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### Can Chronic Consumption of Noni (*Morinda citrifolia*) Juice Lead to Changes in the Coagulation Profile, Deranged Liver Function and Excessive Intraoperative Haemorrhage?

The Editor,

Sir,

Excessive haemorrhage in orthopaedic surgery can be due to multiple causes. One of the rarer causes is the chronic effect of certain drugs (1). Ascertaining preoperative history and stoppage of use of platelet inhibitors, thrombolytics or anticoagulants is imperative (2). Occurrence of excessive bleeding, despite the application of a tourniquet, can be mystifying.

A 68-year old hypertensive female was posted for removal of intra-medullary nail with a discharging sinus from the left tibia, under general anaesthesia. The investigations were normal except for elevated lactate dehydrogenase (LDH) of 401 U/L, prothrombin time (PT) of 16.7 seconds and international normalized ratio (INR) of 1.6.

In spite of tourniquet inflated to 300 mmHg intra-operatively, there was uncontrolled, continuous and profuse bleeding, amounting to nearly 1200 mL. The intra-medullary nail removal had to be abandoned. However, during debridement of the lower tibia, the patient continued to ooze, with the total blood loss estimated to be 1500–1600 mL. The bleeding was assessed as Grade 5, according to Fromme-Boezaart surgical field grading (3). The surgery lasted two hours with the tourniquet time of 77 minutes. Postoperatively, patient informed that she frequently consumed “noni” juice for the last six to seven years. When on noni, she also experienced vaginal bleeding which mimicked menstrual periods and stopped when noni was discontinued. Fifteen days after surgery and discontinuing consumption of noni, repeat investigations were within normal limits: PT 10.5 seconds, INR 1 and LDH 151 U/L.

People use herbal/animal products for various purposes. The commonest examples are ergot alkaloids (4),

belladonna (5) and ginseng (6). Evidence suggests excessive bleeding in patients consuming ginkgo biloba (7, 8) due to ginsenosides, which inhibit platelet aggregation by inhibiting cyclooxygenase/thromboxane A<sub>2</sub> synthase, needed for platelet function (7).

All parts of noni (*Morinda citrifolia*) are used to make “bush” medicine (9, 10). Noni juice contains multiple alkaloids (10) with anti-inflammatory activity mediated via inhibition of cyclooxygenase/lipoxygenase which is inherently associated with the process of coagulation. These are also suppressed by ginsenosides (7, 8) and non-steroidal anti-inflammatory drugs [NSAIDs] (11). In addition, chronic consumption of noni juice does cause hepatotoxicity [elevated enzymes, deranged coagulation profile to fulminant hepatic failure requiring liver transplant] (12, 13).

In our patient with chronic consumption of noni juice, occurrence of vaginal bleeding, significantly prolonged PT/INR and high levels of LDH suggest alterations in the coagulation profile, probably via hepatic enzymatic synthetic mechanisms and derangement in the liver function. The return of these findings to normalcy on stopping noni further strengthens our viewpoint.

We conclude that chronic consumption of noni may actually prolong PT/INR, elevate hepatic enzymes and such a patient may have excessive intraoperative haemorrhage. Eliciting a history of consumption of herbal products like noni, assessment of coagulation profile and liver enzymes, stoppage of noni juice and waiting until the PT/INR/liver functions become normal is recommended.

**Keywords:** Chronic consumption, elevated liver enzyme levels, excessive intraoperative haemorrhage, *Morinda citrifolia*, noni, noni juice, orthopaedic surgery

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