



**REVIEW ARTICLE**

**A Complete Profile on *Michelia Champaca* - Traditional Uses, Pharmacological Activities and Phytoconstituents**

**Raja S\*, Ravindranadh Koduru**

*GITAM Institute of Pharmacy, GITAM University, Visakhapatnam- Andhra Pradesh,  
India-Pincode-530 045.*

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**ABSTRACT**

Indian medicinal plants are used as ancient style of providing helps too many ailments. Presently, variant peoples are looking on healthful plants for his or her primary health care wishes. The current review designates the morphological, ethnopharmacological aspects and active principles of *Michelia champaca* Linn. Being it's a vital healthful plant in Indian medication this are supposed to vary medical specialty activities like antipyretic, analgesic, anti-inflammatory, antihelmintic, anticancer, antihyperglycemic, antiulcer, antimicrobial, wound healing, antioxidant and antifertility activities. Different active constituents such as alkaloids, saponins, tannins, sterols, flavonoids, triterpenoids, michelia-A, liriodenine, parthenolide and guaianolides, methyl linoleate, methyl anthranilate, stigmaterol and  $3\beta$ -16 $\alpha$ - dihydroxy- 5-cholestene-21-al are a unit to date according in *Michelia champaca*. Well conducted biological studies area unit still required for many indications of this species. This review is useful to make interest towards *Michelia champaca* and should be helpful in rising new formulations with additional therapeutic and economical worth.

**KEYWORDS**

*Michelia Champaca*, Phytoconstituents, Liriodenine, Parthenolide,  $3\beta$ -16 $\alpha$ - dihydroxy- 5-cholestene-21-al

**INTRODUCTION**

*Michelia champaca* Linn. known as *champaca* is belonging to the family of Magnoliaceae<sup>1</sup>. It consists of 12 genera and 220 species of evergreen trees and shrubs, native to tropical and subtropical South and Southeast Asia (Indomalaya), including southern China. It's commonly referred as yellow *champaca*. There are three species of *Michelia* available in Malaysia. They are *Michelia Alba* (white chempaka), *Michelia champaca* (orange chempaka) and *Michelia figo* (dwarf chempaka)

with *Michelia champaca* and *Michelia Alba* being the most popular species within the family<sup>2</sup>. In recent times there are several reports of medical specialty roles and activities of *Michelia champaca* and its active principals on the circulatory system, antipyretic, diuretic etc. This review tries to indicate the advances in phytology, chemistry and pharmacological aspects of *Michelia champaca*.

**Botanical Description of *Michelia Champaca***

*Michelia*, known by the scientific name *Michelia champaca*, is a very tall tree that grows up to 30m tall. The young branches are covered with grey hairs. The leaves are ovate in shape and are up to 30.5cm long and 10.2cm wide narrowing to a fine point at the apex.

**\*Address for Correspondence:**

**Dr. S. Raja**

GITAM Institute of Pharmacy, GITAM University,  
Gandhi Nagar, Rushikonda, Visakhapatnam-530 045  
Andhra Pradesh, India.

**E-Mail Id:** [sraja61@gmail.com](mailto:sraja61@gmail.com)

Small bracts, known as stipules, are present on the leaf stalk of the alternately arranged leaves. The flowers are pale yellow to orange and fairly large growing up to 5.1cm in diameter. They are also very fragrant and when a *Michelia* tree is in flower the fragrance produced is noticeable some distance from the tree. The flowers have 15 tepals that curve up towards the tips and many stamens (pollen producing structures). The fruit of *Michelia champaca* is made up of up to 3-20 brown follicles that are dry at maturity and split open at one side. Each follicle contains 2-6 reddish seeds. The taxonomical classification, common names and vernacular names of *Michelia champaca*<sup>1</sup> are mentioned in Table 1, Table 2 and Table 3 respectively.

### Geographic Distribution

*Michelia champaca* is native to India, where it occurs in humid tropical evergreen forests from 250-1500 m in elevation. It is found throughout Indo-China, Malaysia, Sumatra, Java, and southwestern China. Outside of India the native range of this species is difficult to determine as it has been dispersed extensively by humans throughout Southeast Asia and Indonesia on account of the use of the trees. The genus *Michelia* contains about 40 species with a distribution in from India, to Malaysia and Indonesia, and in southern Japan and Taiwan.

Table 1: Taxonomical classification of *Michelia champaca*

Taxonomical classification	
Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Magnoliidae
Order	Magnoliales
Family	Magnoliaceae
Genus	<i>Michelia</i> L.
Species	<i>champaca</i> L.

Table 2: Common names of *Michelia champaca*

Common Names	
Bengali	Champa, Swarnachampa
Hindi	Campa, Campaka, Champ, Champa, Champac, Champaca, Champe-ke-phul, Champaka
Kannada	Champaka, Kendasampige, Kolasampige, Sampage-huvvu, Sampige, Gandhaphali, Kolu sampige
Malayalam	Campakam, Cempakam, Champacam, Champakam, Chempakap-pu, Chembagam, Chembakam, Champa, Champaca, Champaga, Champak, Chempacam, Chempakam
Marathi	Sonchampa, Champa, Kudchampa, Pivalachampa, Sonachampa, Sona champa, Chamfo
Sanskrit	Anjana, Atigandhaka, Bhramaratithi, Bhringmohi, Campaca, Campaka, Campakah, Campakam, Campeya, Chambunala, Champaka, Champakapushpam, Champeya, Deepapushpa, Gandhaphali, Hemanga, Hemapushpa, Hemapushpika, Hemapuspaka, Hemavha, Kamabana, Kancana
Tamil	Amariyam, Sambagam, Sembagam, Sempakam, Sempuga, Shampangi, Vandumarmalar, Canpakam, Shampangi-pushpam, Shanbagapoo, Campakam, Canpakappu, Campanki, Ilai campanki, Shampang, Shenbagam, Shanbagam, Sanbagam, Champakam, Chembagam, Akacampanki, Akantakaram, Ancanam, Atikantam, Shenbagapoo.

Table 3: Vernacular names of *Michelia champaca*

Vernacular names	
Java	Chempaka, Chepaka, Pechari, Lochari, Kantil, Semendara
Malaysia	Chempaka, cempaka merah, Chempa, Cempaka kuning, Jampaka
Sundanese	Champaka.
Sumatra	Champaga
Thai	Champah, Champi

### Traditional Uses

Conventionally it is widely used in both Ayurveda and Siddha medicine. It is being used in fever, colic, leprosy, post-partum protection<sup>3</sup> and in eye disorders<sup>4</sup>. Juice of the leaves of *Michelia champaca* is given with honey in cases of colic. The flower oil is useful in cephalalgia, ophthalmia and gout<sup>5</sup>.

The bark is used as a stimulant, expectorant, astringent and febrifugal properties<sup>6</sup>. The dried root and roots bark, mixed with curdled milk, is useful as an application to abscesses, clearing away or maturing the inflammation. In the form of an infusion it is valuable emmenagogue. It is also considered purgative. Root and bark are used as purgative and in the treatment of inflammation, constipation and dysmenorrhea. The flowers and fruits are considered stimulant, antispasmodic, tonic, stomachic, bitter and cool remedies and are used in dyspepsia, nausea and fever. Flower, flower buds and fruits are useful in ulcers, skin disease wounds<sup>7</sup>. The flowers mixed with sesamum oil forms an external application in vertigo<sup>11</sup> and also applied to foetid discharges from the nostrils. They are useful as a diuretic in renal diseases and in gonorrhoea. The flower buds of *Michelia champaca* are commonly used by many traditional healers in most of herbal preparations for diabetes<sup>8</sup>. The flowers and fruits in combination with other drugs are recommended

as an anti-dote to snake and scorpion venoms<sup>9</sup>. It finds mention as one of the ingredients of the Sarvasugandhi group and is used in psychoneurosis by traditional healers. Different parts of *Michelia champaca* with ethnomedical information are stated in Table No.4.

Table 4: Traditional uses of *Michelia champaca*

Traditional Uses		
Dried root and bark	Abscesses, purgative	[9]
Flower and flower buds	Ulcers, skin disease wounds	[7]
Flower buds	Herbal preparation for diabetes	[8]
Flower oil	Cephalalgia, oetiphthalmia and gout	[5]
Flowers	Stimulant, antispasmodic, tonic, stomachic, bitter and cool remedies and are used in dyspepsia, nausea and fever.	[5]
Flowers	Anti-dote to snake and scorpion venoms.	[9]
Flowers	Foetid discharges from the nostrils.	[5]
Flowers	Vertigo, foetid discharges from the nostrils.	[11]
Fruits	Ulcers, skin disease wounds.	[7]
Leaves	Colic.	[5]
Root and bark	Purgative and in the treatment of inflammation, constipation and dysmenorrhea.	[3]
Stem bark	Stimulant, expectorant, astringent and febrifuge.	[6]

## **Pharmacological Activities**

Different parts of *Michelia champaca* with pharmacological information are mentioned in Table 5.

### ***Cytotoxic Activity of Michelia champaca***

The ethanolic extract of bark of *Michelia champaca* showed activity against human epidermoid carcinoma of the nasopharynx<sup>10</sup>.

### ***Anti-Inflammatory of Michelia champaca***

The anti-inflammatory drug activity in methyl alcohol (95%) extract of *Michelia champaca* leaves by varied carrageenan-induced inflammation rat models was highlighted<sup>11</sup>.

Results showed highly significant maximum inhibition concluding anti-inflammatory activity in pro-inflammatory conditions. This study put together disclosed the presence of some phytoconstituents like flavanoids<sup>12</sup> jointly showed anti-inflammatory drug property of methyl alcohol extract of *Michelia champaca* flowers.

### ***Anti-hyperglycemic Activity of Michelia champaca***

Various extracts of flower buds of *Michelia champaca* for antidiabetic activity was reported<sup>13</sup>.

Results advised that among all the extracts the ethanolic extract of *Michelia champaca* exhibited vital dose-dependent antihyperglycemic activity however didn't produce hypoglycemia in fasted normal rats.

### ***Leishmanicidal Activity of Michelia champaca***

Timber extracts of *Michelia champaca* showed potent leishmanicidal activity<sup>14</sup>.

### ***Anti-infective Activity of Michelia champaca***

Dichlormethane extract of *Michelia champaca* possess antiinfective activity. Dichlormethane extract of *Michelia champaca* and a madagascariense showed the most variety of growth inhibiting compounds against *Cladosporium cucumerinum*; the crude extracts showed activity against many phytopathogenic threadlike fungi<sup>15</sup>.

### ***Radical Scavenging Activity of Michelia champaca***

Ethyl acetate and hexane extracts of *Michelia champaca* possesses a sturdy in vitro inhibitor activity<sup>16</sup>. This study was centered on invitro activity by victimization fully completely different parameters like 2, 2-diphenyl-1-picrylhydrazyl (DPPH) assay, reducing power and in-vitro lipid peroxidation. Results prompt that each extracts of *Michelia champaca* were found to be considerably effective in scavenging DPPH.

### ***Antibacterial Activity of Michelia champaca***

The bactericide activity in ester extract of *Michelia champaca* flowers was reported<sup>17</sup>. The bactericide activity of *Michelia champaca* ester extract was studied against gram-positive organism (*Staphylococcus aureus*, *Bacillus subtilis*) and gram-negative bacteria (*Escherichia coli*, *Pseudomonas aeruginosa*). The ester extract was simpler against all microorganism strains tested.

### ***Wound Healing Activity of Michelia champaca***

The wound healing activity in ethyl alcohol (95%) extract of *Michelia champaca* flowers by burn wound healing methodology was highlighted<sup>18</sup>. Several parameters like incision wound, epithelization quantity, scar area, enduringness and amino acid (hydroxyl proline) measurements beside wound contraction, were accustomed assess the impact of *Michelia champaca* on wound healing. The results indicated that *Michelia champaca* hurries the wound healing methodology by declining the expanse of the wound and increasing the permanency<sup>19</sup>.

### ***Diuretic Activity of Michelia champaca***

Aqueous extracts of stem bark and leaves of *Michelia champaca* was investigated for diuretic activity<sup>20</sup>. Results clearly advised that aqueous compound extracts of stem bark exhibited higher diuretic drug potential as compared to leaves extract, with the upper dose evoking pronounced symptom even larger than standard furosemide drug (Lasix) in terms of Na<sup>+</sup> and K<sup>+</sup> concentration, and approximating

diuretic drug in terms of excretory product volume.

**Antiulcer Activity of *Michelia champaca***

Alcoholic and aqueous extracts of leaves and flowers were evaluated for anti-ulcerogenic property against NSAID-aspirin induced lesion<sup>21</sup>. Various parameters like reduction in internal organ volume, free acidity and lesion index were down upon administration of alcoholic and aqueous extract of *Michelia champaca*. Flower binary compound extract showed most effectiveness followed by leaf alcoholic, flower alcoholic, and leaf binary compound extracts.

**Antifertility Activity of *Michelia champaca***

The anti-fertility activity of a hydroalcoholic leaf extract of *Michelia champaca* in feminine rats was illustrated<sup>22</sup>. Results showed vital anti-fertility impact which can ensure to inhibition of

implantation and steroid hormone impact due to presence of some phytoconstituents.

**Antihelmintic Activity of *Michelia champaca***

The methanolic and aqueous extracts of leaves of *Michelia champaca* showed robust antihelmintic activity against test worms *Pheretima posthuma*<sup>23</sup>. Parameters like dysfunction time (PT) and death time (DT) were increased upon administration of each extracts.

**Cardioprotective activity of *Michelia champaca***

The cardio protecting potential of methanolic extract of *Michelia champaca* flowers on isoproterenol-induced cardiac muscle anemia in male albino wistar rats was studied<sup>24</sup>. Results indicated that retreatment with varied doses showed dose-dependent cardioprotective edges with restoration of biochemical parameters and histopathological confirmation of biochemical findings.

Table 5: Pharmacological activities of *Michelia champaca*

Pharmacological activities			
Plant Part	Solvent used for Extraction	Uses	References
Bark	Ethanol	Antitumor	[10]
Flower	Methanol	Anti-inflammatory	[12]
Leaves	-----	Anti-inflammatory	[11]
Flower	Ethanol	Anti-diabetic	[13]
Plant	-----	Leishmanicidal activity	[14]
Plant	-----	Wound healing	[19]
Flower	Ethanol	Wound healing	[18]
Different parts	Dichloromethane	Anti-infective	[15]
Flower	-----	Antioxidant	[16]
Stem bark	Aqueous	Diuretic	[20]
Leaves/ flowers	Aqueous/alcoholic	Anti-ulcer	[21]
Plant	Hexane/ ethyl acetate	Antibacterial	[17]
Leaf	Hydro alcoholic	Anti-fertility	[22]
Leaves	-----	Anthelmintic	[23]
Flowers	Methanol	Cardioprotective	[24]

## Phyto-Constituents

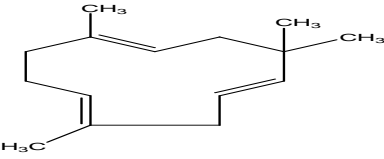
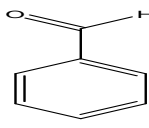
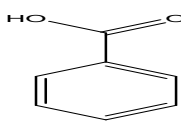
Methanolic extract of flowers of *Michelia champaca* found to have phytochemical constituents like alkaloids, saponins, tannins, sterols, flavonoids and triterpenoids<sup>4,25</sup>. Literature survey disclosed that *Michelia champaca* Linn to contain michelia- A, liriodenine, parthenolide and guaianolides<sup>11,25</sup>. The plant could be an excellent supply of esters of carboxylic acid, benzaldehyde, group alcohol,

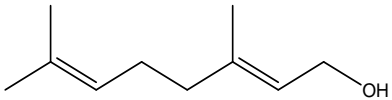
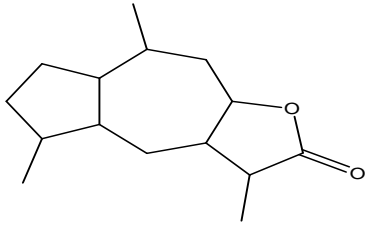
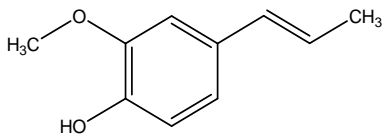
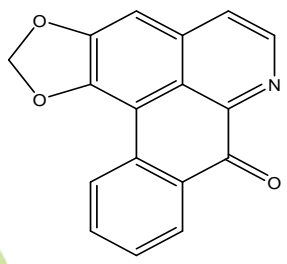
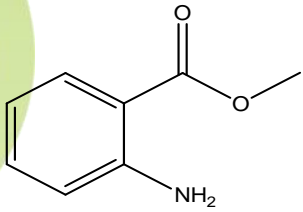
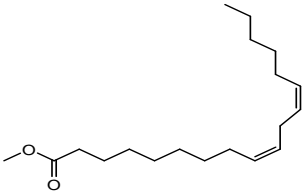
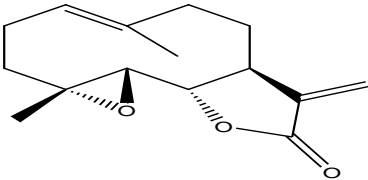
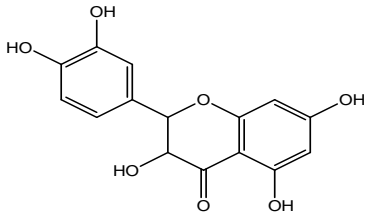
isoeugenol and sesquiterpene lactones<sup>21</sup>. Polyphenolic compounds like gallic acid was isolated from the leaves and stem bark of *Michelia champaca* Linn. Methyl linoleate, methyl anthranilate were different esters isolated from *Michelia champaca* Linn<sup>21</sup>. Stigmasterol and 3 $\beta$ -16 $\alpha$ - dihydroxy- 5-cholestene-21-al were additionally isolated from stem bark of *Michelia champaca* Linn<sup>26</sup>. Active constituents with their IUPAC names and structures are given in Table 6 and 7.

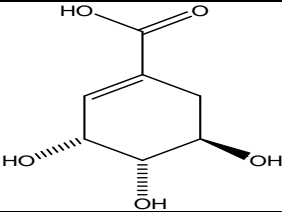
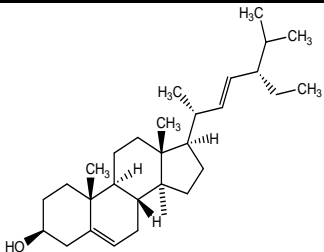
Table 6: Phytoconstituents Information of *Michelia champaca*

Phytoconstituents Information			
Plant part	Solvent used for Extraction	Use	Reference
Flower	Methanol	alkaloids, saponins, tannins, sterols, flavonoids and triterpenoids	[24]
Plant	Not mentioned	alkaloids, saponins, tannins, and triterpenoids	[3]
Various parts of the plant	Not mentioned	michelia- A, liriodenine, parthenolide and guaianolides	[10, 25]
Leaves, stem bark	Ethanol	Gallic acid	[10,25]
Plant	Not mentioned	Methyl linoleate and methyl anthranilate	[20]
Stem bark	petroleum ether	Stigmasterol and 3 $\beta$ -16 $\alpha$ -dihydroxy- 5-cholestene-21-al	[26]

Table 7: Phytoconstituents with IUPAC names and structures

Phytoconstituents Information		
Name	IUPAC Name	Structure
$\alpha$ -humulene	(1E,4E,8E)-2,6,6,9-tetramethylcycloundeca-1,4,8-triene	
Benzaldehyde	Benzaldehyde	
Benzoic acid	Benzoic acid	

Geraniol	(E)-3,7-dimethylocta-2,6-dien-1-ol	
Guaianolide	decahydro-3,5,8-trimethylazuleno[6,5-b]furan-2(3H)-one	
Iso-eugenol	2-methoxy-4-((E)-prop-1-enyl)phenol	
Liriodenine	8H-Benzo[G]-1,3-benzodioxolo[6,5,4-de]quinolin-8-one; Noraporphin-7-one, 4,5,6,6A-tetrahydro-1,2-(methylenedioxy)-	
Methyl anthranilate	methyl 2-aminobenzoate	
Methyl linoleate	(9Z,12Z)-methyl octadeca-9,12-dienoate	
Parthenolide	(E,1aR,7aS,10aS,10bS)-2,3,6,7,7a,8-hexahydro-1a,5-dimethyl-8-methylene-11-oxa-bicyclo[8.1.0]undeca-1(10),4-dieno[9,8-b]furan-9(1aH,10aH,10bH)-one	
Quercetin	3,5,7-trihydroxy-2-(3,4-dihydroxyphenyl)chroman-4-one	

<p>Shikimic acid</p>	<p>(3R,4S,5R)-3,4,5-trihydroxycyclohex-1-enecarboxylic acid</p>	
<p>Stigmasterol</p>	<p>(3S,8R,9S,10R,13R,14S,17R)-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradecahydro-17-((E,2R,5S)-5-isopropylhept-3-en-2-yl)-10,13,14-trimethyl-1H-cyclopenta[a]phenanthren-3-ol</p>	

## CONCLUSION

The extensive literature survey exposed that *Michelia champaca* is important medicinal plant with diverse ethnomedical and pharmacological spectrum. The plant shows the occurrence of many natural constituents which are answerable for wide-ranging pharmacological and medicinal properties. The evaluation needs to be carried out on *Michelia champaca* in order to uses and preparation of the plant in their practical clinical applications, which can be recycled for the welfare of the mankind.

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