

# Antiemetic Effect of *Pistacia Vera* L. (Pistachio) Leaves and Nuts Aqueous Extracts in Young Chicken

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## ABSTRACT

The antiemetic effect of the aqueous extract of leaves and nuts of *Pistacia vera* L. in young chickens was studied. Emesis was induced by copper sulfate (60 mg/kg, orally) and ipecac (600 mg/kg, orally). The aqueous extract was injected intraperitoneally (i.p.). The LD 50 values of aqueous extract of leaves and nuts were 666.5 mg/kg and 565.7 mg/kg, respectively in young chicken. The maximum non-fatal doses of aqueous extracts of leaves and nuts were 100 mg/kg and 150 mg/kg, respectively. As a positive control, metoclopramide (2 mg/kg, i.p.) reduced the number of emesis induced by copper sulfate and ipecac about 45 and 68%, respectively. The ED 50 values of antiemetic effect aqueous extracts of leaves and nuts were 56.97 and 73.31 mg/kg (against copper sulfate) and also 97.5 and 160.75 mg/kg against ipecac, respectively. These results indicate that aqueous extract of leaves and nuts of *P. vera* showed an antiemetic activity in young chickens with peripheral and central mechanisms.

**Keyword:** *Pistacia vera*, Pistachio, Antiemetic, antivomiting, Young chicken, Copper sulfate, Ipecac, Metoclopramide

## INTRODUCTION

*Pistacia vera* Linn. is one of the most common species of Anacardiaceae family that geographically grows in Iran, Turkey and other countries. It has been previously showed that other species of *Pistacia* possess multiple pharmacological effects such as anti-inflammatory (1), antimicrobial and antifungal (2-3), hypotensive (4), antihyperlipidemia (5), gastric and duodenal anti-ulcer (6), estrogen-like (7), and cytotoxicity effect (8). Recently also some pharmacological activities of this species, *P. Vera*, such as antinociceptive and anti-inflammatory (9-10), antiprotozoal (11) and hepatoprotective activity (12) have been reported.

It has been expressed that *P. lentiscus* gum (orally) has a great effect in healing of mucosal erosions that induced by physical and chemical irritation (6).

The medieval philosopher and physician Ibn-e Sina, or Aviceana, reported that pistachio prevent nausea and

gastric reflux (13). Thus, in this study the antiemetic effect of *P. vera* nut and leaf was studied in young chicken.

## MATERIAL AND METHODS

### Animals

Male and female young chickens (32-38 g; 3-5 days old) were obtained from a poultry local store. After 24 h fasting, the antiemetic activity was evaluated. All animal experiments were carried out in accordance with the acts of the Ethical Committee of Mashhad University of Medical Sciences.

### Plant material

The leaf and nut of pistachio were collected from Gonabad and dried in shadow and ground. Voucher samples were preserved for reference in the Herbarium of Department of Pharmacognosy, School of Pharmacy, Mashhad (021-1622-35).

### Preparation of extracts

With decoction method, the powder of leaf or nut (100 g) was added to one liter hot distilled water for 15 min and then filtered through cloth. The extract was then concentrated under reduced pressure to defined volume (yield: leaf and nut: 10.47 and 8.39 % w/w, respectively).

### The acute toxicity

Different doses of the extracts were injected to the separated groups of four young chickens. After 24 h, any mortality was considered and LD<sub>50</sub> (lethal dose) values and the corresponding confidence limits were determined by the Litchfield and Wilcoxon method (PHARM/PCS Version 4).

### Antiemetic activity

The antiemetic activity was evaluated using the method explained by Yang et al, with different emetic agents (14).

The emesis was induced with copper sulfate, 60 mg/kg (0.5 ml, orally) or ipecac, 600 mg/kg (1 ml, orally) in young chickens.

Three doses of extracts and positive control (metoclopramide 2 mg/kg) and negative control (normal saline) were administered to the chickens, i.p. at a volume of 0.2 ml, one hour prior to treatment with the emetic agents. The retching frequency was recorded for copper sulfate and ipecac 60 and 20 minutes after their treatments, respectively. The doses 60, 105 and 150 mg/kg were used for aqueous extract of nut and 40, 70 and 100 mg/kg were used for aqueous extract of leaf.

ED<sub>50</sub> (effective dose) values and the corresponding confidence limits were determined by the Litchfield and Wilcoxon method (PHARM/PCS Version 4).

### Statistical analysis

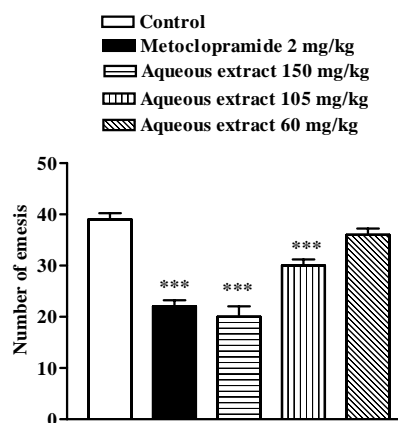
The data were expressed as mean values  $\pm$  S.E.M. Analysis of variance followed by the multiple

comparison test of Tukey-Kramer was used to compare data.

## RESULTS

### Acute intoxication

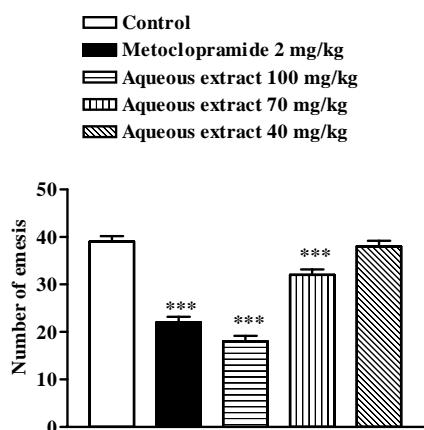
LD<sub>50</sub> values of the aqueous extract of nut and leaf of pistachio (i.p.) were 565.7 mg/kg (95% confidence limits: 371.9 and 866.5) and 666.5 mg/kg (95% confidence limits: 334.4 and 1328.4) in young chickens, respectively. Maximum non-lethal doses of the aqueous extract of nut and leaf of extract were 150 mg/kg and 100 mg/kg, respectively.



**Figure 1.** The antiemetic effect of the aqueous extract of *Pistacia vera* nut and metoclopramide on ipecac (600 mg/kg, orally) induced-emesis in young chickens. The agents were administered to chickens intraperitoneally one hour prior ipecac treatment. The retching frequency was recorded for 20 minutes after the emetic treatments. Compared to control, \*\*\*P<0.001, Tukey-Kramer test, N=7-9.

### Antiemetic activity

Doses 150, 105, 60 mg/kg of aqueous extract of nut, reduced the emesis induced by ipecac and copper sulfate in the chicken (Figures 1 and 3). The percentages of retching inhibition, induced by ipecac were 48%, 22% and 6.4% for doses 150, 105 and 60 mg/kg, respectively and induced by copper sulfate were 68.9%, 53.4% and 47.2%, respectively.



**Figure 2.** The antiemetic effect of the aqueous extract of *Pistacia vera* leaf and metoclopramide on ipecac (600 mg/kg, orally) induced-emesis in young chickens. The agents were administered to the chickens intraperitoneally one hour prior ipecac treatment. The retching frequency was recorded for 20 minutes after the emetic treatments. Compared to control, \*\*\* $P < 0.001$ , Tukey-Kramer test,  $N = 7-9$ .

Doses of 100, 70 and 40 mg/kg of aqueous extract of leaf, reduced the emesis induced by ipecac and copper sulfate (Figures 2 and 4).

The percentage of retching inhibition, induced by ipecac for doses 100, 70 and 40 mg/kg were 55.4%, 22.5% and 6.3%, respectively and induced by copper sulfate were 71%, 52.8% and 39.3%, respectively.

The ED 50 values of antiemetic effect aqueous extracts of leaves and nuts were 56.97 (95% CL: 47.86-67.81) and 73.31 mg/kg (95% CL: 56.12-95.77) against copper sulfate and also 97.5 (95% CL: 87.6-108.5) and 160.75 mg/kg (95% CL: 142.15-181.80) against ipecac, respectively.

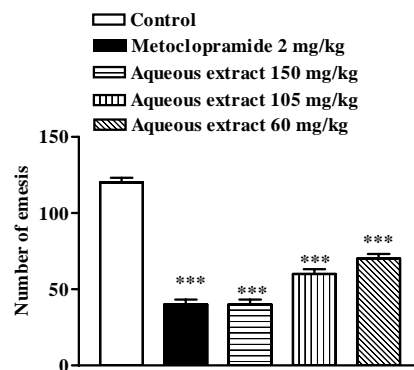
Metoclopramide (2 mg/kg) inhibited emesis induced by ipecac and copper sulfate significantly (Figures 1-4).

## DISCUSSION

This study indicates that the aqueous extract of leaf and nut of pistachio have antiemetic activity in young chickens.

The extracts of leaf and nut pistachio have antiemetic effect against copper sulfate and ipecac

induced emesis in young chickens. Ipecac produces emesis by a direct action on the gastric mucosa (peripheral action), and by the stimulation of the chemoreceptor trigger zone (central action) (15).

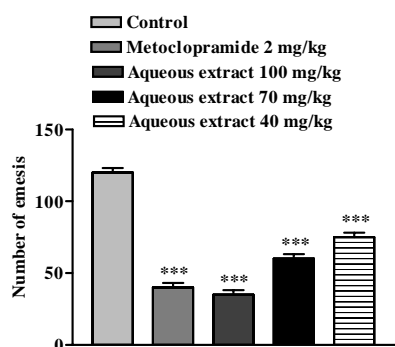


**Figure 3.** The antiemetic effect of the aqueous extract of *Pistacia vera* nut and metoclopramide on copper sulfate (60 mg/kg, orally) induced-emesis in young chickens. The agents were administered to chickens intraperitoneally one hour prior ipecac treatment. The retching frequency was recorded for 60 minutes after the emetic treatments. Compared to control, \*\*\* $P < 0.001$ , Tukey-Kramer test,  $N = 8-10$ .

The extracts prevented emesis induced by ipecac effectively; therefore it is possible that the extracts act centrally as well as peripherally to exert their antiemetic activities.

Oral copper sulfate induces emesis by peripheral action (16), and the extracts were able to effectively prevent its effect, it could be implied that extracts have a peripheral antiemetic activity.

Also, the antiemetic effect of extract of nut and leaf of pistachio in maximum doses was equal to the metoclopramide effect. It is possible that extracts accelerated gastric emptying rate, which resemble to the effect of metoclopramide, an antiemetic drug which stimulates the motility of the upper gastrointestinal tract (17) as Avcina statement in his book ,Ghanoon, that reported that pistachio prevent nausea and gastric reflux (13).



**Figure 4.** The antiemetic effect of the aqueous extract of *Pistacia vera* leaf and metoclopramide on copper sulfate (60 mg/kg, orally) induced-emesis in young chickens. The agents were administered to the chickens intraperitoneally one hour prior ipecac treatment. The retching frequency was recorded for 60 minutes after the emetic treatments. Compared to control, \*\*\* $P < 0.001$ , Tukey-Kramer test,  $N = 8-10$ .

The results of this study suggests that the aqueous extract of leaf and nut of *P. vera* have protective effects against copper sulfate and ipecac induced-retching in young chickens, possibly by peripheral and central mechanisms.

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