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Research Article

Evaluation Of Anti-Parkinson Activity of *Eleocharis Dulchis* in Albino Swiss Mice

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ABSTRACT

The primary objectives of this research are to (1) isolate the active ingredients from Helicteres isora, (2) analyze their phytochemical composition, and (3) assess their potential as a treatment for mice with symptoms similar to Parkinson's disease. The Eleocharis dulchisplant was prepared for Soxhlet extraction by collecting its leaves and stems. Tannins identified by phytochemical screening included a wide variety of bioactive chemicals with possible medicinal uses, including carbs, proteins, saponins, flavonoids, alkaloids, phenols, fixed oils, lipids, and glycosides. The experimental setup involved inducing Parkinsonian-like symptoms in mice with haloperidol and then evaluating the therapeutic effects of Eleocharis dulcis extract (EOED) and Eleocharis dulchisextract using rotarod, actophotometer, and bar test measures of muscle tone and locomotor activity. Motor function improved throughout EOED treatment groups on the Rotarod test, with the highest dosage producing results similar to those of normal therapies. Locomotor activity was also shown to improve with increasing dosages of EOED in the Actophotometer test. Bromocriptine and high-dose EOED improved motor function, as seen by the varied levels of motor activity on the Bar Test. Researchers looked at oxidative stress indicators and dopamine levels as well. By combining bromocriptine with high-intensity electrical exercise (HIEE), UV spectroscopy was able to reverse the loss in dopamine levels caused by haloperidol. While HIEE demonstrated dose-dependent increases, bromocriptine's impact on dopamine was the most pronounced. Moreover, both HIEE and bromocriptine restored catalase (CAT) activity, which reduced brain oxidative stress; bromocriptine produced the greatest amounts of CAT. Combining Eleocharis dulchisextract with bromocriptine and HIEE may help alleviate symptoms similar to Parkinson's disease by restoring motor function and lowering oxidative stress, according to these results.

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INTRODUCTION

Motor symptoms are caused by the degeneration of neurons in the substantia nigra, an area in the middle of the brain that provides the basal ganglia with dopamine. Although the exact mechanism by which neurons undergo this cell death remains a mystery, it is believed to include the formation of Lewy bodies by the protein alpha-synuclein. Parkinsonism is the umbrella term for the primary motor symptoms. Factors that contribute include both hereditary and environmental influences. Because certain genes are known to be heritable risk factors, those who have an afflicted relative are more likely to have the illness themselves. Potential environmental hazards include a history of head trauma, exposure to pesticides, and trichloroethylene [01-05].

The most prevalent kind of parkinsonism, a progressive neurodegenerative condition known as Parkinson's disease (PD), is characterized by tremor, bradykinesia, stiffness, and postural instability. It is also known as idiopathic parkinsonism, as its etiology is unknown. There are other methods to categorize Parkinson's disease. Along with other disorders, Parkinson's is one of the parkinsonian syndromes. This synucleinopathy, which is part of the Lewy body disease group, is defined by the presence of aberrant brain deposits of the protein alpha-synuclein. Multiple system atrophy, dementia with Lewy bodies, and other uncommon disorders are all part of the synucleinopathies.

The aggregation of alpha-synuclein is not present in some uncommon hereditary variants of Parkinson's disease. The perennial Eleocharis dulcis may reach a height of 1 meter, or 3 feet (3 inches). Look up USDA hardiness zones up there. Although it is frost sensitive, it is hardy up to UK zone 9. This species has both male and female reproductive organs; it is hermaphrodite. This plant thrives in sandy, loamy, and clay soils. Acceptable pH range: slightly acidic, neutral, and basic (slightly alkaline) soils. Shadows are too dark for it to thrive. Both dry and damp soil are ideal for its growth [06-12].



Fig no 01- *Eleocharis dulchis*

Decline in motor control is a hallmark symptom of Parkinson's disease (PD), a degenerative neurological disorder. Weakness, injury, or death of nerve cells (neurons) in certain regions of the brain may cause problems with movement, tremor, stiffness in the limbs or trunk, or reduced balance. The worsening of these symptoms could make it difficult for people to walk, talk, or do other fundamental tasks. Not everyone with PD experiences the symptoms since they may be found in other conditions as well. In most cases, motor symptoms may be greatly reduced with medication or surgery, and efforts to discover a cure for PD are ongoing. Raw and sometimes sweetened, they are the most common way to consume them in China. As an ingredient in the dim sum classic water chestnut cake, they may also be crushed into flour. Their cell walls are cross-linked and reinforced by certain phenolic chemicals, such oligomers of ferulic acid, which gives them the uncommon quality of staying crisp even after being cooked or canned. Similar crisp-keeping qualities are shared by spurge nettle root, lotus root, and tiger nut, among other crops. Puchiin, an antibiotic present in the corms, remains stable even when heated [13-16].

MATERIAL & METHODS-

In order to conduct pharmacological and biochemical investigations, the project makes use of a wide range of tools and substances. Dosing in

animal experiments requires precise measurements of tiny amounts of drugs, such as haloperidol (5 mg/kg) and bromocriptine (4 mg/kg), which may be achieved with the use of an analytical weighing scale. We use the rotarod instrument to measure motor coordination and the actophotometer to measure locomotor activity, two behavioral tests. Biochemical processes involving ferric chloride and potassium ferricyanide, as in oxidative stress tests, may be examined using the UV spectrophotometer.

The lyophilizer freeze-dries the samples before evaluating them, and the rotary vacuum evaporator concentrates the extracts. A CO2 chamber is used for the humane euthanasia of animals, and samples that are temperature sensitive are kept in a deep freezer. A variety of enzymatic tests and redox investigations are supported by the chemicals utilized, including phosphate buffers, ice-cold saline, and H2O2. L-DOPA and other medications are evaluated for their therapeutic benefits in motor and oxidative stress research [17-23].

COLLECTION AND AUTHENTICATION OF PLANT-

In July 2023, the medicinal garden of Oriental College of Pharmacy in Mumbai was scouted for Eleocharis dulchis (leaves and stems). Mr. Mahesh Atale, a botanist from Alrsin Ayurvedic Pharmaceuticals in Andheri, Mumbai, received the voucher for the sample specimen. The plant stems were rinsed under running water and then air-dried in the shade at room temperature with the help of a fan. The stem was allowed to dry before being ground into a coarse powder and placed in a jar.

METHOD OF EXTRACTION-

Eleocharis dulcis, often known as Chinese water chestnut, may have its bioactive components like flavonoids, phenolics, and other phytochemicals extracted using the Soxhlet extraction process. Here, a thimble is placed within the Soxhlet apparatus with dried and finely powdered Eleocharis dulcis. The process begins by heating a solvent (often water, methanol, or ethanol) in a flask, and then the vapours from the solvent interact with the plant material. To make sure the target chemicals are extracted efficiently without consuming too much solvent, the solvent condenses and drips back into the flask. This process continues in cycles. This process is a dependable way to get concentrated plant extracts for things like food, medicines, and cosmetics since it allows for the full extraction of chemicals from the plant material.

PHYSICOCHEMICAL CHARACTERISTICS [28-35]-

Loss on drying-

To achieve a consistent weight, two grams of crude powdered Eleocharis dulchis seeds were placed in an evaporating plate and dried in an oven set at 1050C. After drying, the weight was recorded and the loss on drying was computed. The first sample was used to compute the percentage.

Total Ash value-

In a silicon crucible, two grams of powdered Eleocharis dulchis seeds were heated to 5000C until they became white, which indicates that no carbon was present. Then, they were ignited. The ash was quickly weighed after cooling in a desiccator. In order to determine the percentage of total ash, the original sample was used as a reference.

Acid insoluble ash value-

Gradually, 25 ml of diluted HCl acid was poured to the crucible that contained entire ash. Afterwards, cook over low heat, covered with a watch glass, for 5 minutes. Before adding it to the crucible, 5 cc of hot water was used to rinse the watch-glass. Also, heated on a hot plate until they're a consistent weight, then set fire to them. The weight of the cooled residue was promptly taken. Using the original sample as a reference, we were able to determine the acid insoluble ash percentage.

Water soluble ash value-

The 25 cc of water was added to the crucible holding the complete ash and left to boil for 5 minutes. An ash-free filter paper was used to gather the insoluble material. Before being set ablaze in a crucible for fifteen minutes, it was rinsed with hot water. Without further ado, the residue was weighed after cooling. The weight of insoluble materials was removed from the overall ash weight. The original sample was used to determine the proportion of water-soluble ash.

QUALITATIVE PHYTOCHEMICAL SCREENING [36-40]-

Preliminary chemical tests were carried out on ethanolic extract of *Oroxylum indicum* for the determination of presence of different phytoconstituents.

Carbohydrates:

Molisch test:

2-3 ml of ethanolic extract was mixed with α-Naphthol in alcohol. To this added conc. H2SO4 from the side of the test tube. A violet ring formed at the junction at the two liquids showed presence of carbohydrates.

Benedict's test:

1 ml of ethanolic extract was mixed with 2 ml of Benedict's reagent. This mixture was heated in a hot water bath for approximately 3 min or until a visible change in colour appears.

Proteins-

Biuret test-

2 ml of the ethanolic extract was mixed with 1 ml of sodium hydroxide. 2-3 drops of copper sulphate were added to the mixture. A colour change from blue to purple indicates presence of proteins.

Steroids-

Sulphur powder test-

2 ml of ethanolic extract was taken in a test tube. Sulphur powder was sprinkled upon it. The test is positive if the sulphur powder sinks to the bottom of the test tube.

Saponins-

Froth test-

The presence of saponins was determined by Frothing test. The ethanol extract of *Oroxylum indicum* seeds was vigorously shaken with distilled water and was allowed to stand for 10 min and classified for saponin content as follows: no froth indicates absence of saponins and stable froth for more than 1.5 cm indicated the presence of saponins.

Flavonoids-

Lead acetate test-

2 ml of ethanolic extract was treated with few drops of lead acetate solution. Formation of yellow coloured precipitate indicated the presence of flavonoids.

Shinoda test-

The ethanol extract of *Oroxylum indicum* seeds was treated with few drops of concentrated HCL and magnesium turnings. The appearance of pink or red colour within few minutes indicated the presence of flavonoids.

Alkaloids-

Hager's and Dragondroff's test-

The ethanolic extract of *Oroxylum indicum* was dissolved in 2 N HCL. The mixture was filtered and the filtrate was divided into 2 equal portions. One portion was treated with equal amount of Hager's reagent and the other portion was treated with equal amount of Dragondroff's reagent. The brown and yellow precipitate indicated the presence of respective alkaloids.

Phenols and tannins-

Ferric Chloride test0

0.5 gm of extract was boiled with 20 ml of water and filtered. To the filtrate, 0.1% FeCl3 solution was added. Deep black colour indicated the presence of tannins.

Dilute Potassium permanganate test-

2ml of ethanolic extract of *Oroxylum indicum* was mixed with few drops of dilute potassium permanganate solution. A positive test was

concluded as decolouration of potassium permanganate was observed.

Fixed oil and fats test-

Stain test-

Ethanolic extract was kept on a filter paper and allowed it to dry. A positive test was concluded as a translucent stain was formed on the paper when you hold the paper up to the light.

Glycosides-

Legal test-

0.5 gm of the drug extract was mixed with 0.5 ml of pyridine. To this solution, few drops of sodium nitroprusside was added. Formation of yellow precipitate indicates presence of alkaloids

ANIMAL DETAIL & DOSE SECTION -

Groups 4, 5, and 6 of mice are given a mixture of Haloperidol, a medication that induces symptoms similar to Parkinson's disease, and Eleocharis dulcis extract (EOED) as part of this research. A high dosage of EOED will be administered to Group 4, an intermediate dose to Group 5, and a low dose to Group 6. Six mice make up each group, for a grand total of eighteen creatures. The objective is to compare dose-dependent responses by analyzing the effects of EOED at various dosages in combination with Haloperidol on Parkinson's symptoms. The fruits demonstrated that the extract was safe for animal usage after an extensive literature review of existing research data and an Acute Toxicity Study on Helicteres isora. The LD50 was determined to be 3000mg/kg (50). Researchers in another investigation found that Swiss albino mice exposed to OI whole plant extract orally had acute poisoning. Test animals did not die after receiving the aforementioned dose range (100-4000 mg/kg of body weight) of OI whole plant extract. Therefore, a safe dosage of 300 mg/kg was chosen. The ethanolic extract of Eleocharis dulchis seeds was determined to be safe for animal usage after a literature review of existing research data indicated that the LD50 was 3000 mg/kg.

EVALUATION OF ANTIPARKINSON ACTIVITY [40-45]-

Haloperidol induced catalepsy-

Each of the six groups of rats (n=6) will receive a different treatment: a vehicle control group, a haloperidol control group, a bromocriptine group, and an Eleocharis dulchisextract group (medium dosage, high dose). The sodium carboxymethylcellulose (0.5%) suspension containing bromocriptine and Eleocharis dulchis extract will be taken orally. The animals will be given 4 mg/kg of haloperidol intraperitoneally one hour after the medication is administered. At 0, 30, 60, 120, 180, and 240 minutes after the haloperidol is given, the catalepsy will be assessed using standard bar tests. A rotarod test will be administered to assess motor coordination, while an actophotometer will be used to measure locomotor activity. The trial period for animals is fourteen days, during which time they should be given Eleocharis dulchis extract everyday.

Bar Test-

The catalepsy will be measured using a bar test. The animal's front paw will rest on a horizontal bar that is three centimeters above and perpendicular to the base during the bar test. When the animal takes its paw off the bar, that's when it will be recorded. The bar test will have a predetermined maximum cut-off time of 300 seconds. Both the locomotor activity test and the motor coordination test will be conducted on the same rat. Two levels of dosage: intermediate and high. A solution of bromocriptine and Eleocharis dulchisextract in sodium carboxymethylcellulose (0.5%) will be given orally. Standard bar tests will be used to assess catalepsy at 0, 30, 60, 120, 180, and 240 minutes following the drug administration, as well as one hour after the drug administration, when the animals will be challenged with haloperidol 4 mg/kg i.p. An actophotometer will be used to measure locomotor activity, and a rotarod test will be administered to assess motor

coordination.Note: Animals should be treated with Eleocharis dulchisextract daily for fourteen days of the experimental period.

Motor Co-ordination Test (Rotarod test) (same rat)-

The rotarod equipment will be used to measure motor coordination. Before treatment, rats will be put on a moving rod; those who can maintain a fall-free position for 120 seconds will be selected for the research. Prior to and during extract administration, the duration it takes for animals to detach from the revolving rod will be recorded.

Test for Locomotor Activity (Actophotometer) (same mice)-

It will be an actophotometer that measures the locomotor activity. A big cage measuring 30 x 30 x 30 cm with six lights and six photocells arranged around the bottom in a manner that allows a single rat to block just one beam makes up the apparatus. When light rays hit photocells, they activate; when an animal moves across the light beam, the photocells disrupt the beam; and the amount of cuts For 10 minutes, we will record any interruptions.

ESTIMATION OF BIOCHEMICAL PARAMETERS [35-45]-

Determination of dopamine by HPLC-

Preparation of Brain Sample: Dissected striata will be immediately frozen on dry ice and stored at -80 degree Celsius. Striatal tissues will be sonicated in 0.1 M of perchloric acid (about 100 ul/mg tissue). The supernatant fluid will be taken for measurements of levels of dopamine by HPLC.

Determination of Catalase-

Each set of rats will be killed using a carbon dioxide chamber once their performance on the Bar test, motor coordination test, and locomotor activity assessments have been completed. The brains will then be promptly removed and put in ice-cold saline. A 0.1M phosphate buffer (pH 8) will be used to weigh and homogenize the tissues. For the purpose of analyzing Catalase activity, several test tubes will be used to collect samples of rat brain homogenates. The catalase test will be conducted using the supernatant.

Motor Co-ordination Test-

Motor coordination test will be conducted using rotarod apparatus. The animals will be placed on the moving rod prior to the treatment and the rat stayed on the rod with0 out falling for 120 sec. will be chosen for the study. The time animals take for falling from the rotating rod will be noted before and after the treatment with extract.

Test for Locomotor Activity-

Use of an actophotometer will allow for the measurement of locomotor activity. The setup includes a large cage (30 x 30 x 30 cm), six lights, and six photocells strategically positioned around the bottom of the cage to ensure that each rat blocks just one ray of light. Light rays hitting the photocells trigger the activation of the photocells; while an animal moves across the light beam, the number of cutoffs will be recorded for a duration of 10 minutes.

RESULT & DISCUSSION

Phytochemical analysis

Table no 01- The Phytochemical analysis observation of plant

Phytoconstituents	Test	Observation
Carbohydrates	Molisch test	+ ve
	Benedict's test	+ ve
Proteins	Biuret test	+ ve
	Sulphur powder test	+ ve
Saponins	Froth test	+ ve
Flavonoids	Lead acetate test	+ ve
	Shinoda test	+ ve

Alkaloids	Hager's and Dragondroff's test	+ ve
Phenols and tannins	Ferric Chloride test	+ ve
	Dilute Potassium permanganate test	+ ve
Fixed oil and fats test	Stain test	+ ve
Glycosides	Legal test	+ ve

The existence of numerous bioactive chemicals is shown by the phytochemical examination of the plant. Both the Molisch and Benedict's tests came back positive, confirming the presence of carbohydrates. The presence of proteins was confirmed by the positive results of the Biuret and Sulfur powder tests. The Froth test was used to identify saponins. The presence of flavonoids was confirmed by the good outcomes of the Lead acetate and Shinoda tests. The use of Hager's and Dragendorff assays allowed for the confirmation of alkaloids. Positive results from the Ferric Chloride and Dilute Potassium permanganate tests allowed for the identification of tannins and phenols. A positive result from the Legal test revealed the presence of glycosides, whereas the Stain test identified fixed oils and fats. These findings point to the presence of a wide variety of phytoconstituents in the plant, which would explain its possible medicinal effects.

Rotarod Test data- (Common Group)-

The rotarod equipment will be used to measure motor coordination. Before treatment, the rats will be put on the moving rod, and the ones who manage to remain upright for 120 seconds will be selected for the research. Before and after the animals are treated with the extract, researchers will measure how long it takes for them to fall off the revolving rod.

Table no 02- Rotarod Test data Tabular formed

Group	Latency of Fall					
	1	2	3	4	5	6
Group 1 Distilled Water (vehicle)	96.12	89.16	92.42	90.01	93.78	89.92
Group 2 Inducing Agent	20.60	25.13	20.48	29.17	21.53	19.86
Group 3 Standard	72.33	69.78	70.80	75.13	75.89	78.39
Group 4	30.93	28.84	39.73	32.28	36.58	40.24
Group 5	36.72	57.75	55.69	62.13	54.33	65.25
Group 6	69.00	67.52	58.18	58.30	59.42	65.09

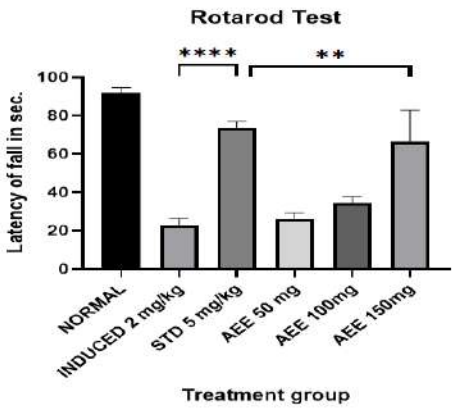


Fig no 02- Rotarod Test data graphical representation

Results from the Rotarod test reveal the six groups of mice's motor coordination and balance by showing their latency of fall, which is the time in seconds before the mice fall off the revolving rod. Latencies in Group 1 (Distilled Water) were consistently high, suggesting that motor function was normal. Group 2 (Inducing Agent) had considerably reduced latencies, indicating decreased motor coordination characteristic of symptoms similar to Parkinson's disease. Motor function improved with longer latencies in Group 3 (Standard therapy), in contrast to Group 2. Motor

function improved in a dose-dependent manner in groups 4, 5, and 6, when administered Eleocharis dulcis (EOED) at varying dosages. Group 6 (high dosage) had latencies comparable to those of the normal treatment group, suggesting improved motor coordination, whereas Group 4 (low dose) demonstrated modest improvement and Group 5 (middle dose) higher recovery.

Actophotometer Test- (Common data)-

Use of an actophotometer will allow for the measurement of locomotor activity. The setup includes a large cage (30 x 30 x 30 cm), six lights, and six photocells strategically positioned around the bottom of the cage to ensure that each rat blocks just one ray of light. Light rays hitting the photocells trigger the activation of the photocells; while an animal moves across the light beam, the number of cutoffs will be recorded for a duration of 10 minutes.

Table no 03 – The Actophotometer Test observation

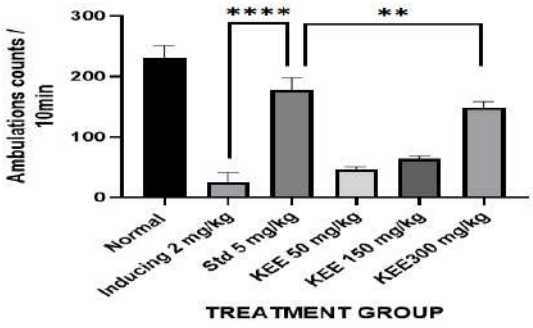


Fig no 03- Actophotometer Test Graphical Data

Experimental animals' locomotor activity, a marker of their motor function and treatment response, is measured with the Actophotometer test. Each of the six categories in this dataset displays a different amount of activity in seconds. Group 1 seems to have a minimal motor response, since there is hardly any activity. With an activity level that never drops below 60 seconds, Group 2 is clearly the most active. Activity levels in Group 3 are moderate, falling anywhere between 9 and 25 seconds. Group 4's performance is comparable to that of Group 2, but with somewhat lower marks. Activity levels in Group 5 are somewhat variable, but in Group 6 they are moderate and relatively consistent when compared to Group 3. There may have been variations in treatments or physiological circumstances among the groups, which might explain this variance.

Bar Test (Common Data):

A bar test will be used to measure the catalepsy. In the bar test, the front paw of the animal will be placed on the horizontal bar located 3 cm above and parallel to the base. The time at which the animal removes its paw from the bar will be noted. The maximum cut off time for the bar test will be fixed at 300 sec.

Table no 04- Bar Test activity observations

Group	Activity (min.)					
	1	2	3	4	5	6
Group 1	236	218	232	254	198	247
Group 2	36	32	00	43	21	20
Group 3	193	183	137	187	189	219
Group 4	50	55	57	69	47	49
Group 5	59	62	65	66	58	70
Group 6	87	98	103	99	103	105

The Bar Test is a timed motor task that is often used to evaluate motor coordination or muscle tone. There are six distinct categories in this dataset, each with its own minute-level of activity. With readings between 198 and 254 minutes, Group 1 demonstrates the most constant and greatest level of activity. With durations ranging from 137 to 219 minutes, Group 3 is likewise rather active, but to a lesser extent than Group 1. Group 6 is moderately active, with values ranging from 87 to 105 minutes. Group 2 is the most inactive, with hardly no movement at all, in some instances. Groups 4 and 5 both show relatively modest levels of exercise, between 47 and 70 minutes. It seems that the experimental circumstances or treatments used to each group

had different impacts, based on the variations among the groups.

BIOCHEMICAL PARAMETERS-

Determination of Dopamine concentration by UV spectrophotometer:

Table no 05- Effect of bromocriptine and HIEE on dopamine concentration using UV

Treatment Group	Concentration of dopamine Mean ± SEM
Vehicle control	13.27±0.39
Haloperidol	11.27±0.28
Bromocriptine	4019±0.53
HIEE 50mg/kg	18.92±0.08
HIEE 150mg/kg	23.18±0.60
HIEE 300mg/kg	35.27±0.48

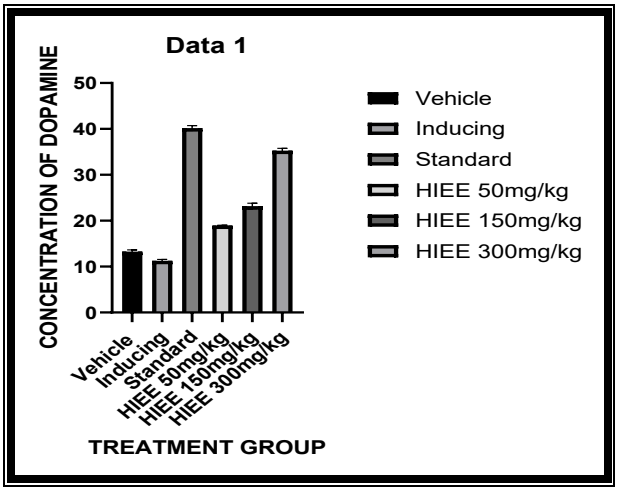


Fig no 04- Graphical representation of Effect of bromocriptine and HIEE on dopamine concentration using UV

The effects of bromocriptine and HIEE on dopamine levels in haloperidol-treated patients are shown by the UV spectroscopy data. Dopamine levels were 13.27 α 11.27 in the vehicle control group before haloperidol treatment. Bromocriptine had a notable impact on dopamine levels, as it significantly raised concentration to 4019. A dose-dependent increase in dopamine levels was also seen with HIEE; dopamine concentrations of 18.92, 23.18, and 35.27 mg/kg were achieved at 50 mg/kg, 150 mg/kg, and 300 mg/kg, respectively. According to these findings, bromocriptine exhibits an extraordinarily high rise in dopamine concentration, whereas HIEE and bromocriptine, especially at larger dosages, successfully reverse haloperidol-induced dopamine decrease.

Determination of Catalase by UV spectrophotometer-

Tablet no 06- Effect of HIEE on the levels of Catalase (CAT) in the brain of haloperidol-

Treatment Group	CAT µmole of H2O2 used/min/mg of protein
Vehicle control	0.1243±0.0012
Haloperidol	0.0378±0.0075
Bromocriptine	0.1943±0.0059
HIEE 50mg/kg	0.05752±0.0015
HIEE 150mg/kg	0.07183±0.0039
HIEE 300mg/kg	0.1006±0.0120

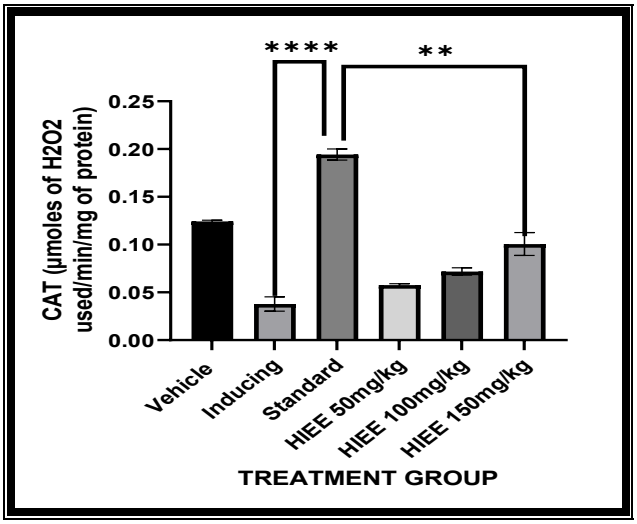


Fig no 05- Graphical representation of Effect of HIEE on the levels of Catalase (CAT) in the brain of haloperidol

The effects of bromocriptine and HIEE on haloperidol-treated individuals are shown by data on brain catalase (CAT) activity. The CAT level for the vehicle control group was 0.1243 µmole of H2O2 used/min/mg of protein. The CAT activity

was drastically decreased to 0.0378 by haloperidol, suggesting the presence of oxidative stress. With a significant rise to 0.1943, bromocriptine surpassed the vehicle control threshold for CAT activity. HIEE also increased CAT activity dose-dependently; CAT levels of 0.05752, 0.07183, and 0.1006 were obtained at 50 mg/kg, 150 mg/kg, and 300 mg/kg, respectively. These results indicate that bromocriptine significantly improves CAT activity, whereas HIEE and bromocriptine both, especially at larger dosages, successfully reduce haloperidol-induced oxidative stress.

CONCLUSION

The phytochemical examination of the plant uncovered many bioactive substances that might be involved in its medicinal potential. These chemicals include carbohydrates, proteins, saponins, flavonoids, alkaloids, phenols, tannins, fixed oils, lipids, and glycosides. Group 2 (those exposed to the inducing substance) had reduced motor coordination on the Rotarod test, but Group 1 (the control) demonstrated normal function. Group 3's motor function was enhanced by the usual therapy, whereas groups 4, 5, and 6 exhibited dose-dependent improvements in coordination with Eleocharis dulcis (EOED) at increasing dosages. Group 6, which received the highest dose, had outcomes that were equivalent to the normal treatment. Results from the locomotor activity-measuring Actophotometer test indicated that therapy had a positive effect on Groups 4, 5, and 6, with Group 2 having the most activity and Group 1 having the lowest. Group 1 exhibited the greatest degree of activity on the Bar Test, which assesses muscular tone and coordination, whereas Groups 4 and 5 had lower levels. The sixth group outperformed groups two and three to a modest degree. Group 2 had the most activity on the Actophotometer, while Groups 4, 5, and 6 all shown an increase in locomotor activity. Group 6 showed modest improvement, Groups 4 and 5 had lower levels of motor activity, and Group 1 had the greatest levels in the Bar Test. High-intensity electrical exercise (HIEE) and bromocriptine both mitigated the dopamine decreases caused by haloperidol, according to UV spectroscopy studies; however, bromocriptine had the most pronounced effect. When it came time to analyze the effects of haloperidol on oxidative stress, the results showed that both bromocriptine and HIEE were effective, with bromocriptine producing the maximum CAT activity.

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