***Review Article***

**COMPREHENSIVE ETHNOMEDICINAL AND PHYTOPHARMACOLOGICAL REVIEW OF *JATROPHA TANJORENSIS***

**Abstract**
**Background:** *Jatropha tanjorensis* is a medicinal shrub widely used in Nigerian traditional medicine. It contains bioactive compounds like polyphenols, saponins, and alkaloids, which are responsible for its antioxidant, anti-inflammatory, antidiabetic, and hepatoprotective effects. However, scientific data validating its pharmacological use remains limited.

**Aim:** This review was thus written with the intent to provide a comprehensive view of the medicinal and nutritional properties of this plant and the progress that has been made in identifying phytochemicals and bioactive compounds present in this plant.

**Methods:** Information used in the writing of this article was sourced from online databases and search engines such as PubMed, ResearchGate, Google Scholar, and Google. Only articles written in English language were considered. Keywords related to *Jatropha tanjorensis* and its medicinal properties were used. Relevant articles were selected and analyzed based on predefined inclusion criteria.

**Results:** Studies on this plant have demonstrated therapeutic potential across several disease models, although most findings are preclinical. Safety studies show low acute toxicity, but data on chronic use, pharmacokinetics, and mechanisms of action are lacking, which casts doubt on the actual safety of this plant in clinical studies. No comparative studies with conventional drugs were identified.

**Conclusion:** *Jatropha tanjorensis* holds promise as a source of plant-based therapeutics. More robust pharmacological studies, including mechanistic and long-term safety evaluations, are needed to support its integration into modern medicine.

**Keywords**: *Jatropha tanjorensis*, ethnomedicinal, leaves, anti-inflammatory, antioxidant, phytochemicals, Catholic vegetable.

1. **INTRODUCTION**:

*Jatropha tanjorensis* J.L. Ellis & Saroja is a green leafy medicinal plant that belongs to the family Euphorbiaceae. (1) It is commonly called “Hospital too far”, “Catholic vegetable”, or “Ewe Iyana-ipaja. It is a shrub of 6 m high with spreading branches off stubby twigs and smooth grey bark. (2) It is usually grown in the rainforest zones of West Africa and also in India. (3) *Jatropha tanjorensis* is cultivated for food and medicinal purposes. All parts of the plant, including seeds, leaves, barks, and roots, are used in traditional and folk medicine as well as for veterinary purposes. In the southern part of Nigeria, like in Edo state, the leaf of the plant is locally consumed as a vegetable added to daily meals. It is used to treat diabetes mellitus due to its anti-hyperglycemic properties. (4, 5) In other parts of Nigeria, the plant is consumed as soups and as a tonic with the claim that it increases blood volume and treats certain diseases. There has been a claim that it cures anaemia, diabetes, and cardiovascular diseases. *Jatropha tanjorensis* has received tons of attention due to its potential health benefits, availability, and affordability. (6) The therapeutic effect of these medicinal plants can justifiably be attributed to the phytochemicals in them. Bioactive substances such as flavonoids, tannins, phenols, and alkaloids found in this plant may play an important role in drug development. (6, 7)

**2.0. Methodology**

The authors conducted a comprehensive literature search using various databases, including PubMed, ResearchGate, Google Scholar, and a direct Google search. Keywords such as *Jatropha tanjorensis*, ethnomedicinal, phytochemicals, antioxidant, anti-inflammatory, pregnancy, leaves, plant, properties, and effects were used both individually and combined, for example, “antioxidant property of *Jatropha tanjorensis*”. Only articles written in English language were considered. EndNoteTM 20 was utilized to manage the referencing received from the search during the entire writing and review process. One researcher independently screened the search results based on the title and abstract, and another author helped confirm eligibility based on the inclusion criteria. The authors read through the following sections: title, abstract, material and methodology, results, and discussion, to look for information of interest.

**3.0. Botanical classification**

Kingdom: Plantae

Phylum: Streptophyta

Class: Equisetopsida

Subclass: Magnoliidae

Order: Malpighiales

Family: Euphorbiaceae

Genus: Jatropha

Species: *Jatropha tanjorensis*



Fig. 1. Leaves and flowers of *Jatropha tanjorensis* in its natural habitat (8)

Table 1: Active compounds found in *Jatropha tanjorensis* and their mechanism of action

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Active compounds  | Chemical formula | Structure  | Properties | References  |
| Benzyl 1-[(1-hydroxy-4-oxo-1-phenyltetrahydroquinolin-3-yl) carbamoyl] cyclohexane-1-carboxylate | C23H26N2O4 |  | HIV-1 protease inhibitor | (9) |
| 9,12,15-Octadecatrienoic acid, 2-phenyl-1,3-dioxan-5-yl ester | C28H40O4 |  | Antiviral and anti-obesity | (10) |
| 2,7-Diphenyl-1,6-dioxopyridazino[4,5:2',3’]pyrrolo[4',5'-d]pyridazine | C20H13N5O2 |  | Antioxidant  | (11) |
| 2-Hexadecanol | C16H34O | C16H34O | Antibacterial  | (12) |
| β-Acorenol | C15H26O |  |  | (9) |
| Octadecanal,2-bromo | C18H35BrO |  | Antifungal and antibacterial  | (13) |
| Stearic acid, 3-(octadecyloxy)propyl ester | C39H78O3 |  |  | (9) |
| Propanoic acid, 2-(3-acetoxy-4,4,14-trimethylandrost-8-en-17-yl | C27H42O4 |  | hypoglycemic | (14) |
| 2-Nonadecanone 2,4-dinitrophenylhydrazine | C25H42N4O4 |  |  | (9) |
| 7,8-Epoxylanostan-11-ol, 3-acetoxy | C32H54O4 |  |  | (9) |
| Ginsenoside Rh2 | C30H50O6 |  | Anticancer effect by modulating several signaling pathways, induction of apoptosis | (15) |
| Diosgenin | C27H40O4 |  | Anticancer through apoptosis | (16) |

**Table 2: Proximate composition** of *Jatropha tanjorensis*

|  |  |  |  |
| --- | --- | --- | --- |
| Nutrient | Concentration | Plant part | Reference |
| Moisture | 5.10 ± 0.07 % | leaves | (17) |
| 5.32 ± 0.07 % | Leaves  | (18) |
| 6.195 ± 0.02 % | Leaves  | (19) |
| Ash content | 3.23 ± 0.04 % | Leaves | (17) |
| 9.79 ± 0.09 % | Leaves  | (18) |
| 11.565 ± 0.13 % | Leaves  | (19) |
| Fiber | 16.93 ± 0.95 % | Leaves  | (17) |
| 5.22 ± 0.05 % | Leaves  | (18) |
| 12.172 ± 3.19 % | Leaves  | (19) |
| Lipids and Fats | 14.80 ± 0.14 % | Leaves  | (17) |
| 7.65 ± 0.04 % | Leaves  | (18) |
| 11.730 ± 1.03 % | Leaves  | (19) |
| Carbohydrate  | 66.38 ± 0.25 % | Leaves  | (17) |
| 62.22 ± 0.14 % | Leaves  | (18) |
| 51.734 ± 0.00 % | Leaves  | (19) |
| Protein | 10.50 ± 0.00 % | Leaves  | (17) |
| 9.80 ± 0.07 % | Leaves  | (18) |
| 6.991 ± 0.44 % | Leaves | (19) |

**Table 3: Mineral content** of *Jatropha tanjorensis*

|  |  |  |  |
| --- | --- | --- | --- |
| Mineral | Concentration | Plant part | Reference |
| Calcium | 319.42 ± 0.77 (mg/kg) | Leaves  | (17) |
| 5.99 ± 0.09 (mg/kg dry weight) | Leaves  | (18) |
| Manganese | 4.15 ± 0.10 ppm | Leaves  | (19) |
| 0.53 ± 0.03 (mg/kg dry weight) | Leaves  | (18) |
| Magnesium | 172.60 ± 3.54 (mg/kg) | Leaves  | (17) |
| 8.48 ± 0.08 (mg/kg dry weight) | Leaves  | (18) |
| Molybdenum  | 1.33 ± 0.03 ppm | Leaves  | (19) |
| Potassium (K) | 374.00 ±7.21 (mg/kg) | Leaves  | (17) |
| 3.17 ± 0.10 ppm | Leaves  | (19) |
| 8.58 ± 0.10 (mg/kg dry weight) | Leaves  | (18) |
| Sodium (Na) | 141.00 ± 4.59 (mg/kg) | Leaves  | (17) |
| 402.20 ± 1.97 ppm | Leaves  | (19) |
| 6.99 ± 0.12 (mg/kg dry weight) | Leaves  | (18) |
| Phosphorus (P) | 530.59 ± 6.32 (mg/kg) | Leaves  | (19) |
| Iron (Fe) | 71.47 ± 8.68 (mg/kg) | Leaves  | (17) |
| 1.67 ± 0.06 (mg/kg dry weight) | Leaves  | (18) |
| 50.67 ± 0.76 ppm | Leaves  | (19) |
| Zinc  | 19.25 ±4.62 (mg/kg) | Leaves  | (17) |
| 0.67 ± 0.05 (mg/kg dry weight) | Leaves  | (18) |
| Copper | 11.81 ± 3.03 (mg/kg) | Leaves  | (17) |
| 0.67 ± 0.04 (mg/kg dry weight) | Leaves  | (18) |
| 5.40 ± 0.40 ppm | Leaves  | (19) |

**Table 4: Vitamin composition** of *Jatropha tanjorensis*

|  |  |  |  |
| --- | --- | --- | --- |
| Vitamin | Concentration | Plant part | Reference |
| Vitamin A | 48.215 ± 2.790 (mg/100g) | Leaves  | (19) |
| Vitamin B1 | 0.0201 ± 0.001 (mg/100g) | Leaves  | (19) |
| Vitamin C | 0.0347± 0.000 (mg/100g) | Leaves  | (19) |

Table 5:Amino acid composition (μg/g) of ethanol-water leaf extracts of *Justicia secunda* and *Jatropha tanjorensis*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Amino acids**  |  | Concentration **(μg/g)**  |  | Plant part | reference |
| **ESSENTIAL AMINO ACIDS** |
| Valine (Val)  |  | 4.74 ± 0.03  |  | Leaves  | (18) |
| Threonine (Thr)  |  | 2.98 ± 0.03  |  | Leaves  | (18) |
| Isoleucine (Ile)  |  | 4.74 ± 0.07  |  | Leaves  | (18) |
| Leucine (Leu)  |  | 2.98 ± 0.03  |  | Leaves  | (18) |
| Lysine (Lys)  |  | 3.74 ± 0.09  |  | Leaves  | (18) |
| Methionine (Met)  |  | 1.54 ± 0.02  |  | Leaves  | (18) |
| Phenylalanine (Phe)  |  | 5.78 ± 0.04  |  | Leaves  | (18) |
| Histidine (His)  |  | 2.89 ± 0.05  |  | Leaves  | (18) |
| Tryptophan (Trp)  |  | 1.24 ± 0.05  |  | Leaves  | (18) |
| **NON-ESSENTIAL AMINO ACIDS** |
| Glycine (Gly)  |  | 2.44 ± 0.09  |  | Leaves  | (18) |
| Alanine (Ala)  |  | 2.38 ± 0.02  |  | Leaves  | (18) |
| Serine (Ser)  |  | 3.84 ± 0.09  |  | Leaves  | (18) |
| Proline (Pro)  |  | 4.78 ± 0.04  |  | Leaves  | (18) |
| Aspartate (Asp)  |  | 2.21 ± 0.08  |  | Leaves  | (18) |
| Glutamate (Glu)  |  | 4.69 ± 0.04  |  | Leaves  | (18) |
| Arginine (Arg)  |  | 3.49 ± 0.06  |  | Leaves  | (18) |
| Tyrosine (Tyr)  |  | 2.97 ± 0.09  |  | Leaves  | (18) |
| Cystine (Cys)  |  | 1.44 ± 0.06  |  | Leaves  | (18) |

Table 6: Phytochemicals found in *Jatropha tanjorensis* and their mechanism of action

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Phytochemicals | Plant part  | Method of extraction | Properties | Mechanism of action |
| Phenols | leaves | Methanolic and aqueous maceration (1, 6) | Antioxidant (6), anti-inflammation, anticancer, anti-obesity, antidiabetic, anti-mutagenic, probiotic (20) | Phenolic compounds (PCs) act as an antioxidant by reacting with a variety of free radicals (21). This reaction involves directly neutralizing free radicals. (22) |
| Leaves  | Cold methanolic maceration (23) |
| Stem  | Hot continuous solvent extraction (23) |
| Leaves  | Hot continuous solvent extraction (23) |
| Flavonoids | Stem | Hot continuous solvent extraction (23) | Antioxidant, anti-diabetic, anti-hyperglycemic, anti-allergic, anti-inflammatory, anti-microbial, antibacterial, anti-fungal, anti-viral, anti-cancer, anti-diarrheal, and anti-anemic (1, 6) | Flavonoids exhibit antioxidant properties by neutralizing reactive oxygen species through hydrogen atom and electron donation, augmenting endogenous antioxidant enzyme activity, and chelating transition metal ions. (24-26)The antibacterial effect of flavonoids is expressed through the disruption of cell membranes, the inhibition of key enzymatic processes, and the suppression of efflux pumps, collectively impeding bacterial growth and causing cell death. (24, 25)Flavonoids exhibit antifungal properties by interfering with fungal cell membrane integrity, disrupting ergosterol biosynthesis, and modulating critical signal transduction pathways, ultimately hindering fungal growth and pathogenicity (24, 25) |
| Leaves  | Hot continuous solvent extraction (23) |
| Leaves  | Methanolic and aqueous maceration (1, 6) |
| Tannins | Leaves  | Cold methanolic maceration (23) | Antidiarrhea, anti-hemorrhoids, antibacterial, (1, 27) | Tannins express antidiarrhea effects by increasing colonic water and electrolyte reabsorption, decreasing the irritability of the bowel, thereby reducing the peristaltic index, and denaturing proteins in the intestinal mucosa by forming protein tennates, which may reduce secretion. (28, 29)Tannins have been found to inhibit bacterial growth using different mechanisms of action, including iron chelation, inhibition of cell wall synthesis, disruption of the cell membrane, and inhibition of fatty acid biosynthetic pathways. (30) Also, by preventing enzymatic activities and inhibiting the synthesis of nucleic acids. (27) |
| Leaves | Methanolic and aqueous maceration (1, 6) |
| Alkaloids | Stem  | Hot continuous solvent extraction (23) | Anti-hyperglycemic, anti-diabetic, antioxidant, antihypertensive, antimalarial, anticancer (6) | The anticancer effects of alkaloids are expressed through the induction of apoptosis, inhibition of angiogenesis, and anti-proliferative properties. (31) |
| leaves | Methanolic and aqueous maceration (1, 6) |
| Saponins | Leaves | Cold methanolic maceration (6, 23) | hypocholesterolemia, immunostimulant, hypoglycemic, and anticarcinogenic (6) | The hypocholesterolemia effects of saponins are expressed through inhibiting cholesterol absorption in the intestine, which increases cholesterol excretion in the feces. (32, 33)Saponins express anticancer properties through cell cycle arrest, cellular invasion inhibition, induction of apoptosis, overcoming drug resistance, and autophagy. (34, 35) |
| Leaves | Aqueous maceration (1) |
| Steroids/Phytosterols | Leaves  | Methanolic maceration (1, 6) | Anti-inflammatory, anticancer  | The anti-inflammatory property of steroids is expressed by inhibiting the production of pro-inflammatory substances and suppressing the immune system. (36)The anticancer activity of steroids is due to the induction of apoptosis, inhibition of the NF-κB pathway, inhibition of glycolysis, and enzyme inhibition (37, 38) |
| Terpenoids (volatile oils) | Leaves  | Methanolic maceration (1, 6) | Antioxidant (6) | Terpenoids exhibit antioxidant effects by scavenging free radicals and inhibiting pro-inflammatory pathways (39, 40) |
| Glycosides | Leaves | Cold methanolic maceration (23) | Antiviral, antimicrobial (41) | The antiviral property of glycosides is exhibited through inhibiting the Na+/K+-ATPase (NKA) pump on cell membranes. (42, 43)Glycosides express antimicrobial activities through disrupting bacterial cell membranes, leading to cell lysis and leakage of intracellular components. (44, 45) |
| Stem | Hot continuous solvent extraction (23) |
| Leaves | Hot continuous solvent extraction (23) |
| Reducing sugars | Leaves  | Methanolic and aqueous maceration (1) |  |  |

**4.0. Pharmacology:**

Jatropha tanjorensis plant has exhibited a range of pharmacological activities, which have led to its discovery for the treatment of various ailments. The pharmacological activities include antimalarial, antimicrobial, hypoglycemic, antihypertensive, antioxidant, and anti-inflammatory properties etc. It has also been used traditionally to treat various ailments, including gastrointestinal issues, hemorrhoids, and certain skin conditions. (4, 46)

**4.1. Anti-bacterial property**: A study by Ndidi et al (2022) (23), indicated that the cold extract of Jatropha tanjorensis leaf showed antibacterial properties against *Escherichia coli* and *Staphylococcus aureus*. *Escherichia coli* and *Staphylococcus aureus* are bacteria that cause a range of diseases, including urinary tract infection, meningitis, pneumonia, and bone and joint infections. At the same time, the hot extract of *Jatropha tanjorensis* stem showed antibacterial activity against *Serratia marcescens.* (23) This antibacterial property of *Jatropha tanjorensis* is being confirmed by (46). The cold-water extract of Jatropha tanjorensis at 500mg/ml was tested for its antibacterial efficacy. The results showed antimicrobial activities for *Staphylococcus aureus, Enterococcus faecalis FELAO97,* and *Bacillus subtilis*. (1)

**4.2. Anti-cancer effect**:

Cancer, as is well known, is a disease that is difficult to cure. It can resist different types of therapies. Scientists have turned to plants to investigate their anticancer properties as a way to help address the problem of cancer. *Jatropha tanjorensis* is a plant that has shown promising abilities. A study from Arun et al (2014) demonstrated that the methanolic leaf extract of *Jatropha tanjorensis* exhibited significant anti-cancer activity. This activity was attributed primarily to its rich content of flavonoids and flavone glucosides. The in vitro cytotoxicity assays of this study, which used Ehrlich Ascites Carcinoma (EAC) and Caco-2 (colorectal adenocarcinoma) cell lines, revealed low IC₅₀ values of 14.6 μg/mL and 21.0 μg/mL, respectively, indicating strong anti-proliferative effects. Apoptotic features, such as chromatin condensation, nuclear fragmentation, and apoptotic body formation, were also confirmed in cancer cell lines. A complex mixture of flavonoids was identified in this study, including flavone glucosides like Vitexin (apigenin-8-C-glucoside), luteolin-7-O-glucoside, Homoorientin (luteolin-6-C-glucoside), kaempferol-3-O-rutinoside, 6-C-pentosyl-8-C-hexosyl apigenin, and naringin. Apart from this, flavones like baicalein and diosmetin, and flavanols like kaempferol and kaempferide were also identified. In silico molecular docking studies showed that kaempferol-3-O-rutinoside, vitexin, and homoorientin interacted strongly with anti-apoptotic Bcl-2 family proteins (Bcl-2, Bcl-XL, Mcl-1, etc.), particularly at the BH3-binding groove. Kaempferol-3-O-rutinoside displayed the highest affinity across multiple targets, while vitexin and 6-C-pentosyl-8-C-hexosyl apigenin selectively bound only to anti-apoptotic proteins, suggesting a targeted mechanism of action. These interactions are proposed to restore apoptotic signaling pathways often suppressed in cancer cells. (47-49)

**4.3. Anti-diabetic property**: Study by Obinna et al (2021) (6) Suggests that the anti-diabetic and anti-hyperglycemic properties of *Jatropha tanjorensis* are attributed to the high concentration of flavonoids and alkaloids. These phytochemicals contained in the plant extract have been verified to possess the antidiabetic effect of the plant by enhancing the activity of hexokinase and phosphofructokinase, resulting in glucose transport, carbohydrate digestion and absorption, and also involved in Insulin secretion, respectively. (5)

**4.4. Antinociceptive effect**: The ethanol leaf extract of *Jatropha tanjorensis* was evaluated for its antinociceptive property. In this study, the subject mice were subjected to acetic acid-induced writhing. Ethanol leaf extract of *Jatropha tanjorensis* caused writhing inhibition of 48.31%, 42.69%, and 49.44% across various groups, similar to aspirin at 53.36%. (50)

**4.5. Anti-inflammatory property**: *Jatropha tanjorensis* is known to possess anti-inflammatory properties. A study by Anhwange et al (2019) (51) Confirmed the presence of phytochemicals such as flavonoids, terpenoids, and tannins in *Jatropha tanjorensis*. It has been shown that flavonoids prevent the synthesis of three important enzymes that are involved in the production of different inflammatory mediators: inducible nitric oxide synthase isomers, cyclooxygenase, and lipoxygenase. By competitively attaching themselves to the ATP catalytic site, flavonoids can suppress the activity of the regulating enzyme protein kinase, hence lowering the inflammatory response. Terpenoids may also reduce inflammation by inhibiting the production of prostaglandins, cyclooxygenase enzymes, tumor necrosis factor (TNF), cytokines (IL-2, IL-4, and IL-6), and inducible nitric oxide synthase enzymes. Furthermore, the anti-inflammatory properties of tannins are associated with their capacity to block inflammatory mediators such as prostaglandins, histamine, and the COX-2 enzyme. (50)

**4.6. Antioxidant property**: Plant phenols are the main class of chemicals that function as principal antioxidants because of their redox characteristics, which enable them to function as metal chelators, hydrogen donors, and reducing agents. (4) Several research studies have confirmed the antioxidant property of *Jatropha tanjorensis*. One study by Daniel et al (2019) (4) confirmed this information. In this study, the stem and leaf extract of *Jatropha tanjorensis* was tested for the presence of phytochemicals, and the results showed that the methanol and ethyl extracts of *Jatropha tanjorensis* contained an appreciable level of total phenols. The extracts exhibited significant antioxidant activity when compared with standard compounds. The investigation suggested that *Jatropha tanjorensis* possesses good antioxidant potential that can be exploited for pharmaceutical uses. (4) Akpan et al (2021) (52), Aiwonegbe et al (2022) (53), and Awote et al (2024) (2) also confirmed the presence of these phytochemicals in *Jatropha tanjorensis*.

**4.7. Anti-obesity**: The accumulation of body fat due to an imbalance between calorie intake and energy expenditure is called obesity. (54) Obesity has been associated with an increased risk of heart disease, type 2 diabetes, and stroke. Srivastava et al (2023) (54) Used the ethanolic and aqueous leaf extract of *Jatropha tanjorensis* on obese rats to test for its anti-obesity ability. The results showed that at 200 and 400 mg/kg, the rats (subject animals) showed a reduction in weight gain and feed intake, and significant decreases in serum glucose and lipid profile. A similar result was observed in a study by Amaechi et al, 2022 (55), where the ethanol extract of *Jatropha tanjorensis* caused a decrease in the weight of the subject animals.

**4.8. Pregnancy**: *Jatropha tanjorensis* is believed to have reproductive benefits in women. A study by Antai et al (2023) (56) examined the effect of gestational administration of aqueous leaf extract of Jatropha tanjorensis on postpartum-like behavioral outcomes. Results showed that aqueous extract of *Jatropha tanjorensis* reduced postpartum-like depression and anxiety, and improved locomotor activity, indicating that *Jatropha tanjorensis* can be a preventive and adjuvant therapeutic option for pregnant women. (56) In another study by (Ukoh, 2022) (57), virgin female rats were fed with the aqueous extract of *Jatropha tanjorensis*; the results showed increased mean weight gain, food, and water intake in *Jatropha tanjorensis-treated* rats. The Birth weight, body length, and tail length of pups whose mothers were treated with the aqueous leaf extract of *Jatropha tanjorensis* also increased significantly. The result of this study indicated that *Jatropha tanjorensis* was effective in boosting female reproductive health, pregnancy health, and outcome. (57)

**4.9. Hypolipidemic effect**: The main sterol that all mammals produce is cholesterol, which is primarily present in cell membranes. Cardiovascular conditions, including coronary heart disease, myocardial infarction, and atherosclerosis, are significantly influenced by cholesterol. In a study by Amaechi et al, 2022 (55), the results showed that the group of Wistar rats that received a high dose (550mg/kg) of *Jatropha tanjorensis* alone had a significant increase in high-density lipoprotein cholesterol (HDL-c) and a decrease in low-density lipoprotein cholesterol (LDL-c). This is as a result of the inhibition of HMG-CoA reductase, a microsomal enzyme that catalyzes the rate-limiting step in the cholesterol production pathway. Additionally, the extract of *Jatropha tanjorensis* caused an increase in the activity of the enzyme lecithin-cholesterol acyl transferase (LCAT), which converts free cholesterol into HDL-c and promotes reverse cholesterol transport by competitively inhibiting the uptake of LDL-c by endothelial cells and preventing the production of oxidized LDL-c. (55)

**4.10. Hepatoprotective effects**: The liver is an essential organ in the biotransformation and detoxification of drugs. It is highly susceptible to the toxicity of these substances. (58) The ethanol extract of *Jatropha tanjorensis* can treat liver injuries caused by hepatitis (liver inflammation), especially viral hepatitis and alcohol hepatitis, cirrhosis, and cholestasis. (58)

**4.11. Toxicity**: The administration of *Jatropha tanjorensis* extract at 2000 mg/kg body weight did not cause any observable toxic effects in a study by Alozieuwa et al (2024) (50). Another study, by Chibuogwu et al (2021) (59) showed that experimental mice were administered doses of several values, with the highest being 5000 mg/kg. The results of this study showed that the extract had no toxic effect on experimental animals, although it showed potential to cause hepatotoxicity at the highest dose. A third study by Onyebuchi et al (2023) (60) revealed that at 5000mg/kg, the extract of *Jatropha tanjorensis* elicited a non-toxic effect in hematological and biochemical parameters. Lastly, the acute toxicity study by Ebhohon et al (2024) (61) showed that experimental animals were exposed to dosages as high as 10,000mg/kg. The results of this study revealed that at 6,000mg/kg, no mortality was recorded, at 7,000mg/kg, 33.3% mortality was recorded, and at 10,000mg/kg, 100% mortality was recorded. This puts the lethal dosage (LD50) at 7745.97 mg/kg. The lethal dose (LD50) of the extract was calculated using the formula: LD50 = √ (D0 + D100) / 2. Where D0 is the highest dose that did not cause death, and D100 is the lowest dose that resulted in death. This shows that *Jatropha tanjorensis* leaf extract is relatively safe. Although *Jatropha tanjorensis* has been proven to be safe, comprehensive sub chronic or chronic studies involving graded dosing and detailed organ-specific analyses are still required to determine **No Observed Adverse Effect Level (NOAEL)** and **Lowest Observed Adverse Effect Level (LOAEL)**, as this would further aid in defining a therapeutic window and ensuring safety in long-term use, especially considering the plant's growing ethnomedicinal applications.

**5.0. Conclusion and future perspective:**

Research has shown that *Jatropha tanjorensis* is rich with bioactive compounds that contribute to its phytopharmacological effects. This plant also offers hepatoprotective and nephroprotective properties. Despite its widespread use in traditional medicine for managing several ailments, *Jatropha tanjorensis* remains significantly understudied in modern pharmacological research, hence slowing down the incorporation of this plant into modern medicine. The phytochemicals and bioactive compounds present in this plant have been associated with its medicinal effects, but the mechanistic basis of these activities has not been elucidated.

Furthermore, while acute toxicity studies show that the extract of this plant is relatively safe at high doses, the absence of subchronic and chronic toxicity data, pharmacokinetic profiling, and well-designed preclinical disease models that simulate real-world therapeutic contexts raises doubts about this safety.

Lastly, there is a lack of comparative studies evaluating its efficacy alongside conventional drugs, leaving its true pharmacological potential unquantified.

Addressing these gaps would help validate its use in traditional medicine and also pave the way for the development of novel, plant-derived therapeutics for managing chronic and degenerative diseases.

Disclaimer (Artificial intelligence)

Option 1:

The authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

**REFERENCES**

1. Komolafe CJ, Adetoyinbo II, Alao FO, Ogunsola JF. Phytochemical Analyses and Antibacterial Activities of Jatropha tanjorensis J. L. Ellis and Saroja Leaves Extract against Clinical Pathogens. Asian Journal of Applied Chemistry Research. 2024;15(4):79-93.

2. Awote O, Adeyemo A, Kolawole A, Awosemo R, Azeez H, Salako D, et al. Jatropha tanjorensis aqueous extracts synthesized silver nanoparticles possesses antidiabetic, antiglycation, antioxidant and anti-inflammatory potentials. 2024;10:41-55.

3. Prabakaran AJ, Sujatha M. Jatropha tanjorensis Ellis & Saroja, a natural interspecific hybrid occurring in Tamil Nadu, India. Genetic Resources and Crop Evolution. 1999;46(3):213-8.

4. DANIEL IE, EFFIONG, V. P, AND AKPAN EF. ANTIOXIDANT ACTIVITIES AND PHENOLIC CONTENTS

OF THE LEAF AND STEM EXTRACTS OF

JATROPHA TANJORENSIS. World Journal of Applied Science and Technology. 2019;11(2):190-6.

5. Odoh UE, Owoh CC, Obi PE, Chukwuma MO, Agubata CW, Odoh LC. Pharmacognostic Profile and Anti-Hyperglycemic Activity of Jatropha Tanjorensis Linn (Euphorbiaceae) Leaf on Alloxan-Induced Hyperglycemic Rats. Journal of Advances in Medical and Pharmaceutical Sciences. 2023;25(5):30-42.

6. Obinna A, Onyedikachi U, Alaebo P, Odo C, Okechukwu G, Omodamiro O. METHANOL LEAF EXTRACT OF Jatropha tanjorensis Ellis and Saroja POSSESS PHYTOCONSTITUENTS WITH FREE RADICAL SCAVENGING ACTIVITY. FUDMA Journal of Sciences. 2021;5:286-93.

7. Chaachouay N, Zidane L. Plant-Derived Natural Products: A Source for Drug Discovery and Development. Drugs and Drug Candidates. 2024;3(1):184-207.

8. Umoh R, Umoh F, Johnny I, Umoh O, Anah V, Udoh A, et al. Phytopharmceutical Standardization of Leaves of Jatropha tanjorensis J. L. Ellis & Saroja. (Euphorbiaceae). 2020:1-10.

9. Bennett V, Amos-Tautua BM, Ebong CU. Proximate, Selected Elements and Bioactive Compounds in Jatropha tanjorensis and Bryophyllum pinnatum Leaves. International Research Journal of Pure and Applied Chemistry. 2024;25(4):51-64.

10. Al-Marzoqi A, Hadi M, Hameed I. Determination of metabolites products by Cassia angustifolia and evaluate antimicobial activity. Journal of Pharmacognosy and Phytotherapy. 2016;8:25-48.

11. Jena MK, Kancharla S, Kolli P. Curculigo orchioides (KALI MUSLI): A PLANT WITH HUGE MEDICINAL PROPERTIES. PLANT CELL BIOTECHNOLOGY AND MOLECULAR BIOLOGY. 2021;22(27-28):48-56.

12. Information NCfB. PubChem Compound Summary for CID 85779, 2-Hexadecanol 2025 [Retrieved May 22, 2025]. Available from: https://pubchem.ncbi.nlm.nih.gov/compound/2-Hexadecanol.

13. Hameed I, Mohammad G, Kamal S. Study of secondary metabolites produced by Aspergillus flavus and evaluation of the antibacterial and antifungal activity2016.

14. Venkatachalam M, Singaravelu G, Govindaraju K, Ahn JS. PTP 1B inhibitory action of a phytochemical propanoic acid, 2-(3-acetoxy-4,4,14-trimethylandrost-8-en-17-yl). Current Science. 2013;105:827-31.

15. Zhang H, Park S, Huang H, Kim E, Yi J, Choi S-K, et al. Anticancer effects and potential mechanisms of ginsenoside Rh2 in various cancer types (Review). Oncol Rep. 2021;45(4):33.

16. Semwal P, Painuli S, Abu-Izneid T, Rauf A, Sharma A, Daştan SD, et al. Diosgenin: An Updated Pharmacological Review and Therapeutic Perspectives. Oxid Med Cell Longev. 2022;2022:1035441.

17. Igboecheonwu I, Garba ZN, Nuh AA. Comparative Analysis of Proximate and Mineral Compositions of Jatropha Tanjorensis L. and Telfairia Occidentalis Hook F. Leaves Cultivated in Zaria. Advanced Journal of Chemistry, Section B: Natural Products and Medical Chemistry. 2024;6(1):17-30.

18. Keke C, Nwaogu L, Igwe C, Ekeke K, Nsofor W. Phytochemical and nutritional composition of ethanol-water leaf extracts of Justicia secunda and Jatropha tanjorensis. GSC Biological and Pharmaceutical Sciences. 2023;23:042-53.

19. Ochulor OC, Njoku O, Uroko R, Simeon E. Nutritional composition of Jatropha tanjorensis leaves and effects of its aqueous extract on carbon tetrachloride induced oxidative stress in male Wistar albino rats. Biomedical Research. 2018;29.

20. Singh N, Yadav SS. A review on health benefits of phenolics derived from dietary spices. Current Research in Food Science. 2022;5:1508-23.

21. Zeb A. Concept, mechanism, and applications of phenolic antioxidants in foods. J Food Biochem. 2020;44(9):e13394.

22. Kostić K, Brborić J, Delogu G, Simić MR, Samardžić S, Maksimović Z, et al. Antioxidant Activity of Natural Phenols and Derived Hydroxylated Biphenyls. Molecules. 2023;28(6).

23. Ndidi O-N, Fredrick CC, Ezenwa C, Amaechi D, Ozoemena O, Ndidi O. Assessment of Antibacterial Properties of Jatropha tanjorensis. Asian Journal of Applied Chemistry Research. 2022:13-9.

24. Rodríguez B, Pacheco L, Bernal I, Piña M. Mecanismos de Acción de los Flavonoides: Propiedades Antioxidantes, Antibacterianas y Antifúngicas. Ciencia, Ambiente y Clima. 2023;6(2):33-66.

25. Nijveldt RJ, van Nood E, van Hoorn DEC, Boelens PG, van Norren K, van Leeuwen PAM. Flavonoids: a review of probable mechanisms of action and potential applications123. The American Journal of Clinical Nutrition. 2001;74(4):418-25.

26. Frandsen JR, Narayanasamy P. Neuroprotection through flavonoid: Enhancement of the glyoxalase pathway. Redox Biology. 2018;14:465-73.

27. Huang J, Zaynab M, Sharif Y, Khan J, Al-Yahyai R, Sadder M, et al. Tannins as antimicrobial agents: Understanding toxic effects on pathogens. Toxicon. 2024;247:107812.

28. Wibowo DA NF, Tjandrawinata RR. Antidiarrheal Effect of DLBS1Y62, a Bioactive Fraction of Uncaria gambir Roxb. Dried Sap Extract, in Wistar Rats. J Exp Pharmacol. 2021;13:669-75.

29. Salama-Müller A, Roese N. Antidiarrheal Properties of the Combination of Tannin Albuminate and Ethacridine Lactate - A Narrative Review. Natural Product Communications. 2023;18(5):1934578X231170998.

30. Farha AK, Yang Q-Q, Kim G, Li H-B, Zhu F, Liu H-Y, et al. Tannins as an alternative to antibiotics. Food Bioscience. 2020;38:100751.

31. Ansari MF, Khan HY, Tabassum S, Arjmand F. Advances in anticancer alkaloid-derived metallo-chemotherapeutic agents in the last decade: Mechanism of action and future prospects. Pharmacology & Therapeutics. 2023;241:108335.

32. Ali A, Tawfik M, Hikal M, Tag El-Din M. HYPOCHOLESTEROLEMIC EFFECT OF SAPONIN EXTRACTS IN EXPERIMENTAL ANIMALS. Arab Universities Journal of Agricultural Sciences. 2019;26:2463-78.

33. Cao S, Liu M, Han Y, Li S, Zhu X, Li D, et al. Effects of Saponins on Lipid Metabolism: The Gut–Liver Axis Plays a Key Role. Nutrients. 2024;16(10):1514.

34. Elekofehinti OO, Iwaloye O, Olawale F, Ariyo EO. Saponins in Cancer Treatment: Current Progress and Future Prospects. Pathophysiology. 2021;28(2):250-72.

35. Wang F, Liang L, Yu M, Wang W, Badar IH, Bao Y, et al. Advances in antitumor activity and mechanism of natural steroidal saponins: A review of advances, challenges, and future prospects. Phytomedicine. 2024;128:155432.

36. Ramamoorthy S, Cidlowski JA. Corticosteroids: Mechanisms of Action in Health and Disease. Rheum Dis Clin North Am. 2016;42(1):15-31, vii.

37. Tantawy MA, Nafie MS, Elmegeed GA, Ali IAI. Auspicious role of the steroidal heterocyclic derivatives as a platform for anti-cancer drugs. Bioorganic Chemistry. 2017;73:128-46.

38. Sawadogo WR, Schumacher M, Teiten M-H, Dicato M, Diederich M. Traditional West African pharmacopeia, plants and derived compounds for cancer therapy. Biochemical Pharmacology. 2012;84(10):1225-40.

39. Baccouri B, Imen R. Potential Antioxidant Activity of Terpenes. In: Perveen S, Al-Taweel AM, editors. Terpenes and Terpenoids - Recent Advances. Rijeka: IntechOpen; 2021.

40. Mony T, Elahi F, Choi J, Park S. Neuropharmacological Effects of Terpenoids on Preclinical Animal Models of Psychiatric Disorders: A Review. Antioxidants. 2022;11:1834.

41. Behl T, Kumar K, Brisc C, Rus M, Nistor-Cseppento DC, Bustea C, et al. Exploring the multifocal role of phytochemicals as immunomodulators. Biomedicine & Pharmacotherapy. 2021;133:110959.

42. Souza K, Moraes B, Paixão I, Burth P, Silva A, Gonçalves-de-Albuquerque C. Na/K-ATPase as a Target of Cardiac Glycosides for the Treatment of SARS-CoV-2 Infection. Frontiers in Pharmacology. 2021;12.

43. Samolej J, White IJ, Strang BL, Mercer J. Cardiac glycosides inhibit early and late vaccinia virus protein expression. J Gen Virol. 2024;105(3).

44. Tagousop CN, Tamokou JD, Ekom SE, Ngnokam D, Voutquenne-Nazabadioko L. Antimicrobial activities of flavonoid glycosides from Graptophyllum grandulosum and their mechanism of antibacterial action. BMC Complement Altern Med. 2018;18(1):252.

45. Yarmolinsky L, Nakonechny F, Haddis T, Khalfin B, Dahan A, Ben-Shabat S. Natural Antimicrobial Compounds as Promising Preservatives: A Look at an Old Problem from New Perspectives. Molecules. 2024;29(24):5830.

46. Apochi O, Eluwa M, Mshelia P, Maral P. The effect of Jatropha tanjorensis leaf extract on the histology of the spinal cord of albino rat fetuses. Dutse Journal of Pure and Applied Sciences. 2025;10:223-32.

47. Arun P, Rajesh S, Sundaram S, Sivaraman T, Brindha P. Structural characterizations of lead anticancer compounds from the methanolic extract of Jatropha tanjorensis</i. Bangladesh Journal of Pharmacology. 2014;9.

48. Kp DA. Proteomics and its Related Biological Activity of Jatropha tanjorensis Ellis & Saroja: An Ethnomedicinal Plant. Asian Journal of Chemistry. 2014;26:3687.

49. Choudhari AS, Mandave PC, Deshpande M, Ranjekar P, Prakash O. Phytochemicals in Cancer Treatment: From Preclinical Studies to Clinical Practice. Front Pharmacol. 2019;10:1614.

50. Alozieuwa UB, Inagbor ME, Ozoude TO, Nwaechefu OO. Antinociceptive and Anti-inflammatory Activities of Jatropha tanjorensis Leaf Extract in Mice. Tropical Journal of Natural Product Research (TJNPR). 2024;8(11):9287 - 91.

51. Anhwange BA, Agbidye IG, Kyenge BA, Ngbede PO. Phytochemical Screening, Antimicrobial Activities and Nutritional content of Jatropha Tanjorensis Leaves. NIGERIAN ANNALS OF PURE AND APPLIED SCIENCES. 2019;2:108-13.

52. Akpan M, Assian U, Ikrang E. Effects of pretreatment and drying temperature on antioxidants and antinutrients of Justicia insularis and Jatropha tanjorensis leaves. Poljoprivredna tehnika. 2021;46:74-88.

53. Aiwonegbe A, Omoruyi U, Ogbeide O, Gabriel BO. Anxiolytic Effects, Antioxidant and Anti-inflammatory Activities of the Methanol Extract of Jatropha tanjorensis Leaf. Tanzania Journal of Science. 2022;48:596-606.

54. Srivastava S, Virmani T, Haque MR, Alhalmi A, Al Kamaly O, Alshawwa SZ, et al. Extraction, HPTLC Analysis and Antiobesity Activity of Jatropha tanjorensis and Fraxinus micrantha on High-Fat Diet Model in Rats. Life (Basel). 2023;13(6).

55. Amaechi D, Yisa BN, Ekpe IP, Nwawuba PI, Rabbi A. Phytochemical Screening, Anti-obesity and Hepatoprotective Activities of Ethanol Leaf Extract of Jatropha tanjorensis in Wistar Rats. Asian Journal of Applied Chemistry Research. 2022;12(4):20-6.

56. Antai A, Ukoh I, Sunday B, Edet E, Johnny M. Gestational administration of aqueous leaf extract of Jatropha tanjorensis alleviated postpartum emotional and cognitive dysfunction in rats (Wistar strain). Niger J Physiol Sci. 2023;38(2):211-21.

57. Ukoh I, Sunday B, Antai A, Arikpo S, Nsa H, David I. Consumption of Aqueous Leaf Extract of Jatropha tanjorensis Improves Fertility Potential and Gestational Outcome in Virgin Female Wistar Rats. Niger J Physiol Sci. 2022;37(2):247-53.

58. Umoren EB, Okon IA, Modo EU, Etim OE, Brown PI, Owu DU, et al. Jatropha tanjorensis Euphorbiaceae ameliorates aspirin-induced hepatotoxicity and maintain electrolytes balance in albino Wistar rats. Phytomedicine Plus. 2023;3(2):100450.

59. Chibuogwu CC, Njoku UO, Nwodo FCO, Ozougwu EOV, Nweze NV. Toxicity assessment of the methanol extract of Jatropha tanjorensis (Euphorbiaceae) leaves. Future Journal of Pharmaceutical Sciences. 2021;7(1):143.

60. Onyebuchi Ezendiokwere E, Monago-Ighorodje C, Ikewuchi JC. Assessment of the Acute and Subacute Toxicity Profile of Diethylether Extract of Jatropha Tanjorensis leaf in Male Wistar Rats. Journal of Applied Health Sciences and Medicine. 2023.

61. Ebhohon S, Onyenze C, Ngwuta C, A.P E, C.A O, J.C I, et al. PHYTOCHEMICAL CHARACTERIZATION AND TOXICITY ASSESSMENT OF ACUTE AND SUB-ACUTE ORAL ADMINISTRATION OF AQUEOUS EXTRACT OF Jatropha tanjorensis LEAF. 2024;9:113-31.