

Respiratory Failure in a Neonate After Folk Treatment With Broom Bush (*Retama raetam*) Extract

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Objectives: To increase the awareness of intoxication by folk herbal remedies in the pediatric population.

Methods: Case report of a 7-day-old baby boy admitted to a pediatric intensive care unit in a university-affiliated hospital.

Results: The patient presented with respiratory failure and central nervous system depression. Specific questioning of the parents revealed consumption of folk herbal remedy by the neonate. Mechanical ventilation was used for 24 hours until normal activity level resumed.

Conclusions: The possibility of intoxication in a neonate should not be overlooked. Folk herbal remedies, especially if taken in larger than recommended amounts, may be hazardous. Accessible herbal and folk medicine data bank will contribute to a better treatment of patients having side effects of these remedies.

Key Words: *Retama raetam*, neonatal jaundice, respiratory failure, herbal medicine, folk medicine

The use of herbal remedies in folk medicine is well known and widespread throughout the world. During the last decade, the use of complementary and alternative medicine (CAM) has increased significantly. Between the years 1991 and 1997, the use of CAM by Americans increased from 34% to 42%.¹ Similar numbers were noted in Europe, where CAM use ranges between 30% and 50%.² An increase in the use of CAM was also noted in Israel.³

With the increase in the use of CAM, a parallel rise in adverse effects related to CAM has been reported.^{4,5} Most adverse effects were associated with herbal medications.⁶ Most herbal medicines are unlicensed, and standards of quality, efficacy, and safety have not been formulated.⁷ Although commonly regarded as harmless, herbal medications may contain toxic plants or heavy metals and may be adulterated with synthetic drugs.^{7,8} This situation is exacerbated by patients' frequent reluctance to report CAM use to their physician.⁸

This article presents a case of intoxication in a 1-week-old baby boy by a tea extract prepared from broom bush

(*Retama raetam*). Broom tea was used as a folk herbal remedy for his neonatal jaundice so that his ritual circumcision could be performed on time.

CASE

A 7-day-old baby boy was brought to the emergency department with a 1-hour history of apathy and cyanosis. He is the third child to nonrelated orthodox Jewish parents of Tunisian origin. The family history was unremarkable. Pregnancy was normal, and he was delivered vaginally at term. Birth weight was 3.290 kg. Peak bilirubin level was 16 mg% on the fourth day of life, and no therapy was given. He was eating a regular cow-milk protein-based formula at home. Bilirubin was 15.2 mg% on the sixth day of life. The baby was otherwise active and alert and eating well.

On the following day, he was lethargic when brought to the emergency department. He was mildly jaundiced and had shallow breathing. Weight was 3.205 kg; rectal temperature, 35.2°C; oxygen saturation, 94% while receiving 100% oxygen by mask with reservoir, heart rate, 153 beats per minute; and blood pressure, 108/68 mm Hg; and capillary refill was less than 2 seconds. Peripheral pulses were easily palpable, and there was good urine output. His oxygen saturation subsequently dropped to 64%, necessitating intubation and mechanical ventilation. Initial parameters of mechanical ventilation were as follows: fraction of inspired oxygen, 50%; peak airway pressure, 18 cm H₂O; positive end-expiratory pressure, 5 cm H₂O; and respiratory rate, 20 breaths per minute. He received 20 mL/kg of 0.9% saline, had a complete sepsis workup, and was started on intravenous ampicillin, cefotaxime, and acyclovir. The baby was admitted to the pediatric intensive care unit for further treatment and observation.

As the history, physical examination, and laboratory findings were not consistent with his critical condition, a urine toxicology screen was performed by immunoassay. It was negative for barbiturates, benzodiazepines, opiates, amphetamines, cocaine, methadone, and tetrahydrocannabinoid. On specific detailed questioning, the parents admitted giving the baby 20 mL of a homemade herbal remedy named "azfar" a few hours before admission. With this new information of a possible intoxication, gastric lavage was performed, and active charcoal was given.

Complete blood count, blood chemistries, and cerebrospinal fluid results were within the normal limits for his age. Initial venous blood gases were as follows: pH 7.243; PCO₂, 50 mm Hg; and HCO₃, 21.9 mEq/L. Fifteen minutes after mechanical ventilation was started, arterial blood gases were as follows: pH 7.42; PCO₂, 21 mm Hg; HCO₃, 13.6 mEq/L; and PO₂, 464 mm Hg. He was treated with 1 mEq/kg of sodium bicarbonate. Three hours later, arterial blood gases were as follows: pH 7.32; PCO₂, 36 mm Hg; HCO₃, 18.5 mEq/L; and PO₂, 202 mm Hg. Due to mild prolongation of the Activated Partial Thromboplastin Time (aPTT), he was given fresh frozen plasma. Chest x-ray and computed tomography of his head were normal. The baby was hemodynamically stable throughout.

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Over the next 24 hours, he started breathing normally and was extubated. He returned to his normal activity level several hours after extubation. All cultures were negative, and antibiotic and antiviral treatments were discontinued.

The baby was discharged from the pediatric intensive care unit after 2 days in good condition, without any obvious neurological deficit. Five days after admission, he was discharged home, and he underwent ritual circumcision 1 week after discharge from the hospital.

DISCUSSION

Broom bush (*R. raetam*) is a natural plant of the sand dunes in the Middle East. Broom bush is mentioned in the Bible as a shelter from the sun and as a source for making coal by nomads.⁹ Nowadays, Bedouins still use it to prepare coals characterized by prolonged slow combustion. Infected wounds are treated with an ointment, which is prepared by crushing the leaves and stems of the plant. Boiled broom is inhaled as a folk remedy for backache, arthralgia, and infertility. Broom is also used for inducing abortions by means of oxytocic effect on the uterus.¹⁰

In the present case, tea extract prepared from broom stems was given by the parents to enhance the baby's recovery from neonatal jaundice. They wished to allow his ritual circumcision to occur on time. According to Jewish tradition, ritual circumcision is performed on the eighth day of life, but must be postponed in a jaundiced or sick child.

Broom bush contains almost 30 different alkaloids, several of which have been purified and characterized. Most of these toxic alkaloids are of the quinolizidine ring family. Broom stems contain mainly retamine and sparteine, alkaloids that may be lethal to laboratory animals when given intravenously or orally in large doses. These 2 alkaloids are cardiotoxic and block autonomic ganglia. Sparteine exerts a curare-like activity causing respiratory failure by paralyzing respiratory muscles. The broom flowers and fruits contain cytisine and anagryne, which are characterized by their affinity to nicotinic cholinergic receptors. These alkaloids act in the central nervous system to stimulate the vomiting center and provoke convulsions. In higher doses, they depress the respiratory center in rats.¹¹ No studies have been performed on humans. Other derivatives of this family are found in several herbs, some of which are also used in herbal medicine.¹²

Our patient mainly had central nervous system depression and centrally mediated respiratory failure. This may be only partially explained by the effects of the alkaloids in the broom stems (sparteine and retamine), which are known to produce muscle paralysis and cardiotoxicity. They have not been reported to cause central respiratory depression. The prolongation of the Activated Partial Thromboplastin Time (aPTT) in our patient cannot be explained by the current knowledge on the alkaloids in the broom bush. It is possible that there are other toxic ingredients in the herb or that the effects of the known alkaloids on a neonate may be different from their known effects on camels and dogs.

Herbs and minerals in folkloristic medical use are frequently named after the symptom they treat or the symp-

toms they may cause in healthy persons.¹³ Broom bush is used in North African communities for the treatment of neonatal jaundice. Its popular name is azfar, literally "yellow" in Arabic, probably because the plant is used to treat jaundice. CAM offers some other alternatives for the treatment of neonatal jaundice. Included is Yin Zhi Huang¹⁴ whose active ingredient, dimethylesculetin, and its target, the constitutive androstane receptor in the liver, were identified.¹⁵

There are several issues to consider when treating patients who have consulted folk healers. Herbs are generally regarded as natural substances and therefore are presumed to be harmless. Patients may be embarrassed at having consulted a CAM practitioner and therefore hesitate before seeking conventional medical help when intoxication or side effects occur. Remedies are generally prepared by the healers or according to their instructions and are not standardized. Patients usually receive verbal instructions and not written ones, thereby increasing the chances of an error being made.

Written information regarding the contents of the medications, their dosages, and their side effects are not readily available. In such cases, apart from getting the information on the use of herbal remedy, the physician faces several challenges including identification of the herb, predicting the natural course of the intoxication, and finding an appropriate treatment.¹⁶

Broom tea is generally given to the nursing mother, rather than the baby. In our case, the healer, an elderly woman, instructed the parents to give the baby 3 drops of a diluted tea preparation. Instead, the parents gave him 20 mL of a concentrated preparation, wishing to accelerate his recovery from jaundice.

In our case, following contacts with the healer via family members and religious scholars, the general description of the plant and its geographical source were disclosed. The father then brought the attending physicians several branches of that bush from a site in the seaboard sand dunes. Digital photos of the plant were e-mailed to several botanical experts, and the plant was absolutely identified as *R. raetam* (broom bush). Unfortunately, botanical experts, toxicologists, and CAM practitioners were unfamiliar with the toxic ingredients of the broom bush. The only available clinical descriptions were from the veterinary literature.

Physicians face treatment compliance problems every day. This problem may also affect alternative medicine practitioners. Patients may not take the medication at all or take it, but not adhere to the protocol recommended. Our patient received 7000 times more than the recommended dose. It is likely that if this herbal tea were prescribed properly, prepared and bottled by a pharmacist, and dispensed with written instructions, the risk for intoxication would have been lower. There may even have been the desired therapeutic effect.

CONCLUSIONS

The popularity of CAM is on the rise, and herbal medicine is one of its leading modalities. Questions about the use of CAM should be integrated into routine medical history

taking. Generalists as well as intensivists must update their knowledge of CAM. Unusual clinical presentations should raise the index of suspicion of complication of CAM usage. Further investigation into the mechanism of action of the *Retama* plant and all herbs being used for medical therapies is warranted. Access to a centralized herbal and natural medicine data bank, akin to state and national poison control centers, would be a great contribution to this field and help improve therapy in case of intoxication.

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