



## Rituals can kill – A fatal case of brucine poisoning

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### CASE REPORT

Please cite this paper as: Achappa B, Madi D, Raghavendra Babu YP, Mahalingam S. Rituals can kill – A fatal case of brucine poisoning. AMJ 2012, 5, 8, 421-423. <http://dx.doi.org/10.4066/AMJ.2012.1293>.

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### Abstract

In some parts of India people follow a religious ritual of drinking an herbal preparation made from the bark of the *Alstonia scholaris* tree (Blackboard tree) on the day of the new moon in the month of July. This tree could be easily confused with the *Strychnos nux vomica* tree. Brucine is the predominant alkaloid present in the bark of the *Strychnos nux vomica* tree. The toxicological property of brucine is similar to strychnine. Brucine is a neurotoxin. A 29-year-old male presented with a history of consumption of an herbal preparation made from the bark of the *Strychnos nux vomica* tree confusing it for *Alstonia scholaris*. Soon after, he developed convulsions and later died in hospital on the same day. The aim of this case report is to highlight the fact that people must be cautious when they follow religious rituals.

#### Key Words

Brucine; *Alstonia scholaris*; strychnine; poisoning

### Implications for Practice

#### 1. What is known about such cases?

Brucine poisoning is a rare entity. We could find only two case reports of brucine poisoning from India. Previous case reports from India have not performed toxicological analysis in cases of brucine poisoning.

#### 2. What is the key finding reported in this case report?

Brucine poisoning is fatal, difficult to diagnose if proper history and social background are not ascertained and rituals can kill people. High performance thin layer chromatographic (HPTLC) method of analysis of routine viscera in our patient showed presence of brucine. The toxicological property of brucine is similar to strychnine. Brucine poisoning can be fatal.

#### 3. What are the implications for future practice?

Following religious rituals is an integral part of Indian culture but people must learn to identify the *Alstonia* tree properly, otherwise rituals can kill.

### Background

Brucine is an alkaloid present in the *Strychnos* tree (*Strychnos nux vomica*), a tree predominantly seen in India and Southeast Asia. Brucine is similar to strychnine in composition and action. The bark of the tree contains no strychnine, but 1.5–3% of brucine.<sup>1</sup> In India, the day of the new moon in the month of July is considered very auspicious. On that day people follow a religious ritual of drinking a decoction prepared from the bark of the *Alstonia scholaris* tree. The bark of this tree is collected well before sunrise and a decoction is prepared. The tree is used in ayurvedic, homoeopathy and other types of alternative medicinal systems to treat different ailments such as malaria, fever and diarrhoea. The plant has anti-cancerous, antimicrobial, anxiolytic and antipsychotic properties.<sup>2</sup> However, this tree could be easily confused with *Strychnos nux vomica*.<sup>3</sup> There are many case reports of strychnine poisoning but case reports of fatal brucine poisoning are poorly documented. We could find only two case reports of brucine poisoning from India.

### Case details

A 29-year-old male presented to the Emergency Department with convulsions after consumption of a decoction made from the bark of the *Strychnos nux vomica* tree confusing it for *Alstonia scholaris*. He drank the preparation along with four other members of the family as a part of a religious ritual. He had been following this religious ritual yearly (on the new moon day in the month of July) for the past 10 years. For the past 10 years his father



used to get the bark of the tree from the forest before sunrise and prepare the decoction. As his father had passed away recently some other family member had prepared the decoction instead.

One hour after drinking the herbal preparation he vomited and subsequently developed an episode of generalised tonic clonic seizure. He also had a series of convulsions while being transported from his home to the hospital. The patient was alert between convulsions. The convulsions were precipitated by any form of physical contact. Other members of the family had mild muscular spasms and nausea.

On arrival at the Emergency Department the patient developed cardio-pulmonary arrest. Cardio-pulmonary resuscitation was initiated which was successful. A stomach washout was performed and the patient was intubated and ventilated. Anticonvulsant medications were initiated to prevent any further convulsions.

Initial investigations performed revealed renal failure (urea: 46mg/dl, creatinine: 1.8mg/dl) and an elevated creatine phosphokinase: 1005U/L. The arterial blood gas showed presence of metabolic acidosis.

Despite all efforts to stabilise the patient, he developed another episode of cardiac arrest shortly after admission, and died.

Subsequent to the patient's death, results from the high performance thin layer chromatographic (HPTLC) method of analysis of the deceased's viscera showed the presence of brucine in the liver and kidney. Quantification of brucine levels was not available.

## Discussion

Brucine is an alkaloid found in various plants of the strychnos family. It is closely related but less potent than strychnine (a substance commonly found in pesticides). Strychnine is an antagonist of the inhibitory neurotransmitter glycine. Malone et al found Brucine to possess strychnine-like properties in their mice experiments.<sup>4</sup> Strychnine increases the excitability of neurons.<sup>5</sup> Like strychnine, brucine also acts as an antagonist at the glycine receptor.<sup>6</sup> The excitatory effect thus produced leads to hyperreflexia, spasms and convulsions. It also has an excitatory effect on the medulla and enhances the sensations of touch, smell, hearing and sight. This explains why a minimal peripheral stimulus triggered diffuse muscle contractions in our patient. Prolonged convulsions can result in life-threatening complications like rhabdomyolysis,

which is indicated by raised creatine phosphokinase. Patients usually die because of asphyxia. Treatment should be mainly aimed at controlling the seizures, providing cardio-respiratory support and removal of poison from the body.

Our patient had consumed an herbal decoction prepared from the bark of the Strychnine tree, which contains only brucine (1.5–3%). HPTLC method of analysis confirmed the presence of brucine and absence of strychnine. Based on the clinical presentation and presence of brucine in his body, we feel that brucine poisoning was the most likely cause for this patient's death. Although it is reported that the fatal dose for brucine poisoning is 1000mg,<sup>7</sup> quantification of brucine in our patient was not available for verification. A similar case of brucine poisoning from our state has been reported by Naik et al.<sup>8</sup> Their patient also developed convulsions and acute renal failure.

## Conclusion

Brucine poisoning is a rare entity. Because of its low potency, it is less likely to cause death as compared to Strychnine unless consumed in large amounts. Religious rituals that involve the consumption of various decoctions are an integral part of Indian culture but dangers of inaccurate plant identification can result in fatality.

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#### **ACKNOWLEDGEMENTS**

Dr. Meghana Rao

#### **PEER REVIEW**

Not commissioned. Externally peer reviewed.

#### **CONFLICTS OF INTEREST**

The authors declare that they have no competing interests

#### **FUNDING**

Not Applicable

#### **PATIENT CONSENT**

The authors, Basavaprabhu Achappa, Deepak Madi, Raghavendra Babu, Soundarya Mahalingam, declare that:

1. They have obtained written, informed consent for the publication of the details relating to the patient(s) in this report.
2. All possible steps have been taken to safeguard the identity of the patient(s).
3. This submission is compliant with the requirements of local research ethics committees.