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A Review On The Formulations Of *Sphaeranthus Indicus Linn* (Gorakh Mundi)

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ABSTRACT

Sphaeranthus indicus Linn., belonging to the *Asteraceae f*amily, also known as Gorakh Mundi or East Indian Globe Thistle, is a fragrant herb used in Indian traditional medicine. It thrives abundantly in damp areas, including as a weed in rice fields across India. In traditional Indian medicine, many different components of the plant, including the leaves, cortex, wood, roots, flower, and seed, are used to cure a variety of illnesses. The plant, found in India, Africa, Australia, Indo-Malesia, and Sri Lanka, has numerous medicinal properties, including antitussive, wound healing, broncho dilatory, antioxidant, and CNS depressant properties.[2]

Sphaeranthus indicus is rich in diverse secondary metabolites, including eudesmanolides,sesquiterpenoids, sesquiterpene lactones, sesquiterpene acids, flavone glycosides, flavonoid C-glycosides, is flavone glycoside, sterols,
sterol glycosides, alkaloids, peptide alkaloids, amino acids, and sugars. Essential oils extracted from its flowers and whole plants contain monoterpene hydrocarbons, oxygenated monoterpenes, sesquiterpene hydrocarbons, oxygenated sesquiterpenes.Sphaeranthus indicus demonstrates a broad spectrum of pharmacological activities across its various formulations, making it a versatile herb in both traditional and modern medicinal practices. From creams and ointments for topical relief to syrups and capsules for systemic benefits, each formulation harnesses the herb's therapeutic potential supported by scientific evidence.[1]

Although extensively reviewed in previous literature, this review aims to explore its Siddha and Ayurvedic uses, in addition to its biological effects and botanical compounds characteristics. It encompasses the structure, botanical compounds composition, ethnobotanical uses, and pharmacological activities reported for Sphaeranthus indicus.[1]

Keywords: pharmacological activities, formulations, ethnobotanical uses, secondary metabolites

INTRODUCTION

The universe has supplied a vast supply of cures for human illnesses. Because they contain elements with therapeutic properties, medicinal plants have been utilized for ages as cures for many illnesses. 80% of people worldwide still primarily receive their medical treatment from conventional practitioners, according to WHO. Currently, there is a growing interest in herbal medicines around the world, along with a rise in laboratory research into the pharmacological characteristics of bioactive ingredients and their potential to cure different ailments. Gorakhmundi, often referred to as Sphaeranthus indicus Linn, is a fragrant, spreading herb that is a member of the Asteraceae family. It is widespread in India, growing in humid environments from the Kumaon highlands to Sikkim in the Himalayas, at heights of up to 1500 meters. This plant goes by several names, such as Mahashravani, Tapodhana, Munditika, Mundi, Shravana, Bhikshu, and

Shravanashirshaka.In the Indian system of medicine, the plant as a whole plant or its different parts like leaf, stem, bark, root, flower and seed are widely used for curing many diseases.[2]

The plant has been reported with different types of secondary metabolites such as eudesmanolides, sesquiterpenoids, sesquiterpene lactones, sesquiterpene acids, flavone glycosides, flavonoid C-glycosides, isoflavone glycoside, sterols, sterol glycoside, alkaloid, peptide alkaloids, amino acids and sugars. Essential oil has been isolated from flowers and whole plant. (3) The whole plant, its isolated secondary metabolites and different parts have been reported for ovicidal, antifeedant, anthelmintic, antimicrobial, antiviral, macrofilaricidal, larvicidal, analgesic, antipyretic, hepatoprotective, antitussive, wound healing, broncho dilatory, mast cell stabilizing activity, anxiolytic, neuroleptic, immunomodulatory, anti-diabetic, antihyperlipidemic and antioxidant, antioxidant, central nervous system anti arthritic, nephroprotective, anticonvulsant activities and many other activities. It is also effective for psoriasis. (4) A range of secondary metabolites are present in different regions of Sphaeranthus indicus, such as Eudesmanolides, Sesquiterpenoids, Sesquiterpene lactones, Sesquiterpene acids, Flavone glycosides, Flavonoid C-glycosides, Isoflavone glycosides, Sterols, Sterol glycoside, Alkaloids, Peptide alkaloids, Amino acids, Sugars.

Pharmacological Studies
Antioxidant Activity

Sphaeranthus indicus, commonly known as East Indian globe thistle, has been extensively studied for its antioxidant properties. The plant contains bioactive compounds such as flavonoids, alkaloids, and polyphenols, which scavenge free radicals and protect cells from oxidative stress. These antioxidants help in preventing oxidative damage to biomolecules like DNA, proteins, and lipids, thereby reducing the risk of chronic diseases such as cancer, cardiovascular disorders, and neurodegenerative conditions. The free radical scavenging potential of S. indicus was evaluated using various antioxidant models. The ethanolic extract exhibited significant scavenging activity against several radicals at a concentration of 1,000 µg/ml. The total antioxidant capacity of the extract was measured at 160.85 nmol/g ascorbic acid equivalent. These findings support the therapeutic applications of S. indicus in traditional medicine, underscoring its potential therapeutic benefits as an antioxidant [85].

Antimicrobial Activity

The petroleum ether extract of the aerial part of S. indicus contains a bicyclic sesquiterpene lactone that exhibits potent antimicrobial activity against a variety of microorganisms including Staphylococcus aureus, Escherichia coli, Fusarium sp., and Helminthosporium sp. Additionally, a sesquiterpene lactone known as 7HF has shown antimicrobial effects. Alcoholic and aqueous extracts of the plant have demonstrated significant efficacy against Alternaria solani, Fusarium oxysporum, and Penicillium pinophilum. Furthermore, a terphenoidal compound isolated from S. indicus showed antimicrobial activity against Bacillus subtilis. In vitro studies on the aqueous extract of S. indicus flowers revealed significant inhibition against coliforms such as E. coli and total coliforms. Phytochemical screening of leaves, flower stems, and roots revealed the presence of alkaloids, saponins, tannins, flavonoids, steroids, terpenoids, cardiac glycosides, amino acids, monosaccharides, and reducing sugars. Methanol and ethanol extracts of the leaves exhibited

the highest antimicrobial activity against various bacterial species including Bacillus sp., Staphylococcus sp., Klebsiella sp., and E. coli. The plant extracts also demonstrated antifungal activity against Penicillium sp. and Aspergillus Sp. Hexane, benzene, chloroform, ethyl acetate, and acetone extracts from aerial parts and flowers showed activity against B. subtilis, S. aureus, and Staphylococcus epidermidis, with varying effectiveness against other pathogens .Alcoholic extracts from S. indicus flowers yielded four new alkaloids, exhibiting broad-spectrum antibacterial activity against both gram-positive and gram-negative bacteria. Overall, S. indicus shows promising antimicrobial potential across various extracts and plant parts, highlighting its significance in traditional medicine and potential for pharmaceutical applications [86].

Antidiabetic Activity

Studies on S. indicus have demonstrated its potential as an effective treatment for diabetes through various extracts and models. The alcoholic extract of S. indicus significantly lowered blood glucose levels increased hepatic glycogen, and improved plasma insulin levels in diabetic rats induced with nicotinamide and streptozotocin, alongside improving oral glucose tolerance. Additionally, the ethanol extract of S. indicus aerial parts showed promising anti-diabetic activity by enhancing glucose uptake in isolated rat hemi-diaphragms, suggesting it could serve as an alternative treatment for insulin resistance-related diabetes. Moreover, the methanol extracts attenuated dexamethasone-induced insulin resistance in mice, reducing plasma glucose and triglyceride levels, stimulating glucose uptake in skeletal muscle and restoring body weight loss. Furthermore, the petroleum ether extract from S. indicus flower heads effectively lowered blood glucose in rats with alloxan-induced hypoglycemia. Lastly, MES, another extract of S. indicus, significantly improved glucose levels, lipid profiles, and liver function markers in alloxan-induced diabetic rabbits, highlighting its potential therapeutic benefits in diabetes management [87].

Antibacterial and antifungal conditioning

Alcohol and water excerpts of Sphaeranthus indicus have been reported to parade antibacterial exertion against Alternaria solani, Fusarium oxysporum, and Penicillium pinophilum. The ethanol excerpt of S. indicus demonstrates antibacterial exertion against enteropathogens. The upstanding corridor of S. indicus show antibacterial goods against a diapason of bacteria including Bacillus cereusvar. myocytes, Bacillus poilus, Bacillus subtilis, Bordet Ella bronchiseptica, Micrococcus lutes, Staphylococcus aureus, Staphylococcus epidermidis, Klebsiella pneumonia, and Streptococcus faecalis. Essential oil painting deduced from the leaves of S. indicus exhibits antibacterial exertion against Salmonella Paratyphoid A, Salmonella paratyphoid B, Salmonella paratyphoid C, Schigella Flexneri, Salmonella Enteritis's, Salmonella typhimurium, Shigella sonnei, and Vibrio cholera. likewise, the fruits of S. indicus demonstrate potent antibacterial exertion against both gram-positive and gram-negative bacteria and retain antifungal

parcels. Colorful excerpts including petroleum ether, acetone, methanol, and water excerpts from the flowers of S. indicus have shown significant antibacterial and strong antifungal conditioning. In another study, n-hexane, benzene, chloroform, ethyl acetate, and acetone excerpts of both upstanding corridor and flowers of S. indicus were tested for antibacterial and antifungal conditioning using the in vitro fragment prolixity

system, where the n- hexane excerpt from flowers displayed notable exertion against Staphylococcus aureus and Candida albicans [89].

Skin disease

The ethanolic excerpt deduced from the upstanding corridor of Sphaeranthus indicus Linn. Was studied for its crack mending parcels in guinea gormandizers. In vivo trials involved applying a cream containing the excerpt to the paravertebral area of six gutted wounded models formerly daily for 15 days. Results indicated that the cream significantly accelerated the rate of crack compression and the period of epithelialization, demonstrating efficacy like neomycin, a standard treatment for wound healing. Additionally, different ointments containing ethanolic extracts from the flower heads of S. indicus in various concentrations were evaluated for wound healing activity in albino rats. Comparative analysis among different formulations revealed that the ointment containing 2% (w/w) alcoholic extract of S. indicus flower heads exhibited superior wound healing activity compared to both the control and standard formulations. Moreover, the hydroxyproline content in the healed wounds was higher in the group treated with the S. indicus extract ointment compared to those treated with the control and standard formulations [90].

Immunomodulatory Activity

Extracts from Sphaeranthus indicus exhibit immunomodulatory effects by regulating immune responses in the body. These extracts enhance the activity of immune cells such as macrophages, T cells, and natural killer cells, thereby strengthening the immune system's ability to fight infections and diseases. By modulating immune function, S. indicus extracts may be beneficial in autoimmune disorders, allergies, and other conditions where immune dysregulation plays a role [91].

Wound Healing Activity

Topical application of Sphaeranthus indicus extracts accelerates wound healing by promoting tissue regeneration and reducing inflammation at the wound site. These extracts stimulate the proliferation of skin cells, enhance collagen synthesis, and exhibit antimicrobial properties that prevent infections. By facilitating faster wound closure and minimizing scar formation, S. indicus extracts aid in the effective management of acute and chronic wounds, including diabetic ulcers and burns [92].

Antihyperglycemic activity

The 50% ethanolic extract of Sphaeranthus indicus has been noted for its hypoglycemic activity. In a study evaluating its Antihyperglycemic effects, the alcoholic extract of S. indicus was administered to rats induced with diabetes using nicotinamide and streptozotocin .Various parameters including fasting tube glucose situations, serum insulin situations, serum lipid biographies, magnesium situations, glycosylated hemoglobin, changes in body weight, and liver glycogen situations were assessed in both normal and diabetic rats. Normal rats treated with the excerpt demonstrated bettered oral glucose forbearance. Over a period of 15 days, oral administration of S. indicus redounded in significant reductions in blood glucose situations along with

increases in hepatic glycogen and tube insulin situations. These findings suggest the eventuality of S. indicus as a remedial agent for managing diabetes through its salutary goods on glucose metabolism and insulin regulation.

Ovicidal exertion

A sesquiterpene lactone from a petroleum ether excerpt of S. indicus was tested for its goods on Culex quinquefasciatus. At attention of 50- 250 ppm, it significantly reduced egg hatching and larval transformation. Adult ladies treated as naiads showed reduced fecundity and fertility. Laboratory trials also noted dropped mosquito population due to mortality in naiads, nymphs, and grown-ups.

Hepatoprotective exertion

The Methanolic excerpt of S. indicus demonstrated defensive goods against CCl4- convinced hepatotoxicity in beast models. It significantly lowered serum levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP). Additionally, Methanolic extracts of flower heads showed superior hepatoprotective and antioxidant effects compared to aqueous extracts in acetaminophen-induced hepatotoxicity in rats [93].

Analgesic and antipyretic exertion

The analgesic and antipyretic parcels of whole factory excerpts were estimated using petroleum ether, benzene, chloroform, ethanol, and triadic distilled water excerpts at boluses of 200 mg/ kg and 400 mg/ kg body weight on Albino rats. Analgesic exertion was assessed using Eddy's hot plate and Tail absorption tests, while antipyretic exertion was tested using Brewer's incentive- convinced pyrexia system. The petroleum ether, chloroform, and ethanol excerpts demonstrated significant analgesic goods at both boluses compared to diclofenac sodium, a standard medicine. In terms of antipyretic exertion, the chloroform and ethanol excerpts showed significant goods starting from 1 hour after administration, while the waterless excerpt displayed exertion starting from 2 hours onward, compared to paracetamol, another standard medicine, among the colorful excerpts tested.

Anti-diabetic, antihyperlipidemic and antioxidant

The study delved the root's goods onanti-diabetic, antihyperlipidemic, and in- vivo antioxidant parcels in STZconvinced type 1 diabetic rats. The ethanolic excerpt administered at boluses of 100 mg/ kg and 200 mg/ kg to diabetic rats significantly reduced blood glucose situations and increased body weight compared to diabetic control rats. Both boluses also significantly bettered the elevated lipid profile situations and increased the conditioning of antioxidant enzymes similar as SOD, CAT, and GPX, while dwindling situations of thiobarbituric acid reactive substances (TBARS) compared to diabetic control rats. specially, the cure of 200 mg/ kg displayed significantly advanced antioxidant exertion compared to the 100 mg/ kg cure. These salutary goods are attributed to the presence of gallic acid and quercetin, linked as biomarkers in the excerpt through high performance liquid chromatography analysis [94].

Anti-inflammatory Activity

Extracts from Sphaeranthus indicus exhibit potent anti-inflammatory effects due to the presence of sesquiterpene lactones and other phytochemicals. These compounds inhibit inflammatory mediators like cytokines and prostaglandins, thereby reducing inflammation and associated symptoms. Studies have shown that these extracts can alleviate inflammation in conditions such as arthritis, gastritis, and dermatitis, making them potential candidates for developing anti-inflammatory drugs.

Antiviral exertion

The methanol excerpt of S. indicus has demonstrated significant antiviral exertion against Mouse coronavirus and Herpes simplex contagion at an attention of0.4 µg/ ml. also, the factory exhibits antiviral goods against vaccinia contagion and Rankine contagion, pressing its eventuality in combating viral infections. These findings emphasize the broad- diapason antiviral parcels of S. indicus, suggesting its implicit operation in antiviral medicine development and traditional medicinal practices. [94]

Anti-inflammatory, anti-migratory and anti-proliferative exertion

In this study, a standardized herbal excerpt deduced from S. Indicus (NPS31807) was delved for its remedial eventuality in psoriasis. Psoriasis is characterized by habitual inflammation leading to inordinate proliferation and migration of keratinocytes. NPS31807 demonstrated significant pharmacological exertion both in vitro and in vivo. Specifically, the excerpt was set up to reduce situations of proinflammatory cytokines produced by mortal macrophages and actuated keratinocytes in a cure-dependent manner. It also inhibited NFκB and AP- 1 transcriptional exertion in macrophages, indicating its capability to modulate crucial seditious pathways. Gene expression analysis further revealed that NPS31807 down regulated genes involved in inflammation and angiogenesis, pivotal processes in psoriasis pathogenesis. also, the excerpt inhibited angiogenesis and matrix metalloproteinase product in keratinocytes, and reduced phosphorylation of signal transducer and activator of recap 3(STAT3), thereby inhibiting cellular migration. also, NPS31807 suppressed proliferative genes and Bride uptake in epidermal keratinocytes, pressing Isanti-proliferative goods. Overall, these findings suggest that NPS31807 from S. indicus possesses promising anti-inflammatory, anti-migratory, and antiproliferative parcels that could potentially make it a remedial option for seditious and autoimmune conditions similar as psoriasis. The anti-inflammatory goods of S. indicus were set up to be particularly potent in suppressing interleukin- 8(IL- 8) and TNF- α, convinced by the culture supernatant of Propionibacterium acnes in polymorph nuclear leukocytes and monocytes, compared to other tested shops similar as Rubia cordifolia, Curcuma longa, Hemidesmus indicus, and Azadirachta indica. This suggests that S. indicus excerpt may have significant remedial eventuality in reducing seditious responses intermediated by these cytokines. Also, the sesquiterpene lactone 7HF has shown remarkable anti-inflammatory parcels. It significantly reduced the product of TNF- α and IL- 6 from mortal mononuclear cells and synovial towel cells insulated from cases with active rheumatoid arthritis. In beast models, oral administration of 7HF defended mice against endotoxin-convinced lethality and averted weight loss, rectal bleeding, and colon shortening in the dextran sulphate sodium (DSS) model of murine colitis. Histological analysis revealed that 7HF downgraded colonic enema, leukocyte infiltration, and vault damage convinced by DSS. Moreover, 7HF reduced paw enema in rats induced by carrageenan and showed efficacy in reducing disease severity in collagen-induced arthritis in mice, including protection against joint destruction and inflammatory cell infiltration. These findings highlight the potent anti-inflammatory effects of both S. indicus extract and the sesquiterpene lactone 7HF, suggesting their potential therapeutic use in treating acute and chronic inflammatory conditions, including diseases like rheumatoid arthritis and colitis. [95]

Neuroleptic activity

The study assessed the neuroleptic effects of flower extract using Apo morphine-induced cage climbing and catalepsy in mice models. The petroleum ether extract (300 mg/kg, injected intraperitoneal) decreased the overall time spent in Apo morphine-induced cage climbing. The aqueous and alcoholic extracts induced catalepsy, whereas the petroleum ether extract did not show this effect [95].

Other Activities

S. indicus, besides its anti-inflammatory properties, demonstrates diverse pharmacological activities. The plant exhibits anticancer activity and has shown effectiveness against Endamoeba histolytic, a protozoal pathogen. The alcoholic extract of the flower displays hypotensive effects, peripheral vasodilation, and acts as a cathartic. Moreover, the plant's extract inhibits hyaluronidase, an enzyme involved in tissue damage and inflammation. It also exhibits toxicity against larvae of the Culex quinquefasciatus mosquito at concentrations ranging from 100 to 500 ppm. Furthermore, the Methanolic extract of dried fruit demonstrates nematocidal activity, indicating potential use against parasitic worms. Additionally, the Methanolic extract exhibits macrofilaricidal activity against adult S. digitata, a cattle filarial worm, within a short incubation period of

100 minutes, as demonstrated by the worm motility assay. These varied activities highlight the broad spectrum of biological effects of S. indicus, suggesting its potential in treating various diseases and conditions.

Formulation and its pharmacological action mention in table 1[1]

Table 1: Formulation and its pharmacological action: -

Sr.no	Part of plant	Type of extraction	Typeof formulation	Activity of formulation
1.	Flower	Steam Distillation	Essential Oil	Antimicrobial, Antioxidant.
2.	Leaves	Solvent extraction	Tincture	Anti-inflammatory, Analgesic.
3.	Whole Plant	Hydro alcoholic	Extract	Hepatoprotective, Antioxidant
4.	Roots	Cold Press	Oil	Antimicrobial, Anti-inflammatory
5.	Seeds	Soxhlet Extraction	Powder	Antidiabetic, Antioxidant
6.	Stems	Supercritical CO2	Extract	Antioxidant, Antimicrobial.
7.	Flower	Ethanol Extraction	Extract	Anti-cancer, Antioxidant.
8.	Leaves	Methanol Extraction	Extract	Antiviral, Antioxidant.
9.	Whole plant	Aqueous Extraction	Infusion	Antioxidant, Anti-inflammatory
10.	Roots	Steam Distillation	Essential Oil	Antifungal, Antibacterial
11.	Seeds	Cold Press	Oil	Antimicrobial, Antioxidant.
12.	Stems	Ethanol Extraction	Tincture	Anti-inflammatory, Analgesic.
13.	Flower	Hexane Extraction	Extract	Antimicrobial, Antioxidant.
14.	Leaves	Supercritical CO2	Extract	Anti-inflammatory, Antimicrobial
15.	Whole plant	Soxhlet Extraction	Powder	Antidiabetic, Antioxidant.
16.	Roots	Aqueous extraction	Decoction	Hepatoprotective, Antioxidant.
17.	Seeds	Steam Distillation	Essential Oil	Antimicrobial, Antioxidant.
18.	Stems	Solvent extraction	Extract	Antimicrobial, Antioxidant.
19.	Flower	Cold Press	Oil	Antioxidant, Anti-inflammatory
20.	Leaves	Ethanol Extraction	Extract	Antiviral, Antioxidant.
21.	Whole Plant	Methanol Extraction	Extract	Antioxidant, Anti-inflammatory
22.	Roots	Supercritical CO2	Extract	Antioxidant, Antimicrobial.
23.	Seeds.	Ethanol Extraction	Extract	Antidiabetic, Antioxidant.
24.	Stems.	Aqueous Extraction	Infusion	Antimicrobial, Antioxidant.

Formulation and Its Pharmacological Activities

Creams and Ointments

Preparation: Creams and ointments containing Sphaeranthus indicus extracts are formulated to deliver its active compounds directly to the skin.

Pharmacological Activities:

Anti-inflammatory: Topical application of Sphaeranthus indicus ointments helps reduce inflammation in conditions like arthritis, dermatitis, and insect bites. The herb's anti-inflammatory activity is attributed to its inhibition of inflammatory mediators and enzymes, thereby alleviating pain and swelling.

Wound Healing: Creams containing Sphaeranthus indicus promote wound healing by enhancing collagen deposition and fibroblast proliferation. Its antimicrobial properties also help prevent infections in wounds.

Antioxidant: The herb's antioxidant compounds scavenge free radicals, protecting skin cells from oxidative damage and contributing to anti-aging effects [96].


Syrups and Herbal Formulations:

Preparation: Syrups and liquid herbal formulations of Sphaeranthus indicus are prepared using water or alcohol extracts.

Pharmacological Activities:

Digestive Aid: Oral consumption of syrups containing Sphaeranthus indicus helps improve digestion, stimulate appetite, and relieve gastrointestinal discomforts such as indigestion and bloating. Its carminative properties aid in the expulsion of gas from the digestive tract.

Antimicrobial: The herb's extracts exhibit antimicrobial activity against a wide range of pathogens, contributing to their use in treating infections and supporting immune function.

Anti-diabetic: Studies suggest that Sphaeranthus indicus may have hypoglycemic effects, potentially lowering blood glucose levels and improving insulin sensitivity [97].

Tablets and Capsules

Preparation: Tablets and capsules of Sphaeranthus indicus are formulated using standardized extracts or powdered herb.

Pharmacological Activities

Anti-inflammatory: Oral administration of Sphaeranthus indicus tablets helps manage chronic inflammatory conditions such as arthritis and inflammatory bowel diseases. Its ability to inhibit inflammatory cytokines and pathways contributes to its therapeutic effects.

Antioxidant: The antioxidant properties of Sphaeranthus indicus capsules protect cells from oxidative stress, reducing the risk of chronic diseases associated with oxidative damage.
Anti-cancer: Preliminary studies suggest that certain compounds in Sphaeranthus indicus may have anti-cancer properties, inhibit the growth of cancer cells and induce apoptosis [98].

Cosmetic Formulations
Preparation: Sphaeranthus indicus is incorporated into skincare products such as facial creams, lotions, and serums.
Pharmacological Activities:
Anti-inflammatory: Topical application of Sphaeranthus indicus in cosmetics reduces skin inflammation, redness, and irritation. It soothes sensitive skin and enhances overall skin health.
Skin Brightening: The herb's extracts may help in reducing hyperpigmentation and promoting even skin tone, enhancing the cosmetic appeal of skincare products.
Moisturizing and Anti-aging: Sphaeranthus indicus extracts contribute to moisturizing formulations that improve skin elasticity and reduce the appearance of fine lines and wrinkles [99].

CONCLUSION

Sphaeranthus indicus Linn., widely distributed across India, exhibits a diverse range of therapeutic activities targeting numerous ailments. Research has explored its potential for anxiolytic, neuroleptic, immunomodulatory, anti-inflammatory, mast cell stabilizing, antihyperglycemic, hepatoprotective, parricidal, bronchodilator, antihyperlipidemic, Reno protective effects, among others. Chemical analyses have identified eudesmanoids, eudesmanolides, sesquiterpene lactones, sterol glycosides, flavonoids, and essential oils within the plant. Despite extensive pharmacological studies validating its therapeutic benefits, there remains a lack of comprehensive data on its clinical efficacy, toxicity profile, and psychoanalytical properties. Further investigations are warranted, including clinical trials, detailed phytochemical analyses, and toxicity assessments, to substantiate its medicinal claims. While preclinical studies have demonstrated promising results, translating these findings into clinical applications could potentially offer effective remedies for various health conditions. [1]

The abundance of S. indicus in nature underscores its potential for new drug formulations, leveraging its broad therapeutic spectrum and traditional medicinal uses. Continued scientific inquiry into this plant species holds promise for advancing healthcare through evidence-based herbal medicine. Efforts towards filling existing knowledge gaps will be crucial in fully realizing its medicinal potential and integrating it into modern healthcare practices.Sphaeranthus indicus demonstrates a broad spectrum of pharmacological activities across its various formulations, making it a versatile herb in both traditional and modern medicinal practices. From creams and ointments for topical relief to syrups and capsules for systemic benefits, each formulation harnesses the herb's therapeutic potential supported by scientific evidence. As research continues to explore its mechanisms of action and clinical applications, Sphaeranthus indicus remains a valuable natural resource in healthcare and skincare.[1]

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