



Contents lists available at ScienceDirect

Journal of Ayurveda and Integrative Medicine

journal homepage: <http://elsevier.com/locate/jaim>

Original Research Article

Anticalcifying effect of *Daucus carota* in experimental urolithiasis in Wistar rats

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ARTICLE INFO

Article history:

Received 20 April 2018

Received in revised form

15 November 2018

Accepted 19 December 2018

Available online xxx

Keywords:

Calcium oxalate

Histopathology

HPLC

Renal stones

ABSTRACT

Background: Urolithiasis is a burgeoning disease that results from pathological biomineralization. *Daucus carota* L. is a widely consumed food crop with reported nephroprotective and diuretic activity. Its potential for *Ashmari bhedan* (destruction of stone/calculi) or treatment of urinary calculi has been explored traditionally. However, no scientific evidence is available to prove its antiurolithiatic efficacy. Moreover, establishing the antiurolithiatic effects of *D. carota*, an extensively consumed commodity with numerous health benefits, would provide a beneficial dietary measure for the prevention and cure of urolithiasis. **Objective:** The study aimed at investigating *in vivo* antiurolithiatic potential of hydroethanolic extract of *D. carota* roots against calcium oxalate urolithiasis.

Materials and methods: Ethylene glycol and ammonium chloride induced hyperoxaluria model of urolithiasis in male Wistar rats was used for the study. Urine and serum parameters and, kidney histopathology was used to determine the antilithic efficacy of *D. carota* root extract.

Results: *D. carota* extract significantly ameliorated abnormal urinary levels of calcium, oxalate, phosphate, magnesium, citrate, protein and uric acid in lithogenic rats. Serum BUN, creatinine and uric acid levels; and calcium, phosphate and oxalate deposition in kidney tissue were also rendered normal following *D. carota* treatment. *D. carota* extract also prevented oxidative stress mediated renal tissue degeneration both prophylactically and curatively.

Conclusion: This study suggests antiurolithiatic effect of *D. carota* roots, which can be attributed to its anticrystallization property, ability to ameliorate urine and serum biochemistry and renal cellularity.

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1. Introduction

Urolithiasis is a multifactorial disorder that results from pathological biomineralization [1]. A worldwide increase in the incidences of urolithiasis has been recorded. Percent increase in the prevalence rate has been recorded to be 14.8% in Turkey, 7.4% in Taiwan, 5% in Brazil, 4.5% in UK, 4% in India, 3.6% in USA, 2.5% in China and 2.4% in Italy [2]. High recurrence rate of urolithiasis mounting to over 50% relapses in 5–10 years is exacerbating [3]. Moreover, benefits from a plethora of urological interventions available for the treatment of urinary stone disease ranging from medical expulsive therapy to extracorporeal shock wave lithotripsy and percutaneous nephrolithotomy are compromised due to

associated complications [4] and tendency to promote recurrence [5]. These treatment options for urolithiasis have emerged as one of the major contributors of chronic kidney disease [6]. Dietary and lifestyle changes that have occurred over decades promote the incidences of renal stone disease [7]. Therefore, dietary modifications and disciplined lifestyle is a key to the prevention of this disorder and others.

Health benefits of diet rich in fruits and vegetables are well known [8]. Moreover, nutraceuticals have emerged as a new venue for research [9]. Carrots or *Daucus carota* L. (Apiaceae) is a widely cultivated food crop in the world. Carrots are of high nutritional value and are a rich source of carotenes specifically α -carotenes and β -carotenes; and polyacetylenes viz. falcarinol, falcarindiol and falcarindiol 3-acetate [10]. Of these polyacetylenes, falcarinol is known to possess allergenic properties as has been reported to cause contact dermatitis [11]. Despite its allergenic potential, falcarinol is extensively explored due to its wide range of beneficial effects ranging from antitubercular, antifungal, antibacterial, anti-

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Peer review under responsibility of Transdisciplinary University, Bangalore.

<https://doi.org/10.1016/j.jaim.2018.12.003>

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Please cite this article as: Bawari S et al., Anticalcifying effect of *Daucus carota* in experimental urolithiasis in Wistar rats, *J Ayurveda Integr Med*, <https://doi.org/10.1016/j.jaim.2018.12.003>