Assessing Abdominal Body Fat Index as a Predictive Marker for Gestational Diabetes Mellitus: A Meta-Analytic Approach

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Introduction

Gestational Diabetes Mellitus (GDM) presents a significant health challenge during pregnancy, impacting both maternal and neonatal outcomes. Ultrasound estimation of maternal fat has been explored as a viable tool for predicting and screening for GDM. The Body Fat Index (BFI) is a composite score that combines visceral and subcutaneous fat measurements in relation to an individual's height. It has emerged as a promising predictor of GDM, with recent research demonstrating its superiority over simple adiposity measurements. This study aims to comprehensively analyze BFI's efficacy as a predictor for GDM.

Methods:

We systematically searched the PubMed, SCOPUS, and EMBASE databases up to May 2024, using medical subject headings and title/abstract terms. Out of an initial pool of 304 studies, we selected those that reported the association between the Abdominal Body Fat Index (BFI) and the odds of developing Gestational Diabetes Mellitus (GDM). After a rigorous screening process, three papers were included in our review after ensuring they matched our inclusion criteria. We used binary random effects models to estimate pooled unadjusted and adjusted odds ratios (ORs) with 95% confidence intervals (CIs) and assessed heterogeneity using I^2 statistics. Publication bias was assessed using the Luis Furuya-Kanamori index score and DOI plots.

Results:

From the three studies pooling data from 767 pregnant women with BFI measured up to the first 28 weeks of gestation, we discovered that a high BFI was associated with significantly higher odds of developing GDM. The odds ratio (OR) was 4.14 (95% CI: 1.96 - 8.70), with minimal heterogeneity ($I^2 = 34\%$). The test for the overall effect was statistically significant ($Z = 3.75$, $P < 0.01$). The LFK index was - 0.18, indicating minimal asymmetry, suggesting no publication bias in our results.

Conclusion:

Increased BFI values are associated with significantly higher odds of developing GDM, making BFI a valuable tool for assessing GDM risk through a non-invasive and accessible method for early detection. Utilizing BFI in clinical practice can help identify high-risk pregnancies, allowing for timely interventions and better management strategies.

Study	logOR	SE	Weight	Odds Ratio IV, Random, 95% CI
A. da Silva Rocha, 2024	1.7716	0.5874	28.3%	5.88 [1.86; 18.60]
S. Benchahong, 2023	0.8671	0.3991	44.7%	2.38 [1.09; 5.21]
A. A. Nassr, 2018	1.9699	0.6095	26.9%	7.17 [2.17; 23.66]
Total (95% CI)			**100.0%**	**4.14 [1.97; 8.70]**

Heterogeneity: $Tau^2 = 0.1623$; $Chi^2 = 3.01$, df = 2 (P = 0.22); $I^2 = 34\%$
Test for overall effect: Z = 3.75 (P < 0.01)