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Solanum Nigrum Linn: A Detailed Exploration of Its Phytochemistry and Pharmacological Properties- A Review

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ABSTRACT

SolanumNigrumLinn, commonly named as makoi or makoy, is a versatile and widely distributed plant species with significant ecological, economic, and medicinal potential. This review explores the botanical, ecological and medicinal characteristics of Solanum nigrum, providing a comprehensive analysis of its morphology, taxonomy, distribution, and reproductive strategies. The plant's adaptability to diverse habitats, ranging from tropical to subtropical regions, highlights its invasive potential. In terms of morphology, Solanum nigrum is a perennial herb or small tree with heart-shaped leaves and flowers. Its anatomical structure, including its vascular tissue and seed morphology, reflects typical characteristics of dicotyledonous plants. Beyond its botanical significance, Solanum nigrum holds substantial economic value. Additionally, Solanum nigrum has high medicinal potency like antibacterial, antifungal, anti-inflammatory, anticonvulsant, antioxidant etc. properties along with traditional uses in various cultures. In this review, tends to highlight the potency of plant to cure several diseases because of the existence of many phytometabolites. Hence, it is useful in many pharmaceutical applications.

Keywords: *Solanum Nigrum, antifungal, secondary metabolites, dicotyledonous, pharmaceuticals.*

Introduction

Since the beginning of human life, the hypothesis of "drug"is people have utilised many plant species for curative causes. According to the WHO survey 80% of the peoples be located in developing countries depend onentirely on traditional remedies for their health care requirements. Now a day, herbal medications are famed back into resources because potency of traditional medicines i.e. antibiotics, which have proved globally efficient against severe infections. As the practice of conventional herbal remedies has increased the affair concerning the protection,value and ability in commercial and developing countries is being addressed up. Proved study of the biochemical compoundsfrom medicinal herbs and pharmacological investigation reveals us information for emergingherbal medications from novel agents. However, estimated 400,000 plant species,only 5 to 7 % has reported for bioticpharmacological activity and phytochemically(Potawale, S. E., et al, 2008).More than 2,000 different kinds of tropical plants in the genus Solanum can be grown anywhere in the world (Chen, X., et al., 2022). S. nigrum, sometimes referred to as Makoi or black nightshade, thrives as a weed in humid areas in a range of soil types, including shallow, deep, stony, and dry soils. By reproducing the seeds in well-kept nursery beds between April and June, it can even be produced in tropical areas. Traditional medicine also frequently uses S. nigrum to treat a variety of ailments, such as fever, inflammation, and discomfort. As a diuretic, antipyretic, hepatoprotective, anti-inflammatory, antioxidant, and antitumorigenic, this herb is also utilized as medicine for a variety of medical conditions.Many biocompounds have been reported and isolated those are responsible for in numerable medicinal activities. (Jain, R.et al. (2011))

Objective: The purpose of this study is to discover medicinal and phytochemical potential of the plant Solanum Nigrum L.

Methods and Methodology:

The primary resource of data used for this review work comprises of research papers and review articles published by reputable publishers such as Springer, Elsevier, Wiley, etc. Literature research was conducted by using Google Scholar and PubMed with the following keywords:makoy, *Solanumnigrum*, Makoi, Indian medicinal weed *Solanumnigrum*, pharmaceutical properties of *Solanumnigrum*, biochemical components of *Solanumnigrum,* medicinal properties of makoy, etc. Several research papers published in the trustworthy have contributed meaningfully to the foundational consideration of this review paper. For instance, prior researches have detailed the taxonomical and geographical description, traditional usage , phytochemical composition and pharmacological activities including antioxidant, antimicrobial, antihelminthic, cytoprotective, Anti-convulsant activity were screened of crude extracts of various parts of this medicinal weed plants were used to explore the information about *Solanum Nigrum L.*

Traditional benefits:

Instead of using other plant parts for medicinal purposes, Solanum nigrum fruits and leaves are frequently used. The leaves were used as an anti-tuberculosis treatment and as a dressing for gouty and rheumatic joints as well as skin diseases. Additionally, leaves can be used to treat nausea, dropsy, and neurological diseases. The berry and floral extracts are useful for treating colds and coughs. The plant part is useful in bronchitis and pulmonary tuberculosis medications, diuretics, etc.

The fruit's juice is discarded as a remedy for heart problems, hydrophobia, ophthalmopathy, and diarrhea. Berries are helpful in treating skin infections and inflammations because of their tonic, diuretic, and cathartic qualities. Hepatitis, osteopathology, and ophthalmopathology can all be treated with the roots. Leprosy, hemorrhoids, nephropathy, dropsy, digestive, diuretic, laxative, diaphoretic, sedative, edema, cardiovascular disorders, and general debility are all treated with whole plant components.

Leaves

Fruit

Flower

Seeds

Root

THERAPEUTIC USES

Plants have been utilized with varying success to cure and prevent diseases due to their therapeutic efficacy and pharmacological potential.*Solanum nigrum* as a medicinal plants has been described in ancient literature of Indian system of medicine (ayurveda). *Solanum Nigrum* possesses various therapeutic usages due to the presence of alkaloid, flavonoids and other phytocompounds. (Gabrani,R., et al,2012)

a) "To treating TB, nausea, and neurological system diseases. b) Works in the medication of rheumatoid arthritis, gout, skin conditions".

c) It works against cancer.

d) "Functions in the management of bacterial infections that might result in colds and coughing".

e) Shows potential towards the growth and the oxidation of biomolecules.

f) Effective in dropping inflammation and curing liver from damage.

g) Act as anticonvulsant, which prevents seizures.

h) Fruit shows their effectiveness in the ailment of diarrhoea and gastrointestinal illnesses

Taxonomical classification

- "Division:Magnoliophyta"
- "Class :Magnoliopsida"
- "Subclass:Asteridae"
- "Order : Solanales"
- "Genus :Solanum"
- "Species:*SolanumNigrum* L."
- "Authority: *Linn."*

GEOGRAPHICAL DISTRIBUTION

People from Europe and asiafirst familiarized it in Americas, Australiaand AfricaOther nations including "India, Afghanistan, Bangladesh, Bhutan, Indonesia, Iraq, Iran, Japan, Pakistan, Europe, North America, South America, Brazil, Peru, Colombia, etc. can also access it".

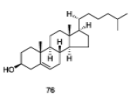
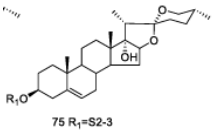
Biophysical Limit & botanical description

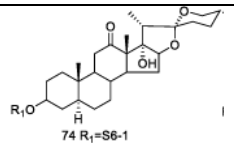
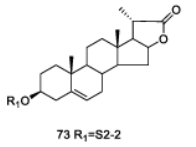
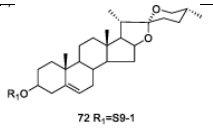
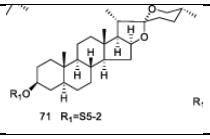
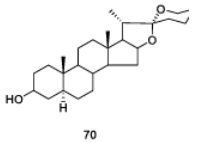
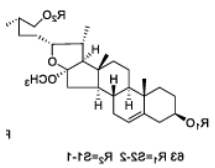
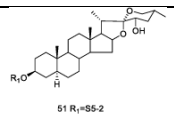
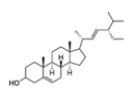
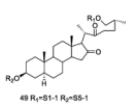
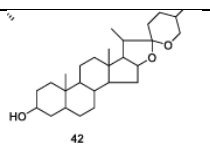
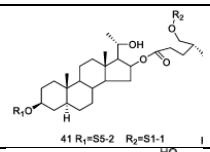
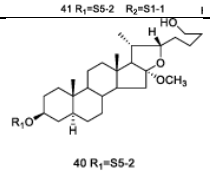
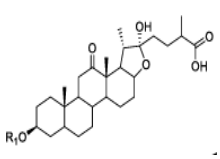
Altitude: up to See level at 3048m,
Temperature: temperatures at 20 and 30°C,
Photoperiod: Approximately 16 to 18 hours a day
Moisture: 40-45% of seed moisturenecessary for optimal germination
Rainfall: 500-1200 mm annually
Soil type: sandy, loamy,clayrich soil (alkaline soil)

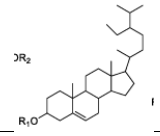
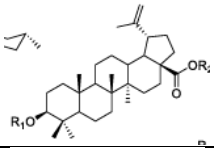
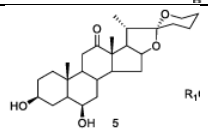
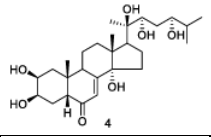
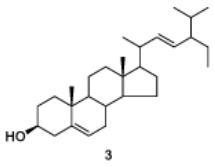
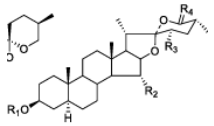
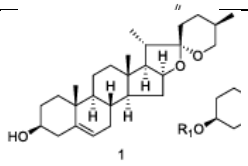
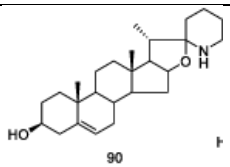
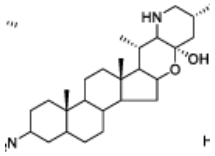
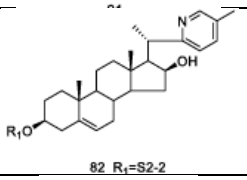
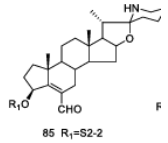
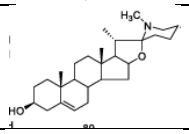
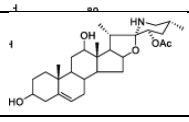
Plant habit

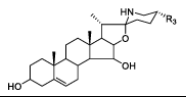
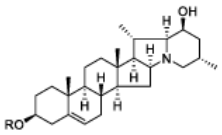
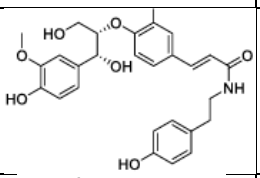
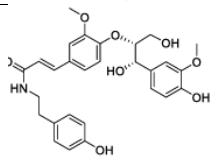
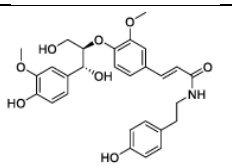
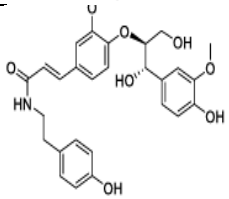
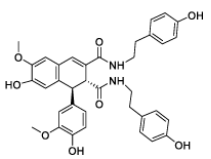
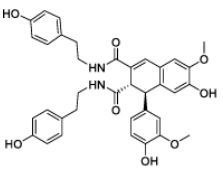
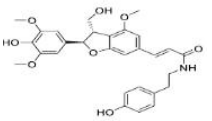
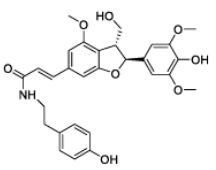
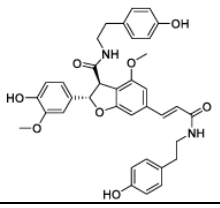
Simple multicellular glandular hairs provide protection for subglabrous plants, which can grow up to 80 cm in height. The branching root system is tapped. The stem of the plant is erect, glabrous, green, unbranched, and slightly woody. The leaves have an oval shape, sinuate dentate margins, and a maximum width of 6.0 cm. Inflorescences are simple cymes with up to ten blooms and tiny pedicels. The calyces are 2 mm long and accrescent, sticking to the base of the ripe fruit, while the sepals are oval in shape. Corolla are stellate and white. Anthers are between 1.6 and 2.9 mm long and have a golden hue. Pollen has a diameter of between 26.6 and 35.8 µm. Styles are 3.5 mm long.The fruit has axle placentation, a thin, papery epicarp, pulpy measo carp, and seeds that stay in the berry pulp. The berry is broadly round, obtuse, dark purple to blackish green, and 12 mm wide.Each fruit contains 15 to 60 seeds, each up to 2.3 mm long. The bark is having pale yellow wood inside. (Potawale, S. E.,et al (2008))(Rani, Y. S., Reddy,et al (2017))

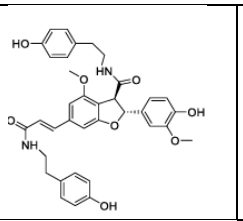
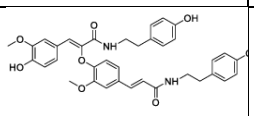
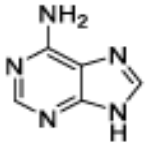
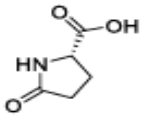
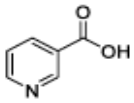
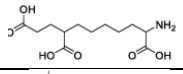
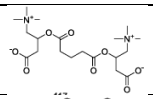
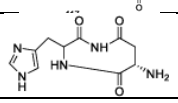
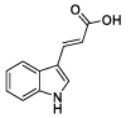
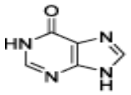
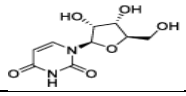
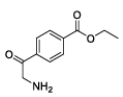
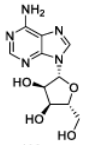
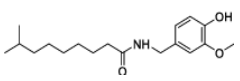
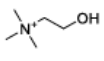
Phytoconstituents of SolanumNigrum L

S.no	Chemical component	Extract	Formula	References
1	Cholesterol	EtoH		He, J., et al(2015)
2	SolanigrosideH	EtOH		He, J., et al (2015)

3	NigrumninII	EtoH		He, J., et al (2015)
4	Dumoside	EtoH		Gao, S, H., et al (2021)
5	UttroninB	EtoH		He, J., et al (2015)
6	UttroninA	EtoH		Wu, X. W. (2011).
7	Tigogenin	EtoH		He, J., et al (2015)
8	"(25R)-26-O-β-D-glucopyranosylfurost-5(6)-ene-16α-methoxy-3β,26-diol-3 O-α-L-rhamnopyranosyl C39H60O16 MeOHWangetal. (2017)-(1→2)-[α-L-rhamno"	MeoH		Wang, Y., (2017).
9	InunigrosideA	MeOH		Ohno, M.,(2012).
10	"Stigmast-5,22-dien-3β-ol"	EtOH MeOH		Sharma, B. K., (2012).
11	"(25R)-26-O-β-D-glucopyranosyl-cholest-5α-3β,26-diol-16,22-dione-3-O-β D-glucopyranosyl-(1→2)-[β-D-glucopyranosyl-(1→3)]-β-D-glucopyranosyl-(1→4) β-D-galactopyranoside(25R)-26-O-β-D-glucopyranosyl-cholest-5α-3β,26-diol-16,22-dione-3-O-β D-glucopyranosyl-(1→2)-[β-D-glucopyranosyl-(1→3)]-β-D-glucopyranosyl-(1→4) β-D-galactopyranoside"	MeOH		Xiang, L., et al (2018).
12	"Tigogenin/(25R)-5α-spirostan-3β-ol"	EtOH		Wu, X. W. (2011).
13	NigrosideA	EtOH		Wu, X. W. (2011)
14	SolanigrosideO	EtOH		Wu, X. W. (2011).
15	"(25R)-5α-furost-3β,22α-diol-12-one-26-carboxylicacid-3-O-β-D glucopyranosy-(1→4)-[O-β-D-glucopyranosyl-(1→2)]-O-β-D-glucopyranosyl (1→4)-O-β-D-galactopyranoside"	EtOH		Yang, Y. (2014).

16	β-daucosterol	EtOH		Yang, Y. (2014).
17	28-O-β-D-glucopyranosylbetulinicacid3β-O-β-Dglucopyranoside	EtOH		Yang, Y. (2014
18	12-keto-porrigenin	EtOH		Zhao, Y. (2010).
19	Pterosterone	EtOH		Zhao, Y. (2010).
20	Stigmasterol	EtOH		Zhao, Y. (2010).
21	Degalactotigonin	EtOH		Wang, L. Y.,(2007).
22	Diosgenin	MeOH		Gao, S, H.,et al (2021).
23	Tomatidenol	EtOH		Gao, S, H., et al 2021
24	Solanocapsine	EtOH		Gao, S, H.,et al (2021).
25	SolanigrosideQ	EtOH		Gao, S, H.,et al (2021). Zhou, X. L. (2006).
26	"(25R)-22αN-4-nor-spirosol-5(6)-en-3β-ol-6-al-3-O-L-rhamnopyranosyl-(1→2) [α-L-rhamnopyranosyl-(1→4)]-β-D-glucopyranoside"	MeOH		Gao, S, H.,et al (2021). Zhou, X. L. (2006).
27	N-methylsolasodine	EtOH		Zhou, X. L. (2006). He, J.,(2015) Zhou, et al (2015).
28	23-O-acetyl-12β-hydroxysolasodine	EtOH		He, J., (2015).

29	15α-hydroxysolasodine	EtOH		Wu, X. W. (2011).
30	LeptinineI	EtOH		Gao, S, H.,et al. (2021).
31	"(7R,8S)-1-(4-hydroxy-3-methoxyphenyl)-2-{4-{2-[N-2-(4-hydroxyphenyl) ethyl] CarbamoylehenylC28H32NO8 Lietal. (2019)-2-methoxyphen"	EtOH		Li, J. H., et al (2021).
32	"(7S,8R)-1-(4-hydroxy-3-methoxyphenyl)-2-{4-{2-[N-2-(4-hydroxyphenyl) ethyl] CarbamoylehenylLietal. (2019)-2-methoxyphenoxyl}}-1"	EtOH		Li, J. H., et al (2021).
33	"(7R,8R)-1-(4-hydroxy-3-methoxyphenyl)-2-{4-{2-[N-2-(4-hydroxyphenyl)ethyl] Carbamoylehenyl 2-methoxyphenoxyl}}-1,3-propanodiolnamed"	EtOH		Li, J. H., et al (2021).
34	"(7S,8S)-1-(4-hydroxy-3-methoxyphenyl)-2-{4-{2-[N-2-(4-hydroxyphenyl)ethyl] Carbamoylehenyl-2-methoxyphenoxyl}}-1,3-propanodiolnamed"	EtOH		Li, J. H., et al (2021).
35	"7′S, 8′R-7-hydroxy-1-(4-hydroxy-3-methoxyphenyl)-N2, N3-bis (4 hydroxyphenethyl)-6-methoxy Lietal. (2019)-1,2-dihydronaphthalene-2,3-d"	EtOH		Li, J. H., et al (2021).
36	"7′R,8′S-7-hydroxy-1-(4-hydroxy-3-methoxyphenyl)-N2,N3-bis(4 hydroxyphenethyl)-6-methoxy 1,2-dihydronaphthalene-2,3-dicarboxamide"	EtOH		Li, J. H., et al (2021).
37	"7′R,8′S-7-(4-hydroxy-3,5-dimethoxyphenyl)-3′-hydroxymethyl-1′-[N-7″-(4″ hydrxyphenyl)ethyl]carbamoylethenyl-3′-methoxybenzodihydrofuran"	EtOH		Li, J. H., et al (2021).
38	"7′S,8′R-7-(4-hydroxy-3,5-dimethoxyphenyl)-3′-hydroxymethyl-1′-[N-7″-(4″ hydrxyphenyl)ethyl]carbamoylethenyl-3′-methoxybenzodihydrofuran"	EtOH		Li, J. H., et al (2021).
39	"(7′R,8′R)-2-(4-Hydroxy-3-methoxyphenyl)-3-[N-2-(4-hydroxyphenyl)ethyl] carbamoyl-5-[N-2-(4-hydroxyphenyl)ethyl]carbamoylethenyl-7 methoxybenzodihydrofurn"	EtOH		Li, J. H., et al (2021).

40	"(7′S,8′S)-2-(4-Hydroxy-3-methoxyphenyl)-3-[N-2-(4-hydroxyphenyl)ethyl] carbamoyl-5-[N-2-(4-hydroxyphenyl)ethyl]carbamoylethenyl-7 methoxybenzodihydrofurn"	EtOH		Li, J. H., et al (2021).
41	Cannabisin F	EtOH		Li, J. H., et al (2021).
42	Adenine	MeOH		Gao, S, H.,et al. (2021).
43	Pyroglutamicacid	MeOH		Gao, S, H.,et al. (2021).
44	Nicotinicacid	MeOH		Gao, S, H.,et al. (2021).
45	9-aminononane-1,3,9-tricarboxylicacid	MeOH		Gao, S, H.,et al. (2021).
46	Glutarylcarnitine	MeOH		Gao, S, H.,et al. (2021).
47	"6S)-3-((1H-imidazol-4-yl)methyl)-6-amino-1,4-diazocane-2,5,8-trione"	MeOH		Gao, S, H.,et al. (2021).
48	3-Indoleacrylicacid	MeOH		Gao, S, H.,et al. (2021).
49	6-Hydroxypurine	MeOH		Gao, S, H.,et al. (2021).
50	Uridine	MeOH		Gao, S, H.,et al. (2021).
51	Ethyl4-glycylbenzoate	MeOH		Gao, S, H.,et al. (2021).
52	Adenosine	MeOH		Gao, S, H.,et al. (2021).
53	Dihydrocapsaicin	MeOH		Gao, S, H.,et al. (2021).
54	Choline	MeOH		Gao, S, H.,et al. (2021).
55	Betaine	MeOH		Gao, S, H.,et al. (2021).

Pharmacological activities of *Solanum Nigrum*

1. Hepatoprotective activity

Aqous extracts of *S. nigrum* showshepatoprotective activity against CCl4 intoxication. As observed in the CCl4-infused groups, increases in AST, ALT, ALP, and serum bilirubin in groups 1 and 2 suggested severe pathological states of the infected rats' livers. These values dropped in Groups 3 and 4 in a dose-dependent way, particularly in Group 4 (500 mg/kg), which led to less liver damage in the rats. According to the research, liver dysfunction is indicated by a drop in Hb, RBC, and MCHC values in the CCl4-treated groups (Groups 2 and 4). [R. A. M. Elhag et al., 2011].

2. Antiulcerogenicand antidiarrhoeal activity

Methanolicextract of*SolanumNigrum resulted anti ulcerogeniceffect* on headache drug-induced ulceration in rodents.*Solanumnigrum*berries shows gastroprotective effect due to the presence for free radicals. A crude extract of SN dried fruit has also been shown to have antidiarrheal qualities, and SN berries may be helpful in treating gastrointestinal issues. At two dosages of 250 and 500 mg/kg body weight, the fruit extracts show notable antidiarrheal activity against castor oil-induced diarrhea in rats, reducing the frequency of stools in rodents. (Mani, R. K. et al., 2022).

3. Neuropharmacological activity:

The neuropharmacological effects of ethanolic extracts of Solanumnigrum L. (Solanaceae) berries were tested on experimental animals. The extract significantly lengthened pentobarbital-induced naps, changed general behavior patterns, reduced exploratory behavior patterns, suppressed aggressive behavior, changed locomotor activity, and reduced spontaneous motility when given intraperitoneally. The results suggest that the fruit of S. nigrum may have CNS-depressant qualities.(Perez G, R. M., et al., 1998).

4. Antitumor activity

Using a range of chromatographic procedures, six steroidal glycoalkaloids were extracted, separated, and purified from "Solanumnigrum L. (SNL)" by acid and alkaline precipitation. These chemicals' structures were clarified using spectroscopic data. The anticancer activity and its molecular mechanism were examined using the "Methyl ThiazolylTetrazolium (MTT)" method, flow cytometry, colorimetric assay, and an immunocytochemical method. MGC-803 cells were found to be cytotoxically affected by "solasonine, β1-solasonine, solamargine, and solanigroside P". Three sugar complex units, "a-L-rhamnopyranose at C-2", or "hydroxyl group" effects on the steroidal backbone are possible therapeutic options for gastric cancer. (X. Ding and others, 2013).

5. Antioxidant effect

Effective antioxidant qualities have been reported for S. nigrum L. A thorough investigation was conducted to determine S. nigrum's antioxidant capacity. Total phenolic content (TPC) is a potent indicator of plant antioxidant efficacy and shows the mechanism of peroxidation inhibition against the linoleic acid peroxidation system.The TPC readings showed a small change. All species revealed significant antioxidant activity from linoleic acid, which was similar to Trolox as the positive control. [A. Mohyuddin et al., 2022].

6. Molluscicidal and larvicidal activities

It has been shown that S. Nigrum root extracts are effective against "AlternariaBrassicicola Isolates ABA-31" and ABA104, which induce black leaf spot on "Chinese cabbage (Brassica pekinensis)". Methanolic preparations of dried black nightshade root tissue exhibit antifungal properties that combat A. brassicicola. When root extracts were evaluated for antibacterial activity using ethyl acetate, n-butanol, and water fractions, n-butanol extracts showed the best results. Saponins were identified as the active components responsible for SN's antibacterial qualities (Muto, H., et al., 2006). The "sub-lethal (LC25)" concentration of SN leaves was observed to affect the AST, ALT, and LDH activities of the Saudi Arabian molluskBiomphalria Arabica, which could reveal how its molluscicidal actions work (Ajayi, E. I. O. (2011)). According to Amer and Manal (2005) and Ahmed, A. H. (1998), the binary combination of SN and "Iris pseudacorus" demonstrates molluscicidal and cercaricidal efficacy against Biomphalariaalexandrina and Schistosomamansonicercariae, respectively. Following a 30-minute pre-treatment of mice with different dosages (2.5–10 mg/ml) of crude water extract of SN, S. mansonicercariae penetration "($p < 0.001$)" and "infectivity ($p < 0.01$)" were considerably reduced (Amer and Manal, 2005). Additionally, a recent study by Raghavendra et al. (2009) and Ahmed et al. (2002) assessed Sn extracts as a larvicidal agent against five laboratory-colonized strains of mosquito species.

7. Anticancer

The investigation showed that total alkaloids may be important in preventing the growth of tumor cells. However, the glycoprotein (150 x 10(3)) that was extracted from S. nigrum may have shown anti-cancer properties by inhibiting NF-kappa B's anti-apoptotic pathway, activating to boost the caspase cascade response, and boosting nitric oxide synthesis. (L. An and others, 2006).

8. Antimicrobial activity

Bacterial and fungal strains were suppressed by Solanumnigrumethanolic extract. The findings show that the zone of inhibition against the investigated microbial strains grew as the extract content rose. S. nigrumethanolic extract was observed to inhibit Gram positive bacteria at all tested concentrations "(100 mg, 75 mg, 50 mg, and 25 mg)", however Gram negative bacteria exhibited no activity at a concentration of 25 mg/ml. SN extracts demonstrated good action against the investigated microorganisms, with the exception of P. aeruginosa, which showed low activity compared to the other tested germs. SN extract was found to have the largest zone of inhibition against S. aureus, B. sublitis came next, and ethanolicextract proved to be the most effective against Gram-negative bacteria, with E. coli exhibiting the largest zone of inhibition, followed by P. aeruginosa. The extract's activity against B. subtilis and S. aureus was similar to that of the common medication ciprofloxacin. According to Kaushik et al. (2009), ethanolic extract had more action against Candida albicans with a zone of inhibition than the conventional medication amphotericin B.

9. Anti-convulsant activity

It was discovered that the extracts significantly affected rats' supramaximal electric shock.

When compared to the common medication phenytoin, the extract's percentage inhibitory activity at 100, 200, and 300 mg/kg was 36.01, 25.21, and 38.86%, in that order. "The effects of ethanolic extracts of S. nigrum in supra maximal electric shock technique in rats. Ravi, V. (2009)"

10. Antinociceptive and Antipyretic Effects

the chloroform extract from Solanumnigrum leaves' antipyretic and antinociceptive qualities in a range of animal models. "To make the extract, the air-dried powdered leaves (20 g) were steeped (1:20; w/v) in chloroform for 72 hours, evaporated (40°C) under low pressure to dryness (1.26 g), and then dissolved (1:50; w/v) in dimethylsulfoxide (DMSO)". Mice and rats received all dosages (s.c.; 10 ml/kg) half an hour prior to testing. DMSO was used to dilute the supernatant, which was considered the stock solution with a dosage of 200 mg/kg, to 20 and 100 mg/kg.The extract showed significant ($p<0.05$) antinociceptive efficacy in the abdominal constriction, hot plate, and formalin tests. Furthermore, the extract showed significant ($p<0.05$) antipyretic and anti-inflammatory properties in the carrageenan-induced paw edema and brewer's yeast-induced pyrexia tests. The actions were dose-independent overall. By demonstrating that the lipid-soluble extract of S. nigrum leaves possessed antinociceptive, anti-inflammatory, and anti-pyretic properties, the current study confirmed the traditional claims, Zakaria, Z. A. (2009)

11. Cytoprotective Activity

Potawale and colleagues (2008) examined the ability of a 50% ethanol-produced plant extract from Solanumnigrum Linn. To protect Vero cells from gentamycin damage in vitro. To find out if cytotoxicity was present, an investigation used the assays for mitochondrial dehydrogenase activity and Trypan Blue exclusion. The ability of the ethanol extract to function as a hepatoprotective agent was also evaluated by looking at the liver under a microscope to look for any histological abnormalities. It has a strong hepatoprotective effect as a direct consequence of the discovery 1599. When the toxicant (carbon tera chloride) was given to a rat, the liver tissue showed significant centrilobular necrosis.Treatment side effects include the regeneration of healthy liver cells and the elimination of necrosis and vacuoles. An adult male albino Wistar rats weighing between 150 and 170 grams served as the study's subjects. The study made use of these rats. The animals were kept in polypropylene cages with a 12-hour day and 12-hour night cycle and a constant temperature of 25 degrees Celsius. Six groups of six creatures each were created from the animals.After that, each group was put in its own cage. Each group's stomach was intubated to administer the medicine. This was the technique of administration used. Injections of 0.2 ml of acacia, 20% ethanol, and "SNFEt" should be administered to groups 1, 2, and 3, respectively. Groups 2 and 3 should also receive the 20% ethanol injection. All of the rats in the group were allowed to go without food for the whole night before receiving ketamine chloride to induce anesthesia. Following the collection of blood, plasma was obtained for use in a number of biochemical assessments. These calculations relied on blood. A few drops of heparin were added to each sterile, fully dry test tube used to draw the blood. (M. Sankaran, 2012).

12. Anti Seizure Activity

The studies demonstrate that administering an intraperitoneal leaf extract to rats and mice has an antiseizure effect. Amphetamine use may have a significant impact on the antiseizure's effectiveness. It is beneficial to improve the plant SN's antiseizure properties. (N. N. Wannang, 2008)

Conclusion

NigrumSolanum Linn is an exceptional remedy for a variety of illnesses, including hepatitis, ulcers, fever, and several immunological conditions and associated remedies. This herb can be used to treat cytotoxicity and hepatotoxicity as well as to support the health of the liver and kidneys. This herbal remedy has potent antibacterial, anti-inflammatory, anti-diabetic, and immunostimulant properties. Due to the presence of several phytochemicals, this plant is probably a valuable and potent plant with the greatest results in pharmacological investigations. It is an intriguing herb with potential that can be utilized to treat a number of illnesses.It also possesses numerous additional potencies, such as anticonvulsant, antiallergic, and hepatoprotective. This review of the literature explains the plant's potency by examining experimental findings indicating Solanumnigrum has traditional medical value for treating ulcers, hepatitis, and numerous immunological bids in cancer, among other conditions. Additionally, it is an immunostimulant, central nervous system, and antidiabetic. It increases their use in pharmaceutical and medical procedures to treat a range of illnesses.

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