

EFFECTS OF A MODIFIED KETOGENIC DIET ON LIPID METABOLISM IN EXPERIMENTAL METABOLIC SYNDROME

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Relevance:

Metabolic syndrome is a complex pathological condition characterized by insulin resistance, dyslipidemia, abdominal obesity, and chronic low-grade inflammation. Disturbances in lipid metabolism play a central role in the development of atherosclerosis and cardiovascular complications associated with metabolic syndrome. Dietary interventions, particularly ketogenic diets, have recently attracted considerable attention due to their potential effects on lipid metabolism. However, the influence of modified ketogenic diets on serum lipid profiles under conditions of metabolic syndrome remains insufficiently studied.

Objective:

To evaluate the effects of a modified ketogenic diet on lipid metabolism parameters in rabbits with experimentally induced metabolic syndrome.

Materials and Methods

The study was conducted on 60 Chinchilla rabbits. Metabolic syndrome was induced using the Saidov method for 60 days. Animals were divided into seven groups: intact, control, traditional ketogenic diet, modified ketogenic diet, ezetimibe, metformin, and metformin plus ezetimibe groups. Treatment lasted for 30 days. Serum levels of total cholesterol, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides were determined using standard biochemical methods. Statistical analysis was performed using mean values and standard errors ($M \pm m$).

Results

The development of metabolic syndrome was accompanied by pronounced dyslipidemia. Total cholesterol increased from 2.7 ± 0.26 mmol/L in the



intact group to 8.0 ± 0.8 mmol/L in the control group. LDL-C increased from 0.53 ± 0.05 mmol/L to 1.25 ± 0.02 mmol/L, while HDL-C decreased from 0.76 ± 0.07 mmol/L to 0.49 ± 0.05 mmol/L. Triglyceride levels increased from 1.2 ± 0.01 mmol/L to 2.4 ± 0.02 mmol/L.

Administration of the modified ketogenic diet resulted in progressive normalization of lipid metabolism. By day 30, total cholesterol decreased to 3.3 ± 0.26 mmol/L, LDL-C decreased to 0.59 ± 0.06 mmol/L, and triglycerides decreased to 1.22 ± 0.01 mmol/L. HDL-C increased to 0.70 ± 0.07 mmol/L. The modified ketogenic diet demonstrated greater efficacy than the traditional ketogenic diet in correcting dyslipidemia.

These findings indicate a significant improvement in lipid homeostasis and a reduction in atherogenic risk factors under the influence of the modified ketogenic diet.

Conclusions

1. Experimental metabolic syndrome is associated with significant disturbances in lipid metabolism, including hypercholesterolemia, elevated LDL-C and triglycerides, and reduced HDL-C.
2. The modified ketogenic diet effectively improves serum lipid parameters in rabbits with metabolic syndrome.
3. The corrective effect of the modified ketogenic diet on dyslipidemia was more pronounced than that of the traditional ketogenic diet.
4. The modified ketogenic diet may represent a promising non-pharmacological strategy for reducing cardiovascular risk associated with metabolic syndrome.

References

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