Effect of Ethanolic Extract of *Nymphaea alba* Linn on Urolithiatic Rats

Shelke TT\(^a\)*, Bhaskar V H\(^b\), Jha U\(^a\), Adkar PP\(^a\), Oswal RJ\(^a\)

\(^a\)Department of Pharmacology & Toxicology, JSPMs Charak College of Pharmacy and Research, Wagholi, Pune, Maharashtra-412 207, India

\(^b\)Department of Pharmaceutical Chemistry, M.P. Patel College of Pharmacy, Kapadwanj, Gujarat - 387 620, India

### ABSTRACT

The urolithiasis was induced by inserting zinc disc (a foreign body) in the urinary bladder. This was also followed by supplementing 1% ethylene glycol in drinking water. The reduction in weight of the stones was used as criteria for assessing the preventive or curative regimen. In the present study, ethanolic extract of dried leaves of *Nymphaea alba* Linn was administered orally. This was evaluated for its antiurolithiatic potential in albino rats of Wistar strains. It was studied by administrating two different doses of the plant for prophylactic and curative groups. Oral administration of the *Nymphaea alba* Linn has resulted in significant reduction in the weight of bladder stones compared to the control group.

**Keywords:** *Nymphaea alba* Linn, Zinc disc, Ethylene glycol, Antiurolithiatic activity.

### INTRODUCTION

Urolithiasis is defined as the presence of one or more calculi in any location within the urinary tract. The disease affects 1% to 5% of the population in developed countries with a peak incidence between 20 and 50 years of age. Men are three times more likely to be affected than women and the lifetime risk of developing a calculus in a Caucasian man is nearly 20%.\(^{[1]}\) It has been reported that 91% of the urinary calculi contain calcium in some form, while 8% and 1% are composed of uric acid and cystine, respectively. The calcium-containing calculi consist of pure or various amount of calcium components such as calcium oxalate monohydrate, apatite, calcium hydrogen phosphate, and calcium carbonate. In men, 70% to 80% of the calculi contain either calcium oxalate alone or in combination with apatite.\(^{[2]}\) *Nymphaea alba* Linn (Nymphaeaceae) is a perennial aquatic herb generally found in tanks and ponds throughout the warmer parts of India and Africa. All parts of the plants are used in folk medicine. The powder of rootstock is given to treat dyspepsia, diarrhoea and piles. An infusion of the rhizomes and stem is considered to be an emollient, diuretic and used for treatment of diseases of the urinary tract. Decoction of the flower is used in palpitation of heart and as a narcotic; syrup of the flower is used in high fever, apoplexy, inflammatory diseases of the brain as also in dysuria. Leaves are applied topically in erysipelas, whereas the macerated leaves are used as a lotion in eruptive fevers.

\(^{[3-4]}\) The seeds are said to be stomachic and restorative.

### MATERIALS AND METHODS

#### Plant Material

Fresh leaves of *Nymphaea alba* Linn were collected from Ganesh temple, Sarasbag, Pune, Maharashtra, India during month of October-2010. The collected plant material was authenticated by Dr. P. G. Diwakar, Joint Director, Botanical Survey of India (BSI), Pune, India. A voucher specimen of the plant was deposited in the JSPMs Charak College of Pharmacy and Research, Wagholi, Pune as a herbarium under the number –TTSNA-1.

#### Method of Extraction

The leaves were dried in shade and were coarsely powdered (40 mesh size). The ethanolic extract (EE, 10%, w/v) of dried barks was prepared using 70% (v/v) ethanol by soxhlet method at a temperature of 60-70ºC. The seeds are said to be stomachic and restorative.\(^{[5]}\)

#### Animal Selection

Healthy adult male albino rats weighing between 150 and 200 g were selected for the evaluation of antilithiatic activity. The animals were acclimatized to standard laboratory conditions (temperature: 25 ± 2ºC) and maintained on 12 h light and 12 h dark cycle. They were housed in polypropylene cages and provided with regular rat chow (Bioscience Ltd, India) and drinking water *ad libitum*. The animal care and experimental protocols were in accordance with Institutional Animal Ethical Committee (IAEC) and were cleared by the same.

#### Acute Toxicity Studies

The acute oral toxicity study\(^{[6]}\) was carried out as per the guidelines set by Organization for Economic Co-operation and Development (OECD) received from Committee for the...
Rats were anaesthetized with intraperitoneal ketamine (50 mg/kg). A suprapubic incision was made and the abdomen was opened. The urinary bladder was then carefully exposed and the urine in the bladder was aspirated with a sterile syringe. A small nick was made at the apex end of urinary bladder and the sterile zinc disc (previously weighed) was carefully inserted into the bladder. Then the bladder was closed in a single stitch using chromic catgut (4-0). The abdomen was then closed in layers with chromic catgut and skin was closed with silk thread. The rats were allowed to recover from anaesthesia. Food and 1% ethylene glycol in water was given ad libitum. The stone was allowed to form and grow inside the bladder during the study period. After the study period the rats were sacrificed and zinc disc implants/stones were removed from the bladder and dried. The difference between the weight of the implanted zinc disc material deposit on zinc discs in control and after treating rats with 150 mg/kg & 300 mg/kg EENA

<table>
<thead>
<tr>
<th>Group</th>
<th>Dose (mg/kg)</th>
<th>No. of animals</th>
<th>Weight of stone in mg (Mean ±SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I–prophylactic control</td>
<td>-</td>
<td>6</td>
<td>280.18 ± 8.42</td>
</tr>
<tr>
<td>Group II–prophylactic treatment</td>
<td>(150 mg/kg)</td>
<td>6</td>
<td>141.7 ± 9.91*</td>
</tr>
<tr>
<td>Group III–prophylactic treatment</td>
<td>(300 mg/kg)</td>
<td>6</td>
<td>108.9 ± 6.56*</td>
</tr>
<tr>
<td>Group IV–curative control</td>
<td>-</td>
<td>6</td>
<td>272.68 ± 11.39</td>
</tr>
<tr>
<td>Group V–curative treatment</td>
<td>(150 mg/kg)</td>
<td>6</td>
<td>173.80 ± 13.87*</td>
</tr>
<tr>
<td>Group VI–curative treatment</td>
<td>(300 mg/kg)</td>
<td>6</td>
<td>116.75 ± 5.51*</td>
</tr>
</tbody>
</table>

*p < 0.001, df = 2, SEM = Standard error of mean, n = 6

CONCLUSION
In conclusion we can confidently confirm the possibility of antiurolithiatic activity of bark of *Nymphaea alba* Linn as there was reduction in size of the stones. Further studies are needed to prove the stone dissolving property of ethanolic extract of *Nymphaea alba* Linn (150 mg/kg & 300 mg/kg) in other animal models

ACKNOWLEDGEMENT
Authors are very much thankful to Jspms Charak College of Pharmacy and Research, Wagholi, Pune, for providing the facilities necessary to carry out the research work Authors also express their gratitude to Botanical Survey of India Pune, MS, India for authentication of the plant material.

REFERENCES


