




Maternal and perinatal outcomes of pregnant women with eclampsia in a reference unit in Maceió, Alagoas

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ABSTRACT

Objective: This study aims to analyze maternal and perinatal outcomes in pregnant women diagnosed with eclampsia at a referral center in Maceió, Alagoas.

Methods: This observational, retrospective study reviewed medical records of pregnant women diagnosed with eclampsia who were admitted to the intensive care unit at Maternidade Escola Santa Mônica (MESM).

Results: The sample consisted of 70 patients, predominantly adolescents of African descent, primiparous women with limited educational backgrounds, and residents of rural areas within the state. The main maternal complications were partial HELLP syndrome and electrolyte imbalances. Perinatal outcomes showed that approximately 26.2% of newborns had Apgar scores ≤ 6 at the 1st minute, and 8.1% at the 5th minute. There was a 37.1% prevalence of prematurity, although the majority of newborns (62.2%) had an appropriate birth weight. The most common adverse perinatal outcomes included Acute Respiratory Distress Syndrome (27.14%) and admission to the neonatal intensive care unit (31.5%).

Conclusions: These findings highlight the importance of adequate prenatal care and neonatal follow-up to improve maternal and perinatal outcomes. There is an urgent need to decentralize specialized obstetric care to reduce the burden on state referral centers and ensure timely emergency care for pregnant women.

Keywords: Pre-eclampsia, Pregnancy complications, Maternal mortality, Convulsions, Maternal-child health services

INTRODUCTION

Gestational hypertensive syndromes (GHS) comprise a group of clinical conditions affecting pregnant women, characterized by elevated blood pressure levels. These conditions pose significant risks to both mothers and fetuses and encompass several distinct conditions¹. They stand as the second leading cause of global maternal mortality, trailing only maternal hemorrhage¹. Moreover, GHS rank among the primary causes of maternal and fetal morbidity and mortality in developing countries².

GHS can be classified into various categories, including chronic systemic arterial hypertension, pre-eclampsia superimposed on systemic arterial hypertension (SAH), gestational hypertension (GH), and pre-eclampsia (PE)³.

Chronic hypertension, conceptually defined, refers to elevated blood pressure levels either existing before pregnancy or observed up to the 20th week of pregnancy in women previously unaware of such values, persisting beyond the 6th week postpartum. In contrast, gestational hypertension arises after the twentieth week of

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pregnancy and typically resolves within ten days post-delivery. It does not typically manifest with proteinuria and, in most cases, carries a good prognosis⁴. However, globally, approximately 0.2% to 9.2% of pregnant women develop PE⁵.

PE is defined as hypertension occurring after 20 weeks of gestation (or earlier in cases of gestational trophoblastic disease or fetal hydrops), accompanied by proteinuria, which disappears within 12 weeks postpartum⁶. Various risk factors associated with this condition include primiparity, extremes of reproductive age, inadequate pre-gestational or gestational nutritional status, insufficient weight gain, unfavorable socioeconomic conditions, the presence of chronic diseases, and a family and/or personal history of PE, among others⁷.

Additionally, HELLP syndrome, a severe complication of PE, is characterized by the presence of a hypertensive disorder associated with a triad: microangiopathic hemolysis, elevated liver enzymes, and low platelet count. This syndrome is related to a higher risk of maternal complications such as cerebral hemorrhage, retinal detachment, liver hematoma/rupture, acute renal failure, disseminated intravascular coagulation, placental detachment, and maternal death⁸.

Pregnant women with pre-eclampsia may progress to eclampsia, a condition that leads to generalized tonic-clonic seizures or coma in women with any hypertensive condition, not caused by epilepsy or any other convulsive disease, and may occur during pregnancy, childbirth, and the immediate puerperium⁶. Major adverse perinatal outcomes in women diagnosed with GHS include intrauterine growth restriction, intrauterine fetal death, preterm delivery, low

birth weight, and birth asphyxia or respiratory distress⁹. Similarly, maternal outcomes primarily include mortality and placental displacement¹⁰.

Mortality is a self-perpetuating medical and social issue, primarily affecting vulnerable women⁶. Over the last decade, in Brazil, 1,745 deaths due to eclampsia were recorded, predominantly in the Northeast region, accounting for 41.1% of cases¹¹.

Correlations between adverse outcomes in GHS have demonstrated that women with eclampsia are five times more likely to have a baby with low birth weight, six times more likely to experience stillbirths, and more than twelve times more likely to face maternal death¹⁰. Consequently, given the health risks and the high incidence of maternal deaths in Brazil, eclampsia is considered an obstetric and clinical emergency¹².

However, in Brazil, despite its high frequency and adverse events, the analysis of factors and maternal-fetal progression is poorly investigated and discussed. This limitation poses a significant barrier to epidemiological analysis and the implementation of effective measures and protocols to enhance the healthcare system's capacity to safeguard maternal and fetal welfare.

This study's objective is to analyze maternal and perinatal outcomes in pregnant women diagnosed with eclampsia at a reference unit in the city of Maceió, Alagoas. Through this investigation, a deeper understanding of clinical and perinatal outcomes related to this condition will be obtained, allowing for the development of appropriate strategies and interventions to improve maternal-fetal care.

METHODS

Study environment

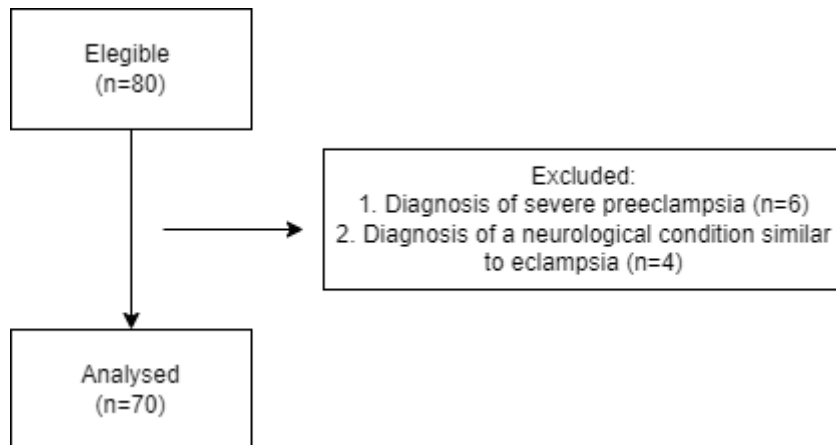
This retrospective cohort study was conducted from 2017 to 2021, utilizing medical records accessible through the Archiving and Electronic Document Management System (SAME). The study focused on pregnant women diagnosed with eclampsia and was conducted at the high-risk unit of Maternidade Escola Santa Mônica (MESM) situated in Maceió, the capital of the state of Alagoas.

Data collection took place from October 3, 2022, to December 5, 2022, conducted by the principal researcher and research assistants from the Medical Course at the Universidade Estadual de Ciências de Saúde de Alagoas (UNCISAL).

Study population and selection

All medical records of pregnant women diagnosed with eclampsia who were transferred to the Intensive Care Unit (ICU) of MESM were included in the study, irrespective of maternal and/or gestational age. However, records with incomplete, illegible, or unavailable data in the SAME were excluded from the analysis. Figure 1 illustrates the flowchart for chart selection. Initially, 80 records were identified in SAME. Among these, 6 patients were diagnosed with severe pre-eclampsia, and 4 had a pre-existing neurological condition that presented symptoms similar to those of eclampsia. Consequently, a total of 70 medical records were analyzed.

Figure 1 . Flowchart of analyzed medical records



Source: Prepared by the authors

Variables and data

To achieve the research objectives, a structured form was developed to collect a comprehensive set of data, including sociodemographic, personal, anthropometric, obstetric, and perinatal information. The diagnosis of eclampsia was confirmed by reviewing the operative report and discharge summary. Perinatal data were obtained from the neonatal postpartum form used at MESM. Personal and sociodemographic details were extracted and analyzed from the initial intake forms completed by the pregnant women.

Statistical analysis

Statistical analysis employed descriptive techniques to assess the sociodemographic and clinical profiles of the study's sample.

Computational tools

Data tabulation was executed manually, utilizing Microsoft Office Excel® spreadsheet

software. Statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS), version 25.

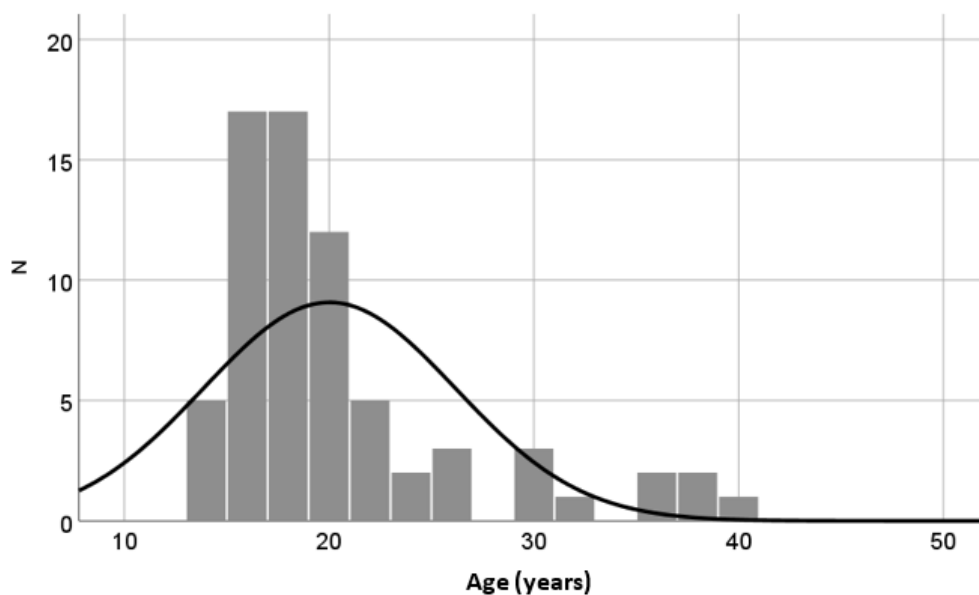
Ethical considerations

This study obtained approval from the UNCISAL Research Ethics Committee, with protocol number 62545822.9.0000.5011 and opinion number: 5.691.099. All ethical principles pertaining to confidentiality and data protection were rigorously observed throughout the data collection and analysis processes.

RESULTS

In the cohort of pregnant women under study, the average age was 20 years, with adolescents constituting the majority at 44.2%, as depicted in Figure 2. A smaller proportion fell within the age group of 28 to 32 years, accounting for 5.7% of the total.

Figure 2. Age distribution among the analyzed pregnant women (years)



Source: Prepared by the authors

Table 1 presents the sociodemographic characteristics of the studied cohort. In terms of origin, the majority of referrals came from rural areas, accounting for 74.3% of the total. Brown was the reported skin color for the vast majority, at 94.3%. Regarding education, approximately 32.9% of the pregnant women had completed only elementary school, while just over 12.8% had completed high school. However, education information was missing in 27.1% of the records. Additionally, most women in the cohort were in stable relationships (60%), followed by those with a single marital status (24.3%). In this cohort, a predominant proportion of women did not engage in paid employment, totaling 45.7%. However, it is noteworthy that there was no recorded data for this aspect in the same proportion.

Table 1 . Socioeconomic profile of the analyzed women

Variables	Values	No (%)
Origin	interior	52 (74.3)
	capital	18 (25.7)
Race	White	1 (1.4)
	black	0 (0.0)
	brown	66 (94.3)
	Yellow	0 (0.0)
	Indigenous	0 (0.0)
	Uninformed	3 (4.3)
Education	1 to 4 years	4 (5.7)
	4 to 7 years	23 (32.9)
	8 to 11 years	10 (14.3)
	11 or older	13 (18.6)
	No informations	20 (28.6)
Marital status	Single	17 (24.3)
	Married	3 (4.3)
	stable union	42 (60.0)
	No informations	8 (11.4)

Main occupation	Various occupations (student, artisan...)	6 (8.6)
	Domestic	32 (45.7)
	No informations	32 (45.7)

Source: Prepared by the authors

Table 2 presents the obstetric profile of the patients. Notably, 75.7% of pregnant women were primiparous, while 5.7% had 2 to 4 children. Regarding their medical histories, 14 pregnant women (20%) had prior comorbidities, including obesity (5.7%), chronic arterial hypertension (7%), and diabetes mellitus (1.4%). It's worth mentioning that there were no instances of pre-eclampsia observed in previous pregnancies.

Table 2 . Obstetric profile of the analyzed women

Variables	Values	No (%)
Number of children	1	53 (75.5)
	2-4	8 (11.4)
	>=5	1 (1.7)
	No informations	8 (11.4)
Did the pregnant woman have any pathological/risk condition prior to pregnancy?	No	51 (72.9)
	Yes	14 (20.0)
	No informations	5 (7.1)
Women's access to health services	spontaneous search	4 (5.7)
	Forwarded from another service	26 (37.2)
	Scheduled inter- hospital transfer	5 (7.2)
	Unscheduled inter- hospital transfer	two (2.8)
	Transfer by urgent/emergency service	32 (45.7)
	No informations	1 (1.4)

	no query	two (2.8)
	1 to 3 appointments	3 (4.3)
Number of prenatal consultations	4 to 6 appointments	20 (28.6)
	7 or more queries	12 (17.2)
	No informations	33 (47.1)
	Spontaneous	8 (11.4)
How to start labor	Induced	48 (68.6)
	No informations	14 (20.0)
	No	0 (0.0)
Did you use magnesium sulfate?	Yes	69 (98.6)
	No informations	1 (1.4)
	No	54 (77.1)
Obesity	Yes	4 (5.7)
	No informations	12 (17.1)
	Alive	64 (91.4)
maternal adverse outcome	Death	0 (0)
	No informations	6 (8.6)

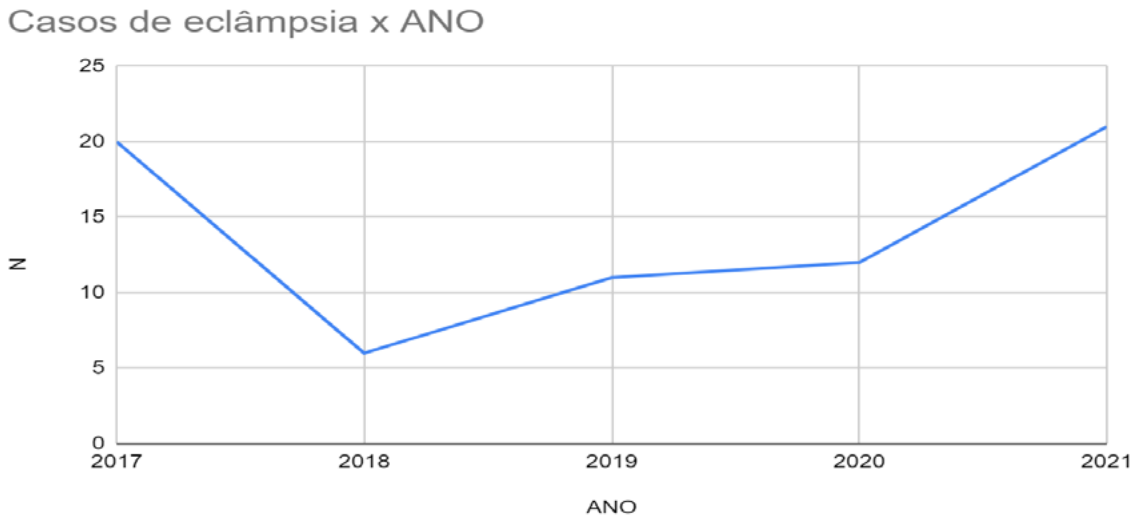
Source: Prepared by the authors

Prenatal care information was notably absent in the majority of records (45.7%). In 28.5% of cases, 4 to 6 prenatal consultations were documented, while in 2.8%, there was no obstetric follow-up.

Figure 3 visually represents the dis-

tribution of cases over the study period. A significant decrease in the number of cases is observed between 2017 and 2018, followed by a gradual increase, culminating in a peak in 2021 when the highest number of occurrences was recorded (21).

Figure 3 . Distribution of the number of eclampsia cases over time



Source: Prepared by the authors

In terms of magnesium sulfate administration during eclampsia, it was appropriately administered in 98.5% of pregnant women. All participants were referred to the ICU in the immediate postpartum period, where they remained on average for 2.2 days. During this period, the primary complications observed included partial HELLP syndrome (14.7%), electrolyte imbalances (7.1%), and bleeding (5.7%). It's noteworthy that no maternal deaths were recorded in this cohort.

All 70 pregnant women included in the study underwent a delivery procedure, with the majority (87.1%) undergoing cesarean section. In terms of gestational age,

37.1% of pregnant women were considered preterm. Despite this, most newborns had an adequate birth weight, comprising 62.2% of cases.

Table 3 provides further insights into the neonatal outcomes. It reveals that 32.8% of the newborns had an Apgar score ≤ 6 in the first minute of life, while 8.5% had the same score in the fifth minute of life. In terms of clinical complications, acute respiratory distress syndrome (ARDS) was observed in 27.14% of cases. Concerning perinatal outcomes, the majority of neonates (31.5%) were referred to the ICU, and there was also a recorded case of stillbirth.

Table 3 . Neonatal profile of children

Variables	Values	No (%)
Current delivery type	Normal	5 (7.2)
	cesarean section	61 (87.1)
	No informations	4 (5.7)
birth conditions	Stillbirth	1 (1.4)
	Alive	61 (87.1)
	No informations	8 (11.4)
NB classification	SGA	6 (8.6)
	SUGA	43 (61.4)
	LGA	3 (4.3)
	No informations	18 (25.7)
Apgar on the 1st minute	≤ 6	23 (32.8)
	≥ 7	30 (42.8)
	No informations	17 (24.2)
Apgar on the 5th minute	≤ 6	6 (8.5)
	≥ 7	44 (62.8)
	No informations	20 (28.5)
Perinatal adverse outcome	No	15 (20)
	Yes	1 (2.9)
	No informations	54 (77.1)
Neonatal outcome	Accommodation	19 (27.1)
	ICU	22 (31.5)
	ICU lower	15 (21.4)
	No informations	14 (20)

Source: Prepared by the authors

DISCUSSION

The incidence of gestational hypertensive syndromes (GHS) is directly related to social vulnerability¹³. In this study, sociodemographic findings reinforce this association, with the predominance of low educational levels, where only 39% of pregnant women completed elementary school. These results are in line with the historical processes of social inequalities in Brazil, which negatively influence access, supply, and quality of health services¹⁴.

The prevalence of brown women in the studied population, 94.3%, is predominantly higher than other studies in developing countries on this subject^{15,16}. When analyzing the sociodemographic repercussions in Brazil, it is known that black women face higher rates of maternal mortality among the obstetric population, and when evaluating the health-disease processes during the COVID-19 pandemic, this group encounters more economic and spatial barriers of access to health. According to the literature, race/ethnicity is a risk factor for eclampsia¹⁷.

Recent studies have shown an increase in pregnancies in increasingly younger age groups, with a greater propensity for preeclampsia and bleeding^{18,19}. According to the United Nations Population Fund (UNFPA), around 16 million girls between the ages of 15 and 19 and 1 million girls under the age of 15 give birth annually around the world²⁰. The predominant age range in this cohort was 13 to 17 years (44.2%), with no record of late pregnancy. Therefore, it is possible to infer that adolescence has a higher prevalence of eclampsia.

Brazil has regional discrepancies in health indicators for pregnant women, with early access and adequate coverage of prenatal care in the South and Southeast regions

to the detriment of other regions²¹. In addition, users face geographic, organizational, and financial barriers to access health services²², which is evidenced by the fact that 74.3% of pregnant women are referred from other municipalities in the state to the MESM.

The absence of records of the variable number of prenatal consultations is observed in 47.1% of the medical records, representing the majority of cases, followed by the range of 4-6 consultations, with 28.6%. It is widely recognized that prenatal care plays a key role in reducing adverse effects for both mothers and newborns, being directly related to health indicators and social development in the country¹⁷. However, due to the high rate of suppression of information identified, it was not possible to establish a relationship between prenatal care and the low rates of maternal and fetal morbidity and mortality in this analysis.

In Brazil, the incidence rate of eclampsia is 10.42 per 10,000 births, similar to that of developed countries. However, maternal mortality levels are still excessively high, with greater accentuation in the North and Northeast regions¹³. However, when considering the MESM as a high-risk reference unit in Alagoas, no maternal deaths were recorded during the period of our research. Showing the importance of qualified care in an ICU specialized in pregnant women care.

Appropriate management of magnesium sulfate was observed in 98.6% of pregnant women, following guidelines that include consultation with a specialist in obstetrics, magnesium administration, and blood pressure control in patients with hypertension²³. The correct therapeutic management helps to reduce the risks of maternal and fetal morbidity and mortality.

The 87.1% prevalence of cesarean sections in this cohort is higher than the prevalence described in the literature²⁴. According to the World Health Organization (WHO), cesarean rates above 10% have no impact on reducing maternal and neonatal mortality²⁵. Furthermore, the Technical Manual for High-Risk Pregnancy prepared by the Ministry of Health confirms that there is no absolute indication for cesarean sections in high-risk pregnancies⁶.

There are no benefits in indiscriminately performing cesarean sections, and it is preferable to encourage normal delivery, under close surveillance²⁶. Furthermore, the literature already points to a higher mortality rate in patients with eclampsia who undergo cesarean delivery²⁷. Finally, performing a previous cesarean section itself is associated with the risk of pre-eclampsia in the second pregnancy²⁸.

Among the implications of teenage pregnancy, there is a greater recurrence of gestational hypertensive syndromes and premature NBs¹⁸. It is known that prematurity is a complex and multifactorial event, influenced by several risk factors, including gestational complications, sociodemographic characteristics, medical interventions, lifestyle, and environmental factors¹⁸. In the present study, the presence of eclampsia increased the frequency of preterm births (37.1%), above the national average, representing a significant challenge for maternal and perinatal health²⁹.

Prematurity is associated with a number of neonatal complications, including breathing difficulties, infections, developmental problems, and increased risk of infant mortality³⁰. In this study, 27.14% of the neonates had ARDS, a direct effect of the high frequency of prematurity observed

in this research. Despite the negative impacts of ARDS, studies on the subject are limited, impairing its understanding and implications.

Low birth weight is a global public health issue that leads to several adverse effects in adult life²⁴. Contrary to what was seen in other developing countries, low birth weight was observed in only 8.6% of live births. Positive data, considering that low weight is correlated with a greater propensity for non-transmissible chronic diseases and mortality in the long term³¹.

In Brazil, the overall prevalence of stillbirths is 14.82 per thousand births³². However, the North and Northeast have the highest rates of variation in stillbirths, 21.44 per thousand and 25.85 per thousand, respectively³². Among the factors associated with this outcome are: social inequality, maternal age (>35 or <20 years), parity (1, ≥5), lack of prenatal care, prematurity, low birth weight, and previous stillbirth. Despite the presence of more than one correlated factor, this sample had only one antepartum stillbirth, evidencing the importance of fast and efficient emergency care, a specialized team, intensive care, in minimizing the maternal-fetal damage produced by this anomaly.

The main limitations of this study are related to the methodology used and the quality of the data collected. Initially, the sample is not representative of the population. Additionally, the use of descriptive statistics restricts the ability to establish causal relationships³³ and, consequently, identify the factors associated with the occurrence of the phenomena in question. In addition, the analyzed data showed a significant amount of missing records, which makes it impossible to carry out more robust tests. This is because the lack of proper comple-

tion of medical records in public hospitals is a chronic issue in the Brazilian health system³⁴, compromising the availability of complete and reliable information for analysis.

The improvement in maternal and perinatal outcomes is directly associated with adequate prenatal care and the implementation of guidelines for emergency care. In this context, it is extremely important to deepen knowledge about the causal relationship between sociodemographic and obstetric factors and the incidence of eclampsia, through awareness and training of health professionals. Specifically, the relevance of using the obstetric embracement form in the MESM is highlighted, which plays a crucial role in the early identification of risk factors and in promoting adequate care for pregnant women at risk of eclampsia. Therefore, investing in continuous training and awareness of health professionals is essential to improve the detection, management, and outcome of this serious obstetric complication.

In addition, it is necessary to encourage the internalization of specialized obstetric care services, in order to alleviate the workload of the only reference unit in the state and guarantee fast and quality emergency care for pregnant women at risk of eclampsia. These measures are essential to improve obstetric and perinatal outcomes, ensuring comprehensive and effective care for all pregnant women in Alagoas.

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Contributions

JMSS: data collection and analysis and manuscript writing.

LEOS: data analysis, discussion of results and revision of the manuscript.

THBL: project design and study design.

All authors approved the final version of the article and declare no conflict of interest.

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