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JATROPHA TANJORENSIS: A REVIEW OF MEDICINAL PROPERTIES, PHYTOCHEMISTRY, PHARMACOLOGY, NUTRITIONAL POTENTIAL AND TOXICITY

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ABSTRACT

Jatropha tanjorensis, commonly known as "Hospital Too Far" in Nigeria, is a perennial shrub valued for its multifaceted medicinal applications and nutritional benefits. Widely distributed across tropical and subtropical regions, the plant is consumed both as a vegetable and as a therapeutic agent in traditional medicine for managing ailments such as anemia, diabetes, malaria, inflammation, and microbial infections. This review consolidates current literature on the origin, distribution, and botanical characteristics of *J. tanjorensis*, alongside its documented phytochemical constituents, including flavonoids, alkaloids, tannins, saponins, phenolics, and essential fatty acids. Pharmacological investigations reveal significant antimicrobial, antioxidant, antidiabetic, anti-inflammatory, antimalarial, and anticancer potentials, with some activities comparable to standard drugs. Nutritional analysis highlights its rich content of proteins, carbohydrates, vitamins, and essential minerals, underscoring its dietary value. Toxicological reports indicate generally low toxicity, though dosage dependent effects have been observed. Despite promising findings, limited clinical studies and variability in phytochemical profiles necessitate further research. This review recommends further research to be carried out on the other part of the plant as most of the research focused on the leaves. Toxicity study of plant and dosage of the extract should also be considered.

Keywords: *Jatropha tanjorensis*, medicinal properties, phytochemistry, pharmacological activity, nutritional analysis.

1.0 INTRODUCTION

Medicinal plants have been centrally a traditional to healthcare systems, especially in developing countries, where access to synthetic drugs may be limited. The genus Jatropha belongs to the Euphobiaceae family. The name is derived from Greek words "jatros" meaning physician and "trophe" meaning nutrition. Jatropha has about 175 species (cuvalcante *et al*., 2020). This plant is found to be a very important secondary metabolite due to its broad spectrum of biological functions. Among the species of Jatropha, Jatropha tanjorensis is part of them, which is a hybrid between Jatropha curcas and Jatropha grossypifolia (Chibvogwu *et al*., 2021). Jatropha tanjorensis is a perennial edible shrub native of central America and has become neutralized in some tropical and subtropical countries like, India, Nigeria and Canada (Rizwan *et al.,* 2020). In Nigeria *J. tanjorensis* has a rich history of medicinal and culinary use, and it is locally known by different names including, "Catholic vegetable" in English and "hospital too far" (a Pidgin name reflecting its medicinal reputation). In Yoruba it is called Ẹfo Ìyànná-Ipája or Lapálapa, and in Igbo Úgu Ọ́yịbọ́. In Hausa it is widely known as Kafi likita or asibiti da nisa for its reputed ability to manage various ailments without the need for hospital visits (Idu *et al.*, 2009). Jatropha tanjorensis leaves are powerhouse packed with essential nutrients such as selenium, phosphorus, zinc, vitamin C and vitamin E. These nutrient plays a vital role in maintaining overall health and prevent diseases (Chibvogwu *et al.,* 2021). It is known to have anti-inflammatory, analgesic, antioxidant, anti-diarrhea, anticancer properties, antidiabetic properties and it is believed to improve the hematological parameters of patient in need of urgent blood transfusion, including pregnant women and

sickle cell patients (Dan borno *et al.,* 2019). It also employed traditionally in the treatment of cardiovascular diseases, and skin diseases (Tarfa *et al.*, 2021).

Jatropha tanjorensis roots possess the required ingredients capable of boosting immune system and could prevent other opportunistic diseases associated with decreasing immunity. The extract maybe useful in the treatment of anaemia as well as improving the immune system of the body. *Jatropha tanjorensis*, has attracted considerable attention due to its diverse pharmacological and nutritional applications. *Jatropha tanjorensis* is known for its bioactive compounds. Its ethnomedicinal uses range from treating anemia, diabetes, and hypertension to promoting general wellness (Umoh *et al.,* 2020). Scientific investigations have confirmed the presence of several bioactive phytochemicals, including flavonoids, alkaloids, tannins, terpenoids, and saponins, which may underlie its therapeutic properties (Adegbaju *et al.,* 2012). In addition to its medicinal potential, the plant is also valued for its rich nutritional content, being a good source of vitamins, minerals, proteins, and antioxidants like tocopherols and flavonoids (Ijoma & Ajiwe, 2022). Despite its promising benefits, there is a growing need to critically evaluate the phytochemical, pharmacological, and toxicological profiles of *J. tanjorensis* to ensure its safe and effective use. This review aims to provide a comprehensive summary of the current scientific knowledge on the medicinal properties, phytochemistry, pharmacological activities, nutritional potentials, and possible toxicity of *Jatropha tanjorensis*, based on both traditional use and modern research findings.

2.0 BOTANICAL CLASSIFICATION

Kingdom: Plantae
Phylum: Streptophyta
Class: Equisetopsida
Subclass: Magnoliidae
Order: Malpighiales
Family: Euphorbiaceae
Genus: Jatropha
Species: *Jatropha tanjorensis*. (Michael, 2023)

2.1 MORPHOLOGY

Jatropha tanjorensis is a fast-growing perennial shrub typically growth up to 2-3 meters in height. The plant has an erect, succulent stem, which may become woody at the base with age. The stem and leaves display a milky color when cut, characteristic of many Euphorbiaceae species. The leaves are broad, simple and palmately lobes arranged alternatively, and they are green, soft textured and often resemble papaya leaves as shown in figure 1. The surface of the leaves bears unicellular trichomes (Umoh *et al.,* 2020). It possesses a fibrous root system, which supports its rapid growth and adaptability to various soil types in tropical climates.

2.2 DISTRIBUTION

Jatropha tanjorensis is mainly distributed in tropical and subtropical regions, especially in India particularly in the southern region (e.g., Tamil Nadu) which is its place of origin. It was later introduced and naturalized in West African such as Nigeria, Ghana, Cameroon etc. It was also found in Central Africa (Congo) and in Southeast Asian with similar climates. In Nigeria, it grows abundantly in southeastern and southwestern zones, often in gardens, farmlands, or as a hedge plant. It adapts well to humid, warm environments and can grow in a variety of soil types (Rizwan *et al.*, 2024).

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Figure 1: *Jatropha tanjorensis* leaves, roots and stems

3.0 METHODOLOGY

This review was conducted using a systematic approach to collect, evaluate and summarize scientific literatures on *Jatropha tanjorensis*, with emphasis given to its medicinal properties, phytochemistry, pharmacology, nutritional potential, and toxicity. Relevant peer-reviewed articles, conference papers and academic reports were sourced from reputable scientific databases and scholarly platforms. These include Sci-Hub, Research Gate, Academia.edu, Semantic Scholar, PubMed, Springer open and Google Scholar. The selection emphasized studies published with preference given to works that provided experimental evidence or critical review of the plant's pharmacological and nutritional activities. The following key areas were explored and documented based on information retrieved from the databases: botanical classification, morphological description and distribution, medicinal application, phytochemical composition, pharmacological activities and toxicological findings. Each selected article was screened for relevance, clarity and scientific credibility. Only publications written in English and accessible in full text were considered for detailed review. Data were synthesized and presented thematically to reflect the current understanding of *Jatropha tanjorensis* in relation to human health and safety.

4.0 MEDICINAL PROPERTIES

J. tanjorensis is best known as a nutritious vegetable and traditional remedy. *J. tanjorensis* is a medicinal shrub widely used in Nigerian traditional medicine, it has anti-microbial potency on antibiotic resistance bacteria (Pills & Ure - ojo, 2022). The leaves extract of *J. tanjorensis* possess antimicrobial activities as they inhibit the growth of many viruses, bacteria, fungi and yeast (Falodun *et al*., 2023). Traditional healers use it for a variety of ailments: malaria, diabetes, hypertension, ulcers, hemorrhoids, constipation, scabies, measles, stomach pain (Dan borno, *et al*., 2019). The treatment of hypertension is due to its high content of potassium which reduces high blood pressure (Nwachukwu, 2018). Dried leaf powder or tea is also made as a general health tonic. Some belief it improves circulation and vision due to its nutrients (fiber, vitamins). Its stems are used as chew sticks for dental health in some folk traditions (Ebenyi, *et al*., 2021).

5.0 PHYTOCHEMISTRY

Phytochemical studies show that various part of *J. tanjorensis* are rich in bioactive secondary metabolites (Sani *et al.,* 2022). Qualitative screens and spectral analyses have identified many compound classes such as alkaloids, flavonoids, tannins, saponins, cardiac glycosides, anthraquinones, and terpenoids (Rizwan *et al*., 2020). Equally GC-MS and isolation work detected specific compounds, notably the flavonoid naringenin and the sterol α-tocopherol (vitamin E) in leaf extracts (Ajiwe *et al*., 2022). Other identified constituents include friedelin, β-amyrin, stigmasterol, and pyrrolidinones (e.g. R(+)4-hydroxy-2-pyrrolidin-one) (Okoye *et al*., 2024). These

compounds likely underlie the plant's medicinal effects. It is also recorded that Terpenoids and steroids are also present (Umoren, et al. 2023*). Jatropha tanjorensis* contains essential oils that gives it distinct aroma and have been found to have antibacterial, antifungal and antiviral properties (oladele, *et al*., 2020). In addition, the cardiovascular activity of *Jatropha tanjorensis* is due to polyphenols, saponins and alkaloids (Ewa-Edu *et al*., 2022). Table1 summarized some of the important phytochemical identified from *Jatropha tanjorensis* with their properties.

6.0 PHARMACOLOGICAL ACTIVITY

6.1 ANTIMICROBIAL ACTIVITIES

Microbes are microorganisms, some of which are pathogens capable of transmitting disease to another organism. These microbes are classified into; Virus, bacteria, protozoa, fungi and algae (Michael, 2023). Extract leaves of *jatropha tanjorensis* demonstrated enormous antimicrobial potential (Abhadionmhen, *et al*., 2023). In another antimicrobial analysis, it has proven that *J. tanjorensi*s is potential antibacterial agent, and this validate its ethnomedicinal efficacy in the treatment of bacterial infections (Ijoma & Ajiwe, 2023). A study reveal that the hot water extract from *J. tanjorensis* had a zone of inhibition of 19.83mm against *S. aureus*, the cold water extract exhibited the highest inhibitory effect, while the methanolic extract displayed the lowest zone of inhibition 13.17mm against *B. subtilis* (Komolafe, *et al.,* 2024). A study using ethanolic extract and petroleum ether extracts of A. muricata and *J. tanjorensis* have antibacterial effect on *E. coli*, *S. aureus*, and *P. aeruginosa* (Ewa- udu *et al*., 2022). According to Komolafe, *et al.* (2023). In competitive zones of inhibition on *Escheria fergusonii*, *Steriotrophomonas maltophilia*, *Enterobacter clocae*, *Lysinibacillus sphaericus* and *Salmonella typhimerium* showed *E. clocae* had the highest zone of inhibition of 17mm at a concentration 100mg/ml, 10mm at 80mg/ml and 8mm at 50mg/ml. *S. maltophilia* had the lowest zone of inhibition 10mm at 100mg/ml, 8mm at 80mg/ml and 7mm at 50mg/ml. These zones of inhibition show the antimicrobial potency of *Jatropha tanjorensis* (Komolafe, *et al.,* 2022). Leaf extracts exhibit inhibitory activity against many bacteria. Methanol and ethanolic leaf extracts gave clear zones of inhibition against *E. coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Streptococcus pneumoniae* and others. For example, Ijoma and Ajiwe (2022) showed crude leaf extract and its flavonoid naringenin inhibited clinical isolates of *E. coli*, *K. pneumoniae*, *S. typhi*, *S. pneumoniae* and *S. aureus* (zone diameters 8–10 mm). In vivo use of the fresh leaves on experimental colds (pneumonia bacteria) is also reported in folk medicine. Some Jatropha species have antifungal activity, though specific data for *J. tanjorensis* is limited. Empirical use for diabetes is supported by studies. An ethanol leaf extract also lowered blood sugar and improved lipid profiles in diabetic rats. These findings align with folk usage as an anti-diabetic (Pills & Uredu - ojo, 2022). In vivo tests against *Plasmodium berghei* in mice showed that aqueous leaf extract suppressed parasitemia and improved blood parameters. Ebenyi *et al*., (2021) found significant parasite clearance at higher extract doses. These findings support folk use against malaria. No direct data on falciparum was found, but *J. curcas* (a related species) also has antimalarial activity, suggesting a genus-wide potential.

6.2 ANTIOXIDANT

J. tanjorensis has demonstrated antioxidant capacity. Its high levels of vitamin C, vitamin E (α-tocopherol), and flavonoids contribute to radical scavenging activity (Ayeni, *et al*., 2024). Omoboyowa (2021) found leaf sterols had DPPH and FRAP activity. Omoregie and Osagie (2011) reported protective antioxidant effects in malnourished rats. The plant's nutrient profile (vitamins, minerals, fiber) also supports general

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antioxidant/health effects (Ayeni, *et al*., 2024).

6.3 ANTI-INFLAMMATORY ACTIVITIES

Recent work confirms anti-inflammatory potential. Sterol fractions from leaf extracts significantly inhibited protein denaturation and membrane hemolysis in vitro. In silico docking showed good binding of these compounds to COX-1/COX-2. The study concluded *J. tanjorensis* leave possess anti-inflammatory activity. Traditional claims (e.g. pain and swelling relief) are thus pharmacologically plausible (Omoboyowa, 2021).

6.4 ANTICANCER (CYTOTOXIC)

Isolated *Jatropha* compounds show cytotoxicity. Viswanathan *et al*. (2018) purified R (+)-4-hydroxy-2-pyrrolidinone from leaves, which exhibited significant in vitro cytotoxicity against human cancer cell lines (e.g. Hep-2 larynx carcinoma, B16F10 melanoma). This pyrrolidinone increased survival time in tumor-bearing mice, indicating anti-tumor potential. Similarly, Omoboyowa (2021) noted anti-tumor properties in the GC–MS profile of leaf sterols. The high dietary fiber and phytochemicals (e.g. flavonoids) in the leaves may also contribute to reduced cancer risk (as sometimes claimed for colon health).

7.0 HAEMATOLOGICAL PROPERTIES

Jatropha tanjorensis have been found to be very effective in tackling anaemia and earn its name "Hospital too far" implying that an anaemic patient can have quicker recovery by consuming preparatory derived from the plant (Rizwan, *et al*., 2020). It was employed traditionally in the treatment of anaemia because of the claim that *Jatropha tanjorensis* increase blood volume (Oyewole *et al*., 2012). *Jatropha tanjorensis* is rich in iron (Fe), hence, increase the amount of iron in the blood cell (Dan borno, *et al*., 2019). This high amount of iron concentration available for erythropoiesis, hence, increase production of blood cells and haemoglobin. Consumption of *jatropha tanjorensis* leaf will help solve the problem of anaemia, because it contains iron and vitamin C which promote iron absorption from the small intestine which helps checkmating anaemia (Nwachukwu, 2013). However, at lower dosage of the leaves extract, it enhances haemopoiesis you, but administration of higher dosage may cause haemolysis (Dan borno, *et al*., 2019).

8.0 HYPOLIPIDEMIC ACTIVITIES

J. tanjorensis has been reported to have hematopoietic (blood-building) effects and lipid-lowering (hypolipidemic) actions. Phytochemical ingredients of *Jatropha tanjorensis* are capable of lowering blood cholesterol level and might be useful in the treatment of cardiovascular diseases caused by hyperlipidemia, this might explain the traditional use of the leaf extract as a natural remedy against heart disease (Oyewole, *et al*., 2011). Ethanolic leave extract of *J. tanjorensis* offered hepato- protective effect in aspirin - induced hepato- toxic condition on tissue, ameliorated both hyponatremia and hyperkalemia effect and maintain normal electrolytes concentration in model (Umoren, *et al*., 2023). Some studies on related *Jatropha* species note anthelmintic and antidiarrheal effects; such uses are plausible but not specifically confirmed for *J. tanjorensis*. In summary, scientific studies validate many of the ethnomedicinal claims: hypoglycemic, antihypertensive, lipid-lowering, anti-malarial, antimicrobial, anti-inflammatory and cytotoxic activities have been documented.

9.0 NUTRITIONAL PROPERTIES

Jatropha tanjorensis leaves extracts were found rich in sources of carbohydrate, protein and minerals such as calcium, potassium and selenium which are essential in the body metabolism (Ayeni *et al*., 2024). Proximate analysis of the leaves shows they are nutrient-rich. On a dry weight basis, *J. tanjorensis* leaves contain roughly 54.3% carbohydrate, 14.7% crude fiber, 14.5% fat,

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6.2% protein, 7.9% ash, and 84.9% moisture (Bennett, *et al.* 2024). Thus, the leaves provide substantial dietary fiber, oils, and minerals. Mineral assays found especially high calcium (1.47%) and moderate iron (0.13%), with lower potassium (0.018%), manganese, and phosphorus. Vitamins C and E are present, these contribute to its nutritious properties (Ayeni *et al.,* 2024). The Vitamins present in the plant makes the plant to retain its high level of antioxidant, by protecting body against free radicals. (Ayeni, *et al*., 2024). Phosphorus and calcium are important minerals in the body as it helps to build strong bones and teeth as well as production of energy. Selenium is a powerful antioxidant that helps to protect the body against free radicals and reduce the risk of chronic diseases such as cancer and heart diseases (Rizwan, *et al*., 2020).

10.0 TOXICITY

Toxicological studies indicate that *J. tanjorensis* is safe at normal usage levels. Acute oral toxicity tests showed no mortality or adverse signs in rodents even at 2000–5000 mg/kg doses (Viswanathan *et al*., 2018). A study on sodium benzoate induced hepato- renal damage revealed that it can be treated using *Jatropha tanjorensis* leaf extract suggesting its productive effect and maybe relevant in the prevention and management of some xenobiotics -induced tissue damage of diseases (Oladele, *et al*., 2020). Umoren, *et al*. (2023), reported that there is no sign of any behavioral damage or toxicity observed after oral administration of *J tanjorensis*. However, a study reported show that administration of the extract at 700mg/kg may disrupt protein metabolic function of the liver and also interfere negatively with the filtration capacity of the kidney resulting to renal and hepatic dysfunction (Dan borno, *et al.,* 2019). Despite the medicinal and pharmacological activity of the plant it should be consumed moderately to avoid been exposed to the adverse effects it may cause.

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Table 1: Summary of isolated and identified phytochemicals of *Jatropha tanjorensis*

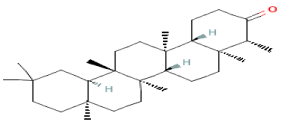
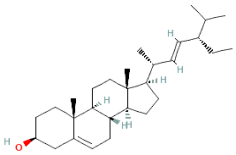
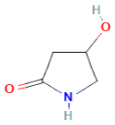
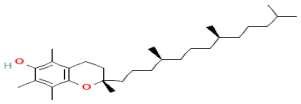
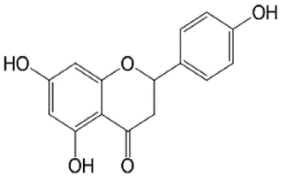
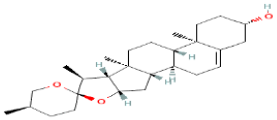
ACTIVE COMPOUNDS	CHEMICAL FORMULA	STRUCTURE	PROPERTIES	REFERENCES
Friedelin	$C_{30}H_{50}O$			Okeye *et al*; 2024
Stigmasterol	$C_{29}H_{48}O$		Anti-inflammatory, antioxidant and anticancer	Okeye *et al;* 2024
(R(+)-4-hydroxy-2-pyrolidinone (pyrrolidinone)			Antimicrobial and antioxidant	Okeye *et al*; 2024
α –tocopherol	$C_{29}H_{50}O_2$		Antioxidant	Ajiwe, 2022
Naringenin	$C_{15}H_{11}O_5$		Antioxidant and anti-imflammatory	Ajiwe, 2022
Diosgenin	$C_{27}H_{40}O_4$		Anticancer	Semwal *et al*; 2022

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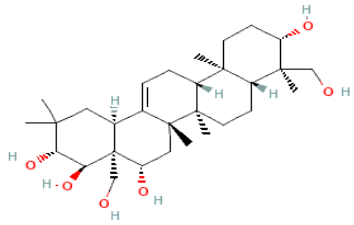
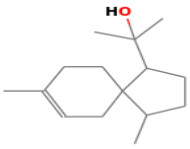
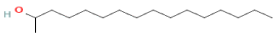
Table 1 (continued)

ACTIVE COMPOUNDS	CHEMICAL FORMULA	STRUCTURE	PROPERTIES	REFERENCES
Ginsenoside	$C_{30}H_{50}O_6$		Anticancer effect	Zhang *et al*; 2021
β – Acorenol	$C_{15}H_{26}O$		Antimicrobial and anti-inflammatory	Bennett *et al*; 2024
2-hexadecanol	$C_{15}H_{34}O$		Antibacteria	Information 2025

11.0 CONCLUSION

Jatropha tanjorensis is a valuable multipurpose plant in Nigerian ethnomedicine. It is well established that its leaves are rich in nutrients and bioactive compounds which are used in the treatment of microbial infection, anaemia, cancer, diabetes and hypertension and diarrhoea. Phytochemical studies reveal that it contains bioactive compounds such as alkaloids, saponins, phenols, flavonoids, tannins, anthraquinones, glycosides and terpenoids. Various extract of the plant had been found to possess biological properties including antioxidant, antimicrobial, and nutritional property. Research on toxicity of the plant extract have shown its low toxic effect. This review highlighted the phytochemistry, pharmacological activity and toxicity of *J. tanjorensis*. However, it deserves further research and development in controlled clinical studies and could be promoted as a nutraceutical to benefit rural and urban communities. Further research needs to carry out on the other part of the plant as most of the research focused on the leaves. Study on the dosage of the plant extract should also be considered

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