



Consumption of bilimbi cause acute kidney injury

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ABSTRACT

Averrhoa bilimbi is a fruit have high oxalic acid content. Excess intake of this fruit will cause acute kidney injury due to high oxalate concentration, and also increase creatinine. In case of high consumption, the only remedy is hemodialysis, but in lower consumption, the renal function will recover without specific treatment. Bilimbi contains 25.1% of oxalate, and its consumption carries a high risk of developing acute kidney injury by deposition of calcium oxalate crystals in renal tubules. The fruit plays an important role in nutrient profile like contain carbohydrates, fibers, proteins, vitamin C, vitamin B, calcium, iron, flavonoids, tannins and terpenes. It also helps to reduce the weight loss due to the high amount of dietary fiber found in bilimbi, which helps to control body weight. Here a male patient who consumed bilimbi fruit per day approximately 30 – 40 and his creatinine level become elevated to 3.49 mg/dl. With conservative treatment, the patient creatinine becomes normal within one week without dialysis. In some cases did not show oxalate crystals because of low urine excretion, here the patient had oliguria, and because of that, no oxalate crystals were found. Here the main parameter was creatinine, and during admission, the serum creatinine was 3.49 mg/dl on the first day then 2.97 mg/dl on the second day, 2.39 mg/dl on the third day and 1.19 mg/dl on fourth day and from the fifth day to the seventh day the patient was serially monitored the serum creatinine. It was 1.19 mg/dl.



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INTRODUCTION

Plant toxins are known to cause acute kidney injury. (Nair *et al.*, 2014). Acute kidney injury {AKI}

in case of high creatinine level because of high consumption of bilimbi fruits. Irumban puli {Averrhoa bilimbi} is a local fruit in south India which has high oxalic acid content and consumption distension a high risk of developing acute kidney injury by deposition of calcium oxalate crystals in the renal tubule. This report describes the patient consume bilimbi, especially in dehydration can precipitate to Acute kidney injury due to its high oxalate content. (Neto *et al.*, 1998).

Here present a case report who developed ARF after consumption of bilimbi fruit with previously normal renal function had AKI. The patient was treated conservatively, and renal function return to normals. Bilimbi fruits are very sour and are used in the production of vinegar, wine, pickles, jams, and jellies and the preparation of south Indian dishes. (Unni

et al., 2013). Averrhoa bilimbi, both belong to the family of Oxalidaceae, the members of which contain high oxalic acid. (Samad *et al.*, 2017). Compare with fruits, the leaves of bilimbi contain a high amount of oxalic acid, and the leaves are used for the treatment of abdominal pain, mumps and rheumatism. The fruits are juicy, small and very acid.

A 32 years old man presented with acute renal failure following oxalate ingestion. (Konta *et al.*, 1998). He developed acute kidney injury with previously normal kidney function, and he was normal without hemodialysis session or any specific treatment 7 days later with serum creatinine 1.19 mg/dl. In this case, did not show oxalate crystals because of oliguria (low urine output less than 400 mL due to abnormal kidney function).

Case Report

A 32 years old male, who is working as a driver presented with left upper abdominal discomfort, low-grade fever and headache for 2 days. He also had complaints of bilateral flank pain, non-radiating, left more than right. He had a history of Bilimbi fruit since the last one week. On examination, he had periorbital edema, the patient was conscious, oriented, pressure 120/80 mmhg, urine routine examination was within normal limits, and his systems were normal. Initial blood investigations revealed a serum creatinine of 3.49mg/dl and his serum creatinine values were serially monitored and found to be down trending, neutrophils 68.6 % (neutrophilic leucocytosis), in liver function test T.bilirubin 1.32 mg/dl and D.bilirubin 0.41 mg/dl.

Abdominal examination revealed distension of abdomen with no edema and no free fluid in abdomen CT abdomen was done to rule out obstructive uropathy and was reported as normal. Urinalysis shows no albuminuria. USG abdomen revealed normal-sized Kidneys with normal corticomedullary differentiation. In this case, patient urine excretion is low because of that urinary oxalate crystals are not detected, when used in high concentration, the fruit can lead to ARF due to acute tubular necrosis, owing to its high oxalate content, which results in intratubularoxalate crystal deposition. On admission serum, creatinine was 3.49mg/dl. He was discharged 7 days later with serum creatinine 1.19 mg/dl.

Averrhoa bilimbi is a small tree mainly seen in tropical areas. (Gupta *et al.*, 2016). Averrhoa bilimbi is a commonly used fruit in South India for various home preparations and as a traditional remedy for hypercholesterolemia and hypertension (Mahamoodh *et al.*, 2018). The various side effects of bilimbi include renal and neurological side

effects like muscle weakness, intractable hiccups, mental confusion, seizure. (Caetano *et al.*, 2017). This oxalate-rich fruit, commonly known as bilimbi, cucumber tree, or tree sorrel. (Neto, 2014).

Due to high oxalic acid content of bilimbi, developed Acute renal failure after consumption of bilimbi juice. Some case reports of Acute renal failure is published due to consumption of bilimbi. Nephrotoxicity in people is a rare event, and only a few case reports publish worldwide. (Barman *et al.*, 2016). Here all the history and clinical information of patient during a hospital stay is shown in Table 1.

Table 1: History and clinical information who developed acute kidney injury

S.No	History	Clinical information
1	Age (years)	32
2	Sex	Male
3	Comorbidities	Nil
4	Bp	120/80 mmhg
5	Edema	Nil
6	Oliguria	Yes
7	Urinary oxalate crystals	Nil
8	USG abdomen (kidney size)	Normal
9	Highest serum creatinine	3.49 mg/dl
10	Kidney biopsy	Not done
11	HD done	Not done
12	Fruits consumed per day (approx)	30-40
13	Recovery time (weeks)	1 week
14	Lowest serum creatinine	1.19 mg/dl

High consumption of bilimbi cause Acute renal failure, especially in empty stomach or dehydration can lead to Acute renal failure due to acute tubular necrosis, owing to its high oxalate content which results in intratubular oxalate crystal deposition, but here our patient not consumed that much, and only serum creatinine was declined up to 3.49 mg/dl, and he was discharged 7 days later with serum creatinine 1.19mg /dl by withdrawing the consumption of bilimbi for 1 week.

His creatinine was serially monitored and found to be down trending (1.19mg/dl), so hemodialysis was not preferred to this patient with previously normal renal function had acute kidney injury after consumption of bilimbi juice. The serially monitored serum creatinine during the hospital stay is shown

Table 2: Serially monitored creatinine during hospital days

S.No	Days	Creatinine
1	First day	3.49 mg /dl
2	Second day	2.97 mg /dl
3	Third day	2.39 mg /dl
4	Fourth day	1.19 mg /dl

in Table 2 and its down trending. With adequate hydration, the patient had symptomatic improvement. Here did not show oxalate crystals because of oliguria but had Acute Interstitial Nephritis. Timely referral of patients with established AKI to centers with dialysis facilities will improve outcome. (Jha and Parameswaran, 2013). In Brazil, it is popularly known as “azedinho”, “bilimbi”, “biri-biri” and “limão-caiena”. (Sá et al., 2019).

CONCLUSIONS

It is not safe to consume high oxalate containing fruits, especially in concentrated forms that too in large quantities. Compare with other fruits bilimbi contain high oxalic acid (25.1mg/100g). Regular intake of Averrhoa bilimbi will cause kidney failure by deposition of calcium oxalate crystals in renal tubules. Most of the patients are unaware of this fact. Studies have shown that oxalate contents vary in different parts of the plant, but that, generally the highest concentrations are found in leaves.

When high concentration is used, the fruit juice can lead to Acute renal failure due to Acute oxalate nephropathy because of high oxalate content results in the deposition of oxalate crystals in renal tubules. Oxalates not only can cause kidney stones (calcium oxalate kidney stones) but also may be responsible for a variety of health problems related to inflammation, auto-immunity, mitochondrial dysfunction, mineral balance, connective tissue integrity, urinary tract issues and poor gut function. Oxalic acid can harm glandular function, connective tissue function, neurological function and the function of the tissues of excretion, particularly the kidneys and bladder.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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