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Review Article

Some Egyptian Medicinal Plants for Sciatica Disease

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Abstract

Medicinal plants played an essential role in the development of human culture. Medicinal plants considered a source of traditional medicines, and many modern medicines. The invention is a kind of medicine for treating sciatica. Damp clearing, pain relieving, and the function of promoting blood circulation; it is quick for treating sciatica, good effect. Medicinal plants used as alternative medicine. This study illustrates the importance of traditional and modern medicines in the treatment and management of human diseases. Meanwhile, developed countries search for modern health care and alternative medicine, which reverts to medicinal plants and their ingredients. Because of their cheap prices and rare inside effect. Traditional and contemporary medical practices as bioactive natural compounds. The present review article examines the effect of some medicinal plants for curing Sciatica disease.

Keywords: *Sciatica Disease; Egyptian Medicinal Plants; Bioactive Natural Compounds*

Introduction

Sciatica is a painful condition usually misdiagnosed as low back pain or radicular leg pain. The condition described by paresthesia in the distribution of the sciatic nerve or other related nerve roots of the lumbosacral area. The largest nerve in the body, the sciatic nerve, which is composed of nerve roots L4 through S2, joins in the pelvis and results in sciatica. The different lumber spine movements, such as bending, flexion, and twisting, exacerbate the sciatic discomfort [1]. The nature of sciatic nerve pain is heterogeneous, and diverse cellular pathways accompany its pathophysiology. The commonly documented cellular events are notably oxidative and nitrosative stress that causes mitochondrial dysfunction [2] and activation of chemokine systems.

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Aconiti ciliare tuber

Did a study to clarify the role of *Aconiti ciliare* tuber on the recovery of locomotor function following sciatic crushed nerve injury in rats, as well as the downstream pain [3]. To evaluate the impact of the *Aconiti ciliare* tuber aqueous extract on the rate of recovery of locomotor function, they examined the walking track analysis. To assess the impact on pain management, they investigated the expression

in the ventrolateral periaqueductal gray region following sciatic crushed nerve injury in rats, as well as the expression of brain-derived neurotrophic factor (BDNF) and inducible nitric oxide synthase in the sciatic nerve. Because of treatment with *Aconiti ciliare* tuber, the SFI value was dramatically increased, BDNF expression was increased, iNOS expression lowered, and iNOS expression lowered. The current findings demonstrated that in rats with sciatic crushed nerve injuries, *Aconiti ciliare* tuber promoted functional recovery. The mechanisms by which *Aconiti ciliare* tuber recovers from SFI may involve the upregulation of BDNF expression for neuron regeneration and reinnervation, as well as the downregulation of iNOS expression to prevent nerve inflammation. In summary, this investigation has demonstrated the potential of *Aconiti ciliare* tuber to manage pain and promote functional recovery following peripheral nerve injury.

Central and peripheral nervous system disorders lead to chronic neuropathic pain, which is difficult to manage. Neuropathic pain upon clinically diagnosis is commonly associated allodynia and hyperalgesia accompanied by burning or shock-like pain [4]. Several painful disorders including compression of nerve (such as cancer metastases, radiculopathies), pain induced by sciatica injury, traumatic injury, changes associated with metabolic complications (e.g. severe neuropathy associated with diabetes, B12 deficiency), and infectious diseases (e.g. HIV-associated neuropathy, post-herpetic neuralgia) display neuropathic pain as a major component [5].

Aegle marmelos L. correa

Gautam M and M Ramanathan [6] studied the effect of *Aegle marmelos* L. correa bark hydroalcoholic extract (AMHE) and the involvement of its components marmelosin, umbelliferone, and Para-coumaric acid in reducing neuropathic pain. For investigation, the impact of Vincristine at a concentration of 100 µg/ml to cause peripheral neuropathy, and found that the administration of AMHE proceeded at three different dose levels (100, 200, and 300 mg/kg) through 21 days. He added that the assessment of mechanical hyperalgesia and allodynia used the Randall-Sellitto test and the electronic Von-Frey test, respectively. The evaluation of nerve function loss and recovery conducted using the sciatic functional index test. The nerve conduction velocity and formalin test done to evaluate the extract's peripheral and central response. He clarified that levels of inflammatory mediators in both the sciatic nerve and brain reduced in the group treated with AMHE compared to the group treated with vincristine alone. This suggests indicated that the extract has anti-inflammatory properties. The rats treated with AMHE exhibited activity in all the behavioral tests, indicating that its effects may influenced by both central and peripheral mechanisms to reduce the pain response. AMHE therapy noted to decrease the levels of excitatory neurotransmitters. It could inferred that AMHE effectively reduces the neuropathic pain induced by vincristine. The peripheral effect would have been achieved by reducing the levels of inflammatory mediators and mitigating the excitotoxicity resulting from peripheral neuropathy and neuroinflammation.

Allium cepa L

Published research indicates that Allium cepa (onion) may have a positive effect on sciatica, primarily due to its anti-inflammatory and antioxidant properties. Many studies suggest that onion extracts could help reduce neuropathic pain associated with sciatica by mitigating inflammation and oxidative stress in the sciatic nerve.

Many studies have explored the effects of *Allium cepa* L. on neuropathic pain, such as [7]. Studied measures of behavioral and oxidative stress examined across different models. Vonfrey hair and the Randall Selitto analgesiometer used to assess behavioral parameters, while oxidative stress indicators and glycosylated hemoglobin measured for biochemical analysis. They added support for the findings that came from histological assessments of the sciatic nerve. Rats with neuropathic pain were administered 25, 50, and 100 mg/kg p.m. of a flavonoid-rich extract from the leaves of *Allium cepa* L. Both models of neuropathic pain showed significant changes in behavioral and oxidative stress markers. Treatment with *Allium cepa* L. leaf extract increased these indicators in a dose-dependent manner toward normal levels ($P < 0.001$, 0.05, and 0.01, respectively). Rats suffering from neuropathic pain also exhibited less severe histological changes in the sciatic nerve and showed improvement. The strong antioxidant activity of the *Allium cepa* L. leaf extract may contribute to its neuroprotective effects. Onion, as a dietary vegetable and nutraceutical, may help reduce cardiovascular risk through its antioxidant and antithrombotic effects, regulation of blood lipids, improvement of endothelial function, and reduction of waistline.

In addition to the flavor, the health benefits of onions make them highly significant in the maintenance of human health and wellness. While onions are not particularly high in most nutrients, they contain anti-inflammatory, anti-cancer, and antioxidant components such as quercetin [8]. Fisetin, a flavonoid found in onions, plays a great role in treating chronic diseases. Quercetin known for its antibacterial and antioxidant activities [9].

In some parts of the tropics, the leaves used as a potherb, and to a lesser extent, the green-shelled beans eaten. In Java, young leaves eaten as salad. After beans are harvested, the straw used for fodder. Beans have reported to use for the cure of acne, bladder infection, burns, cardiac disorders, diabetes, diarrhea, dropsy, dysentery, eczema, emollient, hiccups, itch, kidney disorders, resolving, rheumatism, sciatica, and tenesmus [10].

Aloe barbadensis miller (*Aloe vera*)

Aloe vera used as a remedy for a variety of diseases, including inflammatory conditions, since the dawn of time. Its analgesic efficacy against neuropathic pain showed scientifically, nevertheless. The efficacy of the *Aloe vera* ethanolic extract to lessen the neuropathic pain brought on by sciatic nerve ligation examined. The resistance to heat, chemical, and mechanical allodynia of the nociceptive threshold determined at 0 days, 7 days, 14 days, and 21 days following. Lipid peroxidation, total protein, nitrite in blood, and *in vivo* antioxidant parameters evaluated. Sciatic nerve homogenates used to estimate the amounts of myeloperoxidase and calcium. raised nociception thresholds in models of heat, chemical, and mechanical allodynia. EEAV treatment resulted in a significant reduction in LPO levels, while it improved *in vivo* antioxidant parameters. In addition, the serum levels of nitrite, protein, calcium, and MPO all significantly decreased, showing protection against SCNL-related damage.

A significant decrease in LPO levels and improvement *in vivo* antioxidant parameters noticed after treatment with EEAV. Serum levels of nitrite, protein, calcium, and MPO all significantly decreased, indicating protection against SCNL-related damage. *Aloe vera* may be effective in treating neuropathic pain because of its antioxidant properties and reduced neutrophil migration. Further studies to evaluate the mechanism of action will help in the creation of suitable *Aloe vera* formulations for treating neuropathic pain resulting from [11]. The search for new drug molecules to alleviate the pains of this sort is a priority nowadays. Elucidating the molecular mechanisms of neuropathic pain is an important prerequisite for the rational development of novel analgesic drugs for the therapy of chronic pain [12].

Aloe vera is a succulent plant with medical benefits and used for many years. The plant has a viscous, clear gel core. Clinical evaluations have revealed that some pharmacologically active ingredients are concentrated in both the gel and rind of *Aloe vera* leaves [13]. *Aloe vera* contains many potentially active constituents, such as vitamins, enzymes, minerals, sugars, lignin, Saponins, salicylic acids, and amino acids. The pharmacological actions of *Aloe vera*, studied *in vitro* for arthritic activity and in terms of antibacterial and hypoglycemic effects [14].

In vitro studies with extracted *Aloe vera* compounds to study the potential protective effect on bone pathogenesis. Aloe-emodin induced chondrogenic differentiation in clonal mouse chondrogenic ATDC5 cells, which related to bone formation through BMP-2 and MAPK-signaling pathway activation [15]. Moreover, a loin has noticed to be beneficial in osteoporosis and osteopenia disorders by suppressing receptor activator of NF-κB ligand (RANKL) induced through inhibition in mouse macrophage cells [16].

Azadirachta indica A. Juss

Chronic neuropathic pain is a prevalent and well-established pain disorder that contain challenges for clinicians in terms of management. *Azadirachta indica* A. Juss (AI) exhibits analgesic, anti-inflammatory, and antioxidant characteristics. To help the neuroprotective impact of an AI standardized extract in an animal model of peripheral neuropathy generated by partial sciatic nerve

ligation, peripheral sensory neuropathy was created in male Wistar rats weighing between 180 - 200g by tightly ligating the nerve. The rats were administered different treatments, including distilled water, Pyridoxine (100 mg/kg, p.m.), or AI (100, 200, and 400 mg/kg, p.m.), for 28 days. Multiple behavioral, biochemical, molecular, and histological characteristics help. The administration of PSNL led to a notable reduction ($p < 0.05$) in allodynia, hyperalgesia, motor coordination, and motor nerve conduction velocity. However, prolonged treatment with AI (200 and 400 mg/kg) considerably mitigated ($p < 0.05$) these behavioral alterations. The AI treatment effectively reduced the increased levels of oxidative-nitrosamine stress, inflammatory mediators, as well as the mRNA expression of Bax. Additionally, it markedly enhanced ($p < 0.05$) the oxygen concentration in the peripheral circulation and the expression of mRNA. The flow cytometry study demonstrated that treatment with AI at doses of 200 and 400 mg/kg effectively reduced brain apoptosis and levels of reactive oxygen species. The AI therapy also reduced the histological abnormalities. *Azadirachta indica* provides neuroprotection against neuropathic pain caused by the suppression of oxidative-nitrosamine stress, as conducted study by [17].

Azadirachta indica (AI) is familiar for its broad range of biological activities. AI leaf extract has anti-inflammatory [18].

Cannabis sativa L. kuntze

In the present study, the authors examined the effects of raw *Cannabis sativa* L. leaf powder on the restoration of functions in mice with traumatic sciatic nerve injuries. An oral dose of 200 mg/kg of body weight per day delivered from the day of nerve crush until the conclusion of the experiment. The assessment of motor functions involved the measurement of sciatic functional index, muscular grip strength, and muscle mass. On the other hand, the evaluation of sensory functions conducted using the hotplate test. The hematology and serum analyses done to assess the impact of treatment on the overall health status and oxidative stress levels. The treated mice exhibited a substantial enhancement in motor functions, which noticed. The therapy group showed a statistically significant increase in muscle mass restoration and higher hemoglobin levels. This study suggests that adding *Cannabis sativa* L. to the diet could speed up the recovery of motor functions following nerve compression injury [19]. Cannabis used for millennia to reduce pain. Herbal cannabis advised for some patients and their advocates to treat any type of chronic pain.

Aziz A., *et al*. [20] clarified that pain is a common symptom of a wide variety of conditions and added that the primary reason patients seek health care. McAteer A., *et al*. [21] obtained that globally, tension-type headache the primary cause of morbidity, with musculoskeletal and neuropathic pain also common. The incidence of chronic pain routinely calculated to be between 11% and 40% of the population. As many as 10% report high-impact pain [22]. Dahlhamer J., *et al.* [23] found that there is a graded increase in mortality as pain severity increases in older adults, especially for patients who report walking disability.

Foeniculum vulgare mill

Peripheral nerve injury (PNI) is a significant concern in community health. Currently, treatments for nerve injuries are unable to completely cure and restore function. Natural compounds could provide a viable treatment solution for this gap. The efficacy of methanolic extract derived from *Foeniculum vulgare* seeds evaluated for its potential to enhance the rate of functional recovery following sciatic nerve injury in mice. To do this, a total of 12 adult healthy albino mice, aged 8 - 10 weeks, were divided into two groups: a control group (Ctrl, $n = 6$) and a treatment group (Trt, $n = 6$). Throughout the whole investigation, the treatment group was administered a dosage of 200 mg/kg of *F. vulgare* methanolic extract, starting from the nerve crush and continuing until the completion of the study. Treatment with *F. vulgare* significantly enhanced sensorimotor function, as seen by improvements in the hot plate test, grip strength. The observed outcomes corroborated by a substantial increase in muscle mass in the therapy group. The treated group showed an enhancement in muscle fiber diameter, as observed through morphometric analysis of the cross-sectional area of the tibialis anterior muscle fibers. The conclusive findings suggest that the methanolic extract of *F. vulgare* has the potential to enhance the healing process of peripheral nerve injury; an experiment was conducted with [24].

The ultimate symptoms of injured nerves are muscular atrophy and functional loss. Being the most complicated system, the regain of functions is either very poor or incomplete, which gives rise to everlasting disability and dependency [25]. Unlike the central nervous system, the peripheral nervous system may depict the ability of regeneration after an injury, but the functional recovery is still unremarkable due to the very slow process of regeneration [26]. The recovery process depends on both the possibility of inhibiting muscular atrophy and the rate of nerve regeneration at the earliest [27]. Recently, panch phoron, which is a blend of five spices including *Foeniculum vulgare,* has shown antinociceptive and anti-inflammatory activities in sciatic nerve crush injury mice model [28].

Moringa oleifera Lam

Functional recovery in the SCNCI mice model investigated using crude leaves from *Moringa oleifera* Lam. Sensory abilities determined and evaluated using a hotplate test, whereas the sciatic functional index, muscular grip strength, and muscle mass examined to assess motor skills. This study, conducted by [29] and discovered that *Moringa oleifera* Lam. crude leaves powder enhanced the recovery of sensory and motor function following SCNCI ($P < 0.05$). Also, the gastrocnemius muscle revitalized by adding muscular mass from the perspective of glycemic control. Conclusively, *Moringa oleifera* Lam. They added that crude leaves powder showed a function restoration improving the property, and additional thorough investigation is highly advised for its application as a medicinal agent. Moreover, *M. oleifera* exhibits neurotrophic and neuroprotective properties as its leaf extract stimulates and promotes neuronal outgrowth and survival both under normal and toxic conditions.

Nigella sativa L

The study conducted by [30] examined the potential positive impacts of *Nigella sativa* and thymoquinone (TQ) on the histological alterations of sciatic nerves in streptozotocin-induced diabetic rats. The rats assigned at random to one of four experimental groups: A (control), B (diabetic untreated), C (diabetic treated with NS), and D (diabetic treated with TQ). Each group consisted of 10 animals. Groups B, C, and D were administered streptozotocin (STZ) to cause diabetes. The rats in the NS and TQ treated groups received *Nigella sativa* (at a dosage of 400 mg/kg body weight) and TQ (at a dosage of 50 mg/kg body weight) once daily through oral administration using intragastric intubation. This treatment initiated 2 days after the injection of STZ and continued for 12 weeks. Biological samples of blood and tissue collected to conduct biochemical and histological analysis. They found that both NS and TQ treatments resulted in a significant reduction in raised serum glucose levels ($P < 0.01$, 0.05, respectively) and an increase in reduced serum insulin concentrations ($P < 0.01$, 0.05, respectively) in diabetic rats induced by STZ. The administration of STZ resulted in a substantial reduction in the size of beta cells that are immunoreactive to insulin ($P < 0.0001$). They found that both NS ($P < 0.001$) and TQ ($P < 0.01$) treatments led to a considerable increase in the region of beta cells that showed immunoreactivity to insulin. Currently, there have been no reports on any histological alterations in the sciatic nerves of diabetic rats induced by STZ, following treatment with NS and TQ. The histologic assessment of the tissues in diabetic rats treated with TQ and, particularly, NS revealed a reduced number of morphologic changes. He added that the treatment with NS and TQ resulted in a substantial reduction in myelin breakdown. The axons exhibited significant enhancement in their ultrastructural characteristics. Additional preclinical investigation into the efficacy of NS and TQ may reveal their potential as a therapeutic option for peripheral neuropathy (PN) in STZ-induced diabetic rats.

The effective components of *N. sativa* primarily found in the essential or fixed oil of seeds. The black seeds contain the main active ingredients, including flavonoids, phytosterols, polyphenols, alkaloids, and saponins. Thymoquinone, thymohydroquinone, thymol, and dithymoquinone are the most pharmacologically active components found in *N. sativa* seeds [31]. Recently, it has demonstrated that thymoquinone, a component of black seeds oil, has antinociceptive and anti-inflammatory properties [32].

In another study cleared by [33] showed that oral administration of black seed oil attenuated the thermal and mechanical stimuli in the early phase of the formalin test. In addition, in the writhing test, *N. sativa* suppressed inflammatory nociception. It has demonstrated

that the volatile oil of *N. sativa* seeds relieves inflammation in the carrageenan model of paw edema. In addition, the anti-inflammatory effect of black cumin seed essential oil has demonstrated in the formalin and writhing tests in mice [34]. However, the impact of BSO on neuropathic pain has not been determined so far. Neuropathic pain defined as a debilitating condition that results from injury or dysfunction of the nervous system and often receives inadequate treatment from current medications through a study arranged with [35].

Conclusion

This study illustrates the importance of traditional and modern medicines in the treatment and management of human diseases. Meanwhile, developed countries search for modern health care and alternative medicine, which reverts to medicinal plants and their ingredients. Because of their cheap prices and rare inside effect. Traditional and contemporary medical practices as bioactive natural compounds. The present review article examines the effect of some medicinal plants for curing Sciatica disease.

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