Original Article

Protective effects of Panax Ginseng against ^{131}I-induced genotoxicity in patients with differentiated thyroid cancer

Vida Omrani[1], Reza Fardid[1,2], Mehrosadat Alavi[2,3,4], Golamhassan Haddadi[1,2], Mohammad Ali Takhshid[5]

[1]Department of Radiology, School of Paramedical Sciences, Shiraz University of Medical Sciences, Shiraz, [2]Ionizing and Non-Ionizing Radiation Protection Research Center, School of Paramedical Sciences, Shiraz University of Medical Sciences, Shiraz, [3]Department of Nuclear Medicine, School of Medicine, Shiraz University of Medical Sciences, Shiraz, [4]Department of Nuclear Medicine, Namazi Hospital, Zand Street, Shiraz, [5]Department of Laboratory Sciences, School of Paramedical Sciences, Shiraz University of Medical Science, Shiraz, Iran

For correspondence: Dr. Reza Fardid, Department of Radiology, School of Paramedical Sciences, Shiraz University of Medical Sciences, Shiraz, Iran. E-mail: rfardid@sums.ac.ir

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ABSTRACT

Background: Radioiodine (^{131}I) therapy (RAIT) is associated with oxidative stress (OS)-induced DNA damage in patients with differentiated thyroid cancer (DTC). The goal of this study was to evaluate the possible ameliorating effects of Panax Ginseng (PG) on RAIT-induced genotoxicity in patients with DTC.

Materials and Methods: Forty DTC patients who had received ^{131}I (100 to 175 mCi) were enrolled in this study. The patients were randomly classified ($n = 10$) into control, placebo, PG1 groups (receiving 500 mg/day of PG for 2 days before RAIT), and PG2 group (receiving 500 mg/day of PG for 2 days before to 1 day after RAIT). Blood samples were collected before and 2 days after RAIT. Lymphocyte micronuclei (MN) frequency was measured using the MN assay. Serum total antioxidant capacity (TAC) and ischemia-modified albumin (IMA) were measured using colorimetric assays. Serum albumin, blood urea nitrogen (BUN), creatinine, aspartate aminotransferase (AST), and alanine aminotransferase (ALT) were measured using commercial kits.

Results: The mean of baseline MN frequency was the same in the four groups. RAIT increased the MN frequencies to at least three times the baseline values in the control (39 ± 5) and placebo groups (38 ± 6) ($P < 0.001$). PG caused a significant decrease in the MN frequencies in the treated groups compared to the control and placebo groups ($P < 0.001$). RAIT and PG administration had no significant effects on the serum IMA, TAC, and markers of liver and kidney toxicity.

Conclusion: PG could be considered a useful remedy for the protection against RAIT-induced chromosomal damage in DCT patients.

KEY WORDS: Differentiated thyroid cancer, genotoxicity, Panax ginseng, radioiodine therapy

INTRODUCTION

Differentiated thyroid cancer (DTC) is known as a common endocrine malignancy worldwide.[1] Thyroidectomy and subsequent radioactive iodine (^{131}I) therapy (RAIT) to ablate the remnant thyroid cells are standard effective methods in the treatment of DTC.[2,3] However, RAIT causes several complications such as nasolacrimal duct obstruction,[4] sialadenitis,[5] bone marrow suppression,[6] and secondary cancer in patients.[7,8] It is believed that RAIT-induced oxidative stress in non-thyroid cells expressing iodide transporter plays an important role in these complications.[9] Indeed, many studies have revealed the useful effects of several natural[10-12] or synthetic antioxidants[13] in preventing RAIT-induced oxidative stress. However, most studies were *in vitro* or conducted on animal models and only a few clinical trials[11] have been performed.

Panax ginseng (PG) (Asian or Korean ginseng) is a herbal remedy that is traditionally used for the treatment of weakness and fatigue.[14] Furthermore, the efficacy of oral administration of PG in the improvement of glycemic control of diabetes patients,[15] enhanced efficiency of the immune system against viral and bacterial diseases,[16] and reduced risk of many cancers[17] has been reported. PG is also known due to its potent antioxidant properties. Animal studies have revealed ameliorating effects of PG against oxidative stress in diabetic rats.[18] Moreover, Cho *et al*.[19] reported that oral administration of ginsenosides, a major constituent of PG, can ameliorate oxidative stress in the eyes and kidneys of diabetic rats.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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