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PHARMACOLOGICAL IMPORTANCE OF *ABELMOSCHUS ESCULANTUS*

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ABSTRACT

Okra is a one of the traditional plant scientifically known as *Abelmoschus esculentus* Linn belong to the family Mallow, having rich nutritional value and proved to have many therapeutic uses, various parts of this plant is used in different types of treatment, preparation of pharmaceutical products and also used in preparation of fibers. Scientifically leaf extract of *Abelmoschus esculentus* proved to have antipyretic, antispasmodic, anti-cancer, immuno modulatory activities. Mucilage obtained from the pods were found to act as natural binding agent. Some phytoconstituents has been isolated from the extract of *Abelmoschus esculentus* like flavonoidal glycosides, Uridine and Hyperocides. Very low research work has been carried out so far on *Abelmoschus esculentus*, this phytopharmacological review helpful for the researchers to carry out in detail study on this plant.

KEYWORDS: Okra, *Abelmoschus esculentus*, Flavonoidal glycoside.

INTRODUCTION

Abelmoschus esculentus also known as hibiscus esculentus[1] commonly known as okra belonging to **Malvaceae** family "*Abelmoschus esculentus*" linn is very popular and usually used in the traditional system of medicine.[2] It is also used in a pharmacy field, for the preparation of drugs by the isolation chemical constituents. okra gum used in the preparation of different formulations which is obtained from okra pods. It contains high nutritional value with various mineral contents, different parts of this plant used in the extensively in traditional medicine as antidiabetic, diuretic, anticancer, antispasmodic, antipyritic. Fibres are

prepared from the stem part of okra used for tow bandages preparation. The Scientific classification[3] of okra is as follows.

Common name: okra

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Malvales

Genus: Abelmoschus

Family: Malvaceae

Species: Esculentus

Bionomial name: *Abelmoschus esuclantus*.

Geographical distribution and ecology: The species A. esculentus is cultivated as a vegetable in most tropical and subtropical regions of Africa, India and America. In West Africa, Siemonsma (1982b)[4] has clearly demonstrated that the species has preference for the Sudano-Sahellan zone. However, A. esculentus is also found in forest regions in smaller quantities. This Guinean bioclimatic zone, Siemonsma[5] has given prominence to a new cultivated species provisionally called "Guinean" okra, which can be found in the forest regions of Ghana, Guinea, Ivory Coast, Liberia and Nigeria.

There are two Varieties are available[6]

Type -1: (Green types): Blondy, 48-50days, dwarf plant 3‟high, spineless, ribbed, lime green.

Type-2: (Red types): Red okra, 55-65days, 3-4‟tall, bushy plants with 6-7”pods, red velvet, similar to red okra.

Chemical composition

Okra bast, a multicellular fiber was analyzed andthe estimated average chemical compositions of OBF(*Abelmoschus esculentus* variety) are 67.5% a-cellulose,15.4% hemicelluloses, 7.1% lignin, 3.4% pectic matter, 3.9% fatty and waxy matter and 2.7% aqueous extract. It isclear that the main constituents of OBF are a-cellulose,hemicelluloses and lignin and the rest are very minor inproportion, so render a little influence to the structure of OBF. Therefore, the structure of a-cellulose, hemicellulosesand lignin and the mode of combinations that exist inbetween themselves are dominating the structure of OBF.

Parts used: fruit, leave seed, root 9.

Medicinal uses

Plants for a future cannot take any responsibility for any adverse effects from the use of plants. Always seekadvice from a professional before using a plant medicinally. Antispasmodic; Demulcent; Diaphoretic; Diuretic; Emollient; Stimulant; Vulnerary. The roots are very rich inmucilage, having a strongly demulcent action. They are saidby some to be better than marsh mallow (Althaeaofficinalis). This mucilage can be used as a plasmareplacement. An infusion of the roots is used in thetreatment of syphilis. The juice of the roots is usedexternally in Nepal to treat cuts, wounds and boils. Theleaves furnish an emollient poultice. A decoction of theimmature capsules is demulcent, diuretic and emollient. It isused in the treatment of catarrhal infections, dysuria andgonorrhoea. The seeds are antispasmodic, cordial and**uno modulatory effects**[16]: Castor Oil-Induced Diarrhea: The experiment was performed according to the method described by Shoba & Thomas Briefly, mice fasted for 24 hrs were randomly allocated to four groups of five animals each the animals were all screened initially by giving 0.5 ml of castor oil. Only those showing diarrhea were selected for the final experiment. Group I received 1% CMC (10 ml/kg, p.o.), Groups III, IV, V, and VI were treated with 100 and 200 mg/kg body weight (p.o.) of the MAEF and MAES respectively. Group II was given Loperamide (3 mg/ kg p.o.) in suspension. After 60 min, each animal was given 0.5 ml of castor oil, each animal was placed in an individual cage, the floor of which was lined with blotting paper which was changed every hour, observed for 4 hrs and the characteristic diarrheal droppings were recorded.stimulant. An infusion of the roasted seeds has sudorificproperties.[8,9]

Other Uses

Fibre; Paper; A fibre obtained from the stems isused as a substitute for jute. It is also used in making paperand textiles. The fibres are about 2.4mm long. When usedfor paper the stems are harvested in late summer or autumnafter the edible seedpods have been harvested, the leaves areremoved and the stems are steamed until the fibres can bestripped off. The fibres are cooked for 2 hours with lye andthen put in a ball mill for 3 hours. The paper is Cream coloured. A decoction of the root or ofthe seeds is used as a size for paper 21.Used for: Sylvia Zook, a qualified nutritional specialist, states that okra canfavour one's body due to its properties:

1. Okra contains special fiber which takes sugar levelsin blood under control, providing sugar quantity, acceptable for the bowels.

2. Mucilage, found in okra, is responsible for washingaway toxic substances and bad cholesterol, whichloads the liver.
3. Purgative properties okra possesses are beneficialfor bowel purification. Due to okra fiber content, Consequently, no discomfort and constipationbothers the patient. Wheat bran, applied for thispurpose, can impose certain irritation on thebowels, while okra makes it smooth and allconvenientand safe for the user. Mucilage providessoft effect on the bowels. Stimulating bilemovement, okra washes excess cholesterol andharmful substances from the body. This benefits the organism in general, as the toxins and badcholesterol can induce various health conditions. Okra poses no threat to the organism, causes noaddiction; it is completely safe and Reliable. Moreover, it contains a bunch of useful nutrients and is cheaper than chemical alternatives.
4. Fiber okra contains is a valuable nutrient forintestine microorganisms. This ensures proper intestine functionality.
5. Okra ensures recovery from psychological and mental conditions, like, depression and general weakness.
6. Okra is an effhealthiness. It is used counteract the acids, healthiness. It is used counteract the acids,
7. Due to its alkaline origin. It also guards the mucousmembranes of the digestive system, by covering them with additional layer.
8. Okra is additionally applied for pulmonary inflammations, bowel irritations, and sore throat.

According to Indian researches, okra is a complexreplacement for human blood plasma. In order tokeep the valuable substances safe, it's necessary to cook okra as shortly as possible, processing it either with steam, or on low heat.[4,7]

PHARMACOLOGICAL STUDIES

Toxicity Studies[10]: Test animals were divided into groups (n = 6 per group) which were administered, different doses of the crude extract (62.5, 125, 250, 500, 1000, 2000 and 4000 mg/kg p.o.), while the control group received only the vehicle (1% Tween 80 in water, p.o.). The general signs and symptoms of toxicity were observed for 24 h and mortality was recorded for each group at the end of this period. The results showed that there is no toxic symptom identified at a dose of 4000mg/kg b.w also.

Analgesic effects[11]: A study by Jain evaluated the analgesic activity of the crude dried petroleum ether and methanol extracts of Abelmoschus mani hot 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 hot plate 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.[12]

Acetic Acid-Induced Writhing Test

The analgesic activity of the samples was studied using acetic acid-induced writhing model in mice. The animals were divided into eight groups with five mice in each group. Group I animals received vehicle (1% Tween 80 in water, p.o.), animals of Group II received Diclofenac-Na at 10 mg/kg body weight while animals of groups III, IV and V, VI were treated with 100 and 200 mg/kg body weight (p.o.) of the MAEF and MAES respectively. Test samples and vehicle were administered orally 30 min before intra-peritoneal administration of 0.7% v/v acetic acid but Diclofenac-Na was administered intra peritoneal 15 min before injection of acetic acid. After an interval of 5 min, the mice were observed for specific contraction of body referred to as „writhing" for the next 10 min.

Larvicidal effects[13,14]: In a study conducted to determine the larvicidal activities of Abelmoschus, Dua et al. (2006) 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 were 52.3, 52.6, and 43.8 ppm, respectively**.**

Anti-Diarrheal Activity[15]: Castor Oil-Induced Diarrhea: The experiment was performed according to the method described by Shoba & Thomas Briefly, mice fasted for 24 hrs were randomly allocated to four groups of five animals each the animals were all screened initially by giving 0.5 ml of castor oil. Only those showing diarrhea were selected for the final experiment. Group I received 1% CMC (10 ml/kg, p.o.), Groups III, IV, V, and VI were treated with 100 and 200 mg/kg body weight (p.o.) of the MAEF and MAES respectively. Group II was given Loperamide (3 mg/ kg p.o.) in suspension. After 60 min, each animal was given 0.5 ml of castor oil, each animal was placed in an individual cage, the floor of which

was lined with blotting paper which was changed every hour, observed for 4 hrs and the characteristic diarrheal droppings were recorded.

Hepatoprotective activity[16]: An attempt was made tovalidate the claimed uses of 'Okra' Abelmoshcus esculentus in liver diseases. The preventive action of ethanolic extract of okra (EEO) against liver injury was evaluated in rodents using carbon tetrachloride (CCl4) induced hepatotoxicity model. EEO, at 250 and 500mg/kg body weight, exerted significant dose-dependent hepato protection by decreasing the CCl4-induced elevation of serum ALT, AST, ALP, GGT, cholesterol, triglycerides and malondi aldehyde (MDA) non-protein sulf - hydryl‟s (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.

Effects on GIT[17]: The effects of the mucilage of A.Esculentus at dose of 1g/kg and observed a significant inhibition of the ulcer induced by Indomethacin pre-treatment with the test extract significantly increase the gastric mucosa content in ethanol -ulcerated rats. cyto - protective may be because of formation of a protective layer with increase in mucous secretion from the superficial epithelial cells, animals were divided into 4-groups of 5 mice each and each animal was given orally 1ml of charcoal meal (5% activated charcoal suspended in 1% CMC) 60min after an oral dose of drugs or vehicle. group 1 was administered 1% CMC (10ml/kg body weight p.o) and animals in groups III, IV and V, V were treated with 100 and 200mg/kg body weight (p.o) of the MAEF and MAES respectively. Group II received atropine were killed by light ether an aesthesia and the intestine was removed without stretching and placed lengthwise on moist filter paper the intestinal transitmala compared to the length of the small intestine.

Anti - cancer activity[18]: Esculentus (flowers)against human liver cancer using MTT assay the monolayer cell culture was trypinised and the cell count was adjusted to 1.0 x 105 cell/ml using medium containing 10% FBS and were used for the determination of cell viability by MTT assays as described by Francis and Rita (1986) respectively. the absorbance was measured using a micro plate reader at a wave length of the percentage growth inhibition was calculated traditionally parts of the plants are assumed to have medicinal properties like antioxidant antispasmodic, demulcent, diaphoretic, diuretic, emollient, and stimulant.

C.N.S depression activity[19]: This experiment was carried out as described by gupta et al (1971). the animals were divided into control standard and test groups (n = 6per group). The control group received vehicle (1%tween 80 in water at the dose of 10ml/kg p.o) the test group received the crude extract (at the doses of 100and 200mg/kg p.o) and standard group received diazepam at the dose of 1mg/kg body weight orally. The animals were placed on the floor of an open feild (100 cm x 100cm x40cm h) divided into a series of squares. The number of squares visited by each animal was counted for 3 min on 0,30,60,90,20,180 & 240min during the study period.

ANTI BACTERIAL ACTIVITY[20]

Determination of antibacterial activity[21]

Disc diffusion method against gram positive (B.cereus, S.aureus) and gram negative bacteria (E.coli, salmonella spp). ciproflaxacin was as standard. the bacteria cultures were grown in agar medium at 37°C. After 6hr of growth, at a concentration of 106cells/ml, each microorganism was inoculated on the surface of muller-hinton agar plates. Subsequently, filter paper discs (6mm diameter) saturated with extract (100µg) were placed on surface of each inoculated plate. The plates were incubated at 37 °C for 24hr. Zone of inhibition was determined. Abelmoschus esculentus Crushed okra seeds were extracted with water and the extract is tested for anti bacterial activity by using agar diffusion method.[22]

Anti fungal activity[22]

Each of the petri dish containing potato 20gm, dextrose 20gm and add a 10% concentrated solution of 5ml plant extract were mixed together and allow to solidify. Petridish inoculate with the fungus by cutting 4mm-diameter disc from a pure culture of *F. Oxysporum*, falciparum. species growing on the PDA(potato dextrose agar) using a cork borer. This was done for each of the extracts as well as for two controls: a plate containing 5ml of Benzomyl mixed with PDA and another without plant extracts. The cultures were incubated at 27ºc in an inoculation chamber for 9 days. The percentage growth of inhibition was determined.

CONCLUSION

The entire plants of the A. Esculentus and some other species of Ablemoscus were screened depending on the folklore usage most of the cases traditional method has been validated and some constituents responsible for activity were isolated. This review will be useful for the researchers to proceed further research on Abelmoscus esculentus plants.

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