

Paper (5)

Title:

A synthetic antioxidant molecule, GP13 derived from cysteine desulfurase of spirulina, *Arthrospira platensis* exhibited anti-diabetic activity on L6 rat skeletal muscle cells through GLUT-4 pathway.

Abstract

Objectives: Diabetes creates oxidative stress, which damages several organs and causes various problems including hyperglycemia, hyperlipidemia, hypertension, and maybe iron dyshomeostasis. Consequently, antioxidant therapy may be a promising strategy to avoid diabetes and diabetic complications. In the current study, we investigated the activity of the antioxidant GP13 peptide in an in-vitro diabetic model.

Methods: All anti-diabetic and antioxidant in-vitro tests were performed on differentiated L6 myotubes cells. MTT assay was used to analyze the cytotoxic effect of the GP13 at different concentrations (10 μ M to 80 μ M) in the L6 cells. The DCFDA fluorescence was performed to confirm the radical scavenging effect of GP13 in the myotubule cells. The cells were treated with different concentrations of GP13 peptide before the enzyme assay was conducted. The differentiated L6 myotubes were kept for serum deprivation for 8 h before being treated with GP13 peptide. The RNA extraction from the L6 myotubes was performed using the Trizol reagent.

Results: Cell viability analysis exhibited the non-toxic nature of GP13 in a dose-dependent manner (10 μ M to 80 μ M). Antioxidant enzyme, superoxide dismutase activity was 23.25 U/mL in the untreated group, whereas it was only 11.75 U/mL in the group that was exposed to GP13 at 80 μ M. The catalase activity at 40 μ M was slightly altered in the cells, while the hydrogen peroxide inhibition activity was higher (91.2%) compared to the control group. Additionally, GP13 showed anti-diabetic effects through a dose-dependent increase in glycogen storage (6.1 mM). It was discovered that 40 μ M was the ideal concentration for the highest level of activity. Additionally, the genes involved in diabetes-related to antioxidants and the insulin signalling system were investigated.

Conclusion: It is concluded that the GP13 peptide from *A. platensis* is a promising agent for anti-diabetic and antioxidant activities. To treat diabetes and its consequences, we thus propose that GP13 be regarded.