

GR15 peptide of S-adenosylmethionine synthase SAMe from *Arthrospira platensis* demonstrated antioxidant mechanism against H₂O₂ induced oxidative stress in in-vitro MDCK cells and in-vivo zebrafish larvae model

ABSTRACT

GR15 is a short molecule or peptide composed of aliphatic amino acids and possesses to have antioxidant properties. The GR15, 1GGGAFSGKDPTKVDR15 was identified from the protein S-adenosylmethionine synthase (SAMe) expressed during the sulfur departed state of *Arthrospira platensis* (spirulina or cyanobacteria). The in-silico assessment and the structural features of GR15 showed its antioxidant potency. Real-time PCR analysis found the up-regulation of ApSAMe expression on day 15 against oxidative stress due to 10 mM H₂O₂ treatment in *A. platensis* (Ap). The antioxidant activity of GR15 was accessed by the cell-free antioxidant assays such as ABTS, SARS, HRAS and NO; the results showed dose-dependent antioxidant activity. The toxicity assay was performed in both in vitro and in vivo models, in which peptide does not exhibit any toxicity in MDCK cell and zebrafish embryos. The intercellular ROS reduction potential of GR15 peptide was also investigated in both in vitro and in vivo models including LDH assay, antioxidant enzymes (SOD and CAT), and fluorescent staining assay (DCFDA, Hoechst and Acridine orange sting) was performed; the results showed that the GR15 peptide was effectively reduced the ROS level. Further, RT-PCR demonstrated that GR15 enhanced the antioxidant property and also up-regulated the antioxidant gene, thus reduced the ROS level in both in vitro and in vivo models. Based on the results obtained from this study, we propose that GR15 has the potential antioxidant ability; hence further research can be directed towards the therapeutic product or drug development against disease caused by oxidative stress.

Keyword: Spirulina; S-adenosylmethionine synthase; Antioxidant peptide; Intercellular ROS; Zebrafish