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Review Article

PHARMACOGNOSTIC PROFILE AND PHARMACOLOGICAL ACTIVITY OF DIFFERENT PARTS OF *AMORPHOPHALLUS CAMPANULATUS* (ROXB.) BLUME- A COMPLETE OVERVIEW.

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ABSTRACT

Amorphophallus campanulatus (Roxb.) Blume is a valuable corm producing plant in the world. It is most commonly named as Elephant foot yam. Among all species of *Amorphophallus*, *Amorphophallus campanulatus* (Roxb.) has good medicinal value. *Amorphophallus campanulatus* (Roxb.) is growing widely throughout the Bangladesh (Forests of Gazipur, Sherpur, Chittagong, Chittagong Hill Tracts, Cox's Bazar, Tangail and planted elsewhere). It is largely cultivated in the Philippines, Java, Indonesia, Sumatra, Malaysia, India and China¹⁴. In Bangladesh, it is called as Ol, Olkachu¹⁵. Indian subcontinent, Sri Lanka and Apparently cucumbers have originated in the foothills of the Himalayan mountains, just north of the Bay of Bengal, the area which is now primarily occupied by Bangladesh. As it is a tuberous crop plant, many of the chemical constituents found in its corm. This plant contains vast of important phytochemical constituents whose are able to provide desired pharmacological response. The main goal of this paper is to make a proper status of about pharmacognostic profile and pharmacological activity of *Amorphophallus campanulatus*(Roxb.) Blume.

Keywords: *Amorphophallus campanulatus* (Roxb.), Phytochemicals, Extracts, Pharmacological Activity.



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INTRODUCTION

Amorphophallus campanulatus (Roxb.) tropical tuber crop grown primarily in Africa, South Asia, Southeast Asia and the tropical Pacific islands. The corms and leaves of elephant foot yams are important foods in the local diet in many Asian regions. Because of its production potential and popularity as a vegetable in various cuisines, it can be raised as a cash crop. *Amorphophallus campanulatus* (Roxb.) Blume. Decne (Synonym : *Amorphophallus paeoniifolius*; Araceae) commonly known as surana is a tuberous, stout, indigenous herb, 1.0-1.5 m in height. The tubers contain an active diastatic enzyme-amylase, betulinic acid, B-sitosterol, stigmasterol, B-sitosterolpalmitate,

lupeol, triacontane, amino acids, carbohydrates, saponin, thiamine, riboflavin, niacin and carotene. *Amorphophallus campanulatus* is used to cure piles, deranged digestion and diseases of liver. In Unani medicine, olkachu is given as vegetable in sluggish liver.

Classification¹⁰

Kingdom : Plantae
 Division : Angiosperms
 Class : Monocots
 Order : Alismatales
 Family : Araceae
 Genus : *Amorphophallus*
 Species : *paeoniifolius*
 Synonyms: *A campanulatus*

V Plant Morphology ¹⁶

An annual herb with large, depressed- globose, much-warted tubers, 20-25 cm diam. Perennial herb of 1-2 m tall. Adventitious root system, shallow and fleshy. Underground stem modified into corm, is a cylindrical or spherical, bulb-like fleshy structure with short internode at the base of the stem. The petiole is long,

stout, the blade is bifurcating and ultimately divided into oblong, acuminate, decurrent lobes. Three types of flower namely, male, female and neuter are present. Leaves solitary, 30-90 cm broad, 3-partite, segments pinnatisect, appearing long after the flowers. Spathe 15-23 cm across. Spadix very stout; female inflorescence cylindrical, male subturbinate, appendage dark-purple. Berries ovoid. ¹



Figure 1: Total Plant of *A. campanulatus*

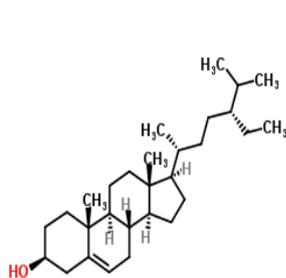


Figure 2: Leaves of *A. campanulatus*

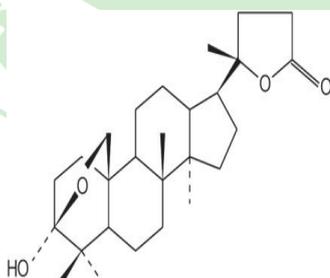


Figure 3: Corm of *A. campanulatus*

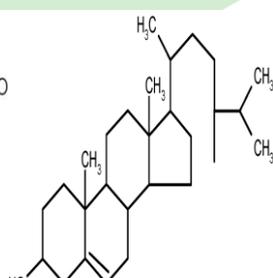
Phytochemical Constituents



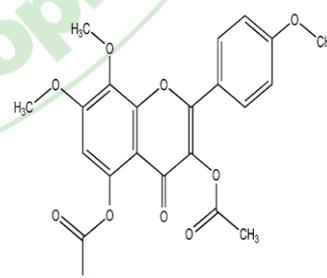
Amblyone



Beta sitosterol



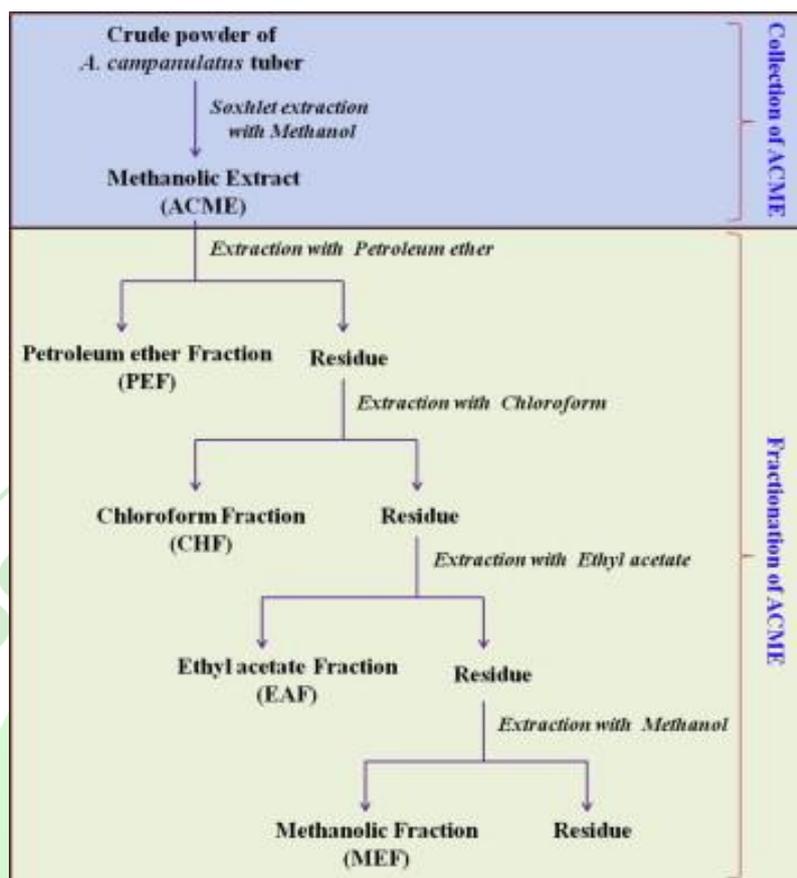
Campesterol



3,5 diacetyltambulin

Phytochemical screening of methanolic extract indicated the presence of steroids, flavonoids, alkaloids and

carbohydrates ³. Some common phytoconstituents are as follows:

Flow chart on extraction way to get extracts from *Amorphophallus campanulatus* tuber:Table: 1. Phytochemical Constituents from different part of *A. campanulatus* with Pharmacological activities^{6, 9, 10, 13}

Name of the Chemical Constituent	Plant Parts	Solvent extract	Pharmacological Activities
Amblyone	Root	Ethanol and Pet. Ether	Antibacterial, antifungal, cytotoxic
Beta sitosterol	Tuber/ Corm	Ethanol and aqueous	Curative
Campesterol	Tuber/ Corm	Methanol and ethanol	Curative and Protective
Hexadecanoic acid	Tuber	Ethanol and aqueous	Antifungal
Oleic acid	Tuber	Aqueous and Ether	Not defined
Phenol	Tuber	Ethanol and aqueous	Not defined
Polysaccharide	Leaves & Corm	Ethanol and aqueous	Hepatoprotective
Hexadecanoic acid	Tuber/ Corm	Ethanol and aqueous	Immunomodulatory, Antifungal
Salviasperanol	Root	Methanol and ethanol	Antibacterial, antifungal, cytotoxic
Tetradecanoic acid	Tuber/ Corm	Ethanol	Anthelmintic
Vitamin E	Tuber/ Corm	Ethanol	Not defined
3,5 diacetyltambulin	Leaves & Corm	Pet ether	Antibacterial, antifungal, cytotoxic
1,3,5 benzenetriol	Tuber	Pet ether	Not defined

Pharmacological Activities of *Amorphophallus campanulatus* (Roxb.)

Anthelmintic Activity

Corm was extracted with petroleum ether, chloroform and methanol. Crude tannins were isolated from methanol extract. All extracts and crude tannins were evaluated for anthelmintic activity. Chloroform, methanol extracts and crude tannins showed very good anthelmintic activity. Paralysis and death times of crude tannins were very close to the standard drug Albendazole³.

Anthelmintic activity of methanolic extract was investigated against *Pheretimaposthuma* and *Tubifex tubifex*. The extract with the concentrations of 25, 50 and 100 mg/ml were tested in the bioassay, which involved determination of time of paralysis and time of death of the worms. The extract exhibited significant anthelmintic activity at highest concentration of 100 mg/ml. Piperazine citrate (10 mg/ml) was included as standard reference and distilled water as control. The extracts were found not only to paralyze (Vermifuge) but also to kill the earthworms (Vermicidal)⁸.

Antihyperglycemic activity

Methanol extract of corm reduces blood glucose levels 37.4% at 400mg/kg body weight of albino mice. Anti-hyperglycemic and anti-nociceptive effects were observed with methanol extract of corms in oral glucose tolerance tests and acetic acid-induced pain model in Swiss albino mice. The results validate the traditional medicinal uses of this plant against pain, and suggest that the corms may prove to be a useful source for isolation of anti-hyperglycemic and pain alleviating compounds⁹.

Acetone extract of *Amorphophallus campanulatus*, at 0.1 to 0.25% was applied to streptozotocin induced male Wister diabetic rats. It has been stated that, acetone extracts of *A. campanulatus* is a potential anti-diabetic agents for streptozotocin induced male Wister diabetic rats⁵.

Antibacterial activity

Khan A, Rahman M, Islam M were investigated Antibacterial, antifungal and cytotoxic activities of ambylone isolated from *Amorphophallus campanulatus*. They reported plant extracts as broad spectrum potential. They isolated different compounds having antibacterial activity. Compounds isolated from *Amorphophallus campanulatus* like ambylone, Salviasperanol3,5-diacetyltambulin also shows antibacterial properties⁷. Waghmare B M was conduct a study on antibacterial screening of corm of *Amorphophallus campanulatus* (Roxb.). The results showed significant antibacterial activities against four pathogenic bacteria. They used *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Vibrio cholera* & *Proteus mirabilis*. Methanolic and petroleum ether extracts were applied to see zone of inhibition. A very small concentration of petroleum ether extracts exhibits remarkable inhibitory action against organism mentioned².

Antioxidant & Cytotoxic activity

Sanjay Jain et al. were evaluated against ethanolic and aqueous extracts of *Amorphophallus campanulatus* (Roxb.) tubers carbon tetrachloride (CCl₄) induced hepatic damage in rats. They extracts at a dose of 500 mg/kg were administered orally once daily. This study suggests that possible mechanism of this activity may be due to free radical scavenging potential caused by the presence of flavonoids in the extracts¹¹.

K. G. Sahu et al conducted a study on antioxidant activity of *Amorphophallus campanulatus* (Roxb.). methanolic and aqueous extract of *Amorphophallus campanulatus* tuber was studied for its free radical scavenging property on different in vitro models e. g. - 1, 1-diphenyl-2-picrylhydrazyl (DPPH) method, nitric oxide method and reducing power method. The extracts showed good dose dependant free radical scavenging property in all the models. Ascorbic acid was used as standard. It is concluded that the aqueous extract shows more antioxidant activity as compared to methanolic extract¹³.

Singh et al. investigated Antioxidant Activity of *Amorphophallus campanulatus* Tubers Extract against Paracetamol - Induced Liver Damage in Rats. The administration of extracts at a dose 300 mg/ kg restored the elevated serum enzyme levels to normal. Silymarin was used as a standard reference, exhibited significant hepatoprotective activity. The biochemical and histopathological results proved that *Amorphophallus campanulatus* tubers had hepatoprotective potency to liver damage due to paracetamol. The increase in the levels of superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPx) shows that the plant may possess antioxidant property. It was concluded from the results that methanolic extract possessed more potent hepato-protective and antioxidant activity than aqueous extract.

Immunomodulatory activity

Tripathi et al studied on methanolic extract of *Amorphophallus campanulatus* Tubers. They applied different concentration of that extracts on mice. The study was conducted using charcoal clearance, spleen index and delayed-type hypersensitivity (DTH) response models. The extract was administered orally at doses of 250 and 500mg/kg. Extract exhibited immunomodulatory activity by causing a significant decrease in charcoal clearance, spleen index and delayed-type hypersensitivity (DTH) response. Researcher were said that further studies are required to confirm this preliminary finding¹.

Protective activity

Datta et al. studies over protective effect of ethanolic extract of *Amorphophallus campanulatus* Roxb. tubers against ethanol-induced hepatotoxicity in rats. Ethanolic extract of *Amorphophallus campanulatus* at two different doses were applied. Raised AST, ALT, ALP and total protein level controlled while pre-treatment

with ethanolic extract of *Amorphophallus campanulatus* ($p < 0.001$)¹².

CONCLUSION

Amorphophallus campanulatus Tubers has a number of pharmacological activity that mentioned above. The potential literature review revealed that *Amorphophallus campanulatus* Tubers, is an important medicinal plant with diverse pharmacological spectrum. There are number of phytochemicals presents in this plant such as such as Beta sitosterol, Hexadecanoic acid, Oleic acid,

Gallic acid. These compounds were found to be responsible for many of the pharmacological activities. Due to the presence of these types of phytoconstituents, the different extracts may show antimicrobial, antioxidant, antibacterial, antidiabetic, anthelmintic, antitumor, hematological activities.

Due to the number of significant pharmacological response the plant can choose for preparation of medication and can be use instead of synthetic drugs to avoid the undesirable adverse action. Hope the modern system of medicine & manufacturer of drug-product will deals with this plant in future.

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