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THE PREVENTIVE ROLE OF VITAMIN D IN DIABETES COMPLICATIONS: EXPLORING CELLULAR PATHWAYS

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Background: It has been reported that vitamin D deficiency is more prevalent in people with diabetes than healthy population and might be responsible for worsening of diabetes complications. This study was designed to investigate the effect of vitamin D treatment on the expression of five key genes involved in the development of vascular complications in heart, liver and kidney tissues.

Methods: Twenty-four male Sprague–Dawley rats were randomly divided into three groups. The first group served as control and the other two groups received an intraperitoneal injection of 45 mg/kg STZ to develop diabetes. Then groups were treated for four weeks either with placebo or vitamin D (two injections of 20,000 IU/kg). At the end of the experiment, blood levels of glucose, insulin, HbA1c and advanced glycation end products (AGEs) were measured. Tissue samples were assessed for the gene expression of AGE cellular receptor (RAGE), glyoxalase (GLO), aldose reductase (AR), O-GlcNAc transferase (OGT) and glutamine: fructose-6-phosphate aminotransferase (GFAT).

Results: Vitamin D treatment resulted in a significant increase in insulin concentration, which could improve hyperglycaemia in diabetic rats. HbA1c concentration had a slight but insignificant decrease following vitamin D intake. In addition, a significant reduction was observed in gene expression of RAGE (the main receptor of AGE pathway) and OGT (the crucial enzyme in the hexosamine pathway) in heart and kidney, as well as GFAT (the rate limiting enzyme of the hexosamine pathway) in all tissues.

Conclusion: Vitamin D might contribute in reducing diabetes complications not only by improving blood glucose and insulin levels, but also via modulating AGE and hexosamine pathways in different organs.

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