The Association Between Body Composition, Metabolic Syndrome Parameters, and Biomarkers related to Energy Expenditure after Bariatric Surgery

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Background: Mitochondrial dysfunction is a major cause of insulin resistance and other complications associated with obesity. Two important factors in regulating energy expenditure through mitochondrial thermogenesis are PGC-1α and UCP-2. However, the effects of bariatric surgery on the levels of PGC-1α and UCP-2, as well as their relationship with body composition and metabolic parameters, are not well understood.

Objectives

Objective: This study aimed to investigate the effects of bariatric surgery on two key pathways involved in energy regulation and to assess its relationship with body composition and metabolic parameters in this regard.

Methods:

Methods: A prospective cohort study was performed on 45 patients with severe obesity who underwent Roux-en-Y gastric bypass surgery. The patients were evaluated at three time points: baseline, three months, and six months after the surgery. Body composition components, levels of PGC-1α, UCP-2, and metabolic parameters were measured at each time point.

Results

Table 4- Biochemical glycolipid profile at three time points before and after surgery.

Variables*	Before surgery	After Surgery		P-Value
	Baseline	3 months	6 months	
PGC-1α, ng/ml	2.55 ± 0.04	2.78 ± 0.06	2.86 ± 0.23	0.01
UCP-2, ng/ml	5.13 ± 0.09	6.11 ± 0.16	8.11 ± 0.09	0.007
HOMA-IR	5.12 ± 0.44	2.84 ± 0.21	2.11 ± 0.23	0.001
FBS, mg/dL	109.64 ± 28.08	91.13 ± 13.87	89.53 ± 8.90	0.02
HbA1c, %	6.79 ± 0.72	5.80 ± 0.45	5.21 ± 0.39	0.03
Insulin, µIU/mL	18.07 ± 6.49	12.18 ± 4.15	9.85 ± 8.33	0.001
TG, mg/dL	163.36 ± 53.38	138.97 ± 41.46	129.81 ± 35.74	< 0.001
Chol, mg/dL	182.42 ± 40.35	168.06 ± 40.72	153.44 ± 34.98	< 0.001
LDL, mg/dL	108.61 ± 32.59	95.24 ± 28.17	86.58 ± 20.54	< 0.001
HDL, mg/dL	45.72 ± 11.86	45.00 ± 8.35	44.90 ± 2.81	0.84
ALT, IU/L	29.51 ±12.80	23.19 ±7.39	18.36 ±3.97	< 0.001
AST, IU/L	31.03 ± 16.71	22.08 ± 9.21	16.08 ± 4.67	< 0.001

*Mean ± SE

PGC-1α: Peroxisome Proliferator- Activated Receptor - Co-Activator-1a, UCP-2: Uncoupling protein -2, HOMA-IR: homeostatic model assessment-insulin resistance, FBS: Fasting Blood Sugar, HbA1c: Hemoglobin A1c, TG: triglyceride, HDL: high-density lipoprotein, LDL: Low-density lipoprotein, AST: Aspartate Transaminase, ALT: alanine aminotransferase,

Results

Furthermore, a multivariate linear regression analysis identified that an increase in insulin, HOMA-IR, uric acid, and trunk fat is associated with a less significant increase in PGC-1α.

Moreover, in relation to the factors that predict changes in the trend of UCP-2, it was found that a higher level of TSH, AST, Fat (%), and FFM were associated with a lower increase in the changing trend of UCP-2 levels.

Conclusion

Conclusion: Bariatric surgery has been shown to positively impact various factors, including levels of UCP-2 and PGC-1α, body composition, and metabolic parameters. These findings indicate that bariatric surgery could potentially improve thermogenesis and energy expenditure by enhancing mitochondrial biogenesis and function.

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Thank You For Your Attention !

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