**Solanum nigrum as Potent Therapy: A Review**

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**Abstract:** Solanum nigrum (European Black Nightshade or locally just "black nightshade", present in the flora of Europe, Serbia. It grows in different types of habitats like as weed, in crops, ruderal habitats, along the roads, fences and neglected places. They are semi cultivated in most countries and largely utilized as a vegetable and fruit source. Solanum nigrum has very much importance as a medicinal plant. There leaves are used as poultice for rheumatic gouty joints, in skin diseases, as anti tuberculosis and are said to produce diaphoresis. Leaves are also used in dropsy, nausea and nervous disorders. This herb also exhibit anti-tumor activity, anti-neoplastic activity against Sarcoma 180 in mice, anti inflammatory and anti-convulsant activity as well and is also used in the treatment of liver diseases. Fresh juice of this herb is used for curing fever and alleviating pain.

**Keywords:** Anti-convulsant, anti inflammatory, anti-neoplastic, antiseptic  

**INTRODUCTION**

Solanum nigrum (European Black Nightshade or locally just "black nightshade", Duscle, Garden Nightshade, Hound's Berry, Petty Morel, Wonder Berry, Small-fruited black nightshade or popolo) is a species in the Solanum genus. Black nightshade is a fairly common herb or short-lived perennial shrub sometimes purple-green, hairy with glandular and simple, non-glandular hairs; prickles absent. It has a height of 30-120 cm (12-48"), leaves 4-7.5 cm (1 1/2-3") long) and 2-5 cm wide (1-2 1/2"); ovate to heart-shaped, with wavy or large-toothed edges; both surfaces hairy or hairless; petiole 1-3 cm (1/2-1") long with a winged upper portion mention in Table 1. The berry is mostly 6-8 mm (1/4-3/4") diam., dull black or purple-black. Taxonomical Classification of Solanum nigrum is mentioned in Table 2. The flowers have petals greenish to whitish, recurved when aged and surround prominent bright yellow anthers (Solanum, 2010). Different constituent of Solanum nigrum and its biochemical percentage are depicted in the Table 3 and 4, respectively which are the beneficial ingredients of this plant.

**Habitat and distribution:** It is annual plant 15 species of this genus are present in the flora of Europe, 9 in the flora of Serbia. Some are crop weeds or weeds of ruderal habitats. The most widespread weed species in Europe and in Yugoslavia is Solanum nigrum L., it belongs to South-Eurasian (Mediterranean) floral element and today is a cosmopolitan species (Quattrocchi, 2000). Grows in different types of habitats, as weed in crops and in ruderal habitats, along the roads, fences and in neglected places. Mostly semi cultivated in most countries and largely utilized as a vegetable and fruit source through harvesting from plants growing spontaneously as weeds in cultivated fields, or in weedy plant communities, under trees, along fences and roads, in shaded areas, near buildings and on waste land. Some communities semi cultivates the vegetable in home gardens or on fertile land portions near homesteads (Herrera-Arellano et al., 2004).

**Ethnomedical properties and uses:** Antiseptic, anti-inflammatory, expectorant, cardiotonic, digestive, diuretic, laxative, diaphoretic, sedative, swelling, cough, asthma, in curing cardiopathy, leprosy, haemorrhoids, nephropathy, ophthalmopathy, dropsy and general debility. Protective effect on the liver and hepatoprotective activity in cases of toxicity induced by drugs and chemicals. It is also effective in the treatment of cirrhosis of the liver. Fresh juice of this herb is used for curing fever and alleviating pain (Solanum, 2006). The juice prepared from the leaves can be used for skin problems and tumors. It can also be used as a cosmetic also as rubbing the seeds on the cheeks helps removin
The berries of Solanum nigrum have been recently been studied and found to contain 4 steroidal alkaloid glycosides, Solamargine, Solasonine, α and β-solanigrine. The berries of Solanum nigrum have been found to contain a saturated steroidal genin, which has been identified as tigogenin by mixed melting point and IR spectroscopy. One spirosestanol glycoside and two furostanol glycosides have been isolated from a methanol extract of the stems and roots of Solanum nigrum (Ravi et al., 2009a).

Six new steroidal saponins, solanigrosides C-H and one known saponin, degalactotigonin, were isolated from the whole plant of Solanum nigrum. Some researchers isolated two new steroidal saponins, named Nigrumnins I and II, together with two known saponins were obtained from the whole plant of Solanum nigrum. Recently phytochemical analysis of Solanum nigrum has resulted in the isolation of two novel saccharides. Their structures were determined as ethyl b-D-thevetopyranosyl-1(4)-b-D-oleandropyranoside and ethyl b-D-thevetopyranosyl-1(4)-a-D-oleandropyranoside, respectively, by chemical and spectroscopic methods. Solanum nigrum seeds have high lipid content. Their protein content and minerals elements (Mg being prominent) are considerable and Solanum nigrum oil is an important source of linoleic acid (Ravi et al., 2009b).

**Pharmacology of Solanum nigrum:** Extracts of Solanum nigrum suppressed the oxidant mediated DNA-sugar damage and the plant exerted cytoprotection against gentamicin-induced toxicity on Vero cells and anti-neoplastic activity against Sarcoma 180 in mice. More recent studies revealed an inhibitory effect of extracts of Solanum nigrum on 12-O-tetradecanoylphorbol 13-acetate (TPA) -induced tumor promotion in HCT-116 cells and a remarkable hepatoprotective effect of the ethanol extract of dried fruits of Solanum nigrum against CCl₄-induced liver damage. Water extract of Solanum nigrum contains several antioxidants, such as gallic acid, PCA, catechin, caffeic acid, epicatechin, rutin and naringenin and possesses strong antioxidative activity _in vitro_.

The ethanol extract of the fruit of Solanum nigrum was studied for its neuropharmacological properties on experimental animals. On intraperitoneal injection, the

### Table 1: Measurements of plant

<table>
<thead>
<tr>
<th>Inflorescences</th>
<th>Peduncle</th>
<th>Pedicels</th>
<th>Calyx</th>
<th>Lobes</th>
<th>Corolla stellate</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-12 flowered</td>
<td>10-20 mm long</td>
<td>10 mm long</td>
<td>1.5-2.2 mm long</td>
<td>1 mm long</td>
<td>8-12 mm diam</td>
</tr>
</tbody>
</table>

### Table 2: Taxonomical classification

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Sub division</th>
<th>Class</th>
<th>Order</th>
<th>Sub order</th>
<th>Family</th>
<th>Genra</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plantae</td>
<td>Angiosperms</td>
<td>Eudicots</td>
<td>Asterids</td>
<td>Solanales</td>
<td>Solanaceae</td>
<td>Lanum</td>
<td>S. nigrum</td>
</tr>
</tbody>
</table>

### Table 3: Names of constituents of _Solanum nigrum_

<table>
<thead>
<tr>
<th>Alkaloid</th>
<th>Carbohydrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steroidal alkaloid</td>
<td>Phytosterols</td>
</tr>
<tr>
<td>Steroidal saponins</td>
<td>Coumarins</td>
</tr>
<tr>
<td>Glycoprotein</td>
<td>Proteins</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>Glycosides</td>
</tr>
</tbody>
</table>

### Table 4: New glycoprotein (150 KDa)

<table>
<thead>
<tr>
<th>Contents (%)</th>
<th>Carbohydrate (%)</th>
<th>Protein content (%)</th>
<th>Glycine and proline (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>69.74</td>
<td>30.26</td>
<td>5</td>
</tr>
</tbody>
</table>

extract significantly prolonged pentobarbital induced sleeping time, produced alteration in the general behavior pattern, reduced exploratory behavior pattern, suppressed the aggressive behavior, affected locomotor activity and reduced spontaneous motility. The observations suggest that the fruit of Solanum nigrum possesses potential CNS-Dependent action (Singh et al., 2001).

The protective effects of water extract of Solanum nigrum against liver damage were evaluated in carbon tetrachloride (CCl₄) -induced chronic hepatotoxicity in rats. The results of this study suggest that Solanum nigrum could protect liver against the CCl₄ induced oxidative damage in rats and this hepatoprotective effect might be contributed to its modulation on detoxification enzymes and its antioxidant and free radical scavenger effects. Oral administration of Solanum nigrum significantly reduces thioacetamide-induced hepatic fibrosis in mice, probably through the reduction of TGF-1 secretion (Heo and Lim, 2004).

Some research reported that a glycoprotein isolated from Solanum nigrum has a strong scavenging effect against reactive oxygen radicals and growth inhibition effects against JA221 and XL1-Blue. Moreover, it has been reported that glycoprotein has a cytotoxic effect against MCF-7 and HT-29 cells, even at low concentrations (Jainu and Devi, 2006) Glycoprotein has a strong scavenging activity against lipid peroxyl radicals and hypolipidemic activity by increasing the detoxicant enzymes activity through the inhibition of hepatic HMG-CoA reductase in mice (Abbas et al., 1998; Ahmad et al., 2007; Akhtar and Muhammad, 1989). It has been reported that glycoprotein has a cytotoxic effect on MCF-7 cells and that the ethanolic extract has anti-proliferative, apoptotic and cytotoxic effects on MCF-7 cells (Ashraf et al., 2003; Dao and Friedman, 1996; Greinwald et al., 1995). Glycoprotein induces apoptosis through the NF-κB activation and inducible nitric oxide (iNO) production in HCT-116 cells. Glycoprotein has the capacity to modulate the TPA-induced DNA-binding activities of transcription factors and NO production, which play a critical role with respect to cytotoxicity in MCF-7 cells. Therefore, glycoprotein from Solanum nigrum might be one of the agents that blocks TPA-mediated signal responses in tumourcells (Al-Qirim et al., 2008; Jamil et al., 2007).

The 50% ethanol extract of the whole plant of Solanum nigrum was tested in vitro for its cytoprotection against gentamicininduced toxicity on Vero cells. Cytotoxicity was significantly inhibited as assessed by the Trypan blue exclusion assay and mitochondrial dehydrogenase activity (MTT) assay. The test extract also exhibited significant hydroxyl radical scavenging potential, thus suggesting its probable mechanism of cytoprotection (Akthar and Munir, 1989).

The antisecretory activity of Solanum nigrum appears to be mainly related to the inhibition of H+K+ATPase and suppression of gastrin release, while its ulcer protective and ulcer healing activities may be primarily related to an antisecretory effect of Solanum nigrum (Jainu and Devi, 2004). The antioxidant potential of Solanum nigrum leaves extract was evaluated on the modulation of restraint induced oxidative stress (Seithe and Anderson, 1982; Stjepanovia-Veseliaia, 1974). The post treatment of crude extract was found more effective in restoring restraint stress induced oxidative changes in rat plasma than pretreatment. In order to reduce oxidative stress, observed in many pathological conditions, the Solanum nigrum leaves extract can be given both as a prophylactic and therapeutic supplement for scavenging free radicals. Antioxidant potential of isolated glycoprotein has been evaluated by several methods like DPPH, superoxide radical and hydroxyl radical assay, from these results it has been suggested that glycoprotein has potent antioxidant potential (Kumar et al., 2001; Takhtajan, 1997).

CONCLUSION

From this preliminary investigation and research it has been concluded that the S. nigrum having significant anti-inflammatory and anti-convulsant activity, the flavonoids present in the berries might be a responsible active constituent for this activity. This herb has a vast medical uses so we can say that it is antiseptic, anti-inflammatory, expectorant, cardiotonic, digestive, diuretic, laxative, diaphoretic, sedative, swelling, cough, asthma, in curing cardiopathy, leprosy, haemorrhoids, nephropathy, ophthalmopathy, dropsy and general debility and its juices are used for abdominal pain and also for skin diseases and Further research is in progress to find more uses of Solanum nigrum (Hawkes and Edmonds, 1972; Kojiã et al., 1997; Landolt, 1977).

REFERENCES


