

Effect of *Lepidium sativum* seeds on Serum and Urine Calcium in Male Albino Rats

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Abstract

Background: The normal relation between serum and urine calcium can be determined by calcium excretion at different serum-calcium levels after oral and intravenous administration of calcium. *Lepidium sativum* seeds contain high amount of calcium.

Objective: This study aims to evaluate the effect of *Lepidium sativum* seeds on serum and urine calcium in male Albino rats.

Method: 15 Rats randomly divided into three groups, control group without treatment of *Lepidium sativum* seeds powder, high dose group treated daily by (5g/ kg) of *Lepidium sativum* seeds powder, low dose group treated daily by (1g/ kg) of *Lepidium sativum* seeds powder. *Lepidium sativum* seeds powder was mixed with the daily diet. Serum and urine calcium were analysed by spectrophotometer.

Results: Serum calcium analysis took place after treatment by *Lepidium sativum* seeds for six weeks. Results showed that, a *Lepidium sativum* seeds has elevated the serum calcium level. The rat group which was treated with high dose of *Lepidium sativum* seeds showed elevation in serum calcium (9.76 ± 0.58) and in the group which was treated with low dose of *Lepidium sativum* seeds (9.42 ± 0.35) compared to the control group (8.66 ± 0.58). Urine calcium analysis after treatment for six weeks by *Lepidium sativum* seeds showed that, *Lepidium sativum* seeds have increased the Urine calcium level in high dose group (15.56 ± 2.29) and in low dose group (9.42 ± 0.35) compared to the control group (10.44 ± 1.4).

Conclusion: *Lepidium sativum* seeds may have an enhanced role in bone fracture healing and we recommend conducting a study in this aspect.

Keywords: *Lepidium sativum* seeds, Urine and Calcium

ملخص

مهدف: هذه الدراسة الى معرفة مدى تأثير بذور حب الرشاد على الكالسيوم في البول ومصل الدم لدى ذكور الجرذان البيضاء.

طريقة العمل: تم استخدام 15 من ذكور الجرذان البيضاء. قسمت ذكور الجرذان الى ثلاث مجموعات 5 جرذان لكل مجموعة. مجموعة ضابطة، مجموعة تم معالجتها بتركيز عال من بذور الرشاد 5 جرام لكل كيلوجرام من وزن الجرذان، ومجموعة معالجة بتركيز منخفض من بذور حب الرشاد 1 جرام لكل كيلوجرام من وزن الجرذان. تم طحن بذور الرشاد وتحويلها الى بودرة وخلطها مع الوجبة الاعتيادية للجرذان.

نتائج الدراسة: فحوصات الكالسيوم تمت بعد ستة اسابيع من المعالجة. فإظهرت النتائج ان بذور الرشاد زادت من مستوى الكالسيوم في مصل الدم. حيث ان المجموعة التي تم معالجتها بتركيز عال من بذور الرشاد رفعت مستوى الكالسيوم بمتوسط وانحراف معياري (9.76 ± 0.58) بينما المجموعة التي تم معالجتها بتركيز منخفض كانت (9.42 ± 0.35) مقارنة بالمجموعة الضابطة (8.66 ± 0.58) تحاليل الكالسيوم في البول بعد ستة اسابيع وضحت ارتفاع في مستوى الكالسيوم في البول في المجموعات المعالجة ببذور الرشاد حيث كانت المجموعة المعالجة بتركيز عال (15.56 ± 2.29) والمجموعة المعالجة بتركيز منخفض (9.42 ± 0.35) مقارنة بالمجموعة الضابطة (10.44 ± 1.4).

الكلمات المفتاحية: بذور الرشاد، كالسيوم البول، كالسيوم مصل الدم.

Introduction:

Calcium is one of the main bone-forming minerals and 99% of the body's calcium resides in the skeleton. There is now substantial evidence that adequate dietary calcium maximizes peak bone mass early in life ([Johnston, et al., 1992](#) & [Palacios, 2006](#)). A recent review of the benefit of calcium on bone throughout the lifespan showed that 52 out of 54 random, controlled intervention trials increasing calcium intake led to increased calcium balance, increased bone gain during growth, reduced bone loss in later years, or reduced fracture incidence ([Heaney, 2000](#)). Disorders in serum calcium level may have profound effects on neurological, gastrointestinal, and renal function. Maintenance of the normal serum calcium is a result of tightly regulated ion transport by the kidney, intestinal tract, and bone mediated by calcemic hormones especially parathyroid hormone and 1, 25 dihydroxy vitamin D3 ([Bushinsky and Monk, 1998](#)).

Lepidium sativum seeds are commonly used in traditional medicine for treatment several diseases, such as antibacterial, anti asthmatic, diuretic, aphrodisiac ([Duke, 2002](#)), inflammation respiratory of hyperactive, such as asthma, bronchitis and cough gastrointestinal stimulant and dysentery diarrhea ([Rehman et al., 2012](#)). Also the analgesic effect of *Lepidium sativum* seeds showed significance inhibition of neurogenic pain and inflammatory pain in albino rats and Swiss albino rats ([Raval and Ravishankar, 2010](#)).

Analysis of *Lepidium sativum* seeds showed that it consists of water, protein, carbohydrate, fat, mineral matter, calcium and phosphorus. ([Gokavi, et al., 2004](#)). According to all those ingredients, this study aimed to evaluate the effect of *Lepidium*

sativum seeds on calcium levels on serum and urine in male Albino rats.

Materials and Methods:

Lepidium sativum seeds collection and doses:

Lepidium sativum seeds samples were collected from Al-Bait Al-Yemeni store at Dhamar, Yemen. The plant was shade-dried and then ground to powder ([Al-Fuhaid, 2018](#)). The dried powder was divided into two doses, high dose (5g/ kg) and low-dose (1g/ kg). Doses were prepared and mixed with daily meal of rats ([Agarwal and Sharma, 2013](#)).

Experimental animals and feeding:

The study conducted on fifty male albino rats (*Rattus rattus Albinus*), which were supplied from Sana'a university, Sciences Collage, animal house. Rats weight is (100-160 g). They were housed in stainless steel cages under the conditions at 25 C0 with a controlled 12 hours light-dark cycle. Rats were fed with standard diet and water for two weeks until the end of experimental work ([Mehmood et al., 2011](#)).

Experimental design:

The rats were housed in stainless steel cages for two weeks at standard conditions before the start of experiments. All rats received standard diet formula and tap water during the adaption period. Rats were randomly divided into three groups of 5 rats in each: Control group without treatment of *Lepidium sativum* seeds powder, high dose group treated with (5g/ kg) of *Lepidium sativum* seeds powder and low dose group treated with (1g/ kg) of *Lepidium sativum* seeds powder. *Lepidium sativum* seeds powder was mixed with the daily diet of the treated groups.

Samples collection and analysis:

After rats fasting for 12 hours, blood samples were collected from eye canthus of rats without anticoagulants by using heparinized micro-hematocrit capillary tubes after six weeks of treatments at Newmedlab, Dhamar, Yemen. Two ml of blood samples have been taken. To get the serum, blood was centrifuged at 3000 r.p.m for 10 minutes. Serum was directly used for chemical tests to detect serum calcium. Urine specimen was collected in calcium free tube. When rats are caught, they excrete urine directly to the tube. The collecting tubes contain 0.1 ml of diluted nitric acid (50% v/v). Dilute of a sample is 1/2 in distilled water.. Rayto Chemray 240 Spectrophotometer System Chains was used.

Test principle:

Calcium with Arsenazo III (1,8-Dihydroxy-3, 6-disulpho-2, 7-naphthalene-bis (azo)-dibenzene-arsonic acid), at neutral pH, yields a blue colored complex. The intensity of the color formed is

proportional to the calcium concentration in the sample (Farell, 1984, Kessler and Wolfman, 1964, Connerty, 1996).

Arsenazo III + Ca^{++} ----- Arsenazo III- Ca^{++} complex.

Statistical analysis:

The data significances between-groups were analyzed by using one-way analysis of variance (ANOVA). Data were applied by (SPSS 22 computer software). The values were considered significant when $P = 0.05$ and 0.001 .

Results and discussion:

The present study investigated the effect of *Lepidium sativum* seeds of on serum and urine calcium in male Albino rats.

Serum calcium analysis after treatment for six weeks by *Lepidium sativum* seeds, showed that *Lepidium sativum* seeds have elevated the serum calcium level in high dose group (9.76 ± 0.58) with significance of (0.005) and in low dose group (9.42 ± 0.35) with significance of (0.05).

Table: (1) Effect of *Lepidium sativum* on Serum calcium after treatment for six weeks

Groups \ S.ca ⁺⁺	Number of rats	(Mean $\pm$ SD)
Control	5	8.66 ± 0.58
low dose group (1g/kg)	5	$9.42 \pm 0.35^*$
High dose group (5g/kg)	5	$9.76 \pm 0.58^{**}$

**= P value=0.005 *= P value=0.05 comparison high dose and low dose groups with control group

Urine calcium analysis after treatment by *Lepidium sativum* seeds for six weeks showed that *Lepidium sativum* seeds have elevated the urine calcium level in high dose group

(15.56 ± 2.29) with significance of (0.005) and in low dose group (9.42 ± 0.35) with non-significance.

Table: (2) Effect of *Lepidium sativum* on urine calcium after treatment for six weeks

Groups	Urine.Ca ⁺⁺	Number of rats	(Mean ±SD)
Control		5	10.44±1.40
low dose group (1g/kg)		5	10.70±2.23
High dose group (5g/kg)		5	15.56 ±2.29**

**= P value=0.005 *= P value=0.05 comparison high dose and low dose groups with control group

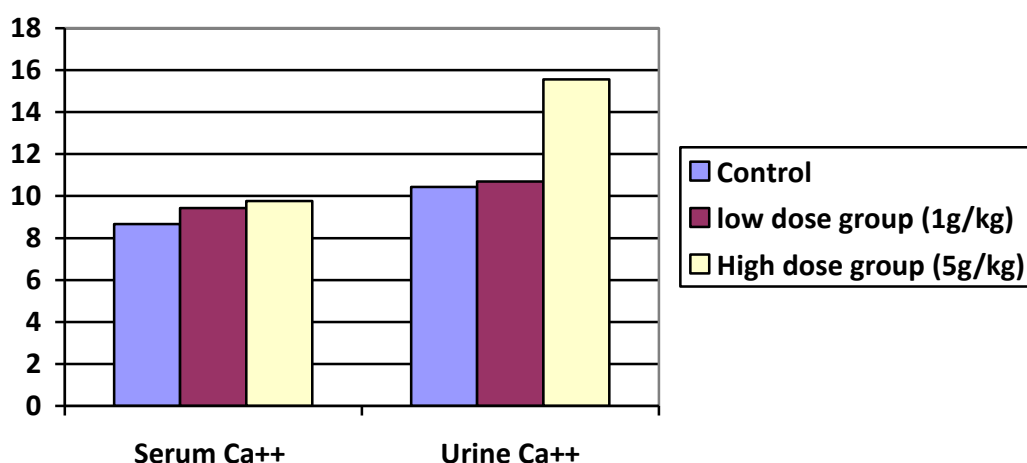


Fig. (1): Effect of *Lepidium satevum* seeds treatment on mean serum Ca⁺⁺ and urine Ca⁺⁺ level.

In this study, *Lepidium sativum* seeds help to increase serum Ca⁺⁺ level. Our findings were supported by ([Elshal, et al., 2013](#)) study that compared the biochemical effects of *Lepidium sativum* seeds and alendronate on glucocorticoid-induced osteoporosis in adult 40 female rats. In this 6 g *Lepidium sativum* seeds were added to the rats' daily diet. This study recorded that the level of serum Ca⁺⁺ in treated group increased by (9.7) comparing with non-treated groups (8.2). Also, ([JR III et al., 2020](#)) state that *Lepidium sativum* seeds 250 g dissolved in 500 ml. Rats were used. Rats have been given *Lepidium sativum* seeds extract for 10 weeks.

The finding showed that *Lepidium sativum* seeds increase serum Ca⁺⁺ in treated group (9.52) more than control group (8.88). There

are no enough previous studies as far as the researcher knows that study effect of *Lepidium satevum* seeds treatment on mean serum Ca⁺⁺ and urine Ca⁺⁺ level.

The treatment with *Lepidium sativum* seeds elevated serum Ca⁺⁺. *Lepidium sativum* seeds is a good source of linolenic acid, which has been shown to inhibit bone reabsorption and decrease the elimination of Ca⁺⁺ ([Paskalev, et al., 2005](#)). According to all the above, *lepidum sativum* seeds have high amounts of Ca⁺⁺ which can increase serum Ca⁺⁺ level and urine Ca⁺⁺. This means the extra amount of calcium in the blood is thrown away in urine ([Gokavi, et al., 2004](#)).

Lepidium sativum seeds have been used for increasing the mean

body weight, mean white blood cell types, red blood cell, and platelet counts and mean hemoglobin concentration ([Mahassni and Khudauardi, 2017](#)). *Lepidium sativum* seeds also were used as a traditional medicine analgesic activity, fracture healing activity, prokinetic and laxative activities, nematicidal activity, Nephroprotective activity, acute renal failure, antibacterial activity, antidiarrhoeal activity, osteoarthritis, hepatoprotective activity, bronchial asthma and antihypertensive ([Saxena, et al., 2015](#)).

Conclusion

Lepidium sativum seeds have been one of the important sources of medicines since the dawn of human Civilization. The pharmacological properties of the plant resemble those of the non-steroidal anti-inflammatory drugs which are known to share antipyretic, analgesic and anti-inflammatory activities and other many more pharmacological activities are antidiarrhoeal, antibacterial, nematicidal, osteoarthritis etc.

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