Original Article

Anti-Parkinsonian Effect Of Momordica Dioica On Haloperidol Induced Parkinsonism In Wistar Rats

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Abstract

In a rat haloperidol model of Parkinson's disease, the current study demonstrates that an ethanolic leaf extract of Momordica dioica has an anti-parkinsonian effect. Testing for the drug's anti-parkinsonism properties involves inducing Parkinsonism in rats with haloperidol. The ethanolic leaves extract of Momordica dioica at a dose of 500 mg/kg, p.o, displayed a stronger pharmacological impact than 250 mg/kg when compared to L-Dopa and Carbidopa (100mg+25mg/kgi.p). Parkinsonism in people or animal models is hypothesized to arise as a result of dopamine deficiency. An increase in dopamine content may have restored the change in locomotor activity and exploratory behavior, similar to the N. Jatamansi treatment. According to earlier research, Momordica dioica extract has strong antioxidant activities and may have provided protection against Parkinson's disease brought on by haloperidol. Numerous researchers have discovered. Numerous studies have found. Numerous investigations have found Numerous investigations have documented increased serotonergic neurotransmission in the CNS as a result of neuroleptic-induced catalepsy. The two primary dopamine pathways in the brain are the nigrostraited route and the mesolimbic pathway.

Additionally, momordica dioica is a rich source of numerous nutrients that are necessary for healthy body operation. It contains 4.1 calories, phytic acid -2.8 mg/g, iron -0.14 mg/g, zinc -1.34 mg/g, sodium -1.5 mg/potassium -8.3 mg/g, calcium -0.5 mg/g, sodium -1.5 mg/potassium -8.3 mg/g, protein -19.38%, fat -4.7%, total phenolic compound 3.7 mg/g, and phytic acid -2.8 mg/g. Momordica dioica has been demonstrated to have anti-feedant, anti-allergic, anti-fertility, analgesic, and anti-inflammatory qualities. It also possesses antidiabetic and hepatoprotective properties.

1. INTRODUCTION

1. OVERVIEW

Herbal remedies have a history that predates human civilization. Long before the Christian era began, the herbs were utilized in the old medical systems employed in China, India, Egypt, and Greece. The ancient science of life known as Ayurveda is thought to have existed in India for the past 5000 years. It is among the oldest medical systems in existence. The foundation of Ayurveda is the idea that everything in the cosmos is made up of five fundamental substances: space, air, energy, liquid, and solid. They can be found in the body of a person in combinations such as Vata (space and air), Pitta (energy and liquid), and Kapha (liquid and solid). The combination of Vata, Pitta, and Kapha is known as tridosha (three pilers of life). Approximately 25% of the active chemicals in contemporary medications are thought to have a plant origin or be closely related to one. At the same time, it is well known that only a tiny fraction—about 5000—of the more than 2,50,000 flowering plants have undergone scientific examination for their therapeutic potential.

The success of this class of goods is attributed in large part to its effectiveness in treating common issues such as degenerative diseases and the ageing process. In order to treat paediatric illnesses, organisations like the World Health Organization (WHO) and United Nations Children's Educational Fund (UNICEF) are particularly interested in using plants.

Drugs made from plants are generally less harmful and have tolerable side effects. Therefore, it is crucial to integrate the usage of remedies within an established framework or a rational, scientific approach to using medications.

Using herbal remedies to treat Parkinson's disease

In ancient India, a condition similar to Parkinson's was known as Kampavatha. The majority of medications used today to treat Parkinson's disease are made in a lab. Drug manufacturing in a lab is a time-consuming, expensive, and laborious process.

Various compounds can be found in plants and other natural sources. The L-Dopa-containing "mucuna pruriens" seeds are used in Ayurveda to treat Kampavatha, or Parkinson's disease.

Banisterine from Banisteria coapi and Nicotiana Tobacum have monoamineoxidase inhibitors that are comparable to selegiline and were previously employed in the treatment of Parkinson's illnesses. Datura stramonium has an anticholinergic effect similar to artane and cogentin.

Mucuna Pruriens

Over 4500 years ago, doctors in ancient India employed mucuna seeds to cure Parkinson's illness.

Mucuna pruriens, a member of the Leguminosae family and a native of India, has been utilised in Ayurveda for a very long period. In 1936, L-DOPA was isolated from Mucuna. If one only considers the amount of synthetic L-DOPA needed to give the same benefit, the amount of mucuna powder used by Ayurvedic doctors was negligible. Mucuna may have contained a trace amount of L-DOPA, and other unidentified medicines may have improved L-activity. DOPA's Similar to CARBIDOPA, there might be an unrelated substance in mucuna that has a direct impact on Parkinson's disease symptoms. Mucuna pruriens is now offered in a variety of dose forms.

An Indian pharmaceutical business created a Mucuna pruriens preparation known as HP 200 that comes in powder form and needs to be combined with water right before dosing. This formulation is known as "liquid levodopa." When mixed with water, this preparation stayed stable for several hours. To prevent the loss of active ingredients during storage, the powder underwent additional testing.

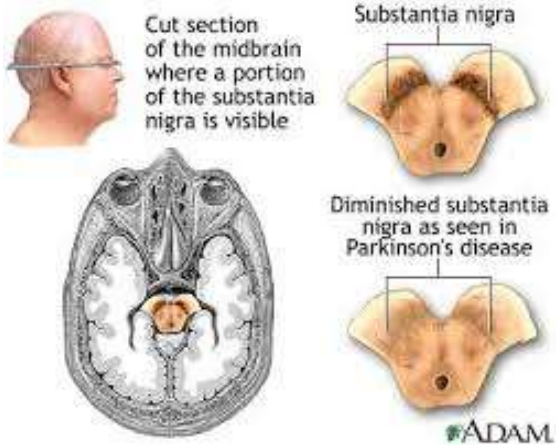
Ayurvedic and siddha medications that treat a variety of neurological illnesses also contain the aqueous extract of NJ.

2. PARKINSON'S DISEASE OVERVIEW

A sickness known as Parkinson's disease damages the nerve cells in the area of the brain responsible for coordinating muscle movement.

Parkinson's disease patients frequently have tremors, tight muscles, trouble walking, balance issues, and delayed movements. Though some Parkinson's disease sufferers are under 50, these symptoms typically appear after the age of 60.

Parkinson's disease progresses, so as time passes, the signs and symptoms get worse. However, Parkinson's disease frequently advances gradually, and most people enjoy many years of useful living after a diagnosis, even though the condition may eventually be incapacitating.



Tremor

Frequently, this begins with a small hand or finger shake. Sometimes hand tremors result in pill-rolling, or the back-and-forth rubbing of the thumb and forefinger. Leg tremors could also appear. When the patient is stressed, these symptoms could be more obvious on one or both sides of the body. Even though tremors might be quite upsetting, they are typically not incapacitating and frequently go away. Many Parkinson's disease sufferers may not have severe tremors while they are asleep.

Slowing down (bradykinesia)

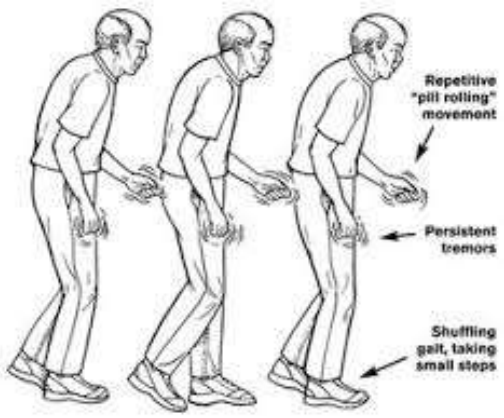
Parkinson's disease may eventually result in a stooped posture, an uneven stride, and a slow, shuffled walk. Additionally, leg muscles may constrict, making it difficult to resume regular motion. This is particularly upsetting since it can make even the simplest chores challenging and time-consuming.

Rigid muscles

Muscle rigidity (rigidity) frequently affects the neck and limbs. Sometimes the stiffness might be so bad that it restricts how much you can move and hurts.

Impaired Balance

Parkinson's disease may cause swayback and a loss of balance, which can lead to a weakened posture. This issue often goes unnoticed for a long period of time.



Automated movements stop working

Blinking, grinning, and swinging the arms when the patient is unconscious are all typical human behaviours. These actions typically deteriorate and may disappear in Parkinson's disease. Some people could start to stare fixedly into space with unblinking eyes. Others may stop gesturing or losing their lively demeanour when speaking.

Impaired speech

Parkinson's disease patients frequently have difficulty speaking, and their voices frequently become monotonous and quiet. The faint voice of a person with Parkinson's disease may not be audible to a partner who has impaired hearing, which could be an issue for elderly adults.

Having trouble swallowing

Unless there are exceptional circumstances, most persons with swallowing difficulties can continue to eat on their own. This may occur in the later stages of the disease.

Dementia

Late in the course of the disease, a tiny number of Parkinson's patients experience this mental impairment that impairs thinking, reasoning, and memory. Although dementia is frequently linked to Alzheimer's disease, other diseases can also cause dementia. Slowed mental processes and attention issues are common dementia symptoms in Parkinson's disease.

Causes

Parkinson's disease symptoms and indicators develop when certain (neurons) in the substantia nigra are harmed or lost. Normally, dopamine impulses are released by these nerve cells between the corpus striatum and the substantia nigra. Smooth, precise motions are produced by the muscles as a result of these impulses.

Everybody loses some of their dopamine-producing neurons as they age. However, the substantia nigra's neurons are lost in at least half of Parkinson's disease patients. Dopamine-containing brain cells take centre stage despite the fact that other brain cells also age and deteriorate.

Genetic influences

The development of Parkinson's disease is thought to be influenced by genes, but it is unclear if heredity has a significant or insignificant impact on this condition.

Two categories of hereditary reasons have been found in families with Parkinson's. One involves anomalies of alpha-synuclein, a protein that builds up in Parkinson's patients' deteriorating neurons. The other concerns issues with the

body's processes for getting rid of extra proteins. These two elements now seem to be crucial in the onset of Parkinson's disease in everyone.

External variables

Parkinson's disease is more likely to occur in persons who have unusual exposure to pesticides and herbicides than in people who don't. The illness hasn't yet been linked to a specific herbicide or chemical, according to researchers.

Medications

Several medications can exacerbate Parkinson's disease symptoms when used frequently or excessively. These include pharmaceuticals intended to cure nausea, such metoclopramide, as well as drugs for specific psychiatric diseases, like haloperidol and chlorpromazine. Some of the symptoms of Parkinsonism, particularly severe tremors, may also be brought on by the epilepsy medication valproate.

These treatments do not, however, cause Parkinson's disease, and symptoms go away when use is stopped.

Risk Elements

One of the major risk factors for Parkinson's disease is advancing age. Although it is uncommon, the condition often begins in middle or late life and seldom affects adults in their 20s. With advancing age, the risk keeps rising. According to some theories, patients with Parkinson's disease may have long-term brain damage brought on by genetic or environmental factors.

Other danger elements consist of Heredity

The likelihood that you will acquire Parkinson's increases if you have one or more close relatives who have the condition, but your risk is still less than 5%.

Sex

Parkinson's disease affects men more frequently than it does women.

Pesticide and herbicide exposure

You run a slightly higher chance of developing Parkinson's if you often come into contact with pesticides and herbicides.

Reduced amounts of oestrogen

Parkinson's disease risk may rise in response to decreased oestrogen levels. This suggests that hysterectomied women and menopausal women who get little to no hormone therapy (HT) may be at higher risk.

Examination and diagnosis

Parkinson's disease is diagnosed based on the patient's medical history, observations of their symptoms, and a neurological examination.

The neurological exam includes assessing dexterity, coordination, walking, and any minor symptoms of Parkinson's disease, such as tremors, absence of movements, or diminished facial expressions.

Complications

Depression affects 50% of persons with Parkinson's disease. Depression can sometimes start months or even years before Parkinson's disease is recognised. Parkinson's disease-related physical restrictions can be upsetting and distressing, but sadness in people with the disease isn't frequently a response to physical handicap. Instead, it most likely results from underlying, disease-related brain alterations.

Additionally, some Parkinson's disease sufferers have dementia over time, which includes memory loss, compromised judgement, and personality changes.

The side effects of Parkinson's disease medications can also include tiredness, hallucinations, and orthostatic hypotension, as well as involuntary jerking or twitching of the arms or legs (dyskinesis).
Other side effects of Parkinson's disease could include trouble swallowing and chewing.
Eating may be more challenging in the later stages of the illness as swallowing muscles may be impacted.

Urinary issues

Urinary incontinence or retention are both potential effects of Parkinson's disease. The disease's treatments, particularly anticholinergic medicines, can sometimes make it difficult to urinate.

Constipation

Since the digestive system functions more slowly in patients with Parkinson's disease, constipation is a common symptom. Additionally, the drugs used to treat the condition may cause constipation as a side effect.

Disturbed sleep Pattern

Parkinson's disease patients may find it difficult to fall asleep and may wake up repeatedly over the night. Additionally, they could have trouble sleeping and even act out their nightmares (rapid eye movement sleep behaviour disorder).

Sexually inappropriate

Some Parkinson's patients may have diminished sexual arousal (libido). This could occur from a mix of psychological and physical reasons or only from physical issues on their own.

Treatment

The first response to treatment may be dramatically positive for many Parkinson's patients. However, the advantages of medications regularly wane or change with time, even while symptoms are typically still effectively controlled.
By boosting the amount of dopamine available to the brain, medications can help manage issues with walking, movement, and tremor. The following are examples of drugs used to treat Parkinson's disease:

Carbidopa with levodopa

Levodopa has been used as the gold standard pharmacological therapy for Parkinson's disease ever since it was first introduced in the 1960s. Levodopa is an organic compound that exists in both plants and animals. It is a precursor to dopamine that the brain's nerve cells transform into dopamine. Many of the incapacitating Parkinson's disease symptoms could be reversed by an increase in dopamine.

Dopamine itself cannot be used for treatment since it cannot pass through the blood-brain barrier. Levodopa, on the other hand, gets beyond this barrier, but only a tiny amount gets to the brain. Levodopa is frequently coupled with other medications, such as carbidopa, to increase the amount of the drug that reaches the brain and lessen some of the negative effects of this therapy. Carbidopa-levodopa therapy side effects are typically not a big deal in the early stages of treatment. The medication does, however, become less consistent and predictable as the illness worsens. As a result, some individuals may have dyskinesia, usually at the medication's peak effects. More frequent dosages may be necessary as the duration of time between each dose's effectiveness may start to reduce (wearing-off effect). The on-off effect, a potential issue with long-term carbidopa-levodopa therapy, may cause Parkinson's-related movement issues to occur and vanish abruptly and erratically. Orthostatic hypotension and hallucinations are possible additional adverse effects. Carbidopa-levodopa treatment may cause nausea in certain patients. Carbidopa-levodopa, however, is frequently successful for a number of years and typically enables people with Parkinson's disease to prolong the time they may lead relatively normal lives.

Adrenergic agonists

These medications don't convert to dopamine like Levodopa does. Instead, they imitate dopamine's functions in the brain and lead neurons to respond as if there were enough dopamine available. In early Parkinson's disease, especially in younger persons, dopamine agonists are used as an addition to carbidopa-levodopa therapy.

Dopamine agonists have similar side effects to carbidopa-levodopa, however they are more likely to cause hallucinations or tiredness and less likely to cause involuntary movements. The risk of compulsive behaviours including hypersexuality, excessive gambling, and compulsive overeating may also be increased by these drugs.

Bromocriptine, pergolide, apomorphine, pramipexole, and ropinirole are among the medications in this class. Due to their potential to trigger inflammatory responses in the lungs or heart valves, bromocriptine and pergolide are now recommended less frequently than in the past.

Selegiline

This medication aids in preventing the breakdown of both naturally existing dopamine and dopamine synthesised from Levodopa, whether it is given with or without carbidopa-levodopa therapy. It accomplishes this by preventing the brain's monoamine oxidase B (MAO-B) enzyme from metabolising dopamine. According to studies, selegiline may be used in conjunction with carbidopa-levodopa to increase the effectiveness of the medication and postpone the need for the treatment for around a year. It was once believed that this medication could halt the progression of Parkinson's disease, but this no longer seems to be the case.

Inhibitors of catechol-O-methyltransferase (COMT)

By inhibiting the enzyme that breaks down dopamine, these medications extend the effects of carbidopa-levodopa therapy. A powerful COMT inhibitor that easily crosses the blood-brain barrier is talcapone. Tolcapone is often only prescribed to patients who are not responding to other treatments because it has been associated to liver damage and liver failure. A COMT inhibitor called entacapone has some of the same characteristics as tolcapone but doesn't enter

the brain. In Parkinson's disease patients, it might help control variations in response to carbidopa-levodopa. Nowadays, entacapone is coupled with carbidopa and levodopa as a drug known as stalevo because it doesn't harm the liver.

Anticholinergics

Before Levodopa was developed, these medications constituted the mainstay of Parkinson's disease treatment. In the early stages of the condition, they aid in controlling tremors. However, they only have a marginally positive effect, and in certain cases, particularly in men with an enlarged prostate and severe constipation, the benefits are outweighed by side effects such dry mouth, nausea, and urine retention.
In addition to memory loss, disorientation, and hallucinations, anticholinergics can also result in mental health issues. Trihexyphenidyl and benztropine are two examples of anticholinergic medications. Doctors may prescribe antidepressants like amitriptyline and the antihistamine diphenhydramine to older persons who are unable to take anticholinergics due to their similar mechanisms of action.

Amantadine

This antiviral medication is used alone to temporarily treat mild, early-stage Parkinson's disease. For those with Parkinson's disease who are receiving carbidopa-levodopa medication, amantadine may also be added, particularly if they experience issues with the involuntary movements caused by carbidopa-levodopa (Dyskinesia). Ankle swelling and a purple spotting on the skin are side effects.

Q10 Coenzyme

The production of chemicals by mitochondria is necessary for the cells to function normally. Coenzyme Q10 is one of these molecules; it transfers electrons throughout cellular respiration, the process by which cells obtain their energy from oxygen. Coenzyme Q10 levels are frequently low in people with Parkinson's disease, and studies have shown that taking supplements of Coenzyme Q10 may reduce the progression of early-stage Parkinson's disease.

Surgery

Parkinson's disease was historically frequently treated surgically by doctors. But when Levodopa and other medication therapy became available, surgical methods have been reassessed.

3. PLANT INTRODUCTION


Diaspora momordica The perennial, dioecious climbing creeper known as Roxb. ex. Willd is a member of the Cucurbitaceae family. Parora and kakora are its alternate names. Between June and July, flowers bloom, and between September and November, fruits ripen. The plant's leaves are simple membranous, broadly ovate in shape, variable in length from 3.8 to 10 cm by 3.2 to 8 cm, cordate at the base, deeply lobed into 3-5 triangular lobes, punctate, entire but distantly denticulate, and with a petiole that is 1.3 to 4.5 cm long and channelled above. They are also pubescent and glandular. The single, 2.8 cm long, bright golden male flower is found alone.

1.3 to 2.5 cm length, oblong-lanceolate in shape. 5-lobed, linear-lanceolate calyx. Corolla with five parts and three stamens. The female flower is solitary, has a little bract below the centre of the peduncle, the same calyx and corolla as the male flower, but lacks staminodes or has three staminodes that are connected, and has an ovary covered in long, soft papillae and numerous ovules. Yellow in colour. When fully mature, the fruit is short-beaked, obtuse, thickly echinate, and covered with soft spines. Round, widely ellipsoid, somewhat compressed, erratically corrugated, and encased in scarlet pulp, seeds have these characteristics. slim, branching, ruffled, glabrous, and shiny stem. Elongated, simple, striate, and glabrous describe the tendrils [1-6]. This climbing creeper is typically found in Ceylon, the Himalayas, Bangladesh, Pakistan, and India. reported up to an elevation of 1500 m in the Assam and Meghalayan Garo hills[7]. The Indo-Malayan region is where the cucurbitaceous crop kakrol was first cultivated [8–9].

Synonyms

English translation for Bengoli's Kartoli dialect: little bittergourd
Kakora, Parora, and Golbandra in Hindi
Tamil - Aegaravalli, Tholoopavai, and Paluppakkay Malyalam - Venpaval and Erima Pasel Marathi - Kartoli
Agakara Cannad-Madahagala-Kayi, Telagu-Karkotaki
Vahisi Panjabi, Dharkarela, and Sanskrit
Batkarila -Assam,
Classification [16].

Kingdom - Tracheobionata - Subkingdom Plantae
Spermatophyta super division, Magnoliphyta division, Magnoliopsida class, Dilleniidae subclass, Violates order, and Cucurbitaceae family.
Momordica is a genus.
Animal species: dioica

Components of plant

Fruits, plant components Plants' fruits are typically eaten as vegetables and are green in colour. It has a wide range of therapeutic qualities. Fruit has diuretic, hepatoprotective, alexiteric, stomachic laxative, and antivenom effects. Additionally, it is used to treat mucous membrane discharge, asthma, leprosy, excessive salivation, elephantiasis, fever, mental illness, digestive problems, heart problems, and snake and lizard bites-related inflammation [3,10]. Juice made from fresh fruit is recommended for hypertension. The fruit is used to cure diabetes after being cooked in a modest amount of oil. Rub soft fruits on the skin to treat acne and pimples. For eczema and other skin conditions, roasted seeds are used [11]. The powder or infusion of the dried fruits, when inserted into the nostrils, has a potent errhine effect and causes the schneiderian mucous membrane to discharge copiously [3].

Leaves

The plant's leaves are aphrodisiac and antihelminthic. It also treats pitta, jaundice, asthma, bronchitis, piles, hepatic damage, mental and digestive disorders, bleeding, intestinal affection, and urinary complaints. It also treats tridosha and fever. To treat head pain, an ointment made from the juice of the leaves is combined with coconut, pepper, red sandalwood, and other ingredients. For skin conditions, leaf paste is ingested twice day and applied externally to the skin [12].

Roots

Momordica dioica roots are rich in therapeutic benefits. Root juice is a stimulant, astringent, and an antiseptic. Themucilaginous tubers are used to treat bleeding piles, related intestinal conditions, and urinary problems. They also have antihelmintic, spermicidal, and antifertility abortificant properties [13]. To soften the skin and lessen perspiration, root powder is applied.

Phytochemical Research

Momordica dioica is a member of the Cucurbitaceae family and is a dioeciously climbing herb. Momordica dioica contains numerous phytoconstituents, including traces of alkaloids, steroids, triterpenoids, flavonoids, glycosides, saponins, triterpenes of urisolic acid dark brown semidrying oil and saturated fatty acids, ascorbic acids, vitamin A, thiamine, riboflavins, niacin, protein carbohydrates, lectins [16], ascorbic acids, carotenes, bitter principles Both the root, momordicafoetida, and the seed, momordicin, contain the alkaloid.

4. GOALS AND PURPOSE

The goal of the current study was to fractionate Momordica dioica's ethanolic leaf extract and test the best fraction for anti-Parkinsonism characteristics.

1. The preparation of an ethanolic leaf extract of Momordica dioica is one of the study's primary goals.
2. Photochemical evaluation of Momordica dioica ethanolic leaf extract
3. OECD guidelines' investigations on the acute toxicity of Momordica dioica's ethanolic leaf extract
4. Testing for anti-Parkinsonism qualities in Wister rat behavior using the Block Method for the Measurement of Parkinsonism and the Metal Bar Test.

5. RESOURCES AND METHODS

Gathering and identification of plants

Momordica Dioica was the main plant employed in the investigation, and it was obtained from Ibrhaimpatnam, Dist., Andhra Pradesh, India.

The plant can be recognized and verified by the department of botany Ibrahimpatnam Branch Research Office (Botanist).

The process of making Ethanolic extract

The leaves were gathered and dried in the dark. To create a coarse powder, the shade leaves were put through a pulverising process. Momordica dioica's roughly chopped dry shade leaves were used for ethanol extraction. Momordica dioica powder (250 g) was placed loosely in the soxhlet thimble and subjected to an ethanol extraction process at 55 °C for 18 hours. The extract was weighed after air drying at 25 to 30°C. The extract was diluted at various concentrations in 10 mL of phosphate buffer saline (PBS) for oral delivery. 1% tween 80 was applied to the extract to make it soluble in PBS.

PHYTOCHEMICAL SCREENING IN BRIEF

The following techniques were used to conduct a preliminary chemical screening of Momordica dioica ethanolic extracts to determine whether or not they contained any active phytochemical ingredients. (18,19,20) (Khandelwal et al., 2006; Trease et al., 2002; Kokate et al., 1990)

1. Check for opiates

Filtered after being treated with little hydrochloric acid. Various alkaloidal agents were used to treat the filtrate.

a) The Mayer test

used Mayer's reagent to treat. A cream-colored look denotes the presence of an alkaloid.

b) Dragendorff's test

The emergence of a reddish-brown precipitate after Dragendorff's reagent treatment of the sample's total amount revealed the existence of alkaloid.

c) Hager's test

When an alkaloid is present, the Hager's reagent treatment results in a precipitate that is yellow in colour.

d) Test for quinoline alkaloids:

Quinoline extract is diluted with glacial acetic acid to produce reddish brown fumes, and concentrated sulfuric acid produces blue fluorescence under ultraviolet light.

2. Check for carbohydrate content

Separately dissolve 300 mg of alcoholic and aqueous extracts in 4 ml of distilled water before filtering. The Molish's test can be used to determine whether there are any carbohydrates in the filtrate. A little amount of the extract should be dissolved in water before being processed with (b) Fehling's solutions A and B, (c) Benedict's reagents, and (d) Barfoed's reagents to look for various sugars.

3. Perform a drug test

a) Liabermann-Burchard test

The emergence of green colour indicates the presence of steroids when the extracts are treated with strong sulphuric acid, a few drops of glacial acetic acid, followed by the addition of acetic anhydride.

4. Examine proteins

a) The Biuret Test

The emergence of violet colour indicates the presence of proteins when the extracts are treated with copper sulphate solution, followed by the addition of sodium hydroxide solution.

b) The Millon test

The emergence of a pink colour after Milon's reagent treatment of the extract revealed the presence of proteins.

5) Check for Tannis

a. The formation of a white precipitate after the extracts were treated with a 10% lead acetate solution revealed the presence of tannins.
b. The presence of tannins was detected when a white precipitate formed when the extracts were treated with an aqueous bromine solution.

6. Phenol testing

a. The emergence of violet colour after the extracts were treated with a neutral ferric chloride solution suggested the existence of phenols.
b. The presence of phenols was detected when the extracts were exposed to a 10% sodium chloride solution and took on a cream colour.

7. Perform a flavonoid test

a. After being hydrolyzed with 10% v/v sulfuric acid, 5 ml of the extract solution was chilled. It was then separated into three pieces and extracted with diethyl ether before being placed in three different test tubes. The first, second, and third test tubes each received 1 ml of diluted sodium carbonate, 1 ml of sodium hydroxide solution (0.1N), and 1 ml of a strong ammonia solution. The emergence of a golden tint in each test tube revealed the presence of flavonoids.
b. The Shinoda test Alcohol was used to dissolve the extract, and then a piece of magnesium, conc., and warm HCl were added one at a time. Flavonoids are present because of the emergence of the magenta colour.

8. Check for mucilage and gums

After applying 25 ml of 100% alcohol to the extracts, the solution was filtered. The filtrate's capacity to swell was evaluated.

9. Examine the glycosides

The red ring that forms at the confluence of two liquids after a pinch of the extracts have been dissolved in Glacial acetic acid, a few drops of ferric chloride solution have been added, and then concentrated sulfuric acid has been added shows that glycosides are present.

10. Perform a saponin test

Test of foam

In a test tube, 1ml of the extracts are diluted to 20ml with distilled water and thoroughly shaken. Saponins are present because foam is forming in the test tube's upper section.

11. Terpenes testing

The emergence of pink colour after the extracts were treated with tin and thionyl chloride suggested the presence of terpene.

Laboratory animals

Both sexes of 150–200 g Wistar albino rats were purchased from NIN's animal house in Hyderabad. Rats were provided a regular diet both prior to and throughout the experiment (Gold Moher, Lipton India Ltd). The rats were acclimated for a period of 7 days under standard ambient conditions of temperature, relative humidity, and dark/light cycle after being randomly assigned to separate groups and before to the start of the experiment. Animals that were considered to be fasting were denied food and water for 16 hours continuously. The study was authorised by the Institutional Animal Ethics Committee (IAEC) and registered with the CPCSEA/ORG/CH/2008/Reg.No.1218 Dr. Samuel George Institute of Pharmaceutical Sciences. All animal experiments were performed in compliance with CPCSEA criteria. Dr. K. Madhavasetty is an assistant professor at Sri Venkateswara University in Tirupathi's department of botany.

Studies on acute toxicity

Using a random sample method, rats were chosen for the investigation. The Organization for Economic Co-operation and Development (OECD)-423 standards were followed while testing for acute oral toxicity. 30 For each dose, three male Wistar rats weighing 150–200 g were used. We chose the dose levels of 5, 50, 500, 1000, 2000, and 5000 mg/kg/body weight per os. The extract's lethal dosage (LD)-50 value was calculated. Rats were given the medication orally after being starved for the previous night and provided with water at will. Before and after the therapy, the rat's body weight was recorded. For 72 hours, the animals were monitored for harmful side effects such as altered behaviour, unsteadiness, convulsions, and death.

Pharmalogical studies

Parkinsonism measurement using the block method (21)

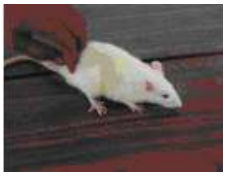
The animal was split into five groups, each with six creatures.
Group 1: Control getting 1 millilitre of 1% tween 80.
Group 2. Haloperidol (1 mg/kg)
Group 3 Momordica dioica ethanolic extract (250 mg/kg) suspended in 1% v/v tween 80 for 15 days, together with haloperidol (1 mg/kg).
Group 4 Momordica dioica ethanolic extract (500 mg/kg) suspended in 1% v/v tween 80 for 15 days, together with haloperidol (1 mg/kg).
Group 5: Standard L-Dopa and Carbidopa (100 mg plus 25 mg/kg intravenously) 1 hour before the Haloperidol Challenge.

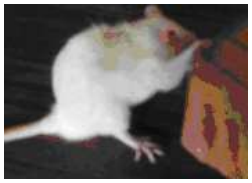
Following then, the Parkinsonism severity was assessed every 30 minutes for the next three hours. A scoring approach has been used to quantify Parkinsonism in a specific rat in a step-by-step fashion.

Step – 1 The rat was removed from its cage and set down on a table.
When the rat was lightly prodded or touched on the back but did not move, a score of 0.5 was given.

Step II The rat's front paws were alternately positioned on a 3 cm high block. A score of 0.5 for each paw was added to the step I score if the rat didn't change its posture within 15 seconds.

Step - III The rat's front paws have been alternatively positioned on a 9 cm high block. The scores from steps I and II were increased by 1 for each paw if the rat didn't change its posture within 15 seconds. The maximum score an animal could receive was 3.5 (the cut-off score), which corresponded to total catalepsy.





Behavioral assessment (Metal bar test) (22)

The following technique was used to investigate the impact of the test and reference medication on behavioural evaluation in rats receiving haloperidol.

Five groups of six animals each were formed from the animal.
Group 1 Control getting 1% tween 80 (1ml/100gm)
Group 2. Haloperidol (1 mg/kg) is
Group 3 Momordica dioica ethanolic extract (250 mg/kg) suspended in 1% v/v Tween 80 for 15 days, together with haloperidol (1 mg/kg).
Group 4 Momordica dioica ethanolic extract (500 mg/kg) suspended in 1% v/v tween 80 for 15 days, together with haloperidol (1 mg/kg).
Group 5: Standard L-Dopa and Carbidopa (100 mg plus 25 mg/kg i.p.) one hour before the Challenge with Haloperidol

Procedure

A high bar test technique was used to gauge acataleptic behaviour. After administering haloperidol for four hours, the rat's catalepsy core was monitored every hour by gently placing both of its forepaws over a metal bar (diameter 2-5mm suspended 6cm above the tabletop). With a maximum cutoff time of three minutes, the duration in seconds until the rat brought both forepaws to the tabletop was used to measure the catalepsy's severity. In order to compare results, scores from various time points (0, 60, 120, 180, 240 minutes after haloperidol injection) were summed and expressed as cumulative catalepsy scores.

Statistic evaluation

Using a computer software, one way analysis of variance (ANOVA) and Dennett's test were used to analyse the data. P-value 0.05 or was used as the significance cutoff.

6. RESULTS

Table 1. Phytochemical analysis of ethanolic leaf extracts of Momordica dioica

TEST	PRESENT/ABSENT
Alkaloids	+
Glycosides	+
Tannins	+
Flavanoids	+
Saponins	+
Terpenoids	+
Steroids	+
Saponins	+

+ = Present
- = Absent

The ethanolic leaves extract of Momordica dioica showed the presence of Alkaloids , Glycosides , Tannins, Flavonoids, Terpenoids, Saponins, and Steroids (Table.1). The acute oral toxicity was done according to the OECD guidelines 423 (acute toxicity class method). There was no considerable change in the body wt before and after treatment of the experiment, and no sign of toxicity was observed (Table 2).

Haloperidol induced Parkinsonism significantly ($p<0.01$) at a dose of 1mg/kg/ip. Haloperidol-induced Parkinsonism was decreased by the treatment of ethanolic leaves extract of *Momordica dioica* , L-Dopa & Carbidopa. The maximal decrease in Parkinsonism was observed in group V animals. The ethanolic leaves extract of *Momordica dioica* at a dose of 500mg/kg has a more significant effect ($p<0.01$) than 250mg/kg in the reversal of Haloperidol-induced Parkinsonism. The combination of L-Dopa & Carbidopaat, a dose of (100mg+25mg/kg i.p), also showed a significant effect ($p<0.01$) in the reversal of Haloperidol-induced Parkinsonism which is assessed by the block method (Table 3 and Fig 1)and metal bar test (table 4 and Fig 2)

Table 2: Acute toxicity study of ethanolic leaves extract of *Momordica dioica* in rats (OECDguideline423).

S.No	Drug treatment	Dose	Weight of animal in gms Group		Signs of toxicity	Onset of toxicity	Death
			Before treatment (1st day)	After treatment (14th day)			
1.	Ethanolic extract of *Momordica dioica*	5mg/kg	161	172	No signs of toxicity	Nil	Nil
2.	Ethanolic extract of *Momordica dioica*	50mg/kg	172	180	No signs of toxicity	Nil	Nil
3.	Ethanolic extract of *Momordica dioica*	500mg/kg	184	190	No signs of toxicity	Nil	Nil
4.	Ethanolic extract of *Momordica dioica*	1000mg/kg	171	178	No signs of toxicity	Nil	Nil
5.	Ethanolic extract of *Momordica dioica*	2000mg/kg	165	171	No signs of toxicity	Nil	Nil

Table-3: Effect of Ethanolic extract of *Momordica dioica* on Haloperido induced Parkinsonism.

A. Block method

S.No	Drug treatment	30 min	60 min	90 min	120 min	150 min	180 min
1	Tween 20	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0
2	Haloperidal treated	1.6±0.0 a**	2.62±0.206 a**	3.42±0.16 a**	3.58±0.0 a**	3.24±0.20 a**	3.06±0.270 a**
3	*M.dioica* (250mg/kg)+ Haloperidal	1.00±0.162 bns	2.02±0.48 bns	1.65±0.1.32 b*	1.44±0.16 b**	0.90±0.35 b**	0.60±0.36 b**
4	*M.dioica* (500mg/kg)+ Haloperidal	0.52±0.17 bns	1.4±0.13 bns	1.2±0.23 b*	1.02±0.35 b**	0.54±0.22 b**	0.00±0.00 b**
5	L-Dopa +Carbidopa+ Haloperidol	0.50±0.42 b**	1.45±0.12 b**	1.15±0.155 b**	0.6±0.24 b**	0.52±0.23b**	0.0±0.0 b**

Values are mean±SEM of four samples of six observations. Statistical significant test for
A comparison was done by ANOVA, followed Dennett's test.
a-Group I and Group II, b-Group II Vs Group III, Group IV
*p<0.05;**P<0.01; Vs nonsignificant.

Figure-1: Effect of Ethanolic extract of *Momordica dioica* on Haloperido-induced Parkinsonism.

A. Block method

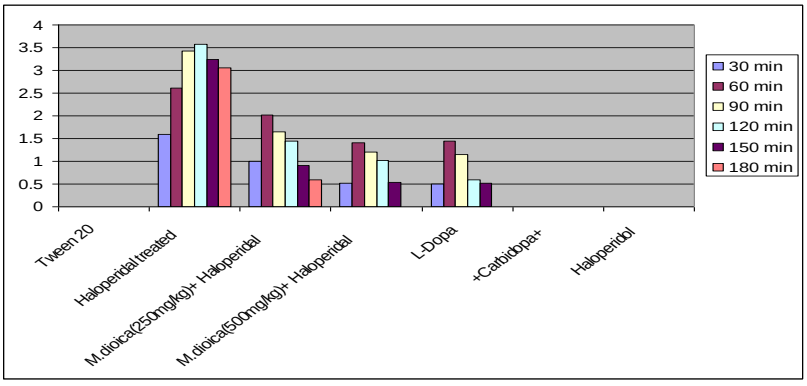


Table-4: Effect of Ethanolic extract of *Momordica dioica* on Haloperido-induced Parkinsonism.

B. Metal Bar test

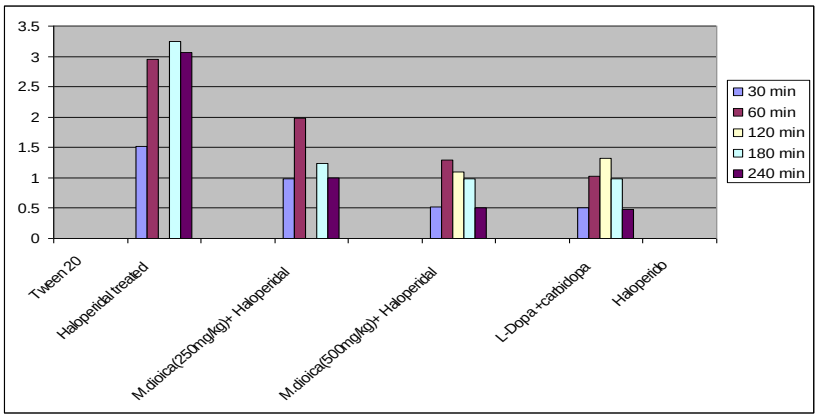
S.No	Drug treatment	30 min	60 min	120 min	180 min	240 min
1	Tween 20	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0
2	Haloperidal treated	1.52±0.2 a**	2.95±0.24 a**	3.68±0.12 a**	3.24±0.0 a**	3.06±0.4 a**
3	*M.dioica* (250mg/kg)+ Haloperidal	0.98±0.16bns	1.98±0.26 bns	1.46±0.14 b*	1.24±0.12 b**	1.00±0.43 b**
4	*M.dioica* (500mg/kg)+	0.52±0.16	1.3±0.14	1.1±0.16	0.98±0.042b**	0.50±0.24

	Haloperidal	bns	bns	b*		b**
5	L-Dopa +carbidopa Haloperido	0.50±0.42 b**	1.02±0.18 b**	1.32±0.18 b**	0.98±0.32 b**	0.48±0.36 b**

Values are mean±SEM of four samples of six observations. A statistically significant test for
A comparison was made by ANOVA, followed by Dennett's test.
A-Group I and Group II, b-Group II Vs. Group III, Group IV
*p<0.05;**P<0.01; Vs. Nonsignificant.

Fig-2: Effect of Ethanolic extract of *Momordica dioica* on Haloperido-induced Parkinsonism.

B. Metal Bar test



7. DISCUSSION

The current research exhibits the anti-parkinsonism efficacy of ethanolic leaf extract of Momordica dioica in the haloperidol type of Parkinson's disease in rats. Anti-medication Parkinson's candidates are tested in a rat model of the disease, induced by haloperidol. When compared to L-Dopa & Carbidopa (100mg+25mg/kgi.p.), the pharmacological activity of an ethanolic extract of Momordica dioica leaves at 500mg/kg, p.o. was greater than that at 250mg/kg. Dopamine deficiency has been identified as a key contributor to the development of Parkinson's disease, both in people and animal models. Similar to what may have happened with N. Jatamansi therapy, an increase in dopamine levels may have reversed the effects of altered motor function and exploratory behaviour (23). Researchers have shown that Momordica dioica extract has powerful antioxidant capabilities (24,25), suggesting that it may have provided protection against Haloperidol-induced Parkinson's disease. Increased serotonergic neurotransmission in the central nervous system has been linked to an aggravation of catalepsy in animals treated with neuroleptics, according to a number of studies (26). The mesolimbic route and the nigrostraited route are the brain's two primary dopamine pathways.
In addition to its useful medicinal properties, momordica dioica has a wide variety of compounds, called nutrient, that are required for healthy bodily function.

Amounts of calcium (0.5 mg/g), sodium (1.5 mg/g), potassium (8.3 mg/g), iron (0.14 mg/g), zinc (1.34 mg/g), protein (19.38%), fat (4.7%), total phenolic compound (3.7 mg/g), phytic acid (2.8 mg/g), calories (4.1), and ash value (6.7%) are all present (27).

Antimalarial (28), antiallergenic (29), antifertility (30), analgesic (31), anti-inflammatory (32), hepatoprotective (33), and antidiabetic (34) properties have all been attributed to Momordica dioica (34).

This research lends support to the hypothesis that Momordica dioica leaf extract treated with ethanol reduces the severity of Haloperidol-induced Parkinsonism in rats. One or more pharmacological or physiological pathways, such as an increase in dopaminergic signalling, might account for the beneficial effects of Momordica dioica leaf extract in ethanol.

8. CONCLUSIONS

According to the studies mentioned above, changes in the dopaminergic system, which is crucial for the prevention of Parkinson's disease, may be the cause of the symptoms of the disease. To cause Parkinsonism, haloperidol 1 mg/kg body weight was given intravenously. Dopamine levels in the substansia nigra are reduced, and this results in Parkinsonism. Momordica dioica leaf extract in ethanol helped to significantly recover the levels that had been adversely affected by haloperidol. The study's findings imply that Momordica dioica is an effective remedy for preventing dopamine depletion in the brain. The findings also show that Momordica dioica's antioxidant properties may be the cause of its anti-Parkinsonism actions.

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