

 HYPERTENSION, LIPIDS AND PREVENTION

IMPROVEMENT OF METABOLIC SYNDROME WITH LOW REFINED CARBOHYDRATES, RELATIVELY HIGH PROTEIN DIET ENRICHED WITH MONO-AND POLY-UNSATURATED FATTY ACIDS

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Authors: *Francisco Lopez-Jimenez, Ling Xu, Kim L. Edens, Mayo Clinic, Rochester, MN*

Objectives We hypothesized a low refined carbohydrates, relatively high protein diet enriched with mono- and poly-unsaturated fatty acids would improve metabolic syndrome (MetS).

Methods We prospectively studied 55 patients with MetS (ATPIII criteria) who were randomly assigned to experimental (n=27) or control (n=28) diet groups. The experimental diet focused on lower carbohydrates, relatively high protein intake enriched with mono- or polyunsaturated oils. The control diet based on the standard dietary recommendation for diabetic patients (< 30% calories from fat). Patients were followed for 6 months. Fasting blood insulin, glucose, lipids and anthropometrics were measured. Insulin resistance was calculated by the modified homeostasis model assessment (HOMA2-IR). Total and regional fat was measured by air displacement plethysmography and dual energy X-ray absorption. Cross sectional visceral and subcutaneous abdominal fat was measured by CT.

Results Both diets improved anthropometrics, fat, glucose and lipids (Table). Experimental diet had a resolution of MetS ranging from 2 to 3 times higher than control diet (32% vs 15%; 31% vs 11%; and 14% vs 7% respectively) by ATP III, IDF and WHO definitions (p<0.01 for all).

Conclusions Improvement of MetS occurs more commonly with a diet focused on lower carbohydrate, higher protein intake enriched with mono- or poly-unsaturated oils.

Table. Improvement of glucose metabolism, lipid parameters, anthropometrics and body fat after diet intervention.

Variables	Exp. Group, n=28			Control group, n=27		
	Mean ± SD (Baseline)	Mean ± SD (Follow-up)	p	Mean ± SD (Baseline)	Mean ± SD (Follow-up)	p
Glucose (mg/dL)	102.52 ± 13.62	101.11 ± 14.08	0.36	101.04±14.36	99.48±11.07	0.56
Insulin (µu/ml)	10.02 ± 7.59	6.96 ± 4.44	0.02	12.10±6.09	8.83±4.73	0.02
HOMA2-IR	1.28 ± 0.97	0.94 ± 0.57	0.04	1.60±0.80	1.18±0.62	0.02
TC (mg/dl)	199.54 ± 40.44	188.89 ± 28.59	0.09	194.07±29.09	182±25.26	0.00
HDL-C (mg/dl)	38.85 ± 8.54	39.85 ± 9.68	0.33	38.11±9.69	37.93±9.14	0.85
LDL-C (mg/dl)	129.57 ± 26.17	124.01 ± 23.15	0.22	122.31±25.87	117.53±22.15	0.18
TG (mg/dl)	170.07 ± 64.64	128.54 ± 44.18	0.00	168.26±79.15	132.70±59.59	0.03
Large HDL particles (µmol/L)	4.71 ± 2.46	6.13 ± 2.77	0.00	4.92±4.07	5.22±2.94	0.60
Total small LDL particles (µmol/L)	1225.27 ± 387.46	1109.08 ± 450.32	0.97	1177.97±388.30	1153.33±458.65	0.70
Mean particle size (n m)	20.23 ± 0.54	20.48 ± 0.80	0.05	20.17±0.72	20.21±0.76	0.70
Large VLDL and Chylo particles (nmol/L)	6.45 ± 1.12	3.46 ± 3.15	0.02	7.29±6.98	4.44±4.45	0.07
Body weight (kg)	98.49 ± 19.31	92.21 ± 20.43	0.00	101.07±20.87	96.31±20.59	0.00
BMI (kg/m ²)	34.10 ± 6.26	31.88 ± 6.65	0.00	35.13±5.56	33.48±5.67	0.00
% excess body Weight	0.98 ± 0.37	0.86 ± 0.39	0.00	1.03±0.38	0.93±0.38	0.00
Waist (cm)	110.78 ± 13.38	101.63 ± 14.04	0.00	113.10±18.72	106.33±13.46	0.03
WHR	0.94 ± 0.07	0.91 ± 0.07	0.02	0.97±0.06	0.91±0.07	0.00
CRP (ng/dl)	0.41 ± 0.53	0.34 ± 0.42	0.15	0.38±0.37	0.82±2.45	0.38
Fat% (BODPOD)	43.82 ± 7.68	40.64 ± 9.71	0.00	44.18±8.34	41.77±8.51	0.02
Trunk fat (g)	26768.54 ± 6240.72	23260.58 ± 6645.50	0.00	28023.10±7577.95	24767.10±6900.57	0.02
Arm fat (g)	4575.65 ± 1460.48	3973.38 ± 1353.01	0.00	4148.70±1242.21	3726.95±1044.19	0.02
Leg fat (g)	16642.77±5216.50	14854.85 ± 5030.91	0.00	16156.90±5161.73	14864.60±4717.93	0.01
Total visceral Fat area	351.53 ± 118.00	297.16 ± 122.65	0.00	373.88±147.93	345.46±153.46	0.02
Total fat area	1085.75 ± 278.58	956.08 ± 322.80	0.00	1129.75±279.35	1038.00±295.25	0.00

Footnote: Significant differences were shown in bold.