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REVIEW ON PHARMACOLOGICAL ACTIVITIES OF *ABELMOSCHUS ESCULENTUS*

T. Naveenkumar[1], D. Niresh Kumar[2], S. Neelakandan[3], M. Suganya*[4], B. Sangameswaran[5]

[1,2,3]Under Graduate, Department of Pharmacy, SSM College of Pharmacy, Chinniyampalayam, Erode, Tamil Nadu, India.

[4]Assistant Professor, Department of Pharmacognosy, SSM College of Pharmacy, Chinniyampalayam, Erode, Tamil Nadu, India.

[5]Principal and HOD, Department of Pharmacognosy, SSM College of Pharmacy, Chinniyampalayam, Erode, Tamil Nadu, India.

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***Corresponding Author: M. Suganya**
Assistant Professor, Department of Pharmacognosy, SSM College of Pharmacy, Chinniyampalayam, Erode, Tamil Nadu, India.
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ABSTRACT

Abelmoschus esculentus (okra), is a widely cultivated plant, particularly in tropical and subtropical regions. Pharmacognostical involves the study of macroscopic characteristics of the leaves of Abelmoschus esculentus are large, lobed, and have a characteristic dark green colour. The leaf surface is rough with veins. The leaf's internal structure consists of a like upper epidermis, lower epidermis, vascular bundle, spongy parenchyma, palisade parenchyma. Then trichome and stomata are predominantly present in lower epidermis. Vascular bundle enlarged consist of xylem and Phloem. As we found in the powder microscopy covering trichomes, xylem vessels with spiral thickening, glandular trichomes, calcium oxalate crystals, paracytic-stomata, vessels fragments-fibers& chloroplast mucilage. Preliminary physicochemical studies confirmed the purity of the drug. The phytochemical investigation showed that the presence of Alkaloids, Flavonoids, Terpenoids, Anthraquinone glycoside, Phenolic compounds, Saponins. The pharmacological activities of Abelmoschous esculentus are the followed by Anti bacterial, Anticancer, Anti daiabetic, Antioxident, Immunomodulating activity, Cardioprotective activity, Hepatoprotective activity, Analgesic effects, Anti maicrobial activity.

KEYWORDS: Abelmoschus esculentus, Pharmacological activity.

INTRODUCTION

Abelmoschus esculentus (L.), is a medicinal plant due to the multiple benefits of its seeds, buds, stems, flowers, leaves, and pods in traditional and contemporary medicine. Abelmoschus esculentus fruits traditionally have been used as aphrodisiac, appetizer, cooling, and astringent agents. Other uses of okra include treatment of gonorrhea, bladder blockage, urinary discharges, diarrhea, and chronic dysentery. Okra seeds have also been used as fungicide agents, anti-tumor, and anti-cancer. The pharmacological properties of okra, such as antioxidant, anti-inflammatory immunomodulatory, gastroprotective, neuroprotective, lipid-lowering, anti-cancer, antibacterial, and anti-diabetic properties. Abelmoschus esculentus (L.)

The world population growth has led to an increase in nutritional deficiencies and disease related to the lack of essential nutrients in human diet, particularly affecting vulnerable populations. One of the world's greatest challenges is to secure sufficient and healthy food for all, and to do so in an environmentally sustainable manner. Moreover, vegetal source may contain substances harmful for human health, affecting the bioavailability of nutrients.

When balanced these three forces ensure that the body is healthy, but when they are abnormalor unbalanced, disease follows. India has a rich cultural heritage of traditional medicines which chiefly comprised the two widely flourishing systems of treatments i.e. Ayurvedic and Unani systems since ancient times.

Role of 'WHO' in herbal medicine

To traditional health systems (including herbal medicine) as holistic That of viewing man in his totality within a wide ecological spectrum, and of emphasizing the view that ill health or disease is brought about by an imbalance or disequilibrium of man in his total ecological system and not only by the causative agent and pathogenic evolution 'WHO' probably implying that the indigenous system drugs (including herbal medicine) restore the imbalance leading to the cure of ill health or disease. However, it helped the inclusion of proven traditional remedies in national drug policies and regulatory approval by developing countries. In 1991 'WHO' developed guidelines for the assessment of herbal medicine, and the 6th International Conference of Drug Regulatory Authorities held in Ottawa in the same year ratified the same.[1]

ANTHELMINTIC ACTIVITY

Helminthes is commonly called as parasitic organism that lives in a human or another animal and derives its nourishment from its host. The word helminthesis derived from Greek word helmins meaning worm. It is macroscopic, multicellular organism, having their own digestive, excretory, reproductive and nervous system.

In the 21st century there are two major challenges posed by the wide- spread prevalence of parasitic nematodes. First, many anthelmintic drugs are losing their effectiveness because nematode strains with resistance are emerging. Second, serious concerns regarding the environmental impact of the nematicides used for crop protection have prompted legislation to remove them from use, leaving agriculture at increased risk from nematode pests.[2]

ANTHELMINTIC AGENT

Drugs that are used in the manifestation and treatment of the worm infection is called as anthelmintics or anti-helmintics or antiparasitic agents. It is a group of antiparasitic drugs that expel parasitic worms (helminthes) that work by either stunning (vermifuge) or killing (vermicide) them.

Anthelmintics or antihelminthics are a group of antiparasitic drugs that expel parasitic worms (helminths) and other internal parasites from the body by either stunning or killing them and without causing significant damage to the host. They may also be called vermifuges (those that stun) or vermicides (those that kill). Anthelmintics are used to treat people who are infected by helminths, a condition called helminthiasis. These drugs are also used to treat infected animals.[3]

BIOACTIVE COMPOUNDS

1. **Flavonoids:** Okra contains flavonoids, such as quercetin and kaempferol, which have antioxidant and anti-inflammatory properties.
2. **Saponins:** Okra contains saponins, which have antimicrobial and anti-inflammatory properties.
3. **Polysaccharides:** Okra contains polysaccharides, which have immunomodulatory and antioxidant properties.

PHARMACOLOGICAL ACTIVITYS ON *ABELMOSCHUS ESCULENTUS*

Immunomodulating activity

A water-soluble polysaccharide (OFPS11) was obtained from okra (Abelmoschus esculentus) flowers using aqueous extraction and purification with DEAE-52 cellulose and Sephacryl™ S-500 column. Its preliminary characterization and immunomodulating activity were investigated. Results showed that OFPS11 is mainly composed of galactose and rhamnose in a molar ratio of 2.23:1 with molecular mass of 1,700 kDa. RAW264.7 cells pretreated with OFPS11 significantly inhibited the proliferation of HepG-2 cells. Additionally, OFPS11 enhanced the phagocytic ability and induced the elevation of NO production, TNF-α and IL-1β secretion of RAW264.7 cells. OFPS11 can strongly increase NF-κB levels in nucleuses, which is an important transcription factor that can modulate expressions of iNOS, NO and TNF-α. These outcomes support that OFPS11 exerts its antitumor activity by probably stimulating macrophage activities through nuclear NF-κB pathway.[4]

Antioxidant effects

The contents of total polyphenols and total polysaccharides were 29.5% and 14.8% in okra seeds and 1.25% and 43.1% in okra skin, respectively. Total flavonoids, isoquercitrin and quercetin-3-O- gentiobiose (5.35%, 2.067% and 2.741%, respectively) were only detected in okra seeds. Antioxidant assays, including 1-diphenyl-2-picrylhydrazyl scavenging, ferric reducing antioxidant power and reducing power test, and weight-loaded swimming test showed okra seeds possessed significant antioxidant and anti-fatigue effects. Moreover, biochemical determination revealed that that anti-fatigue activity of okra seeds is caused by reducing the levels of blood lactic acid and urea nitrogen, enhancing hepatic glycogen storage and promoting antioxidant ability by lowering malondialdehyde level and increasing superoxide dismutase) and glutathione peroxidise levels.[5]

Analgesic effects

A study by the analgesic activity of the crude dried petroleum ether and methanol extracts of Abelmoschus manihot using the hot plate and tail immersion tests. The results obtained indicate that the extracts possessed significant analgesic activity, which was found to be dose-dependent. A significant inhibition in pain threshold in hotplate test was also exhibited; however in flick test, highest analgesic activity was observed only with 400 mg/kg dose as compared with the standard drug. The flowers were also reported to be used in the treatment of tooth ache.[6]

Anticancer Activity

Abelmoschus esculentus plant seed extract and evaluated the extract's effect on the three cancer cell lines delivered in its native form as well as in the form of polymeric micelles. The direct delivery of okra seed extract had the highest cytotoxic effect on the breast cancer cell line (MCF-7), followed by the hepatocellular carcinoma (HepG2) and cervical carcinoma (HeLa) cell lines in that order, while its delivery in a polymeric micelle further increased this effect only in the HepG2 cell line. The okra seed extract's effect demonstrated a dose and time-dependent cell proliferation and migration inhibition plausibly due to VEGF production inhibition, leading to apoptosis and cell death.[7]

Hepatoprotective activity

In a study by, an attempt was made to validate the claimed uses of 'Okra' Abelmoshcus esculentus in liver diseases. The preventive action of ethanolic extract of okra against liver injury was evaluated in rodents using carbon tetrachloride induced hepatotoxicity model. EEO, at 250 and 500mg/kg body weight, exerted significant dose-dependent hepatoprotection by decreasing the CCl4-induced elevation of serum ALT, AST, ALP, GGT, cholesterol, triglycerides and malondialdehyde non-protein sulfhydryls (NP-SH) and total protein (TP) levels in the liver tissue. A significant reduction was also observed in pentobarbital-induced sleeping time in mice. The hepatoprotective and antioxidant activities of the extract are being comparable to standard silymarin. These findings were supported by histological assessment of the liver biopsy.[8]

Cardioprotective activity

The impact of Abelmoschus esculentus fruit mucilage (crude water extract and water fraction) on lipid parameters was studied in rats fed on a high-fat diet. Rats with elevated cholesterol were given okra crude water extract (500 and 1000 mg kg−1 body weight) or water fraction (50 and 100 mg kg−1 body weight) along with a high-fat diet for one week. The total cholesterol, triglycerides, LDL and VLDL lipid fractions as well as the atherogenic index were reduced by crude water extract (1000 mg) and the water fraction of okra (50 and 100 mg). The mucilage had the potential to elevate the HDL level in the test the group. These findings imply that okra fruit water fraction and crude water extract could be employed as “heart-friendly” vegetables by modulating blood lipid levels.[9]

Hypolipidemic and Antidiabetic Activity

Hypolipidemic and Anti diabetic effects Diabetes is a chronic condition which affects over 150 million people in the world today. The percentage of people suffering from diabetes is increasing rapidly to the point that many medical authorities are referring to it as an epidemic. There are two main types of Diabetes, Type-1 Diabetes and Type-2 Diabetes other than gestational diabetes. Each has its own causes and risk factors, although both are characterized by high blood sugar. The ethanolic extract of okra which contains, isoquercitrin and quercetin 3-O-gentiobioside reduced blood glucose and serum insulin levels and improved glucose tolerance in obese mice. The isoquercitrin treatment shows serum triglyceride levels and liver morphology in the mice were significantly ameliorated. Total cholesterol levels in isoquercitrin and quercetin 3-O-gentiobioside treated mice were also reduced. So okra may serve as a dietary therapy for hyperglycemia and hypertriglyceridemia.[10]

Larvicidal activity

In a study conducted to determine the larvicidal activities of Abelmoschus esculentus reported the larvicidal activity of the roots of Hibiscus abelmoschus which was evaluated using the larvae of mosquitoes in the genera Anopheles and

Culex. The mean median lethal concentrations of the aqueous extract of the roots of H. abelmoschus against the larvae of Anopheles culicifacies, Anopheles stephensi, and Culex quinquefasciatus.[11]

Effects on the GIT

In a study the effects of the mucilage of A. esculentus at dose of 1g/kg and observed a significant inhibition of the ulcer induced by indomethacin. Pretreatment with the test extract significantly increased the amount of gastric mucus content in ethanol-ulcerated rats. Cyto-protection may be because of formation of a protective layer with increase in mucous secretion form the superficial epithelial cells.[12]

Antimicrobial activity

Media for test organisms

36 g of Muller Hinton Agar was added to 1000 ml of sterile distilled water and autoclaved at 121o C for 30 minutes at 1.5 lbs. After cooling both the agar was poured into sterile Petri plates approximately 4mm and allowed to set at ambient temperature and used. Sterile Mueller Hinton agar plates were inoculated with the test culture by surface spreading using sterile wire loops and each bacterium evenly spread on the entire surface of the plate to obtain uniformity of the inoculum. The culture plate then had at most 4 holes of 7 mm diameter and 5 mm depth made into it using a sterile agar glass borer. The density of suspension inoculated onto the media for susceptibility test was determined by comparison with 0.5 McFarland standard of Barium sulphate solution (Cheesbrough, 2002).[13]

COUNCLUSION

The phytochemical screening of Abelmoschus esculentus plants parts showed the presence of phytochemical constituents, namely, alkaloids, carbohydrate, glycosides, saponins, phenol, flavonoids, protein, terpenoides, and tannins in various proportions in aqueous extracts which have great medicinal and pharmacological properties. However, further evaluation is needed to isolate the bioactive substances which can be used for welfare of the mankind.

Therefore, apart from the physical features used to classify the Abelmoschus esculentus species, taxonomists could also ague from the view point that plants could be classified on the basis of their chemical composition and biological activities.

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