

## Biomedicinal and Chemical Profile of *Cupressus sempervirens*: A Mini Review

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### Abstract

Medicinal plants have been an important source of plant-based medicines, health products, phytochemicals, food supplements, cosmetics etc. In traditional systems of medicine, plant parts such as stem, stem bark, root, root bark, leaves, fruits and exudates are used in the treatment and prevention of various diseases and disorders. *Cupressus sempervirens*, also known as the Mediterranean cypress or Italian cypress, is native to the eastern Mediterranean region, North America and subtropical Asia at higher altitudes. Literature survey regarding its pharmacology revealed that *Cupressus sempervirens* has antiseptic, aromatherapeutic, astringent, balsamic or anti-inflammatory, antispasmodic, astringent, antiseptic, deodorant and diuretic activities. Literature survey regarding chemistry showed that monoterpenes, diterpenes, flavonoid glycoside and biflavonoid compounds are found in this species. The present review aims to highlight the chemistry, traditional uses and biological activities of the *Cupressus sempervirens* plant.

**Keywords:** *Cupressus sempervirens*; Chemical constituents; Pharmacology; Diterpenoids; Biflavonoid

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### Introduction

Despite of current technological advancement in medical science, we are still depending upon herbal remedy or medicinal plant to cure or treat numerous illness and ailments. Since ancient time, these medicinal plants have been extensively used by traditional medical practitioners because of easily available, reproductive amount, lower cost and minimum side effects. Therefore, the products or remedies made using them are often recommended for their high therapeutic value with minimum side effects and to keep us healthy, fit and energetic.

### Literature Review

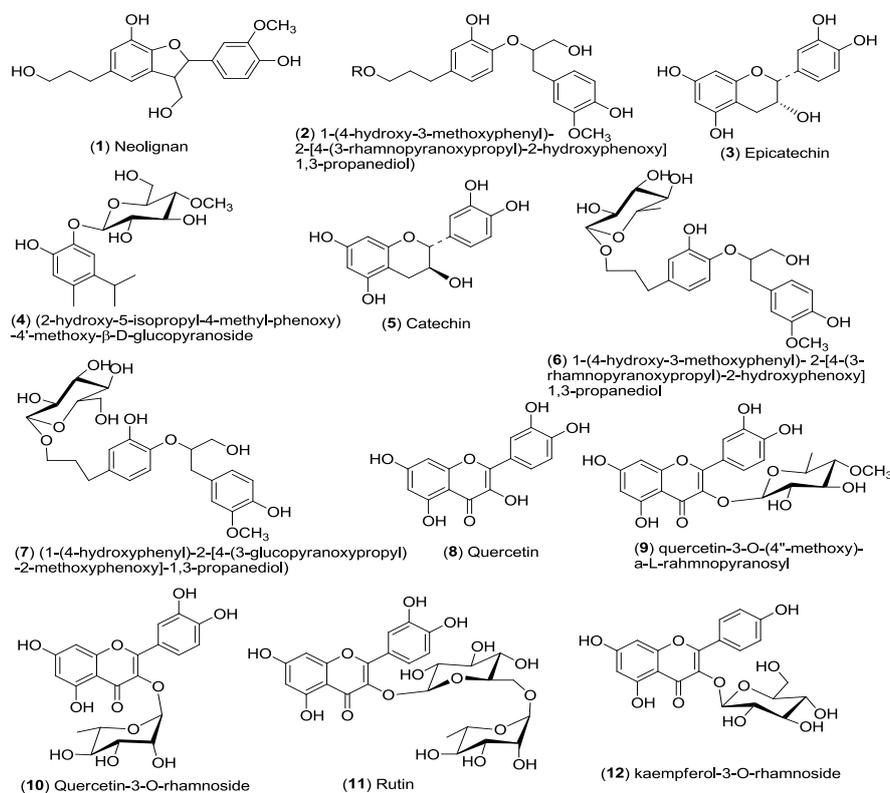
Five species of genus *Cupressus* were reported as a part of the Indian flora viz *C. torulosa*, *C. sempervirens*, *C. funebris*, *C. Lusitanica* and *C. Macrocarpa* [1]. *Cupressus sempervirens* (CS), an evergreen Mediterranean Cypress, is a native to the eastern Mediterranean region, North America and subtropical Asia at high altitudes. It is a medium-sized tree growing to 30 m (98 ft) by 5 m (16 ft) at a medium rate. CS has been widely cultivated as an ornamental tree for millennia away from its native range, mainly throughout the central and western Mediterranean region, and in other areas with similar hot dry summer, mild

rainy and winters [2]. CS was reported to have antiseptic, aromatherapeutic, astringent, balsamic and anti-inflammatory activities, antispasmodic, astringent, antiseptic, deodorant, and diuretic effects. Several monoterpenes, sesquiterpenes, diterpenes, polyphenols, flavonoids, flavonoid glycoside and biflavonoids have been isolated from this plant [3]. In this review, we are going to report the chemical and pharmacological nature of CS.

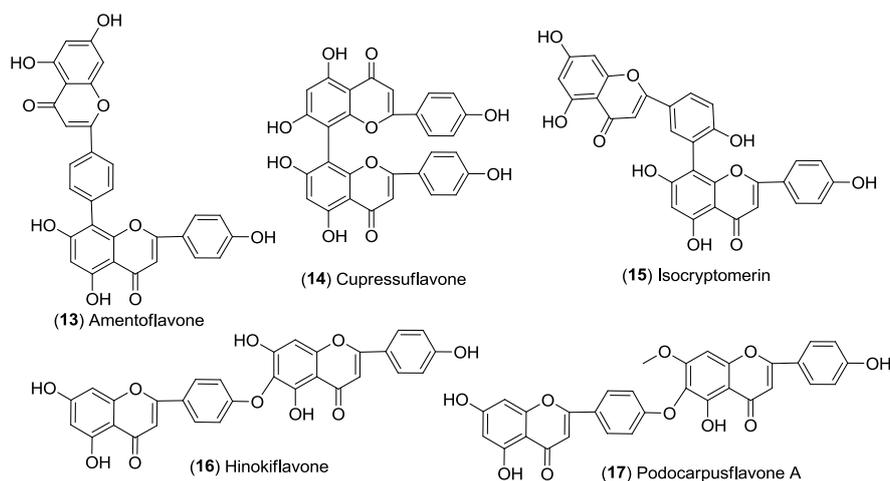
### Chemical constituents

Based on extensive literature survey, CS was found to have a wide range of compounds as shown in the **Figures 1-4**. Chemical studies on CS revealed the presence of polyphenols (1-7), flavonoids (8) and flavone glycosides (9-12). Bioflavonoid including amentoflavone, cupressuflavone, 4''-mono-O-methyl amentoflavone, hinokiflavone, isocryptomerin and podocarpusflavone A has also been reported from this plant (13-17) [4]. As per reported in several studies, essential oils from cones and fruits mainly contained volatile monoterpenes (18-28) and sesquiterpenes (29-32) [5-8].

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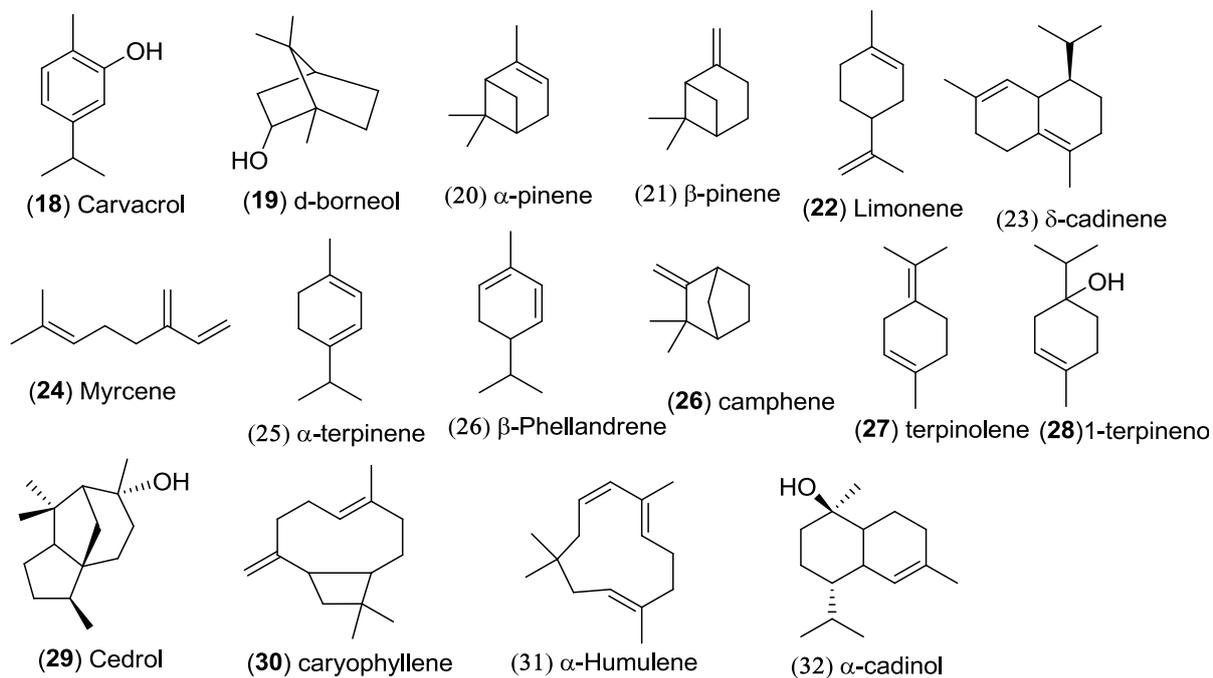
**Figure 1** Chemical structures of some polyphenols, flavonoids, and flavone glycosides.



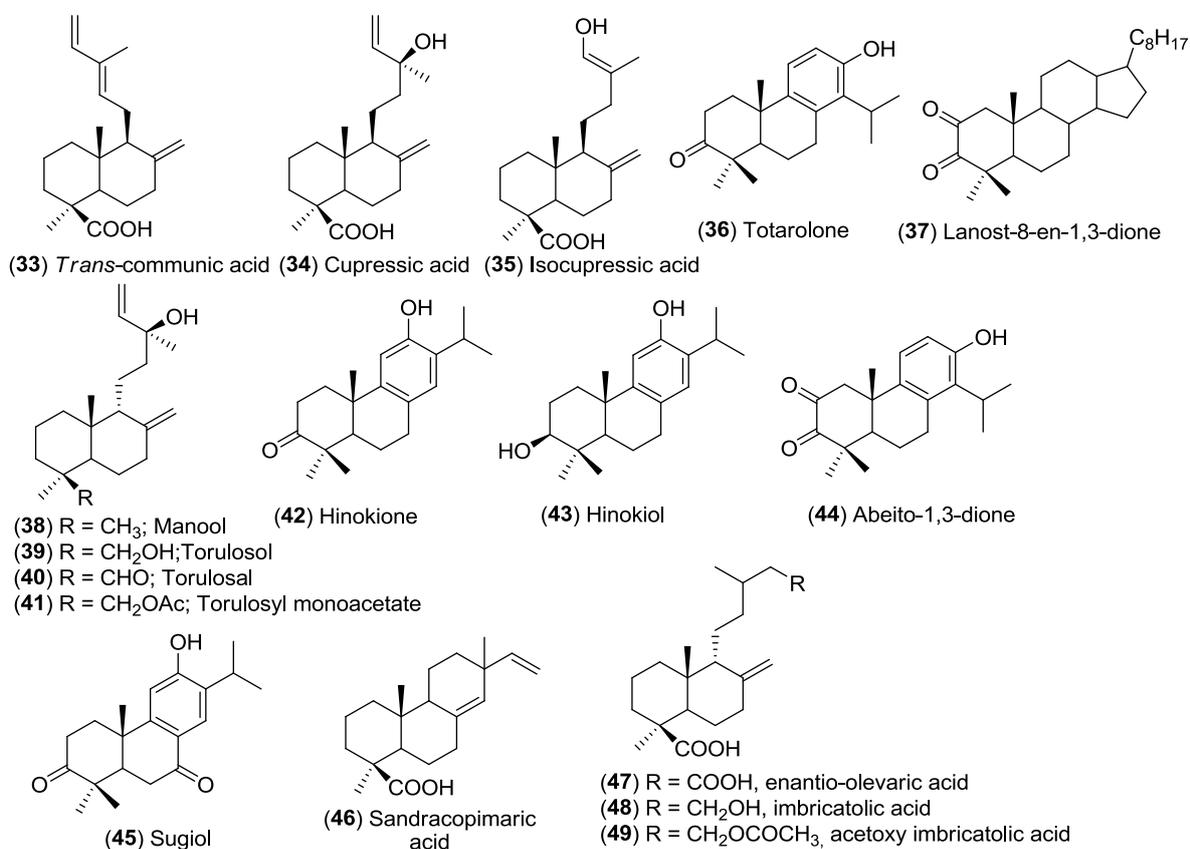
**Figure 2** Chemical structures of isolated biflavone.

Most of the compounds so far isolated from CS species are diterpenoids named as *trans* communic acid (33), cupressic acid (34), isocupressic acid (35), totarolone (36), lanost-8-en-1,3-dione (37), manool (38), torulosol (39), torulosal (40), torulosyl monoacetate (41), hinokione (42), hinokiol (43), abeito-1,3-

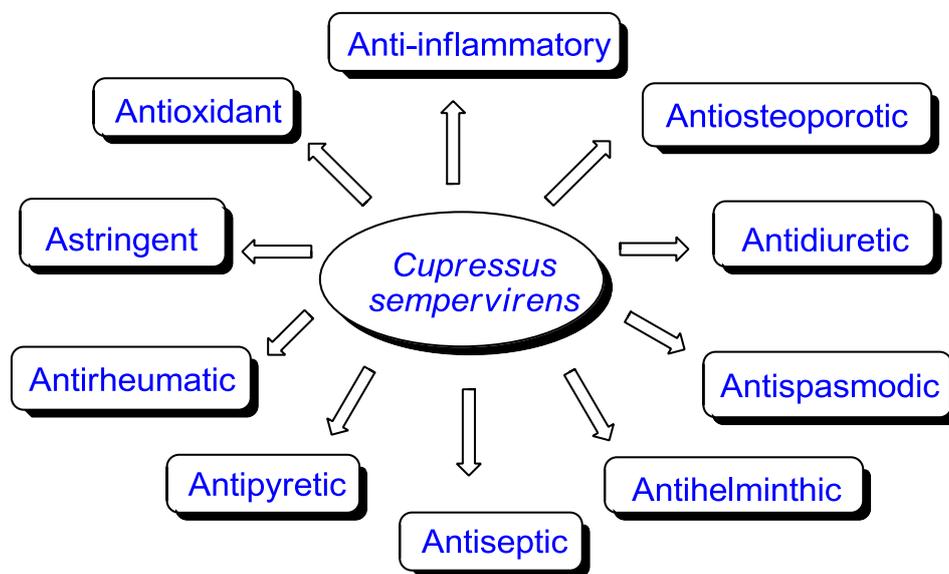
dione (44) (**Figure 3**) [9]. *Trans*-communic acid, cupressic acid and isocupressic acid were also isolated from ethanolic extract of cones of CS [10]. The structures of these compounds are given below in **Figure 4**. Recently, our research group was isolated two new phenolic glycosides along with nine terpenoids (45-49) from fruits of this plant [3].



**Figure 3** Chemical structures of monoterpenes and sesquiterpenes.



**Figure 4** Chemical structures of isolated diterpenoids.



**Figure 5** Various biological activities of *Cupressus sempervirens*.

## Discussion

### Pharmacology

CS has an important place in traditional system of medicine; therefore, many pharmacological studies have been done on various part of the plant (**Figure 5**). The dried cones and young branches are used as anti-anthelmintic, antipyretic, antirheumatic, antiseptic, astringent, balsamic, vasoconstrictive and antifungal [11]. They are taken internally for the treatment of whooping cough, the spitting up of blood, spasmodic coughs, colds, flu and sore throats. Paste of cones and young branches applied externally for tightening up the blood vessels in haemorrhoids [12]. A foot bath of the cones is used to clean the feet and counter excessive sweating. It is also used as antiseptic, deodorant and diuretic effects, to promote venous circulation to the kidneys and bladder area and finally to improve bladder tone and as a coadjuvant in therapy of urinary incontinence and enuresis [13,14]. A proanthocyanidin fraction (MW 1500 to 2000 daltons) from CS exhibited a valuable antiviral activity *in vitro* against two retroviruses, HIV and HTLV III B. In comparison with AZT, no toxicity was observed with PPC at concentration of 50 µg/mL, which exceeded the IC<sub>50</sub> values (1.5 to 15 g/mL for HIV and 5 to 25 µg/mL for HTLV) [13]. The MeOH extract of leaves of this plant was shown to exert hepatoprotective activity against normal and CCl<sub>4</sub>-rats. The MeOH extract and isolated phenolic compounds exhibited free radical scavenging activity against stable 2,2-diphenyl-2-picrylhydrazyl (DPPH) in comparison to α-tocopherol and butylated hydroxyl toluene (BHT) as standard

antioxidants using ESR technique [15]. Recently, Siddique et al. showed that 8, 8'-biapigenyl compound isolated from this plant inhibited osteoclastogenesis of *in-vitro* and in ovariectomized (OVx) mice with beneficial effect on bone cells [16]. Moreover, Khan et al. also investigated the antiosteoporotic activity of sugiol, trans-communic acid, 15-acetoxy imbricatolic acid and imbricatolic acid isolated from this plant. Among them, sugeol at a dose of 1.0 mg/kg body weight exhibited significant osteoprotective effects and did not show uterine estrogenicity at the same dose [17,18].

## Conclusion

This review explains the traditional importance of *Cupressus sempervirens* with comparative view in modern medicine. Among the isolated chemical constituents, cupressuflavone or 8, 8'-biapigeninyl stands as a promising anti osteoporotic entity. It inhibited osteoclastogenesis of bone marrow cells. Keeping an eye on the indelible pharmacological properties of *Cupressus sempervirens*, there is inevitable need to develop the herbal formulations or purification of novel compound so as to overcome the obstacles in the path of discovery of pure herbal drug.

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