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Metabolic consequences of a Paleolithic diet in obese postmenopausal women

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Title

Metabolic consequences of a Paleolithic diet in postmenopausal women with obesity

Abstract**Background**

Obesity, in particular abdominal adiposity, is associated with elevated fatty acids and pro-inflammatory adipokines, which are linked to ectopic fat storage and insulin resistance. During menopause, there is a redistribution of fat from the peripheral to abdominal depots. This transition is associated with an increased risk of type 2 diabetes and cardiovascular diseases. We hypothesized that a Paleolithic diet, with high proportions of lean meat, fish, vegetables, fruits, and oils, but devoid of dairy products and cereals, might have long-term beneficial effects on inflammation, fat metabolism, and circulating fatty acids. These effects might potentially reduce the risk of metabolic complications in postmenopausal women that are obese.

Methods

Postmenopausal women with obesity were studied before, after six months, and after 24 months of one of two specified *ad libitum* diets. One diet was a Paleolithic diet, in which approximately 30% of the total energy (E%) was protein, 30 E% was fat, and 40 E% was carbohydrate. The other diet was a prudent control diet, consistent with Nordic Nutrition recommendations of 15 E% protein, 25 E% fat, and 55 E% carbohydrate. Dietary intakes of polyunsaturated fatty acids and protein were validated objectively by measuring circulating and urinary biomarkers. Anthropometrics and diet reports were analyzed, and abdominal subcutaneous fat samples were evaluated for the expression of proteins key in inflammation and fat metabolism and for lipoprotein lipase mass and activity. In addition, blood samples were analyzed to determine concentrations of specific serum proteins, serum lipids, and the fatty acids carried in cholesterol esters.

Results

The Paleolithic diet group reported reduced intakes of saturated fatty acids and carbohydrates and elevated intakes of protein and unsaturated fatty acids, compared to baseline. The elevated intakes of polyunsaturated fatty acids and protein were objectively verified for this group. After 24 months, both diets were found to have beneficial effects on the expression of inflammation-related genes in adipose tissue and pro-inflammatory factors in the circulation. Compared to the control group, the Paleolithic diet group exhibited more pronounced reductions of circulating cardiometabolic risk factors, including the ratio of triglycerides to high density lipoprotein, lipogenic index, specific fatty acids, and indices of desaturase activities. After six months, the Paleolithic group also exhibited more pronounced reductions in lipogenesis-promoting factors, including the expression of key proteins in fat synthesis, the activity of lipoprotein lipase, and the activity of stearoyl-CoA desaturase 1, compared to the control group.

Conclusion

Long-term weight loss in postmenopausal obese women was accompanied by reductions in low-grade inflammation in adipose tissue and in the circulation. In addition, a Paleolithic diet, with a high content of unsaturated fatty acids and a low content of refined carbohydrates, appeared to provide greater reductions in cardiometabolic risk factors associated with insulin resistance and lipogenesis, compared to a prudent control diet.

Keywords

Postmenopausal women, Paleolithic diet, randomized diet intervention, fat metabolism, low-grade inflammation, circulating fatty acids, diet validation, obesity, insulin resistance

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