

## A Pragmatic “Risk-Age” Stratification Reveals High Cardiometabolic Vulnerability in Pregnant Women with Obesity

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### Abstract

**Background:** Adolescents ( $\leq 19$  years) and women of advanced maternal age ( $\geq 35$  years) with obesity represent vulnerable groups. We propose a practical “risk-age” grouping to evaluate their combined cardiometabolic risk profile.

**Methods:** A cross-sectional analytical study was conducted in 404 pregnant women with a BMI  $\geq 25$  kg/m<sup>2</sup>. Participants were stratified into two groups: Central reproductive age (20 - 34 years, n = 252) and risk-age ( $\leq 19$  and  $\geq 35$  years, n = 152). Anthropometric (waist circumference, waist-to-height ratio - WHtR), biochemical (lipid profile), and perinatal outcome data were analyzed.

**Results:** The risk-age group exhibited a significantly worse cardiometabolic profile, including a higher prevalence of visceral adiposity (WHtR  $> 0.53$ : 97.4% vs. 93.3%,  $p < 0.05$ ) and hypertriglyceridemia (69.7% vs. 55.6%,  $p = 0.004$ ). While perinatal outcomes did not differ significantly between groups in isolation, a powerful interaction was found. The combination of belonging to the risk-age group and having class II-III obesity was associated with an odds ratio of 5.8 (95% CI: 1.1 - 29.5,  $p = 0.035$ ) for fetal death. A high WHtR was a strong independent predictor for fetal macrosomia (OR = 4.5).

**Conclusion:** Grouping pregnant women with obesity at the extremes of reproductive age identifies a cohort with heightened cardiometabolic risk. The synergy between this “risk-age” status and severe obesity is associated with a sharply increased risk of fetal death, advocating for targeted clinical surveillance in this population.

**Keywords:** Gestational Obesity; Advanced Maternal Age; Adolescence; Cardiometabolic Risk; Perinatal Outcomes

### Introduction

Maternal obesity is a major risk factor for adverse pregnancy outcomes. While adolescents and women of advanced maternal age (AMA) are independently considered higher-risk groups, a combined assessment of their cardiometabolic profile is lacking. This study proposes a pragmatic “risk-age” stratification ( $\leq 19$  and  $\geq 35$  years) and compares its cardiometabolic risk and perinatal outcomes against a central reproductive age group (20 - 34 years) in the context of maternal obesity.

### Methods

We conducted a cross-sectional study at the Maternal Provincial Hospital of Villa Clara, Cuba (2023-2024). A sample of 404 pregnant women with a pregestational BMI  $\geq 25$  kg/m<sup>2</sup> was analyzed. The cohort was divided into: Group 1 (Central reproductive age: 20 - 34 years, n = 252) and group 2 (Risk-age:  $\leq 19$  and  $\geq 35$  years, n = 152). Anthropometric measurements included waist circumference and WHtR.

Biochemical analysis included a fasting lipid profile. Perinatal outcomes recorded were: hypertensive disorders, fetal macrosomia (> 4000g), prematurity, and fetal death. Statistical analysis was performed using SPSS v.28.0, employing Chi-square, Mann-Whitney U tests, and binary logistic regression to calculate Odds Ratios (OR) with 95% confidence intervals.

Results and Discussion

The risk-age group demonstrated a significantly more adverse metabolic profile (Table 1), characterized by greater visceral adiposity and atherogenic dyslipidemia. This aligns with the pathophysiological understanding of obesity as a dysfunction of adipose tissue distribution.

Variable	Group 1: Central reproductive age (20 - 34 years) n = 252	Group 2: Risk age group (≤19 and ≥35 years) n = 152	p-value
BMI (kg/m <sup>2</sup> ), Median (IQR)	32.3 (30.6-33.8)	33.2 (30.9-35.5)	0.045*
WC >88 cm, n (%)	200 (79.4%)	134 (88.2%)	0.020**
ICT >0.53, n (%)	235 (93.3%)	148 (97.4%)	0.048**
Triglycerides >1.7 mmol/L, n (%)	140 (55.6%)	106 (69.7%)	0.004**
TG/HDL Ratio, Median (IQR)	4.6 (3.9-5.3)	5.1 (4.3-5.9)	<0.001*

**Table 1:** Comparison of baseline characteristics and cardiometabolic risk indicators between central reproductive age and risk-age groups. Key: BMI: Body Mass Index; IQR: Interquartile Range; CC: Waist Circumference; ICT: Waist-to-Height Ratio (WHtR); TG/HDL: Triglycerides/HDL Ratio / Triglycerides-to-HDL Ratio; Mann-Whitney U test / Mann-Whitney U test; \*\* Chi-square test.

The most critical finding was not from the groups in isolation, but from their interaction with disease severity. The combination of belonging to the risk-age group and having class II-III obesity was associated with 5,8-fold increased odds of fetal death (OR = 5,8; 95% CI: 1.1 - 29,5; p = 0,035). This suggests a synergistic effect where the physiological vulnerabilities at the extremes of reproductive age are dramatically potentiated by severe obesity and its associated inflammatory and pro-thrombotic state.

Furthermore, a WHtR >0.53 was confirmed as a robust anthropometric marker, showing 4.5-fold increased odds for fetal macrosomia (OR = 4.5; 95% CI: 2.8 - 7.2) across the entire cohort, underscoring its clinical utility over BMI alone.

Conclusion

This short communication highlights that a simple “Risk-Age” stratification (≤ 19 and ≥ 35 years) effectively identifies a subgroup of pregnant women with obesity who present a more adverse cardiometabolic profile. The potent interaction between this risk-age status and severe obesity significantly elevates the risk of fetal death. These findings support the integration of this pragmatic stratification and WHtR measurement into prenatal care protocols to optimize resource allocation and intensify monitoring for the highest-risk patients [1-8].

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