AZIENDA OSPEDALIERO - UNIVERSITARIA
Città della Salute e della Scienza di Torino

CASO CLINICO

Scuola di Specializzazione in Scienza dell'Alimentazione

Dott.ssa P. Belci
Dott. A. Collo
Dott.ssa V. Prandi

Alba, 16 settembre 2016

Presentazione del caso clinico

La signora A.G. viene inviata al nostro Ambulatorio di Dietetica e Nutrizione Clinica alla 18a settimana di gestazione.

- **Età 38 anni. Italiana, coniugata, casalinga, ha familiarità positiva per diabete mellito di tipo 2 (madre)**
- **Anamnesi personale non rilevante sul piano clinico**

- **ANAMNESI OSTETRICA**
- **U. M. 14/02/2015**
- **1993: parto spontaneo alla 32a settimana per travaglio inarrestabile e PROM (rottura prematura delle membrane)**
- **2001: parto spontaneo a 40 settimane, fisiologico**
- **2005: gravidanza extrauterina e salpingectomia sn**
- **Dal 2007 al 2014: riferisce 3 aborti spontanei entro la 6a settimana di gravidanza e sottoposta a RCU (revisione cavità uterina)**
- **Riferisce aborto spontaneo tardivo alla 20a settimana per PROM**

Esami

Porta in visione i seguenti esami eseguiti alla 12° settimana:

➢ Batteriologico positivo per streptococco nonostante terapia con Amplital (1 g per 5 gg)
➢ TSH 1.55 mcU/ml
➢ Urocoltura neg.
➢ Glicemia basale 80 mg /dl
➢ **OGTT positivo**

Glicemia 0’	88 mg/dl	v.n. <92 mg/dl
Glicemia 60’	220 mg/dl	v.n. <180 mg/dl
Glicemia 120	186 mg/7dl	v.n. <153 mg/dl

Terapia in corso:

- CardioASA 1 cpr die alla sera dopo cena
- Dalacin 1cp 300mg 1 cpr die per 6 gg
- Enterolactis Plus 1 bs die
- Prefolic 15 mg 1 cpr die

Esame obiettivo:

- Al primo accesso presso il nostro Centro, la paziente presentava un'obiettività non significativa, se non per **marcato incremento ponderale in quadro di obesità di II grado**
- altezza 1,70 m
- peso attuale 108 kg, BMI 37,37 kg/m2
- peso riferito pre-concepimento 103 kg, BMI 35,64 kg/m2
- PAO 130/70 mmHg, FC 82 bpm R
- Obiettività ndr

ANAMNESI ALIMENTARE:

➢ ***Colazione***: 1 tazza di latte con caffè con 1 cucchiaino di zucchero
1 croissant senza marmellata

➢ ***Pranzo:*** nei giorni lavorativi la paziente non consuma il pranzo

➢ ***Merenda pomeriggio***: 1 toast con prosciutto cotto e sottiletta
1 succo di frutta o 1 bicchiere di spremuta di arancia

➢ ***Cena:*** 250 gr di pasta conditi con sugo di pomodoro o pesto
1 porzione di carne
1 banana

➢ ***Spuntino serale:*** 1 tazza di latte con caffè con 1 cucchiaino di zucchero
6 – 7 biscotti frollini

➢ ***Condimenti:*** nella giornata consuma circa 40 gr di olio di mais o arachide

➢ ***Bevande:*** acqua nella giornata circa 3 lt
No bevande alcoliche
No bevande zuccherate (cola, aranciata. …)

➢ ***Alimenti non graditi:*** pesce, la verdura viene consumata occasionalmente

ANAMNESI ALIMENTARE
Calcolo bromatologico

PROTEINE gr	LIPIDI gr	GLUCIDI gr	GLUCIDI R.A gr	Kcal tot gr	Ferro mg	Calcio mg
90	80	350	44	2500	9	968

DIABETE GESTAZIONALE: FABBISOGNO CALORICO

secondo SID AMD ADI

Se normo-peso o sotto-peso pre-gravidanza:

Peso ideale x 30-40 kcal

Se obesità pre-gravidanza???

- Restrizione calorica di grado severo: corpi chetonici, danno fetale
- Restrizione calorica di grado lieve (70% TEE): migliore compenso glicemico??

+ 350 kcal nel II trimestre

+ 460 kcal nel III trimestre

La terapia dietetica nella gravidanza diabetica. Raccomandazioni G.Di Cianni et al. Linee Guida 2006

Peso Ideale (Formula di Lorentz)

60 kg x 30 = 1800 + 350 = **2150 kcal**

DIABETE GESTAZIONALE: FABBISOGNO PROTEICO (LARN 2012)

2°trimestre (Peso Ideale X 0.8/0.9) + 9 g
3°trimestre (Peso ideale X 0.8/0.9) + 29 gr

Nella nostra paziente…

2°trimestre 60 kg X 0.9 = 54 + 9 gr = 63 gr
3°trimestre 60 kg X 0.9 = 54 + 29 gr = 83 gr

LARN Livelli di Assunzione di Riferimento di Nutrienti ed energia per la popolazione italiana Revisione 2012. Documento di sintesi per il XXXV Congresso Nazionale SINU Bologna, 22-23 ottobre 2012 www.sinu.it/documenti/20121016_LARN_bologna_sintesi_prefinale.pdf .

	Donne non in gravidanza (18-59 aa)	Donne in gravidanza	Fonti privilegiate
Folati (µg)	400	600	Legumi, vegetali a foglia verde (spinaci, lattuga, broccoli, asparagi), noci, agrumi, cereali integrali, uova
Calcio (mg)	1000	1000	latte e derivati, frutta secca, legumi, alcuni ortaggi (radicchio, cime di rapa, cavoli)
Ferro (mg)	18	27	carne, pesce, frutta a guscio, legumi, cioccolato fondente
Fibre (g)	25	25	Cereali integrali, legumi,frutta e verdura

LARN Livelli di Assunzione di Riferimento di Nutrienti ed energia per la popolazione italiana Revisione 2012. Documento di sintesi per il XXXV Congresso Nazionale SINU Bologna, 22-23 ottobre 2012 www.sinu.it/documenti/20121016_LARN_bologna_sintesi_prefinale.pdf .

ESTREMI BROMATOLOGICI DELLA DIETA

APPORTO CALORICO (kcal)	PROTEINE (g)	LIPIDI (g)	GLUCIDI (g)	FERRO (mg)	CALCIO (mg)	FIBRA (g)
2000	87	91	205 R.A 50 g	12	770	23

N.B.
Si è fornito l'apporto proteico del terzo trimestre per compensare la riduzione della quota glicidica senza "affamare" la paziente

IMPOSTAZIONE TERAPIA DIETETICA

COLAZIONE

Latte intero o p.s. o yogurt bianco 1 TAZZA (200 ml) o 1-2 vasetti da 125 gr
oppure
Latte ad alta digeribilità o a ridotto contenuto di lattosio 1 BICCHIERE (150 ml)
oppure
bevanda di soia arricchita con calcio e vitamina D, senza zucchero 1 TAZZA (250 ml))
+
Fette biscottate o cereali tipo fiocchi di avena N° 4 fette o N° 4 CUCCHIAI (30 gr)
oppure
Pane di cereali integrali o di grano duro 40-50 gr
oppure
Crackers, grissini, gallette integrali di farro, riso gr. 30 -40

Formaggio, affettato, uova, tofu, verdure SI

Caffè, the, orzo, tisane, cacao amaro SI
Dolcificante: aspartame, acesulfame K, saccarina, sucralosio NO
Zucchero bianco/di canna, miele, fruttosio, marmellata NO

PRANZO e CENA

•1° piatto (pasta, riso, polenta, cous-cous, cereali integrali) gr. 60 – 70
oppure
•Minestroni o zuppe con pasta, riso, cereali 1 PIATTO
oppure
•Minestrina o semolino 1 PIATTO + ½ PORZIONE di PANE
oppure
•Minestroni o zuppe senza pasta, riso, cereali 1 PIATTO + ½ PORZIONE di PANE
oppure
•Pane di cereali integrali o di grano duro gr. 60 – 70

+

2° piatto a scelta tra:
• carne tipo: vitello, maiale 1 – 2 volte alla settimana 100 g
• carne tipo: pollo, tacchino, coniglio 2 – 3 volte la settimana 100 gr
• pesce: tipo alici, sgombri, acciughe, aguglie 2- 3 volte la settimana 150 gr
•legumi almeno 2 volte alla settimana (secchi gr. 40, legumi freschi/scatola gr 100)
•uova 2 volte alla settimana n°2
•formaggio tipo: ricotta e fiocchi di latte (150-200 gr.), mozzarella, formaggi light gr. 100
1 volta alla settimana
•altri formaggi (stracchino, robiola, toma, grana, parmigiano) gr. 80
1 volta alla settimana
•affettato: tipo prosciutto cotto, prosciutto cotto di praga, manzo affumicato, tacchino freddo gr. 70 1 volta la settimana
•tofu, seitan, tempe gr. 80 1 volta la settimana

+

•Verdura di stagione cotta A VOLONTÀ
•Verdura di stagione cruda A VOLONTÀ
•Frutta fresca di stagione gr. 150

TOXOPLASMOSI/LISTERIOSI

Se si è recettivi alla **toxoplasmosi** consumare SOLO carne ben cotta e salumi affettati cotti tipo: prosciutto cotto, manzo affumicato, arrosto o bresaola di tacchino, prosciutto cotto di Praga, petto di pollo al forno.
Consumare SOLO VERDURA COTTA o CRUDA (non fuori casa), ma LAVATA ACCURATAMENTE e sciacquata con abbondante acqua, togliendo, se presenti, i residui di terriccio con l'azione meccanica delle mani.
ATTENZIONE anche FRAGOLE, frutti di bosco, FUNGHI, ERBE AROMATICHE (tipo prezzemolo, basilico, salvia …) vanno adoperati a crudo solo dopo accurato lavaggio.

Per prevenire la **listeriosi** (malattia trasmessa dall'agente patogeno Listeria Monocytogenes) è necessario NON CONSUMARE: prodotti sottovuoto (tipo salmone affumicato, affettati …), latte crudo, latticini NON pastorizzati, formaggi erborinati e a crosta fiorita (tipo gorgonzola, taleggio …).

SPUNTINI

<u>Metà Pomeriggio</u>
Pane di cereali integrali o di grano duro 40 g + 4 – 6 noci
oppure
crackers o grissini o gallette integrali di farro, riso (25 - 30 gr.) + 4 – 6 noci

N.B. si ricorda che sono permesse 2 porzioni di frutta fresca al giorno, quindi se la FRUTTA fresca viene consumata come SPUNTINO NON può più essere consumata alla fine dei pasti principali (pranzo e cena).

CONSIGLI UTILI

CONDIMENTI:

•olio extravergine di oliva (4 – 5 cucchiai in tutta la giornata)
•evitare: olio di semi vari, burro, lardo, strutto, margarina, panna, salse (tipo maionese, ketchup, salsa tonnata, ecc.)
•Per insaporire i cibi utilizzare erbe aromatiche, peperoncino, basilico, origano, prezzemolo, cipolla, aglio, limone, aceto, aceto balsamico, miso, tamari, shoyu
•Per aumentare l'apporto di sali minerali (calcio, ferro, potassio …), è possibile utilizzare semi di sesamo, girasole, zucca, pinoli
•Consigliabile utilizzare sale iodato

BEVANDE/DOLCI:

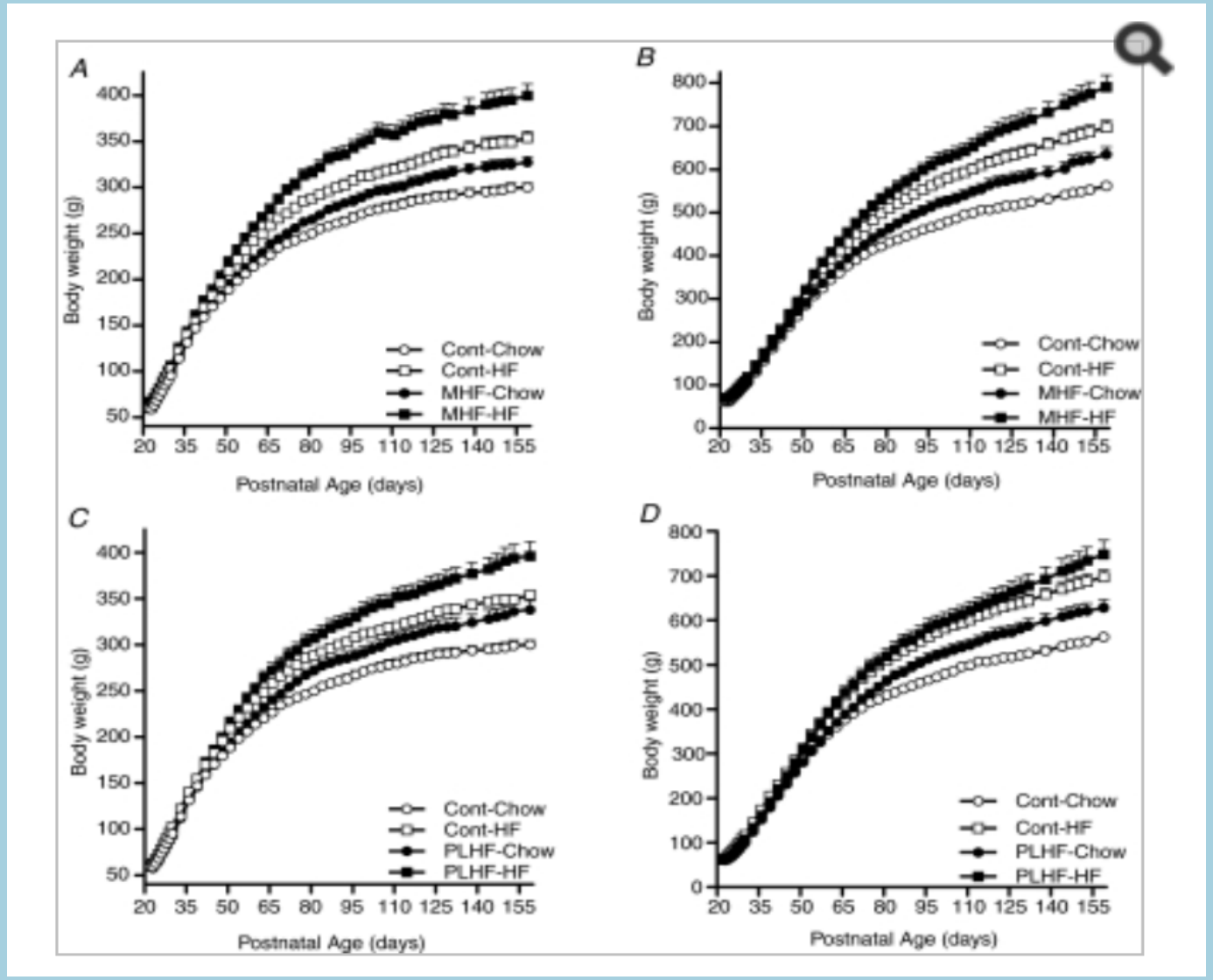
•Assumere almeno 1,5-2 litri di acqua (naturale o gassata)
•Evitare un eccessivo consumo di caffè e tè (concessi 1-2 caffè o 1-2 tazze di the al giorno), preferibile sostituirli con caffè d'orzo e tisane.
•Eliminare bibite zuccherate, sciroppi, spremute, succhi di frutta normali e senza zucchero, integratori salini zuccherati, the solubile, tisane e camomilla solubili.
•Proibiti vino, birra, aperitivi, liquori e superalcolici
•Eliminare gli alimenti ad elevato contenuto zuccherino (zucchero (saccarosio), zucchero di canna, a velo e filato, miele, malto, marmellata, gelatine di frutta, dolci, gelati, ghiaccioli, torte, panna, cioccolato, biscotti, caramelle, gomme da masticare ecc).
•Si sconsiglia l'utilizzo di dolcificanti artificiali tipo aspartame, acesulfame K

J Physiol. 2009 Feb 15;587(Pt 4):905-15. doi: 10.1113/jphysiol.2008.163477. Epub 2008 Dec 22.

Maternal nutritional history predicts obesity in adult offspring independent of postnatal diet.

Howie GJ[1], Sloboda DM, Kamal T, Vickers MH.

The present study investigated the effects of maternal HF nutrition either throughout the mother's life up to and including pregnancy and lactation or HF nutrition restricted to pregnancy and lactation, on growth and metabolic parameters in male and female offspring. Virgin Wistar rats were assigned to one of three experimental groups: (1) controls (Cont): dams fed a standard chow diet throughout their life and throughout pregnancy and lactation; (2) maternal high fat (MHF) group: dams fed a HF diet from weaning up to and throughout pregnancy and lactation; and (3) pregnancy and lactation high fat (PLHF): dams fed a chow diet through their life until conception and then fed a HF diet throughout pregnancy and lactation. At weaning, all offspring were fed either a chow or HF diet for the remainder of the study (160 days). Litter size and sex ratios were not significantly different between the groups. MHF and PLHF offspring had significantly lower body weights and were hypoleptinaemic and hypoinsulinaemic at birth compared to Cont offspring. As adults however, chow-fed MHF and PLHF offspring were significantly more obese than Cont offspring (DEXA scanning at day 150, $P < 0.001$ for maternal HF diet). As expected a postweaning HF diet resulted in increased adiposity in all groups; MHF and PLHF offspring, however, always remained significantly more obese than Cont offspring. Increased adiposity in MHF and PLHF offspring was paralleled by hyperinsulinaemia and hyperleptinaemia ($P < 0.001$; MHF and PLHF versus Cont). It is of interest that a lifetime of HF nutrition produced a similar offspring phenotype to HF nutrition restricted to pregnancy and lactation alone, thus suggesting that the postnatal sequelae of maternal HF nutrition occurs independent of preconceptional diet. These data further reinforce the importance of maternal nutrition during these critical windows of development and show that maternal HF feeding can induce a markedly obese phenotype in male and female offspring completely independent of postnatal nutrition.



Postnatal growth curves from weaning until day 150

A, female offspring of Cont or MHF mothers fed either the C or HF diet postnatally; *B*, male offspring of Cont or MHF mothers fed either the C or HF diet postnatally; *C*, female offspring of Cont or PLHF mothers fed either the C or HF diet postnatally; *D*, male offspring of Cont or PLHF mothers fed either the C or HF diet postnatally. $P < 0.001$ for effect of maternal HF diet and postnatal HF nutrition. MHF *versus* PLHF not significant. No interactions. Data are means ±S.E.M., n= 12–18 per group.

Eur J Clin Nutr. 2013 Jun;67(6):670-9. doi: 10.1038/ejcn.2013.76. Epub 2013 Apr 24.

Maternal macronutrient intake during pregnancy and 5 years postpartum and associations with child weight status aged five.

Murrin C[1], Shrivastava A, Kelleher CC; Lifeways Cross-generation Cohort Study Steering Group.

BACKGROUND/OBJECTIVES:
Animal models have demonstrated that maternal overnutrition during pregnancy influences offspring adiposity. Few human studies of normal pregnancy have replicated these findings. We examined the association between child body mass index at age 5 years and maternal nutrient intake during pregnancy and 5 years postpartum.
SUBJECTS/METHODS:
Five-year-old children (n=585) and their mothers were recruited during pregnancy from two maternity hospitals in Ireland. Data are from the Lifeways Cross-Generation Cohort study with detailed dietary information obtained during pregnancy and postpartum using a food frequency questionnaire. Nutrient intake was adjusted for energy intake (EI) and expressed in quartiles. Heights and weights were measured when the children were aged 5 years. We performed multivariate logistic regression analyses to examine the independent associations of macronutrients (protein, fat and carbohydrate) and their components (saturated fatty acid (SFA)/monounsaturated fatty acid/polyunsaturated fatty acid and sugar/starch) with child overweight/obesity. Associations were examined for nutrient intake during pregnancy (T1), at 5 years postpartum (T2) and the change in nutrient intake between T1 and T2.
RESULTS:
Total mean (s.d.) EI was significantly higher during pregnancy (2548 ± 1239 kcal) than 5 years postpartum (2084 ± 718 kcal). Increased odds of overweight/obesity were found in mothers with higher intakes of sugar at T1 (Q4 odds ratio (OR): 4.57, 95% confidence interval (CI): 1.01-20.69) and high intakes of SFA at T2 (Q4 OR: 3.35, 95% CI: 0.97-11.57). Mothers with persistently high intakes of SFA and those who reduce their sugar intake between T1 and T2 were more likely to have overweight/obese children.

TABLE 2

FROM:
Maternal macronutrient intake during pregnancy and 5 years postpartum and associations with child weight status aged five
C Murrin, A Shrivastava and C C Kelleher for the Lifeways Cross-generation Cohort Study Steering Group

BACK TO ARTICLE

Table 2. Quartiles of maternal macronutrient intake during pregnancy (Time 1) on predicting offspring overweight/obesity

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	Normal weight n	*Overweight/obese* n	*Univariate nutrients* OR	*Multivariate nutrients* OR	*Multivariate fully adjusted 95% CI* OR	Lower	Upper	P-value
			(n=524)	(n=524)	(n=343)			
% Sugar								
Q1	100	26	1.00	1.00	1.00			
Q2	106	37	1.34	1.30	2.61	1.04	6.56	0.04*
Q3	94	39	1.60	2.13†	3.56	1.19	10.60	0.02*
Q4	90	32	1.37	2.29	4.57	1.01	20.69	0.05*
P_{trend}			0.23	0.13	0.07			

TABLE 3

FROM:
Maternal macronutrient intake during pregnancy and 5 years postpartum and associations with child weight status aged five
C Murrin, A Shrivastava and C C Kelleher for the Lifeways Cross-generation Cohort Study Steering Group

BACK TO ARTICLE

Table 3. Quartiles of maternal macronutrient 5 years postpartum (Time 2) on predicting offspring overweight/obesity

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	Normal weight n	*Overweight/obese* n	*Univariate nutrients* OR	*Multivariate nutrients* OR	*Multivariate fully adjusted 95% CI* OR	*Lower*	*Upper*	*P-value*
			(n=381)	*(n=381)*	*(n=358)*			
%SFA								
Q1	74	22	1.00	1.00	1.00			
Q2	65	29	1.50	1.90	1.99	0.85	4.65	0.11
Q3	77	19	0.83	1.32	1.34	0.49	3.71	0.57
Q4	66	29	1.48	2.84†	3.35	0.97	11.57	0.06†
P_{trend}			0.56	0.15	0.12			

TABLE 4

FROM:
Maternal macronutrient intake during pregnancy and 5 years postpartum and associations with child weight status aged five
C Murrin, A Shrivastava and C C Kelleher for the Lifeways Cross-generation Cohort Study Steering Group

BACK TO ARTICLE

Table 4. The effect of change in quartiles of maternal macronutrient between Time 1 and Time 2 on offspring overweight/obesity

Previous table | Figures and tables index | Next table

	Normal Weight n	*Overweight/obese* n	*Univariate nutrients* OR	*Multivariate nutrients* OR	*Multivariate nutrients* OR	*Multivariate fully adjusted 95% CI* OR	Lower	Upper	P-value
			(n=381)	(n=376)	(n=368)	(n=358)			
% Sugar									
Group A	136	49	1.00	1.00	1.00	1.00			
Group B	33	10	0.84	1.11	1.24	1.36	0.49	3.80	0.55
Group C	69	31	1.25	2.34*	2.59	2.48	1.14	5.41	0.02*
Group D	44	9	0.57	0.81	0.97	1.08	0.37	3.19	0.89

Maternal protein intake during pregnancy and offspring overweight 20 y later[1,2,3]

Ekaterina Maslova, Dorte Rytter, Bodil H Bech, Tine B Henriksen, Morten A Rasmussen, Sjurdur F Olsen, and Thorhallur I Halldorsson

Design: We used a prospective cohort of 965 Danish pregnant women recruited in 1988–1989 with offspring follow-up at 19–21 y. Macronutrient intake was collected in gestational week 30, and we divided protein according to its source (animal and vegetable including cereals). Offspring body mass index (BMI; in kg/m2) and waist circumference were recorded at follow-up (n = 695–697), and biomarkers were quantified in a subset (n = 443) of participants. We used multivariable linear and log-binomial regression to calculate effect estimates and 95% CIs for a 1:1-g substitution of carbohydrates for protein.

Results: Offspring mean (±SD) BMI was 22.1 ± 3.3 and 22.8 ± 2.9 for women and men, respectively. The prevalence of overweight (BMI ≥25) was 16.9% for women and 19.1% for men. We showed that a 1:1-g substitution of animal protein for carbohydrates increased risk of BMI ≥25 in female [quartile 4 compared with quartile 1: risk ratio (RR): 3.36; 95% CI: 1.52, 7.42] and male (quartile 4 compared with quartile 1: RR: 2.22; 95% CI: 0.92, 5.35) offspring. These results appeared to be accounted for by protein from meat sources. The results could not be explained by postnatal risk factors.

Conclusions: Protein from animal sources, primarily meat products, consumed during pregnancy may increase risk of overweight in offspring; this association appeared to be stronger for female offspring. Because of the lack of information on postnatal exposure in this cohort, these results are hypothesis-generating and need to be replicating in other cohorts.

TABLE 3

Relation between protein (substituted for carbohydrates) intake in pregnancy and risk of offspring being overweight or having waist circumference above action level II at 19–21 y of age for women (n = 361) and men (n = 325)[1]

	Overweight (BMI ≥25 kg/m^2)		High waist circumference	
	Crude	Adjusted[2]	Crude	Adjusted[2]
Women				
Total protein[3]				
Quartile 1 (median: 64 g/d; n = 80)[4]	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Quartile 2 (median: 74 g/d; n = 94)	1.04 (0.49, 2.20)	1.25 (0.60, 2.62)	1.17 (0.57, 2.40)	1.24 (0.58, 2.62)
Quartile 3 (median: 82 g/d; n = 98)	1.19 (0.58, 2.48)	1.51 (0.74, 3.07)	0.68 (0.29, 1.58)	0.67 (0.28, 1.61)
Quartile 4 (median: 92 g/d; n = 88)	1.97 (1.00, 3.87)	2.18 (1.11, 4.29)	1.78 (0.90, 3.52)	1.76 (0.87, 3.57)
P-trend[5]	0.03	0.02	0.14	0.18
Animal protein[6]				
Quartile 1 (median: 36 g/d; n = 82)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Quartile 2 (median: 49 g/d; n = 98)	1.25 (0.57, 2.76)	1.53 (0.70, 3.34)	1.58 (0.72, 3.47)	1.71 (0.76, 3.85)
Quartile 3 (median: 58 g/d; n = 91)	1.37 (0.59, 3.18)	1.64 (0.75, 3.56)	0.77 (0.30, 1.99)	0.87 (0.34, 2.24)
Quartile 4 (median: 69 g/d; n = 89)	3.01 (1.30, 6.96)	3.36 (1.52, 7.42)	1.93 (0.82, 4.53)	2.20 (0.88, 5.52)
P-trend	0.01	0.003	0.19	0.15
Vegetable protein[7]				
Quartile 1 (median: 17 g/d; n = 92)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Quartile 2 (median: 20 g/d; n = 88)	1.14 (0.61, 2.10)	1.14 (0.59, 2.20)	1.14 (0.60, 2.17)	1.73 (0.89, 3.39)
Quartile 3 (median: 24 g/d; n = 86)	1.06 (0.47, 2.37)	1.10 (0.51, 2.34)	1.15 (0.52, 2.51)	1.98 (0.84, 4.64)
Quartile 4 (median: 28 g/d; n = 94)	1.53 (0.64, 3.62)	1.39 (0.65, 2.99)	0.67 (0.26, 1.71)	1.18 (0.42, 3.28)
P-trend	0.38	0.41	0.44	0.77
Men				
Total protein[3]				
Quartile 1 (median: 64 g/d; n = 83)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Quartile 2 (median: 74 g/d; n = 87)	1.25 (0.61, 2.56)	1.37 (0.67, 2.78)	0.58 (0.10, 3.35)	0.58 (0.15, 2.27)
Quartile 3 (median: 81 g/d; n = 82)	1.69 (0.85, 3.34)	1.62 (0.82, 3.22)	1.12 (0.24, 5.31)	1.42 (0.27, 7.50)
Quartile 4 (median: 91 g/d; n = 72)	1.98 (1.00, 3.92)	1.74 (0.88, 3.45)	1.43 (0.29, 6.95)	0.74 (0.12, 4.36)
P-trend	0.03	0.08	0.58	0.95
Animal protein[6]				
Quartile 1 (median: 37 g/d; n = 80)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Quartile 2 (median: 49 g/d; n = 89)	1.28 (0.61, 2.68)	1.31 (0.61, 2.82)	0.69 (0.13, 3.85)	0.67 (0.16, 2.84)
Quartile 3 (median: 57 g/d; n = 91)	1.63 (0.79, 3.38)	1.89 (0.86, 4.19)	0.44 (0.07, 2.97)	0.80 (0.13, 4.94)
Quartile 4 (median: 70 g/d; n = 64)	2.27 (1.02, 5.06)	2.22 (0.92, 5.35)	0.97 (0.15, 6.04)	0.94 (0.08, 11.69)
P-trend	0.03	0.05	0.90	0.94
Vegetable protein[7]				
Quartile 1 (median: 17 g/d; n = 68)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Quartile 2 (median: 20 g/d; n = 82)	2.12 (1.10, 4.12)	2.64 (1.22, 5.69)	1.19 (0.29, 4.91)	1.41 (0.24, 8.26)
Quartile 3 (median: 24 g/d; n = 87)	1.72 (0.81, 3.64)	2.35 (1.00, 5.52)	0.34 (0.03, 3.43)	0.45 (0.05, 4.35)
Quartile 4 (median: 28 g/d; n = 88)	1.78 (0.74, 4.29)	2.51 (0.91, 6.98)	0.61 (0.07, 5.02)	1.16 (0.08, 16.39)
P-trend	0.29	0.14	0.52	0.89

(…) The increase in offspring BMI exposed to high protein pre-natally could be explained by the association between protein intake and increased concentrations of IGF-I and reduced growth hormone, which are linked via a negative feedback loop (9, 10). High IGF-I has been shown to stimulate hyperplasia of adipose tissue, whereas low growth hormone decreases lipolysis (10, 29); together these processes promote the development and maintenance of adipose tissue. Both high IGF-I and low IGF binding protein 1 have been related to high birth weight (30, 31) and may mediate overgrowth in offspring of diabetic mothers (32). Although still unclear, animal and vegetable proteins may act differently on IGF binding protein 1 (33). In our study, we showed that maternal animal protein intake was related to higher BMI in offspring but not related to IGF-I. However, we did not have IGF-I measured in early life when these mechanisms may have been more relevant. An additional analysis of food sources seemed to suggest that this association was driven by protein from meat and meat products rather than fish or milk products. Early life adiposity may also track into adulthood (34); studies that examined maternal intake in relation to child growth and adiposity have shown that animal protein intake in pregnancy is directly related to birth weight and the child ponderal index (35–40). (…)

Health Technol Assess. 2012 Jul;16(31):iii-iv, 1-191. doi: 10.3310/hta16310.

Interventions to reduce or prevent obesity in pregnant women: a systematic review.

Thangaratinam S[1], Rogozińska E, Jolly K, Glinkowski S, Duda W, Borowiack E, Roseboom T, Tomlinson J, Walczak J, Kunz R, Mol BW, Coomarasamy A, Khan KS.

RESULTS:

A total of 88 studies (40 randomised and 48 non-randomised and observational studies, involving 182,139 women) evaluated the effect of weight management interventions in pregnancy on maternal and fetal outcomes. Twenty-six studies involving 468,858 women reported the adverse effect of the interventions. Meta-analysis of 30 RCTs (4503 women) showed a reduction in weight gain in the intervention group of 0.97 kg compared with the control group (95% CI -1.60 kg to -0.34 kg; p = 0.003). Weight management interventions overall in pregnancy resulted in a significant reduction in the incidence of pre-eclampsia (RR 0.74, 95% CI 0.59 to 0.92; p = 0.008) and shoulder dystocia (RR 0.39, 95% CI 0.22 to 0.70; p = 0.02). Dietary interventions in pregnancy resulted in a significant decrease in the risk of pre-eclampsia (RR 0.67, 95% CI 0.53 to 0.85; p = 0.0009), gestational hypertension (RR 0.30, 95% CI 0.10 to 0.88; p = 0.03) and preterm birth (RR 0.68, 95% CI 0.48 to 0.96; p = 0.03) and showed a trend in reducing the incidence of gestational diabetes (RR 0.52, 95% CI 0.27 to 1.03). There were no differences in the incidence of small-for-gestational-age infants between the groups (RR 0.99, 95% CI 0.76 to 1.29). There were no significant maternal or fetal adverse effects observed for the interventions in the included trials. The overall strength of evidence for weight gain in pregnancy and birthweight was moderate for all interventions considered together. There was high-quality evidence for small-for-gestational-age infants as an outcome. The quality of evidence for all interventions on pregnancy outcomes was very low to moderate. The quality of evidence for all adverse outcomes was very low.

CONCLUSIONS:

Interventions in pregnancy to manage weight result in a significant reduction in weight gain in pregnancy (evidence quality was moderate). Dietary interventions are the most effective type of intervention in pregnancy in reducing gestational weight gain and the risks of pre-eclampsia, gestational hypertension and shoulder dystocia. There is no evidence of harm as a result of the dietary and physical activity-based interventions in pregnancy. Individual patient data meta-analysis is needed to provide robust evidence on the differential effect of intervention in various groups based on BMI, age, parity, socioeconomic status and medical conditions in pregnancy.

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Maternal dietary patterns during pregnancy and body composition of the child at age 6 y: the Generation R Study.

van den Broek M[1], Leermakers ET[2], Jaddoe VW[2], Steegers EA[3], Rivadeneira F[4], Raat H[5], Hofman A[1], Franco OH[1], Kiefte-de Jong JC[6].

METHODS:

This study was performed among 2695 Dutch mother-child pairs from a population-based prospective cohort study from fetal life onward. Maternal diet was assessed in early pregnancy by a 293-item semiquantitative food-frequency questionnaire. Vegetable, fish, and oil; nuts, soy, and high-fiber cereals; and margarine, snacks, and sugar dietary patterns were derived from principal component analysis. We measured weight and height of the child at age 6 y at the research center. Total body fat and regional fat mass percentages of the child were assessed with dual-energy X-ray absorptiometry.

RESULTS:

In the crude models, statistically significant associations were found for higher adherence to the vegetable, fish, and oil dietary pattern and the nuts, soy, and high-fiber cereals dietary pattern with lower body mass index, lower fat mass index, and lower risk of being overweight, but none of these associations remained significant after adjustment for sociodemographic and lifestyle factors. We found no associations between the margarine, snacks, and sugar dietary pattern and any of the outcomes.

CONCLUSION:

Our results suggest that the associations between maternal dietary patterns during pregnancy and body composition of the child at age 6 y are to a large extent explained by sociodemographic and lifestyle factors of mother and child.

- **Attenzione ed interesse scientifico verso l'associazione tra dieta materna e salute della prole**

- **Risvolti sanitari, sociali, di politica e programmazione economica**

- **Evidenza di un'associazione, sebbene sia ancora discusso il suo «peso» vs altri fattori materni e della progenie:**
  - Familiarità
  - Co-morbidità
  - Età alla gravidanza
  - Allattamento al seno
  - Stili di vita (attività fisica, fumo)
  - Fattori e modelli culturali, sociali…

- **Ruolo dei singoli macro-e micro-nutrienti**

- **Difficoltà nel disegno degli studi scientifici**