

Ethnic Differences in Visceral Adiposity Measured in Early Pregnancy

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Abstract

Objective: To determine if visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT) depth in early pregnancy differs by maternal ethnicity.

Methods: We prospectively evaluated 482 women without pre-pregnancy diabetes. All underwent sonographic measurement of VAT and SAT depth at 11 to 14 weeks' gestation.

Results: SAT did not differ between groups, but VAT did. Compared with Canadian-born women (3.9 cm, 95% CI 3.7–4.1), mean VAT depth was higher among Latin American (4.6 cm, 95% CI 4.1–5.2), Sub-Saharan African (5.0 cm, 95% CI 4.0–6.1), and Caribbean (6.0 cm, 95% CI 4.8–7.3) women. Adjusting for age, parity, and 1/height², the relative risks of having a VAT depth >80th percentile were 1.69 (95% CI 1.05–2.73) for Latin American, 2.24 (95% CI 1.28–3.93) for Sub-Saharan African, and 3.34 (95% CI 1.91–5.84) for Caribbean women, relative to Canadian-born women. Women from these world regions also had a greater percentage of preterm births and emergency CSs.

Conclusion: VAT differs appreciably among certain ethnic groups, which may reflect their predisposition to adverse pregnancy outcomes.

Résumé

Objective : Déterminer si la profondeur des tissus adipeux viscéraux (TAV) et des tissus adipeux sous-cutanés (TAS) en début de grossesse varie selon l'origine ethnique de la mère.

Methods : Nous avons évalué prospectivement 482 femmes qui ne souffraient pas de diabète avant la grossesse. La profondeur de leurs TAV et de leurs TAS a été mesurée par échographie entre la 11^e et la 14^e semaine de grossesse.

Key Words: Ethnicity, pregnancy, visceral adiposity, ultrasound, obesity

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Results : La profondeur des TAS ne varie pas entre les groupes, mais celle des TAV, oui. Comparativement aux femmes nées au Canada (3,9 cm; IC à 95 % : 3,7–4,1), la profondeur moyenne des TAV était plus élevée chez les femmes d'origine latino-américaine (4,6 cm; IC à 95 % : 4,1–5,2), d'origine subsaharienne (5,0 cm; IC à 95 % : 4,0–6,1) et d'origine caribéenne (6,0 cm; IC à 95 % : 4,8–7,3). Une fois l'influence des facteurs d'intérêt neutralisée (âge, parité et 1/grandeur²), le risque relatif d'afficher une épaisseur de TAV supérieure au 80^e percentile se chiffrait à 1,69 (IC à 95 % : 1,05–2,73) pour les femmes latino-américaines, à 2,24 (IC à 95 % : 1,28–3,93) pour les femmes subsahariennes et à 3,34 (IC à 95 % : 1,91–5,84) pour les femmes caribéennes, comparativement aux femmes nées au Canada. Les femmes originaires de ces régions du monde affichaient également une proportion plus élevée d'accouchements prématurés et de césariennes d'urgence.

Conclusion : La profondeur des TAV varie sensiblement entre divers groupes ethniques et pourrait refléter une prédisposition à l'égard de certaines issues défavorables de grossesse.

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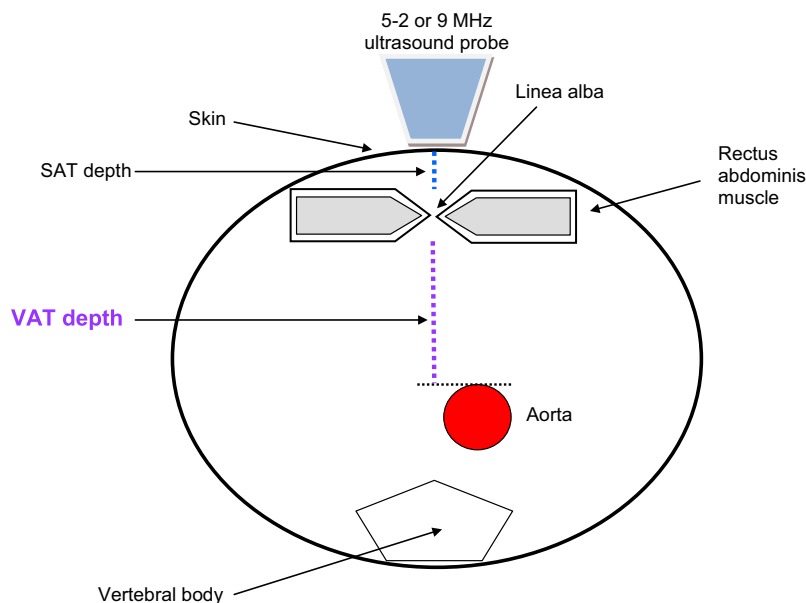
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INTRODUCTION

Visceral adipose tissue depth, measured by ultrasonography in early pregnancy, is associated with greater insulin resistance and mid-pregnancy impaired glucose homeostasis, independent of pre-pregnancy BMI.^{1–3} Image-based assessment of VAT depth may better predict future cardiometabolic risk compared with anthropometric measures, including BMI and waist circumference.^{1–9} Abnormal glucose handling in pregnancy and preeclampsia are more common in certain non-Caucasian groups, the latter especially among women originating from South Asia, Africa, and the Caribbean.^{10,11}

Figure 1. Method for sonographic measurement of SAT and VAT depth. Shown is a cross-sectional representation of the patient in a supine position.



An ethnicity-based approach to cardiometabolic risk assessment could have implications for early targeted screening of women at high risk for adverse pregnancy outcomes and allow for specific interventions to mitigate that risk. Although ethnic differences in measured VAT have been explored in non-pregnant persons,¹² a similar comparison has not been done in pregnancy, which is the goal of the current study.

RESEARCH DESIGN AND METHODS

We evaluated an existing cohort of 482 women prospectively recruited from an urban city hospital in Toronto, Canada (St. Michael’s Hospital, Toronto).^{3,8} All women were without known pre-pregnancy diabetes mellitus. Each participant underwent standardized sonographic measurement of VAT and subcutaneous adipose tissue depth in triplicate at 11 to 14 weeks’ gestation. Figure 1 further illustrates this method, as described elsewhere.^{1,3,8} This non-ionizing radiation imaging approach correlates well with measures obtained by CT scan.¹³ Maternal country of birth and self-reported ethnicity were prospectively collected at the time of sonographic measurement.

ABBREVIATIONS

RR	relative risk
SAT	subcutaneous adipose tissue
VAT	visceral adipose tissue
WC	waist circumference

We presented the mean (95% CI) SAT or VAT depth for women by their world region of birth, namely, Canada (n = 250); other Western nations, including Europe (n = 55); the Middle East and North Africa (n = 16); East Asia and the Pacific (n = 50); South Asia (n = 24); Latin America (n = 58); Sub-Saharan Africa (n = 21); and the Caribbean (n = 8). This analysis was repeated using self-reported ethnicity. Next, we calculated the 80th percentile VAT depth for all study participants and evaluated the number of women in each world region of birth group who were above this cut-point. Poisson regression with robust variance estimation, to account for potentially more than one pregnancy within a woman, was used to calculate crude and adjusted relative risks of having an elevated VAT depth >80th percentile by world region of origin relative to Canadian-born women (the referent). RRs were adjusted for maternal age (<35, 35 to 39, or >39 years), parity (0, 1, 2 or ≥3), and 1/height²—the latter to account for potential ethnic differences in cross-sectional girth unrelated to fat. Pearson correlation coefficients (r) were calculated to reflect the relation between mean VAT depth and other conventional measures of obesity at 11 to 14 weeks’ gestation, BMI and WC at 11 to 14 weeks’ gestation, and newborn weight.

RESULTS

Among the 482 women, 309 (64.1%) were aged under 34, and 267 (55.4%) were nulliparous. Mean (SD) pre-pregnancy BMI was 24.0 (4.9) kg/m²; 24 women (5.0%) were

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