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Phytochemistry and Pharmacological Activities of *Lagenaria breviflora*: A Review

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Abstract

Lagenaria Breviflora is from the family Cucurbitaceae. Traditionally, it is useful in the treatment of human measles, digestive disorders and as wound antiseptics. The phytoconstituents present in the plant include triterpenoids, curcubitacin etc. Pharmacological study reported the anti-implantation, anti- bacterial, antiulcer, anti-inflamatory, antioxidant, Miracidal and Cercidal activity and antifertitlity. This review is an attempt to pin-point unexplored potential of the plant for further research.

Keywords: *Lagenaria Breviflora*; Phytochemistry; Pharmacological Activities

Introduction

Lagenaria breviflora (Benth.) is from the tribe Benincaseae and from the family Cucurbitaceae [1]. It is also known as squash family. Its from the genus Lagenaria which has seven species viz: *Lagenaria abyssinica, Lagenaria guineensis, Lagenaria rufa, Lagenaria siceraria, Lagenaria sphaerica, Lagenaria vulgaris*. It synonyms are *Adenopus* Benth, *Sphaerosicyos* Hook. F [1].

English wild colocynth (Ainslie). French calebasse tigrée (Berhaut). SENEGAL: BASARI a-kása-kása (Ferry) BEDIK ginyudùŋ (Ferry) DIOLA é sigir (JB) ku batak (JB) FULA-PULAAR (Senegal) denni biram dau, denni: water melon (A. Chev.) MANDING-BAMBARA ka bara ni (JB) SERER mbomb (JB) THE GAMBIA: DIOLA-FLUP é sigir = heart (DF) kufatak = lamb (DF) GHANA: AKAN-TWI asãmãn-akyẽkyẽa = spirit's water melon (FRI) ANYI-AOWIN aboa ngateɛ (FRI) SEHWI aboa-ngateɛ (FRI) GA ánúwátrɛ̀ (FRI; KD) NZEMA aboangatseɛ = leopard's groundnut, from the blotched fruit (FRI) NIGERIA: HAUSA gojin jima, gunar jiímaà, jiímaà: to tan (JMD; ZOG) IGBO ányụ́ḿmụ̀ọ́ = anyu of the spirits (Singha); any plant qualified by ḿmụ̀ọ́: spirits, dead, is inedible, as opposed to another which is eaten (KW) uriem (BNO) YORUBA eso gbegbe, eso: fruit (IFE) eso gbo ayaba the seed (IFE) ito (JRA) tagiiri (auctt.) [1].

The plant, and especially the fruit of *Lagenaria breviflora* is widely used in folklore medicine in West Africa as a herbal remedy for the treatment of human measles, digestive disorders, and as wound antiseptics (e.g. umbilical incision wound), while livestock farmers use it for Newcastle disease and coccidiosis treatment in various animal species, especially poultry. The present review provides detail information of the plant exploring its ethnopharmacological uses, phytochemical and pharmacological studies conducted on *L. breviflora* and also pinpoints unexplored potential of it.

Phytochemical analysis

The fruit pulp of *L. breviflora* was also reported to possess phenolic acids, while p-hydroxybenzoic and vanillic acids

were found to occur as free and bound acids in the pulp, ferulic acid was also found to occur only as an ester [2]. Elujoba and Alfy alsoprovided morphology as well as the ash values and solvent extractive values of the fruit of *Lagenaria breviflora* Robert for proposed African Pharmacopoeia. Standard phytochemical methods were used to test the presence of saponins, alkalodis, tannins, anthraquinones, cardiac glycosidees, cyanogenetic glycosides and flavonoids [3]. Analysis of the phytochemical contents of *L. breviflorain* methanolic solvent showed enhanced reducing sugar, anthraquinoen and terpenoids whereas flavonoids, taninis and alkaloidswere least and saponin and cyanogenic glucoside were absent [4]. Curcubitacin was isolated from the plant which is responsible for its anti-inflammatory and analgesic activities [5]. From the methanol extract of fruit pulp, 3 new saponins were characterized as 3- O -β-galactopyranosyl 28-O -β-xylopyranosyl(1→4)-α-rhamnopyranosyl(1->3)-β-xylopyranosyl(1→3)-α-arabinopyranosylolean-12-en-28-oic acid ester, 3-O -β-galactopyranosyl 28- O -β-galactopyranosyl(1→4)-α-rhamnopyranosyl(1->3)-β-xylopyranosyl (1→3)-α-arabinopyranosylolean-12-en-28-oic acidester and 3-O -β-galactopyranosyl 28- O -α-arabinopyranosyl(1→6)-β-galactopyranosyl(1->4)-α-rhamnopyranosyl(1→3)-β-xylopyranosyl-(1->3)-α-arabinopyranosylolean-12-en-28-oic acidester. Oleanolic acid and 3-O –acetyloleanolic nacid were identified from the hydrolytic products of the pulp [2]. The results of phytochemical analysis indicate that the extract contains saponins (triterpenoids) [6,7].

Antibacterial activity

Its antibacterial activity was determined by Tomori *et.al* using agar-well diffusion method and expressed as the average diameter of the zone of inhibition of bacterial growth around the wells. The effect of the extract was compared with that of the two standard antibiotics (ofloxacin and erythromycin) used. The difference of the means was considered significant at $p< 0.05$ using Student t-test. The extract potently inhibited the growth of all the bacterial colonies studied. This inhibitory effect was also dose dependent. Tomori *et.al* also further reported the antibacterial effect of *L. breviflora* to have a broad spectrum activity because it inhibited the growth of colonies of Gram positive bacteria (*B. subtilis* and *S. aureus*) and that of Gram negative bacteria (*S. gallinarium*, *P. aeruginosa*, *Klebsiella*, *Proteus* and *E. coli*). Compared with standard antibiotics, the extract had moderate activity. While ofloxacin was observed to be significantly ($p< 0.05$) more potent than the extract for all the bacteria species studied, the extract was itself more potent than erythromycin on all the bacteria species; *P. aeruginosa, S. aureus* and *Proteus sp* were not even sensitive to erythromycin at all in his study. The degree of inhibition by the plant extract varies from one bacteria colony to the other [8]. Extracts of *L.breviflora* was able to exhibit higher antimicrobial property against *S. typi*, *P. fluorescens* and *Salmonella typhi* while *S. dysenteriae* was the least affected [4].

Anti-inflammatory activity

The anti-inflammatory activity of the aqueous leaf extract of the plant was assessed using carrageenan-induced paw edema and histamine-induced paw edema in rats. The analgesic effect was determined using the acetic acid writhing method as well as formalin test in mice. Our results showed that the extract at 100 and 200 mg/ kg body weight significantly reduced the formation of the oedema induced by carrageenan and histamine. In the acetic acid-induced writhing model, the extract showed a good analgesic effect characterized by reduction in the number of writhes when compared to the control. The extract caused dose-dependent decrease of licking time and licking frequency in rats injected with 2.5% formalin, signifying its analgesic effect. These results were however less than those of indomethacin, the reference drug used in this study. Since the plant extract reduced significantly the formation of oedema induced by carrageenan and histamine, as well as reduced the number of writhes in acetic acid-induced writhing models and dose-dependent decrease of licking frequency in rats injected with 2.5% formalin, the results have validated the basis for the traditional use of *Lagenaria breviflora* against inflamed purulent wounds, swellings, and bruises seen in some infectious diseases such as New Castle disease [3]. Onasanwo also reported its anti-inflammatory properties of the ethanolic extract . Analgesic activity was also measured with its analgesic activity. There were significant inhibition effect in each of the test [9,10].

Anti –implantation activity

The fruit of *Lagenaria breviflora* Robert (*Adenopus breviflorus* Benth) family Cucurbitaceae used by natives as an abortifacient in Nigeria, was investigated for anti-implantation activity. The ethyl acetate extract of the whole fruit and methanol extract of the seed were very toxic to rats. Using ten female virgin albino rats for each extract, the World Health Organization special protocol and doses on a moisture-free basis: 20 g/kg whole fruit methanol extract gave 60% anti-implantation activity, 2.5 g/kg fruit pulp gave 80% and 5 g/kg fruit pulp gave 100% activity while 2 g/kg seed also gave 100% activity but four of the rats died. Statistical evaluation of the data showed that the results were significant [11].

Miracidal and Cercidal activity

Experiments were conducted on the miracicidal and cercaricidal activity of various concentrations of the methanolic extracts of the seed and pulp of *Lagenaria breviflora* on Schistosoma mansoni miracidia and cercariae using the methanolic extract of Tetrapleura tetraptera (Aridan) as control, 1mg/ml of aridan, the seed and pulp extracts of *L. breviflora* each re-

sulted in a 100% kill of both the miracidia and cercariae at 60 minutes. At this same exposure period, lower concentrations (0.25 mg/ml) of Aridan, seed and pulp extracts of *L. breviflora* eliminated 0%, 100% and 40% of the miracidia respectively. Lower concentrations (0.125 mg/ml) of the extracts of the seed and pulp of *L. breviflora* eliminated 100% and 80% of the cercariae respectively. Higher concentrations of these extracts were potently miracicidal and cercericidal. The results obtained indicate that the use of the methanolic extracts of Lagenaria breviflora as miracicidal and cercaricidal substances even at concentrations lower than that of the control (Aridan), a known miracicidal and cercaricidal agent, will be an additional effective agent in the control of the transmission of schistosomiasis.

Antifertility activity

The sperm cell count, motility, live/dead sperm cell reatio, morphology, and the seminal volume were used in this study to evaluate the effect of prolonged administration of L. breviflora Roberton male reproductive system using the Wistar rat as animal model [12].

Antioxidant activity

Lagenaria breviflora possess hepatoprotective, antiulcerogenic and antioxidative activity. Findings suggest that the extract exerts its antiulcerogenic activity via antioxidative mechanism, there by stalling ravaging effects of reactive oxygen species [13]. Ethanolic extract of the whole fruit of Lagenaria breviflora was assesessed using the cold-restraint stress-induced (CRU) gastric ulcer, aspirin-induced (ASP) gastric ulcer and alcohol-induced (AL) gastric ulcer models [9,10]. 150mg/kg b.w of the plant extract protected against the Pl gastric ulcer, ASP gastric ulcer and AL gastric ulcer. The in vitro antioxidant activitiy was demostraed by its ability to quench free radicals generated by nitric oxide and superoxide anion with a concomitant scavenging potential against DPPH-induced radical formation [9,10].

Conclusion

LB has been employed ethnomedicinally as therapeutic cure for a variety of diseases. This has been helpful in correlating its uses traditionally with some of its scientific proven activity like antioxidant,antiulcerogenic, antibacterial and many other acivities. It is reported to contain saponins of which are triterpenoids, curcubitacin, cardiac glycosides, flavanoids which may be responsible for the different biological activities. Hence, only saponnis were isolated and characterized which in turn call for more isolation and characterization of active phytochemicals with bioactivity. Characterization can be done to improve on some phytopharmaceuticals which in turn can be used as lead molecules for synthesizing novel organic compounds having good therapeutic activity. Elucidation of mechanism of action of the isolated compounds and clinical trial are much needed. So also more activities such as antihypertensive, antiviral and anticholinesterate could also be done and especially its nutritional effect on the body.

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