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# ABELMOSCHUS ESCULENTUS (OKRA): A COMPREHENSIVE REVIEW OF ITS PHYTOCHEMISTRY, TRADITIONAL USES, AND PHARMACOLOGICAL POTENTIAL

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## ABSTRACT

A popular vegetable with considerable therapeutic significance and potential as a functional food is Abelmoschus esculentus, also known as lady's finger or okra. It belongs to the Malvaceae family. It has historically been used to treat worm infestations, gastrointestinal issues, inflammation, and metabolic diseases including diabetes. Okra's mucilage, a polysaccharide rich in galactose, rhamnose, and galacturonic acid, is a significant bioactive component with potential antidiabetic, antioxidant, gastroprotective, and hepatoprotective properties. Okra mucilage has drawn interest for pharmaceutical and nutraceutical uses because of its advantageous qualities, including non-toxicity, biocompatibility, affordability, and beneficial rheological behavior. Even though many conventional claims are supported by experimental research, more thorough in vitro, in vivo, and clinical studies are required to determine its therapeutic potential and encourage its sensible use.

**KEYWORDS:** Abelmoschus esculentus, okra, functional food, mucilage, polysaccharides.

## INTRODUCTION

Abelmoschus esculentus (L.) Moench, often known as okra or lady’s finger, is a major vegetable crop belonging to the family Malvaceae and is widely produced in tropical and subtropical countries. The plant is prized for its nutritional and therapeutic qualities in addition to its use as a food source. Fruits, seeds, and leaves are among the plant's many parts

that are historically eaten and used for a variety of health-related purposes. Among these, the seeds are especially high in minerals, proteins, carbs, and edible oil with a good fatty acid makeup. Okra has drawn interest as a functional food with possible nutraceutical value because of its high dietary fiber, vitamin, and micronutrient content.

A. esculentus has long been used to treat a number of illnesses, including diabetes, ulcers, inflammation, exhaustion, and gastrointestinal problems. Its soluble fibers aid in controlling the absorption of glucose, and its mucilaginous composition soothes inflammatory tissues, particularly in the respiratory and digestive systems. According to pharmacological research, the plant has hepatoprotective, antioxidant, anti-inflammatory, and neuroprotective properties. These benefits are mainly attributable to bioactive ingredients such as flavonoids, polysaccharides, terpenoids, vitamins, and steroidal chemicals, underlining the therapeutic potential of A. esculentus in pharmaceutical research.

**Taxonomical classification**

- Kingdom : Plantae
- Division : Magnoliophyta
- Order : Malvales
- Family : Malvaceae
- Genus : Abelmoschus
- Species : *Abelmoschus esculentus* (L.)

**Common name**

- English : Okra / Lady’s finger
- Hindi : Bhindi
- Sanskrit : Tindisha
- Marathi : Bhendi
- Kannada : Bendekāyi
- Telugu : Bendakāya
- Tamil : Vendakkāy

**Description**: The annual herb Abelmoschus esculentus (L.) Moench, also called lady's finger or okra, is erect and grows quickly. It is a member of the Malvaceae family. The plant has a strong tap root, a slightly woody and hairy stem, and broad, palmately lobed leaves. It usually

reaches a height of one to two meters. It produces single, eye-catching yellow blooms with a distinctive dark purple center that eventually grow into long, green, ridged pods. These mucilage-rich pods are harvested at an early stage for both nutritional and therapeutic uses. The plant is commonly grown in India and other countries because it does well in tropical and subtropical regions. A. esculentus has drawn a lot of interest in pharmaceutical research for its possible pharmacological effects because it contains bioactive phytoconstituents like flavonoids, phenolics, polysaccharides, and vitamins.

**Ethnomedicinal uses**: Traditional medical practices in India, Africa, and other tropical countries have long used Abelmoschus esculentus. The fruits and their mucilage are frequently employed in ethnomedicine as calming and demulcent agents to treat gastrointestinal conditions such diarrhea, gastritis, dysentery, and intestinal and stomach discomfort. Traditionally, the mucilage-rich pods have been used to relieve urinary tract discomfort and as a diuretic. While root extracts are prized for their emollient and wound-healing qualities, the plant's roots are used in infusions or juices to treat ulcers, diabetes, jaundice, and as a mild laxative. Flowers are traditionally used in concoctions to treat respiratory problems including pneumonia and bronchitis, while leaves are applied topically as poultices for skin conditions, boils, and inflammation. In traditional medicine, seeds are employed as stimulants, antispasmodics, and remedies for weakness. These extensive customary applications bolster A. esculentus's medicinal value and offer a solid foundation for further pharmacological research**.**

**Chemical constituents**

- Glycosides – Rutin, quercetin glycosides.
- Penolic acids – Caffeic acid, gallic acid, ferulic acid.
- Tannins – Condensed tannins, gallotannins.
- Flavonoids – Quercetin, rutin, kaempferol.
- Alkaloids – Indole alkaloid derivatives.
- Terponids – Phytol, β-sitosterol, squalene.
- Triterpenoids – Oleanolic acid, ursolic acid.
- Fatty acids – Oleic acid, linoleic acid, palmitic acid.

**Pharmacological Activities**

**Anticancer Activity:** Using an in-vitro MTT cell viability assay on breast and cervical cancer cell lines, the anticancer potential of Abelmoschus esculentus flowers was assessed. Ethanolic, aqueous, and hydroalcoholic solvents were used to make the extracts. Of these, the hydroalcoholic extract exhibited the strongest dose-dependent cytotoxic impact, followed by the ethanolic and aqueous extracts. Bioactive substances such flavonoids, phenolics, alkaloids, and tannins are thought to be responsible for the observed impact. These results imply that floral extracts from Abelmoschus esculentus have promising anticancer potential and may need more in-vivo and clinical research.

**Hepatoprotective activity:** Wistar albino rats were used as an in-vivo model to assess the hepatoprotective potential of Abelmoschus esculentus roots. After causing liver damage with carbon tetrachloride ($CCl_4$), a semi-solid ethanolic root extract was made and given orally at dosages of 50, 100, and 200 mg/kg, with silymarin acting as the standard medication. Histopathology verified that a 15-day course of treatment dramatically decreased high liver enzymes (ALT, AST, and ALP), enhanced antioxidant levels, and restored normal liver architecture. These results confirm the traditional use of A. esculentus roots in liver problems by indicating that they have significant hepatoprotective effect, probably because of their polyphenolic and antioxidant constituents.

**Antidepressant activity:** Wistar albino rats were used in an in-vivo investigation to assess the antidepressant potential of Abelmoschus esculentus seeds. To reflect traditional use, a roasted seed decoction was also made after the seeds were shade-dried, defatted, and extracted using different solvents. The tetrabenazine-induced catalepsy and ptosis model was used to measure antidepressant activity, with imipramine serving as the standard medication. The extracts showed antidepressant-like effects by considerably lowering ptosis and catalepsy scores. The most active of them was the roasted seed decoction, which was followed by the ethanolic and aqueous extracts. The chloroform extract had the least impact. Flavonoids and phenolic chemicals that may improve monoaminergic neurotransmission are thought to be responsible for the action.

**Anti-inflammatory activity:** Wistar albino rats were used in an in-vivo investigation to assess the anti-inflammatory properties of Abelmoschus esculentus leaves. The leaves were pulverized, shade-dried, and extracted using Soxhlet extraction with methanol. Diclofenac sodium was the usual medication used in the carrageenan-induced paw edema model to

evaluate anti-inflammatory efficacy. At doses of 200 and 400 mg/kg, the methanolic leaf extract significantly reduced paw edema in a dose-dependent manner. Strong anti-inflammatory capacity was demonstrated by the higher dose, which had an impact similar to that of diclofenac. Its historic medical usage is supported by the activity, which is mostly related to the presence of flavonoids and phenolic chemicals.

**Antioxidant activity:** Aqueous and methanolic extracts were used to assess the antioxidant activity of Abelmoschus esculentus (okra) seeds. Soxhlet extraction was used to extract the dried seed powder using distilled water and 80% methanol, followed by 72 hours of room temperature maceration. Using DPPH free-radical scavenging, FRAP reducing power, β-carotene bleaching, and metal ion chelation assays, the antioxidant potential was evaluated in vitro using BHT as a reference antioxidant. Every experiment was carried out three times. Both extracts demonstrated dose-dependent antioxidant activity; however, because of its higher phenolic and flavonoid content, the methanolic extract outperformed the aqueous extract in terms of free-radical scavenging, reducing power, and metal-chelating effects.

**Antistress activity:** Using an acute restraint stress model, the study assessed the antistress properties of Abelmoschus esculentus aqueous and methanolic seed extracts in mice. Prior to stress induction, mice were given oral dosages of 200 mg/kg extract. Blood glucose, corticosterone, cholesterol, and triglycerides were examined, as well as behavioral tests like the Forced Swim Test and Elevated Plus Maze. In untreated mice, stress markedly raised anxiety, immobility time, and physiological stress indicators. On the other hand, extract-treated groups displayed normalized physiological markers and decreased anxiety and depressive-like behavior. The inclusion of antioxidant phytochemicals such flavonoids and phenolic compounds is probably why the methanolic extract showed greater antistress efficacy.

**Antihypertensive activity:** The study used fructose-induced hypertension Wistar rats to examine the antihypertensive properties of Abelmoschus esculentus ethanolic seed extract. Soxhlet extraction was used to extract seeds using 70% ethanol. Rats were given a 10% fructose solution for six weeks to produce hypertension, and they were given the extract orally at a dose of 150 mg/kg starting on day 22 and continuing for 21 days using enalapril as the conventional medication. The extract improved heart rate and ECG patterns, cut cholesterol and triglyceride levels, and considerably decreased systolic, diastolic, and mean arterial blood pressure, according to the results. These results imply that okra seed extract,

perhaps because of its flavonoids, polyphenols, and antioxidant components, has significant antihypertensive benefits.

**Antidiabetic Activity:** In streptozotocin-induced diabetic Wistar rats, the antidiabetic effects of Abelmoschus esculentus peel and seed powders were assessed. After being shade-dried and pulverized, fresh okra peels and seeds were given orally at doses of 100 and 200 mg/kg for 28 days. Okra powder treatment dramatically lowered blood glucose levels and improved body weight in diabetic rats with elevated blood glucose and metabolic abnormalities. Reduced HbA1c, an enhanced lipid profile, and protection against liver damage were found by biochemical examination. The largest effect was demonstrated by the seed powder at 200 mg/kg, which was similar to glibenclamide. This suggests that okra peel and seeds have significant antidiabetic and antihyperlipidemic qualities.

**Antihyperlipidemic activity:** The study assessed the antihyperlipidemic effect of Abelmoschus esculentus methanolic seed extract in Wistar rats with hyperlipidemia brought on by a high-fat diet. Soxhlet extraction with methanol was used to extract the dried, powdered seeds. For 28 days, rats were given the extract orally at a dose of 200 mg/kg while atorvastatin was administered as the usual medication. According to the findings, the extract considerably raised HDL cholesterol while lowering triglycerides, LDL, VLDL, and total cholesterol. Because it contains flavonoids, phenolic compounds, and dietary fiber, which promote better lipid metabolism and cardiovascular health, its lipid-lowering effect was similar to that of atorvastatin, indicating high antihyperlipidemic potential.

**Antibacterial activity:** An in-vitro agar well diffusion method was used to assess the antibacterial activity of Abelmoschus esculentus peel and seed extracts against Streptococcus mutans, a bacterium that causes dental caries. After cleaning fresh okra pods, the skin and seeds were separated, shade-dried, ground into a powder, and extracted for 72 hours using ethanol and acetone. Following filtration and solvent evaporation, the extracts were examined. The combined peel and seed extract produced the biggest inhibition zone (approximately 4 mm), however all extracts demonstrated antibacterial activity, according to the results. Okra may contain phenolic and flavonoid chemicals with promising antibacterial potential against oral infections, as evidenced by instances when the activity was similar to that of the drug ofloxacin.

## CONCLUSION

A herbaceous plant rich in vitamins, minerals, dietary fiber, and many bioactive substances, Abelmoschus esculentus L. has substantial nutritional and therapeutic significance. Because of its high phytochemical content, research shows that it has antioxidant, antidiabetic, anti-inflammatory, antibacterial, and hypolipidemic properties. It is a promising candidate for additional study in nutrition, medicine, and pharmaceutical applications because of these qualities, which highlight its medicinal potential and support its traditional uses.

## REFERENCE

1. Tamboli AM, Mali NR. In vitro evaluation of anti-inflammatory and anticancer activities of flower extracts of *Abelmoschus esculentus* L. *Int J Adv Res Sci Commun Technol*, 2025; 5(3): 133–142. doi:10.48175/IJARSCT-28515.
2. Doreddula SK, Bonam SR, Gaddam DP, Desu BS, Ramarao N, Pandy V. Neuroprotective and antioxidant activity of methanolic extract of *Abelmoschus esculentus* leaves. *J Food Sci Nutr*., 2014; 2(4): 1–8.
3. Sabitha V, Ramachandran S, Naveen KR, Panneerselvam K. Antidiabetic and antihyperlipidemic potential of *Abelmoschus esculentus* in streptozotocin-induced diabetic rats. *J Pharm Bioallied Sci*., 2011; 3(3): 397–402. doi:10.4103/0975-7406.84447.
4. Kumar R, Sinha VR. In vitro antioxidant and anti-inflammatory activity of *Abelmoschus esculentus* seed extract. *Asian Pac J Trop Biomed*, 2012; 2(3): S1620–S1624. doi:10.1016/S2221-1691(12)60466-0.
5. Xia F, Zhong Y, Li M, Chang Q, Liao Y, Liu X, et al. Antioxidant and anti-fModi CM, Bhatt PR, Pandya KB, Patel HB, Patel UD. Comparative evaluation of in vitro anti-inflammatory activity of different extracts of selected medicinal plants from Saurashtra region, Gujarat, India. *Int J Curr Microbiol App Sci*., 2019; 8(5): 1686–1698.
6. Sengkhamparn N, Sagis LM, de Vries R, Schols HA, Sajjaanantakul T, Voragen AGJ. Physicochemical properties of pectins from okra (*Abelmoschus esculentus*). Carbohydr Res., 2009; 344(14): 1824-1832.
7. Gemede HF, Ratta N. Antinutritional factors in plant foods: Potential health benefits and adverse effects. *Int J Nutr Food Sci*., 2014; 3(4): 284–289. doi:10.11648/j.ijnfs.20140304.18.
8. Agarwal A, Bora D, Agarwal C, Kumar R, Choudhary V. CNS stimulant and antidepressant activity of seeds of *Abelmoschus esculentus* in rats. *Bull Pharm Res*., 2015; 5(2): 1–4. ISSN: 2249-6041(Print); 2249-9245.

9. Liu IM, Tzeng TF, Liou SS, Chang CJ. Improvement of insulin sensitivity in obese Zucker rats by myricetin extracted from *Abelmoschus esculentus*. *Planta Med*., 2007; 73(10): 1054-1060. doi:10.1055/s-2007-981564.
10. OECD. *OECD Guidelines for the Testing of Chemicals: Acute Oral Toxicity – Fixed Dose Procedure*. Paris: Organisation for Economic Co-operation and Development, 2001.
11. Adelakun OE, Oyelade OJ, Ade-Omowaye BIO, Adeyemi IA, Van de Venter M. Chemical composition and antioxidative properties of okra seed (*Abelmoschus esculentus* Moench) flour. *Food Chem Toxicol*, 2009; 47(6): 1123-1126. doi:10.1016/j.fct.2009.01.036.
12. Ngoc LTN, Nguyen TTT, Nguyen THT. Anti-inflammatory activity of polysaccharides isolated from okra (*Abelmoschus esculentus*). *Carbohydr Polym*., 2017; 165: 1-7. doi:10.1016/j.carbpol.2017.02.020.
13. Harborne JB. *Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis*. 3rd ed. London: Chapman & Hall, 1998.
14. Kouémou NE, Taiwe GS, Moto FCO, Pale S, Ngoupaye GT, Njapdounke JSK, et al. Nootropic and neuroprotective effects of Dichrocephala integrifolia on scopolamine mouse model of Alzheimer's disease. Front Pharmacol, 2017; 8: 847. doi:10.3389/fphar.2017.00847.
15. Zilani B, Ayub MA, Ghnia JB, Nisar S, Jilani MI. Potential use of Tawa-Tawa (*Euphorbia hirta*): A schematic review of literature. *Int J Chem Biochem Sci*., 2017; 12: 107–112.
16. Modi CM, Bhatt PR, Pandya KB, Patel HB, Patel UD. Comparative evaluation of in vitro anti-inflammatory activity of different extracts of selected medicinal plants from Saurashtra region, Gujarat, India. *Int J Curr Microbiol App Sci*., 2019; 8(5): 1686–1698.
17. Kalarani G, Govindharajan M, Leoney A, Prabhu A, Krishnakumar R, Dhurikaliyamorthy S. Antibacterial effect of *Abelmoschus esculentus* (okra) extracts on dental caries derived *Streptococcus mutans*. IOSR J Dent Med Sci., 2017; 16(4): 63–66. doi:10.9790/0853-1604026366.
18. Fan S, Zhang Y, Sun Q, Yu L, Li M, Zheng B, et al. Extract of okra lowers blood glucose and improves insulin sensitivity through activation of AMPK signaling pathway. J Nutr Biochem, 2014; 25(3): 265-271.
19. Peter EL, Nagendrappa PB, Ajayi CO. Antioxidant activity and protective effect of *Abelmoschus esculentus* fruit extract against oxidative stress. Food Chem., 2012; 134(4): 1906-1911.

20. Khatun H, Rahman A, Rahman M, Islam S. Phytochemical and pharmacological review of *Abelmoschus esculentus*. Int J Pharm Sci Res., 2016; 7(9): 3676-3685.
21. Lengsfeld C, Titgemeyer F, Faller G, Hensel A. Glycosylated compounds from okra inhibit adhesion of *Helicobacter pylori* to human gastric mucosa. J Agric Food Chem**.,** 2004; 52(6): 1495-1503.
22. Khomsug P, Thongjaroenbuangam W, Pakdeenaro N, Suttajit M, Chantiratikul P. Antioxidative activities and phenolic content of extracts from okra (*Abelmoschus esculentus L.*). Res J Biol Sci., 2010; 5(4): 310-313.
23. Obiadalla-Ali HA, Abd-Elkader DY, Mohamed AH. Phytochemical and pharmacological studies of *Abelmoschus esculentus*. Int J Pharm Sci Rev Res., 2014; 27(1): 120-126.
24. Ghasi S, Nwobodo E, Ofili JO. Hypocholesterolemic effects of crude extract of okra fruit (*Abelmoschus esculentus*) in hypercholesterolemic rats. J Ethnopharmacol, 2000; 69(1): 21-25.