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Hepatoprotective Effects of *Capparis spinosa* L. Fruit Extract in Mice

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ABSTRACT

***Objective**: The aim of this study is to evaluate the hepatoprotective effect of methanolic and aqueous extract of Capparis spinosa L. fruit in mice. **Methods**: The hepatoprotective effects of methanolic extract of C. spinosa was assessed by measuring the serum levels of enzymes including bilirubin, alkaline phosphatase (ALP), aspartate aminotransferase (AST), and alanine aminotransferase (ALT) in the treated mice after oral administration of C. spinosa at the doses of 250, 500, and 750 µg/kg, respectively, for 14 days. **Results**: The results demonstrated that C. spinosa at the tested doses of 250, 500, and 750 mg/kg had no significant toxicity on the serum liver enzymes of ALT, AST, ALP, and bilirubin. **Conclusion**: The findings revealed the hepatoprotective effects of methanolic extract of C. spinosa in mice.*

Keywords: *Capparis spinosa, BALB/c mice; liver; enzymes.*

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INTRODUCTION

During human history, plants and their derivatives have been considered as the most effective source in traditional medicines to treat a lot of diseases [1]. Today, people around the world are using various herbal plants; however, it is very important to have some information and scientific confirmations about the complications and side effects of these plants [2, 3].

Based on the previous investigations on animal models, the liver is one of the main organs in the evaluation of drug toxicity; so, evaluating the function of this organ can be considered as a great method to study the toxicity of some new drug agents [4]. Today, one of the most important methods for detecting liver damage is evaluation of the level of liver enzymes in serum such as bilirubin, alkaline phosphatase (ALP), aspartate aminotransferase (AST), and alanine aminotransferase (ALT) [5-8].

Capparis spinosa L. belonging to the family of Capparidaceae, called "Kabar" in Persian is a very common plant in Iran, which is widely used in traditional medicines to treat numerous diseases [9]. This plant generally grows in various parts of the world, especially in Iran. Recent studies demonstrated that in modern medicine, various parts of *C. spinosa* have a wide range of medicinal and biological effects such as antimicrobial, antioxidant, and anticancer activities [10, 11]. Based on what was said above, the present investigation aimed to assess the hepatoprotective effects of *C. spinosa* in BALB/c mice by measuring the serum level of some liver enzymes (ALT, AST, ALP, and Bill).

MATERIALS AND METHODS

Collection of plant materials

We collected the fruits of *C. spinosa* from the mountains of Lorestan Province, Iran. The materials were then recognized by a botanist at Razi Herbal Medicines Research Center, Khorramabad, Iran (Fig. 1).

Figure 1. The collected fruits of *C. spinosa*

Preparation of extract

After chopping the fruits into smaller portions, drying them in the shade, and powdering, they were extracted, successively using the percolation technique with methanol at 21 ºC for three days. The obtained extracts were then allowed to pass through a filter paper to take away the excess particles. Finally, the extracts were vacuum concentrated at 50 °C using a rotary evaporator (Heidolph, Germany), and kept at -20 °C until testing [12-17].

Animals

This study was approved by the Ethics Committee of Lorestan University of Medical Sciences, Lorestan, Iran, (No. 2018/A-10-1633-4). 32 male BALB/c mice weighing between 25 to 30 g were purchased and housed with the same light-dark cycles (12:12-h) at room temperature (22±2 ºC) and enough food and water. For evaluating the hepatoprotective impact of *C. spinosa* extract, mice were divided into 4 groups including:

(C): orally received normal saline for 14 days

(T1): orally received 250 mg/kg of the *C. spinosa* methanolic extract for two weeks

(T2): orally received 500 mg/kg of the *C. spinosa* methanolic extract for two weeks

(T3): orally received 750 mg/kg of the *C. spinosa* methanolic extract for two weeks

Evaluation of the serum liver enzymes

After this time and at the 15th day, the mice were anesthetized via Ketamine (100mg/kg) – Xylazine (10 mg/kg); and then were euthanized by means of sodium pentobarbital (70 mg/kg, i.p.). After opening the abdomen, blood samples were collected from the heart and transferred to tubes without anticoagulant to create the clot, then they were centrifuged at 5000g for 10 min and serum was separated. Finally, the levels of liver enzymes such as AST, ALT, ALP, and bilirubin (direct and total) in serum were measured to assess the liver function by commercial diagnostics kits [18].

Statistical analysis

All obtained data analysis was done by SPSS software version 21.0 (SPSS Inc., Chicago, IL, USA). We also used the one-way ANOVA test and Tukey's post-hoc test to determine the difference between the tested groups. $P<0.05$ was measured as statistically significant.

RESULTS

Hepatoprotective effects of *C. spinosa*

Table 1 shows the hepatoprotective effect of *C. spinosa* at doses of 250, 500, and 750 mg/kg for 14 days. The obtained findings revealed that after orally administration of *C. spinosa* extract although the serum level of AST, ALT, ALP, and bilirubin was changed in a dose-dependent manner, no significant difference ($p>0.05$) was observed in the concentration of serum liver enzymes between the treatment (with oral administrations of *C. spinose*) and control groups.

Table 1. Effects of *C. spinosa* on serum liver enzymes after two weeks of administration in mice.

Clinical biochemistry parameters	AST (U/L)	ALT (U/L)	ALP (U/L)	TB
Control	130.6± 8.15	38.3± 4.31	132.3± 8.15	0.12± 0.03
C. spinosa (250 µg/kg)	122.3± 6.15	35.3±3 .15	137.3± 6.51	0.13± 0.05
C. spinosa (500 µg/kg)	129.6± 3.15	41.3± 2.51	143.6± 3.51	0.16± 0.04
C. spinosa (750 µg/kg)	136.3± 8.15	44.6± 3.51	146.6± 6.15	0.18± 0.05

BUN, blood urea nitrogen; Cr, creatinine; ALT, alanine aminotransferase; ALP, alkaline phos-

phatase; AST, aspartate aminotransferase; TB, total bilirubin

DISCUSSION

In recent decades, the tendency to use medicinal herbs and their derivatives, as well as supplements, has risen; so that 80% of the world's people rely on medicinal herbs for much principal healthcare. Reviews demonstrated that even though treatments relating to herbal medicines have revealed considerable potential with the high efficacy; the safety of some of them is still unclear and need to be used with caution. [19]. The common opinion that herbal therapies do not have adverse side effects is wrong and ambiguous. Recent studies have exhibited that some herbs are able to generate a number of dangerous and even life-threatening side effects [20, 21].

Based on the international definitions, toxicity properties are related to a number of factors including hepatotoxicity, contamination by heavy metals or microorganisms when preparing, and adverse responses because of age, genetics and underlying disease features of the consumer [22, 23].

Nowadays, reviews have demonstrated that liver enzyme measurement is an important diagnostic test to assess the liver function, inflammations, and serious damages such as hepatitis and cirrhosis [18]. According to the recent studies that have shown biological and pharmacological properties of *C. spinosa*, we decided to assess the hepatoprotective effects of *C. spinosa* in BALB/c mice.

The obtained findings revealed that after oral administration of *C. spinosa* extract for 14 days although the serum level of AST, ALT, ALP, and bilirubin was changed in a dose-dependent manner, no significant difference ($p>0.05$) was observed in the concentration of serum liver enzymes between the treatment (with oral administrations of *C. spinose*) and control groups, indicating that *C. spinosa* at the doses of 250, 500, and 750 mg/kg had no hepatotoxicity effects in mice.

CONCLUSION

The findings of the current investigation revealed the hepatoprotective effects of biosynthetic copper nanoparticles from *C. spinosa* fruits. However, other supplementary tests are required to reach this conclusion.

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Conflict of Interest

The authors declare no conflict of interest.

REFERENCES

1. World Health Organization. General guidelines for methodologies on research and evaluation of traditional medicine. Geneva: World Health Organization; 2000.
2. Garodia P, Ichikawa H, Malani N, Sethi G, Aggarwal BB. From ancient medicine to modern medicine: ayurvedic concepts of health and their role in inflammation and cancer. J Soc Integr Oncol. 2007 Mar 21;5(1):25-37.
3. Tilburt JC, Kaptchuk TJ. Herbal medicine research and global health: an ethical analysis. Bulletin of the World Health Organization. 2008;86:594-9.
4. Giannini EG, Testa R, Savarino V. Liver enzyme alteration: a guide for clinicians. Cmaj. 2005 Feb 1;172(3):367-79.
5. Mahmoudvand H, Fallahi S, Mahmoudvand H, Shakibaie M, Harandi MF, Dezaki ES. Efficacy of Myrtus communis L. to inactivate the hydatid cyst protoscoleces. Journal of Investigative Surgery. 2016 May 3;29(3):137-43.
6. Fallahi S, Beyranvand M, Mahmoudvand H, Nayebzadeh H, Kheirandish F, Jahanbakhsh S. Chemical composition, acute and subacute toxicity of Satureja khuzestanica essential oil in mice. Marmara Pharmaceutical Journal. 2017 Jan 1;21(3):515-21.
7. Mahmoudvand H, Tavakoli Oliaei R, Mirbadie SR, Kheirandish F, Tavakoli Kareshk A, Ezatpour B, Mahmoudvand H. Efficacy and safety of Bunium persicum (Boiss) to inactivate protoscoleces during hydatid cyst operations. Surgical infections. 2016 Dec 1;17(6):713-9.
8. Mahmoudvand H, Mahmoudvand H, Oliaee RT, Kareshk AT, Mirbadie SR, Aflatoonian

MR. In vitro protoscolicidal effects of cinnamomum zeylanicum essential oil and its toxicity in mice. Pharmacognosy magazine. 2017 Oct;13(Suppl 3):S652.
9. Zargari A. Medicinal Plants. Vol.2. Tehran University Publication, Tehran, Iran 1989, pp. 550.
10. Ghahraman A. Chromophytes of Iran, Vol.1 Tehran University Press, Tehran, Iran 1998, pp. 202.
11. Ebrahimi K, Shiravand S, Mahmoudvand H. Biosynthesis of copper nanoparticles using aqueous extract of Capparis spinosa fruit and investigation of its antibacterial activity. Marmara Pharmaceutical Journal. 2017 Jan 1;21(4):866-71.
12. Masoumi-Ardakani Y, Mahmoudvand H, Mirzaei A, Esmaeilpour K, Ghazvini H, Khalifeh S, Sepehri G. The effect of Elettaria cardamomum extract on anxiety-like behavior in a rat model of post-traumatic stress disorder. Biomedicine & Pharmacotherapy. 2017 Mar 1;87:489-95.
13. Mahmoudvand H, Asadi A, Harandi MF, Sharififar F, Jahanbakhsh S, Dezaki ES. In vitro lethal effects of various extracts of Nigella sativa seed on hydatid cyst protoscoleces. Iranian journal of basic medical sciences. 2014 Dec;17(12):1001-6.
14. Mahmoudvand H, Dezaki ES, Sharififar F, Ezatpour B, Jahanbakhsh S, Harandi MF. Protoscolecidal effect of Berberis vulgaris root extract and its main compound, berberine in cystic echinococcosis. Iranian journal of parasitology. 2014 Oct;9(4):503-10
15. Mahmoudvand H, Sepahvand P, Jahanbakhsh S, Azadpour M. Evaluation of the antileishmanial and cytotoxic effects of various extracts of garlic (Allium sativum) on Leishmania tropica. Journal of Parasitic Diseases. 2016 Jun 1;40(2):423-6.
16. Saedi Dezaki E, Mahmoudvand H, Sharififar F, Fallahi S, Monzote L, Ezatkhah F. Chemical composition along with anti-leishmanial and cytotoxic activity of Zataria multiflora. Pharmaceutical biology. 2016 May 3;54(5):752-8.
17. Jahanbakhsh S, Azadpour M, Kareshk AT, Keyhani A, Mahmoudvand H. Zataria multiflora Bioss: lethal effects of methanolic extract against protoscoleces of Echinococcus granulosus. Journal of parasitic diseases. 2016 Dec 1;40(4):1289-92.
18. Mahmoudvand H, Kheirandish F, Dezaki ES, Shamsaddini S, Harandi MF. Chemical composition, efficacy and safety of Pistacia vera (var. Fandoghi) to inactivate protoscoleces during hydatid cyst surgery. Biomedicine & Pharmacotherapy. 2016 Aug 1;82:393-8.
19. World Health Organization. National policy on traditional medicine and regulation of herbal medicines: Report of a WHO global survey.
20. Ekor M. The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. Frontiers in pharmacology. 2014 Jan 10;4:177.
21. Godipurge SS, Biradar NJ, Biradar JS, Mahurkar N. Chemical composition and hepatoprotective effects of polyphenolic fraction from Rivea hypocrateriformis in paracetamol induced liver damage in wistar albino rats. Int J Pharm Pharm Sci 2016;8(10):228-34.
22. Bateman J, Chapman RD, Simpson D. Possible toxicity of herbal remedies. Scottish Medical Journal. 1998 Feb;43(1):7-15.
23. Ingawale DK, Shah PV, Patel SS. Hepatoprotective effect of virgoliv syrup against ccl4 induced hepatic injury in rats. 2015. 2015;6.