Body composition in women of reproductive age and during pregnancy
Method comparisons and gestational changes

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i Arvid Carlsson, Medicinaregatan 3, Göteborg, torsdagen den 19 april, klockan 09:00

av Marja Bosaeus

Fakultetsopponent:

Docent Marie Löf

Institutionen för biovetenskaper och näringslära, Karolinska institutet, Sverige

Avhandlingen baseras på följande delarbeten

I. Bosaeus M, Karlsson T, Holmäng A, Ellegård L, Accuracy of quantitative magnetic resonance and eight-electrode bioelectrical impedance analysis in normal weight and obese women. Clinical Nutrition 2014; 33: 471-7

II. Bosaeus M, Hussain A, Karlsson T, Andersson L, Hulthén L, Svelander C, Sandberg AS, Larsson I, Ellegård L, Holmäng A, A randomized longitudinal dietary intervention study during pregnancy: effects on fish intake, phospholipids, and body composition. Nutrition Journal 2015; 14:1

III. Bosaeus M, Andersson L, Karlsson T, Ellegård L, Holmäng A, Body composition during pregnancy: longitudinal changes and method comparisons. Manuskript.

SAHLGRENSKA AKADEMIN
INSTITUTIONEN FÖR NEUROVETENSKAP OCH FYSIOLOGI

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Body composition in women of reproductive age and during pregnancy
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Marja Bosaeus

Sektionen för fysiologi, Institutionen för neurovetenskap och fysiologi, Sahlgrenska akademin, Göteborgs universitet, Sverige, 2018.

Abstract

Body composition measurements can contribute to assessment of nutritional status, both for clinical use and for research purpose. During pregnancy, body composition measurement is complicated by decreased density of the fat-free mass (FFM). Body composition assessment during pregnancy can be valuable for studies in unbeneficial gestational weight gain (GWG), as a large weight gain during pregnancy is associated with complications. In addition, nutritional intake during pregnancy is hypothesized to affect the growing foetus, and some polyunsaturated fatty acids (PUFA) are important for foetal development.

In these studies, body composition measurements by quantitative magnetic resonance (QMR) and bioelectrical impedance analysis (BIA) were respectively compared with air displacement plethysmography (ADP) in normal weight and obese non-pregnant women of reproductive age and during pregnancy. Non-pregnant women were analyzed in a cross-sectional study. Pregnant women were measured in each trimester, and ADP measurements were adjusted for changed FFM density. Also, effects of a dietary intervention study in normal weight women during pregnancy were analyzed, with focus on fish intake, serum phospholipid (s-) PUFAs (arachidonic acid, ARA; docosahexaenoic acid, DHA; eicosapentaenoic acid, EPA), and body composition changes. Additionally, effects of fish intake and meat intake in early pregnancy were analyzed, with focus on s-PUFAs, GWG, and body composition changes.

In non-pregnant normal weight women, fat mass (FM) estimates by QMR and by BIA were biased 1 kg compared with ADP. In non-pregnant obese women, FM estimates by QMR and by BIA were underestimated 2 kg and 9 kg respectively, compared with ADP. Total body water estimates by BIA were larger compared with QMR estimates in both normal weight and obese non-pregnant women.

Reported fish intake increased from the first trimester to the second and third, respectively, in the group of normal weight women that received the dietary intervention. In early pregnancy, reported fish intake correlated with s-DHA and s-EPA, and reported meat intake correlated with s-ARA. In addition, reported meat intake in early pregnancy correlated with the subsequent maternal FFM gain.

GWG was 12 kg with 4 kg FM in normal weight women, and 9 kg with 2 kg FM in obese women. Cross-sectional FM and FM changes measured by QMR and by pregnancy-adjusted ADP were similar in obese women during pregnancy. BIA underestimated FM in obese pregnant women, compared with pregnancy-adjusted ADP. FM measured by QMR and FM changes measured by BIA yielded higher values than pregnancy-adjusted ADP in normal weight women during pregnancy.

In conclusion, dietary counselling during pregnancy may help women to increase fish intake. FM measurements by QMR and by BIA were biased in non-pregnant normal weight and obese women. QMR and the BIA equipment used here would need validation against gold standard methods during pregnancy, but the results indicate that the present software specific BIA equipment is unsuitable for FM measurements during pregnancy.