



## **Review on *Jatropha tanjorensis* (Hospital too far); Significance as an Anti-Anaemia Plant**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author RAA conceptualized the problem coined the topic and prepared the initial draft. Author KMR fine tuned the initially prepared draft by author RAA. Author VA provided the materials with which the article was drafted and author OOO proof read the manuscript at all review stages. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Anaemia is a blood disorder which is a direct result of decreased hemoglobin (Hb) concentration and or red blood cell numbers (RBC) which culminates to loss of physiological potentials. It is a major public health problem in developing countries orchestrated by an imbalance between erythrocyte loss relative to production which occurs as a result of ineffective or deficient erythropoiesis, nutritional deficiency, inflammation or genetic hemoglobin (Hb) disorder and or excessive loss of erythrocytes due to hemolysis, blood loss or both. An estimated 30-80% preschool age children at the age 1 year suffer from anaemia. Anaemia imposes deleterious consequences such as stunted physical and cognitive development, impaired language coordination and motor skill equivalent to a 5-10 points deficit in intelligent quotient (IQ). Anaemia in pregnancy translates to decreased productivity through energy loss and consequent lack of working capacity and consequent declination in household food security and income. Long before now, many plants had been used successfully to address anaemia locally, one of which is *Jatropha tanjorensis* dubbed

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“Hospital too far” a name it acquired as a result of its unverified perceived exceptional anti-anaemic property. Therefore, this review aims at evaluating the veracity of the impression on *Jatropha tanjorensis* as an exceptional anti-anaemic plant using data derived from studies on anti-anaemic plants.

**Keywords:** Anaemia; *Jatropha tanjorensis*; blood; erythrocyte.

## 1. INTRODUCTION

Anaemia is a common blood related disorder which results from decreased hemoglobin (Hb) concentration and or red blood cell numbers (RBC) [1]. It is a major public health problem in developing countries. This condition is triggered by an imbalance between erythrocyte loss relative to production which results from ineffective or deficient erythropoiesis due to nutritional deficiency, inflammation, genetic hemoglobin (Hb) disorder and or excessive loss of erythrocytes to hemolysis, blood loss or both [2] and are known by symptoms such as fatigue, weakness, pale skin which include reduced pinkness of the lips, gums, lining of the eyelids, nail beds and palms, rapid heartbeat with mild exertion, shortness of breath with mild exertion, chest pain, dizziness, irritability (in children with anaemia), numbness or coldness of hands and feet.

Anaemia which affects mainly pregnant women and children is suffered by approximately, one third of the world’s population [3]. Generally, women are more susceptible to anaemia than men across virtually all geographic regions and in most age groups [3]. The fact that the prevalence of anaemia rises with advancing age from 50years has placed the elderly within the “at risk group category” [4]. Variation in the prevalence of anemia cuts across diverse geographic regions. For instance, Sub-Saharan Africa, South Asia, the Caribbean and Oceania are known with the highest anaemia prevalence across all ages, groups and sexes [3].

The burden of anemia on human health and consequent impact on social and economic development is monumental. It is responsible for about 90% of the total global disability burden from all conditions and has been implicated in low birth weight, neonatal and perinatal mortality as well as delayed child development [5, 6]. Through intense research efforts, drugs have been developed for extensive management of anemic conditions. Unfortunately, these drugs are characterized by some pitfalls in addition to their exorbitant cost which has significantly reduced their accessibility to the poor within the

communities in developing country who cannot afford the cost implication of having these drugs.

The use of plant parts such as the leaf, stem, bark, root, etc in the treatment of diverse ailments dates back to the prehistoric times. Nowadays, traditional medicine which solely relies on plant is dubbed the preferred primary health care system in many communities with over 60% of the world’s population and about 80% in developing countries sourcing out remedies to their health challenges from the said source [7]. This observation is unconnected to the fact that plant based therapies are affordable and accessible [8].

*Jatropha tanjorensis*(Euphorbiaceae) popularly known as “Hospital too far” is a common weed found in the higher rainfall forest zones of West Africa and is associated with fields, bush regrowth, road sides and disturbed places in the higher rainfall forest zones of West Africa [9], the leaf is a widely consumed vegetable in the Southern part of Nigeria and has been used extensively in the treatment of diabetes [10]. Locally, this plant has also been used extensively to address severe anaemic conditions especially by the rural poor who cannot afford the luxury of subscribing to standardized anti-anaemic drugs. Alongside numerous other plants, *Jatropha tanjorensis* has been scientifically confirmed to wield anti-anaemic potential [11]. However, the name “Hospital too far” signals an exceptional measure of therapeutic strength in reviving erythropoietic responses, the fulcrum upon which the need to review existing works on the efficacy of some anti-anaemic plants to ascertain the veracity of this verbal impression on *Jatropha tanjorensis* rests.

## 2. CLASSIFICATION OF ANAEMIA

More than 400 types of anaemia are in existence, many of which are uncommon. A common phenomenon that characterizes all forms of anaemia is the reduction below the normal range of circulating red blood cells. Some of the commonly known types of anaemia discussed are iron deficiency anaemia,

pernicious anaemia, hemolytic anaemia and aplastic anaemia.

### 2.1 Iron Deficiency Anaemia (IDA)

Iron deficiency anaemia is a condition triggered by iron insufficiency in the blood stream which is said to occur when the body's iron need outweighs its supply primarily due to reduced iron consumption and or absorption, blood loss as a result of heavy menstrual flow, internal bleeding from gastrointestinal tract and kidney. Parasitic infections caused by hookworm and helminth have been implicated in iron deficiency anaemia [12]. Infants and children are at risk for iron deficiency anaemia as their high demand for iron to grow effectively is rarely met due to minimal appetite for foods. Other factors that can predispose infants to IDA include consumption of breast milk beyond six months of life without supplements and excessive intake of calcium rich food such as cow milk also poses a high risk for IDA since calcium wields the potential to block iron absorption. Other "at risk groups" for IDA include the adolescent and pregnant women. Signs and symptoms of IDA depend on its severity. Often, mild anaemia presents no symptom. However, in severe cases, symptoms such as pale skin, weak nails, swelling or soreness of the tongue, headache and dizziness, shortness of breath during exercise, fast heart beat and cold hands have been observed [12].

### 2.2 Pernicious Anaemia

Intrinsic factors (IF) are glycoproteins that binds cobalamin or vitamin B12 to facilitate its absorption at the terminal ileum [13], a function which is lost to atrophic gastritis thus paving way for the occurrence of vitamin B12 deficiency and consequent emergence of pernicious anaemia (PA) also known as Biermer's disease [14]. The incidence of the disease is age dependent evident by the fact that it is rarely found among individuals <30 years of age, while it is more prevalent among individuals within the age range of 59-62 years. Although PA is said to cut across all continents, it is seen more among people of African and European descents especially Northern Europe mainly those in the UK and Scandinavian countries. Clinical presentations proceeds gradually and patients usually manifests symptoms of anaemia with pallor, fatigue, lightheadedness or tachycardia and decreased mental concentration.

### 2.3 Hemolytic Anaemia

Hemolytic anaemia is a condition which results from the premature destruction and abortion of red blood cells from the bloodstream. It affects people irrespective of age, race and sex. The kinds of condition are the inherited hemolytic anaemias which include thalassaemia, hereditary spherocytosis, glucose-6-phosphate (G-6-P-D) deficiency sickle cells, anaemia, drug induced hemolytic anaemia, hereditary elliptocytosis, mechanical hemolytic anaemia and pyruvate kinase deficiency and the acquired hemolytic anaemias which however include immune hemolytic anaemia, alloimmune hemolytic anaemia, paroxysmal nocturnal hemoglobinuria autoimmune hemolytic anaemia, etc [15]. The rate and duration of hemolysis determines whether anemia will occur or not. If the rate and duration of hemolysis does not override erythropoietic response of the bone marrow, then the decreased RBCs lifespan is compensated for and normal hemoglobin concentration maintained thereby giving rise to a state called compensated or fully compensated hemolysis. On the hand, if the erythropoietic response is insufficient to completely make up for hemolysis, then anemia is triggered, producing a state known as uncompensated or incompletely compensated hemolysis. Hemolytic anaemia therefore commonly refers to both uncompensated and compensated hemolytic states, even though anemia may not always be present. Symptoms of hemolytic anaemia are leg ulcer, jaundice, pain in the upper abdomen, [15].

### 2.4 Aplastic Anaemia

Aplastic anaemia is a blood disorder that occurs when the bone marrow stem cells are damaged leading to the bone marrow's inability to synthesize new red blood cells. Certain health conditions such as heart failure, enlarged heart, arrhythmias, infections and bleeding are traced to this anaemia type [16]. Artificial agents which have also been implicated in this condition are chemical agents, like benzene, pesticides, arsenic and physical factors such as radiation and chemotherapy, medications like chloramphenicol, Infectious diseases such as hepatitis, cytomegalovirus, and HIV, Epstein-Barr virus, autoimmune disorders are not left out as causes of this condition. Inherited conditions, like the Shwachman-Diamond syndrome, Fanconianaemia, dyskeratosis and Diamond-

Blackfananaemia have in no small measure contributed to aplastic anaemia [17]. The most common symptoms of this disease include fatigue, dizziness, headache, shortness of breath pale skin, gums and nail beds, chest pains etc [18].

### 3. PREVALENCE AND BURDEN OF ANAEMIA

The tropics are known for its higher anaemia prevalence owing to the high incidence of anaemia and other parasitic infections [19]. Children and pregnant women have been categorized as the most vulnerable groups in the population followed by the non pregnant women and the elderly. It is estimated that the prevalence of anaemia among children below the age of 5 year is >40% [20]. Report from the National Family Health Survey (NFHS) affirms that the incidence of anaemia in developed countries is 71%, underdeveloped world 84%. Globally, the prevalence of anaemia is 79% [20]. Anaemia imposes deleterious consequences such as stunted physical and cognitive development, slows down psychomotor development, and impairs language coordination and motor skill equivalent to a 5-10 points deficit in intelligent quotient (IQ) [21]. Anaemia in women invariably translates to decreased productivity through energy loss and consequent lack of working capacity [22] which eventually culminate to household food insecurity through diminished income generation. Severe anaemia in pregnancy impairs oxygen supply to the fetus and interferes with normal intra-uterine growth, which causes intrauterine growth retardation, still birth, low birth weight and neonatal deaths [22]. Thus, it can be said that anaemia contributes to poor pregnancy and problematic birth outcomes in developing countries which impacts negatively on the patient's economic and social wellbeing [22]. Severe anaemia predisposes one to infection as a result of declined resistance to disease. Stunted physical and cognitive growth caused by iron deficiency anaemia impacts negatively on the gross domestic product of developing countries [23].

### 4. PLANT IN HEALTH CARE DELIVERY

Traditional medicine which solely relies on the use of plant parts to address health conditions still retains its place of pride in the primary health care system in most parts of the world evident by the fact that over 60% of the world's population

and about 80% of the population of developing countries rely on their therapeutic strength to meet their health needs at an affordable cost [7]. The application of plant parts to salvage health challenges dates back to prehistoric time. It is important to note that most drugs being dispensed nowadays were scientifically derived from plants. Typical examples of such plants include opium, aspirin, digitalis and quinine [24]. Some medicinal plants which have been found valuable in the treatment of anaemia include *Magnifera indica*, *Solanium nigrum*, *Spinacia oleracea*, *Telferia occidetallis*, *Jatropha curcas*, *Waltheria indica* and *Spondias mombin* [25].

#### 4.1 *Jatropha tanjorensis* in Health Care Delivery and Its Significance as an Anti-anaemia Plant

*Jatropha tanjorensis* is a bushy, gregarious shrub of about 1.8 metres in height. It is a natural hybrid between *J. curcas* and *J. gossypifolia* [26]. The leaves are 3-5 lobed palmate and contain glandular hairs. Aside the fact that *Jatropha tanjorensis* is commonly consumed as vegetable in many parts of southern Nigeria, it is also a reference plant because of its potential health benefits, availability and affordability [27]. Phytochemical analysis performed on *Jatropha tanjorensis* leaf revealed the presence of bioactive components such as alkaloids, anthraquinones, flavonoids, cardiac glycoside, tanins, and saponins [27].

Research has successfully associated the plant with some wide range of biological activities, such as hypolipidemic, hematological, antihypertensive, antimalarial, antioxidant, antimicrobial and anti-diabetic [28]. The belief among some locals that the plant is the most effective of all plants known to have been used in tackling anaemia has earned it the name "Hospital too far" implying that an anaemic patient can have a quicker recovery by consuming preparations derived from the aforementioned plant has formed the basis for this review. Table 1 which although does not account for a comprehensive list of works on anti-anaemic plants has successfully jettisoned the belief that had been built around the plant especially by some locals especially from the Southern part of Nigeria as some plants with higher anti-anaemic activity have been scientifically reported.



**Fig. 1. Leaves and seeds *Jatropha tanjorensis***

Source: www.svele.com

**Table 1. Some plants with reported anti-anaemic potential**

S/N	Common name	Botanical name	Plant part used	Hb conc. (g/dl)	Reference
1	Mango	<i>M. indica</i>	Stem bark	12.41	Ogbe et al. [29]
2	Fluted pumpkin	<i>T. occidentalis</i>	Leaf	13.15	Ogbe et al. [29]
3	Hospital too far	<i>J. tanjorensis*</i>	Leaf	11.96	Idu et al. [30]
4	Stonebreaker	<i>P. niruri</i>	Leaf	11.96	Abubakar et al. [31]
5	European black night shade	<i>S. nigrum</i>	Leaf	14.26	Umaru et al. [32]
6	Pigeon wood	<i>T. guineensis</i>	Leaf	13.44	Droucouala et al. [33]
7	Spinach	<i>S. oleracea</i>	Leaf	12.70	Luka et al. [23]
8	Velvet bean	<i>M. pruriens</i>	Leaf	10.51	Eze et al., 2014 [34]
9	Green amaranth	<i>A. hybridus</i>	Leaf	12.41	Ogbe et al. [35]

## 5. CONCLUSION

It is no doubt that preparations derived from *J. tanjorensis* can stimulate recovery from anaemic conditions evident by the findings that had been made by different researchers. However, the wildly held impression about its therapeutic strength on anaemia that imposes on it the identity "Hospital too far" should rather be considered a mere name since the impression it conveys is not a true reflection of its therapeutic strength.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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