

Delayed in the Psychomotor Development of a Premature born Mother with Malaria failed in the Western Amazon, Brazil

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Abstract— Objective: To report the case of a young man born of premature birth, whose mother contracted *Plasmodium falciparum* infection in one pair in gestation. **Case report:** Young male, born at 32 weeks of gestation, vaginally, Apgar 7 and 8, the first and fifth minute, respectively, weighed 1100 g. He sat down at age two. He spoke at the age of three. He was 4 years old. His mother, primiparous, had malaria in a *falciparum* in the first trimester of gestation, made quinine tablet 500 mg, in the dose of 1 tablet of 8/8 h for ten days. At the examination: 17 years and 10 months, presented Weight: 39 Kg, Height: 1,51 cm, PA: 80/60 mmHg. He presented good state of nutrition, active attitude, normocorado, normohidratado, acyanotic, eupnéico, without alteration of the cardiovascular and respiratory apparatus, without secondary sexual characters, does not have axillary or pubic hair, penis and testes of infantile aspect, with little increase in its overall size, but with a slight change in its appearance, without intonation of speech, that is, the vocal mute has not yet occurred. **Conclusion:** Premature

born to mothers who had *Plasmodium falciparum* infection, presented delayed neuropsychomotor development and secondary sexual characteristics. It recommends the improvement of diagnosis and treatment programs in the services of assistance to pregnant women, perinatology and rehabilitation, aiming at the appropriate and timely treatment and regular outpatient follow-up to prevent or minimize the sequelae of these preterm infants.

Keywords— Malaria. Plasmodium falciparum. Pregnant women.

I. INTRODUCTION

Neuropsychomotor Development Delay (DNPM) in the first year of life may be related to different risk factors, including genetic, biological, psychological and environmental factors, and there may be interactions between them¹. There is a view that multifactorial traits are involved in the development of children, and that there is a cumulative effect on the risk of the child present

delays², we see malaria in pregnancy, especially that caused by *Plasmodium falciparum* as responsible for a high morbidity rate - maternal and fetal mortality in the north of our country, particularly in the states of Pará, Rondônia and Mato Grosso³.

Malaria is one of the main Brazilian endemic diseases, caused by the *Plasmodium* protozoan vector transmission, occurring predominantly in the Amazon Region, with more than 500,000 new cases of malaria per year⁴. The occurrence of malaria in pregnancy is common in endemic areas, where several factors are related to the severity of the disease, such as maternal iron deficiency anemia, low socioeconomic power and deficiency of prenatal services, leading to malicious effects on the concept. Malaria in pregnancy can lead to miscarriage, prematurity, low birth weight, megaloblastic anemia, perinatal and maternal mortality. Complications are more important in primigravidae, in cases with exacerbated clinical symptoms and elevated parasitemia⁵.

Given the above, and This article reports a case of a young man born of premature birth, whose mother contracted malaria *falciparone* in the gestation, and presented delay in its neuropsychomotor development and in the secondary sexual characters and it proposes to comment the controversies of the literature in relation to the findings.

II. CASE REPORT

TCN, 17 years old, male, single, native of Porto Velho - Rondônia, Brazilian Amazon, resident in line 8 of the Transpurus Project, in the municipality of Canutama - State of Amazonas, 5th grade student (4th grade) of Youth and Adult - EJA. He was born in the Base Hospital Dr. Ary Pinheiro (HBAP), 32 weeks of gestation, of vaginal delivery, with APGAR 7 and 8, in the first and fifth minutes of life, respectively, weighed 1100 g. His mother (MJC), primipara presented *falcipar malaria one* in the first trimester of pregnancy, made use of quinine 500 mg tablet at a dose of 1 tablet 8/8 h for ten days, prescribed by a doctor specializing in the infectology of the Center of Tropical Medicine of Rondônia - CEMETRON. The newborn infant was hospitalized in the HBAP nursery, where he stayed in the incubator and then in a warm crib, around 60 (sixty) days. She was followed up for 6 months in the outpatient clinic of the *folio up* of preterm infants, Policlínica Osvaldo Cruz - POC. He did all his own childhood vaccination in POC. He sat down at age two. He spoke at the age of three. He was 4 years old.

At the examination: 17 years and 10 months, presented Weight: 39 Kg, Height: 1,51 cm, PA: 80/60 mmHg. He presented good state of nutrition, active

attitude, normocorado, normohidratado, acianótico, eupnéico, without alteration of the cardiovascular and respiratory apparatus, without secondary sexual characters: it does not have axillary or pubic hair, the penis and the testes of infantile aspect, with little increase in its overall size, but with a slight change in its appearance, without intonation of speech, that is, the vocal mute has not yet occurred.

III. RESULTS AND DISCUSSIONS

This article reports the complexity of the delay in the DNPM of preterm infants of mothers with *falcipara* malaria during pregnancy, since malaria is considered a serious public health problem, due to its etiological agents, the plasmodia, being found in areas where almost half the population lives world. In the Americas, 21 countries are endemic and 357 million (38.6%) of inhabitants are at risk of becoming ill. Brazil accounts for one-third of malaria reported cases⁶. About 40% of the population in more than 90 countries are living with the risk of malaria contagion. Across the world, among infectious diseases, only Acquired Deficiency Syndrome (AIDS) outnumbers malaria in number of deaths (WHO).

Reports of modern - day (WHO)⁷. 2016 discloses rams were estimated 216 million cases of malaria, an increase of nearly 5 million cases in relation to 2015. The deaths reached 445.000, a number similar to the previous year.

The pregnant woman is more vulnerable to malaria, and this is due to altered immunity leaving the susceptible ma laity infection, making it risk pregnancy that can at it even lead to fetal death.

The Amazon region is an endemic area in malaria, so it is to be expected that the subject was born and still lives in a vulnerable area.

Du Rante management malaria parasites can penetrate the fetal circulation through the placenta, although it is rare congenital transmission. According to Viggiano⁸ in his study of placentas in malaria, it was shown that, although 23% of the cases had placentas parasitized, no parasites were found in any newborn in the first 24 hours of birth. No cases had parasites in umbilical cord blood.

According to Suguitan *et al*⁹, malaria is responsible for microscopic changes in the placenta, such as: deposition of malaric pigment and infiltration of the intervillous space by skin lesions, and may be associated with the presence of the parasite intervilliary fibrinoid deposit, ischemic changes in the syncytiotrophoblast and thickening of the membrane basal trophoblast that together with the changes in the intervillous space are

responsible for the Restriction of Intrauterine Growth, prematurity and perinatal morbi-mortality.

A study published by researchers¹⁰ of the Institute of Biomedical Sciences (ICB) at USP identified the main structure of the placenta responsible for the inflammatory process caused by malaria during pregnancy, the TLR4 receptor, the study results indicate that in the future, a drug blocking the action of TLR4 may be used in treatment to reduce the effects of malaria on the mother and fetus, such as maternal anemia, decreased fetal viability, and delayed intrauterine growth and motor development implications.

Corroborating with the findings above research¹¹ recent study, states that malaria in pregnancy is a major cause of mortality and morbidity in tropical regions, causing maternal anemia, intrauterine growth retardation, preterm birth and low birth weight.

Prematurity due to malaria *falciparone* contracted by the mother during pregnancy, early exposure to extra-uterine environment, which can lead to impaired fast and whole development of the central nervous system¹², the drug that was used in the treatment of malaria, quinine, these factors associated with neonatal hypoxia, low birth weight and neonatal disorders of the newborn, according to the intensity and duration of these risks, the child may present delays or permanent disturbances in their development¹³.

According to Miranda *et al*¹⁴, can occur several risk factors in changing the child's neurodevelopment. This definition, although didactic, is not always easily used in daily practice, since in many situations there is a superposition of biological and environmental factors, resulting in a greater probability of damages. *Plasmodium falciparum* infection during pregnancy can be considered as a prenatal biological factor, prematurity and low birth weight as perinatal biological factors and environmental factors such as socioeconomic conditions and unfavorable environment.

In the first years of life, 20-30% of extremely low birth weight preterm infants present some degree of impairment in their motor skills. Neurosensory deficiencies occur in 7-17% of cases. But the most frequent problem at this time is the delay in cognitive development, detected in 30-40% of these children¹⁵. In this case the subject presented a delay in the psychomotor development, since he sat at 2 years and walked at 4 years, and in cognitive development, therefore, he spoke at 3 years.

A cohort¹⁶ held in Thailand considered an endemic country for malaria, revealed that infection can affect cognitive function and lead to impairment of memory and language functions.

Studies on preterm infants show that health problems decline after the first years of life. At preschool age, 5-30% have some functional limitations in their motor, communication or self-care activities. At school age, many preterm infants are able to perform normally, however, as the intellectual challenges at school increase, new neuropsychological, behavioral, and learning problems may arise. Rates of neurosensory and cognitive disability, psychological and behavioral disorders are high school in preterm infants and especially very low birth weight (<1000 g)^{17,18,19}. At age 17 the subject still attended the 5th grade (4th grade) of the EJA, demonstrating a learning delay in school age.

Among the main determinants of poor quality of life of premature infants, we highlight the neurosensory and cognitive deficiencies. In this sense, there is concern in several studies that problems in the development of preterm infants detected at preschool and school age persist through adolescence, and although some may be attenuated over time, others may be underdiagnosed at younger ages precocious¹⁷.

In a cohort of 79 EBP preterm infants born in the late 1970s and followed up to 14 years of age, only 46% of the adolescents were fully normal in adolescence, 14% had severe motor, visual or intellectual sequelae, moderate deficiencies occurred in 15%, and mild in 25% of the cases. However, it should be considered that these figures may be different for premature infants born in more recent decades²⁰. The school performance of adolescents born less than 29 weeks of gestational age, evaluated through questionnaires answered by adolescents, their parents and teachers, showed that most of them attended regular school, had good health status, performed well their academic challenges and had an optimistic outlook for his future. However, one in six of these adolescents presented a motor, sensory, intellectual or behavioral sequel, necessitating a special school²¹.

Puberty is a set of somatic transformations that occur in adolescence and fundamentally involves growth (skeletal, muscular, visceral and other development) and sexual maturation (development of gonads, reproductive organs and secondary sexual characters).

In this case, the young man did not present secondary sexual characters, that is, he did not have axillary or pubic hair, he is in stage 1 of the classification of Tanner²², penises and testes of infantile aspect, with little increase in its global size, but with a slight change in their appearance, without speech intonation, that is, the vocal mute has not yet occurred, with a height of 1.51 m. Puberty in boys starts in 98% of cases between 9.5 and 13.8 years of age, and the average is 11.5 years²³. Looking at studies and charts comparing the development of adolescents, it was verified that in boys

the highest linear growth comprised the stages 3 (13 years) and 4 (14 years) of Tanner^{2,2}, which also coincides with the onset of onset of the axillary hair, facial and with some modification of the voice (vocal mute)^{2,3, 2,4}. After the onset of puberty, the penis enlargement will occur within 12 to 18 months, and the puberty spurt between 24 and 30 months^{2,3}.

The vocal muda is a natural process in the life of every adolescent, in both sexes and occurs due to organic maturation, being that in males the changes are more noticeable. This process lasts for a few months and the voice may change. The development of vocal mute may in some individuals delay, prolong or become incomplete. This can be due to hormonal, anatomical, physiological and emotional problems^{2,5}. In males the molt occurs around 13-15 years, while in females around 12-14 years. The changes of the vocal muda are: hoarseness, alteration of the fundamental frequency, changes of intensity and resonance.

IV. FINAL CONSIDERATIONS

Neurodevelopment is related more to gestational age than to birth weight and is influenced by several factors (biological, established, and environmental). Some problems occur early and are definitive, others may arise later and progress, but most disorders disappear or diminish over time. Severe sensorineural sequelae, represented by cerebral palsy, blindness and deafness, are identified in the first 2 years of life and involve predominantly the most immature children, born with less than 26 weeks of gestational age. Delay in cognitive development is the most frequent change in the first years of life, and in school age, with predominance of educational and behavioral problems. It is expected that from adolescence, the problems will be attenuated, allowing good social integration in adult life. Premature infants are at-risk children presenting psychomotor development problems, and associated with complications caused by malaria in pregnancy may be related to the changes found in delayed psychomotor, cognitive, school and pubertal development. What is recommended is the improvement of diagnosis and treatment programs in the services of assistance to pregnant women, perinatology and rehabilitation, aiming at the appropriate and timely treatment through regular outpatient follow-up to prevent or minimize the sequelae of these preterm infants.

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