

Maternal nutrient intake during pregnancy and childhood weight status aged five years

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Under- or over-nutrition of the fetus during gestation may increase their risk of developing chronic disease in later life. The aim of this study was to identify potential nutrient exposures during pregnancy associated with overweight and obesity in early childhood.

The Lifeways Cross-Generational Cohort Study was established between 2001 and 2002 when a sample of 1124 expectant mothers were recruited while attending their first ante-natal visit in two maternity hospitals in Dublin and Galway. Mothers were asked to complete a questionnaire relating to their socio-economic status and lifestyle in addition to a validated food frequency questionnaire. A follow-up study of the families was conducted in 2007/2008 when the children were aged 5 years on an average. The height and weight of children was measured at home using standardized protocols. Age- and sex-specific BMI charts were used to identify overweight and obese children. Overweight in children was defined as a BMI between the 91st and the 98th percentile and obesity was defined as a BMI on or above the 98th percentile.

Energy-adjusted nutrients included were protein, fat, carbohydrate, MUFA, PUFA, SFA, cholesterol, sugar, starch, fibre, folate, vitamin C, vitamin E, Ca, Fe and Zn. Maternal nutrient intake was expressed in quartiles and associations with childhood overweight/obesity were examined using logistic regression analysis. Associations were adjusted for gender, birth weight, maternal smoking during pregnancy and maternal education.

Overweight and obesity aged five was associated with increasing levels of cholesterol and sugar during pregnancy. However, these nutrients were no longer significant when adjusted for gender, birth weight, maternal smoking and education. Intakes of vitamin C in the third quartile appeared to be associated with decreased risk of overweight and obesity (OR 0.50, $P = 0.02$). However, when adjusted for other confounding factors, those in the second quartile (Q2) (OR 1.91, $P = 0.06$) and highest quartile (Q4) (OR 2.28, $P = 0.020$) were more likely to have overweight or obese children.

		Model 1 (unadjusted)				Model 2 (adjusted)			
		OR	P-values	95% CI		OR	P-values	95% CI	
				Lower	Upper			Lower	Upper
Cholesterol	Q1	1.00							
	Q2	1.79	0.04	1.03	3.12				
	Q3	2.16	0.01	1.25	3.75				
	Q4	2.09	0.01	1.17	3.75				
Sugar	Q1	1.00							
	Q2	1.47	0.18	0.84	2.57				
	Q3	2.12	0.01	1.20	3.77				
	Q4	1.98	0.03	1.06	3.68				
Vitamin C	Q1	1.00				1.00			
	Q2	1.09	0.74	0.64	1.87	1.91	0.06	0.98	3.74
	Q3	0.50	0.02	0.28	0.88	1.17	0.66	0.59	2.31
	Q4	1.08	0.78	0.62	1.90	2.28	0.02	1.17	4.44
Birth weight SDS	Q1					1.00			
	Q2					1.44	0.28	0.74	2.78
	Q3					1.33	0.41	0.68	2.59
	Q4					2.59	0.00	1.35	4.97
Gender	Male v. females					0.68	0.09	0.44	1.06
Mother's education	3rd v. ≤ 2nd level					1.74	0.02	1.10	2.75

These results suggest that while typical socio-demographic risk factors remain strong predictors of overweight and obesity in children, maternal nutrient intake during pregnancy may also have a role. Further research on the association of vitamin C and its sources may be warranted.