

## Review Article : Open Access

## Ethnomedicinal uses and therapeutic potential of some selected medicinal plants: A review

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### Abstract

Diverse ethnobotanical knowledge is available on traditional medicinal plants since ancient time in India. Medicinal plants are being interestingly studied by researchers from centuries ago. Furthermore, studies are being done in the field of botany, pharmacognosy, chemistry, pharmacology and biotechnology of medicinal plants and herbal drugs. The importance and significance of ethnomedicine have been globally. The preliminary knowledge from the tribal claims, folklore claims, house hold or home remedies, has provided a direction of research to many researchers led to the development of several novel drug discovery and lead molecules from the medicinal plants. The knowledge from the traditional medicinal plants has explored to a great extent, resulting into various therapeutic potentials from several secondary plant metabolites. The bioactive molecules derived from different medicinal plants are earlier reported in literature to possess various biological and pharmacological properties. The present review on selected six medicinal plants is to document the various biological and pharmacological properties and their therapeutic potentials used to treat various human ailments. The bioactive phytoconstituents mainly responsible for the therapeutic activity of the plant based extracts mostly for skin diseases, cardiovascular diseases, bronchitis, diarrhoea, arthritis and other diseases.

### 1. Introduction

The ethnobotanical study of selected six medicinal plants is being reported for their biological and pharmacological properties. The selected and most important medicinal plants under discussion are: (i) *Boswellia serrata* Roxb, (ii) *Drimia indica* (Roxb.) J.P. Jessop, (iii) *Pittosporum floribundum* Wight & Arn, (iv) *Aeschynomene aspera* L., (v) *Sebastiania chamaelea* Muell.-Arg., and (vi) *Cycas beddomei* Dyer. The selected six plant species are naturally grown and mainly distributed in the Eastern Ghats. According to the Botanical Survey of India, IUCN guidelines issued for the endangered plants under Schedule-VI of wild life protection act 1972, Government of India (Rao, 1974) to conserve and protect species. The two endangered plants *Cycas beddomei* and *Boswellia serrata* need to conserve and develop propagation methods due to their high medicinal values. The six plant photographs are shown in the Figure 1. The present review also describes about the nature of phytoconstituents and their structures present in above medicinal plants. The information about the collection of plant parts from the local tribal community and utilization of herbs for ethnomedicinal purpose was very important in order to preserve the traditional knowledge and to carry out their scientific validation

(Sharma *et al.*, 2004; Prusti and Behera, 2007; Savithramma *et al.*, 2007; Panda and Mishra, 2011; Sree *et al.*, 2019). Further, information presented in Table 1, viz., botanical name, vernacular or local name and major chemical constituents (Figure 2), part used, therapeutic properties and medicinal uses.

#### 1.1 *Boswellia serrata* Roxb.

Synonym *Boswellia glabra* Roxb. belongs to the family Burseraceae, and reported as endemic to India and has been recorded on dry hills and slopes, on gravelly soils of Uttar Pradesh, Bihar, Punjab, Gujarat, Madhya Pradesh, Peninsular India between an altitude ranges 275-900 m. It grows upto 12-15 feet in height, medium sized but highly branching tree (Kokate *et al.*, 1990).

##### 1.1.1 Ethnomedicinal uses and medicinal properties of *B. serrata*

Bark and gum-resin used to treat asthma, dysentery, ulcer, haemorrhoid, skin diseases, convulsions, bronchitis, diarrhoea, syphilitic diseases, chronic laryngitis, jaundice, ringworm, diaphoretic, astringent, diuretic, arthritis, cardiovascular diseases and conjunctivitis. Leaf powder was mixed with coconut oil and prepared into paste and applied externally to relieve joint pain (Sharma *et al.*, 2004). Oleo gum-resin yield of *B. serrata* contains higher amount of essential oil as 3.30-9.37% (Ali *et al.*, 2008). Essential oil of gum-resin most commonly used oils in aroma therapy. The gum-resin of *B. serrata* possesses analgesic activity in albino wistar rats in addition to its sedative effect (Menon and Kar, 1970).

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*Boswellia serrata* Roxb.



*Drimia indica* (Roxb.) J.P. Jessop



*Pittosporum floribundum* Wight & Arn.



*Aeschynomene aspera* L.



*Sebastiania chamaelea* Muell.-Arg.



*Cycas beddomei* Dyer.

**Figure 1: Photographs of medicinal plants.**

### 1.1.2 Chemical constituents reported

*B. serrata* contains not less than 1.0% of total acetyl-11-keto- $\beta$ -boswellic acid and 11-keto- $\beta$ -boswellic acid. The volatile oil composed of sesquiterpene alcohols, anisaldehyde, D- $\alpha$ -thujone,  $\alpha$ -pinene,  $\alpha$ -phellandrene and phenolic compounds. Its gum mainly composed of arabinose with small amounts of xylose and galactose. Volatile oil contains D-limonene, terpenolene, *p*-cymene,  $\alpha$ -thujone, methyl chavicol (Kokate *et al.*, 1990). *B. serrata* gum-resin extracts have been traditionally used in folk medicine to treat various chronic inflammatory diseases. It contains diterpenes, monoterpenes, triterpenes, tetracyclic triterpenic acids and four major pentacyclic triterpenic acids, *i.e.*,  $\beta$ -boswellic acid, 11-keto- $\beta$ -

boswellic, acetyl-11-keto- $\beta$ -boswellic and acetyl- $\beta$ -boswellic acids responsible for inhibition of pro-inflammatory enzymes (Siddiqui, 2011).

### 1.2 *Drimia indica* (Roxb.) J.P. Jessop

*Drimia indica* (Roxb.) J.P. Jessop Syn. *Urginea indica* (Roxb) Kunth., belongs to Liliaceae family. The species globally distributed from Tropical Africa to Myanmar. Within India, it is found abundantly throughout the plains and in the dry hills of the lower Himalayas up to an altitude of 1500 m. and cultivated in sandy soils near the sea-shore in the Deccan Peninsula and on an experimental basis in the lower Himalayas (Manning *et al.*, 2004).

**Table1: Ethnomedicinal uses of some medicinal plants, chemical constituents and therapeutic activity**

S.No.	Plant name	Vernacular names	Part used	Chemical constituents	Therapeutic activity	Ethnobotanical use
1.	<i>Boswellia serrata</i> Roxb.	Indian frankincense, salai guggul	Bark/leaf/oleo gum resin	11-keto- $\beta$ -boswellic, acetyl-11-keto- $\beta$ -boswellic and acetyl- $\beta$ -boswellic acids, D- $\alpha$ -thujone, $\alpha$ -pinene, <i>p</i> -cymene, D-limonene, terpenolene, $\alpha$ -thujone and methyl chavicol.	Antiarthritic, anticarcinogenicity and analgesic, astringent, diuretic activities.	Asthma, dysentery, ulcer, haemorrhoid, convulsions, bronchitis, diarrhoea, chronic laryngitis, jaundice and arthritis.
2.	<i>Drimia indica</i> (Roxb.) J.P. Jessop	Indian squill, true squill, or sea onion, adavivulli	Bulb	Coumarin salicylic acid; kaempferol, quercetin, luteolin and apigenin tartronic acid and paraldehyde.	Antihypertension, Antiosteoporosis, Antiseptic, Anti-arrhythmia, Anti-inflammatory, antitumour and analgesic activities.	Joint pains, ulcers-scorpion sting, psoriasis, asthma and various dermatological diseases.
3.	<i>Pittosporum floribundum</i> Wight & Arn	Chettu-kasidra	Stem bark/leaf	Linalool, methyl salicylate, dipentene, $\alpha$ -pinene, cineol, eugenol, n-dodecanoic acid, n-tetradecanal and $\beta$ -acoradiene butyl methyl ketone.	Hepatoprotective, antifungal, anti-inflammatory, antibacterial, antioxidant, neuropharmacological and behaviour activities.	Diabetes, rheumatism, chest pain, leprosy, sprain, antidote, eczema, snake bite leprosy, asthma and chronic bronchitis.
4.	<i>Aeschynomene aspera</i> L.	Sola pith plant, pith plant, jiluga bendu	Aerial parts/pith	Quercetin, apigenin flavones and myricetin.	Analgesic, antioxidant, antidiarrheal, anti-inflammatory, antifungal and anthelmintic activities.	Joint pains, swellings, jaundice, fever, cold, cough, and urinary troubles.
5.	<i>Sebastiania chamaelea</i> Muell.-Arg.	Kodiyaavanakku, karkidaka kanji	Whole plant	Myricetin, quercetin, kaempferol, luteolin, apigenin, triterpenoids.	Anti-inflammatory, antipyretic, antimicrobial, antioxidant activities.	Headache, vertigo, diarrhoea and syphilis.
6.	<i>Cycas beddomei</i> Dyer.	Peritha	Leaf/pith/Bark/male and female cones	1,3-Propanediol, Methyl tetradecanoate, hexadecanoic acid, methyl ester and Methyl <i>cis</i> -7-octadecanoate.	Antimicrobial, anti-inflammatory, antiarthritic, antidiabetic activities.	Ulcers, hyperacidity, boils, skin diseases, arthritis and diabetes.

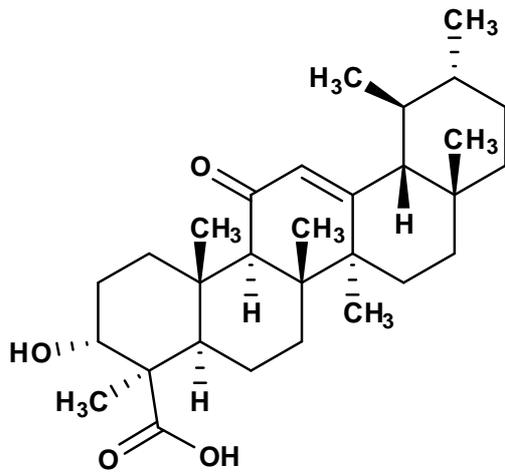
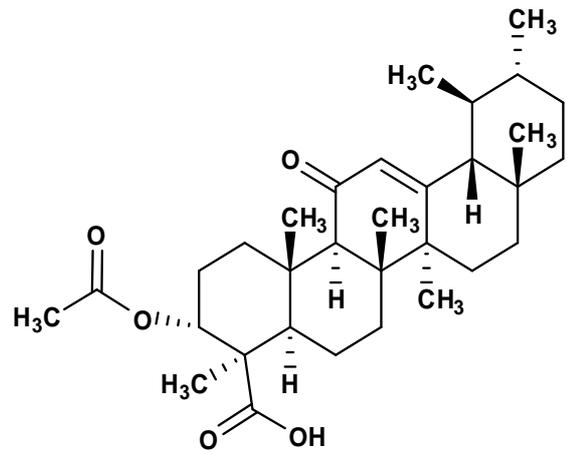
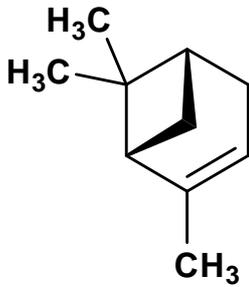
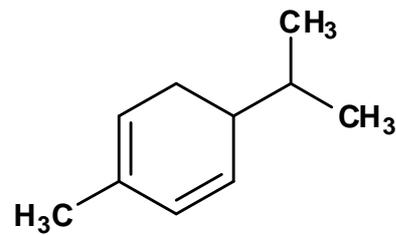
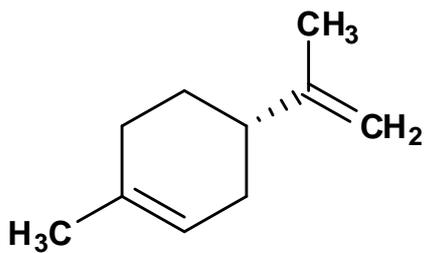
### 1.2.1 Ethnomedicinal uses and medicinal properties of *D. indica*

Bulb powder paste can be locally applied to remove warts, externally for joint pains (Nadkarni, 1976; Prusti and Behera, 2007). The bulb paste along with oil of Mahua (*Madhuca longifolia*) can be used on affected part of the body and to cure ulcers (Dinesh and Ashok, 2003). The bulb paste of *D. indica* used against scorpion sting (Kala, 2009) and also for Pyrexia and antinematod (Choudary *et al.*, 2008). Mostly used traditionally by many tribes and aborigines against psoriasis, asthma and dermatological diseases (Vahdettin and Vahit, 2010). It acts as potent rodenticide and has been used in the treatment of lymphedema (Farinola and Piller, 2005), also reported to have antihypertension, antiosteoporosis, antiseptic

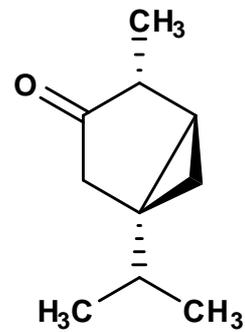
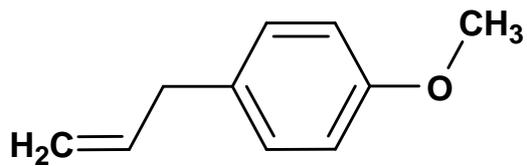
antiarrhythmia, anti-inflammatory, antitumour and analgesic properties (Liu, 2010).

### 1.2.2 Chemical constituents of whole plant of *D. indica*

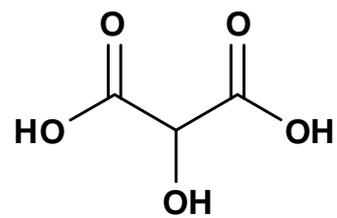
Chemical constituents of whole plant of *D. indica* reported to possess phenolic compounds like coumarin and salicylic acid; flavonoids like kaempferol, quercetin, luteolin and apigenin (Dinesh and Ashok, 2003). *D. indica* bulb was found to have tartronic acid and paraldehyde as potential bioactive compounds (Armstrong and Battiu, 2001). *D. indica* contains salicylic acid which helps in the control of nausea and diarrhoeal activities and coumarin used in the pharmaceutical industries as a precursor molecule in the synthesis of anticoagulant pharmaceuticals (Johnson *et al.*, 2009).

11-keto- $\beta$ -boswellic acidAcetyl-11-keto- $\beta$ -boswellic acid $\alpha$ -pinene $\alpha$ -phellandrene

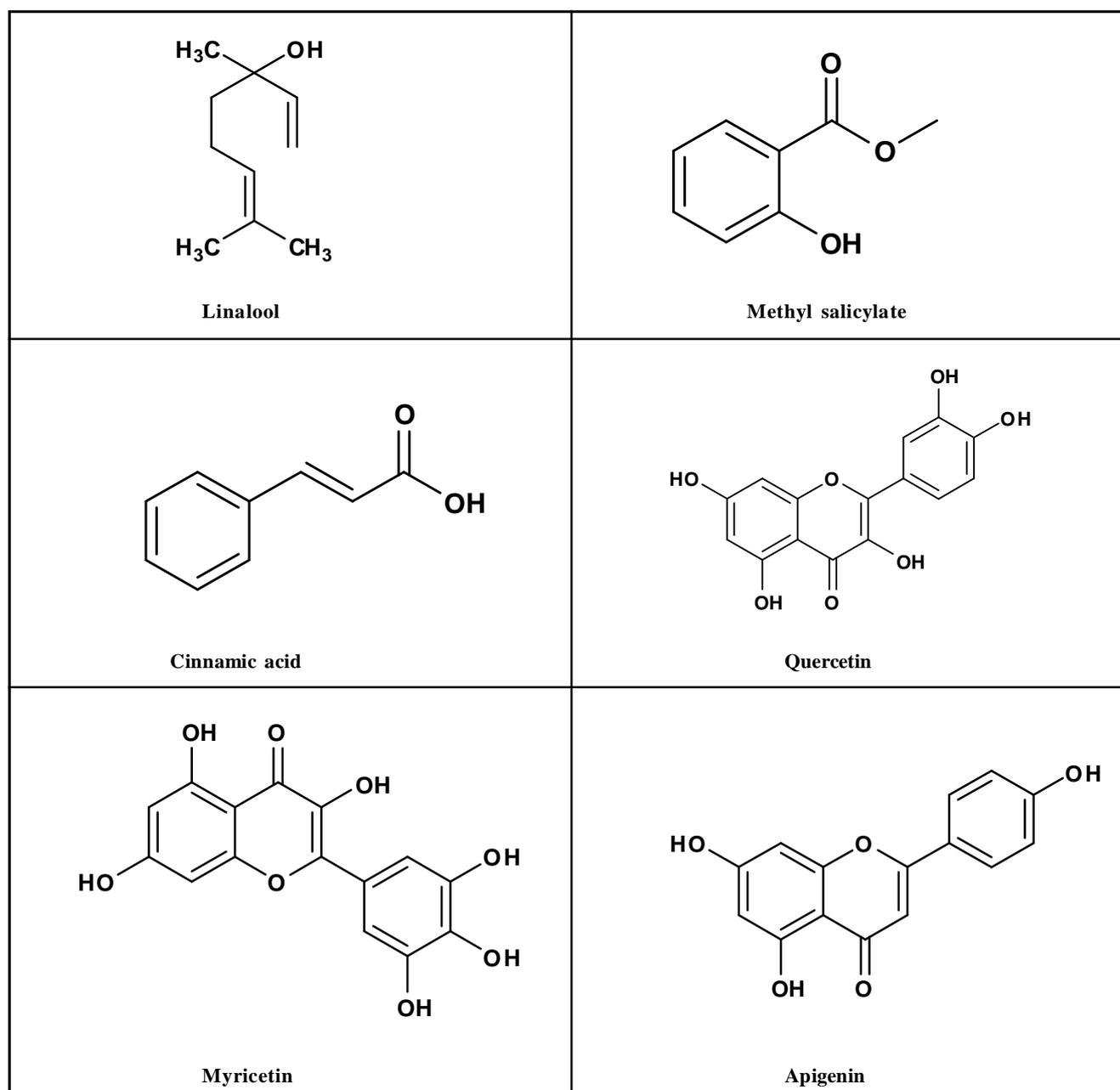
D-limonene

 $\alpha$ -thujone

Methyl chavicol



Tartronic acid



**Figure 2:** Chemical structures of main phytoconstituents of above selected medicinal plants.

### 1.3 *Pittosporum floribundum* Wight & Arn Syn.

*P. napaulense* Rehder and Wilson of Bixaceae family. A small evergreen tree, observed in Himalayas from Punjab, east wards to the hills of Assam and Peninsular India, ascending up to an altitude of 2400 m (Kirtikar and Basu, 1975; Pullaiah, 2006).

#### 1.3.1 Ethnomedicinal uses

*P. floribundum* leaves and stem bark were used to treat diabetes, arthritis, chest pain, leprosy, rheumatism, sprain, antidote, eczema and for snake bite. Bark methanolic extract having anti-inflammatory, hepatoprotective, antibacterial, antioxidant, antifungal, behaviour and neuropharmacological activities (Kishangiri *et al.*, 2020). Bark

(aqueous), leaf (methanol) and fruit (alcohol) extracts has effective antifungal and antibacterial activity adjacent to tested bacteria to that of control group (Nagamalleswari *et al.*, 2013). Bark powder mainly used for leprosy, leprous affections, chronic rheumatism, cutaneous disease, asthma, chronic bronchitis and secondary syphilis (Savithramma *et al.*, 2007). Bark decoctions are generally used to treat chest infection, skin disease, stomach complaints, abdominal pain and fever (Burkil, 2004).

#### 1.3.2 Chemical constituents

Different parts of alcoholic extracts were subjected to phytochemical screening for the presence of phytoconstituents such as flavonoids, alkaloids, lignins, phenols, steroids, anthroquinones,

saponins, tannins, fixed oils and glycosides (Kishangiri *et al.*, 2020). Plant yields an essential oil (0.26%) with linalool, methyl salicylate, dipentene, alpha-pinene, cineol, anisaldehyde, eugenol, benzoic and salicylic acids as major constituents. Hydrodistillation of stem bark of *P. floribundum* gave oil of 0.9% yield, based on the dry weight of the plant. The main constituents are n-tetradecanal with 60.1%,  $\beta$ -acoradiene with 0.3% and butyl methyl ketone with 4.3% (Sreelekha, 2012).

#### 1.4 *Aeschynomene aspera* L.

*A. aspera* belongs to family Fabaceae, a tall erect subshrub in swampy areas; native to Bangladesh, Bhutan, India, Indonesia, Malaysia, Myanmar, Thailand and Vietnam.

##### 1.4.1 Ethnomedicinal uses

Leaves are used to cure joint pains and swellings (Padal *et al.*, 2010). Aerial parts juice used to cure fever, cold, cough, increase the consistency of semen and urinary troubles (Panda and Mishra, 2011). Bioactivity study such as *in vitro* antioxidant activity by free radical diphenylpicrylhydrazyl (DPPH) scavenging assay, total flavonoid and phenolic contents, antidiarrheal and analgesic activities were evaluated by acetic acid induced writhing inhibition in albino rats and castor oil induced diarrheal in parasites (Imtiaz *et al.*, 2020).

##### 1.4.2 Chemical constituents

Phenolic compounds like protocatechuic acid acts as antioxidant and antimutagenic (Tanka *et al.*, 1995). Protocatechuic acid acts against influenza virus (Lu *et al.*, 2002). Chlorogenic acid acts as antifungal, antibacterial and anti-inflammatory agent (Sotillo *et al.*, 1998). Caffeic acid prevents type 2 diabetes mellites (Paynter *et al.*, 2006). Caffeic acid acts as anti-inflammatory and trans-p-coumaric acid as antibacterial agent (Pereira *et al.*, 2007). Cinnamic acid acts against herpes and influenza virus (Ivanka *et al.*, 2008). Flavonoid compounds exhibits antiallergic, antiviral, anti-inflammatory and vasodilatory activities in human beings. These compounds are used in the treatment of dermatitis, hemorrhage and albuminuric diseases. Quercetin possesses anti-inflammatory and antioxidant properties (Laura *et al.*, 2008). Myricetin plays a significant role in inhibiting the tumor growth and enhancing the diuretic and diaphoretic activities. Myricetin lowers the rates of prostate cancer (Knekt *et al.*, 2002). Flavones reduce the risk of pancreatic cancer (Nothlings *et al.*, 2007), jaundice and hepatitis (Abbasi *et al.*, 2008). Apigenin showed its anti-inflammatory activity (Pieroni *et al.*, 2000).

#### 1.5 *Sebastiania chamaelea* Muell.-Arg.

*S. chamaelea* Muell. Arg. A perennial herb of family Euphorbiaceae, mainly distributed from Maharashtra, Karnataka, Mysore, Kerala, Tamilnadu (Esser, 1999).

##### 1.5.1 Ethnomedicinal uses

Leaf decoction of the plant in ghee was given as tonic and applied to the head in vertigo patients. The whole plant juice was astringent and used as a remedy for diarrhoea and syphilis. Whole plant accounted for 77.5% of human necessary amino acids of which arginine stands highest with 60% of free amino acids, may promote the role for its medicament activity (Sree *et al.*, 2010). Phytochemical constituents like saponins, steroids, flavonoids,

tannins and phenols are known to have anti-inflammatory and antipyretic activities (Polukonova *et al.*, 2015). Antibacterial activities of leaf and callus extracts are tested against bacterial cell cultures by agar well diffusion method. Ethyl acetate and methanol extracts of leaf and leaf derived callus showed effective inhibitory effect in bacterial strains (Ganesan *et al.*, 2013). Based on ethnobotanical data obtained from Nigerian and Senegalense traditional healers *S. chamaelea* traditionally used to treat malaria (Sree *et al.*, 2019).

##### 1.5.2 Chemical constituents

Phenolic acids such as cinnamic acid, coumarin, p-hydroxy benzoic acid salicylic acid, caffeic acid, melilotic acid, scopoletin, and aesculetin flavonoids like myricetin, quercetin, kaempferol, luteolin, apigenin, triterpenoids like betuline and glucoside of betulinic acid are found in *S. chamaelea* (Sree *et al.*, 2010). Phenolic acids like caffeic acid has anti-inflammatory activity (Fernandez *et al.*, 1998), while cinnamic acid has anthelmintic, antifungal properties and natural protection against infections caused by pathogenic microorganisms (Champbel *et al.*, 1999).

#### 1.6 *Cycas beddomei* Dyer.

*Cycas beddomei* Dyer. family Cycadaceae, an endemic medicinal plant known as "Peritha" by the local people of the Seshachalam hill ranges of the Eastern Ghats; confined to a small area of Andhra Pradesh state in the Tirumala Hills in scrubland and brush covered hills. It is identified as critically endangered as per IUCN criteria (Alekhya *et al.*, 2012).

##### 1.6.1 Ethnomedicinal uses

Male cone part used in ayurvedic medicine to cure for rheumatoid arthritis and muscle pains (Latheef *et al.*, 2008; Rao, 2010). Pith can be used in diet for debility (Sudhakar *et al.*, 2009). Traditional data collected from the Yandi tribe and local herbalists of Talakona area showed that *Cycas beddomei* leaves used to treat acidity and ulcers. Bark powder used to cure boils and skin diseases. Male cones used to cure arthritis and diabetes. Male and female cone used as an ideal food supplement and rejuvenator. Therapeutic activities of the species are antioxidant, antiulcer, aphrodisiac, debility, arthritis and diabetic conditions (Alekhya *et al.*, 2012). Phenolic quinines act as anti-inflammatory and antiseptic. Tannins acts as antiseptic in the treatment of hemorrhages. It is also used in uterine diseases, diarrhoea and hypoglycemia (Kokate *et al.*, 2007).

##### 1.6.2 Chemical constituents

In *Cycas beddomei* plant, major phytochemical constituents have been identified by GC-MS such as 1,3-propanediol, mome inositol,  $\beta$ -sitosterol, tetradecanamide, methyl tetradecanoate, hexadecanoic acid, methyl cis-7-octadecenoate, methyl ester, *etc.* (Ravi *et al.*, 2012).

## 2. Conclusion

The traditional medicinal plants are popularly known for their safety and prolong use for medicinal purpose. The above discussed medicinal plants possess important ethnomedicinal uses and therapeutic potentials. Previously some practical works on these endangered medicinal plants are carried out. The discussed medicinal plants revealed that they possess different medicinal properties

and can be used to treat various disease conditions. Explore the medicinal plants further in the direction of pharmacological approaches and also for generation of scientific data for their efficacy and to develop new potent drugs to treat diseases like skin diseases, cardiovascular diseases, bronchitis, diarrhoea, arthritis and other inflammatory disorders. Plants are the major source for the drug discovery and isolation of bioactive marker compounds. There is a resilient need to conserve the endangered species like *C. beddomei* and *B. serrata* through *in vivo* and *in vitro* propagation for future studies.

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### Conflict of interest

The author declares that there are no conflicts of interest relevant to this article.

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