

## Lithotripsy of Different Urinary Tract Stones by Using Seeds of *Carum copticum*

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### Abstract

It has been a well-known practice to use seeds and the essential oil of *Carum copticum* as a strongly antiseptic , antispasmodic , aromatic , bitter , diaphoretic , digestive , diuretic , expectorant and tonic. Also used for cure influenza, asthma, and rheumatoid arthritis. To our knowledge it will be the first time to use the seeds of this herb as a urinary tract stone lithotripsy. This research aimed to the use of these seeds as a lithotripsy against different types of urinary stones and determine the efficiency of these preparation against which types of stone. A liquid solution was prepared from dissolving the seeds powder in cow milk and then concentration this preparation was done by boiling at 100°C to reduce the volume of solution to the half. The treatment was given via oral administration for successive 9 days before breakfast. 350 patients with urinary stone of different type took part in this research. All patients were subjected to ultrasonography and intravenous pyelography examinations to localized the position and detect diameter of stone. The above examination and also biochemical tests for diagnosis of stones ingredients were repeated after the administration of treatment and excretion of stone fragments in urine. The results were so promising especially against pure calcium oxalate stone.

**Key words:** *Carum copticum*; Lithotripsy; Ca-Oxalate stone; mixed stone

### الخلاصة

استخدمت بذور نبات النخوة (كمون الملوكي) وكذلك الزيوت الطيارة المستخلصة من البذور كمواد مضادة للمغص ، مدرة ، مساعدة للهضم ، مقشعة ، واستعملت أيضا لعلاج البرد والسعال والربو والاسهال والتهاب المفاصل الروماتزمي. واستخدمنا بذور هذا النبات كعلاج لتفتيت حصى المجاري البولية حسب معلوماتنا لأول مرة في هذا المجال . يهدف هذا البحث الى استخدام بذور نبات النخوة الهندية كعلاج لتفتيت حصى المجاري البولية بانواعها المختلفة ، وتحديد الفعالية الاكبر تجاه اي نوع من انواع الحصى . تم تحضير نقيع من مسحوق بذور النبات باستخدام حليب الابقار وتم تركيز النقيع بغليانه الى 100 درجة مئوية لاختزال الكمية الى النصف . اعطي الخليط عن طريق الفم لمدة 9 ايام متتالية قبل الافطار . شارك في هذه الدراسة 350 مريضا ممن يعانون من وجود الحصى في المجرى البولي اخضعوا الى فحوصات السونار (الموجات فوق الصوتية) ، والاشعة الملونة لتحديد موقع وحجم الحصى ، ثم اجري لكافة عينات البحث فحص الادرار العام . اعيدت هذه الفحوصات بعد استخدام العلاج . كذلك اجريت الفحوصات البايوكيميائية على الحصيات المتفتتة والنازلة في الادرار لتشخيص مكوناتها حيث تبين ان هذا العلاج فعال بكفاءة عالية تجاه حصاة او كزلات البوتاسيوم النقية وبدرجة اقل للحصوات من الانواع الاخرى .

### Introduction

Renal stones (nephrolithiasis) are concretion composed of crystalline components and organic Matrix<sup>[1]</sup>. Although the symptomatic presentations may be similar ;the disorder is heterogeneous as to composition and etiology. Today, most urinary stones in patients in most countries are renal stones. About 1-4% of the population is believed to have kidney stones every year in USA and Europe. About 2-5% of population in Asia, 8-15% in Europe and North America and 20% in saudia Arabia develop kidney stone in their lifetime<sup>[2, 3, and 6]</sup>. Renal stones tend to recur, and the rate of recurrence is about 75% during 20 years environmental and genetic factors<sup>[4-5]</sup>. A specific diagnosis for every patient with kidney stones, may give very important information about the stone-formation mechanism and the pharmaceutical manner to

prevent recurrent stone formation<sup>[5-6]</sup>. *Carum copticum* with herbarium number 293-0303-1 is a plant in Umbelliferae family with a white flower and small, brownish seeds. This plant is commonly grows in India, Iran, Egypt and Europe<sup>[7]</sup>. The seeds and especially the essential oil are strongly antiseptic, antispasmodic, diuretic, and used in the treatment of so many diseases. The seeds contains about 4-6% essential oil, of which 45-55% is thymol<sup>[8]</sup> , while the essential oil in the dried fruits (2.5-5% ) is dominated by thymol (35-60%)<sup>[9]</sup>. From South India *Carum copticum* fruits, almost pure thymol has been isolated (98%) , but the leaf oil was found to be composed of monoterpenoids and sesquiterpenoids: 43% cadinene, 11% longifolene, 5% thymol, 3% camphor and others<sup>[9]</sup>. The effective components of this

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Plant, responsible for the observed bronchodilatory effect<sup>[6]</sup>, despite the availability of modern medication the propensity towards the traditional medications is growing through out the world<sup>[7,8]</sup> which needs scientific investigation for evaluating the therapeutic effects and their mechanism of action. Indeed no acute toxicity data were available for *Carum copticum*, although animal studies of putative beneficial effect of this plants seeds involved the use of a dose of 500mg/kg body weight in mice and rat without morbidity or mortality ascribable to the herb, suggesting that the oral LD50 of *Carum copticum* (fruit/seeds) is likely to be higher than that figure<sup>[9]</sup>. The present study was carried out to determine the role of *Carum copticum* seeds as a herbal medication for treatment urinary tract stones.

## Materials and Methods

The study of effects of *Carum copticum* seeds as a lithotripsy agent was carried out in 2008 on (350) patients diagnosed by specialist physician in private clinic from different sites of Iraq (Baghdad, Diala, Mousol) and the experimental part was undertaken during the period (2001-2008).

### Materials

Seeds of *Carum copticum* (other Latin name : *Trachyspermum ammi*), were collected from local market in Baghdad, identified under expert guidance, taxonomy was performed by national herbarium of Iraq at 1997, depended on Ayurvedic pharmacopoeia of India (API)<sup>[10]</sup>, and kew herbarium<sup>[11]</sup>, liquid milk, sugar. The dose normally recommended in traditional Ayurvedic use is 3-6 gm / day, presumably being 3 gm once or twice a day<sup>[12]</sup>. Also this dose was documented in Arabic antique manuscript (Tathkarat Daood AL-Antaky)<sup>[13]</sup>.

### Methods

Before started giving the preparation we obtained the written consent of the patients who included in the study; (15gm) of seeds were ground to a very fine powder. (Total dose for each patients taken with in 9 days) ; (5gm) of grounded seeds were boiled with 150 ml of liquid cow milk and 25 gm sugar, until half of the volume was obtained; the preparation was kept cool<sup>[13]</sup>; This preparation divided to ( 3 ) equal doses, each patients was given single dose a day before breakfast for a period of 3 days ; This procedure was repeated for remainder (10gm) of grounded seeds ; Ultrasonography (U /S) and Intravenous pyelography (IVP), were performed pre-, and post treatment to be sure of curing urinary tract from any stone; Urinary tract stones were of different sizes ranging from 5mm and 1.2 cm and they were seen in the kidney (renal stone) at upper pole calyx, mid renal part and

lower pole calyx, also they were seen in the ureter (uretral stones), and finally they were seen inside urinary bladder (vesical stones). In addition general urine examination (GUE) was done for all patients ; Qualitative analysis of stone / fragments passed after herbal treatment, a procedure described by Hodgkinson<sup>[14]</sup>, was employed to figure out the chemical constituent of urinary stone

## Results

The present study included (350) patients with different urinary tract stones were treated with liquid extract of *Carum copticum* seeds.

**Table 1 : Chemical constituent of stones**

Type of stone	No. of patients	%	Patients age range(years)
Pure Ca-oxalate	170	48,57	(20-45)
(Ca-oxalate/uric acid) mixed stone	100	28,57	(20-50)
(Ca-oxalate/Hydroxyapatite) mixed stone	80	22,86	(22-50)
Total	350	100%	

**Table 2 : Lithotripsy events**

Type of stone	No. of patients	No. of lithotripsyed stone	%
Pure ca-oxalate	170	170	100
(Ca-oxalate./Uric acid) mixed stone	100	53	53
( Ca-oxalate./hydroxyapatite) mixed stone	80	25	31.25
Total	350		

**Table 3 : Duration of lithotripsy**

Type of stone	Time (days)
Pure ca-oxalate	2-7
Ca-oxa./uric acid)(Mixed stone.	7-12
Ca-oxalate./hydroxyapatite) Mixed stone.	7-15

**Table 4 : Response the types of stones to the treatment with *Carum copticum***

Type of stone	Response (%)	C.S (p-value) Between each pairs of types		
		Ca-oxa.×mixed(1)	Ca-oxa.×mixed(2)	mixed(1)×mixed(2)
Pure ca-oxalate.	170 (100%)			
Ca-oxalate./uric acid mixed stone. (1)	53 (53%)	0.000 *H.S	0.000 H.S	0.003 H.S
Ca-oxa./hydroxyapatite mixed stone. (2)	25 (31.25%)			

\* H.S: Highly Significant

## Discussion

The results of this study including the investigation of the efficiency of *Carum copticum* seeds (liquid solution), locally prepared on urinary stone among (350) patients. The results present in table (1) showed that pure ca-oxalate consist the larger percentage among types of stones. Since a (170) patients out of (350) patients (48.57%) have a pure ca-oxalate urinary stone. Results of table (1) revealed that (28.57), (22.86) of patients got mixed stone (ca-oxalate/uric acid) and (ca-oxalate/hydroxyapatite) respectively. The results cleared out in table (2) indicated that the local preparation of *Carum copticum* seeds have a good affectivity on ca-oxalate stones, since a hundred percent of this type of urinary stone had been lithotripsyed, comparing to (53%) for mixed (ca-oxalate/uric acid) and (31.25%) for mixed (ca-oxalate/hydroxyapatite). Recently in India had successfully purified an anticalcifying protein from the seeds of *Carum copticum* using oxalate depletion assay and deciphered its inhibitory activity against ca-oxalate crystals growth. The antilithiatic potential of *Carum copticum* was confirmed by its ability to maintain renal functioning, reduce renal injury and decrease crystal excretion in urine and retention in renal tissue<sup>[15]</sup>. It was obvious from the results presented in table (3) that pure ca-oxalate required the minimum duration to complete lithotripsy. While mixed stone of both types required a longer time to complete lithotripsy. The response of types of stone was indicated in table (4) which showed that pure ca-oxalate was the most affected types of stones by the treatment with *Carum copticum* seeds compared with other two types of urinary stones mainly (ca-oxalate/uric acid) mixed stone and (ca-oxalate/hydroxyapatite) mixed stone. On the other hand type two of stone (ca-oxalate/uric

acid) mixed stone was affected by treatment with *Carum copticum* seeds more than the mixed stone (ca-oxalate/hydroxyapatite). Our results confirmed the antilithiatic properties of *Carum copticum* seeds that authorized by many researchers<sup>[16-19]</sup>. Biostatistical analysis (Binomial-test and Z-test) confirmed these results. It could be argued for that the effect of herb extract (crude extraction) is depending totally on chemical structure of urinary tract stones, also it is clear from the results presented in table (4) that ca-oxalate whenever existed as one of the constituent of urinary tract stones it will provoke or stimulate the action of herbs seeds extract, in other word ca-oxalate is decisive component of urinary tract stone that encourage lithotripsy whenever *Carum copticum* seeds extract are available. In this view, mixed stones which are either (ca-oxalate/uric acid) or (ca-oxalate/hydroxyapatite) showed different response to the treatment with *Carum copticum* seeds extraction and that in our view is corresponding to the amount of ca-oxalate present in the mixture. In general, the lithotriptic effects of *Carum copticum* seeds against urinary tract stones were mentioned by Arabic scientist sheikh Dawood Antaki (about 1008 A. H)<sup>[13]</sup>.

## Conclusion

Thus, the present study suggests the potential of *Carum copticum* seeds in lithotripsy of urinary stone, especially calcium oxalate and forms the basis for the development of antilithiatic drug interventions against urolithiasis.

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