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The effect of Ginseng's extracts on the corticosteron hormone secretion and blood cells in male Rat

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Abstract: Benefits of medical plants have been of interest to scientists for a long time. Ginseng is an aromatic plant which is used as a valuable medicine. This plant is an adabtogen and enhances resistance to stress. Due to increasing stress in modern societies, this study is aimed at evaluating the role of ginseng on corticosteron hormone and blood cell in rat as.mammale model. In this survey, 63 Wistar rats whigted 150 ±20g randomly divided into control (without treatment), sham1 (under stress), sham2 (gavage water) and treatment groups (1-6). 1- 3 groups were under stress and 4-6 without stress received daily, (50, 100 and 200) mg/ kg/ b.wt Ginseng's extract. After 21 days, blood sampling from all groups and separated serum was used to measure blood cell and hormone levels by ELISA. Using statistical software, SPSS 16, data were analyzed by ANOVA and Duncan test ($p<0.05$). Results showed that no significant change on weight any but corticosteron hormone decreased in treatment groups compared to sham groups. The number of lymphocytes and monocytes in the sham groups and treatment groups that were under stress were decreased ($P<0.05$) and increased in treatment groups (4, 5 and 6). The other blood cell didn't change significantly. According to obtained results, Ginseng can treat many diseases especially those were caused by stress.

Key words: *Stress; Ginseng root; Blood cell*

1. Introduction

Ginseng (Panax) is an aromatic and perennial medicinal herb which has been popular in traditional medicine of Asian countries since 18th century. The medicinal value of this plant has made it known as "panacea" (Mahady et al; 2000). Ginseng as "natural metabolic regulators that increase the ability of organism to adapt to environmental factors and to avoid damage from such factors (Piato et al., 2010).

The effect of gensing on Psychological stress was studied by Young Choi (2011) showed resulting in decreasing of plasma corticosteroids levels. This result indicates potential implications for the clinical use of red ginseng in the treatment of stress.

Ginseng's root, which produces and stores its efficient ingredients, is a confirmatory medicine for stimulating appetite, relieving depression, strengthening the immune system, alleviating pain, and improving mental performance and physical force. Although the mechanism of its function is not completely known, it is believed that it has some effects on secretion of Corticotrophin and Cortisol, regulation of immune response, production of antioxidants, neuroendocrine activity, regulation of carbohydrate metabolism (Xie et al., 2004), and fat and stimulation of the production of nitric acid in cardiovascular system (Attele et al., 1999).

The most active components of ginseng have been identified as saponin substances which possess hormone-like effects and it has anti-fatigue properties. Also, the steroid-like properties of the ginseng due to immune response (Young et al., 2011).

The beneficial and apparently safe in respect to chronic toxicity of ginseng on man were studied in vivo (Chong and Oberholzer, 1988). Stress, regardless its productive factor (physical, chemical or environmental factors), destroys physiological balance of the body (Shin et al., 2000). Disorders made from the effects of stress on immune and hormonal systems have been studied since many years ago (Chang et al., 2003). By the appearance of the stress as a result of today's modern life, the close relationship which exists between endocrine, immune, and neurological systems has been under consideration more than past. Response to stress includes changes in blood sugar and electrolytes, increase in the number of white blood cells, hypertrophy of the adrenal cortex, shrinking of the thymus, and etc. (Attele et al., 1999).

In the present study, the effect of Ginseng root extract on the secretion of Corticosterone and blood cells in rat, as a mammal, has been studied.

2. Material and methods

In this research, the extract was prepared with 250 g dry root of jinsing (Samsam, 2006). 65 male

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rats (Wistar) were preserved in at standard conditions (at temperature 22±2°C and humidity 50±5% under 24 hours light and 24 hours darkness), were weighted 150 ±20g and divided randomly into control group (without treatment), sham1 (under stress), sham 2(gavage water) and treatment groups (1-6). The treatment groups 1- 3 were under stress and 4-6 without stress and they received daily respectively, (50, 100 and 200) mg/ kg/ b.wt Ginseng's extract. After treatment period (21 days), blood sampling from all groups and separated serum was used to measure blood cell, stained with Giemsa and hormone levels (corticosterone) by ELISA. Using statistical software, SPSS 18, data were analyzed by ANOVA and Duncan test at significance level ($p<0.05$).

3. Results

Weight increased in the groups sham 1 and 2 but was seen decreasing in treatment 1-3. Also significant decreasing was seen in serumic corticostron level in the under stress groups. Lymphocytes spatially monocytes decreased in groups 1, 2 and 3 and increased in groups 4, 5 and 6 compared to the control. In all cases the effect is dose-dependent.

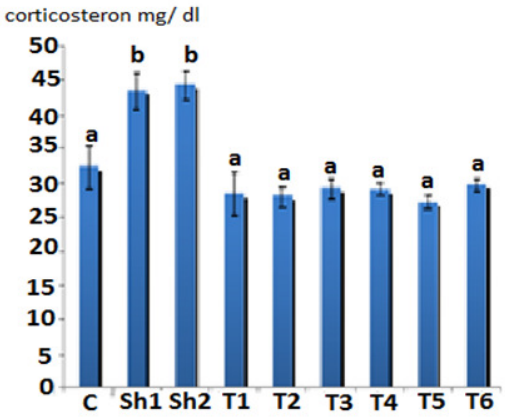

Fig. 1: Corticosterone level

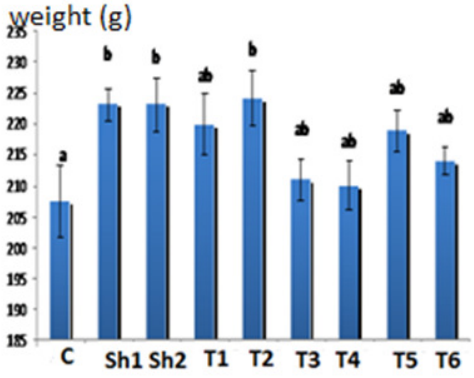

Fig. 2: Wight in treatment groups

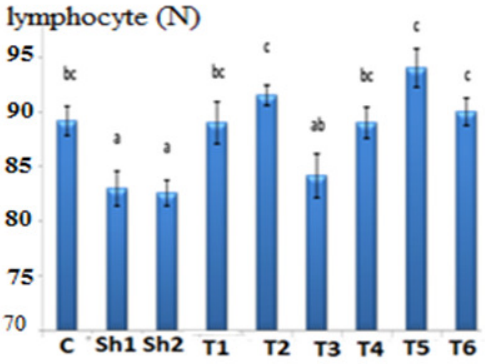

Fig. 3: The number of lymphocyte

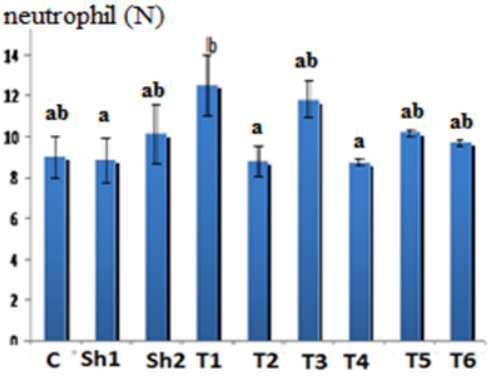

Fig. 4: The number of neutrophil

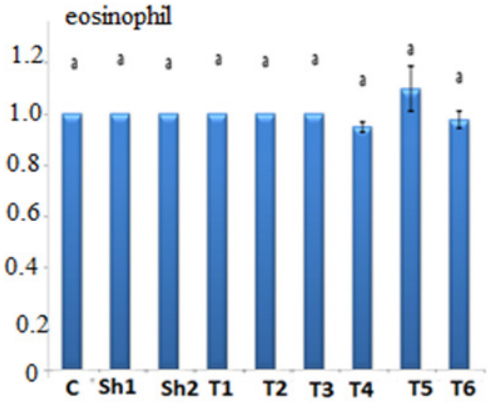

Fig. 5: The number of eosinophil

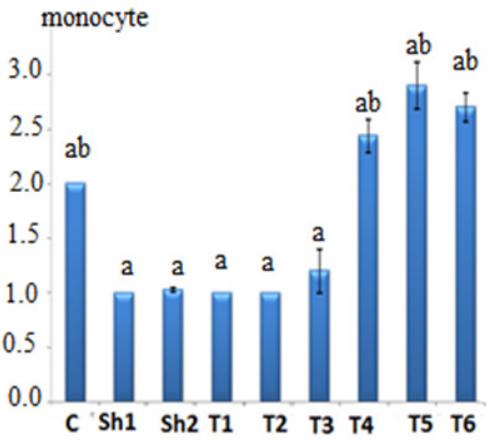

Fig. 6: The number of monocytes

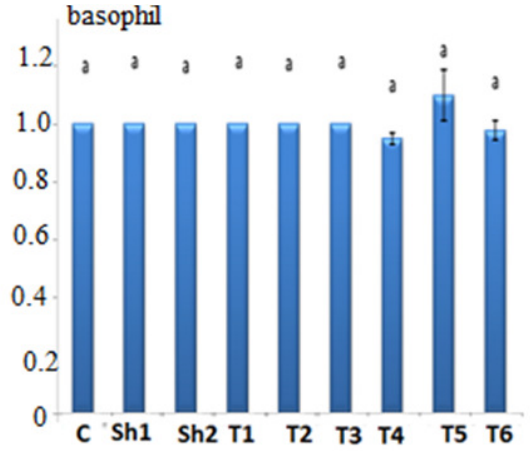

Fig. 7: The number of basophils

4. Discussion

According to the results, weight gain is due to stress; even the stress caused by gavage has been reflected in weight change (Fig 2) which, by an increase in the observed level in these two groups (Fig 2), is partially expected. Stress causes secretion of corticosterone because stressful events are along with the secretion of Glucocorticoid hormones from adrenal cortex (Hasani and Ranjbar, 2008; Kwak et al., 2010). The absence of any significant difference in the level of Corticosterone between treatment groups and control groups and its reduction in relation to both witnesses confirms that Ginseng extract has partially compensated this effect (Fig 1). The result shows that the mentioned extract has had a decreasing effect on the weight of rats; having no significant difference between treatment and control groups confirms this point. Weight loss occurs because of the effect of medicine on the reduction of body fat, which in this study it is probable that the amount of time of the treatment was not enough, or the weight loss has been compensated through stimulation of appetite and eating more food (Fig 2). These peripheral stimulations, caused by stress, influence on Pituitary by sympathetic nerves and cause secretion of adrenal stimulating hormone (ACTH). As a result, the secretion of Glucocorticosteroids will be increased. The increase of these hormones, along with stimulation of sympathetic nerves and secretion of Catecholamine's, will increase the secretion of Glucocorticosteroids hormones (Simpson; 1997).

Fat reduction is also related to the reduction of Leptin secretion during having stress; regardless possible errors during the test, duration of treatment and the measure of stress should be mentioned as interferer factors. Ginsenoside is one of the most important combinations of Ginseng which, by influencing on plasma membrane through affecting multiple receptors and passing them, causes some changes in the level of cell and hormones (Young Choi et al., 2011).

Immobilization stress leads to the reduction of immune function (Wang et al., 2000). This kind of stress releases Corticotropin on neurological centers such as Amygdala and Locus coeruleus through Hypothalamus - Pituitary - Adrenal axis and the impact of releasing factor. A change in the performance of the immune system may also be because of the stress of motion limitation, which is related to the change in the concentration of Glucocorticoids in blood, which is done through the sympathetic system route (Shanks et al, 2001).

No significant difference between the studied groups ($P < 0.05$) in comparing the number of Neutrophils (Fig 4), Eosinophils (Fig 5), Basophil (Fig 7), but the reduction of the number of monocytes (Fig 6), and especially Lymphocytes (Fig 3), in relation to stressed groups was to some extent unexpected.

The studies done on rats, receiving the stress of electric shock, have indicated an increase in the total number of white blood cells (Nakata, 1996). But since the impact of plant combinations is slow and gradual, it is likely that the duration of treatment was not enough. The most impact of Ginseng on a Steroid-like combination, named as Sopanin glycosides, is known as Ginsenoside, which causes many changes in the level of cells through influencing on plasma membrane by affecting multiple receptors and passing those (Shin et al., 2000; Oh et al., 2010).

Lymphocyte Apoptosis in the rats that are under the daily chronic motional limitation stress have been reported in mice (Yin et al., 2000). Glucocorticoid hormones, which are known as anti-inflammatory drug, affect Lymphocytes due to stress. A combination named as G 511, existing in Ginseng's extract, increases the level of T-helper Lymphocyte, and increases the speed of immune response along with Polysaccharide combination (Helms, 2004). The Ginsenoside which exists in the extract, through stimulation of Synthesis of Nitric Oxide in the Endothelium tissue of the vessels, increases the annular GMP level in the vessels' smooth muscles and makes them loose, and then reduces blood pressure. In addition, along with vitamins and Flavonoids existing in the stem, the mentioned plant acts as Antioxidant (Attel et al., 2002).

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