



## Review Article

The pharmacological and phytochemical study of *adansonia digitata*Gautam Kumar<sup>1</sup>, Girendra Kumar Gautam<sup>1</sup>, Ravi Kumar<sup>1,\*</sup>, Harshit Rana<sup>1</sup><sup>1</sup>Dept. of Pharmacy, Shri Ram College of Pharmacy, Muzaffarnagar, Uttar Pradesh, India

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## ABSTRACT

Adansonia digitata is a unique tree with their tender root, twigs, seeds, leaves, tubers, fruits and flowers which are edible. The Adansonia are also used for treat of various types of disease/disorder due to their nutritional and chemical contents. This plant is mostly found in South Africa and Asian countries. In this paper, we represent the nutritional benefits of Adansonia digitata tree parts vise its fruits pulp, seeds, and leaves etc. The medicinal properties of the tree parts as well as the medicinal compound contained are discussed on addition. In this paper, the nutrition benefits of seeds oil are concluded use as premium oil.

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## 1. Introduction

Adansonia digitata is also known as baobab and pharmacist tree.<sup>1,2</sup> It is found in South Africa. Baobab tree is very different than another tree.<sup>1</sup> The fruit pulp of baobab is used to prepare drink, sweets and sauces and also recently used in formulation of ice creams. It is used as a source of food Complement. The daily intake of baobab is providing energy, carbohydrates, and protein for children and pregnant lady.<sup>3</sup> It is a very long-lived tree and their parts widely used as foods, medicine, fibers etc. The tree provides food, clothes and medicine to fight several types of disease. Baobab tree height is very long and width is about 5-6 meters.<sup>4</sup> Adansonia digitata have several types of action such as anti-inflammatory, anti-oxidant, anti-pyretic and anti-diabetics activity.<sup>1</sup> Baobab tree have secondary metabolites to give medicinal value. This extract is prepared by different part of plant such as flowers, root, seeds, stem and fruits.<sup>5</sup> Baobab fruit pulp contain a highly valuable source of ascorbic acid approximately six time more than the content of an organ<sup>6</sup> and also

contain the highest level of pro vitamin A was collected in the young leaves, especially when they are used as dried material.<sup>6</sup> Stem bark of Adansonia tree can be used for treatment of several diseases such as typhoid fever, malaria and UTI (urinary tract infection).<sup>5</sup> The fruit pulp of baobab is used as medicine like antipyretic (febrifuge), anti-dysenteric, diaphoretic, immunostimulant, analgesic, anti-inflammatory and probiotic, and also used to treat diarrhea in children & help to milk production in breastfeeding women. Baobab tree show many effects such as cardio protective, anti-tumorand hepato protective effect.<sup>3</sup> The previous biochemistry analysis revealed that the leaves, seeds and the fruit pulp of baobab are rich in nutrients.<sup>7</sup> Baobab fruit pulp is contain more amount of vitamin C and it is a good source of iron, calcium and magnesium, vitamin c (ascorbic acid) and dietary fibers content in baobab tree represent the most important natural source of ascorbic acid, while the leaves represent the content on pro vitamin A.<sup>6</sup> A recent researcher's suggests that there are two different species of Adansonia in mainland Africa, as the tetraploid A. digitata (found on 'lowland baobab') and the diploid A. kilima (found on 'hill baobab').<sup>8</sup> The baobab tree leaves are used in the formation of soup, and

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seeds are used as thickening agent in soup, but they can be used as flavoring agent and eaten as snacks.<sup>7</sup> The baobab product is used for 17 medicinal uses, 7 food uses, and 1 construction uses.<sup>9</sup> The baobab species have been known to provide shade, edible fruits, resins, aesthetic sight, gums, pharmaceutical product, tannins, oils and leaves.<sup>10</sup> The socio-economic importance of the species is highest because the tree is used for various purpose.<sup>11</sup> Its major constraints are the quality changes during storage and production.<sup>12</sup> The importance of proteins in the daily intake of diet of man cannot be over emphasized, because they play essential roles in the body system of animals including man which the fact that they serve as the building block of protein in the body structural organs and play important roles in the maintenance of body structural integrity as well as function of hormones and enzymes.<sup>13</sup> The naturally low water content present in the fruit pulp leads to long-term storage and later consumption in times of need and makes its transport to domestic and international markets easy.<sup>14</sup> The history of known references to *Adansonia digitata* is well documented in Baum. The binomial *Adansonia baobab* was given by Linnaeus, the generic name of baobab honoring Michel Adansonia who had been to Senegal in the 18th century and described Baobab.<sup>15</sup> According to recent study on chloroplast DNA has show the genetic differences between baobab populations from south-eastern Africa and western.<sup>16</sup> The fruit of *Adansonia digitata* (baobab) tree consists of large seeds which surrounded by a sour acidic pulp and shell, and is generally found in the Northern states of Nigeria. The aim of this study is to investigation the nutritional quality of the protein extract which prepared from Baobab seeds and its potential as a component of weaning material and food.<sup>17</sup> The medicinal shrub of baobab (Bombacaceae) has 25 genera and about 250 species.<sup>18</sup> The acceptability and optimal utilization of *Adansonia digitata* seed as protein source may be limited by the presence of anti-nutritional factors such as tannins, oxalate and phytate. Nevertheless, techniques employed for extracting protein there from are known to be effective in the elimination of the above ant nutrients such as oxalate, phytate and tannins<sup>4</sup> The consumption of seed *Adansonia digitata* oil has been reported to cause harmful effect such as potential health risks due to the presence of these carcinogenic ingredients with medical and mutagenic effects on animals and carcinogenic effects.<sup>19</sup> *Adansonia digitata* is a multi-purpose tree generally valued for food and traditional medicine such as root tubers, twigs, fruits, seeds, leaves and flowers are all edible and have been found to possess various minerals and phytochemical (calcium, magnesium, zinc, phosphorus).<sup>20</sup> In Benin of baobab 35 food products have been recorded, with various fermented products which are yet to be characterized. Tayohountais one of those indigenous fermented baobab foods which obtained from Benin, and its production

process was only described recently.<sup>21</sup> It is a product belongs to the category of the alkaline fermented foods and when making soups it is used as a flavor agent.<sup>22</sup>

### 1.1. Chemical constituents

Baobab Leaves contain- protein, lipids, carbohydrates, ash, vitamin-c, traces of calcium, phosphorus and leaves also contain mucilage which gives galacturonic acid and glucuronic acids on hydrolysis with small quantities of galactose, rhamnose, glucose and arabinose. The fruit contain-protein, lipids, ash, calcium, vit B1, and fruit also contain furfural. Baobab seed contain -protein, lipids, ash, calcium, vitamin B1, rich in proteins, fatty acids. Young shoot, stem bark- $\beta$  sitosterol, on wounding, the bark yields a large quantity of semi fluid white gum, have acidic reaction.<sup>23</sup>

## 2. Medicinal Properties of Baobab

### 2.1. Anti-oxidant activity

Anti-oxidant activity of baobab tree is very high than other tree due to presence of vitamin c.<sup>1,24</sup> It prevents from oxidative stress related disease such as cancer, cardiovascular disease and inflammation.<sup>1</sup> vitamin c is play important role in human nutrition and low blood pressure.<sup>25</sup> Daily required vitamin c for healthy, non-smoking person 65mg/day, smoking person required more vitamins than non-smoking.<sup>1</sup> The daily recommended of vitamin c is obtained from 13g of baobab tree. The antioxidant capacity of baobab was evaluated with the oxygen radical absorbance capacity (ORAC) method.<sup>26</sup> Every part of the African *Adansonia digitata* tree such as leaves, barks, pulp and seeds have been used for several medicinal purposes in Africa. According to Willet (2001), African baobab has a good anti-oxidant property because it has high amount of Vitamin C, bioflavonoids, and pro-vitamin A.<sup>27</sup>

### 2.2. Anti-inflammation activity & anti-pyretic activity

*Adansonia digitata* fruits pulp have anti inflammation & anti pyretic both activity during to their presence of sterols, saponins and triterpenes. Baobab leaves and fruits are used in medicine as antipyretic or febrifuge to overcome fevers.<sup>28,29</sup>

### 2.3. Anti-microbial activity

Baobab tree show antibacterial activity to work against *Staphylococcus aureus*, *Bacillus subtilis*. Baobab stem and root barks have bioactive constituents which are responsible for anti-microbial activity. The extract of baobab stem and bark is used in traditional medicine. e.g., to treat fever caused by malaria.<sup>30</sup>

#### 2.4. Antiviral activity

Baobab tree leaves, fruit pulp and seeds show antiviral activity against influenza virus, simplex virus herpes and syncytial virus of respiratory and polio. The chemical analysis of baobab reports that presence of several potentially bioactive ingredients such as triterpenoids, flavonoids and phenolic compound.<sup>31</sup> In some experiment the antiviral activity is measured by presence or absence of light.<sup>32</sup>

#### 2.5. Antidote to poisoning

Seeds, fruits pulp, and bark appear to contain an antidote poisoning by Strophanthus species. Baobab contain alkaloids which has a strophanthuslike action.<sup>33</sup> The juice of baobab tree used widely as an arrow poison especially in East Africa, a baobab extract is poured onto the wounds of animal killed in this way to neutralize the poison before the meat is eaten. Baobab fruit pulp powder has good lubricating, binding agent, and diluting characteristics.<sup>31</sup>

#### 2.6. Anti-diabetic activity

Hypoglycemic activity of baobab (*Adansonia digitata*) stem bark, fruit pulp extract was work against strep to zotocininduced diabetic rats. Methanol used as solvent. Fruit pulp of baobab 300 mg/kg ability to lower serum glucose comparison tochlorpropamide.<sup>23</sup>

#### 2.7. Hepato-protective activity

The fruit pulp of baobab (*Adansonia digitata*) shows hepato protective activity in which wistar male albino rats used.<sup>34</sup>

#### 2.8. Anti-Rheumatoid arthritic activity

The seeds of baobab (*Adansonia digitata*) have anti rheumatoid arthritic activity (which help to reduce pain) were assessed by method of complete Freund's adjuvant induced arthritis.<sup>23</sup>



Fig. 1:

#### 2.9. Vitamin C healing effect

Vitamin C is most important in human nutrition and powerful antioxidant capacity.<sup>35</sup> It works against to low blood pressure, enhance immunity against many tropical disease, low incidence of cataract development and coronary disease. The daily requirements of vitamin c intake for healthy life in adults are 65 mg. And daily recommendation can be obtained through 23 g of baobab powder.<sup>31</sup>

#### 2.10. Bilirubin content present in baobab

The reaction between bilirubin and the diazonium salt of sulphanic acid produced azobilirubin which shows a maximum absorption at 535 nm in an acid medium.<sup>14</sup>

#### 2.11. Non-food application of baobab

The baobab tree can also be used for various purposes. The fiber from inner bark is strong and it is widely used for making rope, snares, fishing lines, basket nets, and is even used for weaving.<sup>36</sup> The roots of baobab tree are used to make a soluble red dye. The green bark is used as a dye and for decoration.<sup>37</sup> The wood is a poor source of fuel.



Fig. 2: Baobab: Flower, mature tree, fruit and seeds

Table 1: Analysis of baobab fruit pulp (mg/100g)

Constituents	Quality(mg/100g)
Vitamin c	280-300
Calcium	292.9
Phosphorus	95.9-118
Protein	2.29
Potassium	2.3
Lipids	0.28
Carbohydrates	75.59
52u	

### 3. Process and Sampling

The fruit content is ground and its broken using mortar pestle. Then the ground mixture is separate pulp, seeds, and fibers through sieved. In village the preparation of three products was carried out in each of three localities

on next day with replication.<sup>38</sup> The production was carried out mostly in rainy season. The hygienic circumstance was uncontrolled when sample were produced under local village condition.<sup>39</sup> The sample were collected in sterile stomacher bags which contain a thermo cooler ice blocks, stored at four degrees Celsius when necessary and transfer to the laboratory for analysis.<sup>38</sup> A wide set of qualitative survey techniques were used to understanding of markets for baobab products.<sup>40</sup> Based on the assumption that this was the most likely source for dispersal of *Adansonia digitata* across the Indian Ocean.<sup>41</sup> Phytochemical screening of leaf of *Adansonia digitata*.<sup>42</sup>

Chemicals	Quantity (%)
Terpenoid	1.12
Glycosides	0.19
Saponin	1.79
Flavonoids	3.59
Alkaloids	0.89

#### 4. Conclusion

Microbial contamination of baobab plant products causes a lot of inconvenience to manufacturers. So, the majority of fruit and vegetable juice manufacturers indicated that there was an essential need to control microbial spoilage as part of brand protection. The results of the study revealed that *Adansonia digitata* leaves contain appreciable levels of nutritional components that are essential for human health and maintenance of the body cells. It also reveals varying levels of phytochemicals capable of exhibiting free radical scavenging and antioxidant activity. Hence, consumption of baobab will go a long way in prevention of disease elicited by free radicals, oxidative stress and damage to the biopolymers of the body. However, an exact account of the contribution of baobab products to nutrition and food security was beyond the scope of our study.

#### 5. Authors Contribution

All authors are contributing own valuable advice, management and contribution in collection of materials for this review.

#### 6. Source of Funding

None.

#### 7. Conflict of Interest

None.

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