



## PHYTO-PHARMACOLOGICAL STUDY OF SALVADORA OLEOIDES - A REVIEW

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**Abstract:** *Salvadora oleoides* Decne. is an oil-yielding medicinal and multipurpose tree, belongs to the family Salvadoraceae. It is commonly known in India as meetha jal. This article discusses about the medicinal values of *Salvadora oleoides*. In this communication, we reviewed the pharmacological action and Phytochemistry and its application in the treatment of various ailments like piles, tumors, bronchitis, cough rheumatism, fever, conjunctivitis, carminative and alexipharmic etc. The plant is reported to possess anti hypoglycemic, hypolipidemic, analgesic, and antimicrobial activity. The major constituents of the plant are sterols like beta-sitosterol and their glucosides, flavonoids, dihydroisocoumarin, terpenoids like-methoxy-4-vinylphenol and *cis*-3-hexenyl benzoate etc.

**Keywords:** *Salvadora oleoides*, Salvadoraceae, Phytochemistry

### INTRODUCTION

India is one of among the most popular country in the world, where traditional medicine system is practiced in primary health care. Medicinal plants are used in the treatment of much life threatening disease. *Salvadora oleoides* Decne is an oil-yielding medicinal and multipurpose tree, belongs to the family Salvadoraceae. It is commonly known in India as meetha jal<sup>1</sup>. It is facultative halophyte found in dry and arid regions of India (Rajasthan, Haryana, Punjab, Maharashtra and Gujarat). *Salvadora oleoides* leaves are said to possess anti-inflammatory, anti-ulcer, and analgesic activity<sup>2</sup>.



*Salvadora oleoides* Dence Tree

*S. oleoides* is a shrub or small tree, attaining 6-9m height under favorable conditions; trunk short, often twisted or bent, up to 2m in diameter; branches drooping, numerous, stiff, often swollen at forks; bark grey or whitish-grey. Leaves are bluish-green, linear-or ovate-lanceolate, leathery and somewhat fleshy, dark

greenish-yellow when young, grey when mature. Flowers are sessile, greenish-white, minute in panicle spikes, often clustered; calyx cup-shaped, in 4 rounded, obtuse lobes. Fruits are drupe, globose, about 6 cm in diameter, usually yellow when ripe, dark brown or red when dry. Seeds are greenish-yellow, about 3 mm in diameter<sup>3</sup>.

### Phytochemistry:

Fruit contains sterols, beta-sitosterol and its glucosides and stigmaterol; benzyliothiocyanate, *n*-octacosanol and tetracosane; flavonoids including quercetin and rutin; thiourea derivatives and phospholipids<sup>4</sup>.

Two compounds octadecanoyl heptanoate and  $\delta$ -lactone of 3 isobutyl-5-hydroxy-19-oxononadeconic acid were isolated from stem bark<sup>5</sup>. A new dimeric dihydroisocoumarin, salvadorin was isolated from the chloroform fraction of *Salvadora oleoides*. The chemical structure was established as 8-benzyl-6-[6-(6-ethyl-7-methyl-5, 8-dihydro-2-naphthalenyl)-1-oxo-3, 4-dihydro-1 H-isochromen-8yl]-3,4-dihydro-1H isochromen-1-one through spectroscopic techniques and chemical analysis<sup>6</sup>.

Essential oil of leaves and stems of *Salvadora oleoides* was extracted by hydro distillation and analyzed by gas chromatography and mass spectrometry (GC-MS). Thirty five (94.0%) and twenty five (91.1%) components were identified in the leaves and stems, respectively. The results show that leaves

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contain high concentration of 2-methoxy-4-vinylphenol (25.4%), cis-3-hexenyl benzoate (16.8%), phytol (13.9%), n-hexadecanoic acid (6.9%), and trans- $\beta$ -damascenone (2.1%). Stems contain high concentration of 2-methoxy-4-vinylphenol (21.6%), phytol (12.9%), n-hexadecanoic acid (3.6%), octacosane (7.9%), nonacosane (7.3%), 1-octadecene (5.8%), heptacosane (5.9%), hexacosane (4.5%), pentacosane (3.4%), squalene (3.9%) and trans- $\beta$ -damascenone (2.3%)<sup>7</sup>.

Seeds contain about 42% fat which on hydrolysis produces fatty acids like myristic acid (28.4%), lauric acid (47.2%), palmitic acid (28.4%), oleic acid (12%) and linoleic acid (1.3%). Unsaponifiable seed fat fraction constitutes compounds like benzylisothiocyanate, sitosterol, and s-di benzyl thiourea<sup>8</sup>.

**Table: Ethno-Pharmacological Uses**

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#### Medicinal uses of Leaves

Leaves are used in dry cough, asthma and digestive disorders. The leaves are made into paste with leaves of *Cannabis sativa* L. is applied on anus to cure piles<sup>9,10</sup>

Also used in treatment of enlarged spleen, rheumatism, low fever, snake bites, coughs, and used widely as a purgative<sup>11,12,13</sup>

Paste of leaf is mixed with water and sprayed over eyes to treat opacity of cornea<sup>14</sup>.

The decoction of the leaves is given in cough and retention of placenta<sup>15</sup>.

Paste is used to cure cough and treatment of enlarged spleen and fever<sup>16</sup>.

Leave decoction is used topically in conjunctivitis<sup>17</sup>.

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#### Medicinal Uses of Fruits

Decoction is given to cure enlarged spleen and rheumatic fever<sup>9,10</sup>.

Aphrodisiac and to reduce body temperature<sup>11,12</sup>.

Fruit is chewed as a carminative and purgative and is prescribed in rheumatism<sup>13,15</sup>

Used for treatment of Calculi, constipation, indigestion and stomatitis<sup>18</sup> Cooling effect<sup>19</sup>

Appetizer, laxative, carminative, alexipharmic, useful in piles, tumors, bronchitis, diseases of the spleen, ascites<sup>20</sup> resolvent, expectorant, diuretic and opens the pores of body<sup>21</sup>

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#### Medicinal Uses of Roots and stem bark

The root ash boiled in water used for killing mange and removing hair<sup>11,12</sup>

To treat blisters and rheumatism<sup>22</sup>

The decoction is used in fever as febrifuge<sup>18</sup> and to regulate the menstrual periods<sup>15</sup>

Young stems and rootlets used for making miswak which is used for clearing teeth, Roots bark is used as vesicant<sup>13,21,23</sup>

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#### Medicinal Uses of seed and seed oil

Seeds are mixed with jaggery and given to check camel bite<sup>14</sup>

Seed oil is applied topically in rheumatic pain<sup>9,10,24</sup> and in preparation of toothpaste<sup>21</sup>

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#### Pharmacological action:

##### Hypoglycemic and Hypolipidemic activity:

Hypoglycemic and hypolipidemic activity of ethanolic extract (1 g and 2 g/kg b.w) of the aerial part of *Salvadora oleoides* in euglycemic and alloxan-induced diabetic albino rats was evaluated in comparison to standard antidiabetic drug tolbutamide (0.5 g/kg b.w.). Blood samples were collected by cardiac puncture and were analyzed for blood glucose and lipid profile on days 0, 7, 14, and 21. The ethanolic extract produced significant reduction in blood glucose and also had beneficial effects on the lipid profile in euglycemic as well as alloxan-induced diabetic rats at the end of the treatment period (21<sup>st</sup> day). However, the reduction in the blood glucose and improvement in lipid profile was less than that achieved with the standard drug tolbutamide. It was concluded that an ethanolic extract of *S. oleoides* is effective in controlling blood glucose levels and improves lipid profile in euglycemic as well as diabetic rats<sup>25, 26</sup>

Anti hyperlipidemic activity of total methanolic extract of leaves were evaluated against elevated cholesterol, triglycerides level in Triton-WR 1339 induced hyperlipidemic rats. The effect was comparable with that of fenofibrate (65 mg/kg b.w.), a standard antihyperlipidemic drug. Cholesterol and triglycerides levels were measured. Administration of total methanolic extract at a dose level of 100 mg/kg b.w. resulted in significant reduction in cholesterol and triglycerides level as compared to normal rats and standard<sup>27</sup>

Butanol fraction of methanolic extract of leaves yielded four sub-fractions A-D by using column chromatography technique. All four sub-fractions were tested against Triton WR-1339 induced hyperlipidemic rats. Butanol sub-fraction D of *Salvadora oleoides* not only have resulted in significant reduction in cholesterol, triglyceride, LDL, VLDL level but also increases the HDL level at a reduced dose level. Further studies on the isolated fractions and constituents are

needed to isolate compound responsible for activity and elucidate the mechanism by which *Salvadora oleoides* exerts protective effects against hyperlipidemia<sup>28</sup>

Combined effect of *Coccinia indica* and *Salvadora oleoides* leaf extract on blood glucose level and certain other biochemical parameters in alloxan induced diabetic rats was studied. The Combined Methanolic Extract of the two plants at a dose level of 150 mg/Kg b.w. showed significant reduction in blood glucose level of diabetic rats compared to that of standard drug Glipizide (5 mg/kg b.w.). It also showed significant effect on lipid profile, serum glutamic oxaloacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), serum creatinine and urea levels, there by exhibiting its overall significant anti diabetic potential<sup>29</sup>.

**Analgesic activity:** Analgesic activity of the successive extracts (chloroform, ethyl acetate, ethanol and aqueous extracts) of powdered leaves at the dose of 500 mg/kg b. w. was evaluated using eddy's hot plate method in Albino mice. The results of the statistical analysis showed that ethanol and aqueous extracts have significant analgesic activity. The aqueous extract of the leaves has showed significant activity at 30 min. The ethanol extract showed significant activity at 60 and 120 minutes when compared to the control group. While the standard drug showed significant activity at 30, 60, 120 and 180 minutes. Hence present investigation reveals that the aqueous extract has more analgesic activity than ethanol extract. Other successive extracts (Chloroform and ethyl acetate extracts) could not produce the significance of the difference from the control as analgesics<sup>30</sup>

**Antimicrobial activity:** Aqueous and organic solvent extracts of different plant parts of *Salvadora oleoides* were screened for antimicrobial activity by the agar well diffusion method and microtitre plate method. Different extracts obtained by Soxhlet extraction method were evaluated for their antimicrobial potential against eight bacterial strains: *Bacillus subtilis*, *Bacillus cereus*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli*, *Proteus vulgaris*, *Proteus mirabilis*, *Klebsiella pneumoniae* and three fungal strains: *Aspergillus fumigatus*, *Candida albicans* and *Aspergillus niger*. Benzene extracts of both root and stem possesses highest antibacterial activity with Minimum inhibition Concentration (MIC) of 6.25 to 12.5 mg/ml and MIC of 6.25 to 25 mg/ml respectively. The leaf extract was inactive against all the tested pathogenic microbial strains. Antimicrobial activity of the root and stem benzene extracts were highly significant when compared with standard drug streptomycin (10 µg)<sup>31</sup>.

**Acute toxicity study:** Two groups of Albino mice of 10 animals per group and weighing 20-25 g were administered graded dose (100-2000 mg/kg b.w.) orally of the methanolic extracts of *Salvadora oleoides*. After administration of the extracts animals were observed for general organ toxicity, morphological behavior and mortality in any group for 7 days. No mortality was observed therefore the extracts were found safe for use up to the dose of 2000 mg/kg of body weight orally.<sup>25, 26</sup>

## CONCLUSION

The above collected information regarding the Phytochemistry, pharmacology and medicinal uses of *Salvadora oleoides* is matched with available literature. Furthermore, the uses of this plant should be exploited more for human well-being in daily life.

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