



## Journal of Medicinal Plants Studies

# Hydroalcoholic extract of *Coriandrum sativum* had no effect on ghrelin hormone in rat

Mohsen Mazidi<sup>1</sup>, Mohsen Nematy<sup>2\*</sup>, Sara Baghban Taraghdari<sup>2</sup>, Mohammad Soukhtanloo<sup>2</sup>, Mahmoud Hosseini<sup>3</sup>, Hassan Rakhshandeh<sup>4</sup>, Abdolreza Norouzy<sup>2</sup>, Habibollah Esmaily<sup>2</sup>

1. Institute of Genetics & Developmental Biology, Chinese Academy of Sciences, Beijing, China.
2. Biochemistry and Nutrition Research Center and Department of Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran.
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Pharmacological Research Center of Medicinal Plants, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

**Corresponding Author:** Mohsen Nematy; Biochemistry and Nutrition Research Center and Department of Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran

Losing weight in consequence of appetite loss can be a sign of a serious underlying condition. Ghrelin is an orexigenic peptide which is secreted from stomach. Recent studies have shown this hormone can improve the nutrition status of patients with cachexia. *Coriandrum sativum* is known as an orexigenic herb in Iranian traditional medicine. Little evidence is gathered about its orexigenic effect and its mechanism; therefore, in the current study the possible orexigenic effect of hydroalcoholic extract of *Coriandrum sativum* was evaluated. To measure the ghrelin level in rats, two groups of 6 male Wistar rats were randomly selected. One group received the orexigenic dose of *Coriandrum sativum* and the other received distilled water by gavage. Rats were anaesthetized, blood samples were collected and plasma total ghrelin level was measured by using ELISA. The results suggest that *Coriandrum sativum* has no effect on level of the ghrelin hormone. Future studies are needed to determine the contribution of the other mechanisms to orexigenic effect of this plant.

**Keyword:** *Coriandrum sativum*; Ghrelin; Appetite; Weight loss; Orexigenic effect.

### 1. Introduction

Malnutrition is a major health issue worldwide. About 10-40% of hospitalized patients are underweight<sup>[4]</sup>, however, additional loss of weight as a consequence of hospitalization is a common occurrence<sup>[12]</sup>. Reduced energy intake is probably the most important general cause of malnutrition in clinical practice<sup>[7]</sup>. Reduced absorption due to malabsorption caused by gastrointestinal disease, increased energy or nutrient losses e.g. through burned skin or damaged gut, and increased demands associated with specific diseases are also common causes of malnutrition<sup>[19]</sup>. The clinical adverse effects of malnutrition are: a) increased morbidity

following surgery or injury b) symptoms such as depression and fatigue, and c) prolonged hospital stay<sup>[10]</sup>.

Recently, there has been a growing attention on appetite management in patients. Peptide hormones released from the stomach have been described to affect appetite and may play a role in altered food intake in hospitalized patients<sup>[15]</sup>. Food ingestion causes the release of anorexigenic peptides as well as vagal stimulation by mechanical and chemical receptors in the gut. The gut, as the portal of entry of all nutrients, naturally has a basic role in appetite regulation. When the food is ingested, anorexic peptides are released and also mechanical and

chemical receptors of gut stimulate vagal nerves [18].

Ghrelin is a recently discovered orexigenic peptide produced by endocrine cells in the oxyntic glands of the stomach, also appears to have a role in the stimulation of appetite. It reaches to the maximum levels in fasting state and falls after food intake [5]. Circulating ghrelin concentrations are highest in the fasting state, rising sharply before and falling within one hour of a meal, suggesting that ghrelin may be involved in meal initiation. Ghrelin is potentially an important peripheral signal to the brain to stimulate food intake in humans [5].

*Coriandrum sativum* (Coriander) is a herb belonging to the family *Apiaceous*. It is digestive and appetite stimulating in traditional medicine [20]. Studies of Emamghoreishi and coworkers proposed that the aqueous extract of *Coriandrum sativum* seeds has anxiolytic influence and may have possible sedative and muscle relaxant properties [8]. It has also been used as a drug for rheumatoid disorders, pain in the joints, and against worms [8, 13, 16]. Numerous animal surveys offer evidence that coriander seeds can stimulate the hepatic antioxidant scheme [1].

So far, there has been little discussion about the potential role of *Coriandrum sativum* L. in regulation of appetite. To the best of our knowledge, no studies have been published linking ghrelin with the *Coriandrum sativum*. This paper seeks to address the following question: Can *Coriandrum sativum* L. manipulate the level of ghrelin in rat?

## 2. Materials and Methods

### 2.1. Animals

Thirty male Wistar rats 8 weeks old and weighing 200-220 g were used. Laboratory temperature was  $22\pm 1$  °C with 12 hours light/dark cycle, and all rats had ad libitum access to food and water. The rats were group housed.

### 2.2. Preparation of hydroalcoholic extract

*Coriandrum sativum* was provided by University herbarium. Pharmacologic parts of coriander are seed, leaf and stem. These parts were dried at

room temperature in shadow, and then powdered. Maceration extraction method was used for extraction. Powder was inserted in closed can and solvent (70% alcohol) was added. Then the solution was kept in the can for 2-4 days and mixed one or two times a day. The solution was filtered and liquid was separated with rotary evaporator. After that, the extract was dried in 40 °C oven. The extract was dissolved in water before gavage every day.

### 2.3. Procedure

The study was designed in two parts. The first part of study has been published by Nematy *et al.* [14]. In the second part of the study, after administration of each extract concentrations by gavage, the blood samples were collected in certain time intervals to measure the changes in plasma ghrelin levels by the use of ELISA method. Twelve rats were randomly selected and were divided into 2 groups, each containing of 6 rats. Animals were fasting 12 hours before start of the second part. Blood samples were collected from the orbital sinus of rats in heparinized capillary, to measure the base ghrelin level (time zero). For this purpose, rats were anaesthetized for a short time by inhalation of ether. Later, the orexigenic dose of *Coriandrum sativum* and distilled water was gavaged to the intervention and control groups. Then, general anaesthesia was inducted to the animals with intra-peritoneal injection of 1.5 mg/kg urethane. The jugular vein was cannulated to withdraw the blood samples (0.5 ml) in 0.5, 1, 2 and 4 hours intervals after gavage. The diminished blood volume was replaced with normal saline. Blood samples were centrifuged at low temperature and acidic condition until the plasma was separated. Plasma samples were stored in  $-20\pm 5$  °C. Total ghrelin levels were measured by ELISA method (EZRGRT-91KRat/Mouse Ghrelin (total) ELISA).

### 2.4. Statistical analysis

The data obtained in the study was analysed by t-Student test. P-values less than 0.05 were considered to be statistically significant.

### 3. Results

As it can be seen, from table 1 ghrelin levels in 5 time intervals (0.5, 1, 2 and 4 hours after extract gavage) were compared between case group

(received 150 mg/kg *Coriandrum* solution) and vehicle group. It was understood from the data in table 1, that there was no significant difference ( $p > 0.05$ ) in ghrelin levels after intervention.

**Table 1:** Ghrelin levels in 0, 0.5, 1, 2 and 3 hours after *Coriandrum Sativum* extract gavage

Time after administration	Vehicle group (received distilled water)	case group (received 150 mg/kg <i>Coriandrum</i> solution)	P-Value
	Ghrelin level (ng/ml)	Ghrelin level (ng/ml)	
Zero point	1.55 ± 0.41	1.336 ± 0.326	0.910
30 minutes	1.66 ± 0.467	1.667 ± 0.508	0.407
60 minutes	1.054 ± 0.618	2.00 ± 0.829	0.326
2 hours	1.384 ± 0.421	2.380 ± 0.611	0.602
4 hours	1.005 ± 0.384	1.005 ± 0.384	0.786

Values are expressed as a Mean ± SEM.

### 4. Discussion

Traditional herbal medicines which are used to increase the appetite, are believed to be safe, effective and economic. *Coriandrum Sativum L.* is known to have antispasmodic, carminative, antidiabetic properties [11, 6]. According to a previous study conducted by Nematy *et al.* (2012), administration of 100 and 150 mg/kg of hydroalcoholic extract of *Coriandrum Sativum* to the male Wistar rats increased their energy intake significantly ( $p = 0.030$  and  $p = 0.007$ ) which confirmed the traditional use of *Coriandrum Sativum* as an appetizer herb [12]. In the present study, to find the orexigenic mechanism of *Coriandrum Sativum* and its effect on ghrelin level, 150 mg/kg of hydroalcoholic extract was used. Results showed that total ghrelin levels were not significantly elevated in the *Coriandrum sativum* group compared with control group. Therefore, there are other probable mechanism involved in the appetite stimulating effect of this herb. *Coriandrum Sativum* is majorly constituted of flavonoids, isocoumarins and volatile elements. The essential oils in the ripe fruit of coriander is mainly composed of linalool,  $\alpha$ -pinene,  $\gamma$ -terpinene and fatty oils [5, 14]. So far, there has been no research relating the anorexic effect of *Coriandrum sativum* and its chemical

constitutions. Grey and Flatt (1999) showed that coriander possesses the insulin-releasing and insulin-like activity in mice which might justify the increased food intake by rats in the present study [11]. In the other hand, Shen *et al.* (2005) demonstrated that food intake was optimized by linalool due to reduction in plasma glycerol levels; therefore, it resulted in the elevated body weight [17]. As the linalool is one of the components of *Coriandrum Sativum* essential oils, it can also be a suggestive mechanism for the orexigenic effect of this plant in this study. This study showed that hydroalcoholic extract of *Coriandrum sativum* has no effect on ghrelin hormone in rat. Future studies are needed to determine the contribution of the other mechanisms to orexigenic effect of this plant.

### 5. Acknowledgement

This work was financially supported by the Research Council of the Mashhad University of Medical Sciences (MUMS) and Iran National Science Foundation (INSF). This paper is part of MSc thesis of Maryam Kamgar's (A-320, 1390).

### 6. Conflict of Interest

The authors have no conflict of interests to declare.

## 7. References

1. Anilakumar KR, Nagaraj NS, Santhanam K. Effect of coriander seeds on hexachlorocyclohexane induced lipid peroxidation in rat liver. *Nut Res* 2001; (21):1455-1462.
2. Asgarpanah J, Kazemivash N. Phytochemistry, pharmacology and medicinal properties of *Coriandrum sativum* L. *African Journal of Pharmacy and Pharmacology* 2012; 6(31):2340-2345.
3. AVECINA A, Ghanoon in Medicine, Tehran, Soroush Co, 1992.
4. Corish CA, Kennedy NP. Protein-energy undernutrition in hospital in-patients. *Br J Nutr* 2000; 83:575-591.
5. Cummings DE, Purnell JQ, Frayo RS, Schmidova K, Wisse BE, Weigle DS. A preprandial rise in plasma ghrelin levels suggests a role in meal initiation in humans. *Diabetes* 2001; (50):1714-1719.
6. Diederichsen. Axel. Coriander (*Coriandrum Sativum* L.). Promoting the conservation and use of underutilized and neglected crops. 1996. Institute of Plant Genetics and Crop Plant Research, Gatersleben/International Plant Genetic Resources Institute, Rome.
7. Elia M, Stroud M. Nutrition in acute care. *Clin Med* 2004; 4(5):405-407.
8. Emamghoreishi M, Khasaki M, Aazam MF. *Coriandrum sativum*: evaluation of its anxiolytic effect in the elevated plus-maze. *Journal of ethnopharmacology* 2005; 96(3):365-370.
9. Esiyok D, Otles S, Akcicek E. Herbs as a food source in Turkey. *Asian Pacific Journal of Cancer Prevention* 2004; 5(3):334-339.
10. Garrow JS, James WPT, Ralph A. Human Nutrition and Diabetics, Edn 10, Curchill Livingstone, London, 2000,
11. Gray AM, Flatt PR. Insulin-releasing and insulin-like activity of the traditional anti-diabetic plant *Coriandrum Sativum* (coriander). *Br J Nutr* 1999; (81):203-209.
12. McWhirter JP, Pennington CR. Incidence and recognition of malnutrition in hospital. *BMJ* 1994; 308:945-948.
13. Medhin DG, Bakos P, Verzar-Petri G. Hypotensive effects of *Lupinus termis* and *Coriandrum sativum* in Anaesthetized Rats. A preliminary study. *Acta Pharmaceutica Hungarica* 1986; 56(2):59.
14. Nematy M, Kamgar M, Mohajeri SMR *et al.* The effect of hydroalcoholic extract of *Coriandrum sativum* on rat appetite. *Avecina Journal of Phytomedicine* 2012; 3(1):91-97.
15. Nematy M, O'Flynn JE, Wandrag L, Brynes AE, Brett SJ, Patterson M. Changes in appetite related gut hormones in intensive care unit patients: a pilot cohort study. *Crit Care* 2005; 10:R10.
16. Rajeshwari U, Andallu B. Medicinal benefits of coriander (*Coriandrum Sativum* L.). *Spatula* DD 2011; 1(1): 51-58.
17. Shen J, Niijima A, Tanida M, Horii Y, Maeda K, Nagai K. Olfactory stimulation with scent of lavender oil affects autonomic nerves, lipolysis and appetite in rats. *Neurosci let* 2005; 383:188-193.
18. Stanley S, Wynne K, Bloom S. Gastrointestinal satiety signals III. Glucagon-like peptide 1, oxyntomodulin, peptide YY, and pancreatic polypeptide. *Am J physiol gastrointest Liver physiol* 2004; 286(5):G693-G697.
19. Stratton RJ, Ceri J, Green CJ, Elia M. Disease-related malnutrition. An evidence-based approach to treatment 2003, CAB International Publishing, Oxford.
20. Van-Nostrand J, Sarles CV. *Alewife's Garden: 7 Radical Weeds for Brewing Herbal Ales Radical Weeds*, 2002.