Acute Kidney Injury following Ingestion of Henna Leaf Extract: A Case Report from Myanmar

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Keywords

Acute kidney injury · Henna leaf extract · Herbal remedies

Abstract

Alternative medicine is gaining popularity worldwide. In Asia, particularly Southeast Asia, herbal medicine plays an important role in healthcare. A 34-year-old man from Yangon, Myanmar, was admitted to the medical ward of our hospital after ingesting a herbal remedy of boiled henna leaves (*Dan Ywet* in Burmese). He developed hemoglobinuria leading to acute kidney injury (AKI). The insult was severe, and he underwent 5 sessions of hemodialysis. His condition improved and within 7 weeks of injury, he made a full recovery. However, he was lost to follow-up when renal function became normal. Our diagnosis was AKI from hemoglobinuria secondary to henna leaf extract nephrotoxicity in G6PD deficiency. This case highlights the steps required to achieve the International Society of Nephrology's goal of 0 preventable deaths from AKI by 2025 and the efforts needed to increase public knowledge about herbal remedies and AKI, medication adherence, and compliance with follow-up.

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Introduction

In Myanmar, because of strong traditional beliefs, people have continued to engage in the widespread use of traditional medicines including herbal remedies. This case report exemplifies the mindset behind the use of herbs and the generalized naiveté about the scientific analysis and documentation required for a remedy or herb to qualify as medicine or as a medicinal plant. Generally, herbal medicines are not tested for safety and efficacy and side effects are not known [1]. Therefore, healthcare professionals should provide education to increase public awareness about acute kidney injury (AKI) and to emphasize the importance of proper follow-up to prevent progression to chronic kidney disease.

Case Report

A 34-year-old man living in Yangon was admitted to the medical ward of Thingangyun Sanpya Hospital (TSGH) in March 2015 with a history of yellow discoloration of skin and eyes, accompanied with passing of dark-colored urine for 3 days. There was associated shortness of breath on exertion and dizziness for 1 day. He had a history of alcohol consumption for over 15 years. About 2 weeks prior to presentation, he visited his hometown and his mother noticed swelling of his face and unhealthy appearance of his skin. She prepared an herbal remedy of boiled henna leaves, known as *Dan Ywet* in Burmese, of which he drank about 700 mL/

Table 1. General laboratory findings after admission

	Hospital day 1	Hospital day 2	Hospital day 7	Reference range
Hb, g/dL	3.3	5	6.4	13.5–16
MCV, fL	99	96.9	89.1	80–100
HCT, %	9.9	15.8	19.6	40–54
WBC, $\times 10^9/L$	35.59	29.31	6.04	4–11
Platelet count, $\times 10^9/L$	25	220	207	150–400
Retics count, $\times 10^9/L$		13.47		20–84
LDH, U/L		1,925.4		135–225
G6PD, mU/ 10^9 RBC		142.2		118–144
Bilirubin, $\mu\text{mol/L}$		50		0–6
Alanine aminotransferase, U/L		24		10–40
Aspartate aminotransferase, U/L		83		7–56
Alkaline phosphatase, IU/L		69		44–147
PT(s)/INR		16.6/1.3		11–13.5/0.8–1.1
Albumin, g/L		30.1		35–50
Globulin, g/L		22.4		23–35

Bold type indicates clinical parameters of note.

day for 3 days (Fig. 1). Soon afterwards, he noticed his urine had the same color as the liquid from the boiled henna leaves. On his return to Yangon, he felt unwell and dizzy and eventually could not stand on his own. He visited TSGH and was admitted.

On examination, he was febrile (temperature 37.8°C) with a tinge of jaundice and marked pallor. His blood pressure was 150/90 mm Hg with a heart rate of 100 bpm. Liver and spleen were not palpable and there was no pedal edema. On hospital day 2, he was transferred to the renal ward because of anuria and elevated serum creatinine. Laboratory investigations on hospital day 1 revealed severe anemia (Hb 3.3 g/dL), elevated serum urea (46 mg/dL) and markedly elevated creatinine (1,015 $\mu\text{mol/L}$); electrolytes were normal (on hospital day 1). On hospital day 2, significant findings were extremely high bilirubin (50 $\mu\text{mol/L}$) and aspartate aminotransferase (83 U/L); alanine aminotransferase and alkaline phosphatase were normal. There was hypoalbuminemia (30.1 g/L) and globulin was normal (22.4 g/L). These and other laboratory results are shown in Table 1. Routine urinalysis revealed dark-colored urine (Fig. 2), with hyperalbuminuria (3+), pus cells 5–7, erythrocytes 5–10, and epithelial cells 2–4 per hpf. G6PD was within normal limits. Serology for hepatitis B, hepatitis C, and HIV were all non-reactive. Also, Dengue serology and Leptospiral antibody were both negative. No malaria parasites were detected on blood film and immunochromatography was negative. Culture and sensitivity for both blood and urine were sterile. Renal ultrasonography showed normal kidney size, renal length was 10.9 cm and 10.3 cm for the right and left kidneys, respectively. Based on the above, our diagnosis was AKI following ingestion of henna leaf extract.

We administered supportive treatment for AKI including fluid replacement, antibiotics, antiemetics, and histamine H₂-receptor blockers. He was transfused 3 units of packed cells. On hospital day 4, he commenced renal replacement therapy (RRT) in the form of hemodialysis and subsequently underwent 5 sessions of hemodialysis (HD). Table 2 shows changes in indices of renal function

Fig. 1. Typical color of henna leaf extract, (*Dan Ywet* in Burmese), a homemade herbal remedy commonly used for astringent, antibacterial, and other anti-infective purposes.

during HD. The patient achieved clinical recovery and subsequent biochemical recovery from AKI and was discharged on hospital day 38 (5 weeks after admission and initial diagnosis of AKI). At discharge, urine output was more than 2 L/day and serum creatinine had dropped to 245 $\mu\text{mol/L}$.

By the first follow-up visit at 7 weeks after initial diagnosis of AKI, there was evident recovery of renal function, urine output was more than 2 L/day, and serum creatinine had dropped to 105 $\mu\text{mol/L}$.

Laboratory findings at the latest follow-up in February 2017 revealed that serum urea and electrolytes were within normal range, hemoglobin was 15.5 g/dL, leucocytes 6.4, platelets 320,

Table 2. Serum urea and electrolytes after starting HD

	Hospital day						Reference range
	4	5	7	8	15	18	
Urea, mg/dL	59.4	71.6	52	54.4	24.8	17.7	8–21
Creatinine, μ mol/L	1,418	2,256.7	1,963	2,218	2,024	1,830	59–104
Na, mmol/L	131		134	135	137	139	136–146
K, mmol/L	4.5		4.9	5.1	5.6	4.8	3.5–5
Cl, mmol/L	84.7		102	102	97	23	98–106
HCO ₃ , mmol/L	20		22	16.1	20	17.7	23–29

Bold type indicates clinical parameters of note.

Fig. 2. Color of the patient's urine on hospital day 1 is very similar to that of homemade henna leaf extract (see Fig. 1).

G6PD assay 78.98 mU/10⁹ RBC (reference: 118–144 mU/10⁹ RBC). Our final diagnosis was AKI due to hemoglobinuria secondary to henna leaf extract nephrotoxicity in G6PD deficiency. A timeline of the patient's course is shown in Figure 3.

Discussion

Henna (*Lawsonia inermis*), a sturdy plant native to north Africa, west and south Asia, and north Australasia thrives at high temperatures of up to 45°C; growth is inhibited at temperatures below 11°C and it dies at temperatures below 5°C [2]. It is commonly used to make herbal remedies in Southeast Asia. Henna is used for hair dyes and for coloration in ceremonies, especially traditional Hindu ceremonies.

Nephrotoxic herbal medicines cause kidney injury and toxicity through one or more of the following mechanisms: alteration of intraglomerular hemodynamics, tubular cell toxicity, inflammation, crystal nephropathy, rhabdomyolysis, and thrombotic microangiopathy [3, 4, 5]. Herbal medicines are also known to contain contaminants that are nephrotoxic, such as excessive or banned pesticides, microbial contaminants, heavy metals, and chemical toxins. Herbal remedies have also been known to be adulterated with orthodox drugs, and a study by the California Department of Health found undeclared pharmaceuticals or heavy metals in 32% of Asian medicines sold in the state of California [6]. Undeclared pharmaceuticals identified were ephedrine, chlorpheniramine, methyltestosterone and phenacetin, sildenafil, steroids, and fenfluramine. The heavy metals lead, mercury, and arsenic were found in 10%–15% of these Asian medicines. Furthermore, approximately 10% of more than 500 Chinese drugs contain undeclared drugs or heavy metals.

Contaminants in herbal medicines have been identified in other parts of the world. Lead, cadmium, and mercury were found in herbal remedies in Thailand, other parts of Southeast Asia, and India. Also, uranium contamination was detected in about 15% of herbal remedies in South Africa. The pesticides quintozene and hexachlorobenzene and excessive amounts of lead were also detected in ginseng dietary supplements in the US [7].

Coadministration of herbs and orthodox therapeutics increases the possibility of pharmacokinetic or pharmacodynamic herb-drug interactions. These herb-drug interactions are known to result in adverse renal effects. *Ginkgo biloba*, for instance, should not be administered concomitantly with anticoagulants and is contraindicated in patients with bleeding disorders. Also, St. John's wort, derived from the plant *Hypericum perforatum*, is an

Fig. 3. Timeline of the patient's course.

enzyme inducer and reports indicate significant increases in the metabolism of other drugs such as warfarin, theophylline, oral contraceptives, and cyclosporine [7].

Taken together, this case and the above facts offer important lessons in the prevention and management of AKI and other complications arising from the use of

herbal remedies. Medical personnel need to educate the public about the use of alternative medicine, and mass media support can contribute greatly to improving public awareness. Moreover, legislation and the enforcement of such legislation is crucial to motivate pharmaceutical companies and retailers to conform to set guidelines for

the production and sale of prescription-only and over-the-counter medicines.

One of the causes of AKI is improper usage of herbs, and more efforts are needed to prevent this. This case highlights the steps required to achieve the International Society of Nephrology's goal of 0 preventable deaths from AKI by 2025 and the efforts needed to increase public knowledge about herbal remedies and AKI, medication adherence, and compliance with follow-up.

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Statement of Ethics

The patient provided written informed consent for his case to be published.

Disclosure Statement

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