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A REVIEW ON PHARMACOLOGICAL ACTIVITIES OF *HYOSCYAMUS NIGER (L.), CURCUMIN, MUCUNA PRURIENS (L.)*, & *CAMELLIA SINENSIS (L.)*

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Abstract :

A) ***Hyoscyamus niger L.*** are a significant and large genus within the *Solanaceae* family. These plant are renowned for their rich content of tropane alkaloids, primarily *hyoscyamine* and scopolamine, which are of great pharmacological interest. The phytochemical profile of *Hyoscyamus* species reveals a variety of compounds, including alkaloids, flavonoids, tannins, terpenes, saponins, carbohydrates, cardiac glycosides, and anthraquinones(1,2). *Hyoscyamus niger L.* commonly known as *henbane*, belong to family *Solanaceae* is a plant that has historically played a significant role in traditional medicine, although it is also toxic and must be used with caution(3,6). It belongs to the *Solanaceae* (nightshade) family and contains several active compounds with medicinal properties, most notably tropane alkaloids like hyoscyamine, scopolamine, and atropine(1,4).

B) ***Curcumin*** is a natural polyphenolic compound derived from *turmeric (Curcuma longa)*, which is a plant belonging to the *Zingiberaceae* family. It is the principal active component of turmeric, which gives the spice its characteristic yellow color. *Curcumin* has been extensively studied for its potential health benefits, particularly its anti-inflammatory, antioxidant, and antimicrobial properties(31). It is thought to exert these effects by modulating various biological pathways, including inhibiting enzymes and transcription factors involved in inflammation, oxidative stress, and cell signaling. As a result, *curcumin* is often researched for its role in managing conditions like arthritis, cardiovascular disease, and even certain types of cancer(32).

C) ***Mucuna pruriens (L.)*** common name is (Khaj-kuiri) or (Kavachkuiri) . ***Mucuna pruriens*** **(L.)**, commonly known as the velvet bean, is a leguminous plant belonging to the family **Fabaceae**. It is widely known for its many uses in traditional medicine, agriculture, and as a food source(44).

Scientific classification-

- Kingdom: Plantae
- Clade: Tracheophytes
- Order: Fabales
- Family: Fabaceae
- Subfamily: Faboideae
- Genus: Mucuna
- Species: M. pruriens(45)

Botanical Characteristics

- Scientific name: *Mucuna pruriens* (L.)
- Common names: Velvet bean, cowitch, Kapikacchu, Nescafe, and more.
- Plant type: Climbing vine or herbaceous plant.
- Leaf structure: The leaves are trifoliate (having three leaflets) with large, ovate to lanceolate-shaped leaflets.

- Flowers: The plant produces purple to white flowers in clusters.
- Fruit/Seed pods: The seeds of *Mucuna pruriens* are contained in long, hairy pods, which can be quite itchy upon contact with the skin due to the fine hairs.
- Seeds: The seeds are kidney-shaped and typically dark brown or black in color. They contain bioactive compounds[44,46].

D) ***Camellia sinensis (L.) Camellia sinensis (L.)***: commonly known as the tea plant, is a species of evergreen shrub in the **Theaceae** family, native to East Asia. It is the source of all varieties of tea, including green, black, white, and oolong, depending on how the leaves are processed after harvesting[55].

Botanical Characteristics

- Scientific name: *Camellia sinensis* (L.)
- Common names: Tea plant, tea bush, green tea (when processed), black tea (when processed), etc.
- Plant type: Evergreen shrub or small tree.
- Height: Typically grows to a height of 1.5 to 2 meters in cultivation, but it can grow taller in the wild (up to 10 meters).
- Leaves: The leaves are dark green, glossy, and leathery with serrated edges. They are alternately arranged and oblong in shape.
- Flowers: The flowers are white or pale pink with five petals and a yellow center. They are fragrant but not as showy as many other flowering plants.
- Fruit: The plant produces small, woody capsules that contain seeds.

Varieties and Types

- Green tea: Made from unoxidized leaves, preserving the natural green color and high levels of antioxidants.
- Black tea: Made from fully oxidized leaves, giving it a darker color and stronger flavor.
- Oolong tea: A partially fermented tea, somewhere between green and black tea in terms of oxidation and flavor.
- White tea: Made from the youngest leaves and buds, which are minimally processed and dried, offering a delicate flavor.

Index Terms - Desmethoxycurcumin (DMC) , Bisdemethoxycurcumin (BDMC), Epigallocatechin gallate (EGCG), *Hyoscyamus niger (L.),Curcumin* , *Mucuna pruriens (L.),* & *Camellia sinensis (L.),* anti-Parkinson's, Curcuma longa , L-Dopa, Hyoscyamine , Hyoscine , Scopolamine, Substantia nigra.

I. INTRODUCTION

Herbal medicine is the oldest form of healthcare known to humanity, with herbs being used by all cultures throughout history. According to the World Health Organization (WHO), approximately 80% of the global population currently relies on herbal medicine for some aspect of primary healthcare. Despite the rise of modern medicine, plants continue to provide some of the most valuable medicines available. Phytochemical analysis of *Hyoscyamus* species has revealed the presence of various bioactive compounds, including alkaloids, flavonoids, tannins, terpenes, saponins, carbohydrates, cardiac glycosides, and anthraquinones. These compounds contribute to the pharmacological properties of *Hyoscyamus*[9], which include anti-diabetic, antioxidant, anticancer, insecticidal, antiasthmatic, antiallergic, antidiarrhoeal, antisecretory, Ca^{2+} channel-blocking, hypotensive, cardioprotective, hepatoprotective, anti-Parkinsonian's, anticonvulsant, antidepressant, and anticholinergic effects due to the tropane alkaloids it contains[7,8].*Hyoscyamus niger L.* (commonly known as *henbane*) has demonstrated Antiparkinson's activity. This is largely attributed to its content of tropane alkaloids, particularly hyoscyamine and scopolamine, which have anticholinergic properties. These alkaloids work by inhibiting acetylcholine receptors in the brain, helping to balance the dopaminergic and cholinergic systems, which is crucial in managing symptoms of Parkinson's disease. In Parkinson's disease, there is a loss of dopaminergic neurons, which leads to an imbalance between dopamine and acetylcholine in the brain, resulting in tremors, rigidity, and bradykinesia (slowness of movement). By blocking acetylcholine, the alkaloids in *Hyoscyamus niger L.* can help mitigate some of these symptoms, providing relief similar to that of other anticholinergic medications used in Parkinson's treatment. Several studies have shown that *Hyoscyamus niger L.* can have beneficial effects on motor symptoms associated with Parkinson's disease, although its use is often limited due to potential side effects like dry mouth, blurred vision, and confusion. However, ongoing research into its effects and safer applications continues to explore its full potential as an adjunct therapy for Parkinson's disease[10]. *Curcumin* is a natural polyphenolic compound derived from *turmeric (Curcuma longa),* which is a plant belonging to the *Zingiberaceae* family. *Mucuna pruriens (L.)* common name is (Khaj-kuiri) or (Kavachkuiri) . **Mucuna pruriens (L.),** commonly known as the velvet bean[44], *Camellia sinensis (L.)* **Camellia sinensis (L.)**, commonly known as the tea plant, is a species of evergreen shrub in the **Theaceae** family[55].

Chemical constituents

A) ***Hyoscyamus niger L.:***

The seed of *H. niger* contains main chemical constituents like -

1. **Tropane alkaloids** :
   - Hyoscyamine
   - Hyoscine
   - Scopolamine
2. **Flavonol glycosides**:
   - Quercetin
   - Rutin
   - Kaempferol
3. **Saponins**
4. **Lignans**

H. niger Medicinal uses for antispasmodic, anticonvulsant, hypotensive, cardiosuppresant, bronchodilator, urinary bladder relaxant, sedative, analgesic agent , for heavy coughs, neuralgia, cramp[(17)].

B) Curcumin:

Turmeric contains curcuminoids which are found in a mixture of three principal compounds:

1. Curcumin (curcumin 1: 77%)

2. Desmethoxycurcumin (DMC: Curcumin 2 : 17%)

3. Bisdemethoxycurcumin (BDMC: Curcumin 3 : 3%)[(12)]

Other Chemical constituents of turmeric -

- 70% carbohydrates
- 6% protein
- 6% essential oils (phellandrene, sabinene, cineol, borneol, zingiberene and sesquiterpenes)
- 5% fat
- 3% mineral (potassium, calcium, phosphorus, iron, and sodium), 3–5% curcuminoids
- vitamins (B1, B2, C, and niacin)

- Turmeric shown Neuroprotective and Anti-inflammatory properties, Antioxidant which help to reduce PD symptoms[(33)].

C) **Chemical Composition of *Mucuna pruriens. (L)***

- L-DOPA (levodopa): The seeds are a rich natural source of L-DOPA, which is a precursor to dopamine, a neurotransmitter. This makes the plant highly significant in the treatment of neurological conditions such as Parkinson's disease.
- Serotonin: It is believed to contribute to mood elevation.
- Tannins, alkaloids, and saponins: Present in different parts of the plant, these compounds exhibit antioxidant, anti-inflammatory, and anti-microbial properties.
- Mucunain: A protein that can cause irritation on contact, found in the pods and seeds[(44,45,46)].

D) **Chemical Composition of *Camellia sinensis (L.)***

Chemical Composition and Active Compounds

Camellia sinensis leaves contain several bioactive compounds

- Caffeine: Tea contains caffeine, which acts as a mild stimulant, improving alertness and focus.
- Polyphenols: Particularly catechins (e.g., epigallocatechin gallate or EGCG), which are powerful antioxidants.
- Theanine: An amino acid that promotes relaxation and counteracts some of the stimulating effects of caffeine.
- Flavonoids: Other antioxidants that help reduce oxidative stress in the body.
- Tannins: Compounds that contribute to the astringent taste of tea and have antimicrobial properties[(56.57.58)].

A) Role of *Hyoscyamus niger L.* in medical practices:

1. Anticholinergic Properties:

The alkaloids found in *Hyoscyamus niger L.* have anticholinergic effects, meaning they block the action of the neurotransmitter acetylcholine. This action can help treat a range of medical conditions. Hyoscyamine and scopolamine are the most notable alkaloids, and they are used to treat conditions like motion sickness, irritable bowel syndrome (IBS), asthma, and peptic ulcers.

2. Treatment of Motion Sickness and Nausea:

Scopolamine, derived from *Hyoscyamus niger L.* is widely used in medicine to prevent and treat motion sickness and nausea, particularly in the form of patches that are applied to the skin. It works by blocking signals from the inner ear that trigger the nausea response in the brain.

3. Anti-Spasmodic and Pain Relief:

Hyoscyamus niger L. has been used as an anti-spasmodic to relieve muscle cramps, especially those associated with the gastrointestinal system. It is often used in treating IBS and other conditions with painful cramping. The plant has also been historically used for pain relief, particularly for conditions involving spasms or nerve pain.

4. Sedative Effects:

In traditional medicine, *henbane* was sometimes used as a sedative or tranquilizer, to help with conditions like insomnia, anxiety, or nervous agitation. This sedative effect is due to the hyoscyamine and scopolamine alkaloids.

5. Pupil Dilation (Mydriasis):

Atropine, a compound found in *Hyoscyamus niger L.* is used to induce pupil dilation in eye examinations. This effect is important in allowing doctors to view the retina and other parts of the eye for diagnostic purposes. It can also be used to treat bradycardia (slow heart rate), as atropine can increase heart rate.

6. Respiratory Conditions:

Because of its bronchodilator effects, *Hyoscyamus niger L.* has been used to treat asthma and other respiratory conditions by helping to relax the muscles in the airways and reduce the risk of spasms[2,3].

7. Parkinson's disease :
Problems occur due to the loss of dopaminergic neurons in the substantia nigra, which causes striatal dopamine deficiency. Characterized by tremor, rigidity, and bradykinesia and postural instabilities. Due to deficiency of the mitochondrial complex 1, neuroinflammation, and Alpha-synuclein. Alpha-synuclein interfere with mitochondrial function, lead to damage complex 1[18,19]. Parkinson's disease is the second-most common neurodegenerative disorder that affects 2–3% of the population ≥65 years of age. Neuronal loss in the substantia nigra, which causes striatal dopamine deficiency, and intracellular inclusions containing aggregates of α-synuclein are the neuropathological hallmarks of Parkinson's disease [20]. The symptoms you've described—rigidity, slowness (bradykinesia), and tremor—are characteristic of Parkinson's disease. In Parkinson's disease, these movement problems occur due to the loss of dopamine-producing neurons in the brain [18]. Dopamine is a neurotransmitter involved in controlling movement and coordination. Parkinson's disease is a progressive disorder that primarily affects movement, but it can also cause a wide range of other symptoms, including difficulty with balance, changes in speech, and even cognitive impairment in some cases. The exact cause of Parkinson's disease is not fully understood, but both genetic and environmental factors are believed to play a role[19]. Treatment for Parkinson's disease typically involves medications that increase dopamine levels in the brain, such as levodopa, as well as other medications that help manage symptoms[21]. Many synthetic medicines give various adverse effects hence it is necessary to use herbal medicines or formulations to treat Parkinson's disease. Herbs can provide significant value in the treatment and management of various diseases due to their therapeutic properties. It is crucial to pursue the development of novel therapeutic agents or herbal formulations that are low-cost, highly effective, and devoid of side effects for treating Parkinson's disease. Exploring herbal medicine can provide valuable insights into natural compounds with therapeutic potential. *Hyoscyamus Niger L.* may shows better effect for PD patients.

B) Role of *Curcumin* in medical practices:

1. Anti-inflammatory Effects

Curcumin is widely recognized for its ability to reduce inflammation. It inhibits the activity of inflammatory molecules like pro-inflammatory cytokines, chemokines, and enzymes (e.g., cyclooxygenase-2 or COX-2) involved in the inflammatory response.

- Osteoarthritis and Rheumatoid Arthritis: *Curcumin* can help alleviate joint pain, swelling, and stiffness due to its anti-inflammatory properties.
- Inflammatory Bowel Disease (IBD): *Curcumin* has shown potential in reducing symptoms of conditions like Crohn's disease and ulcerative colitis.

2. Antioxidant Properties

Curcumin acts as a powerful antioxidant, scavenging free radicals and neutralizing oxidative stress. Oxidative stress is linked to the aging process and the development of several diseases, including cardiovascular diseases and neurodegenerative disorders. By reducing oxidative damage

- Protect against cardiovascular diseases by improving endothelial function and reducing lipid oxidation.
- Help in the management of neurodegenerative disorders like Alzheimer's disease by preventing the accumulation of toxic proteins such as amyloid plaques.
- Slow the progression of diabetic complications, as oxidative stress plays a key role in diabetes-related organ damage.

3. Cancer Prevention and Treatment

- Inducing apoptosis (programmed cell death) in cancer cells while leaving normal cells unharmed.
- Inhibiting tumor growth by interfering with cell signaling pathways that regulate cell proliferation, invasion, and metastasis. *Curcumin* affects pathways like the NF-kB, Wnt/β-catenin, and PI3K/Akt/mTOR pathways.
- It has been studied in various cancers, including colon, breast, lung, and pancreatic cancer, either alone or as an adjunct to traditional cancer therapies (e.g., chemotherapy and radiation).

4. Neuroprotective Effects

Curcumin has potential benefits for brain health:

- It has anti-inflammatory and antioxidant effects that protect brain cells from damage.
- Studies suggest *curcumin* can increase brain-derived neurotrophic factor (BDNF), which plays a role in cognitive function and the growth of new neurons.
- It may help in the management of Alzheimer's disease by reducing amyloid plaque buildup and improving cognitive function.

5. Management of Metabolic Disorders

Curcumin is being researched for its role in managing metabolic diseases for type 2 diabetes:

- It helps regulate blood sugar levels by improving insulin sensitivity and reducing insulin resistance.
- Curcumin may reduce blood lipid levels, lowering the risk of cardiovascular disease in diabetic patients.

6. Liver Health

- Detoxify the liver and improve liver function by reducing oxidative stress and inflammation.
- It has been shown to help with fatty liver disease (non-alcoholic fatty liver disease, NAFLD) and may reduce liver fibrosis.

7. Antimicrobial Properties

- Treating infections, particularly those resistant to conventional antibiotics.
- Enhancing the immune response, thereby improving the body's ability to fight infections.

8. Skin Health

- Anti-inflammatory and antioxidant effects, which can help in treating psoriasis, eczema, and acne.
- It also promotes wound healing and can improve the appearance of skin aging by reducing the effects of oxidative stress.

9. Psychiatric and Mood Disorders

- Curcumin may influence brain chemistry, including serotonin and dopamine levels, contributing to mood regulation.
- Some studies have suggested curcumin as a potential adjunctive treatment in depression (particularly in patients resistant to traditional antidepressants).

10. Role in Wound Healing

Curcumin promoting collagen formation, reducing inflammation, and acting as an antimicrobial agent.Its topical application has shown promise in treating cuts, burns, and skin abrasions(34,35,36).

C) Role of *Mucuna pruriens* in medical practices:

1) Parkinson's disease: The L-DOPA content is the primary reason for Mucuna pruriens use in traditional medicine, especially in the treatment of Parkinson's disease. It serves as a natural alternative to synthetic L-DOPA treatments.
2) Mood and anxiety relief: It is thought to help reduce stress and elevate mood due to its dopamine-producing properties.
3) Libido and fertility: It is traditionally used as an aphrodisiac and is believed to enhance male fertility and increase testosterone levels.
4) Antioxidant properties: The plant's compounds help protect cells from oxidative damage, which may aid in overall health and anti-aging.
5) Digestive health: The seeds have been used in traditional remedies for improving digestion and alleviating constipation.
6) Anti-inflammatory and anti-pain: The seeds and other parts are used for their anti-inflammatory effects, often in joint pain and muscle cramps(44,45,46,47).

Health Benefits of *Mucuna pruriens:*

- Neuroprotective effects: The presence of L-DOPA is vital for Parkinson's disease patients, helping restore dopamine levels in the brain.
- Antioxidant action: The plant helps combat free radical damage, which is linked to various diseases.
- Improved sexual health: The plant may enhance male reproductive health and libido through its impact on hormone levels.
- Blood sugar regulation: Some studies suggest that *Mucuna pruriens* may help regulate blood sugar levels, contributing to managing diabetes.

D) Role of *Camellia sinensis* in medical practices:

1. **Antioxidant properties:** Tea is rich in polyphenols, catechins, which help neutralize free radicals and may reduce the risk of chronic diseases like heart disease and cancer.
2. **Heart health:** Studies suggest that regular consumption of tea may reduce the risk of cardiovascular disease by improving cholesterol levels, reducing blood pressure, and improving blood vessel function.
3. **Weight management:** Green tea, in particular, has been linked to fat loss and improved metabolism, possibly due to its combination of caffeine and catechins.
4. **Brain function:** The caffeine and theanine content in tea can enhance cognitive function, improve mood, and increase mental alertness.
5. **Diabetes management:** Some studies suggest that tea consumption may help improve insulin sensitivity and regulate blood sugar levels.
6. **Oral health:** The catechins in tea may help reduce the growth of harmful bacteria in the mouth and improve oral hygiene.
7. **Skin health:** The antioxidants and anti-inflammatory properties of tea may contribute to healthier skin, with some studies showing benefits in reducing the appearance of aging(55,56,57,58).

Pharmacological activities of *Hyoscyamus niger L.*

Activity	Plant Part	Extract Use	Dose of Extract	Route	Model/ Species	Reference
Antiparkinson's Activity	Seed	Methanolic	500mg/kg	p.o.	MPTP Induced Parkinson's disease in mice	Sengupta, et al.2010
Antiparkinson's Activity	Seed	Methanolic	500mg/kg	p.o.	Rotenone induced parkinson's disease in rat	Khatri, et al.2015
Cardio protective	Seed	Crude powder	100mg/100g	p.o.	Isoproterenol induced myocardial injury in rats	Vallabi, et al.2016
Antidiarrheal	Seed	Methanolic	300mg/kg 1000mg/kg	p.o.	Castor oil induced diarrhoea in mice	Gilani, et al.2007
Antipyretic activity	Seed	Methanolic extract	400mg/kg 800mg/kg	p.o.	Aq.solution of yeast induced fever in rat	Begum. S, et al.2009
Anti-	Seed	Methanolic	200mg/kg	p.o.	Cotton pellet	Begum. S, et al.2009

inflammatory activity		extract	400mg/kg		method	
Analgesic activity	Seed	Methanolic extract	200mg/kg 400mg/kg	p.o.	Hot plate method	Begum. S, et al.2009
Antidepressant activity	leaves	Ethanolic extract	400mg/kg	p.o.	Tail suspension test	Patil, et al.2013
Seizures	Seed	Methanolic extract	300mg/kg 400mg/kg	i.p.	Picrotoxin induced seizure	Reza, et al.2009

Pharmacological activities of *Curcumin:*

Activity	**Compound**	**Dose of Extract**	**Route**	**Model/ Species**	**Reference**
Antiparkinson Activity	Curcumin	150mg/kg	p.o.	Rotenone induce Parkinson disease in mice	Shamarka, et al.2022
Antiparkinson Activity	Curcumin	80mg/kg	p.o.	6OHDA induce parkinson disease in rat	Khuwaja, et al.2010
Antiparkinson Activity	Curcumin	200mg/kg	p.o.	Rotenone induce Parkinson disease in mice	Khatri , et al.2016
Antiparkinson Activity	Curcumin	40mg/kg	i.p.	Lipopolysaccharides (LPS) induce parkinson disease in rat	Sharma, et al.2017
Antiparkinson & Neuroprotective	Curcumin	150mg/kg	i.p.	Intracerebral Hemorrhage model in mice	King, et al.2011
Antiparkinson	Curcumin	60mg/kg 80mg/kg	i.p.	MPTP induce parkinson disease in mice	Rajeshwari, et al.2007
Antiepileptics	Curcumin	300mg/kg	p.o.	PTZ induced epilepsy model rat	Menla, et al.2010
Prevent hippocampal injury	Curcumin	20mg/kg	p.o.	6OHDA induced injury in rat model	Yang, et al.2014
Antidiabetic	Curcumin	500mg/kg	s.c.	High Fat induced obesity in mice	Eiaz, et al.2009
Antithrombotic	Curcumin	500mg/kg	p.o.	Myocardial ischemia reperfusion rat by ramipril	Prakash, et al. 2010
Antithrombotic	Curcumin	200mg/kg	i.p.	Adrenaline induced thrombotic in mice model	Srivastava, et al.1985
Neuroprotective ischemia	Curcumin	500mg/kg	p.o.	Embolic cerebral ischemia was induced by injecting multiple fibrin-rich autologous clots one after another into external carotid artery	Dohare, et al.2008
cerebral ischemia/reperfusion injury	Curcumin	250 mg/kg	i.p.	Ischemia was induced by intraluminal filament technique	Dohare, et al.2008

Pharmacological activities of *Mucuna pruriens (L.)*:

Activity	Extract used	Dosage	Route	Model/Species	Reference
Anti- parkinson	Aqueous extract of seed	100mg/kg	p.o.	Paraquat induced parkinson in mice	Singh, et al.2013
Anti- parkinson	Ethanolic extract of seed	100mg/kg	p.o.	Paraquat induced parkinson in mice	Singh, et al.2013
Anti- inflammatory	Methanolic extract of seed	50mg/kg	p.o.	Carrageenan & formalin induced paw edema test in rats	Uchegbu, et al.2016
Anti-bacterial	Methanolic extract of seed	175µg/ml	(Invitro)	(MIC)Minimum inhibitory concentration assay against bacterial pathogens	Shanmugavel, et al.2015
Anti-tumor	Methanolic extract of seed	250mg/kg	i.p.	Ehrlich ascites carcinoma in mice	Rajeshwar, et al.2005
Anti-oxidant	Methanolic extract of seed	100mg/kg	(Invitro)	Invitro DPPH free radical scavenging activity and reducing power method	Mazumdar U.K, et al. 2005
Anti-venom	Aqueous extract of seed	21mg/kg	i.p.	Malayan cobra venom induced in rats	Tan, et al. 2009
Anti-diabetic	Ethanolic extract of seed	100mg/kg	p.o.	Alloxan induced diabetes in rats	Adeyemi, et al.2016
Aphrodisiac	Ethanolic extract of seed	200mg/kg	p.o.	Dose & time dependent effect by mating behavior test in rats	Seppan, et al. 2009
Androgenic	Methanolic extract of seed	150mg/kg	p.o.	Level of serum & testicular testosterone in rats	Muthu, et al.2009
Anti- depressant	Aqueous extract of seed	10mg/kg	p.o.	Reserpine induced depression in mice	Pandey, et al.2010
Analgesic	Ethanolic extract of leaf	2g/kg	p.o	Acetic acid induced analgesic model in mice	Lauk, et al.1993
Anti-pyretic	Ethanolic extract of fruit	2 & 3g/kg	p.o	Pyrexia induced pyretic model in rats	Lauk, et al.1993

Pharmacological activities of *Camellia sinensis (L.):*

Activity	**Extract used**	**Dosage**	**Route**	**Model/Species**	**References**
Anti-parkinson	Aqueous extract of leaf	50mg/kg	p.o.	6-OHDA induced parkinson disease in rats	Pinto, et al.2015
Anti-parkinson	Aqueous extract of leaf	50mg/kg	p.o.	Haloperidol induced parkinson disease in rats	Ittiyavirah, et al.2014
Anti-parkinson	Hydro-ethanolic extract of leaf	30 & 100mg/kg	p.o.	Haloperidol induced parkinson disease in rats	Giri, et al.2020
Anti-bacterial	Methanolic extract of leaf	30µl	(Invitro)	Anti-bacterial susceptibility test by Disk diffusion method.	Kumar, et al.2012
Anti-carcinogenic	Aqueous extract of leaf	10.5µg/ml	(Invitro)	Inhibition of Telocidin induced PKC model	Komori, et al.1993
Anti-inflammatory	Ethanolic extract of leaf	0.07g/kg & 0.14g/kg	p.o.	Carrageenan induced in mice model	Lima Mota, et al.2015
Anti-oxidant	Ethanolic extract of leaf	90.86 & 68.67	(Invitro)	Invitro DPPH free radical & Nitric oxide scavenging activity	Jain, et al.2011 14
Anti-microbial	Aqueous extract of leaf	300µl	(Invitro)	Anti-streptococcal activity	Gopal, et al.2016
Anti-depressant	Aqueous extract of leaf	50mg/kg & 100mg/kg	i.p.	Tail suspension test & Despair swimming test in mice model	Daglia, et al.2015
Anti-psychotic	Aqueous extract of leaf	100mg/kg	i.p.	Olanzapine induced weight gain and reduce locomotor activity in rats	Hosseinzadeh, et al. 2017
Anti-diabetic	Ethanolic extract of leaf	300mg/kg	i.g.	Streptozotocin induced diabetes in rats	Sachdanandam, et al. 2013

Anxiolytic	Aqueous extract of leaf	33mg/kg	p.o.	Picrotoxin induced anxiety in rats	Ullal, et al. 2016 15

Conclusion:

While ***Hyoscyamus niger L.*** (*henbane*) has several medicinal uses due to its active compounds, particularly **scopolamine** and **hyoscyamine**. Some of its compounds, like **scopolamine**, are still used in modern medicine (for motion sickness, nausea, and some eye conditions), but the plant itself is largely avoided in favor of safer, more controlled treatments. Therefore, while it has historical significance in medical practices, ***Hyoscyamus niger L.*** is typically reserved for specialized medical applications and must be approached carefully to avoid potential toxicity.

Curcumin, Camellia sinensis (L.) & Mucuna pruriens (L.) has Neuroprotective Effects: demonstrated potential neuroprotective properties, which may help protect dopamine-producing neurons from damage and reduce neuroinflammation in Parkinson's. and Antioxidant Activity: Its strong antioxidant effects can help mitigate oxidative stress, which is implicated in the progression of neurodegenerative diseases, including Parkinson's.

NEED OF THE STUDY.

Plants highlights their rich phytochemical profiles and diverse pharmacological properties. While some, like Hyoscyamus niger, are traditionally used for their psychoactive properties, others, such as Curcumin**,** Mucuna pruriens, and Camellia sinensis, are better known for their potential in treating chronic diseases, improving mental health, and promoting overall wellness.
By using this natural crud drug it will definitely reduce the side effects and improve therapeutic activity.

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