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CHANGES IN RENAL TISSUE PHOSPHOLIPID CONTENT DURING THE DEVELOPMENT OF METABOLIC SYNDROME

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Abstract

Over the past several decades, the prevalence of obesity and overweight has increased dramatically worldwide, reaching epidemic proportions. This global trend has contributed substantially to the rising incidence of metabolic syndrome (MetS), which has become a major public health concern (Aripkhodzhaeva F.Z. On the Metabolism Disorders in the Development of Kidney Damage in Metabolic Syndrome. ISSN: 3030-3753, Vol. 2, Issue 12).

The individual components of MetS are closely associated with the development of albuminuria and a progressive decline in glomerular filtration rate (GFR). Among these factors, hypertension plays a pivotal role, as sustained elevation of blood pressure can directly contribute to glomerulosclerosis and the progression of chronic kidney disease (Khaled Nashar, Brent M. Egan. Relationship Between Chronic Kidney Disease and Metabolic Syndrome: Current Perspectives. 18 September 2014; pp. 421–435).

Keywords: metabolic syndrome, phospholipids, ketogenic diet.

Objective:

To determine the phospholipid content in the renal tissue of rabbits during the development of metabolic syndrome.

Materials and Methods

The study was conducted on 60 Chinchilla rabbits weighing 2.2–2.4 kg. Metabolic syndrome (MetS) was induced according to the method described by Saidov S.A. (2006). All experimental procedures were performed in accordance with the principles of the European Convention for the

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Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes (Strasbourg, 1986). Treatment of MetS with a standard ketogenic diet was carried out using a dietary composition containing fats, proteins, and carbohydrates in a ratio of 70:20:10. The modified ketogenic diet consisted of fats, proteins, and carbohydrates in a ratio of 60:30:10. At the end of the experiment, phospholipid content in the renal tissue of rabbits with MetS was determined according to the methods of Folch (1957) and Kates (1975).

Results and Discussion:

Phospholipids are the principal structural components of biological membranes. In rabbits with metabolic syndrome, the phospholipid content in renal tissue decreased by 19.95% compared with the healthy control group. Treatment with the standard and modified ketogenic diets significantly increased renal phospholipid levels by 12.9% and 22.6%, respectively, compared with the MetS control group. Administration of ezetimibe, metformin, and their combination also significantly increased phospholipid content by 8.5%, 10.0%, and 19.6%, respectively, compared with the MetS control group. These findings indicate that the development of metabolic syndrome is associated with a reduction in renal phospholipid content. The modified ketogenic diet demonstrated a greater restorative effect on phospholipid levels than the standard ketogenic diet. Furthermore, combination therapy produced a more pronounced therapeutic effect than either monotherapy.