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MedEst|2026 | Vol.6: e566| ISSN: 2789-7567 |RNPS: 2524| RESEARCH ARTICLE

Characterization of patients with late intrauterine growth restriction at the Provincial Gynecological-Obstetrical Hospital. Matanzas, 2024-2025

Caracterización de pacientes con restricción del crecimiento intrauterino tardío en Hospital Ginecobstétrico Provincial. Matanzas, 2024-2025

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Palabras Clave: Restricción Del Crecimiento Intrauterino; Insuficiencia Placentaria; Flujometría Doppler; Relación Cerebro Placentaria; Morbilidad Neonatal; Cuba.

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RESUMEN

RESUMEN

Introducción: La restricción del crecimiento intrauterino (RCIU) tardía, diagnosticada después de las 32 semanas, representa un desafío por su presentación clínica sutil y su asociación con morbimortalidad perinatal. En Cuba existen limitados estudios actualizados que caractericen esta entidad a nivel provincial. **Objetivo:** Caracterizar las pacientes con diagnóstico de RCIU tardío atendidas en el Hospital Ginecobstétrico Provincial Docente "José Ramón López Tabrane" de Matanzas, Cuba, entre enero de 2024 y diciembre de 2025. **Métodos:** Estudio observacional, descriptivo y prospectivo. Se incluyeron 25 gestantes con RCIU tardío (peso fetal estimado <p10, diagnóstico >32 semanas, evidencia Doppler de afectación hemodinámica). Se analizaron variables sociodemográficas, clínicas, Doppler, perinatales y placentarias mediante estadística descriptiva. **Resultados:** Predominó la edad ≥35 años (40 %), procedencia urbana (60 %), nivel secundario (48 %), ama de casa (40 %), ganancia de peso insuficiente (48 %) y nuliparidad (44 %). Las patologías gestacionales más frecuentes fueron hipertensivas (32 %) e infección urinaria (20 %). El Doppler mostró relación cerebro-placentaria patológica (68 %), uterino alterado (60 %) y umbilical normal (44 %). El 72 % culminó en cesárea por deterioro hemodinámico fetal (36 %). El 28 % presentó acidosis neonatal (pH ≤7,20) y el 52 % requirió reanimación. La histología placentaria reveló índice bajo (60 %) y vasculopatía decidual (40 %). **Conclusiones:** La RCIU tardía se asoció a edad materna avanzada, déficit nutricional, trastornos hipertensivos y alteraciones hemodinámicas. El elevado intervencionismo obstétrico y los hallazgos placentarios confirmaron origen vascular, apoyando la optimización del cribado ecográfico en el tercer trimestre y el seguimiento neonatal especializado.

ABSTRACT

Introduction: Late-onset intrauterine growth restriction (IUGR), diagnosed after 32 weeks of gestation, presents a challenge due to its subtle clinical presentation and its association with perinatal morbidity and mortality. In Cuba, there are limited updated studies characterizing this condition at the provincial level. **Objective:** To characterize patients diagnosed with late-onset IUGR treated at the "José Ramón López Tabrane" Provincial Teaching Gynecological-Obstetrical Hospital in Matanzas, Cuba, between January 2024 and December 2025. **Methods:** Observational, descriptive, and prospective study. Twenty-five pregnant women with late-onset IUGR were included (estimated fetal weight <10th percentile, diagnosis >32 weeks, Doppler evidence of hemodynamic compromise). Sociodemographic, clinical, Doppler, perinatal, and placental variables were analyzed using descriptive statistics. **Results:** The predominant factors were age ≥35 years (40 %), urban origin (60 %), secondary education (48 %), homemaker status (40 %), insufficient weight gain (48 %), and nulliparity (44 %). The most frequent gestational pathologies were hypertensive disorders (32 %) and urinary tract infection (20 %). Doppler ultrasound showed a pathological cerebroplacental ratio (68 %), altered uterine artery (60 %), and normal umbilical artery (44 %). 72 % of pregnancies resulted in cesarean section, primarily due to fetal hemodynamic deterioration (36 %). 28 % had neonatal acidosis (pH ≤7.20), and 52 % required resuscitation. Placental histology revealed a low placental index (60 %) and decidual vasculopathy (40 %). **Conclusions:** Late IUGR was associated with advanced maternal age, nutritional deficiency, hypertensive disorders, and hemodynamic alterations. The high rate of obstetric intervention and placental findings confirmed vascular origin, supporting the optimization of ultrasound screening in the third trimester and specialized neonatal follow-up.

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INTRODUCTION

Intrauterine growth restriction (IUGR) is one of the most common obstetric complications, with an estimated prevalence of 5-10 % of all pregnancies worldwide [1]. It is defined as the inability of the fetus to reach its genetically determined growth potential, secondary in most cases to placental dysfunction that compromises the supply of oxygen and nutrients [2]. Its clinical significance transcends the perinatal period, being associated with greater fetoneonatal morbidity and mortality, neurodevelopmental alterations, and cardiovascular and metabolic risk in adult life [3-5].

The late form—diagnosed after 32 weeks—represents a particular challenge [6]. Unlike early IUGR, which usually presents with frank umbilical artery Doppler abnormalities, late IUGR is characterized by a more subtle presentation and a distinctive pathophysiology, with predominant involvement of the cerebral circulation and a frequently normal umbilical artery [7]. It is estimated that this variant can explain up to 50 % of perinatal deaths near term [8].

The 2016 Delphi consensus established differentiated diagnostic criteria, incorporating functional parameters such as the middle cerebral artery pulsatility index and the cerebro-placental ratio [9]. The latter—ratio between the pulsatility index of the middle cerebral artery and that of the umbilical artery—is the most sensitive and specific tool to identify placental insufficiency in the absence of umbilical Doppler abnormalities [10,11]. A placental-brain ratio below the 5th percentile reflects compensatory hemodynamic redistribution (brain sparing) and is associated with a higher risk of adverse perinatal outcomes [12].

In Cuba, IUGR is a health problem prioritized in the Maternal and Child Care Program. National indicators of low birth weight – indirect approximation – show an increase from 5,6 % in 2020 to 6,6 % in 2021 [13]. At the local level, studies in Guantánamo have identified maternal factors such as short stature, insufficient weight gain, and a history of high blood pressure [14,15]. Despite advances in international guidelines, variability persists in clinical practice, especially in resource-limited settings. In the province of Matanzas, there are no updated studies that characterize this entity in the "José Ramón López Tabrane" Provincial Teaching Gynecobstetric Hospital.

For this reason, the present investigation was carried out with the objective of characterizing the patients with a diagnosis of late IUGR treated at said center during the period January 2024 – December 2025.

METHODS

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Design and study period: An observational, descriptive and prospective study was conducted. The research period comprised from January 2024 to December 2025.

Population and sample: The universe consisted of all pregnant women with a diagnosis of late IUGR whose deliveries were attended at the "José Ramón López Tabrane" Provincial Teaching Gynecological-Obstetrical Hospital of Matanzas, Cuba, during the study period, amounting to 25 patients. Non-probabilistic purposive sampling was used. Inclusion and exclusion criteria were applied (see original for details). The final sample consisted of 25 patients. Six cases were excluded.

Variables: They were grouped into four conceptual categories: (1) maternal and sociodemographic variables (age, origin, education, occupation, pregestational nutritional status, gestational weight gain, parity, previous IUGR, chronic diseases, gestational pathologies); (2) prenatal diagnosis and follow-up variables (gestational age at diagnosis, diagnostic method, estimated fetal weight percentile, amniotic fluid index, umbilical artery Doppler, cerebroplacental ratio, uterine artery Doppler, antenatal corticosteroids); (3) perinatal and delivery variables (gestational age at delivery, onset of labor, delivery route, indication for cesarean section, amniotic fluid characteristics, Apgar score, umbilical artery pH, neonatal resuscitation); (4) placental variables (placental weight, placental index, macroscopic and microscopic alterations).

Data collection: A structured data collection sheet was designed. Each patient was identified with an alphanumeric code (e.g., IUGR-01). Data were extracted from medical records, ultrasound reports, delivery records and pathology reports.

Data analysis: Microsoft Excel and SPSS version 25. Descriptive statistics: absolute and relative frequencies for categorical variables; measures of central tendency for continuous variables. No inferential tests were performed.

Ethical considerations: The research followed the principles of the Declaration of Helsinki and current Cuban ethical regulations. The protocol was approved by the Ethics Committee and Scientific Council of the hospital. Confidentiality was guaranteed. Written informed consent was obtained from all participants (see annex).

RESULTS

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Twenty-five pregnant women with late-onset intrauterine growth restriction (IUGR) were included. Maternal age ≥35 years was the most frequent (40%), followed by the 25–35 year age group (32%). The majority of participants resided in urban areas (60%), had a secondary education level (48%), and were homemakers (40%). Normal weight was the most common pre-pregnancy nutritional status (40%), but underweight affected 28% and insufficient weight gain affected 48%. Nulliparity predominated (44%), and only 12% had a history of previous IUGR. The most frequent chronic diseases were hypertension (16%) and diabetes/thyroid disorders (8% each). Among gestational pathologies, hypertensive disorders of pregnancy (32%) and urinary tract infection (20%) were the most prevalent (Table 1).

Table 1. Distribution according to sociodemographic, clinical and obstetric characteristics of pregnant women with late IUGR (N=25)

Variable	Category	n	%
Maternal age	15-25 years	7	28
	25-35 years	8	32
	≥35 years	10	40
Origin	Urban	15	60
	Rural	10	40
Educational level	Primary	2	8
	Secondary	12	48
	Pre-university	5	20
	Technical	3	12
	University	3	12
Occupation	Housewife	10	40
	State worker	6	24
	Student	3	12
	Self-employed	3	12
	Unemployed	3	12
Pregestational nutritional status Underweight	Underweight	7	28
	Normal weight	10	40
	Overweight	5	20
	Obesity	3	12
Gestational weight gain	Adequate	8	32
	Insufficient	12	48
	Excessive	5	20
Parity	Nulliparous	11	44
	Primiparous	8	32
	Multiparous (2 deliveries)	4	16
	Grand multiparous (≥3)	2	8
History of **RCIU**	Yes	3	12
	No	22	88

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Chronic diseases	None	15	60
	Chronic hypertension	4	16
	Diabetes mellitus	2	8
	Thyroid disorder	2	8
	Renal disease	1	4
	Other	1	4
Gestational pathologies	None	6	24
	Hypertensive disorder	8	32
	Urinary tract infection	5	20
	Gestational diabetes	4	16
	Gestational anemia	2	8

Source: Own elaboration from medical records.

The diagnosis was made by ultrasound in 84% of cases, primarily between 34 and 36 weeks (48%). The estimated fetal weight percentile was <p3 in 36%, p3-p5 in 32%, and p5-p10 in 32%. Oligohydramnios was present in 36%. The most relevant Doppler findings were: abnormal cerebroplacental ratio (68%), abnormal uterine artery Doppler (60%), while umbilical artery Doppler was normal in 44% (increased in 40% and absent/reversed diastolic flow in 16%). Antenatal corticosteroids were administered in 72% (Table 2).

Table 2. Distribution according to prenatal diagnosis findings and Doppler evaluation in pregnant women with late IUGR (N=25)

Variable	Category	n	%
Gestational age at diagnosis	32-34 weeks	8	32
	34-36 weeks	12	48
	≥37 weeks	5	20
Diagnostic method	Clinical (uterine height)	4	16
	Ultrasound	21	84
Estimated fetal weight percentile	< p3	9	36
	p3-p5	8	32
	p5-p10	8	32
Amniotic fluid index	Normal	16	64
	Oligohydramnios	9	36
	Polihidramnios	0	0
Umbilical artery Doppler	Normal (p < 95)	11	44
	Increased (p ≥ 95)	10	40
	Absent/reverse diastolic flow	4	16
Cerebroplacental ratio	Normal	8	32
	Abnormal	17	68
Uterine artery Doppler	Normal	10	40
	Abnormal	15	60

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Antenatal corticosteroids	Yes	18	72
	No	7	28

Source: Ultrasound reports and prenatal control records.

Gestational age at delivery was concentrated between 34–37 weeks (48%) and 37–40 weeks (40%). Labor was induced in 68% and cesarean section was the delivery method in 72%; the main indication was fetal hemodynamic deterioration (36%), followed by acute fetal distress (28%) (Table 3).

Table 3. Distribution according to delivery characteristics in pregnant women with late IUGR (N=25)

Variable	Category	n	%
Gestational age at delivery	32-34 weeks	3	12
	34-37 weeks	12	48
	37-40 weeks	10	40
Onset of labor	Spontaneous	8	32
	Induced	17	68
Route of delivery	Vaginal	7	28
	Cesarean	18	72
Indication for cesarean section	Acute fetal distress	7	28
	Fetal hemodynamic deterioration	9	36
	Cephalopelvic disproportion	2	8

Source: Delivery records and medical records.

The amniotic fluid was meconium-stained in 28%. The Apgar score at one minute was normal (7-10) in 64%, with moderate depression in 28% and severe depression in 8%; at five minutes, 84% reached normal scores. The umbilical artery pH was ≤7.20 (acidosis) in 28%. Neonatal resuscitation was required in 52% (basic measures 36%, advanced 16%) (Table 4).

Table 4. Distribution according to birth conditions and neonatal adaptation in newborns with late IUGR (N=25)

Variable	Category	n	%
Amniotic fluid	Clear	18	72
	Meconium-stained	7	28
Apgar at 1 minute	Normal (7-10)	16	64
	Moderate depression (4-6)	7	28
	Severe depression (0-3)	2	8
Apgar at 5 minutes	Normal (7-10)	21	84
	Moderate depression (4-6)	3	12

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	Severe depression (0-3)	1	4
Umbilical artery pH	Normal (>7,20)	18	72
	Acidosis (≤7,20)	7	28
Neonatal resuscitation	None	12	48
	Basic measures (VPP)	9	36
	Advanced resuscitation	4	16

Source: Neonatal medical records and delivery room records.

Placental weight was <400 g in 72% of cases; the placental index was low (<0.14) in 60%. The most frequent macroscopic abnormalities were infarcts (32%) and calcifications (20%); microscopically, decidual vasculopathy (40%) and thrombosis (24%) predominated (Table 5). No notable differences were observed according to origin.

Table 5. Distribution according to placental anatomopathological findings in late IUGR (N=25)

Variable	Category	n	%
Placental weight	<300 g	6	24
	300-399 g	12	48
	400-499 g	5	20
	≥500 g	2	8
Placental index	Low (<0,14)	15	60
	Normal (0,14-0,20)	8	32
	High (>0,20)	2	8
Macroscopic alterations	Infarcts	8	32
	Calcifications	5	20
	Hematomas	4	16
	Cord insertion abnormalities	3	12
	Ninguna	5	20
Microscopic alterations	Decidual vasculopathy	10	40
	Thrombosis	6	24
	Villositis	5	20
	Chorioamnionitis	4	16
	None	4	16

Source: Pathology reports.

DISCUSSION

The profile of pregnant women with late-term intrauterine growth restriction (IUGR) in this series—advanced age, nulliparity, insufficient weight gain, and hypertensive disorders—is consistent with that reported by Figueras et al. [7] and Quintana González et al. [15], who identified age ≥35 years as an independent risk factor. The frequency of older pregnant women (40%) exceeds that reported by Cardona

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Pérez et al. [16] (30.4%), which could reflect changes in Cuban reproductive patterns with postponement of motherhood. The predominance of secondary education and homemaker occupation is similar to that found by Tamarit Pérez et al. [14] in Guantánamo.

Low pre-pregnancy weight (28%) and insufficient weight gain (48%) were higher than in European studies [17], suggesting differences in the baseline nutritional status of the population and underscoring the importance of prenatal nutritional intervention. Nulliparity (44%) is consistent with the pathophysiology of the disease, as it doubles the risk of intrauterine growth restriction (IUGR), as demonstrated by the TRUFFLE study [18].

Hypertensive disorders of pregnancy (32%) exceed the 20% reported in European populations [7], possibly due to characteristics specific to the studied population. Urinary tract infection (20%) is a modifiable risk factor and has been associated with inflammatory responses that affect placental perfusion [19].

The ultrasound diagnosis (84%) and gestational age at diagnosis (34–36 weeks) reflect the late nature of the condition and the importance of ultrasound screening in the third trimester, as emphasized by the Delphi consensus [9]. The low sensitivity of uterine height measurement (16%) confirms its limited usefulness for early detection.

The characteristic Doppler pattern—pathological cerebroplacental ratio (68%) and altered uterine artery (60%), with a normal umbilical artery in 44%—is consistent with the pathophysiology of late-onset IUGR described by Figueras [7] and Hertting et al. [20]. The presence of absent/reversed diastolic flow (16%) indicates an advanced degree of hemodynamic compromise, higher than the 10% reported in Europe [18]. The high frequency of pathological cerebroplacental ratio confirms its usefulness as a fundamental diagnostic tool [21].

The cesarean section (72%) and induction (68%) rates were high, but similar to those documented in other series (50–80%) [22]. The main indication was fetal hemodynamic deterioration, consistent with the use of Doppler ultrasound as a management guide. The administration of antenatal corticosteroids (72%), even though most pregnancies ended after 34 weeks, could be due to uncertainty about the timing of delivery, although their usefulness near term has been questioned [23].

Meconium-stained amniotic fluid (28%) and metabolic acidosis (28%) reflect the greater intrapartum stress experienced by these fetuses [24]. The need for advanced resuscitation (16%) underscores the importance of having adequate staff and resources in the delivery room.

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Placental pathology findings—low birth weight, low placental index (60%), and decidual vasculopathy (40%)—confirm the vascular origin of intrauterine growth restriction (IUGR), consistent with the findings described by Burton et al. [25] and Chen et al. [26]. The presence of inflammatory lesions (chorioamnionitis 16%, villitis 20%) suggests that infectious or immunological mechanisms may have contributed in some cases, which has implications for the management of future pregnancies [27].

Limitations

The small sample size (n=25) limits generalizability and increases the risk of random error. Non-probability sampling introduces selection bias. The descriptive design does not allow for establishing causal relationships or statistical comparisons. The absence of a control group prevents better contextualization of the findings. Variability in ultrasound measurements and subjectivity in the interpretation of the histopathological findings are inherent limitations of the techniques used. Despite these limitations, the study provides valuable information on the local behavior of late-onset intrauterine growth restriction (IUGR) and lays the groundwork for future research with more robust designs.

CONCLUSIONS

In the studied series, late-onset intrauterine growth restriction was associated with advanced maternal age and nulliparous women, with insufficient weight gain and hypertensive disorders. The diagnosis was established by ultrasound in the third trimester. Hemodynamic findings showed alterations in the cerebroplacental relationship and uterine artery Doppler, while umbilical Doppler remained normal in a considerable proportion, suggesting placental compromise. Cesarean section was the most frequent delivery method due to fetal deterioration. Neonatal adaptation was favorable in most cases, although some presented with metabolic acidosis and required resuscitation. Placental examination confirmed placental insufficiency and decidual vasculopathy. These results reinforce the need to optimize third-trimester ultrasound screening and specialized neonatal follow-up.

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AUTHORSHIP STATEMENT

ESG: Conceptualization, data curation, research, methodology, project management, resources, software, supervision, validation, visualization, drafting, writing, revision, and editing of the final work.

GGR: Conceptualization, data curation, research, methodology, validation, visualization, drafting, writing, revision, and editing of the final work.

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OMO: Conceptualization, research, methodology, validation, original draft writing, and revision.

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The authors declare no conflict of interest.

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The authors declare that no artificial intelligence was used in the writing of this manuscript.

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ANNEXES

Annex 1. Informed Consent.

Information for the participant

Dear pregnant woman:

You are invited to take part in a research study entitled: "Characterization of patients with intrauterine growth restriction." The main objective of this study is to characterize pregnant women with a diagnosis of late-onset intrauterine growth restriction and their newborns, in order to contribute to the knowledge of this condition in our setting and to improve the obstetric and neonatal care offered at the institution.

Your participation is entirely voluntary. You may decide not to participate or withdraw at any time, without this affecting the medical care you or your child receive, your relationship with health personnel, or any other right you are entitled to as a patient.

What does your participation consist of?

If you decide to participate, you will be followed up during the remainder of your pregnancy, delivery, and the immediate neonatal period, which will include:

1. Review of the data contained in your obstetric medical record and that of your child, as well as in your obstetric card and ultrasound and pathology reports.
2. Recording of sociodemographic and clinical information on a data collection form specifically designed for this research, including age, origin, educational level, occupation, nutritional status, health history, pregnancy evolution, ultrasound and Doppler study results, delivery conditions, and characteristics of your newborn.
3. Collection of findings from the histopathological study of the placenta, which is part of routine clinical practice in these cases.

The entire process will be carried out without intervening or modifying the medical decisions established by the health team caring for you.

What are the possible benefits?

- Contribute to scientific knowledge about late-onset intrauterine growth restriction in our population.
- Receive detailed information about your condition and the follow-up of your pregnancy.

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- Contribute to the improvement of care protocols for future pregnant women with this condition.

Are there any risks?

The research does not imply any additional risk for you or your child, beyond those inherent to routine clinical practice. No experimental intervention will be performed, nor will the management established by your physician be modified. Participation is limited to the collection of information contained in existing clinical records.

Confidentiality:

The strictest confidentiality of all your personal and clinical data is guaranteed. Your identity will not be revealed in any report, publication, or presentation of the results. To this end, all information will be dissociated through an alphanumeric coding system (e.g., FGR-01, FGR-02), without names, surnames, or personal identity numbers appearing. Only the research team will have access to the data, which will be used exclusively for scientific purposes and to improve healthcare.

Do you have any obligation?

No. Your participation is completely free and voluntary. You may decide not to participate or withdraw from the study at any time, without the need to give explanations and without this affecting the quality of medical care you or your child receive.

DECLARATION OF CONSENT

I,

_____,

with identity number _____,

- I have read (or have had read to me) the information contained in this document.
- I have had the opportunity to ask questions and have received clear and satisfactory answers.
- I understand that my participation is voluntary and that I may withdraw at any time without this affecting my medical care or that of my child.
- I understand that my data will be treated confidentially and anonymously.

Therefore, I agree to participate in this study freely and with full knowledge.

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Participant's signature: _____
Full name: _____
Date: _____

Investigator's signature: _____
Full name: _____
Date: _____

Witness's signature (if applicable): _____
Full name: _____
Date: _____