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EFFECT OF AQUEOUS EXTRACT OF CARAWAY SEEDS ON GHRELIN HORMONE IN MALE RATS

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ABSTRACT

Introduction: Obesity is today considered as one of the problems of human society. Obesity is a predisposing factor for chronic diseases such as cardiovascular disease, diabetes, hyperlipidemia and hormonal disorders. In addition to physiological problems, obesity impairs psychosocial dimensions and reduces quality of life. Ghrelin is an appetizing peptide that plays a key role in the regulation of energy balance. According to anti-appetite effects of cumin, the aim of this study is to evaluate the effect of aqueous extract of caraway seeds on the ghrelin hormone in male rats. Method: In this experimental study, 32 adult male Wistar rats were divided into 4 groups of 8 animals, including control and experiment receiving cumin (at concentrations of 60 and 90 mg/kg). Cumin was administered to animals by gavage. Fifty-seven days after the start of the experiment, the animals were weighed and blood samples have been taken out of the heart and serum concentrations of ghrelin hormone were measured. Results were analyzed with ANOVA test and Duncan test at a significance level of 05/0 p≤. Results: In comparing different doses of aqueous extract of black cumin seeds, the most evident effects of reduced serum concentrations of ghrelin hormone and weight loss were related to the extract group at dose mg / kg90. Conclusion: Because of its anti-anorexia, cumin reduces hormone ghrelin secretion and loss of appetite in rats, resulting in weight loss and prevents weight gain.

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Introduction

Obesity is medically defined as a health problem in the world, increased body weight and increased adipose tissue which its prevalence is increasing worldwide [1-3]. Obesity usually increases risk of life-threatening diseases, including diabetes, cardiovascular disease, hyperlipidemia, hypertension, non-alcoholic fatty liver disease and some cancers [4]. According to the studies, the prevalence of obesity in Iran is 19%, showing strongly that the population is at increased risk of obesity compared with low-to middle-income countries [5]. Due to the physical and psychological effects of obesity, experts are trying to reduce the prevalence of this problem in different ways. Several mechanisms are involved in the physiology of obesity that overcoming each of these mechanisms can be considered a cure for obesity. Loss of appetite is the treatment of obesity. Different hormones play a role in determining the amount of appetite. Ghrelin is a peptide appetizer that is known as an important regulator of energy homeostasis and growth hormone secretion and is produced by in the stomach, intestine, pituitary and possibly hypothalamus [6]. Among synthetic drugs, orlistat and sibutramine have been only approved for long-term use to prevent weight gain, which in addition to high prices and significant side effects, have limited effectiveness in preventing weight gain. Therefore, medications and other effective procedures with fewer side effects are needed [7]. For this purpose, the use of medicinal plants can be a good choice. Cumin is a medicinal plant used in traditional medicine as a treatment for overweight and obesity. Black cumin (caraway) is a perennial herb of Apiaceae (umbelliferae) family with scientific name Carum Carvi or Bunium persicus boiss [8]. The results of the purification and study of black cumin

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compounds show that the aqueous phase of this product has 19 monotrpenoids and a variety of aromatic, flavonoids, and nucleoside and glucoside compounds. In addition, the main components of this oil essence extracted from caraway seeds including monoterpenes, have anti-inflammatory properties and their oral administration has reduced side effects of intestinal inflammation in rats [9]. In traditional medicine, this herb is used in anti-cramps, carminative, appetizer, mucus, increasing the secretion of milk and food industry as a flavor [9]. Antifungal [10], antimicrobial [11], antispasmodic [12] analgesic and anti-inflammatory [13] and anticonvulsants effects [14] have been also proved for compounds in cumin essence. It is reported that aqueous extract of black cumin reduces blood lipid levels [15] and its effect on weight loss in diabetic and normal mice was also demonstrated [16]. Since no scientific research has been carried out to evaluate the effect of seed extracts of black cumin on body weight and hormone ghrelin, this study was conducted to evaluate the effects of aqueous extract of black cumin on body weight and serum levels of the hormone ghrelin in male rats.

Method

This study is a randomized experimental study. The ethical issues relating to the storage and handling of laboratory animals have been observed throughout the study, and procedures have been recorded in Ethics Committee of Jahrom University of Medical Sciences, by IR.JUMS.REC.1394.168. For this study, 32 male Wistar rats with an average weight of 200 to 220 grams and 10 weeks of age were used. The rats were kept in 4 cages and a week after adaptation and compliance of darkness and light including 12 hours' light and 12 hours' darkness and humidity about 50 to 55 as well as feeding with standard chow and municipal tap water, they were weighed and divided randomly into 4 groups of 8 animals. During the experiment, the control group did not receive any drug. The second group (sham group) received 1 ml of distilled water by gavage in terms of body weight. The third group was an experimental 1 group which, in addition to the supply of water and standard food, received the aqueous extract of caraway per day to 60 mg per kg of body weight and dissolved in 1 ml of distilled water by gavage for 8 consecutive weeks. The forth group was an experimental 2 group which, in addition to the supply of water and standard food, received the aqueous extract of caraway per day to 90 mg per kg of body weight and dissolved in 1 ml of distilled water by gavage for 8 consecutive weeks. [15].

Blood sampling and hormone tests:

One day after the last injection, the rats were weighed and then were anesthetized with ether. blood samples were directly taken from the heart by the syringe 5 cc and blood serums were collected by centrifugation (15 min, 3000 rpm) and retained in the blood serum of Fryzr◦20- until sent to a laboratory to determine the concentration of the ghrelin hormone. In order to measure the ghrelin hormone, ELISA kit from the Bioassay Technology Laboratory Company in China was used.

Preparation of aqueous extract of Cumin:

One hundred grams of powdered cumin seeds were mixed with 200 ml of water and then were stirred by an electric mixer for three days. Then the liquid mixture was separated by the filter paper and dried at a temperature of 40 ° C. The sample was then dried and stored away from moisture at -20 ° C until examination [15].

Statistical Analysis

To assess body weight and serum concentration in ghrelin according to the quantitative features of data and their normality, ANONA and Duncan test were used to determine the point of the differences between means. The data are reported in the results by Mean ± SEM.

Findings

There was no significant difference in the concentration of ghrelin hormone and changes in body weight in the first control group compared to the control group (Figure 1 and 2).

The average concentration in the groups receiving hormone ghrelin Cumin 90 mg / kg showed a significant decrease in the level ($P \leq 0.05$) compared to the control group.

In the comparison of groups receiving cumin with together, it was found that the concentration in 90mg / kg is more effective in reducing hormone ghrelin compared to the group receiving the extract concentration of 60 mg / kg. There was no significant difference in the groups compared to the control group.

Average body weight changes in the groups receiving Cumin 90 mg / kg showed a significant decrease in the level ($P \leq 0.05$), compared to the control group.

In the comparison of groups receiving cumin with together, it was found that the concentration in 90mg / kg is more effective in lose weight compared to the group receiving the extract concentration of 60 mg / kg.

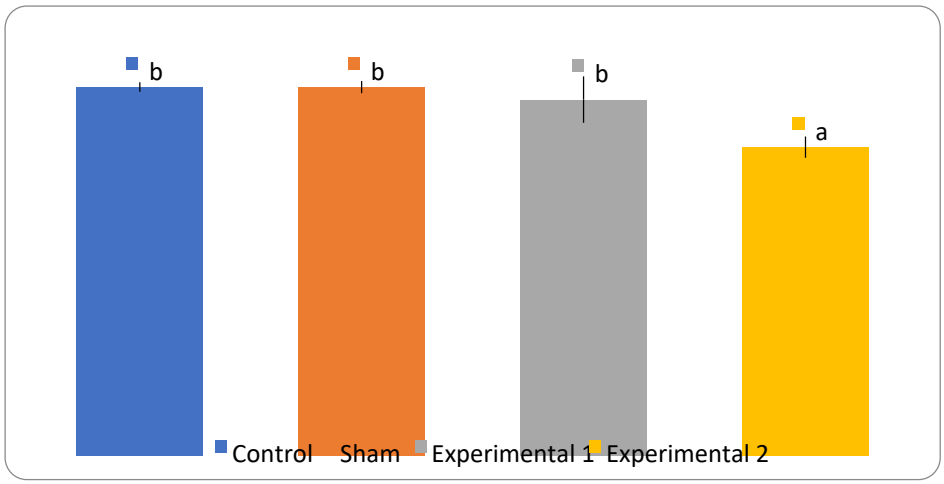

Figure 1. Mean serum level in ghrelin hormone in the groups studied

Means of each column have at least one common letter. No significant differences were observed according to Duncan test.

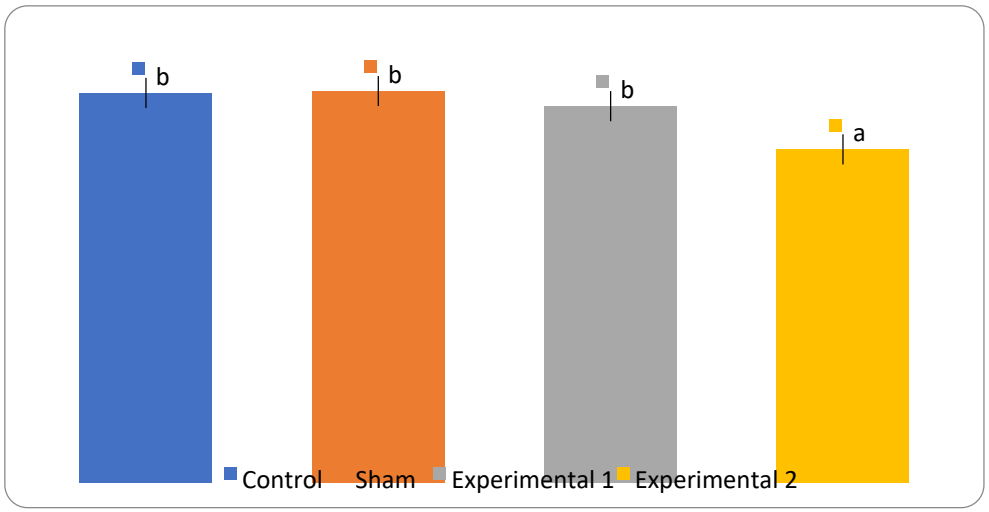

Figure 2. Average changes in body weight in the groups studied

Means of each column have at least one common letter. no significant differences were observed according to Duncan test.

Table 1. Comparison of serum concentration changes in hormone ghrelin and body weight in the treatment groups receiving different doses of the extract of caraway with the control group

Experimental 2	Experimental 1	Sham	Control	Groups / Parameters
1015.00 ± 34.76 a	1171.74 ± 76.35 b	1212.62 ± 19.94 b	1212.75 ± 15.84 b	Ghrelin
22.12 ± 0.47 a	25.00 ± 0.75 b	26.0 0± 1.01 b	25.87 ± 0.63 b	Body Weight Changes

According to Duncan test, means of each column have at least one common letter and no significant differences were observed at 5%.

Discussion

Cumin is considered as a medicinal plant that many studies have shown its effects in the treatment of diabetes, cardiovascular disease (CVD) and high blood pressure as known complications of obesity [17]. Anti-appetite property of cumin was investigated in the study. The results showed that the aqueous extract of caraway seeds by dose-dependent decreases serum concentrations of ghrelin hormone and thus prevents weight gain. The results of this study are consistent with results of a study that had been conducted on the effect of hydroalcoholic extract of caraway seeds on cholecystokinin hormone [18]. Ghrelin is a peptide hormone with 28 amino acids and octnobile which is known as an endogenous ligand for

the growth hormone receptors. Ghrelin causes the release of growth hormone, increases food intake behavior and reduces energy consumption and ultimately increases body weight [19]. Ghrelin acts with its structural resemblance to motilin and its strong appetite effects on Y neuropeptide receptors in the hypothalamus. Unlike peptides to reduce appetite, ghrelin reduces the activity of afferent vagal gastric emptying [20]. Major constituents of cumin seeds include carvacrol, carvone thymol, trans-carveol, limonene and γterpinene [17]. Carvacrol prescribed as a phenolic component of multiple aromatic plants [21] can significantly reduce the accumulation of fat inside cells in a dose dependent manner and inhibits visceral adipogenesis [22]. It seems that carvacrol can increase thermogenesis in adipose tissue and adaptive exothermic reaction, which is direct associated with the oxidative metabolism and is controlled by the mitochondria, is an important component of energy homeostasis of the body and the central metabolic against obesity [23]. However, ghrelin hormone increases lipogenesis and inhibits lipid oxidation [24]. carvacrol in aqueous extract of black cumin seeds can be one of the possible reasons for the reduction of ghrelin serum concentrations. Carvacrol selectively reduces serotonin receptors (5-HT) [25]. Through the 5-HT2C receptor and activating some signals, carvacrol is likely to inhibit the signal and reduces GHS-R ghrelin serum levels in these hormones and appetite [26]. In a study by Cho et al., carvacrol was administered to prevent the accumulation of fat in adipocytes cells during cell differentiation [22]. In a study by Lee et al., oral carvacrol affected food intake in the mice by modulating appetite and prevented weight gain in them [27].

Conclusion

Cumin seed extract promotes weight loss via inhibition of adipogenesis, stimulated fat-burning and inhibiting the secretion of the ghrelin hormone.

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Conflict of interest

The authors declare no conflict of interest with respect to the compilation and / or publication of this article.

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