DJENKOL BEAN

By JEERASAN SANRATTHAGIT
Botanical Description

- **Common Name**: Djenkol tree (Indonesia), krakos (Cambodia), jering (Malaysia), niang-yai (Thailand), jenkol, genkol, yiniking, yi-ring, ma-niang, cha-niang, niang, kra-niang

- **Scientific Name**: *Archidendron jiringa* (Jack) I. C. Nielsen

Exposure

- Djenkol beans are a local delicacy in Indonesia, Malaysia, southern Thailand, and Myanmar
- The beans are commercially available in markets during most of the year
- Are consumed raw, roasted, or fried
Chemical Composition

0.3-1.3g/100 g wet weight

FIG 1. Chemical structure of djenkol acid.
### Table 1: Demographic and clinical characteristics of reported cases of djenkolism

<table>
<thead>
<tr>
<th>Article (year)</th>
<th>Country</th>
<th>Number of patients</th>
<th>Age range (years)</th>
<th>Sex</th>
<th>Number of beans</th>
<th>Onset (days)</th>
<th>Abdominal/loin, colicky pain</th>
<th>Dysuria</th>
<th>Hypertension</th>
<th>Macroscopic hematuria</th>
<th>Oliguria/anuria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Areekul et al* (1978)</td>
<td>Thailand</td>
<td>1</td>
<td>8</td>
<td>M, 1</td>
<td>10</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>Anuria</td>
</tr>
<tr>
<td>H'ng et al* (1991)</td>
<td>Malaysia</td>
<td>2</td>
<td>21, 25</td>
<td>M, 2</td>
<td>20, 10</td>
<td>2, 3</td>
<td>Bilateral loin pain with CVA tenderness</td>
<td>2/2</td>
<td>2/2</td>
<td>2/2</td>
<td>Anuria, 1; oliguria, 1</td>
</tr>
<tr>
<td>Reimann and Sukaton* (1956)</td>
<td>Indonesia</td>
<td>16</td>
<td>Adult</td>
<td>NR</td>
<td>10–20</td>
<td>2–12 hours</td>
<td>16/16</td>
<td>16/16</td>
<td>3/16</td>
<td>10/16</td>
<td>Oliguria, anuria, 4</td>
</tr>
<tr>
<td>Segosothy et al* (1995)</td>
<td>Malaysia</td>
<td>1</td>
<td>26</td>
<td>M</td>
<td>3</td>
<td>4</td>
<td>Bilateral loin pain with CVA tenderness</td>
<td>1</td>
<td>1/1</td>
<td>1/1</td>
<td>Oliguria</td>
</tr>
<tr>
<td>Suharjono and Sadatum* (1968)</td>
<td>Indonesia</td>
<td>50</td>
<td>1.5–12</td>
<td>M, 45</td>
<td>1–10</td>
<td>2–36 hours</td>
<td>21/50 back pain/colic</td>
<td>24/50</td>
<td>NR</td>
<td>21/50</td>
<td>Oliguria, 7; anuria, 8</td>
</tr>
<tr>
<td>West et al* (1973)</td>
<td>Indonesia</td>
<td>2</td>
<td>7; NR</td>
<td>M, 1</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Wong et al* (2007)</td>
<td>Malaysia</td>
<td>1</td>
<td>45</td>
<td>M</td>
<td>NR</td>
<td>1</td>
<td>Left loin pain</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>Oliguria, anuria by day 3</td>
</tr>
<tr>
<td>Yong et al* (1995)</td>
<td>Malaysia</td>
<td>1</td>
<td>35</td>
<td>M</td>
<td>NR</td>
<td>Hours</td>
<td>Severe abdominal pain</td>
<td>NR</td>
<td>1/1</td>
<td>1/1</td>
<td>NR</td>
</tr>
</tbody>
</table>

*Abbreviations: M, male; F, female; NR, not reported; CVA, costovertebral angle.*
**Review Articles**

### Table 2: Laboratory and imaging characteristics, treatment, and outcome of reported cases of djenkolism

<table>
<thead>
<tr>
<th>Article (year)</th>
<th>Number of patients</th>
<th>BUN (mg/dL)</th>
<th>Creatinine (mg/dL)</th>
<th>Urine analysis</th>
<th>Imaging/diagnostics</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Areekul et al (1978)</td>
<td>1</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>X-ray, no stones</td>
<td>Surgery for stone removal</td>
<td>Recovered (4 days)</td>
</tr>
<tr>
<td>Eiam-Ong et al (1987)</td>
<td>22</td>
<td>7–100</td>
<td>0.9–10</td>
<td>Proteinuria, 10; leukocyturia, 2; crystals, 1</td>
<td>NR</td>
<td>Hydration-all; diuretic, 8; alkalinization, 8; dialysis, 1</td>
<td>All recovered (2–14 days)</td>
</tr>
<tr>
<td>H'ng et al (1991)</td>
<td>2</td>
<td>61; 114</td>
<td>7.8; 14.1</td>
<td>Turbid urine</td>
<td>X-ray, no stones; US: increased echogenicity; prominent pyramids; no hydronephrosis</td>
<td>Hydration, alkalinization</td>
<td>All recovered (5 days)</td>
</tr>
<tr>
<td>Reimann and Sukaton (1956)</td>
<td>16</td>
<td>20–70</td>
<td>NR</td>
<td>Milky urine at beginning (NQ); crystal, 6</td>
<td>NR</td>
<td>Hydration, alkalinization, morphine</td>
<td>All recovered (3 days)</td>
</tr>
<tr>
<td>Segasothy et al (1995)</td>
<td>1</td>
<td>45</td>
<td>5.2</td>
<td>Turbid urine</td>
<td>US: not increased echogenicity, pyramid hyperechoic, enlarged; no hydronephrosis</td>
<td>Hydration, alkalinization</td>
<td>Recovered</td>
</tr>
<tr>
<td>Suharjono and Sadatun (1968)</td>
<td>50</td>
<td>20–340</td>
<td>NR</td>
<td>Turbid urine, 9; crystals, 30; microscopic hematuria, 36; Crystals, 2</td>
<td>NR</td>
<td>NR</td>
<td>Recovered, 47; died, 3</td>
</tr>
<tr>
<td>West et al (1973)</td>
<td>2</td>
<td>NR</td>
<td>NR</td>
<td></td>
<td>NR</td>
<td>Irrigation of the urethra, bladder</td>
<td>Recovered, 1; died, 1</td>
</tr>
<tr>
<td>Wong et al (2007)</td>
<td>1</td>
<td>18</td>
<td>1.99</td>
<td>Foul-smelling urine</td>
<td>US: normal kidney with minimal right hydronephrosis</td>
<td>Bilateral ureteric stenting after failed conservative treatment (Cr increased to 9.59); thick &quot;tomato sauce&quot; sludge found</td>
<td>Recovered (stent removed after 4 days)</td>
</tr>
<tr>
<td>Yong et al (1995)</td>
<td>1</td>
<td>11</td>
<td>3, 6</td>
<td>Turbid urine</td>
<td>X-ray, no stones</td>
<td>Hydration</td>
<td>Recovered (3 days; blue urine secondary to jamu ingestion)</td>
</tr>
</tbody>
</table>

**Abbreviations:** BUN, blood urea nitrogen; NR, not reported; Cr, creatinine; NQ, not quantified; US, ultrasound.
Physiochemical Properties

- Boiling, frying, roasting the djenkol bean does not prevent toxicity
- Pungent smell in the breath
- Characteristic urine is sulfuric odor
Dose Response

- No clear dose-response effect
- Poisoning can occur especially if eaten raw and low fluid intake
- Dose associated with ARF is variable (1-20)
- This variability may include
  - hydration status
  - activity of enzymes for metabolizing toxic product
  - difference in the djenkolic acid content
Clinical Response

Acute Effects
The clinical features of djenkolism range from
• Asymptomatic hematuria
• Dysuria
• Abdominal pain with gross hematuria
• Severe flank pain
• Vomiting
• Diarrhea
Clinical Response

- Opaque ("milky") urine
- Proteinuria
- Acute renal failure
- Urethral stones, urether obstruction, and urinary retention
- Hypertension
- The symptom complex has been designated *djenkolism*
- Majority of cases usually resolve within 3 days
Clinical Response

Chronic Effects

• In a study of 609 school children aged 7-11 yrs in an urban area of Thailand
• Presence of hematuria was 4-fold (odds ratio 3.7) higher in children with hx of djenkol bean consumption compared with children not consuming djenkol beans
• No significant difference in the presence of crystalluria or pyuria between these 2 groups
Diagnostic Testing

- UA (isomorphic hematuria, proteinuria, and needle like crystals)
- Renal biopsies typically demonstrate evidence of acute tubular necrosis
Treatment

- High fluid intake
- Urinary alkalinization
- Decontamination are unnecessary
- Hospitalization is necessary for close monitoring for ARF
Prevention

- Incidence is low, syndrome is sporadic
- Not dependent on quantity or mode of preparation of the beans
- Individuals eating from the same dish do not all become symptomatic
- Individual’s susceptibility and AKI is not fixed from one exposure to the next
- Boiling the bean in dilute alkali would remove the acid
REFERENCES

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