between infants with gestational zika and strong affectation in the actions or behaviors that a patient has to move and physically interact with activities, and objects and thus perform a learned motor activity.

Keywords: Zika virus; Gestational; Skills, Infant Development.

1. Introduction

Zika virus is a Flavivirus belonging to the Family Flaviviridae and was discovered in monkeys in 1947 in Uganda [1,2] and later in humans in 1952 in Uganda and the United Republic of Tanzania. Also, flaviviridae are positive-stranded RNA viruses that include human pathogens such as West Nile virus, yellow fever virus, mosquito-borne dengue virus, Japanese encephalitis virus, and tick-borne encephalitis virus.

This arthropod-borne virus (arbovirus) has its vector in the Aedes aegypti mosquito; that is, it is transmitted by the bite of infected mosquitoes, but can also occur through intrauterine infection. Congenital or intrauterine transmission of Zika virus occurs when a woman becomes infected with Zika virus during her pregnancy, but before delivery, and the virus passes to the fetus.

Correspondence Author E-mail: vivi.hernandez@mail.udes.edu.co

In this regard, Foy et al. [3] state that "circumstantial evidence suggests direct person-to-person, possibly sexual, the transmission of the virus," although they do not rule out other possibilities such as the exchange of other body fluids, including saliva. But to date, no reliable evidence of Zika transmission through kissing has been found. Similarly, it should be noted that Zika virus (ZIKV) infection is asymptomatic in about 80% of cases [4,5]. On the other hand, although Zika virus (ZIKV) has been isolated for decades, it is not known whether Zika virus (ZIKV) is asymptomatic or not:

> It began to change in 2013 when the landing of ZIKV in French Polynesia was associated with higher rates of Guillain-Barré syndrome, an autoimmune condition that affects the peripheral nervous system and can be triggered by infections. In 2015, just two years after the Polynesian outbreak, an unprecedented epidemic was reported in Brazil. There, ZIKV became an extraordinary health burden due to a new correlation between ZIKV and severe brain malformations in newborns [6, p. 1].

An important change in the behavior of the infection is clear, evidenced by a greater severity in the clinical presentation and associated complications such as alterations in fetal brain development (causing microcephaly) and Guillain-Barré syndrome. On the other hand, Zika epidemics outside the African continent (appearance of the Asian lineage), occur after 2007 and it is especially in 2015 when it enters America [7,8].

In this regard, Gomes et al. [9] revealed that "upon its entry into America, this new pathogen generated, only in Brazil, the report of 440,000 to 1,300,000 suspected cases and more than 4,000 cases of possibly associated microcephaly, between September 2015 and February 2016". According to Galán et al. [10], there are "six countries, territories and areas reporting cases of microcephaly potentially associated with Zika virus infection. These are Brazil, Cape Verde, Colombia, French Polynesia, Martinique, and Panama." Therefore, the acquisition of infection during pregnancy has become an important risk of fetal malformation, and therefore, strategies to control its transmission should be prioritized.

The Pan American Health Organization/World Health Organization [11], shows that in Colombia five departments concentrated 58% of suspected cases and 53% of confirmed cases in the period from 32 weeks of 2015 to 52 weeks of 2016: Norte de Santander, Valle del Cauca, Santander, Tolima and Huila, placing Norte de Santander in first place nationally [12].

With the aggravating factor of an incidence rate three times higher than the national rate (277.29 cases/100,000 inhabitants), in the period between weeks 1-21 of 2016, 765.72 cases/100,000 inhabitants. The Department Norte de Santander continued to register cases, with 1 of the 3 cases reported from January 01 to June 03, 2017, (along with Tolima and Risaralda) [13].

Similarly, concerning pregnant women (population susceptible to a complication), 16,323 cases were recorded, of which 5,420 were laboratory-confirmed (33.2%), as a consequence of the epidemic in Colombia. Within the latter group, 1,203 (19%) were from Norte de Santander, with an associated fetal and perinatal mortality of 5.96% of all completed pregnancies, with a predominance of abortion (68.3%) due to infection during the first trimester.

Therefore, this research offers a scientific advance on the Zika virus, since this virus could compromise the nervous system, both centrally (brain) and peripherally (nerves). Studies mention that a low percentage of infected people develop neurological complications as mentioned in previous sections. Therefore, Zika related to cases of pregnant women, one (1) to 13% may present neurological alterations in the fetus, therefore, this research adds a differential with other explorations, which had as main challenge the diagnostic confirmation and study of the immunological mechanisms that lead to Guillain-Barré.

On the practical side, to investigate the Zika virus during gestation and the affectation of the execution skills and the maturational age of children of a pregnant mother whose pregnancy developed

between 2015 and 2016 during the epidemic phase of the Zika Virus, attended at the Erasmo Meoz University Hospital in the city of Cúcuta and considered as a case of gestational Zika.

The problematic situations indicated above, as well as their respective justification, allow formulating the following research questions: Is the history of Zika virus infection identified, both individual and maternal, during gestation through the review of medical records in the program Valientes del Futuro? Is the maturity age and execution skills of the children prioritized in the program Valientes del Futuro and the control population determined through the Abbreviated Development Scale and checklist?

These minor questions may provide an answer to a major one: can the level of impairment in performance skills and maturational age of children in the Courageous of the Future Program with neonatal Zika virus infection be described?

1.1 Zika virus during gestation. Impairment of performance skills and maturational age in children.

1.1.1 Gestation and Zika

For Bolaños [14] pregnancy or gestation:

> ...is the physiological state of the woman by which, over an average of 281 days, a new human being develops in her womb... Pregnancy is considered an anabolic stage, in which the creation of new tissues leads to a progressive weight gain (10 kg on average). This weight gain is conditioned by: fetus (3,400 grams [g]), placenta (650 g), amniotic fluid (800 g), extracellular fluid (1,680 g), other tissues and fat reserve to ensure lactation (3,345 g), uterus and breasts (1,375 g) and blood (1,250 g) (page 1197).

Likewise, Lugones and Ramírez [15] define pregnancy:

> The period that elapses between implantation in the uterus of the fertilized ovum and the moment of delivery. It includes all the physiological processes of growth and development of the fetus inside the maternal uterus, as well as the significant physiological, metabolic and even morphological changes that occur in the woman to protect, nourish and allow the development of the fetus.

As a result, almost all limbs and systems of the pregnant woman experience anatomical and physical alterations that are reversed in the puerperium. However, certain neonates are born with complications of infection in pregnancy. Belfort et al. [16] report that Zika virus infection has been associated with the appearance of neurological alterations in newborns due to the special neurotropism of the virus. On the other hand, regarding diagnosis, according to Gourinat et al. [17], ZIKV can be detected in whole blood, plasma, serum, urine, cerebrospinal and amniotic fluids, semen and saliva. It can be detected longer term in semen and urine than even in the blood.

Therefore, the Spanish Society of Gynecology and the Spanish Society of Pediatric Infectious Diseases (SEGO-SEIP) warn that "the risk that Zika virus infection in a pregnant woman can cause disorders in the development of the neurological system of the fetus" [18]. Also, these authors point out that the diagnosis of congenital Zika virus infection, epidemiological, clinical and laboratory criteria are established. Where the epidemiological criterion for diagnosing whether the newborn fetus of a mother with a history of Zika virus infection is whether it has been infected by Zika virus; as well as having traveled or resided in an area of virus transmission during pregnancy or having had unprotected sex with men diagnosed with Zika virus infection.

While the clinical criteria refer to whether the fetus or newborn has microcephaly, neuroimaging abnormalities, neurological abnormalities, ocular involvement, intrauterine growth retardation or other findings: Clubfeet, arthrogryposis secondary to neurological damage of central origin.

Laboratory criteria, meanwhile, refer to cases with nucleic acid detection by PCR in a clinical specimen (serum, urine, CSF or amniotic fluid); positive IgM confirmed with positive neutralizing antibodies in serum; persistence of positive IgG for Zika beyond 18 months of life. The presence of IgM antibodies, not confirmed by neutralization in a serum sample, and, IgG persistence between 6 and 18 months of age (at least two samples with similar IgG concentration).

Similarly, the Spanish Society of Gynecology and Spanish Society of Pediatric Infectious Diseases (SEGO-SEIP), mentions that:

A scientific publication analyzing a cohort of 1,850 pregnant women infected with Zika virus in Colombia, concluded that more than 90% of the women who had been infected during the third trimester of pregnancy had given birth to newborns that did not present any abnormalities, including microcephaly. However, in Brazil, the appearance of a rash in the pregnant woman during the third trimester was associated with brain alterations even though the newborns had normal cranial perimeters (50); 4 cases of microcephaly were also identified in children of asymptomatic women (51,52) [18].

Based on the studies there is scientific consensus to affirm that Zika virus infection is a cause of microcephaly and other neurological alterations in newborns, as well as, Guillain Barré syndrome [19]. In this regard, Arroyo argues "...that this arboviral infection is associated with an increased incidence of microcephaly in fetuses and children born to infected mothers. The risk of fetal microcephaly is higher for infections occurring in the first trimester" [20].

The latter author argues that children with microcephaly may have different problems such as intellectual disability, developmental delay, epilepsy, cerebral palsy, as well as ophthalmologic and hearing disorders. He also indicated that in a study of 680 children he reported that 65% of the children with microcephaly had an intellectual disability, 43% epilepsy, and 30% ophthalmologic conditions. Familial idiopathic isolated microcephaly has not been associated with decreased developmental outcomes or IQ scores in children without other notable deficits.

On the other hand, the Ministry of Health of Argentina points out that "various infections, produced by arboviruses, that could affect the performance skills and the maturational age of children" [21], and, therefore, the progressive acquisition of skills is the primary task of the nervous system and it is the reflection of this maturation that is called development.

1.1.2 Maturational development

Child development is linked to growth. Growth begins at the moment of conception of the human being and continues through gestation, infancy, childhood and adolescence. Therefore, growth is inherent to development. Now, development involves maturity and refers to the acquisition of skills and abilities at various stages of life. Thus, maturation emphasizes the importance of nature or genetics in human development, as opposed to nurture or the environment.

Maturation development occurs in fixed sequences or stages that are governed by genes. This "genetic blueprint" for development determines the sequence, timing, and form of emergent patterns of action [22]. For this, it is necessary to have adequate knowledge of the normality characteristics. Iceta and Yoldi [23], mention that normal development is due to the acquisition of certain skills, among them are Gross motor skills, so that the voluntary motor act evolves normally requires, on the one hand, a progressive differentiation of broad and undifferentiated acts to other precise and specific ones, that there is a cephalo-caudal projection and that it also happens from axial to distal.

On the other hand, Escudero points out that "the child is a subject that follows a highly complex development process. On the one hand, it is necessary to consider the evolutionary development of the

acquisition of adaptive and instrumental functions. This development is organized into four main areas: psychomotor, intelligence, language and socialization" [24].

In this regard, the Pan American Health Organization cited by the Ministry of Health of Argentina [21] states that the developmental stages of maturation refer to the following areas: motor, coordination, language and social, namely:

- Motor area: Motor development are cephalo-caudal, proximal-distal and specific global activities, that is, it is related to the principles of movements, which in the first months of birth are abrupt, broad and uncoordinated, although later these movements will appear slow, limited and coordinated, which gives control to gross motor skills, which are the movements that comprise large areas of the body (sitting, walking, running) and then the control of fine motor skills will be acquired (kicking a ball, drawing, writing, and thus developing the capacity for autonomy and independence). In fine motor skills, the development of the hand is seen from about 4 months and ends with the achievement of the manual tripod (posture adopted by the thumb, index and middle fingers to hold the pencil) back between 4 and 6 years. It is necessary for the disappearance of the tonic flexor reflexes of the hand and the asymmetric cervical tonic reaction and to achieve coordination with the sight so that the manipulation begins. Thus, he will initially hold an object placed in his hand, and then he will be able to reach for it and reach for it.
- Coordination area: Refers to the integration of sensory-motor functions before objects and situations, i.e., audiovisual and hand-eye coordination. The first one allows looking for sound sources with the eyes. The second allows the development of pressure processes before objects that are within reach. Later, complex manual skills are acquired (inserting small objects into jars or bottles), opening or closing doors, turning pages of a book, dressing and undressing, among others, when wrist flexion and forearm rotation begin to develop.
- Social Area: Refers to the child's reactions to the environment in which he/she lives, as well as the relationship with the mother and other people. The ability to integrate and adapt to the environment (playing, feeding and dressing), interaction behaviors, the process of socialization, individualization, autonomy and independence. Therefore, in social development, the child will acquire behavioral patterns that will serve for its interaction with the environment, because by nature it is a social being.
- Language Area: The use of language is a communication channel exclusive to the human species that starts in the first year of life. The infant has many forms of preverbal communication: laughing, screaming and tantrums; stretching out his arms to be picked up, closing his mouth when offered food. Therefore, this area refers to all forms of audible or visible communication (looks, gestures, sound perceptions and verbal expressions), whether postural movements, vocalizations, words or sentences. It includes imitation, comprehension and articulated language.

All of the above induces that the maturational development of the newborn with Zika infection will depend on the affectation found in the execution skills of infants. Because the maturation and growth of the individual go hand in hand with the cognitive, social, affective, and language, acquiring these skills according to their age, since each child is a different world, where the Abbreviated Developmental Scale could be a tool for early identification of motor, language, social and coordination anomalies.

1.1.3 Abbreviated Developmental Scale – EAD

For Alarcón and Trujillo [25], children have physical, psychological and social capacities as the basis for their processes of interaction with themselves, with the world and with others. Therefore,

development during childhood is a complex process of permanent change, which happens differently for each child, taking into account the particularities of the child and his or her context. On the other hand, developmental failure is a concept that is used to evaluate a child who does not reach the expected developmental milestones for his or her age, even after considering the wide variation of normality.

From this perspective, for Ortiz, the EAD "is an instrument designed to perform a global and general assessment of certain areas or processes of development" [26] that makes it possible to detect alterations or problems in children. The purpose of this scale is to identify early the risk of developmental delays in Colombian and Spanish-speaking children up to 5 years of age.

It is applied from the age range, the item or question on the area in question: a) gross motor skills; b) fine-adaptive motor skills, c) hearing-language and; d) personal-social. In this way, the age in months is requested for each evaluation. These provide normative parameters for the evaluation of the development of children under 60 months of age, to refer the infant to a medical evaluation.

Paraphrasing Ortiz [26] on developmental areas. The gross motor area refers to neurological maturation, tone and posture control, and motor coordination of the head, limbs, and trunk. While the fine-adaptive motor area refers to the ability to coordinate specific movements, intersensory coordination: eye-hand, control and precision for the solution of problems involving fine apprehension, calculation of distances and visual tracking.

Meanwhile, the auditory-language area involves the evolution and improvement of speech and language: auditory orientation, communicative intention, vocalization and articulation of phonemes, word formation, vocabulary comprehension, use of simple and complex sentences, naming, and understanding of instructions, spontaneous expression. And, the personal-social area refers to the processes of initiation and response to social interaction, dependence-independence, expression of feelings and emotions, learning behavioral patterns related to self-care.

In this way, it uses basic materials for the administration of this scale and which should be simple for the cognitive age of the infants, such as Red and black pencils or pens; a medium-sized rubber ball, approximately 15cms in diameter; a medium-sized mirror, small box of wooden cubes of approximately 2cms. Sideways (preferably 3 red, 3 blue and 4 yellow); small blunt-tipped scissors, plastic cup and saucer set, among other materials.

As well as forms for observation and recording information on the following areas: gross motor, fine motor-adaptive, hearing and language, and personal-social to evaluate performance skills, which are the performance skills that occupational therapists work on.

1.1.4 Execution skills

According to the American Occupational Therapy Association [27], multiple adjustments have been used to catalog and qualify the adaptations from the occupational therapy approach to the explorations and practices regarding the ability of skills in the effective performance of infants. For Ares "skills and abilities are elements that constitute the activities of daily living in their family, social and work aspects" [28, p. 2].

According to the aforementioned, Occupational Therapy professionals emphasize checking and investigating each one of the execution skills to know all those aspects that appear and support or limit the performance at the moment of demonstrating one of the activities of daily living. In this regard, Anderson and Prada [29] mention that in the framework for Occupational Therapy Practice, performance skills or abilities are defined as:

> Observable, concrete and goal-directed actions are used by the person to participate in activities of daily living. They can be observed while the person performs meaningful tasks in a specific

environment, bringing into play and combining different body functions and structures. Performance skills are classified into motor skills, processing skills, and interaction and communication skills [29].

Thus, the performance skills that are demonstrable activities, where their categories are interrelated and include:

Motor skills and praxis: motor skills are actions that a client uses to move, including planning, sequencing and executing new movements. While praxis are skillful intentional movements, it is the ability to perform a learned motor activity. **Sensory-perceptual skills:** the actions or behaviors a client uses to locate, identify and respond to sensations and to select, interpret, associate, organize and recall sensory events based on discrimination of experiences. **Emotional regulation skills:** actions a client uses to identify, manage and express feelings while participating in activities or interacting with others. **Cognitive skills:** actions a client uses to plan and manage the performance of an activity. **Communication and social skills:** actions a client uses to communicate and interact with others in an interactive environment [30]

Consequently, it follows that the execution skills are actions, and movements that are assimilated and accommodated over time and located in certain environments. In the particular case of children aged 3 to 5 years, who have been infected by Zika since gestation, the actions or movements are related to carrying out the execution of a skill when they perform it, according to the context and the demands of the activity in the performance of the occupation. For all the above-mentioned reasons, this work aimed to describe the level of affectation in execution skills and maturational age of children of the Valientes del Futuro program with neonatal Zika virus infection, to evaluate these skills according to performance practices according to cognitive age from occupational therapy.

2. Materials and Methods

2.1 Method

The present research is framed within analytical research with a quantitative approach of correlational type. According to Hernández et al. [31], the quantitative approach "uses data collection to test hypotheses based on the numerical measurement and statistical analysis, to establish patterns of behavior and test theories" [31]. On the other hand, for Bernal, correlational research "has the purpose of showing or examining the relationship between variables or results of variables" [32]. That is, "to know the relationship or degree of association that exists between two or more concepts, categories or variables in a particular sample or context" [31].

The research in turn fell within the type of field study, since "the data of interest are collected directly from reality" [33], which in our case are the children born to mothers who were or were not affected by Zika during their pregnancy.

Thus, it is expected to perform a complete characterization of the population under study to identify the possible relationship between the affectation of Zika on the mother in her pregnancy process and the presence of some affectations in the performance of their children in the Valientes del Futuro program in the city of Cúcuta.

2.2 Study design

This research could be defined as non-experimental design research because "it is conducted without deliberate manipulation of variables and only observing the phenomena in their natural environment to analyze them" [31]. In which we sought to describe relationships between two or more categories, concepts

or variables at a given time, which in our case are the children born to mothers who were or were not affected by Zika during their pregnancy.

2.3 Operating assumptions

According to Hernández et al. [31], correlational hypotheses specify the relationships between two or more variables. Therefore, the following assumptions are made:

- Null Hypothesis (H0): Zika virus infection in children, acquired during gestation, limits maturational age-specific performance skills.
- Alternative Hypothesis (H1): Zika virus infection in children, acquired during gestation, does not limit maturational age-specific performance skills.
- Research hypothesis of relationship: The variables, zika virus infection in children, acquired during gestation, and maturational age-specific performance skills.

2.4 Sample

The type of sample is non-probabilistic, given that the choice of the elements does not depend on probability but on causes related to the characteristics of the research. Regarding the population under study, it is worth clarifying that to assess the infant it is necessary to have the informed consent of the parents, given their condition of being minors and in special conditions, and they were included with the following selection criteria:

a) Inclusion (study cohort)

The child of a pregnant mother whose pregnancy developed between 2015 and 2016 during the epidemic phase of the Zika virus, attended the Erasmo Meoz University Hospital in the city of Cúcuta and was considered as a case of gestational Zika.

Child between 3 and 5 years of age belonging to the Valientes del Futuro program, with the aforementioned maternal history.

3. Child is considered as a case of congenital Zika, according to clinical history.

b) Inclusion (control cohort)

Boys or girls, schoolchildren aged 3 to 5 years belonging to the Jaime Prieto Amaya School with no immunological history of Zika virus infection, nor the history of diagnosed congenital or acquired pathology.

2.5 Data Collection Techniques

According to Arias, a research technique is understood as “the procedure or particular way of obtaining data or information” [34]. Consequently, the Abbreviated Developmental Scale (EAD-1), a test designed by the Colombian Ministry of Health and sponsored by UNICEF, was used for the present study.

It is composed of 120 dichotomous response items distributed in four groups of 30 items to assess gross motor, fine motor, language and social personality [26]. It uses the following normative parameters for the evaluation of the development of children under 108 months of age (Table 1).

Table 1. Normative parameters for developmental assessment of children under 108 months of age.

Age in Months	Gross Motor Skills (A)				Fine Motor Skills (B)				Hearing and Speech (C)				Social Personnel (D)				Total			
	Alert	Medium	Medium High	High	Alert	Medio	Medium High	High	Alert	Medio	Medium High	High	Alert	Medio	Medium High	High	Alert	Medio	Medium High	High
1-3	0-1	2-3	4-5	6+	0-1	2-3	4-5	6+	0-1	2-3	4-5	6+	0-1	2-3	4-5	6+	0-6	7-13	14-22	23
4-6	0-4	5-6	7-9	10+	0-4	5-6	7-9	10+	0-4	5-6	7-9	10+	0-4	5-6	7-9	10+	0-18	19-26	27-34	35
7-9	0-7	8-9	10-12	13+	0-7	8-9	10-12	13+	0-7	8-9	10-12	13+	0-7	8-9	10-12	13+	0-30	31-38	39-46	47
10-12	0-10	11-12	12-15	16+	0-10	11-12	12-15	16+	0-10	11-12	12-15	16+	0-10	11-12	12-15	16+	0-42	43-50	51-58	59
13-18	0-13	14-15	16-18	19+	0-13	14-15	16-18	19+	0-13	14-15	16-18	19+	0-13	14-15	16-18	19+	0-54	55-62	63-70	71
19-24	0-16	17-18	19-21	22+	0-16	17-18	19-21	22+	0-16	17-18	19-21	22+	0-16	17-18	19-21	22+	0-66	67-74	75-82	83
25-36	0-19	20-21	22-24	25+	0-19	20-21	22-24	25+	0-19	20-21	22-24	25+	0-19	20-21	22-24	25+	0-78	79-86	87-94	95
37-48	0-22	23-24	25-27	28+	0-22	23-24	25-27	28+	0-22	23-24	25-27	28+	0-22	23-24	25-27	28+	0-90	91-98	99-106	107
49-60	0-25	26-27	28-30	31+	0-25	26-27	28-30	31+	0-25	26-27	28-30	31+	0-25	26-27	28-30	31+	0-102	103-110	111-118	119
61-72	0-28	29-30	31-33	34+	0-28	29-30	31-33	34+	0-28	29-30	31-33	34+	0-28	29-30	31-33	34+	0-114	115-122	123-130	131
74-84	0-31	32-33	34-36	37+	0-31	32-33	34-36	37+	0-31	32-33	34-36	37+	0-31	32-33	34-36	37+	0-126	127-134	135-142	143
85-96	0-34	35-36	37-39	38+	0-34	35-36	37-39	38+	0-34	35-36	37-39	38+	0-34	35-36	37-39	38+	0-138	139-146	147-154	155
96-108	0-37	38-39	40+		0-37	38-39	40+		0-37	38-39	40+		0-37	38-39	40+		0-150	152-158		

Similarly, an observation sheet was used for the evaluation of performance skills in the areas of motor skills and praxis, sensory-perceptual skills, cognitive skills, emotional regulation skills, communication and social skills. It consists of 23 items for children 3 years old, as well as the observation sheet for 4 years old reflects 36 items and, finally, the observation sheet for 5 years old is composed of 37 items, all with dichotomous answers.

Thus, after confirming the history of Zika virus both individual and maternal (in the study court), according to the clinical history (as specified), and the absence of a history of infection by this agent in the control cohort, we proceeded to the assessment of performance skills using the checklist by age of 3, 4 and 5 and the Abbreviated Developmental Scale. For which the maturational age of each participant was determined based on the findings of the previous activity. Finally, the database was filled out with the information obtained for statistical analysis.

4. Results

In the instruments applied, the following findings were obtained related to the history of Zika virus infection, both individual and maternal during gestation, as well as the maturity age and execution skills, in which it was found that 60.0% of the infants belong to the female sex and 40.0% to the male sex, of which 66.7% (10 infants) have a chronological age of 3 years, 13.3% (2 children) are between 4 years old and the rest 20.0% (3 children) are 5 years old. It was also shown that 40.0% of the mothers of the infants belonged to a special care group (displaced).

Concerning zika virus infection during gestation, it was established that the infants born were especially related to the antecedent, that all of these infants had sequelae of gestational zika infection and showed a diagnosis in thirteen of them (86.7%) of microcephaly, along with other diagnoses such as developmental delay (40.0%), Steven Johnson Syndrome (13.3%), epilepsy (33.3%) and cerebral palsy (33.3%).

As this is the starting point to relate whether the Zika virus by generating associated congenital defects could have an effect on the client's performance and with it, the skills, characteristics or beliefs that reside in the client according to their maturity age (Table 2).

Table 2. Maturational age of infants with Gestational Zika

Chronological age	Months	Age range in months (EAD)	Location in the items of the (EAD)	Part A - gross motor skills	Part B - fine motor skills	Part C - hearing and language	Part D - social personnel	Total
3 years y 6m	42	37 - 48	22-23-24	11	11	13	17	52
3 years	36	25 - 36	19-20-21	7	4	7	5	23
3 years and 9m	45	37 - 48	22-23-24	6	4	7	6	23
3 years	36	25 - 36	19-20-21	9	0	0	0	9
3 years and y 2m	38	37 - 48	22-23-24	6	4	7	7	24
5 years 4m	64	61 - 72	28-29-30	8	9	9	9	35
3 years and 7m	43	37 - 48	22-23-24	9	4	7	10	30

3 years and 6m	42	37 - 48	22-23-24	7	9	7	10	33
3 years and 8m	44	37 - 48	22-23-24	9	6	9	10	34
3 years	36	25 - 36	19-20-21	5	6	9	9	29
3 years and 6m	66	61 - 72	28-29-30	4	4	10	4	22
5 years	60	49 - 60	25-26-27	9	6	9	9	33
4 years and 2m	50	49 - 60	25-26-27	11	11	13	17	52
4 years	48	37 - 48	22-23-24	10	11	13	17	51
5 years and 2m	62	61 - 72	28-29-30	9	6	9	9	33
			Min. months item	4 months	0 months	0 months	0 months	
			Max. months item	11 months	11 months	13 months	17 months	
			Mode	9 months	4 months	7 months	9 months	

On the other hand, an excellent trend was found in the evaluated areas of development through the Abbreviated Developmental Scale and the execution skills in infants with gestational Zika aged 3, 4 and 5 years, Table 3 shows the weights of the scales in each area, as well as their average means, standard deviations, minimum and maximum maturational age items. Likewise, the asymmetry is given to know the distribution of the values, whether positive or negative concerning the mean, as well as the amount of data that is concentrated in the mean (kurtosis).

Table 3. Measure of central tendency and dispersion for the assessed areas of development by EAD and performance skills for infants with gestational zika aged 3, 4 and 5 years.

	Abbreviated Development Scale (EAD)				Execution skills				
	Gross motor skills	Fine motor skills	Hearing and language	Social staff	Motor skills and praxis	Sensory perceptual skills	Cogniti ve skills	Emotional regulation skills	Communi cation and social skills
Children 3 years of age with gestational zika	4	0	0	0	0	0	0	0	0
	5	4	7	4	0	1	0	0	0
	6	4	7	5	0	1	0	0	0
	6	4	7	6	0	2	0	0	0
	7	4	7	7	0	2	0	0	0
	7	4	7	9	0	2	0	1	0

		9	6	9	10	0	2	0	1	0
		9	6	9	10	0	2	0	1	0
		9	9	10	10	0	2	0	1	0
		11	11	13	17	2	4	2	0	0
Summation		73	52	76	78	2	18	2	4	0
N		10	10	10	10	10	10	10	10	10
Mean		7,30	5,20	7,60	7,80	0,20	1,80	0,20	0,40	0,00
Dev. typ.		2,16	3,05	3,31	4,57	0,63	1,03	0,63	0,52	0,00
Median		7,00	4,00	7,00	8,00	0,00	2,00	0,00	0,00	0,00
Minimum Item:		4,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Maximum Item:		11,00	11,00	13,00	17,00	2,00	4,00	2,00	1,00	0,00
Pearson's skewness		0,42	1,18	0,54	-0,13	0,95	-0,58	0,95	2,32	-
Kurtosis		0,24	0,13	0,09	0,17	0,00	0,14	0,00	5,00	-
Quartile 1	2,75	5,75	4	7	4,75	0	1	0	0	0
Quartile 3	8,25	9	6,75	9,25	10	0	2	0	1	0
10th percentile	1,1	4,1	0,4	0,7	0,4	0	0,1	0	0	0
90th percentile	9,9	10,8	10,8	12,7	16,3	1,8	3,8	1,8	0,1	0
Children 4 years of age with gestational zika		Part a - gross motor skills	Part b - fine motor skills	Part c - hearing and language	Part d - personal social	Motor skills and praxis	Sensory perceptual skills	Cogniti ve skills	Emotiona l regulation skills	Communi cation and social skills
		10	11	13	17	0	1	0	0	0
		11	11	13	17	0	1	0	0	0
Sum		21	22	26	34	0	2	0	0	0
N		2	2	2	2	2	2	2	2	2
Mean		10,50	11,00	13,00	17,00	0,00	0,20	0,00	0,00	0,00
Tip deviation		0,71	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Children 5 years of age with gestational zika		Parte a - motricidad gruesa	Parte b - motricidad fina	Parte c - audición y lenguaje	Parte d - personal social	Destrezas motoras y praxis	Destrezas sensoriales perceptuales	Destrezas cognitivas	Destrezas regulación emocional	Destrezas comunicativas y sociales
		8	6	9	9	0	1	0	0	0
		9	6	9	9	0	1	0	0	0
		9	9	9	9	0	1	0	0	0
Sum		26	21	27	27	0	3	0	0	0

N	3	3	3	3	3	3	3	3	3
Mean	8,67	7,00	9,00	9,00	0,00	0,30	0,00	0,00	0,00
Tip deviation	0,58	1,73	0,00	0,00	0,00	0,00	0,00	0,00	0,00

According to the criteria evaluated for 3-year-old infants with gestational Zika, it is observed that the values of gross motor skills, fine motor skills, hearing and language, as well as motor skills and praxis, cognitive skills, emotional regulation skills, communication and social skills are skewed to the right and are concentrated far from the mean, except for the personal and social area and sensory-perceptual skills, where the distribution is approximately skewed and their values are far from the mean.

That is, the kurtosis and skewness values for each area evaluated with the EAD and performance skills, allow us to conclude that the scores have an asymmetric distribution to the right and leptokurtic, except for the personal and social part which is asymmetric to the left and leptokurtic. While perceptual sensory skills indicate that there is a presence of the minority of data on the left side of the mean, a trend of kurtosis shows a slight or weak concentration of data around the mean. On the other hand, for children 4 and 5, the data were not representative, although they follow the same trend as for the 3-year-old infants with gestational Zika and their correlation of the areas evaluated concerning the maturational age shown in Tables 4 and 5.

Table 4. Correlation of Gross Motor vs Motor Skills and Praxis along with Correlation of Overall Totals Execution Skills vs Overall Totals EAD la for 3-year-old infants with gestational zika.

Motor skills and praxis		
For n=10	R	P
Gross motor skills	0,601	0,066
Total Global EAD		
For n=10	R	P
Overall totals Execution Skills	0,853	0,002

In Table 4, the weighting of motor skills and praxis found a correlation coefficient of 0.601 (moderate) and in the same the performance skills of 3 year old children with gestational zika obtained a correlation of 0.853 (strong).

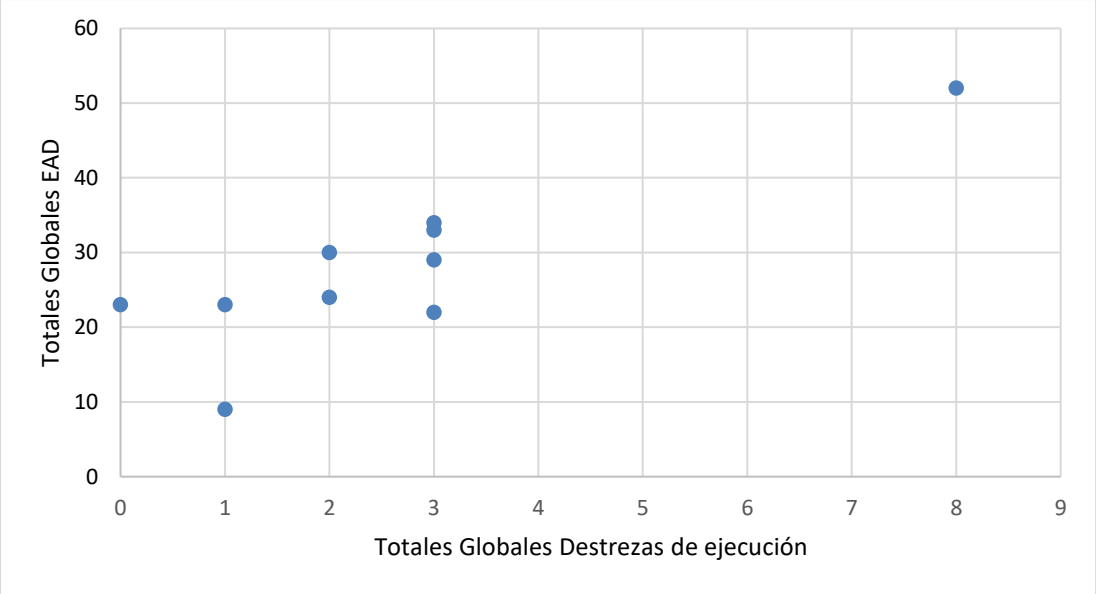

Figure 1. Scatterplot of Performance Skills and overall, EAD totals of 3-year-old infants with Gestational Zika.

5. Discussion

The research allows to see the results found that children born with Zika virus infection during gestation are related to other diagnoses and pathologies that have a level of affectation on the maturational age and performance skills in these infants. Thus, the results are consistent with the approach of Arroyo [20] who points out that the Zika virus spectrum includes congenital defects associated with microcephaly (hearing loss and ophthalmologic defects), as well as epilepsy, intellectual disability, among others, as shown in Table 2.

Table 2 shows that the maturational age of infants with gestational Zika shows an age range on the abbreviated developmental scale (EAD) that is very different from the chronological age. Since these children should have a maturational age of 37 to 48 months (53.3%). While 20.0% are at a maturational age of 25 to 36 months. The rest of the infants are between 49 to 60 months (13.3%) and the others are between 61 to 72 months (13.3%).

However, in the same Table 2, it was shown in the evaluation that gross motor skills are between the minimum item of 4 months and the maximum item of 11 months, with a trend of greater frequency in the data distributions of the 9-month-old infants (age range 7 to 9 months according to EAD), in which these children barely hold themselves seated with help, as well as crawl in the prone position and sit up on their own. Regarding fine motor skills, the results found are between zero (0) and 11 months, with a mode of greater frequency of data of 4 months, that is, a range of maturity age from 4 to 6 according to EAD, in which infants can grasp objects voluntarily, hold an object in each hand and pass objects from one hand to another.

Regarding hearing and language, it was clarified that the findings found a range from zero (0) to 13 months, with a frequency mode of 7 months. This indicates that most of the infants are with a maturational age of 7 to 9 months according to EAD, in which infants can pronounce 3 or more syllables, ring the bell and say a clear word. Meanwhile, concerning the evaluation of the personal and social part, it was found that the minimum item is zero and the maximum item is 17 months, with a frequency mode of 9 months.

This indicates that most infants with gestational Zika are located in this area with a maturational age of 7 to 9 months according to EAD, where they can help hold a cup to drink, react to their image in the mirror and imitate clapping.

Thus, the Abbreviated Developmental Scale (EAD) is a tool to pre-screen for global and general abnormalities in motor, language, social and coordination areas. Because the more distant the maturational age is from the chronological age, the greater the degree of affectation that the child has in his development. In addition, the data revealed in Table 2 shows that the development in chronological age is not under the life stages of infants infected with gestational Zika, in the maturity of skills and abilities.

This coincides with the statement of the Ministry of Health of Argentina [20] that various arbovirus infections can affect the maturational age of children and, thus, executive skills, as evidenced by the findings in Table 3 where the measures of central tendency and dispersion for the evaluated areas of development through EAD and executive skills for infants aged 3, 4 and 5 years were reported, It was found that in gross motor skills for 3-year-old infants, the mean value was 7.30 with a standard deviation of 2.16 points, a median of 7 months and the minimum and maximum value of 4 and 11 months, respectively.

For fine motor skills, the mean value found was 5.20 and a standard deviation of 3.05 points, with a median of 4 months and a minimum value of 0 and a maximum of 11 months. For hearing and language, the mean value was 7.60 with a standard deviation of 3.31, a median of 7 months and the minimum and maximum values between 0 and 13 months, respectively. Regarding the personal and social area, a mean of 7.80 and a standard deviation of 4.57 points was found. With a median of 8 months and a minimum value in months of zero (0) and a maximum of 17.

As can be seen, the areas of least progression are fine motor and gross motor, while the personal and social areas present a better evolutionary ascent. This is related to the execution skills since the sensory-perceptual skills achieved a low mean value of 1.8 and a standard deviation of 1.03. Followed by motor skills and praxis with a mean of 2.0 and a standard deviation of 0.63 points that present a lower progression in executive skills to perform actions or behaviors used by the infant to locate, identify and respond to visual and tactile sensations to move and physically interact with objects.

The other executive skills acquired for cognitive skills (mean of 2.0 and standard deviation of 0.63 points) and emotional regulation skills (mean of 4.0 points and standard deviation of 0.52 points). The communicative and social skills obtained a mean value and standard deviation of zero (0).

The latter skills are consistent with the findings found in Table 2, where it was shown that in hearing and language the highest maturation item was 13 months and a frequency mode of 7 months, for this reason, the communicative and social skills are delayed in development due to various affectations (microcephaly, developmental delay, cerebral palsy, epilepsy, among others) that seem to be unable to perform the tasks typical of their chronological age. This coincides with Escudero [24] who maintains that maturation and growth go hand in hand with cognitive, social, affective and language development.

All of the above implies that infants with gestational Zika may develop very few cognitive, communication, emotional regulation, motor (gross and fine), sensory and perceptual skills that allow them to perform the demands of an activity involving things and mechanical actions of the body, as well as social requests to carry out the activity, and the functions and structures of the body used during the performance of the activity for chronologically healthy infants of 3 years of age. This is in agreement with the Spanish Society of Gynecology and the Spanish Society of Pediatric Infectious Diseases [17] who argue that infants infected by the Zika virus produce developmental disorders of the neurological system.

The above shows that gross motor skills of 3-year-old infants with gestational Zika correlate positively with their motor skills and praxis (see Table 4), where the p-statistic value ($p = 0.066 < 0.05$) is

above 0.05 and the correlation coefficient (r) for gross motor skills and motor skills and praxis is 0.601, which shows a statistically moderate correlation between these two areas. Hence, the moderate correlation between children with gestational Zika virus infection and maturational age-appropriate skills, little or no development of gross motor skills because these involve results in the actions and behavior of motor skills and praxis.

Thus, the performance skills are positively correlated with the results obtained from the EAD of 3-year-old infants with gestational Zika, ($p< 0.05$). In that sense, the statistical value ($p = 0.002$) is below 0.05 and the correlation coefficient (r) for these two variables is 0.853 as shown in (Table 5) indicating a statistically strong correlation between them.

Therefore, it is demonstrated that there is a strong correlation between the variables of Zika virus infection in boys and girls, acquired during gestation and the execution skills of the maturational age. This indicates that performance skills involve maturational age outcomes in the actions and behaviors of infants with gestational Zika.

Finally, taking into account the research hypothesis proposed, the null hypothesis is accepted, since it has been found that Zika virus infection in children, acquired during gestation, strongly limits the performance skills characteristic of the maturational age in this population. This provided an answer to the third objective since it was determined that there is a relationship between gestational zika virus infection and execution skills, which allows describing and appreciating the adjustments from the occupational therapy approach to the inquiries and practices about the ability of skills in the effective performance of infants with gestational zika.

In the development of this research, there were some limitations associated with the various phases of the process, for example, in the phase of identification of informants, problems arose in accessing the medical records of mothers in which it is identified that during their gestation process they had been affected by Zika, which is complemented with the screening that was performed to infants at birth to verify the presence of the genotype of this pathology.

When the infants were evaluated, it was necessary to guarantee the resources to travel to the university, since this activity could not be carried out at the hospital. Finally, another limitation was being able to consolidate a relatively large sample size that met the criteria for inclusion in the research. It is recommended for future research the development of rehabilitation processes aimed at improving the conditions of these affected infants, as a complement to this work.

6. Conclusions

With this research, not only is it possible to recognize the EAD as a useful instrument to evaluate children born with Gestational Zika, but also the correlation between the skills and abilities that infants show in the actions or behaviors they carry out in their execution and their maturational development.

The deductions found here contribute to the follow-up of the maturational age and development of infants with Gestational Zika, to the disposition and suggestion of therapists and parents, by being able to evaluate if the motor skills and praxis advance, as well as the perceptual sensorial skills, emotional regulation, cognitive, communication and social skills in their different evolutionary moments, according to what is expected for their chronological age in their different areas of fine gross motor skills, language and the personal-social area and for their condition of human development in all its dimensions and basic social and cultural process.

Thus, there is a correlation for infants with Gestational Zika to have a strong affectation in the actions or behaviors that the person has to move and interact physically with activities, and objects and

therefore perform a learned motor activity. It could be that these actions or behaviors were affected to locate, identify, select, associate, organize or remember sensory events or other skills that include cognitive, communication or social skills.

This is the effect of this future research; to determine the maturational age and performance skills of the prioritized children of the Brave for the Future Program and the control population by employing the Abbreviated Development Scale and checklist, as well as to describe the level of affectation in these performance skills and maturational age that are associated with the evolutionary process of the children of the Brave for the Future Program with neonatal Zika virus infection, especially in the aforementioned area and skills associated with the future evolutionary development of these children in habits, routines and specific and automatic behaviors that may be useful or detrimental that may serve the occupational therapy profession to positively influence the client's life.

References

1. **Heinz F, Stiasny K**. The Antigenic Structure of Zika Virus and Its Relation to Other Flaviviruses: Implications for Infection and Immunoprophylaxis. Microbiol Mol Biol Rev. 2017; 81(1):1-27.https://doi.org/10.1128/MMBR.00055-16
2. **Song BH, Yun SI, Woolley M, Lee YM.** Zika virus: History, epidemiology, transmission, and clinical presentation. J Neuroimmunol. 2017; 308:50-64. https://doi.org/10.1016/j.jneuroim.2017.03.001
3. **Foy BD, Kobylinski KC, Foy JL, Blitvich BJ, Travassos A, Haddow AD, et al.** Probable Non–Vector-borne Transmission of Zika Virus, Colorado, USA. Emerg Infect Dis. 2011; 17(5):880-882. https://dx.doi.org/10.3201/eid1705.101939
4. **Duffy M, Thane W, Kool J, Marfel M, Dubray C, Bel M, et al.** Zika virus outbreak on Yap Island, federated states of Micronesia. N Engl J Med. 2009; 360(24):2536-2543. https://www.nejm.org/doi/full/10.1056/NEJMoa0805715
5. **Kantor IN.** Dengue, zika y chikungunya. Medicina (B Aires). 2016; 76(2). http://www.medicinabuenosaires.com/wp-content/uploads/2016/02/Med76-2-6504-Dengue-A-1.pdf
6. **Barbeito-Andrés J, Schuler-Faccini L, Garcez PP.** Why is congenital Zika syndrome asymmetrically distributed among human populations? PLoS Biol. 2018; 16(8): e2006592. https://doi.org/10.1371/journal.pbio.2006592
7. **Kindhauser MK, Allen T, Frank V, Shankar R, Dye, C.** Zika: the origin and spread of a mosquito-borne virus. Bull World Health Organ. 2016; 94:675–686. http://dx.doi.org/10.2471/BLT.16.171082
8. **Weaver SC, Costa F, Garcia-Blanco M, Ko AI, Ribeiro GS, Saade G, et al.** Zika virus: History, emergence, biology, and prospects for control. Antiviral Res. 2016; 130:69-80. https://doi.org/10.1016/j.antiviral.2016.03.010
9. **Gomes C, Schuler-Faccini L, Matijasevich A, Ribeiro E, Pessoa A, Celso F.** Microcephaly in Brazil: how to interpret reported numbers? The Lancet. 2016; 387(10019):621-624. https://dx.doi.org/10.1016/S0140-6736(16)00273-7
10. **Galán-Huerta K, Rivas-Estilla A, Martínez-Landeros EA, Arellanos-Soto D, Ramos-Jiménez J.** The Zika virus disease: Anoverview. Revista Medicina Universitaria. 2016; 18(71):115-124. http://dx.doi.org/10.1016/j.rmu.2016.05.003

11. **Organización Panamericana de la Salud/Organización Mundial de la Salud.** Actualización Epidemiológica Regional de la OPS (Américas). [Internet]. [consultado en 2016 Oct 20]. Disponible en: https://www.paho.org/es/documentos/20-octubre-2016-zika-actualizacion-epidemiologica
12. **Instituto Nacional de Salud.** Boletín Epidemiológico semanal. 2016. [citado 29 de marzo de 2019]. Recuperado a partir de https://www.valledelcauca.gov.co/loader.php?lServicio=Tools2&lTipo=viewpdf&id=411
13. **Instituto Nacional de Salud.** Boletín Epidemiológico semanal. [Internet]. 2017 [consultado en 2019 Mar 29]. Disponible en: https://www.ins.gov.co/buscador-eventos/BoletinEpidemiologico/2017%20Bolet%C3%ADn%20epidemiol%C3%B3gico%20semana%2022%20NUEVO.pdf
14. **Bolaños P.** La importancia de la alimentación en el embarazo. Su significado en trastornos de la conducta alimentaria. Trastornos de la Conducta Alimentaria. 2010; (11):1196-1230. https://dialnet.unirioja.es/servlet/articulo?codigo=3734361
15. **Lugones M, Ramírez M**. Curioso origen y significado de la palabra embarazada. Rev Cubana Obstet Ginecol. 2015; 41(1). http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0138-600X2015000100011
16. **Belfort R, De Paula B, De Oliveira, JR.** Zika Virus, Microcephaly, and Ocular Findings—Reply. JAMA Ophthalmol, 2016; 134(8):946-947. http://dx.doi.org/10.1001/jamaophthalmol.2016.1305
17. **Gourinat AC, O'Connor O, Calvez E, Goarant C, Dupont-Rouzeyrol M.** Detection of Zika virus in urine. Emerg Infect Dis. 2015; 21(1):8486. https://dx.doi.org/10.3201/eid2101.140894
18. **Sociedad Española de Ginecología y Sociedad Española de Infectología Pediátrica (SEGO, SEIP)**. Procedimiento de manejo de la infección por virus zika durante el embarazo y en recién nacidos. [Internet]. 2017 [consultado en 2019 Abr 10]. Disponible en: https://www.aeped.es/sites/default/files/documentos/procedimiento_manejo_conjunto_zika.pdf
19. **Pacheco O, Beltrán M, Nelson CA, Valencia D, Tolosa N, Farr SL, et al.** Zika Virus Disease in Colombia - Preliminary Report. N Engl J Med. 2016 Jun. https://dx.doi.org/10.1056/NEJMoa1604037
20. **Arroyo HA**. Microcefalia. Medicina. 2018; 78(Supl.2):94-100. https://www.medicinabuenosaires.com/revistas/vol78-18/s2/94-100-S.II-17-Arroyo-Neurologi%CC%81a-D.pdf
21. **Ministerio de salud**. Guía para la vigilancia integrada de la infección por virus zika y recomendaciones para el equipo de salud. [Internet]. 2017. [consultado 2019 Abr 09]. Disponible en: https://bancos.salud.gob.ar/sites/default/files/2018-10/0000000933cnt-2017-01-25-zika-guia-para-equipos-de-salud.pdf
22. **MacDonald PM**. Maduration. In: Editors: Goldstein S., Naglieri J.A. (eds). Encyclopedia of Child Behavior and Development. Boston, MA: Springer; 2011. https://doi.org/10.1007/978-0-387-79061-9
23. Iceta A, Yoldi, ME. Desarrollo psicomotor del niño y su valoración en atención primaria. ANALES Sis San Navarra. 2002; 25(2):35-43. https://doi.org/10.23938/ASSN.0829
24. **Escudero A.** Las etapas del desarrollo madurativo. Form Act Pediatr Aten Prim. 2012; 5(2):65-72. http://archivos.fapap.es/files/639-779-RUTA/02%20FAPap_2_2012.pdf
25. **Alarcón CL, Trujillo MC.** Estrategia de atención integral a la primera infancia: Un modo de concebir, comprender y actuar. Bogotá, Colombia: Ledfish; 2014.

http://www.deceroasiempre.gov.co/Prensa/CDocumentacionDocs/Estrategia%20de%20Atenci%C3%B3n%20Integral%20a%20la%20Primera%20Infancia.pdf

26. **Ortiz N**. Escala Abreviada de Desarrollo. [Internet]. 1999. [consultado 2019 Abr 15]. Disponible en: https://docenciaeinvestigacionmanuelsanchezserrano.files.wordpress.com/2014/08/escala-abreviada-de-desarrollo-unicef-colombia.pdf
27. **American Occupational Therapy Asociation.** Occupational therapy practice framework: Domain and process. 2nd ed. United States of America: Amer Occupational Therapy Assn. 2008; 62(6):625-683. https://doi.org/10.5014/ajot.62.6.625
28. **Ares, L.** Análisis de una actividad ocupacional: marco de trabajo para la práctica de terapia ocupacional de la asociación americana de terapia ocupacional: dominio y proceso. TOG (A Coruña). 2012; 9(15):1-15. http://www.revistatog.com/num16/pdfs/caso2.pdf
29. **Anderson M, Prada M.** Estudios interdisciplinarios y nuevos desarrollos. Evaluación de las habilidades motoras y de procesamiento en el desempeño de las actividades de la vida diaria en pacientes con secuela de traumatismo craneoencefálico (TCE) al alta del tratamiento de rehabilitación en internación. En: Memorias III Congreso Internacional de Investigación y Práctica Profesional en Psicología XVIII Jornadas de Investigación Séptimo Encuentro de Investigadores en Psicología del MERCOSUR. Buenos Aires: Universidad de Buenos Aires; 2011. p. 23-27.
30. Occupational Therapy Practice Framework: Domain & Process 2nd Edition. Am J Occup Ther. 2008; 62(6):625-683. https://doi.org/10.5014/ajot.62.6.625
31. **Hernández R, Fernández C, Baptista M.** Metodología de la Investigación. 6ª ed. México: McGraw-Hill/Interamericana Editores; 2014.
32. **Bernal C.** Metodología de la Investigación. Para administración, economía, humanidades y ciencias sociales. 3ª ed. México: Pearson Educación; 2010.
33. **Universidad Pedagógica Experimental Libertador (UPEL)**. Manual de Trabajos de Grado de Especialización y Maestría y Tesis Doctorales. 5ª ed. Caracas: FEDUPEL; 2016.
34. **Arias, F.** El Proyecto de Investigación Introducción a la metodología científica. 6ª ed. Caracas: Editorial EPISTEME; 2012.