

Patients admitted for Acute *Jatropha* Poisoning Region Medical Center, Dagupan: Profile and Clinical Outcomes of an 11-year Retrospective Study

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OBJECTIVE:

This study aimed to describe the clinical profile and outcome of children admitted for acute *Jathropha* poisoning at the Region1 Medical Center from 2001-2011.

DESIGN:

This is a retrospective descriptive study.

METHODOLOGY:

Hospital charts of children (ages 1 year to 18 years or less) included in the study were reviewed, clinical profile and outcome were described as according to age, sex, locality, clinical signs and symptoms, duration of hospital confinement and disposition upon discharge. Mean, summation, percentage and frequency distribution were used where applicable.

RESULT:

A total of 34 children were included in the study, most are females belonging to the school age-group of 7-12 years old and residing at Dagupan City. The most prominent symptom of poisoning is nausea and vomiting, followed by abdominal pain.

CONCLUSION:

All of the 34 children manifested with mild gastrointestinal symptoms, no severe poisoning was noted. Symptoms subsided several hours after ingestion, and all were discharged improved. The cornerstone in the management of acute *Jathropha* poisoning is still hydration. Limited local studies are done regarding acute *Jathropha* poisoning; hence, it is recommended to conduct more local studies regarding the poisonous effects of *Jathropha curcas*.

Keywords: *Jatropha*, Tagumbao, Phorbol esters, Poisoning

Introduction

Jatropha is a genus of approximately 175 succulent plants, shrubs and trees (some are deciduous, like *Jatropha curcas* L.), from the family Euphorbiaceae. The name is derived from Greek (*iatros* = physician and *trophe* = nutrition), hence the common name physic nut. *Jatropha* is native to Central America and has become naturalized in many tropical and subtropical areas, including India, Africa, and North America. Originating in the Caribbean, *Jatropha* was spread to Africa and Asia by Portuguese traders.¹

In the Philippines, *Jathropha curcas* is known as *Tubang-bakod*. It is very common in and about towns, found in thickets and hedges along roadsides. The name derives from its cultivation and use as a hedge or fence (bakod). The other common names are galumbang (Pampanga), kasla (Bisaya), kirisol (Tagalog), tagumbau or tagumbau-na-purau (Ilokano), tangan-tangan-tuba (Tagalog), purging nut tree, and big-purge nut (English).²

As with many members of the family Euphorbiaceae, *Jatropha curcas* contains compounds that are highly toxic. Its sap is a skin irritant, and ingesting as few as three untreated seeds can be fatal to humans.¹ As these plants are grown as an ornament they will often be found in gardens and public areas and therefore will be easily accessible. *Jatropha* are fruit bearing and the seeds have a pleasant taste, the plants are particularly attractive to children.² Furthermore, studies show that children are more susceptible to *jathropha* poisoning

when they ingest the seeds of the plant. *Jathropha* poisoning is one of the 10 leading causes of poisoning in children in the Philippines.

Every year children are admitted at Region 1 Medical Center, one of the biggest referral centers in the north of Luzon, due to acute *jathropha* ingestion or what is locally known as “tagumbau” ingestion. Details regarding the profile and outcome of these local cases are presented.

General Objective

To describe the profile and the outcome of patients with acute *Jatropha* poisoning admitted at Region1 Medical Center from 2001 to 2011.

Specific Objectives:

1. To describe the clinical profile of children admitted for acute *Jathropha* poisoning at Region1 Medical Center from 2001 to 2011
2. To determine the clinical outcome of children admitted for acute *Jathropha* poisoning at Region1 Medical Center from 2001 to 2011.

Materials and Methods

The descriptive method was used in the study by doing a retrospective analysis of inpatient charts. Descriptive statistic was used for data analysis.

Table 2 shows, most children admitted at Region 1 Medical Center due to acute *Jatropha* poisoning are from the locality of the City of Dagupan (41%) followed by nearby municipalities like San Fabian (26%) and Mangaldan (21%). Calasiao and Lingayen had 2 cases each (6 %). This distribution may be due to the proximity of the named municipalities to the hospital.

Table 2: Distribution According to locality

Locality	No. of Cases	Percentage
Dagupan	14	41 %
Mangaldan	7	21 %
San Fabian	9	26 %
Calasiao	2	6 %
Lingayen	2	6 %
TOTAL	34	100 %

Table 3 shows that all of the 34 children study population had nausea and vomiting and some signs of dehydration, with abdominal pain as second prominent symptom (53%) followed by weakness (50%). Only four (12%) of the 34 study population had diarrhea. Tachycardia or bradycardia was not seen in a any subject, though mean heart rate was 90 beats per minute.

A. Signs and Symptoms	No. of Cases n	Percentage n/N
Nausea & Vomiting	34	100 %
Signs of Dehydration	34	100 %
Abdominal Pain	18	53 %
Weakness	7	21 %
Diarrhea	4	12 %
B. Duration of Hospital Confinement		
Less than 24 hours	21	62 %
More than 24 hours	13	38 %
Total	N= 34	100 %

Table 3: Clinical Profile (Signs & symptoms/ duration of confinement)

With regards to the duration of hospital confinement, most of the study population were discharged improved less than or equal to 24 hours. The rest were discharged after 24 hours, mostly due to financial reasons. All cases were discharged with improved disposition.

Discussion

Jatropha curcas is a large coarse annual shrub or small short lived tree which can grow 3.5 to 4.5 metres (8-15 feet) tall. It has thin, often greenish bark which exudes copious amounts of watery sap when cut. The roots, stems, leaves seeds and fruits of the plant have been widely used in traditional folk medicine in many parts of West Africa. The leaves are dark green; alternate, simple, ovate to slightly lobed with 3-5 indentations. The fruit looks attractive and closely resembles the cashew fruit, though it bears no relationship to the latter. The meat of the seeds are white and oily in texture and are reported to have an agreeable taste.⁶

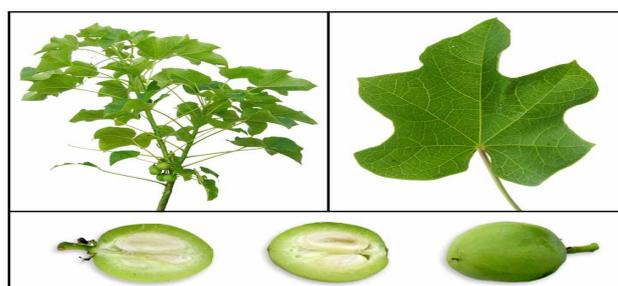


Figure *Jatropha curcas* plant with fruits and seeds

The main reasons for admission due to *Jatropha* poisoning were for some signs of dehydration and further observation. Most of acute *Jatropha* poisoning in children happen during the months of February, March and April which is the fruit-bearing season of *Jatropha curcas*, the Philippine summer months; hence, its accessibility and availability.

According to age group, 25 out of the 34 children study population belong to the school age group. It is very common in and about towns, in thickets and hedges along roadsides. Children usually pass them on their way to school and alongside play areas. They are attractive to children, having a pleasant taste. Twenty-one out of the 34 cases or 62% are girls which may imply girls getting easily attracted to their flowers and plants.

Geographic incidence of poisoning associated with it can be explained by the accessibility and proximity of the hospital to the areas in particular.

Nausea and vomiting and some signs of dehydration, with abdominal pain are the most common clinical manifestations, cause of admission of the patients. Weakness can be explained by the dehydration. Cardiac rate seem unaffected though the mean heart rate was 90 beats per minute.

In severe *Jatropha* poisoning, these symptoms progress to hemorrhagic gastroenteritis and dehydration. Polydipsia can be extreme and salivation and sweating may occur. There may be skeletal muscle spasm. Intense hyperpnea is seen together with hypotension and electrocardiographic

abnormalities. There may be CNS and cardiovascular depression. In one report, atropine-like effects developed eight hours after ingestion of *Jatropha multifida*.³ Symptoms include sweating, dry skin and mouth, slight mydriasis, mild tachycardia and flushing of facial skin which may persist for hours.² However miosis may also present in *Jatropha* intoxication. The combination of vomiting, diarrhea and miosis resemble organophosphate poisoning warranting its inclusion as a differential.⁴

Majority of the study population was discharged improved less than or equal to 24 hours probably due to mild poisoning. The poisonous property of the *Jatropha* plant is mainly due to toxin called curcin, ricin and cyanic acid, related to ricinoleic acid.⁴ In recent studies, phorbol esters have been identified as one of the main toxic agents in addition to the mentioned lectins.⁵

Phorbol esters are the tetracyclic diterpenoids generally known for their tumor promoting activity. The phorbol esters mimic the action of diacyl glycerol, activator of protein kinase C, which regulates different signal transduction pathways and other cellular metabolic activities. They occur naturally in many plants of the family Euphorbiaceae and Thymelaeaceae. The phorbol esters, even at very low concentrations, show toxicological manifestations in animals fed diets containing them. This toxicity limits the use of many nutritive plants and agricultural by-products containing phorbol esters to be used as animal feed.⁶ A study was done on the effects of *Jatropha curcas* phorbol

esters in mice revealing histopathological findings of diffused haemorrhages in lung, and glomerular sclerosis and atrophy in kidney. Multiple abrupture of cardiac muscle fibers and anachromasis of cortical neurons.⁷

Detoxification or complete removal of the potent toxins present in jatropa oil is essential before its use in industrial applications or human medicine.⁸ Curcin is a phytotoxin (toxalbumin) found mainly in the seeds and also in the fruit and sap. Phytotoxins or toxalbumins are large, complex protein molecules of high toxicity.³ Toxalbumin ricin causes severe vomiting and diarrhea, dehydration, shock, and renal and hepatic impairment. It also has cardiotoxic and hemolytic effects which may cause death.⁹

Though all parts of the plant are poisonous, seeds have the highest concentration of ricin; thus, highly poisonous.⁴ All cases of systemic poisoning have resulted from ingestion of plant material (in most cases the seeds).³ In some instances as few as three seeds have produced toxic symptoms. It has been suggested that there may be two strains one with toxic seeds and one without. Curcin, the phytotoxin or toxalbumin found in *Jatropha curcas* is similar to ricin the phytotoxin found in the castor bean. The minimum lethal dose of ricin, when administered by injection, may be as small as 1×10^{-7} % of body weight, although oral toxicity is probably several hundred times less. Children toxicity is same as adult with a few as 1-3 seeds producing toxic symptoms.¹²

Though it is commonly believed that roasting process detoxifies the seeds, catastrophies have been reported even after eating roasted seeds. A study revealed that roasting of seeds inactivated almost 100% of trypsin inhibitor activity. Although lectin activity is reduced on roasting, it was still present in high amounts. Saponins, phytate and phorbol esters were not affected by roasting.¹⁴

The management of *Jatropha* poisoning is similar to that for the castor bean (*Ricinis*). Decontamination is indicated for all known or suspected poisonings. There is no antidote. In all cases of ingestion or suspected ingestion, if possible induce emesis within 1-2 hours of ingestion with Ipecac syrup or perform gastric lavage with activated charcoal and a cathartic to hasten elimination.⁵ Hydration, either by voluntary water ingestion or intravenous fluid administration, to replace fluid lost due to vomiting and diarrhea is critical. Treatment is essentially symptomatic and supportive. Further critical analyses and investigations are fluid and electrolytes, acid-base status, complete blood count, and renal and hepatic function. Monitor level of consciousness. Specific therapy may be indicated for hemorrhagic gastrointestinal damage, skeletal muscle and gastrointestinal spasm, excessive salivary secretions and hemoglobinuria.³ Alkalinize urine to minimize effects of hemoglobinuria, treat hemorrhagic gastrointestinal damage same as for peptic ulcers, and observe for CNS depression with initiation of

assisted ventilation if necessary.⁴ After substantial exposures to toxalbumin containing plants, an observation period of up to 8 hours is advised.³ Although the available literature is scarce, all the jatropha poisoning victims reported so far are in the pediatric age group, and all presented with gastrointestinal manifestations.

Conclusion

Gastrointestinal symptoms are the predominant presenting problems of jatropha poisoning. Most cases seen at R1MC come from early school children with more female patients but their presentation is in the mild to minimal poisoning requiring most of the time hospital discharge within 24 hours.

Recommendations

Areas in the Philippines with wide distribution of Jatropha plants have to be identified with information dissemination and education focused on pupils, parents and teachers of elementary schools in endemic areas. The Toxicology unit of R1MC should have a poisoning protocol which includes jatropha.

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