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EVALUATION OF ANTIPARKINSONS ACTIVITY OF RICINUS COMMUNIS OIL BY USING PARAQUAT INDUCEDCARASSIUS AURATUS

Deepa P.[1]*, Anagha P. P.[2], Fathimathu Zahra[3], Shahanas Fathima V. V.[4], Shahitha Afreen[5] and Sona Fathima S.[6]

[1]Assistant Professor, Pharmacology Department, Karuna College of Pharmacy, Thirumittacode, Palakkad.

[2-6]8th Semester Students, 2019 Batch, Karuna College of Pharmacy, Thirumittacode,Palakkad.

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***Corresponding Author**
Deepa P.
Assistant Professor, Pharmacology Department, Karuna College of Pharmacy, Thirumittacode, Palakkad.

ABSTRACT

Ricinus communis oil also known as Castor oil is known for its various medicinal properties like antioxidant, anti inflammatory and central analgesics. The phytoconstituents present in the castor oil responsible for the Neuroprotective action in CNS disorders like Parkinson's disease. The antioxidant property of Castor oil in paraquat dichloride induced *Carassius auratus* in Parkinson's disease is studied. *Carassius auratus* is known as Gold fish. The Gold fish obtained were divided into 4 groups with 6 fish each. Neurotoxicity was induced in gold fish by paraquat dichloride for 4 days. One of the group is treated with standard drug, one group is drug treated, one is control group and other is paraquat induced. In comparison to control group the movement is reduced during the course of paraquat treatment. They regained it with treatment with RC oil. Paraquat treatment restricted the movement of fish from moving to dark zone. When fishes treated with paraquat dichloride their mobility is restricted to upper portion of tank, however when they are treated with RC oil their movement is gradually restored. The standard, control, drug treated showed aggressive, response towards the mirror test, while paraquat treated doesn't show any interaction or response to the mirror test. The fish in standard and drug treated was showed positive response towards shoal cohesion, while paraquat treated doesn't showed shoal cohesion.

KEYWORDS: *Ricinus communis*, Neuroprotective, *Carassius auratus*, Paraquat dichloride.

INTRODUCTION

The central nervous system (CNS) is the part of the nervous system consisting of the brain and spinal cord which integrates the received information, coordinates and controls the activity of all parts of the body.

Parkinson's disease (PD) is a chronic progressive nervous system disorder characterized rest tremor, bradykinesia, rigidity, postural instability, and other motor and non-motor symptoms. Parkinson's disease (PD) is the second most common neurodegenerative disease affecting 1–2% of the population over the age of 60. PD results from the deterioration of especially the dopaminergic neurons in substantia nigra due to the factors like Genetic mutations, Age, Head trauma, Viral infections, Exposure to neurotoxins, etc. The key findings in PD is the deficiency of Complex 1 of the mitochondrial respiratory chain, Oxidative stress, Excitotoxicity, α- Synuclein misfolding and aggregation and Dysfunctional protein clearance. Neurotoxicity pertains to the detrimental effects caused by substances on the nervous system, encompassing both the brain and peripheral nerves. The field of toxicology explores how chemicals canadversely affect nervous system functions. Neuroprotection involves the ability of a treatment to prevent neuronal cell death by interfering with and stopping the pathogenic process that leads to cellular dysfunction and demise. Neurotoxicity can arise from exposure to insecticides, heavy metals like mercury and lead, radiation therapy, cosmetics, chemotherapy drugs, and viral infections.

Castor oil, also known as *Ricinus communis*, contains a variety of phytochemicals that offer numerous medicinal benefits, including antioxidant, anti-inflammatory, and central analgesic properties. Exposure to paraquat dichloride can result in neurotoxicity, which in turn causes impairment of locomotion and thigmotaxis. The goldfish, also known as *Carassius auratus*, is a freshwater fish belonging to the Cyprinidae family. The neuroprotective effect of ricinus communis oil on paraquat dichloride induced neurotoxicity in goldfish model by evaluating the behavioural parameters like height of fish in tank, locomotion, light and dark test, shoal cohesion, mirror test was conducted.

MATERIALS AND METHOD

- ***Materials***

a) Fish models

Adult healthy Male Goldfish were obtained from approved animal breeders. The animals were kept in an aquarium tank with 7L of water which is aerated and maintained at 20±5°C.They were feed twice a day with fish feed.

b) Chemicals

i. Paraquat dichloride
ii. Tween 20
iii. DMSO

c) Drugs

i. Ricinus communis oil
ii. Levodopa

d) Graphpad prism

It is commercial scientific 2D graphing and statistics software for windows and Mac OS desktop computers. Graphpad prism offers a broad variety of analyses from standard to very specialized–T-test, one way, two way and three way ANOVA, linear and non-linear regression.

- ***Method***

Sl no.	Groups	Treatment	No. of animals
1	I	Normal control	6
2	II	Paraquat treated	6
3	III	Paraquat + RC oil	6
4	IV	Paraquat + Levodopa	6

The animals were divided into four groups each containing 6 animals. The water in tank was continuously aerated, maintained at PH-7.5, temperature 20±5ºC. Paraquat dichloride was used to induce neurotoxity in goldfish. 10µM of paraquat dichloride added to be glass tank containing fish and was constantly monitered for neurotoxicity. RC oil (10µg/ml) and standard levodopa (25mg/kg) was added. Behavioural studies was performed as: latency to move high in tank, locomotion effects, light/dark, shoal cohesion, mirror test, thigmotaxis.

Evaluating parameters

- ***Height of fish in tank***

The anxiety index of fish was calculated using the bottom, medium and higher level position. The fish were watched for one minute, and during that time the height at each fish swims is observed and recorded.

- ***Shoal cohesion***

Gold fish usually prefers to swim in groups and their group aggregation is termed as Shoal cohesion. Fishes prefer this behavior to escape from predators. It is measured as an individual parameter for each fish by comparing to "Internal control" fish. It is scored as:

i. Complete lack of group cohesion
ii. Increased shoal cohesion
iii. Partial shoal behavior
iv. Normal distance compared to "internal control"

- ***Locomotion***

Locomotion refers to the fish movement and activity level. It was scored on a scale of 1-5:

1. Virtually immobile
2 Slower than normal
3. Normal
4. Increased locomotion
5. Intense locomotion

This is evaluated by comparing with "Internal control" group.

- ***Mirror test***

This test is used to assess behavioral parameters in animals. Mirror test is employed to investigate their self-recognition and cognitive behavior. A mirror is placed in the aquarium and response of fish towards their reflection is observed. In general, the gold fish shows aggressive behavior and interact with mirror, usually called as 'Mirror biting'.

- ***Light and Dark test***

This test is carried out to assess the anxiety behavior of gold fish. Gold fish prefers both light and dark region. Light region is required for their activities and prefers dark region for sleep. The apparatus is divided into light and dark zone, and the preference of each fish towards the light and dark zone can be observed.

RESULT AND DISCUSSION

- ***Height of fish in tank***

The height travelled by the fish was taken as the index of anxiety. The height of the fish in a tank can be related to its cognitive function and behavior. Height of the fish was observed at 5 min and 10 mins.

Table 1: The height of fish in the tank in 5 minutes and 10 minutes of various groups.

Groups	Heights of fish in tank (cm)(5min)						Height of fish in tank (cm)(10 min)					
Control	10	12	10	11.5	11	10.5	11.5	9.5	11	12.5	12	10
Paraquat Dichloride	3	2	2	3.5	2.5	3	1	1	1.5	1.5	2	3
RC oil	8	8	7	8.5	7.5	8	10	10	8	10	8.5	7.5
Levodopa	10	12	11.5	9.5	9	10.5	11	10	12	12.5	10.5	10

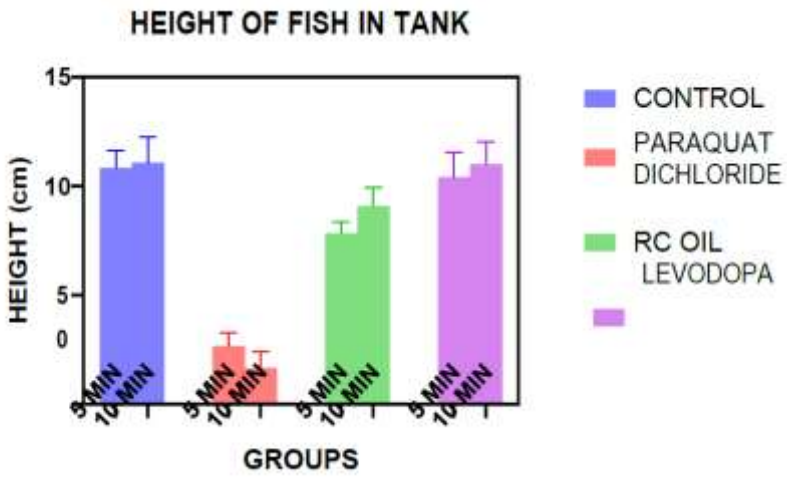

Fig. 1: The height of the fish in tank in5mints and 10mints.

The values are evaluating statistically using TWO WAY ANOVA. Expressing the values of Mean ±SEM P value, P=0.0285, P= 0.3002, P<0.0001. This graph has been showed that there is significant difference between RC oil and standard group. RC oil treatment shows that statistical difference in height compared to Paraquat dichloride treated group.

- ***Locomotion***

Locomotion is used as a general index of behavioral excitation with normal being the base line. Compared to the control group, paraquat treated group has reduced mobility. However, standard group and castor oil treated group restored the movement to normal level.

- ***Mirror test***

In generally, gold fish shows aggressive response towards their reflection in the mirror.

Paraquat treated group doesn't show any response while standard treated group showed aggressive and positive response towards the mirror reflection.

- ***Shoal cohesion***

Generally gold fish prefers to swim in groups. The drug treated and standard group showed shoal cohesion, while the paraquat induced doesn't show shoal cohesion.

- ***Light and Dark test***

Anxiety parameter can be determined by this test. The paraquat treated group was found to be spend more time in dark zone. The standard and the drug treated groups when introduced into this chamber, swims towards both zones, but spends more time in light.

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