

Cardiometabolic Obesity Phenotype: Lipedema

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Abstract

Background: Lipedema is increasingly recognized as a distinct obesity-related phenotype characterized by disproportionate subcutaneous fat accumulation, altered body fat distribution, chronic low-grade inflammation, and emerging cardiometabolic vulnerability. Beyond excess adiposity, ectopic fat deposition and qualitative body composition changes may contribute to metabolic and cardiovascular risk in this condition.

Objective: To investigate the relationship between diet quality, body composition, and gut microbiota (GM) in lipedema, considered as a specific obesity phenotype with cardiometabolic implications.

Methods: In a case-control setting, women with lipedema and healthy controls underwent DXA-based body composition assessment, dietary adherence evaluation, and GM profiling using 16S rRNA gene sequencing. Associations between microbial taxa, intramuscular adipose tissue (IMAT), lean mass-to-fat mass indices, and dietary patterns were explored.

Results: Lipedema was characterized by increased ectopic fat deposition, particularly IMAT, and reduced lean mass-to-fat mass ratios, despite heterogeneous BMI values. These features were associated with a distinct GM signature, including reduced abundance of taxa linked to metabolic flexibility and insulin sensitivity (e.g., Blautia, Eggerthellaceae) and enrichment of short-chain fatty acid-producing genera such as Anaerostipes and Phascolarctobacterium. Higher adherence to Mediterranean/MIND-like dietary patterns was associated with improved diet quality and a more favorable microbial profile, independent of caloric restriction or weight loss.

Conclusions: Lipedema represents a metabolically relevant obesity phenotype in which cardiometabolic risk is driven by qualitative alterations in body composition and gut microbiota rather than body weight alone. Nutritional strategies targeting diet quality may offer a feasible approach to modulate the gut-adipose-muscle axis and mitigate cardiometabolic risk in lipedema.