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Review of Chemical Constituents and Medicinal Attributes of *Jatropha tanjorensis* J.L. Ellis and Saroja Leaves

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Abstract

***Jatropha tanjorensis* "Hospital too far" is a well-known perennial plant grown for its leafy vegetable and much considerable potential. This review centered on how important chemical constituents of *J. tanjorensis* contribute medically in disease treatment and prevention, with a view to incorporate them into modern drug applications. The data source used in this review was obtained from secondary sources. The leaf is rich in phytochemical contents like phenols, alkaloids, terpenoids, cardiac glycoside, tannins and saponins responsible for its activities as antioxidant, antianemia, antimicrobial, antimalarial, antihyperlipidemic, anti-cholesterol and antidiabetic agents. It contains many minerals like vitamins C, B_1, B_2 and B_3, crude fiber, moisture, ash, sodium, iron, lignin, starch, mucilage, oil, calcium oxalate crystals, sugars, amino acids involved in cell activation and enzyme function. The ash values are considered as good determinant for purity and quality of crude drugs. Its flavonoid and phenolic compounds can inhibit the growth of bacteria. The plant secondary metabolites and mineral compositions can be influenced by the prevailing environmental factors in the surrounding habitat and toxicity of the medicinal herbs is dependent on the applied concentrations, doses and long term usage. This review supplied the necessary chemical constituents of *J. tanjorensis* and its medicinal values. Based on the findings, different extracts of *J. tanjorensis* leaf treat many health disorders by restoring of liver enzymes and ameliorating of depleted blood volume in physiological conditions, thus "hospital too far".**

Keywords: Jatropha tanjorensis; Extract; Bioactive constituents; Mineral contents; Medicinal attributes; Toxicity

Introduction

Jatropha tanjorensis J.L. Ellis and Saroja belongs to the family Euphorbiaceae, subfamily Crotonoideae, order Malpighales, genus *Jatropha*. The genus *Jatropha* is morphologically diverse comprising eight agronomical important species: *J. chevalieri*, *J. curcas*, *J. elliptica*, J. gandulifera, *J. gossypifolia*, *J. intergerrima*, *J. multifid* and *J. podagrica* and a natural hybrid, *J. tanjorensis*. *J. tanjorensis* is a native of Mexico and Central America and has been distributed in many tropical and subtropical countries like Africa, India and North America. The species has no ecological effect and can grow in areas with extreme climates because it possesses drought resistant succulent stem that can adapt in a big range of soil. It is an evergreen vegetable called 'Chaya' leaf in English, 'hospital too far' or 'catholic vegetable' in southern Nigeria and locally identified as 'Uguoyibo' (Igbo) and 'Iyana Ipaja' or 'Lapalapa' (Yoruba) [1-3].

Literature Review

J. tanjorensis is a gregarious perennial shrub that grows to about 5 m-6 m tall. Figure 1 shows the plant. The species has a dichotomous spreading branches and stubby twigs. The leaves are greenish, ovate, 3-5 lobed in outline, 6 cm-40 cm broad with about 3 cm-8 cm petiole length [4-7]. *J. tanjorensis* species is identified by possession of inflammable property that is capable of inflicting injury to the skin on mere contact after some days. The leaves are traditionally collected by holding the long petiole or not harvested on a bare hand to avert the danger of itching or injury posed on the skin later [8-10]. The plant produces white bell shaped flower with broad deltoid sepal. The plant also possesses smooth spineless bark which exudes whitish latex when cut. *J. tanjorensis* has vigorous and regrowth habit locally cherished in demarcating boundaries, road sides and disturbed places. It is also used as live fence or as ornamentals in Catholic Church premises as well as source of edible vegetable, hence as well called "Reverend fathers" vegetable. According to Bharanthy and Uthayakuman. *J. tanjorensis* is an important medicinal taxon

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composed of many phytochemicals including terpenoid, saponin, cardiac glycoside, flavonoid and tannin [11]. The species is also a good source of dietary ascorbic acid, crude protein, crude fiber, trypsin and oxalic acid. Traditional and pharmacological reports showed that the leaf is used in the treatment of diabetes, malaria, cardiovascular diseases and contains an exceptional anti-anaemic property [12-15]. Mishra, et al. reported that *Jatropha* leaf can be employed in cancer, as in abortifacient, antiseptic, diuretic and purgative homeostatic [16]. In view of the growing history of potential health benefits, availability, affordability and important ingredients in plants, the essence of this review is to discuss on the medicinal properties and phytochemical profile of *J. tanjorensis*.

FIG. 1. **Various parts of *Jatropha tanjorensis* (a) Leaves on the stem; (b) Flowers.**

Methodology

A multi-purpose plant, *J. tanjorensis* (hospital too far) was selected for this review based on its great described medicinal and nutritional values. The data source used was obtained online from goggles chrome and published journals. The review started January 2021-2022. Photograph showing the plant morphology was taken from its natural habitat with a Samsung camera 2.0 image system software [17-20].

Results and Discussion

Chemical composition of *J. tanjorensis*

Nutritionally, *J. tanjorensis* leaf contains huge mineral compositions (mg/100g) which include Magnesium, Mg (35.45), Calcium, Ca (39.56), Phosphorus, P (3.01), Sodium, Na (16.21), Potassium, K (41.70), Iron, Fe (8.65), Copper, Cu (4.81) Manganese, Mn (3.68) and Zinc, Zn (20.11). Nwachukwu reported the quantitative mean mineral content in mg/100g to include Mg (32.81 ± 0.12), Ca (36.85 ± 0.00), Na (19.89 ± 0.04), Zn (14.49 ± 0.00), P (4.28 ± 0.00), K (43.15 ± 0.09), Fe (9.95 ± 0.29) while Ochuloret et, al. revealed a detectable molybdenum (1.33) value [21-23]. The leaf has more magnesium than the African eggplant (*Solanum aethiopicum*). Its calcium and phosphorus ratio were considered "good" (*i.e.* above recommended value of 1.00) which increases the absorption of calcium in the intestine [24-27]. The leaf has significant sodium to potassium ratio which is important in promoting normal functioning of nervous system and prevents high blood pressure. Also, the leaf is a good source of iron which is important in improving of Iron Deficiency Anaemia (IDA). Moreover, *J. tanjorensis* leaf contains alkaloids, flavonoids, anthraquinones, terpenoids, cardiac glycoside, tannins, saponins, phenols and steroids [28]. These are plant secondary metabolites commonly referred to as 'phytochemicals' or 'anti-nutrients' because they have no satisfactory role in plant metabolism, growth, development and reproduction, but are involved in synthetic drug precursor, template and modification. Increased levels of biochemical parameters are an indication of altered hepatic structure. However, flavonoid content of *J. tanjorensis* leaves exhibited convincing hepatoprotective through significant reduction ($p<0.05$) in Alanine aminotransferase (ALT) level of biochemical parameter similar to normal control values [29-31]. Flavonoid from this plant is a potent super antioxidant, free radical scavenger and strong anticancer, the tannin has antioxidant effects that prevent cancer, while alkaloid contents serve as an antiseptic.

Proximate compositions of the *J. tanjorensis* leaf revealed good percentages of moisture from 8% to 14%, total ash (9.33%), crude fat (0.02%), fiber (10.21%), carbohydrate contents (58.7%), protein (41.65%) with 0.016 % of converted crude fat to fatty acid and 1079.39 kg of metabolizable energy. Ash values are used to determine the quality and purity of crude drugs while

moisture contents in plants aid metabolic processes by increasing digestive enzyme's function thereby improving growth and development. The low fat and concentrated or metabolizable energy source serve as an attribute for alternative diet to control weight in the presence of high energy [32-35]. The leaf showed marked variation in the vitamin levels such as: Vit. C (26.41 mg/100 g), Thiamine, Vit. B_1 (2.46 mg/100 g), riboflavin, Vit. B_2 (1.03 mg/100 g) and niacin, Vit. B_3 (3.18 mg/100 g). Also, Ochuloret, et al. reported vitamins values in *J. tanjorensis* to include Vit. A (48.215 mg/100 g ± 2.790 mg/100 g), vit. B_1 (0.0201 mg/100 g ± 0.001 mg/100 g), Vit. C (0.0347 mg/100 g ± 0.000 mg/100g) and undetectable level of vitamin E. The vitamin C and niacin (B_3) play significant role in cell activation as a powerful antioxidant in iron absorption and anti-cardiovascular respectively [36].

Other natural chemical compounds from *J. tanjorensis* leaf extract include friedelin, β-amyrin, stigma sterol and R(+)4-hydroxy-2-pyrrolidinone which have antimicrobial activities. Chemo microscopic screening of *J. tanjorensis* powdered leaf showed presence of lignin, starch, mucilage, oil and calcium oxalate crystals while water soluble extracts contained sugars, amino acids, vitamins and could be useful in establishing pharmacopoeia standard of both fresh and powdered drugs [37-40].

Medicinal importance of *J. tanjorensis*

Medically, *J. tanjorensis* (hospital too far) is referred to as one plant equal to many remedies. It is consumed as leafy vegetable as well as a reference plant in folk medicine in many southern Nigeria due to its potential health benefits, availability and affordability [41-43]. Growing trend in many researches were on the use of medicinal plants as natural resources to develop new drugs because of some wide range of biological activities like hypolipidemic, hematological, antihypertensive, antimalarial, antioxidant, antimicrobial and anti-diabetic [44]. Following the traditional knowledge of medicinal plants, use of plant parts to address health conditions is becoming very important in medical systems almost in the entire world. Also, reliance on the plant parts to salvage health issues dates back to prehistoric time and most of the scientific drugs of the modern world were derived from plants. *J. tanjorensis* leaf contains a range of organic and inorganic compounds like secondary metabolites such as flavonoids, phenols. Flavonoid rich fraction (CCl_4+40 mg/kg b.w FRJT) of the methane extract of *J. tanjorensis* leaf in CCl_4 induced hepatotoxicity rats is an important hepatoprotective and antioxidants [45-47]. It helps in restoring liver enzymes and in ameliorating depleted blood volume in physiological condition like pregnancy and menstruation when there is drop in hemoglobin and package cell volume. Thus, the traditional claims as a 'haematinic agent' in the treatment of anemia. *J. tanjorensis* has been reported as an exceptional anti-anaemic plant. Supplementing glutathione peroxidase, catalase and superoxide dismutase, the natural antioxidant defense and ameliorating depleted blood volume respectively [48-50].

Antimicrobial and antifungal activities of *J. tanjorensis*

Several scientific studies conducted on *J. tanjorensis* were to determine its efficacies reported in traditional system. Aqueous, ethanol, hexane and methanolic extracts of *J. tanjorensis* leaves are effective antimicrobial agents that can inhibit growth of various bacteria like *Escherichia coli* and *Staphylococcus aureus*. However, bioactive compounds present in the extracts varied with extract type which indicate that its efficacy is dependent on the activities of the extracts [51]. Its ethanol and aqueous extracts contained antimicrobial properties useful in the treatment of infections caused by bacteria. Ethanol extract acted against *Salmonella typhi* and *S. aureus* with 7.00 mm and 5.40 mm as the zones of inhibition and against *Escherichia coli*, *Shigella* spp. and *Streptococcus* spp. with 5.10 mm, 4.15 mm and 3.99 mm as the zones of inhibition respectively. Daniyan, et al. reported that aqueous and ethanol extracts of the plant leaves at three concentrations; 30 mg/ml, 40 mg/ml and 50 mg/ml were bacteriostatic in activities on the *Escherichia coli* and *Staphylococcus aureus* under a dose. Aqueous extract had higher activities on the test organisms at 7.5 mg/ml minimum inhibition in all concentrations while the ethanolic extract had no activities on *E. coli* in lower concentrations at 25 mg/L minimum inhibition but *S. aureus* was easily affected by all concentrations at 15 mg/L inhibition zone [52-54]. Also, methanolic and hexane extracts of the *J. tanjorensis* leaves possess antimicrobial properties which have some degree of inhibition on the growth of *E. coli*, *S. aureus*, *Klebsiella pneumonia* and *Candida albicans*.

The methanol leaf extracts contained natural chemical compounds such as friedelin, β-amyrin, stigmasterol and R (+) 4-hydroxy-2-pyrrolidinone which provided scientific evidence for its antimicrobial activity. Maximum activity of methanol extract was obtained at 30 mm-46 mm, 27 mm-43 mm and 17 mm-40 mm in friedelin and 23 mm-46 mm, 28 mm-44 mm and 18 mm-41 mm in R (+) 4-hydroxy-2-pyrrolidinone activities against bacteria but at 12 mm-37 mm, 8 mm-34 mm and 31 mm-33 mm in friedelin and 12 mm-40 mm, 11 mm-35 mm and 10 mm-33 mm in R (+) 4-hydroxy-2-pyrrolidinone against fungi at 10 mg, 5 mg and 2.5 mg respectively [55]. These antimicrobial agents may act by inhibiting the nucleic acid, protein cell wall and membrane phospholipid biosynthesis to exert its effect. Also, hexane, chloroform and methanol extracts of *J. tanjorensis* leaf performed different levels of efficacy as ameliorating agents in antimicrobial and anti-inflammatory activities [56-58].

Flavonoids, phenols and their derivative compounds can be isolated from *J. tanjorensis*. These compounds can inhibit the growth

of bacteria in different dilutions. Phenols including tannins have strong effect on tropics in treating of skin wounds while tannins display strong potential toxic against bacteria, filamentous fungi and yeast [59]. The high content of these compounds in the *J. tanjorensis* extract were found active against the strains of *S. aureus* and *Pseudomonas aeruginosa*. *S. aureus* and *P. aeruginosa* are the commonest leg ulcers and wounds microorganisms which show greater resistance to commonly used antibiotics. *J. tanjorensis* also possesses anti-dermatophytic and anti-candida roles potent against fungi of *C. albicans*, *Trichophyton rubrum* when compared with *Aspergillus fumigatus* and *Microsporum gypseum* in agar well diffusion methods. Other potent inhibition of *J. tanjorensis* extracts are reported against *P. aeruginosa*, *E. coli*, *Proteus mirabilis*, *Proteus vulgaris* and *Klebsiella pneumoniae*, the causative agents of urinary tract infections. The efficacy of the plant extract against *P. aeruginosa*, the major cause of infection in burns provides scientific evidence to ethno therapeutic claim to heal wounds. Therefore, *J. tanjorensis* compounds could be explored in the development of antimicrobial therapy to boost skin wound healing [60-62]. Hence, the plant extracts could be of value in the management of disease conditions associated with the bacteria and fungi.

Antiplasmodial activity

Jatropha leaf has natural anti-oxidants and cold sensations that would bring about pain and fever relief without any side effects. Reports of experiment on antimalarial and cytotoxic properties of plants used in traditional medicine revealed that an extract can be said to be very active if IC_{50}<10 µg/ml, moderately active if IC_{50} is between 10 µg/ml and 50 µg/ml and inactive if IC_{50}>50 µg/ml [63]. According to Airaodion and Ogbuagu, ethanolic leaf extract of *Jatropha* species possesses anti-plasmodial potential against *Plasmodium berghei* and maximum antimalarial efficacy at complete dose. *J. tanjorensis* leaf is considered to possess antimicrobial and anti-plasmodial properties. Also, *in vitro* studies of anti-plasmodial activity of *J. tanjorensis* assayed in three 50:50 v/v forms of extract (aqueous, ethanolic and hydro ethanolic) showed that ethanolic extract contained significantly the highest anti-plasmodial activity observed at 10.86 µg/ml ± 1.52 µg/ml at 50% Inhibitory Concentration (IC_{50}) of parasite growth compared to other extracts against chloroquine sensitive 3D7 strain of *Plasmodium falciparum*, followed by aqueous extract (44.0 µg/ml ± 2.40 µg/ml) while hydro ethanolic extract (48.0 µg/ml ± 1.34 µg/ml) had the least activity. Therefore, the three extracts forms were regarded as moderately active against the *Plasmodium falciparum* in contrast to the standard antimalarial drug chloroquine (IC_{50}<0.087 µg/ml ± 0.0003 µg/ml) [64-66]. The anti-plasmodial property of the plant extracts, particularly the ethanolic extracts may be attributed to presence of some phytochemicals which might have relatively conferred some protective or antioxidative effect against oxidative stress induced by the malaria parasite and can justify local claims on the use of *J. tanjorensis* leaf in the treatment of malaria infection.

Antioxidant activities

Antioxidants are the free radical scavengers that can prevent or slow down cell damages caused by free radicals. The free radicals also called Reactive Oxygen Species (ROS) are the waste substances produced in the cell during normal cellular metabolism and can chemically react with cellular biomolecules**,** environment and other pressures [67]. Hence, inability of the body to process and remove free radicals efficiently results in a physiological condition called oxidative stress. Oxidative reaction is a destructive reaction that harms cells, body functions and has been identified as root cause of several diseases. Free radical's damage also linked to the manifestation of many degenerative diseases like cancer, atherosclerosis, stroke, vision loss, Parkinson's disease, inflammation and many other body disorders like, nervous disorders. Factors such as pollutants, UV exposure, tissue trauma, hormones, smoking, radiation can increase the production of free radicals, cell damages and speeds up aging. Antioxidants can be endogenous like catalase, Superoxide Dismutase (SOD), Glutathione Peroxidase (GPx) produced in body enzymes or exogenous like vitamins A, C and E, lycopene, beta carotene, zeaxanthin, flavonoids, flavones, catechins, phenols, phytoestrogens obtained outside the body mainly from plant based nutrients [68].

Antioxidant efficacy of *J. tanjorensis* leaf is high and could be used in treatment or prevention against cellular disorders associated with oxidative stress. *In vitro* studies on free radical scavenging activities of aqueous leaf extract of *Ficus exasperata* (FE), *Moringa oleifera* (MO) and *J. tanjorensis* (JT) showed that *J. tanjorensis* leaf exhibited the highest radical scavenging activity against Ferric Reducing Antioxidant Power (FRAP) And Total Antioxidant Capacity (TAOC) in this order JT <MO<FE at IC_{50}. The ability of *J. tanjorensis* extracts to scavenge free radicals may be due to the affluence of secondary metabolites or bioactive compounds such as alkaloids, flavonoids, phenols, saponins, steroids, terpenoids.

Aqueous extract of *J. tanjorensis* leaf has high levels of alkaloids, phytates and low levels of saponins, cyanides, oxalates and phenols. High alkaloids composition is important in decreasing some disease incidences such as stomach ache, vomiting, intestinal worms, constipation, dysentery and diarrhoea. Phytate is also an anti-oxidant capable of suppressing oxidative reactions in the body system. Presence of phenol compound is the major contributing agents in the antioxidant potentials of food and medicinal plants. Phenol compounds have anti-radical activities that trap free radicals when transferring hydrogen atom into a stable molecule and reducing power due to the presence of hydroxyl group in their structure that can serve as an electron donor.

J. tanjorensis extract possess mild cardioprotective potency at certain dose range which revealed that most of the plant extracts are dose dependent and can offer health benefits when consumed in right quantity. It also contained many bioactive compounds in moderate concentrations that are helpful in maximizing its health benefits without experiencing toxic effects as much of these compounds will be lost through processing. *J. tanjorensis* contained cardiac glycosides as good heart tonics that increases the rate of urine flow to get rid of excess water and prevent cases of heart failure by Sunil. Again, unlike other vegetables, processing methods does not eliminate the antioxidative properties in *J. tanjorensis*.

Flavonoid rich fractions of the methanol extract of *J. tanjorensis* leaf showed antioxidants, which retard free radicals in the system of CCl_4 induced hepatotoxicity rats and support its use in the treatment of diseases resulting from oxidative damage. Studies on haematological indices of *J. tanjorensis* aqueous leaf extract in rats showed that lower doses of the extract can result in haemopoiesis *i.e*. increased RBC, Hb, PCV, WBC and PLT while higher doses lead to haemolysis in the treated groups than in the control. Also, studies on heart histopathology showed that low doses of methanolic extract of *J. tanjorensis* leaf can offer better potency in preventing induced damage of cardiomyocytes and induced biochemical changes though mild alteration in heart histoarchitecture occurred at 400 mg/kg and higher doses.

Antidiabetics and Anti-cholesterol activities

J. tanjorensis leaf has 4.90% fat content which conforms to the normal fat content range (1.60% to 4.15%) of other leafy vegetables. This low amount of fat content is an indication of low lipid composition in the leaf which is good in controlling and preventing obesity. The leaf contains high magnesium values and potassium content. Magnesium is good for biochemical reactions in the body to maintain muscle and nerve functions as well as in regulating blood sugar levels while potassium reduces high blood pressure effective for hypertensive patient. So, increased magnesium and potassium contents can offer control to blood sugar levels and regulates nerve conduction during high blood pressure in diabetes associated cases.

Methanolic extract of *J. tanjorensis* species indicated hepatoprotective role in diabetic complications by maintaining the normal serum level of AST and ALT which increased in the in diabetic control rats as a sign of hepatic injury due to leakage of these enzymes from liver cytosol to the blood stream. Also, the methanolic extract has the potentials to drop blood lipid irregularities in induced diabetes. The leaf and stem of *J. tanjorensis* possess hypoglycemic potential useful in diabetes management. The leaf serves as vegetable and as well prevents and cures diabetes in southern Nigeria.

Certain phytochemicals of plant extracts exhibit hypolipidemic activity which can alter Serum Lipid Profile (SLP) of Hypolipidemic Rabbits (HyL-Rs). Phytochemicals of *J. tanjorensis* leaf extract produced bioactive principles (terpenoids, saponins, cardiac glycosides, flavonoids and tannins) that possessed hypocholesterolemia activities capable of lowering blood cholesterol level and readjusting of lipid metabolism in cardiovascular diseases associated with hyperlipidemia. Flavonoids can lower cholesterol and triglyceride levels in the blood while saponin specifically can lower both glucose and cholesterol levels thereby promote good health, prevent and reduce risk of diabetic complications.

Also, serum lipid profile of *J. tanjorensis* extract showed no significant difference in triglycerides and High density lipoprotein Cholesterol (HDL-C) in the control rats but had significant reduction ($p<0.05$) in Total Lipids (TL), Total Cholesterol (TC) and Low Density Lipoprotein Cholesterol (LDL-C) in the experimental rat group. The significant reduction in serum lipid profile implies that *J. tanjorensis* leaf extract can suppress atherogenic lipoproteins levels in atherosclerosis and other coronary heart disease complications due to hyperlipidemia.

Anti-anaemic activities

Anaemia is a blood related health issues that resulted from low hemoglobin concentration, premature destruction Red Blood Cells (RBC) as well as declined resistance to disease. Anaemia condition can be inherited, acquired, mechanical or drug induced with headache, dizziness, lethargy, pale skin and eyes, weakness, shortness of breath or arrhythmias, chest pains etc. as the common symptoms. Anaemia is a global issue with 71% reported incidence in developed countries and 84% in underdeveloped countries (National Family Health Survey (NFHS) and the most affected groups are children, women (mostly the pregnant) and the elders.

Traditionally, *J. tanjorensis* leaves are valuable in the treatment of anaemia as a hematinic agent, diabetes, renal problems, cardiovascular diseases, hypertension and inflammation. The leaves were popularly consumed in Nigeria as a health tonic with claim that it increases blood volume. Hematological examination revealed significant increase in the hemoglobin, packed cell volume and red blood cells which justifies its safety and claim in the treatment of anaemia. The extracts possess excellent anti-anaemic activities due to the presence of enough iron for the formation of red blood cells and haemoglobin, manganese to content against anaemia, fiber for emulsification and absorption of cholesterol and presence of phenol for free

radicals' clean-up. Ansari, et al. reported that people's belief on *J. tanjorensis* as the most effective of all plants in building up blood in anaemic conditions earned it the name "Hospital too far". Crude extract of the plant leaf is rich in iron which is important in production of red blood cells in Iron Deficiency Anaemia (IDA).

Wound healing activity

Extracts of *J. tanjorensis* can stop germ infections due to its wound healing activities. The juice can restore disrupted anatomical structure and it is very useful in the treatment of dermatomycosis including scabies, eczema ringworm, blisters, scar, amongst others. Locally, crushed or squeezed juice of the leaf can be applied to an open wound and stubborn ulcers, to stimulate fibrinogen cells and increase antigen. Wound closed with 5% w/w *J. tanjorensis* methanol leaf extract ointment base everyday revealed wound healing activity on 16^{th} day similar to standard drug, nitrofurazone ointment in excision wound model. The authors attributed the efficacy to basic Fibroblast Growth Factor (bFGF) of the extract which stimulated the local growth factors responsible for wound healing.

Toxicity

Studies on undesirable effects of medicinal herbs appeared to be less significant on the controlled clinical trials depending on the applied concentrations, doses and long term usage. Toxicological evaluation in the renal and hepatic functions of rats administered with *J. tanjorensis* leaf extract for 21 days had low adverse effect in the body and organ weight index. Iboi and Agoreyo reported toxicological effects of consumption of extract *J. tanjorensis* for 14 days on the liver of adult wistar rats. Results of the histological examination on the rats after the 14 days showed significant toxic to the liver as evidenced in necrotic regions, congestion, portal triaditis of the hepatocytes when compared to the control rats. The examination also revealed that liver architecture in the rats treated with *J. tanjorensis* leaf extract had pathological distortion like ultra-structural changes in the liver morphology in dose dependent manner and more at higher doses. Results of the acute toxicity study on *J. tanjorensis* leaf extracts recorded no mortality at all concentrations but a decrease in appetite at the higher (5000 mg/kg) concentration. This implies that toxicity or damage associated with *J. tanjorensis* leaf extracts treatment depends on concentrations and doses. However, plant secondary metabolites and mineral compositions can be influenced by the prevailing environmental factors in the surrounding the habitat. Mbosowo and Samuel reported influence of soil status on the mineral nutrients and phytochemical constituents of *J. tanjorensis* leaf in two locations; Abak in Akwa Ibom state (L1) and Yenagoa in Bayelsa state (L2). It was found that the mineral elements in leaves of *J. tanjorensis* located at Abak composed of lead (0.002 ± 0.00) which is not environmentally friendly and toxic in large accumulation.

Conclusion

J. tanjorensis (hospital too far) is well known shrub grown for its leafy vegetable and other values. It is found to be effective in traditional treatment of many diseases. The leaf is rich in phytochemical contents, vitamins C, B_1, B_2 and B_3, crude fiber, moisture, ash, sodium, iron, lignin, starch, mucilage, oil, calcium oxalate crystals, sugars, amino acids involved in cell activation, enzyme function and responsible for its activities. The leaf contains phenols and tannins that are good for care and repair of skin wounds and active potential toxic to filamentous fungi, yeast and bacteria. *J. tanjorensis* possess antioxidant, antianemia, antimicrobial, antimalarial, anti-hyperglycemic, antihyperlipidemic, anti-cholesterol and antidiabetic. Therefore, due to its bioactive constituents and medicinal attributes it can surely help in prevention and treatments of many health issues.

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Availability of data and materials

The data source used in this reviews were obtained online from goggles, chrome and published journals.

Ethics approval and consent to participate

It is not applicable; this is a review work and did not involve human participants.

Competing interests

The authors declare that no competing interests exist and all authors agree for publication.

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