Gene expression changes of collagen I and III in human skin fibroblast cells in effect of microalga *Chlorella vulgaris* extract and compared to vitamin C

Sodabeh Abdolbaghian[1]
Shahla Jamili[2*]
Azadeh Manayi[3]
Ali Mashinchian Moradi[4]

1, 4. Department of Marine Biology, Faculty of Natural Resources and Environment, Science and Research Branch, Islamic Azad University, Tehran, Iran
Iranian Fisheries Research Organization, Tehran, Iran
Medicinal Plants Research Center, Faculty of Pharmacy, Tehran University of Medical Science, Tehran, Iran

***Corresponding author:**
shahlajamili45@yahoo.com

Received date: 2019.10.08
Reception date: 2020.01.16

Abstract

Skin aging is a biological process that is due to the reduction of collagen production and increase of multiple enzymes, including matrix metalloproteinase (MMP_S), which degrade collagen. *Chlorella vulgaris* is a marine microalga and its beneficial effects on the skin make it a proper ingredient to be used in anti-aging products. In this study, the effect of *C. vulgaris* extract comparing to vitamin C on types I and III collagen production in the human cell line Hu02 was investigated at the Iranian Biological Resource Center in September 2018. Chlorella was extracted using ultrasonication plus enzymatic hydrolysis, and Chlorella extract at different concentration was investigated for its effect on gene expression of collagen I and III in Hu02 cells. First, it was investigated whether alga extract induced cytotoxicity in Hu02 cells. MTT assay showed that extract was non-toxic to Hu02 cells. Using quantitative PCR, it was confirmed that extract increased the gene expression of types I and III collagen, comparing to the control group. Chlorella extract and vitamin C with a similar viability (97%) was used to investigate the effect of extract on gene expression of types I and III collagen, compared to vitamin C. Extract and vitamin C increased gene expression of type I collagen 3.14-fold and 1.42-fold, respectively. Alga extract had more effect on gene expression of type I collagen, compared to the vitamin C and vitamin C had more effect on gene expression of type III collagen, compared to the alga extract and increased its expression 2.12-fold, whereas this amount for the extract was 1.14 fold. These findings indicated that *C. vulgaris* extract and vitamin C induces collagen synthesis in Hu02 cells and could be proper alternative ingredients to the harmful chemicals used to make skin collagen.

Keywords: Chlorella extract, Vitamin C, Collagen, Matrix metalloproteinase, Fibroblast cells.