

ANABOLIC EFFECT OF *BOMBAX CEIBA* LINN. ROOT IN IDIOPATHIC INVOLUNTARY WEIGHT LOSS – A CASE STUDY

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ABSTRACT: *Bombax ceiba* Linn. is a popular plant among native communities for its medicinal properties. The root is specially used for debility and impotence. We report a case study of a patient of involuntary weight loss without any detectable cause who was administered 1.5 g of *B. ceiba* root powder with milk for 24 weeks. He regained his weight and achieved normal body mass index (19.9 Kg/m²) with 147% rise in fibrinolytic activity and marked improvement in his total antioxidant status without any undesirable side effects with its administration or withdrawal symptoms after its discontinuation. This case study, first time scientifically documents anabolic potential of *B. ceiba* root powder, which the indigenous communities have been utilizing since ages.

Key words: Semal musli, Silk cotton tree, β -sitosterol, antioxidant, fibrinolysis, BMI

INTRODUCTION

Bombax ceiba Linn., a large, deciduous tree, commonly known as Silk Cotton Tree, Indian Red Kapok tree, Semal, Shimul, Shalmali etc.; is a member of family Bombacaceae. It is found throughout India and other parts of tropical and sub-tropical Asia, Australia and Africa¹. The plant is among five trees of 'Panchwati' and therefore, has spiritual importance². Ayurvedic scripture 'Rajnighantu' has beautifully described its characteristics and properties. It states that the tree is Yamadruma, Diirghadruma, Kantakdruma, Nirgandhpushpi etc. It has beautiful red flowers and large fruits. It yields gum and cotton. It is large and long living tree species which give strength to body, mind and heart³.

The plant is quite popular among the tribal communities of Udaipur for the treatment of various diseases. Almost every part of the plant possesses medicinal properties. The young roots of *B. ceiba* have been reported to be useful in diarrhoea, dysentery, urinary troubles, gynecological problems, bladder disorders, heart diseases, debility, diabetes and impotence^{4,5}.

Recent scientific researches have shown that the flowers, leaves and stem of *B. ceiba* possess strong anti-inflammatory, antibacterial, antiviral, analgesic, oxytocic⁶, antioxidant⁷, hypotensive⁸, hypoglycemic⁸, antiangiogenic⁹ and hepatoprotective¹⁰ activities. Lately the root (Figure 1) has been evaluated for its fibrinolysis enhancing¹¹, antihyperglycemic¹² and antioxidant¹³ properties in human volunteers.

We report the first clinical case study of a person who was moderately malnourished, lost 10 % of the body weight without any obvious cause and achieved normal body mass index (BMI) after 6 months of *B. ceiba* root powder administration.

Case Study

A fifty six years old male, non-alcoholic, non-smoker librarian, living in a joint family approached Indigenous Drug Research Centre, RNT Medical College, Udaipur with a history of loosening of clothes and gradual weight loss during last six months without any

major illness. He had no change in his appetite nor there any acute illness, trauma, sepsis or surgical intervention. There was no major alteration in his dietary pattern, bowel habits or exercise schedule. There was no history suggestive of precipitation of stressful situation during last six months and no history of drug or substance abuse.

General physical examination revealed a normally built but under nourished male with 45 kg weight and a height of 160 cm. The pulse rate was 72/minute, regular, normal volume and character, the vessel wall was just palpable. Resting supine blood pressure was 120/80 mmHg without any postural fall.

Laboratory parameters revealed that he was non diabetic, with normal lipid profile, normal liver, kidney and thyroid functions with reduced fibrinolytic activity and reduced total antioxidant status (Table 1, Figure 3). Serum albumin, serum total iron binding capacity, prothrombin time, serum creatinine and blood urea nitrogen were within normal range reflecting normal protein intake and normal muscle mass. His serum was negative for both HIV 1 and 2 antibodies. Abdominal ultrasound, CT scan and upper and lower endoscopies did not reveal any abnormality. Age specific cancer screening was normal including prostate specific antigen (PSA). Psychiatric consultation did not reveal evidence of depression,

dementia, anorexia nervosa or other emotional problems.

Body mass index (BMI) which is the reference standard for normal body weight was calculated as weight in kilograms divided by height in square meter. It came out to be 17.57 Kg/m² which mean that the person was moderately malnourished (BMI <18.5 Kg/m²)¹⁴.

In absence of any obvious physical and psychological causes, the diagnosis of involuntary weight loss (IWL) of unknown cause was made. After informed consent, he was put on *B. ceiba* root powder in the dose of 1.5 g daily with a glass of milk. The dose was based on ethnomedicinal recommendations and our previous experiences with the plant^{11,15}. He was evaluated every month for weight gain and symptoms. Blood parameters were repeated after completion of the treatment. Throughout the study period, he maintained his dietary and exercise schedule which he was taking during last six months. Once the patient achieved normal BMI, then *B. ceiba* root powder was stopped and the patient was followed for next three months for any withdrawal symptoms.

Blood parameters for sugar, lipid profile, and liver and kidney functions were repeated after six months which were remarkably stable. Fibrinolytic activity

Table 1: Blood parameters before and after administration of *B. ceiba* root powder

Sr. No.	Parameter	Initial	24 weeks
1	Blood sugar (mg/dl)	88.00	99.00
2	Total Cholesterol (mg/dl)	88.80	110.34
3	Triglycerides (mg/dl)	100.00	76.77
4	HDL-C (mg/dl)	32.08	48.88
5	LDL-C (mg/dl)	36.72	46.11
6	VLDL-C (mg/dl)	20.00	15.35
7	Fibrinolytic activity (Units)	48.71	120.39
8	SGOT (IU/L)	20.00	13.00
9	SGPT (IU/L)	15.00	21.00
10	Alkaline phosphatase (IU/L)	129.00	66.00
11	Blood Urea (mg/dl)	30.00	32.00



Figure 1 : Roots of *Bombax ceiba* Linn.

which was reduced in the beginning was enhanced by more than 147 % (Table 1). It was interesting to observe that the total antioxidant status which was quite low (0.31 mM/L) before the administration of *B. ceiba* root was improved and achieved normal status (Figure 3). The most remarkable objective improved was the weight which increased progressively (Figure 2) and at the end of six months patient achieved 51 kg and a BMI of 19.9 Kg/m² which was in the normal range (18.5-24.9). There were no untoward effects observed during the entire period of *B. ceiba* administration and no withdrawal symptoms observed after stopping it.

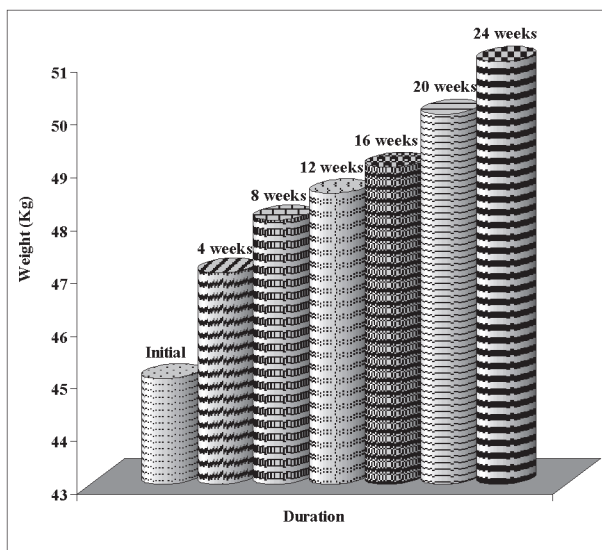


Figure 2 : Progressive weight gain (Kg) after *B. ceiba* administration

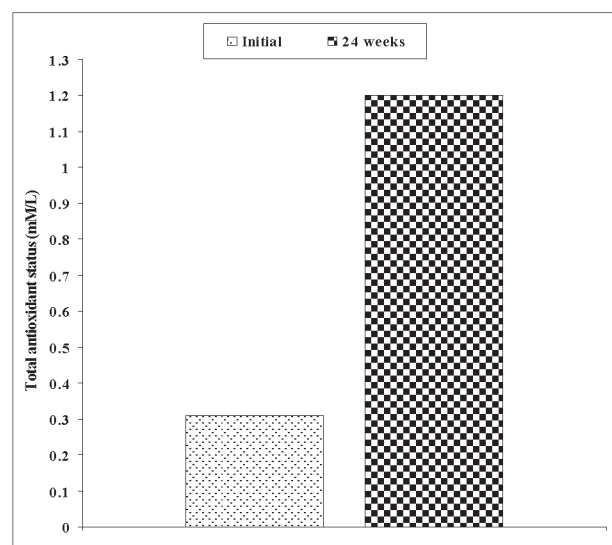


Figure 3: Remarkable improvement in total antioxidant status after administration of *B. ceiba* root powder

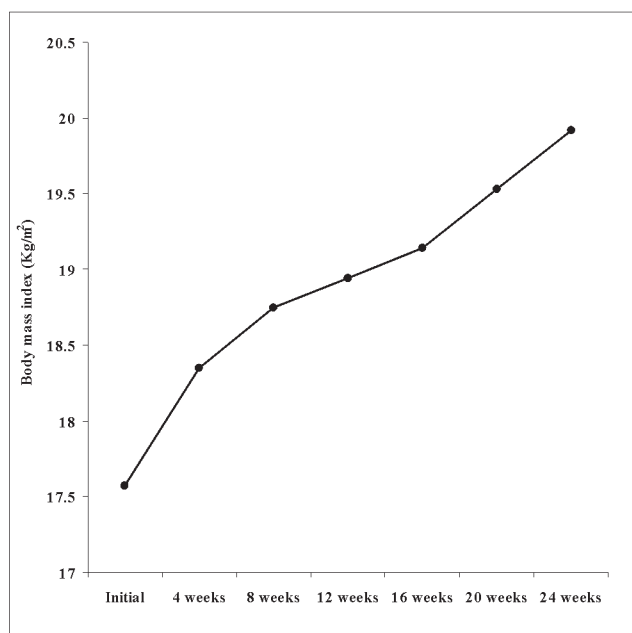


Figure 4: Progressive increase in Body mass index (BMI)

DISCUSSION

Body weight is determined by a person's calorie intake, absorptive capacity, metabolic rate and energy losses. The metabolic rate can be affected by a multitude of medical conditions through the release of various cytokines, such as cachetin and interleukins. Body weight normally peaks by the 5th and 6th decade and then gradually declines at the rate of 1 to 2 Kg per decade. When the weight loss exceeds 5 % or more of the usual body weight over a 6 to 12 months period, then it indicates serious physical or psychological illness.

Involuntary weight loss is regarded as clinically significant when the weight loss exceeds 5 %. The most common causes of involuntary weight loss include malignancy, gastrointestinal disorders (mal-absorption, pancreatic insufficiency) and psychiatric disorders (dementia, depression, anorexia nervosa). In approximately 15-25% of cases of IWL, no obvious cause can be found for weight loss¹⁶.

The present case, after excluding all, physical and psychological causes with relevant investigations, come in the category of idiopathic IWL with no definite attributable cause for weight loss. The treatment strategy for such patients rest solely on pharmacological agents which include appetite stimulants, anabolic agents and anticatabolic agents with varying degree of side effects and withdrawal symptoms especially which occurs with anabolic steroids.

In the present case of IWL, *B. ceiba* root powder was administered in the hope that its anabolic effect as mentioned in the ethnomedicine, might prove helpful and in fact, it did. The patient gained weight on an average of 1 kg/month (Figure 2) and at the end of six months he achieved 51 kg which has recovered his 10 % loss during last 6 months. Along with this, the BMI, the reference standard for normal body weight, which placed the patient under the category of moderately malnourished, increased to 19.9 kg/m², which is normal for this patient (Figure 4).

Chemical investigations worldwide have revealed that root of *Bombax ceiba* is rich in lupeol, β -sitosterol, sesquiterpenes, flavanoids, steroids, calcium and naphthaquinones¹⁷⁻²⁰. Recently some new sesquiterpenoids named as Bombamalones A-D,

Bombamaloside, Lacinilene, Bombaxquinone have also been isolated from the roots by Zhang and associates²¹.

Strong antioxidant potential of its roots has also been observed both in *in vitro* and *in vivo* studies by our group¹³ and can very well be attributed to its phytoconstituents such as flavanoids, phenolics, steroids and sesquiterpenoids; which are well known for their antioxidant potential²²⁻²⁵. Along with this, root powder of *B. ceiba* has also proved to be a good fibrinolysis enhancing agent in healthy volunteers in our earlier study¹¹.

It is difficult to incriminate the anabolic activity to any specific component present in the root. However, it can be possibly explained on the basis of presence of high amounts of steroids in the root. Steroids are well known compounds for their anabolic effect along with some side effects. It is likely that various phyto-sterols like β -sitosterol present in root of *B. ceiba* may be involved directly or indirectly in the observed anabolic effect in form of weight gain and muscle mass; without causing any untoward effects and withdrawal symptoms. It is plausible that these steroids may have activity like that of 5- α -reductase; the enzyme that catalyzes the conversion of testosterone to 5- α - dihydrotestosterone (DHT). DHT is more potent than testosterone and might have strong androgenic effect. However, it is quite conjectural in absence of objective evidence. Moreover, its anti-catabolic effect cannot be ruled out. Therefore, further studies in these directions are warranted to establish this important property of *B. ceiba* root.

The present case study strongly favors the use of *B. ceiba* root powder in situations of involuntary weight loss where there is no detectable underlying cause such as malignancy, mal-absorption or mental illness. The treatment in such situation is proper diet and pharmacological agents which stimulate appetite or have anabolic or anti-catabolic activities. In this regard, *B. ceiba* root has not only been proved effective anabolic but also strong antioxidant and fibrinolysis enhancing agent without any side effects.

These beneficial properties of *B. ceiba* root can very well be utilized to slow down the wasting and weight loss in AIDS patients where the main strategies have been limited to supplementation of high caloric drinks

and anabolic steroids. These pharmacological agents are not very safe and invariably bring side effects. *B. ceiba* root powder, which is nutritive, relatively safe, cheaper, having reasonably good anabolic effect with added advantage of its antioxidant and fibrinolysis enhancing properties, might prove useful in these patients. However, it needs further scientific evaluations.

In conclusion, this is the first human case study documenting the anabolic effect of *B. ceiba* root powder administration in patient with idiopathic involuntary weight loss. The patient regained his BMI with a feeling of well being and also gained the benefit of improvement in fibrinolytic activity and total antioxidant status. However, well controlled studies are warranted to establish it, as a safe and effective herbal anabolic agent.

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