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CASE REPORT THE POTENTIAL ANTI HYPERTENSIVE EFFECTS OF THE AFRICAN OILBEAN SEED - *Pentaclethra Macrophylla Bentham*

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INTRODUCTION

In Nigeria, several trees which yield fruits of nutritional and medicinal importance have been identified within the forest and savannah regions. One such important but less known legume protein source is the African oil bean seed. While the literature shows its effect in treatment of hypercholesterolemia, reduced risk of cancer and tobacco-related diseases, no case study from the available literature search has reported its antihypertensive effect. We report a case of resistant hypertension that improved remarkably on ingestion of the African oil bean seed, with a call for more studies and clinical trials on the possible antihypertensive property of the African oil bean seed. Extraction of the likely putative content may increase the available literature of anti hypertensives available for patient care.

Case Summary

A 52 year old local government councillor who hails from Umuahia and resides in same place. He is a Christian of Pentecostal denomination with tertiary institution as the highest educational status. He was admitted through the Accident and Emergency unit of Federal

Medical Center Umuahia Abia state with history of hiccups, generalised body weakness and shortness of breath at rest of 3 weeks duration. There was also a history of early morning facial puffiness, anorexia and occasional vomiting. There was neither a history of reduction in urine frequency and volume, orthopnea, paroxysmal nocturnal dyspnoea, intake of herbal preparations, passage of coke coloured urine nor skin rashes in the past. Also there was no history of significant alcohol nor cigarette intake.

He is a known diabetic diagnosed 11 years ago, has been on oral hypoglycaemic drugs, compliant to medications and clinical appointments. Also diagnosed hypertensive about 3 years ago and has been on lisinopril 10mg daily and Amlodipine 10mg daily.

Physical Examination

Physical examination findings reveal a middle aged man, restless, afebrile to touch, pale, dehydrated, anicteric with bilateral leg oedema up to the knees. Weight = 68kg, Height 1.56m, BMI = 27.9 kg/m^2

Pulse rate was 80 b/m, Blood pressure (BP) was 190/110mmHg. The apex beat was located at the 6^{th} left inter coastal space lateral to mid clavicular line with first, second and fourth heart sounds.

The central nervous system revealed a conscious patient, well oriented in time, place and person, restless with flapping tremors of the outstretched hands. Respiratory and Abdominal examinations were unremarkable.

Diagnosis

A diagnosis of Chronic Kidney Disease with uraemia from Diabetic Nephropathy complicated by anemia, hypertension (with hypertensive heart disease) and uraemic encephalopathy was

made.

Investigations

Admitting Random Blood Sugar was 163mg/dl while Packed cell volume was 17%. Urinalysis done at presentation showed Protein of 2+, blood of 2+ and Sugar of 1+. The result of urgent serum electrolyte, urea and creatinine came out showing

Urea- 258 (10-55)mg/dl, Creatinine- 22.3(0.5-1.5)mg/dl, Sodium- 134 (135-145)mmol/l Pottasium- 5.8 (3.0-5.5)mmol/l, Bicarbonate-12 (20-28)mmol/l, Chloride-101(98-106)mmol/l. Estimated Glomerular filtration Rate(eGFR) was calculated to be 3.7mls/min/1.73m^2.

The following additional investigations were requested for; Grouping and crossmatching of 3 pints of blood, renal scan, Urine microscopy, Serum albumin, calcium and phosphate, renal ultrasound scan.

Treatment

He was placed on IV Frusemide 80mg 12hourly, Tabs Aldomet 500mg 12hourly, Tabs Amlodipine 10mg daily, Tabs Gliclizide 80mg 12hourly, Calcium carbonate, Vitamin D_3 and haematinics, to discontinue Metformin (eGFR<20mls/min) and Lisinopril (due to the uraemic state). An urgent session of hemodialysis was prescribed for the patient with intradialysis transfusion of one pint of packed cells. He was to receive further three pints of blood after the dialysis.

Follow-Up

Ten days later, the patient was noted to have made remarkable improvement as evidenced by resolution of presenting symptoms and resolution of asterixis and edema state. He had received a total of three sessions of hemodialysis, three pints of blood and was on medications earlier prescribed. However his blood pressure remained persistently elevated, lowest

recording being systolic BP of 170mmHg and diastolic BP of 100mmHg. Intradialytic BP recordings showed an average of 170/90mmHg. The dose of anti hypertensives (Aldomet, Amlodipine) were increased in succession to maximal permissible doses and latter introducing Doxazocin (cadura) which was gradually increased to the highest dose after one week. Also patient continued taking oral frusemide and other medications earlier prescribed. The dietician was invited to review the meals with the view of placing patient on low salt diet and other dietary modification. However, there was no appreciable reduction in the blood pressure of the patient. The BP profile over a 10 day period is illustrated below.

Days	**Admission**	**Day 1**	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Bp (mmHg)	190/110	195/110	190 /100	185/100	180 /100	185/100	180 /90	170 /100	180 /90	175 /90	175 /90

Two weeks later, the patient requested for discharge due to unavailability of funds. His request was granted, BP on discharge been 170/100mmHg. He was to be seen one week later in the clinic.

Two weeks later, the patient reported to the clinic with a BP of 100/70mmHg. Further inquiry showed that the patient discontinued all the medications two days after discharge having being told by a friend to take the fermented African oil bean seed(ugba). He takes two seeds a day and the home BP recording was as follows:

Days	**MON**	**TUE**	**WED**	**THUR**	**FRI**	**SAT**	**SUN**	**MON**
Bp (mmHg)	100/70	100/60	110/72	120/60	115/65	110/70	125/63	110/65

However the patient presented with bilateral pitting ankle oedema, minimally deranged serum electrolytes and severe hyperglycemia. He had a session of hemodialysis same day with three episodes of intradialytic hypotension despite the minimal ultrafiltration of 500mls prescribed.

Two weeks later, patients BP profile remained remarkably normal, highest recorded value been Systolic BP of 130mmHg and Diastolic BP of 85mmHg.

During an informal group discussion in the dialysis unit, the patient shared the findings with other patients who came for maintenance hemodialysis. Two of the patients tried it and reported similar reduction in their blood pressure within one week necessitating self discontinuation of their anti hypertensive despite medical advice against doing so.

Discussion

In Nigeria, several trees which yield fruits of nutritional and medical importance have been identified within the forest and savannah regions. One such important but less known legume protein source is the African oil bean seed - *Pentaclethra macrophylla* (Benth).

It belongs to the natural order *Mimosaceae* and is used as food in various parts of Africa. It is consumed by an estimated 15 million people in Eastern Nigeria, majority of who are Igbos[1].The Nigerian fermented oil bean seeds are called *Ugba* by indigenes of Abia, Imo and Ebonyi states, *Ukpaka* by Enugu and Anambra States and *Ukana* by the Efiks. The method of preparation varies from one community to another resulting in a non-uniform product[2]. It is widely consumed in South Eastern states of Nigeria with tapioca, stockfish and garden eggs and leaves. It can also be eaten with bitter kola *(Garcinia kola)* or kola nuts *(Cola acuminate* and C. *nitida)* and when prepared with garden-egg leaves is used to eat yam and cocoyam [3,4]. It is an important and cheap source of protein for people whose staple foods are deficient in proteins[5].

SOURCE; Oilbean seeds are obtained from a perennial legume tree, *Pentaclethra macrophylla, Bentham,* commonly called the oilbean tree. The fruit is a black, hard and woody pod measuring about 32-36 cm long and 6-10 cm broad. When mature it splits open explosively to release about eight flat, glossy brown seeds measuring about 5-7 cm in diameter and weighing between 15-20 g [6].

In Africa, *Pentaclethra macrophylla* Benth exists in Nigeria and Angola; *Penthdethra etveldema* is wild in Gabon and Congo basin; and *Penthdethra macrolabtze* is indigenous to South America especially in Amazon, Brazil and northwards to West Indies.

PROXIMATE COMPOSITION OF OILBEAN SEED; The unfermented oilbean seeds contain 4-17% carbohydrate, 44-47% oil which has been found to be rich in oleic acid, linoleic acid and lignoceric acid.[7]

TABLE 1: fatty acid composition of African oilbean seeds[1]*

COMPOSITION	VALUE
Yield of oil (%)	46.3
Saturated fatty acids	
Palmitic acid	3.4
Behenic acid	5.2
Lignoceric acid	12.0
Unsaturated fatty acids	
Oleic acid linoleic acid	29.0
Linoleic acid	42.8
Linolenic acid	3.2
Gadoleic acid	0.28

* As percentage of total oil.

Also the unfermented seeds have been found to contain 36.2-43.89% crude protein which contains the 20 essential amino acids. The high content of the essential amino acids makes the seeds a rich source of protein [8].

TABLE 2: Amino acid content (g/100 g protein) of African oilbean seeds[1]

AMINO ACIDS	CONTENT
Aspartic acid	7.95-10.30
Threonine	3.27-4.54
Serine	4.80-5.54
Glutamic acid	9.32-11.60
Praline	2.90-5.77
Gly cine	3.84-4.62
Alarnine	3.81-4.70
Cysteine	1.10-4.80
Valine	4.90-6.60
Methionine	0.90-1.80
Isoleucine	3.30-4.88
Leucine	5.30-6.68
Tyrosine	1.80-5.58
Phenyl lalanine	5.01-7.00
Lysine	5.46-6.97
Histidine	1.53-2.44
Arginine	4.70-6.53
Tryptophan	1.15-1.78

The vitamin content of African oil bean seed is low and the fermented product contains niacin (0.30g/kg), riboflavin (0.30g/kg) and thiamin (0.07g/kg) [9,10]. Raw African oil bean seed has a high fiber content (71.21g/kg), which is not affected by cooking and fermentation. Hence it may be a good source of dietary fiber which improves large

bowel functioning and reduce plasma cholesterol in the body[11].

The energy value (67,340 kJ/kg) of fermented African oilbean seed showed that African oilbean seed is a good source of gross energy[11]. African oilbean seed is a good source of potassium, phosphorus, calcium, magnesium, sodium, manganese, iron, copper and zinc, which are significantly reduced during processing[11]. The quantities of manganese, copper and zinc in African oilbean seed are however adequate for dietary purposes[11]. The result of a recent study inOwerri by Allinor et al showed that 100g (about 5-7seeds) of African oilbean seed contains more sodium, copper, iron and zinc than the standard recommended dietary allowance(RDA) per day by the world health organisation. However it contains less potassium, calcium and magnesium than the RDA per day[12].

TABLE 3: Mineral Composition of African oilbean seed samples (mg/100g)[12]

MINERALS	**VALUE ***
Sodium,	906.60±0.02
Potassium	1178.93±0.03
Calcium	329.59±0.02
Magnesium	292.90±0.04
Iron	140.97±0.03
Copper	706.73±0.02
Zinc	1134.36±0.02
Phosphorus	4.39±0.03
Na/K	0.77
Ca/P	75.08
Ca/Mg	1.13

***** Values are mean±standard deviation of triplicate determination

African oil bean seeds contain saponins or phytochemicals that, together with the unsaturated fatty acids, can reduce cholesterol levels[10]. Findings in a study done in Nigeria suggest that patients who regularly eat ugba had reduced risks of cancer and tobacco-related diseases[13]. The seed can also treat anaemia since it increases the amount of haemoglobin from its supply of amino acids.

The Na/K ratio in the body helps in controlling high blood pressure[12]. A food source

having Na/K ratio of less than value of 1 has impact in lowering blood pressure[14]. The Na/K value of 0.77 obtained from analysis of the African oil bean seed indicates that African oil bean seed will not promote high blood pressure because of low Na/K value. However no case report has been documented from the available literature search on this potential antihypertensive effect of the African oilbean seed. The mechanism of action of the different classes of antihypertensive include ieresis, centrally acting, calcium channel blocking, *B*-adrenoceptor blocking, Renin angiotensin aldosterone blocking. None of the discovered contents of the African oilbean seed is known to act through any of the mechanisms described above.

We therefore hypothesize that the African oil been seed may have antihypertensive effect arising from either its nutritive value (as alluded to earlier) or a yet undiscovered content with putative antihypertensive action. We therefore call for elaborate studies to look into this phenomenon with a view of possibly extracting the content or elucidation possible mechanism responsible for this. Such an effort might increase the literature of antihypertensives available for patient care.

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