ABSTRACT

The plant *Scindapsus officinalis* (Roxb.) Schott fruits are widely used in many parts of India for the treatment of various diseases and ailments. It is one of the plants used in Indian system of medicine which belongs to family arace. The plant of *Scindapsus officinalis* is large climber with areal roots growing on trees and rocks. The plant is growing in tropical parts of India. The fruit of *Scindapsus officinalis* is known as Gajpeepal in ayurveda. Gajpeepal consists of dried, transversely cut pieces of mature female spadix of *Scindapsus officinalis* (Fam. Araceae). It found all along the sub-Himalayan tract between an altitude of 330-1000 m in West Bengal, Orissa, Andhra Pradesh and the Andaman Islands. It has the significant antioxidant property due to presence of flavonoids and phenolic compound and have ability of cytoprotection due to antioxidant property In this review we highlight the anatomical & histological properties of fruit of *Scindapsus officinalis* and the various pharmacological activities of plant which are proved like antioxidant, antidiabetic, anti-inflammatory, analgesic, anti histaminic, antibacterial by Various authors.

Keywords- *Scindapsus officinalis*, Gajpeepal, anti inflammatory and Analgesic, anti oxidant, anti diabetic, anti histaminic, hepatoprotective.
INTRODUCTION

*Scindapsus officinalis* (Roxb.) Schott. is one of the plant used in Indian system of medicine which belongs to family Araceae. The plant of *Scindapsus officinalis* is a large, stout, epiphytic and perennial climber with adventitious aerial roots growing on trees and rocks (Figure 1). The plant is growing in tropical part of India. It is common in the Midnapore district of west Bengal and cultivated vegetatively for its fruit, which is cut into transverse pieces, dried and used medicinally. Fruit (Figure 2) is very important part of the plant and accepted as raw drug of known properties in both Ayurvedic and Unani system of medicine. The fruit is reported to be useful as a diaphoretic, carminative stimulant, anthelmintic aphrodisiac, galactagogue, appetizer and also useful in the form of decoction in diarrhea, asthma and other affections supposed to be caused by Kafa. Anatomical/histological practice playing a unique role in the more detailed examination of crude drugs and can be used to confirm the structural features of the crude drugs. Quantitative microscopy and linear measurements are the other important aspects of the histological method. The histological approach to study plants and plants parts is helpful in the searching of specific microscopical characters and even some times it is helpful in the differentiation between two species of same genus. Based on this fact and Since no complete anatomical data related to fruit is available so far. The plant of *Scindapsus officinalis* is large climber with areal roots growing on trees and rocks. The fruit of *Scindapsus officinalis* is known as Gajpeepal in ayurveda. Gajpeepal consists of dried, transversely cut pieces of mature female spadix of *Scindapsus officinalis* (Fam. Araceae). It found all along the sub-Himalayan tract between an altitude of 330-1000 m in West Bengal, Orissa, Andhra Pradesh and the Andaman Islands. It have the significant antioxidant property due to presence of flavonoids and phenolic compound and have ability of cytoprotection due to antioxidant property.

Plant profile

I. Taxonomical hierarchy

*Scindapsus officinalis* (Gajapeepal)

<table>
<thead>
<tr>
<th>Kingdom:</th>
<th>Plantae</th>
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<tbody>
<tr>
<td>Phylum:</td>
<td>Tracheophyta</td>
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<tr>
<td>Class:</td>
<td>Magnoliopsida</td>
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<tr>
<td>Order:</td>
<td>Alismatales</td>
</tr>
<tr>
<td>Family:</td>
<td>Araceae</td>
</tr>
<tr>
<td>Genus:</td>
<td>Scindapsus</td>
</tr>
</tbody>
</table>
Species: officinalis
Botanical name: - Scindapsus officinalis

II. Synonyms
Sanskrit: Gajakrsna, Hastipipali
Bengali: Gajapeepal
Gujarati: Motopeepar
Hindi: Gajapeepal
Kannada: Adkebeeluvalli
Malayalam: Attipali
Marathi: Gajapipalee
Punjabi: Gajapeepal
Tamil: Anaitippalee
Telugu: Enugopippal

Figure 1. Plant of Scindapsus officinalis with fruit

Figure 2. Shade dried fruit of Scindapsus officinalis

Anatomical & Histological Review of Fruit
Microscopic Features of Spadix and Fruit: The spadix has thick straight central axis or the peduncle with spirally arranged fruits. The fruits are covered entirely by fleshy perienth. In the mature inflorescence the fruits are fused into hard, cylindrical, brownish body (Figure 3)
within the perienth. In L.S. view of the spadix the axis of the inflorescence bears the fused fruits on either side in vertical rows. The seeds are seen in each of the fruit with seed coat and endosperm. The spadix is 5 mm thick and spadix axis is 1.5 mm thick. The seeds are free from the pericarp and only the funicle is attached with basal part of fruit.

Fig. 3.1 Middle portion showing central axis and fruit on either side.

Fig. 3.2 An enlarged portion showing a single fruit

In T.S. view of the spadix, there is a central lobed axis with hollow central core and lobed inflorescence axis. The axis bears radial circle of fruits which are separated from each other by thin radial septa. The fruits are fused with each other laterally. The central axis has well developed vascular system (Figure 4.1 and 5.1). There are three major vascular bundles with smaller accessory strands around each major bundle. The major vascular bundles are collateral and have wide rectangular block of phloem and a few parallel rows of angular thick walled xylem elements. The vascular bundle has a thick and wide sclerenchyma cap abutting the xylem elements. Outer with vascular bundle, there is a parenchymatous bundle sheath of one or two cells thick (Figure 5.1).

Fig. 4.1 T.S. of the spadix at 20X (IA-inflorescence axis of the spadix; Pe-perenth; PC-pericarp; S-seed; VB-vascular bundle)
Pericarp (3,4 and 5.2): The pericarp is formed by a single integument of the ovary. It consists of thick walled tabular epidermal cells with thick cuticle and a subepidermal cell layer of similar cells with thick walls. The ground tissue consists of a mixture of thin walled parenchyma cells and thick walled sclereids (Figure 5.2). The sclereids are of brachy-sclareid type i.e. the cells isodiametric or circular with heavily lignified thick walls and wide lumen. The sclereids are either solitary or in groups of two or three. They are random in orientation and are about 20-25 µm in diameter.

Seed: The seed develops from straight ovule which is attached to the ovary wall with the basal funicle. The seeds are obovate with the basal part and wider outer part (Figure 4.1, 2). It contains dense endosperm and thick testa or seed coat.
Seed-coat (Figure 6 and 7.1): The seed coat is 100-130 µm thick and consists of outer zone of sarcotesta where the cells are wide, angular and parenchymatous with thin walls. The cells are random in orientation. The outer sarcotesta is 20 µm wide.

Inner with parenchymatous sarcotesta is a thin dark region of sclerotesta forming the inner seed-coat. It is three layered, comprising of outer and inner wide sclerotic cells and middle thin layer of parenchymatous cells. The two sclerotic layers are darkly stained so that they are less distinct. The sclerotic inner seed coat is about 150 µm thick (Figure 7.1).

Fig. 6 Vertical section (VS) of the fruit and the seed-entire view at 10X [En- Endosperm (cellular type); Fu-funicle (stalk of the ovule); OS- ostiole (passage of the ovule); OV-ovary (seed); S-seed; SC-seed coat]

Fig. 7.1 An enlarge section of the seed coat at 40X [En-endosperm; ISC-inner seed coat; ScT- sclerenchyma tissue; ST-sarcotesta (outer seedcoat)].

Fig. 7.2 Endosperm cells as seen under polarized microscope at 40X (En- endosperm; SG- starch grains).
Endosperm: The seed is filled with copious amount of endosperm (Figure 6). The endosperm is cellular type which are elongated polyhedrally with thin walls and dense starch grains (Figure 7.1,2). In sections of the seed the central core of the seed has free cells while the outer zone has wide, compact polyhedral cells. When viewed under the polarized light microscope, the endosperm cells exhibit dense accumulation of starch grains (Figure 7.2).

Perienth (Figure 4.1,2): In sectional view the perienth appears triangular with long wings. The central portion is 200 µm thick and the marginal portion is 50 µm thick. The perienth has darkly staining compact parenchyma cells and wide hyaline cells dispersed in the parenchyma tissue.(12)

PHARMACOLOGICAL REVIEW
Antioxidant activity
Mahendra singh and Malarkodi velraj (2009) reported in this study the course powder of Scindapsus officinalis (Roxb.) schott. Fruit was extracted successively using hexane, chloroform, ethyl acetate and 50% ethanol .the ethyl acetate and 50% ethanolic extract is were investigated for its antioxidant activity by using nitric oxide and DPPH radical scavenging activity methods. IC50 value was also calculated. Ascorbic acid was used as standard. Both the 50% ethanolic extract and ethyl acetate were found to exert concentration dependent free radical scavenging activity but former extract was more effective than later one. The highest free radical scavenging activity by Scindapsus officinalis fruit extracts was observed at concentration of 1000 µ/ml.(13)

Anti inflammatory and analgesic activity
This study was done by B.D. Patel et al. (2010) the aim of this study was to evaluate the anti-inflammatory activity and analgesic activity of ethanolic extract of Scindapsus officinalis (EESO) fruit as assessed in the carrageenan induced rat paw edema at the doses of 50,100, 200 mg/kg, using different animal models. Phytochemical analysis of Scindapsus officinalis indicates the presence of steroids flavonoid and terpenoid compound since these compounds are of pharmacological interest coupled with the use of this plant in traditional medicine, prompted us for its possible analgesic and anti-inflammatory activities. The ethanolic extract of Scindapsus officinalis showed statically significant (p<0.001) analgesic activity in albino rat in a dose dependent manner. The extract at 50, 100, 200mg /kg body weight reduced significantly, the formation of edema induced by carrageenan. The analgesic activity of extracts was evaluated for their central and peripheral pharmacological actions using tail flick
method. It was conclude that apart from the folk uses of *Scindapsus officinalis* as antioxidant agent, the ethanolic extract of fruit of the plant *Scindapsus officinalis* also possess anti-inflammatory and analgesic activities.\(^{(14)}\)

**Anti histaminic activity**

This study was performed by M.D. Hedyatullah and Ganesh Shankar *et al.* (2010) Investigate and reported that the effect of methanolic extract of fruit of *Scindapsus officinalis* (MESO) on experimental models were evaluated for its anti-histaminic activity significant increase in preconvulsion time was observed due to pretreatment *Scindapsus officinalis* when guinea pig exposed to histamine this bronchodilating effect was compared with ketotifen fumarate. In this in vivo study MESO has been shown the increase in preconvulsion time due to pre treatment with the 50, 100, 200 mg/kg dose, when guinea pigs were exposed to histamine, thus the present study revealed that the methanolic extract of *Scindapsus officinalis* fruit has significant antihistaminic activity.\(^{(15)}\)

**Antibacterial activity**

This study performed by Rakshit *et al.* (2011) to evaluate that the Aqueous and ethanolic extract of medicinal plant *Scindapsus officinalis* for their antibacterial activity against clinical isolates *Escherichia coli*, *Salmonella typhi*, *Klebsiella pneumonia* and *Staphylococcus aureus*. Both the ethanolic and aqueous extracts inhibited the growth of the test organisms, while *S. typhi* showing the highest susceptibility. This research supports the local use of the fruits of the plant *Scindapsus officinalis* for prophylactic and therapeutic purposes against bacterial infections.\(^{(16)}\)

**Anti diabetic activity**

Malarkodi Velraj *et al.* (2011) reported that in the present study ethyl acetate (EAESOF) and ethanolic (EESOF) extract of *Scindapsus officinalis* fruit were subjected to the phytochemical investigation and evaluated for antidiabetic activity on blood glucose level, lipid profiles and on the body weight in alloxan induced diabetic rats. EAESOF & EESOF (200 mg/kg) and Glibenclamide (10mg/kg) were administered orally in alloxan (120 mg/kg, i.p.) induced diabetic rats. In this antidiabetic study, maximum reduction in blood glucose was observed in EAESOF & EESOF (160.8, 96.7 mg/dl) at the dose of 200 mg/kg on 21st day respectively. The EAESOF & EESOF showed the significant effect (p<0.005) in the various biochemical parameters like protein, triglycerides, cholesterol and total lipid levels. EAESOF & EESOF prevented further loss of body weight. EAESOF& EESOF (200 mg/kg) was found to have
significant (p<0.001) blood glucose lowering effect. Preliminary Physiochemical investigation revealed the presence of alkaloids, flavonoids, saponins and tannins as the major constituents in the ethyl acetate & ethanol extract. These results suggest that EAESOF & EESOF (200 mg/kg) showed antidiabetic activity in alloxan induced diabetic rats.\textsuperscript{(17)}

**HepatoProtective Activity**

Nikhil et al. (2013) reported that the *Scindapsus officinalis* (Roxb.) Schott fruits are widely used in many parts of India for the treatment of various diseases. It is one of the plants used in Indian system of medicine which belongs to family Aracea. It has the significant antioxidant property due to presence of flavonoids and phenolic compound and has ability of cytoprotection due to antioxidant property. Hydroalcoholic extract (50\%Ethanol) of *Scindapsus officinalis* fruit was prepared and evaluated for its hepatoprotective Potential against paracetamol-induced hepatotoxicity in rats. Alteration in the levels of SGPT, SGOT, ALP, bilirubin, total protein and tissue GSH, GSSG and MDA were tested in both treated and untreated groups. SGPT, SGOT, ALP and bilirubin was enhanced significantly (p<0.05) in Paracetamol (2mg/kg B.wt.) treated group and total serum protein, tissue MDA rise and tissue level of GSH was significantly (p<0.05) reduced in Paracetamol (2mg/kg B. wt.) treated group. Pretreatment with Hydroalcoholic extract (50\% Ethanol) of *Scindapsus officinalis* fruit (200mg/kg B. wt. and 400 mg/kg B. wt.) has brought back the altered levels of biochemical markers to the near normal levels. The histopathology of the liver tissue shows liver necrosis and the recovery is significant in HESO treated groups. Silymarin is used as standard drug. All statistics was done on SPSS windows Ver.16.0.\textsuperscript{18}

**CONCLUSION**

The conclusion of this review is that the pharmacological activities in *Scindapsus Officinalis* fruit Anti asthmatic (Hedaytullah, M.D., Arya G.S.), Anti-inflammatory (Patel, B.D. et al.), analgesic (Patel B.D.et al.), Antioxidant (Singh M. and Velraj M.), Antidiabetic (Velraj M. et al.), Antibacterial (Rakshit et al.) are proved and utilizable for future detailed study for development of new drugs.

The folklore claim of *Scindapsus officinalis* fruits are antidiabetic, anthelmintic, aphrodisiac, galactagogue, stimulant, diaphoretic, anti diarrheal, carminative, expectorant, tonic, antiprotozoal, anticancer, sharpening hearing, aphrodisiac, cardio tonic and regulating the bowel and appetite. It is also used in dysentery, asthma, troubles of the throat, rheumatism, worm infestations, pharyngopathy, helminthiasis and bronchitis. So there are vast activities to
explore in *Scindapsus officinalis* fruit in view of future prospective. The need of new drugs is consistently rise for better treatment of various diseases in human. It is frequently used in the various ayurvedic preparations like chandraprabhavati, kunchpak, prasarani oil etc.

**REFERENCE**

