



## Phytochemical composition and Pharmacological aspects of *Salvia plebeia* R. Br.: A mini review

### KEYWORDS

*Salvia plebeia*, Lamiaceae, phytochemical, pharmacological properties.

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**ABSTRACT** *Salvia plebeia* R. Br. is a biannual herb, distributed widely throughout the world. It is one of the special members of Lamiaceae with immense medicinal potential. The whole plant found to be used by different tribal community peoples in folk medicine as diuretic, anthelmintic, astringent, demulcent, hemogenetic, hemostatic, antioxidant, anti-oncogenic and anti-inflammatory agent. The aim of the present review is to summarize the research related to the isolation of bioactive phytochemicals and pharmacological properties of *Salvia plebeia*.

### Introduction

*Salvia plebeia* R. Br. (Lamiaceae) is well-known as a common sage plant. It has been widely distributed throughout the world especially at higher elevations. In the different tribal communities, it has been used as crude herbal medicine for the treatment many diseases including hepatitis, cough, diarrhea, gonorrhoea, menorrhagia, tumors, and hemorrhoids (Gupta H C et al., 1972; Tayade and Patil, 2005; Bhanote A et al., 2011; Shirsat R et al., 2012). With the development of herbal medicines, the intensive research about *S. plebeia* is now being pursued all over the world. Hard efforts are being made by the plant biologist and phytochemists in exploring the plant in the world to discover more new drugs. The present review includes, a comprehensive account on phytochemistry and pharmacological aspects of this plant which are partially shared by the authors. Moreover, an intense search of the references has been revealed that the stems, leaves, roots and seeds of this wild medicinal plant are potential sources of bioactive phytochemicals (Jiang & Wang, 2006).

### Phytochemical Aspects

Phytochemical compounds are the secondary metabolites of the plants. Along with the function of plant protection, they provide various medicinal properties to the plants which in turn are useful for human beings. There are sev-

eral reports on preliminary phytochemical analysis of *Salvia plebeia* (Shirsat R et al., 2012, 2014). The plant is rich in chemical composition. The flavones like hispidulin, Homoplantagenin, Nepetin, Nepetin-7- glucoside, Leutioline, Luteoline-7- glucoside, Quercetin, Apigenin along with some lignin derivatives have been identified and isolated from this plant (table-1). Apart from this several isoflavones, terpenes, sesquiterpenes, was also been reported in this plant. Some active compounds like b-sitosterol, Ursolic acid, eugenol, a-tocopherol were also reported in the extract of *Salvia plebeia*. There are few reports which indicate that this herb is also rich in composition of essential oil. Lu R M et al., (2008) identified elemol, borneol, evedmol, laganene, benzyl benzoate, a-curjunene, oleic acid, agarospirol, guaioi, copaene and aromadendrene. Lee G T et al., (2009) demonstrated presence of Pinenene, caryophyllene, b-humulene, a-cardenene, a-farnesine, isoleidene and Wang L K et al., (2009) reported phytol, cinnamic acid, pentadecanoic acid, 2,6,10- trimethyl tetradecane and 6,10,14- trimethyl pentadecanone. Nughroho A et al., (2012) reported polyphenols present in the leaves of *Salvia plebeia*. Cao S Y et al., (2013) reported a sesquiterpene lactone from this medicinal plant. Shirsat R et al., (2013) and Ren D B et al., (2014) identified and separated different phenolics and bioactive compounds from *Salvia plebeia*.

**Table- 1: Flavones isolated from *S. plebeia*.**

Sr. No.	Name of Compound	Formula	References
1	Apigenin	C <sub>15</sub> H <sub>10</sub> O <sub>5</sub>	Liu et al., 2013
2	Eupatilin	C <sub>18</sub> H <sub>16</sub> O <sub>7</sub>	Nugroho et al., 2012
3	Eupatorin	C <sub>18</sub> H <sub>16</sub> O <sub>7</sub>	Gu and Weng, 2001
4	Hispidulin	C <sub>16</sub> H <sub>12</sub> O <sub>6</sub>	Jin et al., 2008
5	Homoplantagenin	C <sub>22</sub> H <sub>22</sub> O <sub>11</sub>	Jin et al., 2008
6	Nepetin	C <sub>16</sub> H <sub>12</sub> O <sub>7</sub>	Jin et al., 2008; Shirsat, 2013
7	Nepetin-7-glucaoside	C <sub>22</sub> H <sub>22</sub> O <sub>12</sub>	Jin et al., 2008; Shirsat, 2013
8	Luteolin	C <sub>15</sub> H <sub>10</sub> O <sub>6</sub>	Jin et al., 2008; Shirsat, 2013
9	Luteolin-7-glucoside	C <sub>21</sub> H <sub>20</sub> O <sub>11</sub>	Jin et al., 2008; Shirsat, 2013
10	Quercetin	C <sub>15</sub> H <sub>10</sub> O <sub>7</sub>	Nugroho et al., 2012; Shirsat, 2013

### Pharmacological Aspects

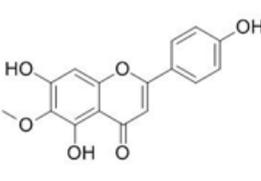
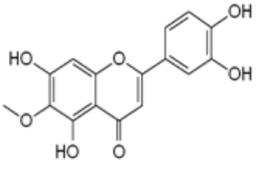
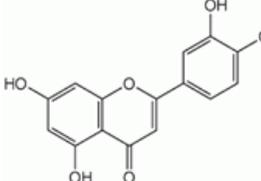
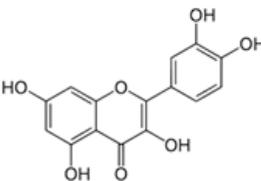
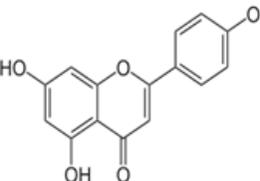
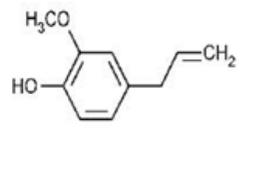
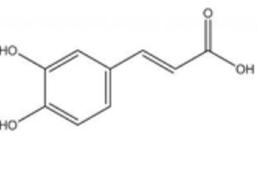
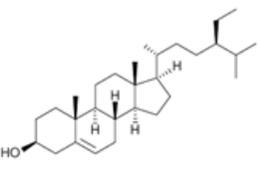
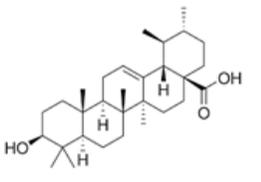
Pharmacology play vital role in the authentication of folklore claims of tribal ethnomedicines. *Salvia plebeia* is also used in various preparations of tribal medicines since ages by different folk communities and tribal healers. The ethanol extract of *Salvia plebeia* possesses anti-inflammatory, anti-angiogenic, anti-nociceptive, and anti-oxidant activities, which offers partial support to its folkloric use (Jung H J *et al.*, 2009). Three compounds were isolated and identified as royleanonic acid, hispidulin, and eupatorin from *S. plebeia*, which displayed anti-oxidant activity (Gu & Weng, 2001). The effect of aqueous extract of *S. plebeia* showed strong anti-allergic activity and the differences in bioavailability may cause differential activity following different administration routes (Shin & Kim, 2002). Que X J *et al.*, (2009) showed that Homoplantaginin isolated from *S. plebeia* has protective effects on hepatocyte injury, which might be associated with its anti-oxidant properties. The investigation by Park S H *et al.*, (2012) on *S. plebeia* extract showed that, it may serve as a protective therapeutic agent against the development of atherosclerosis. The compound *S. plebeia* granules (CSPG) isolated from *S. plebeia* showed significantly diuretic, anti-blastic, anti-pyretic, anti-inflammatory, and anti-dynous activities which support its folk medicine use on urinary tract infection (UTI) (Peng M M *et al.*, 2010). Three compounds, 6-methoxy-luteolin-7-glucoside,  $\beta$ -sitosterol, and 2-hydroxy-5-methoxy-biochanin A were isolated from *S. plebeia* which showed strong anti-oxidant activities, their anti-oxidant activities were investigated individually and compared with butylatedhydroxytoluene (BHT) and  $\alpha$ -tocopherol (Weng & Wang,

2000). The antioxidant activity of various extracts of *Salvia plebeia* is well studied by Shirsat R *et al.*, (2012). In 2012, Nughroho A *et al.*, found that the composition of polyphenols played a major role in the sedative and gastroprotective effects of *S. plebeia* by animal experiments. The inhibitory activity of plebeilide C and plebeiafuran isolated from *S. plebeia* which were evaluated by Dai Y Q *et al.*, (2014). The ethanol extract of *S. plebeia* could prolong the latent period of cough and decrease the frequency of cough induced by citric acid in guinea pigs. It could increase phenolred output of trachea in mice. It could also prolong the latent period of histamine which induce asthma in guinea pig and inhibit the isolated tracheal smooth muscle induced by histamine of guinea pigs. So, *S. plebeia* has antioxidant, expectorant, and anti asthmatic action (Tepe B *et al.*, 2006 & Ma Q *et al.*, 2008). Shirsat *et al.*, (2014) showed that the alcoholic extract of *salvia plebeia* has significant antifungal and antibacterial property. Choi J K *et al.*, (2014) reported that the *salvia plebeia* leaves has the potential to reduce the atopic like skin lesions.

### Conclusion

The wild herb, *Salvia plebeia* is being used as traditional medicine by different tribal communities' world over and this herb is still playing vital role as herbal medicine. Since last decade, several biologists have isolated different phytochemicals from this plant. Due to richness in diverse chemical composition, which imparts different biological properties to this plant, it has great scope in pharmaceuticals and drug discovery.

Fig. 1: Structures of some important phytochemicals from *Salvia plebeia*

		
Hispidulin (C <sub>16</sub> H <sub>12</sub> O <sub>6</sub> )	Nepetin (C <sub>16</sub> H <sub>12</sub> O <sub>7</sub> )	Luteolin (C <sub>15</sub> H <sub>10</sub> O <sub>6</sub> )
		
Quercetin (C <sub>15</sub> H <sub>10</sub> O <sub>7</sub> )	Apigenin (C <sub>15</sub> H <sub>10</sub> O <sub>5</sub> )	Eugenol (C <sub>10</sub> H <sub>12</sub> O <sub>2</sub> )
		
Caffeic acid (C <sub>9</sub> H <sub>8</sub> O <sub>4</sub> )	$\beta$ -sitosterol (C <sub>29</sub> H <sub>50</sub> O)	Ursolic acid (C <sub>30</sub> H <sub>48</sub> O <sub>3</sub> )

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