A Brief Review of the Protective Role of Sennsa Sigunea in Diverse Biological Functions

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Abstract:

Senna singueana is one of the most potential medicinal plants from genus Senna that are widely studied for medical purposes. Belongs to the family Fabaceae that growing up to 15 m. Other names are winter cassia, scrambled egg or sticky pod. S. singueana is commonly found in semi-arid regions of tropical Africa Senna singueana (Delile) Lock is a potential medicinal plant commonly used to mitigate various infectious and non-infectious diseases including malaria, typhoid, gonorrhoea, bilharzia, cancer, epilepsy and ulcer. The phytochemical profile of S. singueana indicates the presence of different phytoconstituents corresponding to the pharmacological properties. Scientific studies reveal that S. singueana has pharmacological activities including antimicrobial activity, antioxidant activity, antidiabetic activity, anticancer activity, hepatoprotective activity and antiapoptotic activity.

Keywords: Senna singueana, Fabaceae, Phytochemical, Pharmacological properties.

Introduction:

Plants with medicinal properties have historically been employed with remarkable efficacy to manage a variety of ailments due to the presence of active phytoconstituents. The isolation of biologically active compounds from medicinal plants has a lot of promise for developing drugs [1,2] Rural societies particularly in developing countries, still use medicinal plants as the principal source of medicines [3,4]..*Senna* a genus belonging to family Fabaceae, subfamily Caesalpinioideae, tribe Cassieae ser. Aphyllae has roughly 350 species of tree shrubs and subshrubs [5, 6]. It is called Runhu in Hausa language.[7] and is native to tropical Africa, occurring throughout mainland tropical regions of Africa (8). This genus can be found in wide-ranging habitats, in distinct climatic conditions, latitudes, and continents such as America, Africa, and Oceania and to a minor extent in Asia and Pacific islands [9]. *Senna* plants colonized forests (both humid and dry), deserts (both cold and dry), and rock outcrops [10]. Different parts of this plant species have numerous medicinal uses all over Africa. The plant is used to treat fever, malaria, pulmonary troubles, eye problems (conjunctivitis), skin disorders, venereal diseases, abdominal problems, bilharzia, impotence due to diabetes and wounds caused by leprosy, and syphilis (11, 12). It is also used as a purgative and as a lactation stimulant in both humans and animals (11, 12). In Zimbabwe, the leaves of *S. singueana* are used to treat a broad spectrum of poultry conditions such as coccidiosis, Newcastle disease, coughing, and flu-like symptoms (13). To date, the genus is also commonly recognized for its biologically active compounds and medicinal properties [14, 15].

The plant's root and bark extracts have been used for treatment of many diseases across African continent ranging from skin cancer in Ethiopia,[16] liver diseases in Egypt,[17] malaria in Ethiopia,[18] and pain from any cause in Malawi.[19] Other traditional uses of the plant are in the treatment of convulsion, inflammatory conditions, gonorrhea, constipation, heartburn, and wound healing [20] Despite widely reported beneficial effects of the plant in treating common illnesses and diseases, there has not been much investigation on its potential glucose lowering effects. Indeed, Abubakar *et al*. [21] did not list it as one of the plants.

These phytochemicals majorly included classes of pentacyclic triterpenes and piperidine alkaloids displaying health-promoting properties [22]. Several studies indicate that *S. singueana* contains various phytochemicals including flavonoids, tannins and phenolic compounds [23]. However, very few studies have been conducted on *Senna singueana*. Many of the parts such as leaves, pods, roots, and fruits of the natural plants have beneficial pharmacological properties against diseases. Reports of traditional uses of *S. singueana* for mitigation medical conditions such as sexually transmitted infections, diabetes, stomach pains, leprosy, rheumatism, inflammation, skin cancer, malaria etc., throughout Africa are available [24,25,27,28,29]. Scientific studies reveal that *S. singueana* has pharmacological activities including antimicrobial activity [26,27], antioxidant activity [30], antidiabetic activity [31], anticancer activity [30], hepatoprotective activity [32] and antiapoptotic activity. Therefore, this review provides comprehensive and up-to-date information about the potential of *S. singueana*

Pharmacological Properties

Antioxidant activities in vitro the extract showed a remarkable **hepatoprotective activity** against D-galactosamine (D-GalN) induced hepatic injury in rats. It significantly reduced elevated AST (aspartate aminotransferase), and total bilirubin. Moreover, the extract induced a strong cytoplasmic Bcl-2 expression indicating **suppression of apoptosis**. In conclusion, the bark extracts [33]

Traditionally used for different conditions including treatment of pain conditions in humans and animals. Although various reports are available in the literature claiming different activities of the plant, scientific studies supporting analgesic potential of *Senna singueana* are lacking and the present study aimed to investigate the **antinociceptive effect** of methanol extract of leaves of *Senna singueana* in mice [34]

Various reports are available in the literature claiming different activities of the plant, scientific studies supporting **analgesic** potential of *Senna singueana* are lacking and the present study aimed to investigate the **antinociceptive effect** of methanol extract of leaves of *Senna singueana* in mice [35]

Sennasingueana(Del). Lock (Fabaceae) has many traditional uses against infections and related disorders. The aim of the present study was to evaluate the antibacterial potential and phytochemical properties of root extracts of *Senna singueana*.Root extracts of *Senna singueana*demonstrated **antibacterial activities** against both gram positive and gram-negative bacteria and this in turn may, at least partly, rationalize the traditional use of the plant against various infections [36]

Leaves and bark of *Senna singueana* (Del). Lock (family: Fabaceae) are traditionally used in some parts of Ethiopia, for the treatment of a form of skin cancer locally called 'MinshiroNekersa'. It was thus proposed that the observed radical scavenging activity of S. singueana may contribute partly to the possible scientific basis for the traditional **anticancer** use of the plant [37]

Senna *singueana* is currently used in the traditional treatment diabetes mellitus of in Nigeria. The present study examined the **anti-diabetic activity** of the *Senna singueana* acetone fraction (SSAF) of stem bark in a type 2 diabetes (T2D) rat model [38]

Both leaves and bark of *Senna singueana*(*Del).Lock* fabaceae traditionally used in some parts ethopoina form of skin cancer. The objective of this work was to study the antioxidant properties, of this plant using an erythrocyte haemolysis inhibition assay, because one way to justify the traditional **anticance**r uses can be through the concept of **antioxidan**t effect. The results revealed that the ethyl acetate solvent fraction from the bark of *S. singueana* exhibited concentration dependent erythrocytehaemolysisinhibitory activity, with an IC_{50} value of 233 g/ml [39]

Senna singueana leaves are traditionally used against malaria and fever. Extracts from the leaves of this plant demonstrated *in vitro* and *in vivo* **antioxidant** activities, which in turn could reduce the severity of malaria. Extracts from the root bark of this plant exhibited **antiplasmodial** activity; however, the leaves are the more sustainable resource [40]
Investigation of 70% aqueous acetonic leaf extract from *S. singueana* on the **antihelmintic** activity against Haemonchus contortus larval in a dose dependent manner with extract concentrations of 0, 150, 300, 600 and 1200 µg/mL phosphate buffered saline was conducted [41]. The results showed significant inhibition activity ($P < 0.0001$) in all tests contained

extract concertation. The leaves of *S. singueana* had high level of kaempferol-based flavanol, and aglycones. The observed anthelmintic activity can be connected with a presence of high concentration of compounds 3 and 18

Laxative effect of anthropoids, two independent mechanisms are always happening, which are changes in colonic absorption and secretion, which resulting in a fluid accumulation and changes in colonic motility that accelerated large intestinal transit [42].

Anti-oxidative properties of *S. singueana* leaves and seeds extracted using various solvents were studied [43]. All extracts had decreasing power of 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging properties. Using the DPPH free radical scavenging experiment, methanolic and ethyl acetate extracts from the leaves had the highest total reducing power, whereas ethyl acetate and methanolic extracts from the seeds had more potent free radical scavenging activity than all other extracts. Furthermore, alcoholic extract from *S. singueana* bark demonstrated remarkable antioxidant activity as analyzed using ferric reducing antioxidant power (FRAP) assays and DPPH [44]. Similarly, antioxidant activity reported from *S. singueana* root bark extracts. The activity of the methanolic extract was slightly higher than other extracts [45]. Recently, the antioxidant activity of methanolic extracts of *S. singueana* leaves was investigated

Table No:1 Summary of Pharmacological activities of *S. singueana*

S.NO	PLANT PARTS	THERAPEUTIC USE	REFERENCES
1.	Root bark	Hepato protective	Mansour Sobeh *et al*.,2017
2.	Leaves	Anti-nociceptive	HisheHZ *et al*., 2018
3.	Leaves	Analgesic	HaileMichaelZeruHishe *et al*., 2018
4.	Root	Anti-bacterial	TeklayGebremariam *et al*.,2014
5.	Leaves and bark	Anti-cancer	Mebrahtom Gebrelibanos *et al*.,2007
6.	Stem bark	Anti-diabetes	Mohammed Auwal Ibrahim *et al*.,2014
7.	Leaves	Anti- malarial	Mebrahtom GebrelibanosHiben *et al*., 2016
8	Root	Antioxidant and Antibacterial activity	K.T. Hilawea *et al*.,2020
9	Leaves	Anti-inflammatory potential	M. Gebrelibanos *et al*., 2014
10	Root	Cytotoxicity potential	I.T. Shawa *et al*.,2015
11	Leaves	Antibacterial, anti-lipoxygenase, Antioxidant activity	P. Jambwa *et al*.,2022
12.	Root	Anticonvulsant activity	Ayyanna.C *et al*., 2020
13	Leaves	Anti helmintic	G. Mengistu *et al*.,2017

Summary: The use of *S. singueana* plant extracts to mitigate medical conditions has long traditional history. The research on *S. singueana* as a medicinal plant justified its traditional use as an alternative medicine. Reports of extracts from *S. singueana* demonstrate various bioactivities such as antimicrobial, antioxidant, antimalarial etc., as presented early in this work [46, 47, 48, 49, 50, 51, and 52,53–58]. There is significant diversity in the bioactivity among plant parts such as stem, leaves, roots and seed as well as plants collected from the different geographical locations [59, 60, and 61]. Furthermore, the bioactivities of several fractions of *S. singueana* extracts suggest that it is a potential medicinal plant that can be employed to mitigate medical conditions globally.

Conclusion:

Scientific information collected and presented in this review showed that *S. singueana* contains several phytoconstituents responsible for the various pharmacological properties. The findings on pharmacological properties support the traditional uses of *S. singueana*. The presence of significant nutritional components in *S. singueana* contribute to its wonderful ability to manage medical conditions and maintain human health. All parts of the plant have medicinal properties potential for mitigation of medical conditions, but the leaves and roots are the most utilized plant parts, and are widely studied. Furthermore, the information on bioactive compounds isolated from *S. singueana* and their mechanisms of action is limited. Therefore, future study should focus on identifying phytoconstituents and evaluating pharmacological properties. Further identifications of bioactive compounds from all parts of *S. singueana*, their mechanisms of action and toxicological study are highly recommended for sustainable utilizations of this potential medicinal plant.

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