



MEDICINE OR POISON??- CITRULLUSCOLOCYNTHIS

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ABSTRACT Citrullus colocynthis is an herb and all parts of the plant including the root, stem, leaves, ripe fruit, seeds are used as medicine. In spite of its medical benefits, it is reported to have toxic effects on multiple organs. The most frequent complication was identified as acute dysenteric diarrhoea. Here we discuss a case of 38 years old patient who developed acute dysenteric diarrhoea due to C.Colocynthis poisoning which was prescribed for its traditional value.

KEYWORDS : Citrulluscolocynthis, Acute dysenteric diarrhoea, hypotension, hypokalemia, hypoglycemia.

INTRODUCTION:

Citrulluscolocynthis is commonly known as Bitter apple, bitter cucumber, Desert gourd, wild gourd, vine of Sodom resembling a watermelon in appearance (figure 1). It is a small hard fruit about 5-10 cm in diameter, variegated green and white with a dry, spongy bitter pulp⁽⁵⁾ whereas watermelon (Citrulluslanatus) is a large fruit which exceeds 60 cm in diameter with thick rind exocarp and sweet fleshy center mesocarp and endocarp. It belongs to the family of Cucurbitaceae. Being a desert vine plant, it grows in sandy, arid soils, native to the Mediterranean Basin and Asia whose geographical distribution comprises the west coast of north Africa, eastward through the Sahara, Egypt until India. Different parts of the plant like leaves, stem, root, fruit and seed have been used in traditional medicine for many centuries. Though it has many medicinal values, it has toxic effects too. Because of its toxic effects, Citrullus have been placed amongst top 10 toxic plants.



Figure – 1: Citrulluscolocynthis.



Figure – 1α – Citrulluslanatus

CASE REPORT:

A 38 years old female patient presented to casualty with history of around 20 episodes of blood stained loose stools per day for 2 days, 3 hours following consumption of bitter apple (Citrullus colocynthis – half fruit) which was prescribed for her skin rash as native treatment.

She developed diffuse abdominal pain, colicky in nature, 2

episodes of vomiting and dizziness. She had no past history of hemorrhoids, fissure, inflammatory bowel disease and peptic ulcer disease. On examination, her pulse rate was 110/min, blood pressure was 70/50 mmHg and respiratory rate was 14/min. SpO2 was 96%. Abdomen examination revealed diffuse tenderness and normal bowel sounds and no organomegaly. Examination of other systems was normal. As there was no travel history, preceding history of fever and she developed symptoms within 3 hours of consumption of fruit, her symptoms are attributed to poison.

Blood parameters (Hemoglobin, Total count, Platelet), Renal and Liver parameters, Urine Routine, Chest radiograph, Ultrasonogram of Abdomen and pelvis were normal. S.electrolytes showed hypokalemia (k+ 3.0 mmol/L) Na+ 138 mmol/L, Blood glucose level was 59 mg/dl. Urine pregnancy test was negative. Electrocardiogram shows U waves, no ST-T changes. (figure 2a, 2b).

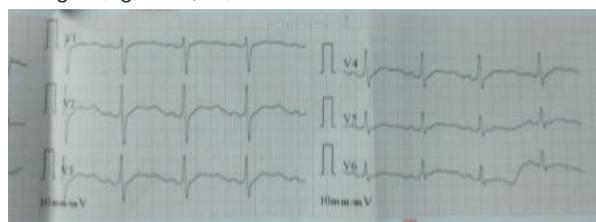


Figure - 2a:ECG (taken on Day 1) precordial leads showing 'U' waves

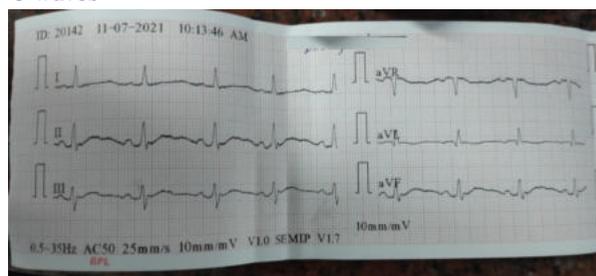


Figure –2b:ECG (taken on Day 1)-Limb leads

Arterial blood gas was normal. Stool examination showed blood and mucus. Blood culture and stool culture were normal.

She was treated with stomach wash, IV fluids (Normal saline, Ringer lactate, 5% Dextrose) antibiotics, and other supportive measures. Serial clinical and lab parameters were normal from day 3. Patient was discharged on day 7 in a hemodynamically stable condition.

DISCUSSION:

Traditionally, *C. colocynthis* has been used as a medical plant for centuries. *Colocynthis* contains a chemical called cucurbitacins, which is responsible for both beneficial and toxic effects.

Cucurbitacins are biochemical compounds found in members of pumpkin and gourd family. Chemically they are classified as triterpens, derived from cucurbitane, a triterpene hydrocarbon from the unsaturated variant cucurbit-5-ene or 19 (10- β)-abeo-10 α -labost-5-ene (figure 3a, 3b)

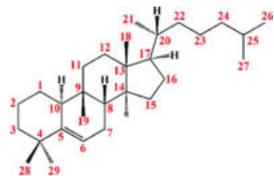


Figure - 3a

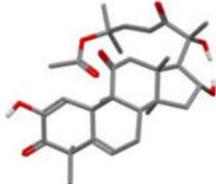


Figure - 3b

They are divided into 12 classes from A to T, which share a common feature as presence of 5(6) double bond. It imparts a bitter taste in plant foods such as cucumber, watermelon, pumpkin, zucchini.

It is used as a laxative, diuretic, emetic, hair growth promoting agent, and to treat skin eruption and insect bites. It is also used topically to treat neural pain in diabetic patients. It is believed to have antidiabetic, anti-inflammatory, anticancer, analgesic, hypolipidemic, antibacterial, antifungal, antioxidant properties and free radical scavenging activity.

The various mechanisms postulated for the wide spectrum of effects of this herb are as follows:

Anticancer activity of cucurbitacins involves the inhibition of JAK/STAT 3 pathway, MAPK pathway, thereby inhibits the proliferation, angiogenesis, induces apoptosis, cell cycle arrest at G2/M phase, inhibits cancer cell invasion and migration⁽³⁾.

Anti-inflammatory activity is due to inhibition of TNF alpha and other mediators such as Nitric oxide synthase-2, Cyclooxygenase-2⁽³⁾.

Anti-oxidant effects of *Citrullus colocynthis* is due to its methanolic extract, it eliminates free radicals like hydroxyl radicals, superoxide anions and singlet oxygen⁽⁴⁾.

Anti-atherosclerotic activity is due to its inhibitory effect on lipid oxidation products like MDA (Malondialdehyde) and 4-hydroxynonenal (4-HNE)⁽³⁾.

Anti-diabetic and anti-obesity effects by activation of AMPK pathway increases fatty acid oxidation, inhibits lipid synthesis and improves insulin action⁽³⁾. It also has cardio-protective, neuro-protective, hepato-protective properties.

The clinical spectrum of *C. Colocynthis* poisoning ranges from dysenteric diarrhoea, haematochezia, nephrosis, colic, liver impairment, hypotension and shock to other like convulsion, paralysis and death.

The most common presentation of this toxicity is acute dysenteric diarrhoea as cucurbitacins are extremely irritating to mucosal membranes particularly in the stomach and intestine.

Toxicity associated with consumption of foods high in cucurbitacins is sometimes referred to as "Toxic Squash Syndrome".

Saponin, an ingredient from pulp extract, has membranolytic

effect, aggravating the intestinal damage⁽¹⁾. Colonoscopy usually shows mucosal congestion, hyperemia with abundant exudates, erosion without any ulceration or pseudopolyp. These transient changes completely resolve after 14 days. Purgative effect is due to colocynthidin and elaterin.

For these reasons, *Colocynthis* was banned by the Food and Drug Administration (FDA) in 1991.

In case of poisoning, a dilute tannic acid solution should be given followed by large quantity of albumin-rich drink containing eggs.

The acceptable therapeutic dose of fruit ranges from 0.6 to 1.75 gram per day, seed 120-300mg (max 600mg) / day, root powder 0.2 to 0.4g / day. If the fruit is administered with its correctives such as Arabian gum, the adverse effects are reduced and large doses can be consumed⁽¹⁾.

CONCLUSION:

Any medication is a poison if not taken in a prescribed form and dose. This is also applicable to herbs and other native drugs. With pharmacogenetics which defines the individual susceptibility to the chemical compounds in any formulary, the individual response to herbal medicine is more challenging. In this scenario, patient developed acute dysentery leading to hypotension, hypokalemia to a very minimal consumption of fruit. It is also very important to identify the safe and toxic parts of the plant belonging to the same family. For example, Watermelon (*Citrullus lanatus*) and *Citrullus Colocynthis* is identified by its size. Hence proper documentation of all the benefits, side effects and identification of the safe parts of the herbal medicine is required.

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