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Relationship between maternal BMI, nutrient intakes and glycaemic control in third trimester of pregnancy

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The prevalence of obesity in pregnancy is increasing and is associated with an increased risk of adverse pregnancy outcomes such as gestational diabetes⁽¹⁾. This study examined the nutritional composition of diets of pregnant women in Belfast in the 3rd trimester in relation to maternal anthropometry. Pregnant women were participants in the Hyperglycaemic and Adverse Pregnancy Outcomes Study⁽²⁾ a prospective observational study which examined the relevance of minor degrees of maternal glycaemia to maternal fetal outcome. Diet was assessed using a validated self-administered food frequency questionnaire at an average of 29 weeks gestation. Mean daily nutrient intakes were analysed using nutritional software Q Builder Questionnaire Analysis System version 2.0 (Tinuviel Software, UK). Dietary intake data was available for 1639 women (97.7% of cohort). At approximately 28 weeks gestation, 415 (25.3%) participants were classed as overweight with BMI ≥ 28.5–32.9 kg/m² and 235 (14.3%) as obese with BMI > 33.0 kg/m²⁽²⁾. A Goldberg EI:BMR⁽³⁾ cut-off of 1.2 was used to assess the extent of under-reporting within the dataset and 768 (46.9%) participants with EI:BMR < 1.2 were excluded from final analysis. A one-way ANOVA investigated differences in mean plasma glucose levels assessed at Oral Glucose Tolerance Test and mean daily macronutrient intakes between BMI categories. All measures of glycaemic control were significantly higher in overweight and obese pregnant women compared with normal weight women (Table 1). However, no significant differences in nutrient intakes between BMI categories were observed except mean sugar intake was significantly lower in overweight women compared with normal weight women (Table 2).

	Normal weight (n = 473)			Overweight (n = 220)			Obese (n = 102)		
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Fasting Plasma glucose (mmol/L)	4.56	0.34	3.5–6.4	4.73*	0.42	3.9–8.3	4.82*	0.43	4.1–6.4
1hr Plasma glucose (mmol/L)	7.37	1.69	2.8–13.7	7.84*	1.53	3.2–12.6	7.90*	1.72	4.0–12.3
2hr Plasma glucose (mmol/L)	5.98	1.16	3.0–11.0	6.28*	1.08	3.5–10.1	6.68*	1.36	5.0–12.4
HbA1C (%)	4.68	0.35	3.3–5.9	4.81*	0.31	3.8–5.6	4.82*	(0.38)	3.9–5.9

*Significantly different at P < 0.05 level when compared to women with BMI within normal range

	Normal weight (n = 473)			Overweight (n = 220)			Obese (n = 102)		
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Energy (kcal)	2466	414	1829–3719	2524	422	1776–3712	2574	401	1951–3671
Carbohydrates (g)	339.2	62.3	186.6–581.0	339.3	59.2	185.7–526.5	349.8	58.9	250.6–525.3
Sugars (g)	148.0	44.3	44.6–327.8	144.8*	42.2	37.6–284.7	143.8	40.2	63.1–276.6
Protein (g)	92.1	18.3	47.8–173.9	96.4	18.5	52.0–175.9	95.4	15.6	62.7–130.7
Fat (g)	92.5	26.4	37.2–201.4	97.0	25.8	50.4–178.3	98.7	24.5	62.6–190.7
Englyst Fibre (g)	18.0	4.8	7.5–34.0	17.9	4.7	9.2–32.1	18.3	4.5	9.2–29.9

*Significantly different at P < 0.05 level when compared to women with BMI within normal range.

Results indicate that plasma glucose levels are significantly higher in overweight and obese pregnant women in the third trimester of pregnancy, however there are no differences in nutrient intakes between women and BMI categories.

1. CMACE-RCOG (2010) Joint Guideline for management for women with Obesity in pregnancy. Centre for Maternal and Child Enquiries and the Royal College of Obstetricians and Gynaecologists.
2. HAPO (2010) Hyperglycaemia and Adverse Pregnancy Outcome Study: associations with maternal body mass index. *International Journal Obstetrics and Gynaecology* 117(5): 575–84.
3. Goldberg GR, Black AE, Jebb SA, *et al.* (1991) Critical Evaluation of energy intake data using fundamental principles of energy physiology 1. Derivation of cut-off limits to identify under-reporting *European Journal Clinical Nutrition* 45(12): 569–81.