ISSN 0975-2366
DOI:https://doi.org/10.31838/ijpr/2020.12.04.626

Research Article

Role of Flavonoid Rich Fraction of Butea monosperma Linn. In Memory Enhancing Activity

GHASSAN SALAH AHMED [1], MAZIN A. A. NAJM [2], AHMED S. ABDUL JABBAR [3], *FALAH HASSAN SHARI [4]

[1]Department of Clinical pharmacy, College of Pharmacy, University of Basrah, Iraq.
[2]Department of Pharmaceutical Chemistry, College of Pharmacy, University of Al-Ayen, Thi-Qar, Iraq.
[3]Department of Pharmaceutics, College of Pharmacy, University of Basra, Iraq.
[5]Department of Clinical Laboratory sciences, College of Pharmacy, University of Basrah, Iraq.
*Corresponding Author
Email: falah.shary@uobasrah.edu.iq
Received: 09.10.20, Revised: 05.11.20, Accepted: 16.12.20

ABSTRACT

Aim: The main of the present study is to find out the Role of Flavonoid Rich Fraction of Butea monosperma Linn. In Memory Enhancing Activity.

Material & Methods: The dried powder of flowers was extracted and Flavonoid-rich fractions were prepared by the prescribed method. The quantitative phytochemical test for the occurrence of various active phytoconstituents was performed for the presence of phenolic and flavonoid compounds. The acute toxicity study was also performed for dose determination. The antioxidant activity of Flavonoid fraction was performed by different methods i.e. DPPH, Hydroxyl radical, and carotene method. The Flavonoid fraction was evaluated for the memory-enhancing activity by Morris test and elevated plus maze and at the end of the study, cholinesterase level in brain was estimated. RESULTS: The result showed that Flavonoid fraction extract reserved β-carotene/lin¬oleic acid oxidation and progressive action happening beside by concentration. Hydroxyl radical scavenging ability calculated as IC50 reveals that Flavonoid fraction has IC50 values of 48 µg/mL respectively. DPPH scavenging ability calculated as IC50 shows that Flavonoid fraction has IC50 of 38 µg/mL followed by ascorbic acid (3.4 µg/mL). Flavonoid fraction significantly decreased ($P<0.001$) EL and significantly increased TSTQ as compared to vehicle-treated control. Oral administration of Flavonoid fraction in 25 and 50 mg/kg, respectively exhibited significant ($P < 0.01$) increase in the percentage of the number of open arm entries and time spent in open arm whereas, in the closed arm number of entries and time spent was significantly ($P < 0.01$) reduced as compared to vehicle-treated group.

Conclusion: The results obtained in this study have exposed that Flavonoid fraction displayed significant memory enhancing activity.

Keywords: Flavonoid Rich Fraction, Butea monosperma Linn., Memory Enhancing Activity, Morris Water Test, Cholinesterase Enzyme

INTRODUCTION

by day conduct. The most boundless type of dementia encompassed by more seasoned individuals is AD, which in the first place includes the pieces of the cerebrum that control thought, memory, and language, finishing with savage mind harm (Joshi et al., 2007). Cognizance from a broad perspective methods data allotment. It indicates a generally significant level of preparing unmistakable data including thinking, memory, discernment, impetus, talented game plans, and language. The hippocampus contains the neural hardware vital for intellectual capacities, for example, learning and memory (Tripathi, 2006). Memory is the main element of the mind. Memory is the cycle by which creatures can affirmation their encounters and uses this to adjust their reactions to the climate. Thus it is indispensable for endurance. The focal cholinergic framework is all around considered as the main synapse engaged with guidelines of psychological capacities. Debilitated psychological capacities are the significant highlights of AD. The presence of acetylcholine inside the neocortex is sufficient to improve learning shortfalls and restore memory (Kanwal et al., 2010).

The international arrangement of medication is loaded down with restorative plant professed to

advance learning memory and insight. The plants have been gathered under the overall class of Medhaya Rasayana that is substance/specialists that repudiate the degenerative changes related to maturing and are worthwhile in advancing the mind (Sharma et al., 1901).

Ivery old Ayurvedic physicians had developed 'Rasayan Chikitsa' therapy for preventing early aging, developing brainpower, and increasing the body resistance against diseases. Rasayana group of plants generally possesses physically powerful antioxidant activity. They inhibit generation/ causes neutralization of free radicals which are accountable for lipid peroxidation of the neuronal cell membrane (Joshi & Parle, 2006; Dua et al., 2009).

Hence, by keeping in view, the main of the investigation was to appraise the memory-boosting activity of Flavonoid-rich fraction of *Butea monosperma*.

MATERIAL & METHODS

Procurement of Plant Materials & Authentification

Butea monosperma Linn flowers. Collected from collection gardens in Kurdistan, northern Iraq. The flowers were recognized taxonomically by Dr. Ghassan Salah Ahmed and Dr. Ahmed S.

Preparation of Flavonoid Rich Fraction

The air-dried powdered flowers (100 g) were extracted with ethanol in a Soxhlet extractor for 24 hours. After removal of the solvent, the residue (15.8 g) was extracted with petroleum ether (60 - 80 °C) to eliminate waxy material. The defatted material was then dissolved in water and successively extracted with ethyl acetate and n-butanol. The individual fractions of ethyl acetate and n-butanol were distilled under reduced pressure to provide dried extract.

The ethyl acetate crude extract was dissolved in ethanol and thoroughly adsorbed on a silica gel column (5 g). Then it was located on the peak of the silica gel column which had been packed with 35 g of silica gel in diethyl ether. The column was eluted consecutively with diethyl ether, graded amount of ethyl acetate in diethyl ether, ethyl acetate, and then increasing amount of methanol in ethyl acetate. The chromatography was monitored by silica gel TLC using ethyl acetate-methanol (8:2) as the solvent. The fractions that gave the same spot were combined and crystallized by using methanol to provide Flavonoid rich fraction (Mukherjee, 2002).

Preliminary Phytochemical Tests

Different qualitative chemical tests were subjected to test the presence of Flavonoid. (Kokate, 2003; Khandelwal, 2006).

Antioxidant Activity Of Flavonoid Rich Fraction

Lipid Peroxidation Inhibitory Test

Method of inhibition Beta-carotene

This test depends on the limit of β-carotene oxidative fading in β-caroten/linoleic corrosive blend with and without the addi¬tion of various concentrations of the two plants, the technique depicted by Kikuchi and Kitamura (1987) with a slight adjustment. Quickly, 6.0 mg β-carotene was dis-unraveled in 10 ml of chloroform, at that point 1 ml of arrangement pipetted to glass-filled of 20 mg linoleic corrosive. 5 ml of blend then pipetted to response tube filled with concentrate in scope of fixation, blended homogenously. Test retentions were led when hatching at 50oC for 30, 60, and 120 minutes (Murdifin et al., 2017).

β-carotene bleaching inhibition percentage was calculated by the following formula:

$$\% \text{ Inhibition} = [1 - (AA(120) - AC(120)) / (AC(0) - AC(120))] \times 100$$

AA(120): sample absorbance at t = 30, 60 or 120 minute

AC(120): control absorbance at t = 30, 60 or 120 minute

AC(0): control absorbance at t = 0 min

Hydroxyl radical ($OH^{\cdot}$) scavenging activities

One mL of the response blend contained 100 µL of 2.8 mM 2-deoxyribose (disintegrated in phosphate cushion (10 mM), pH 7.4), 500 µL arrangement of different centralizations of the concentrate (500n1000 µg/mL), 200 µL of 200 µM FeCl3 and 1.04 µM EDTA (1:1 v/v), 100 µL of H2O2 (1.0 mM) and 100 µL of ascorbic corrosive (1.0 mM). After hatching season of 1 hour at 37OC, the measure of deoxyribose debasement was estimated by TBA response (Badmus et al., 2011; Halliwell et al., 1987).

The % restraint of hydroxyl revolutionary was determined by utilizing following recipe.

$$\% \text{ Inhibition} = \frac{(100 - A_{Sample})}{A_{Control}} \times 100$$

DPPH (1, 1-Diphenyl-2-picrylhydrazyl) free radical scavenging activity

DPPH free extremist rummaging action of the test arrangements was resolved to utilize DPPH photometric strategy (Mensor et al., 2001). At the point when DPPH responds with a cell reinforcement compound which can give hydrogen, it is decreased. The adjustment in shading from profound violet to brilliant/light yellow can be estimated at 518 nm. Quickly, 1 mL of 0.3 mM of DPPH arrangement was added to 1 mL every one of the test arrangements and was brooded in obscurity at room temperature for 30 min (Badmus et al., 2011). The absorbance esteems were perused at 518 nm, and changed over into rate cancer prevention agent movement,

utilizing the beneath referenced recipe:

$$\text{DPPH scavenging effect (\%)} = \frac{A_{Control} - A_{Sample}}{A_{Control}} \times 100$$

In-Vivo Evaluation for Memory Enhancing Activity

Selection of animals

Wistar rats with pale skin of the same sex 1 and 2 months old enough to measure 25-35 g were used which were obtained from Animal House, College of Science. The critters were allowed to have a rodent family diet (Lipton India Limited, Mumbai, India) and water was not mandatory. All conditions and creatures of the search center were preserved in accordance with CPCSEA rules throughout the investigations..

Acute Toxicity Study

The intense oral harmfulness considers was done by the rules set by the Organization for Economic Co-activity and Development (OECD), updated draft rule 423.

Flavonoid rich part was set up as a suspension by pulverizing dried division with 1% Tween 80, arranged in refined water. Wistar rodents (150-200 g) were utilized for intense poisonousness study to decide the intense harmfulness. Before dosing, creatures were saved for 12 h of fasting. Root extricates were directed orally to pale-skinned person rodents at a portion of 500 mg/kg. The perception was made during the initial four hours after the medication organization to see the change in skin and hide, eye, bodily fluid layer, hyperactivity, prepping, spasms, sedation, hypothermia, quake, salivation, unconsciousness, torpidity, body weight, and mortality

One 10th and one-fifth of the deadly portion was taken as a compelling portion (helpful portion) and cut off worth was chosen as 25 and 50 mg/kg to assess the portion subordinate activity for the assessment (OECD rules, 2001).

Evaluation of Memory Enhancing Activity

Morris Water test

The technique and boundaries for testing learning and memory of mice utilizing Morris water labyrinth were followed as revealed before (Domange et al., 2013; Morris, 1984; Parle and Singh, 2007). Creatures were partitioned into four gatherings and six creatures were set in each gathering. Gatherings 1 filled in as control and gathering 2 as standard medication (physostigmine, 0.1 mg/kg i.p.) treated. Gathering 3 and 4 treated by Flavonoid-rich part in a portion of 25 and 50 mg/kg, individually were directed for 15 progressive days. Break dormancy (EL) was recorded 120 min after medication organization from the eleventh day to the fourteenth day. On the fifteenth day, time spent in the target quadrant (TSTQ) was noted 120 min after the medication organization. If there should be an occurrence of creatures controlled with physostigmine, EL, and TSTQ were noted after 30 min of medication organization. The treatment schedule was as follows:

Group-1 Served as control

Group-2 As standard drug (physostigmine, 0.1 mg/kg *i.p.*)

Group-3 Animals were treated by Flavonoid rich fraction in dose of 25 mg/kg

Group-4 Animals were treated by Flavonoid rich fraction in dose of 50 mg/kg

Elevated Plus-Maze Test

The percentage of time spent in the open arms and number of open arm entries were calculated using the formulas [100 × open/ (open + enclosed)] and

(100 × open/total entries), respectively (Nishino et al., 2008).

After 1 h of oral administration of vehicle, diazepam and Flavonoid-rich fraction were assessed for memory enhances or behavior studies using the elevated plus-maze test. The flavonoid-rich fraction was used in a dose of 25 & 50 mg/kg.

Biochemical Estimation

Collection of Brain Sample

After the fifteenth day utilizing Morris's water labyrinth, the creatures were relinquished on the sixteenth day by cervical separation. The entire cerebrum was deliberately taken out from the creatures. The new entire cerebrum was gauged first and afterward homogenized in quite a while of 0.1 M phosphate cradle (pH 8) utilizing a glass homogenizer. The homogenate was centrifuged at 3000 rpm for 10 min at 4°C utilizing a refrigerated rotator. The resultant overcast supernatant fluid was utilized for the assessment of cerebrum acetylcholinesterase action (Ellman et al., 1961).

Estimation of Acetyl cholinesterase Activity

0.4 ml of cerebrum homogenate was added into a test tube containing 2.6 ml of phosphate cushion. 5,5-dithiobis-2-nitrobenzoic corrosive reagent (0.1 ml) was added to the above combination and absorbance was noted at 412 nm. At that point, 0.02 ml of acetylcholine iodide arrangement was added and again absorbance was noted 15 min from that point. Change in absorbance every moment was determined (Ellman et al., 1961).

Statistical Analysis

The values are expressed in mean ± SEM. The results were analyzed by using one-way analysis of variance (ANOVA) followed by Dunnet's "t" test to determine the statistical significance. $p < 0.05$ was chosen as the level of significance.

RESULTS

Preliminary Phytochemical Screening

The phytochemical analysis showed that occurrence of Flavonoid and phenolic compounds.

Table 1: Qualitative chemical analysis of extracts by chemical tests

S. No	Phytoconstituents	Chemical Tests	*Plumbago zeylanica* Linn.
1	Flavonoids	Shinoda test	+++
		Zinc hydrochloride test	+++
2	Phenolics (Tannins)	Gelatin test	+
		Ferric chloride test	+

Where, (+) Positive

Antioxidant Activity

β-carotene inhibition method

The outcome demonstrates that Flavonoid division extricates hindered β-carotene/lin¬oleic corrosive oxidation and reformist movement occurring next to with focus. Ongoing investigations revealed that the lower extremity of nutrient E brings about improved disintegration in the lipid stage and efficient in protecting linoleic corrosive. Nutrient E as standard was utilized in this examine and 86% hindrance was discovered to be at 30 minutes. Flavonoid fraction also showed concentration-dependent activity.

Table 2: Effect of Flavonoid fraction on β-carotene inhibition method.

S. No.	Treatment	Concentration	Time		
			30 Min	60 Min	120 Min
1	Flavonoid fraction	20 µg/ml	52.33±2.35	38.55 ± 3.34	29.25 ± 1.86
		40 µg/ml	61.15±3.41	48.33 ± 3.22	31.94 ± 2.58
		60 µg/ml	64.23±3.51	51.32 ± 2.21	42.22 ± 3.84
		80 µg/ml	72.10±1.85	59.27 ± 2.47	45.23 ± 3.89
	Vitamin E	4 µg/ml	30.33±2.19	33.55 ± 2.27	15.19 ± 2.29

2		6 µg/ml	37.55±2.52	32.29 ± 2.33	21.43 ± 2.88
		8 µg/ml	65.13±2.98	58.27 ± 2.59	39.26 ± 3.27
		10 µg/ml	86.10±3.22	71.21 ± 3.97	60.28 ± 3.94

Hydroxyl radical scavenging activity

Hydroxyl radical scavenging ability calculated as IC50 from Table…….. reveals that Flavonoid fraction has IC50 values of 48 µg/mL respectively. These results implied that the Flavonoid fraction has the highest OH^- radical scavenging abilities.

Table 3: Effect of Flavonoid fraction on Hydroxyl radical scavenging activity

S. No.	Concentration (µg/mL)	Flavonoid fraction (%)
1.	50	52.72±2.27
2.	100	56.22±3.85
3.	150	63.74±3.29
4.	200	72.32±3.97
5.	250	78.12±3.65

Values are expressed as the mean of triplicate

DPPH scavenging activity

DPPH scavenging ability calculated as IC50 from Tables 4 and 5 shows that Flavonoid fraction has IC50 of 38 µg/mL followed by ascorbic acid (3.4 µg/mL). The result revealed that the Flavonoid fraction had the highest DPPH scavenging ability.

Table 4: Effect of Flavonoid fraction on Percentage DPPH scavenging activities

S. No.	Concentration (µg/mL)	Flavonoid fraction (%)
1.	10	29.23±2.55
2.	20	35.11±3.64
3.	30	43.55±3.24
4.	40	52.37±3.29
5.	50	61.22±3.24

Values are expressed as the mean of triplicate

Table 5: Percentage (%) DPPH radical scavenging effect (standard)

S. No.	Concentration (µg/mL)	Vitamin C (%)	Gallic Acid (%)
1.	2	46.28±2.35	44.62±3.54
2.	3	48.22±3.39	47.78±2.77
3.	4	63.38±3.98	51.27±1.91
4.	5	69.88±2.85	59.12±3.59

Acute Toxicity Studies Of Plant Extracts

No toxic effects were observed for Flavonoid fraction at a higher dose of 500 mg/kg body weight of Wistar rats. Hence, 1/ 10th dose was selected as an effective dose or therapeutic dose

Table 6: Acute toxicity studies of plant extracts

S. No.	Treatment	Dose (mg/kg)	Number of animals	Mortality			Toxicity Profile
				After 24 hrs	After 7 days	After 14 days	
1	Flavonoid fraction	500	5	0	0	0	Safe

Pharmacological Evaluation of Flavonoid fraction for Memory Enhancing Activity

Morris Water Test

According to results appeared in Table No.and 8. A Learning and memory are related with get away from inertness and Retentions time in the target quadrant (RTTQ). The decay of EL and expansion of TSTQ by mice in Morris water labyrinth shows an perfection of education and memory and the other way around. Flavonoid part and Physostigmine (0.1mg/kg, i.p.) managed for 15 progressive days altogether diminished EL of mice from eleventh to the fourteenth day and expanded TSTQ by mice on the fifteenth day when contrasted with the control, consequently indicated critical improvement of learning and memory. Flavonoid division altogether diminished ($P<0.001$) EL and essentially expanded TSTQ when contrasted with component-treated control.

Table 7: Morris Water Maze to study the effect of Flavonoid fraction on escape latency (EL) of mice

Treatment Schedule	Escape Latency (Sec) Day 11	Escape Latency (Sec) Day 12	Escape Latency (Sec) Day 13	Escape Latency (Sec) Day 14
Control	92.22 ± 1.22	93.21 ± 1.22	92.48 ± 1.67	93.12 ± 2.55
Physostigmine, 0.1 mg	92.32 ± 1.29	88.11 ± 1.37*	85.29 ± 1.99**	78.32 ± 2.22 ***
Flavonoid fraction, 25 mg/kg	92.55 ± 128	87.15 ± 1.78 *	83.54 ± 1.37 **	78.31 ± 1.57 ***
Flavonoid fraction, 50 mg/kg	90.12 ± 1.27	84.25 ± 1.59 *	81.38 ± 1.59 **	80.52 ± 1.40 ***

Qualities are communicated as mean±SEM, n=6 in each gathering; * $p<0.05$, contrasted with infectious prevention ** $p<0.01$, contrasted with infectious prevention. *** $p<0.001$, contrasted with infectious prevention.

Table 8: Effect of Flavonoid fraction on Retentions time in the target quadrant (RTTQ)

Treatment Schedule	(RTTQ) (sec), (15^{th} day)
Control	44.42 ± 2.88
Physostigmine, 0.1 mg	96.21±2.79***
Flavonoid fraction, 25 mg/kg	99.87±2.49***
Flavonoid fraction, 50 mg/kg	102.46±2.90***

Values are expressed as mean±SEM, *n*=6 in each group;. *** $p<0.001$, compared to disease control

Table 9: Effect of Flavonoid fraction on Acetyl cholinesterase activity of mice in brain

Treatment Schedule	Acetyl cholinesterase activity (mol/l per min × 10-6/g of tissue)
Control	0.062 ± 0.012
Physostigmine, 0.1 mg	0.018±0.003***
Flavonoid fraction, 25 mg/kg	0.020±0.004***
Flavonoid fraction, 50 mg/kg	0.019±0.007***

Values are expressed as mean±SEM, *n*=6 in each group; *** $p<0.001$, compared to disease control

Elevated Plus Maze Test

The vehicle-treated mice (10 ml/kg, p. o. ordinary saline) invested more energy in the shut arm and demonstrated fewer sections in the open arm contrasted with the shunt arm of the labyrinth at 5 min. Creature treated with diazepam (1 mg/kg, p. o.) indicated huge ($P < 0.001$) increment in the level of open arms sections just as time spent in the open arm while in shut arm number of passages and time spent were essentially ($P < 0.001$)

diminished. Oral organization of Flavonoid portion in 25 and 50 mg/kg, separately showed critical (P < 0.01) increment in the level of the number of open arm passages and time spent in the open arm while in the shut arm number of sections and time spent was essentially (P < 0.01) decreased when contrasted with vehicle-treated gathering.

Table 10: Effect of Flavonoid fraction on open and closed entries

S. No.	Treatments	No of Entries		Time Spent (Sec)	
		Open Arm	Closed Arm	Open Arm	Closed Arm
1.	Vehicle	6.8 ± 1.3	22.8 ± 2.6	25.5 ± 3.7	198.8 ± 4.7
2.	Diazepam	12.8 ± 1.8***	14.7 ± 1.9***	37.9 ± 2.4**	140.9 ± 4.5
3.	Flavonoid fraction, 25 mg/kg	11.6 ± 1.7**	10.6 ± 1.4**	44.8 ± 3.7**	132.3 ± 3.4**
4.	Flavonoid fraction, 50 mg/kg	11.9 ± 1.4 **	11.8± 1.5**	50.5 ± 3.9**	148.9 ± 3.6**

Values are expressed as mean±SEM, $n=6$ in each group; * p <0.05, compared to disease control ** p<0.01, compared to disease control. *** p <0.001, compared to disease control

DISCUSSION

Memory is capable of an individual to record the occasion, data and holds them over short or extensive stretches of time and reviews a similar when on earth required. Age, stress, and feeling are conditions that may prompt cognitive decline, amnesia, nervousness, hypertension, dementia, to all the more compromising danger like schizophrenia and Alzheimer's sicknesses (Kshirsagar, 2011). As explore progress, many similarities come into view which relates these diseases to one an additional on a sub-cellular level which including uncharacteristic protein assemblies as well as induced cell death (Bredesen et al., 2006).

Nootropic specialists, for example, piracetam, pramiracetam, aniracetam, and choline esterase inhibitors like Donepezil are as of now utilized for improving memory, mind-set, and conduct. Nonetheless, the subsequent unfriendly impacts related to these specialists have restricted their utilization (Joshi and Parle, 2006).

In the fundamental investigation, dried blossom powder of the chosen plant was separated by utilizing oil ether, ethyl acetic acid derivation, methanol lastly water. The concentrates were dried and screened for the presence of different dynamic constituents. The concentrates indicated the presence of flavonoids, phenolic mixes.

After the preliminary phytochemical screening of different extracts, antioxidant activity of Flavonoid fraction by lipid peroxidation, hydroxyl radical scavenging activity, and DPPH methods were evaluated.

Lipid peroxidation is a gathered impact of responsive oxygen species (ROS), which prompts the intensifying of natural frameworks. It could be started by prompt free revolutionaries, which remove an allylic hydrogen iota from a methylene gathering of polyunsaturated unsaturated fat side chains. This is joined by bond deferment that outcomes in adjustment by diene form setup. The lipid revolutionary at that point takes up oxygen to frame peroxy species. (Dzingiral et al., 2007). Oxygen extremists and other responsive kinds are created in natural frameworks either as side-effects of oxygen decrease or by xenobiotic catabolism (Chance et al., 1979). These ROS, for example, superoxide anion (O2-), hydroxyl revolutionaries (OH.), nitric oxide (NO), and peroxy revolutionary (ROO.) are unequal and can assault key biomolecules, for example, lipids, proteins, and nucleic acids (Halliwell and Gutteridge, 1999). The punishment of oxidation of these biomolecules has been connected to a variety of various human issues, including atherosclerosis, malignancy, and illness of the sensory system (Cross et al., 1987). Cells have a comprehensive exhibit of cancer prevention agent guard instruments to lessen free extreme development or cutoff their harming impacts (Sato et al., 1996). These instruments are insufficient when the equilibrium movements to the side of free revolutionaries age (Gulcin et al., 2002), accordingly the body requires cell reinforcement enhancements to diminish oxidative harm and retard lipid peroxidation.

β-carotene dying hindrance strategy was intentional dependent on the capacity of a cancer prevention agent to hinder orange shading decrease of β-carotene because of the oxidation happened in linoleic corrosive/β-carotene combination (Mikami et al., 2009; Kulisic et al., 2004; Wang et al.,

2010). β-carotene is receptive to free extremists shaped by linoleic corrosive oxida¬tion. Linoleic corrosive free extremist formed when bubbled will draw in hydrogen molecule of methylene diallelic, at that point curved peroxide expense revolutionary administrations con¬jugated twofold obligation of β-carotene which is responsible for its carotenoid orange shading which range at 400-500 nm. Late investigations revealed that the lower extremity of nutrient E brings about improved disintegration in the lipid stage and more productive in securing linoleic corrosive (Fukumoto and Mazza, 2000; Apak et al.,2007).

In the case of Flavonoid fraction, we found that showed the best inhibitory activity. Vitamin E as standard was used in this assay and 86% inhibition was found to be at 30 minutes.

Hydroxyl progressives are generally viewed as one of the quick initiators of lipid peroxidation measure, abstracting hydrogen atoms from polyunsaturated unsaturated fat, which accomplishes peroxidic reactions of layer lipids (Kitada et al., 1979) and besides, from all of the carbon molecules of the sugar moiety of DNA causing oxidative pound up to DNA. These effects have been concerned in mutagenesis, carcinogenesis, and development (Halliwell and Gutteridge, 1999). Ferric-EDTA hatched with H_2O_2 and ascorbic corrosive at pH 7.4, produces hydroxyl extremists and was recognized by their inclination to corrupt 2-*deoxyribose* into pieces, on warming with TBA at low pH shaping a pink chromogen (Halliwell et al., 1987; Aruoma et al., 1989).

In the case of Flavonoid fraction, Hydroxyl radical scavenging ability calculated respectively. These results implied that the Flavonoid fraction has the highest $OH^{\bullet}$ radical scavenging abilities.

DPPH is a free extreme consistent at room temperature and produces a purple shading arrangement in methanol. It is dense within the sight of the cancer prevention agent atom, offering to ascend to a yellowish methanol arrangement. One of the components worried in cell reinforcement action examine is the inclination of a particle to give a hydrogen iota to a revolutionary, and the affinity of the hydrogen gift is the basic factor associated with free extremist searching (Miliauskas et al., 2004). In the case of Flavonoid fraction, DPPH scavenging ability calculated and the result revealed that Flavonoid fraction had the highest DPPH scavenging ability.

Acute oral toxicity studies of Flavonoid fraction were studied. Flavonoid fraction showed no toxic effects i.e. hypersensitivity reactions, diarrhea, itching, conduct changes, and mortality at the portion of 500 mg/kg body weight. Thus, 1/tenth (25 mg/kg) and 1/5 (50 mg/kg) of the deadly portion were chosen as a compelling portion for memory improving movement.

Memory might be viewed as a capacity to remember past procedures. It is a mind-boggling advancement including different pieces of the cerebrum, a few synapses, and tactile organs (Parle et al., 2004a; Parle et al., 2004b). The MWM has been utilized for spatial learning and memory in research center rodents (Rudi et al., 2001).

In our investigation of Flavonoid division, Learning and memory are related with get away from inertness and time spent in the target quadrant. The decay of EL and enlargement of TSTQ by mice in Morris water labyrinth demonstrates improvement of learning and memory and the other way around. Flavonoid portion and Physostigmine (0.1mg/kg, i.p.) regulated for 15 progressive days fundamentally diminished EL of mice from eleventh to the fourteenth day and expanded TSTQ by mice on the fifteenth day when contrasted with the control, hence demonstrated huge improvement of learning and memory. The flavonoid part demonstrated a profoundly huge impact on EL and TSTQ. Flavonoid division fundamentally diminished ($P<0.001$) EL and altogether expanded TSTQ when contrasted with vehicle treated control.

Acetylcholine is estimated as the main synapse engaged with the guideline of intellectual capacities (Hasselmo, 2006). Particular annihilation of cholinergic neurons or diminished combination of acetylcholine was accounted for to be a trait highlight of neurodegenerative problems (Watanabe et al., 2009). Medications that builds the general amount of acetylcholine was considered as memory upgrading drug (Deutsch and Rocklin, 1967). In the current investigation, Flavonoid division altogether weakened the memory of mice in the Morris water labyrinth test. As we have recently examined that Flavonoid which is a primary dynamic constituent in the Flavonoid part might be answerable for the memory upgrading impact because of the restraint of acetylcholinesterase, prompting increment in mind acetylcholine levels. Intellectual brokenness has been demonstrated to be connected with hindered cholinergic transmission and the assistance of focal cholinergic transmission bringing about improved memory. The decay and brokenness of cortical cholinergic neurons are firmly connected with the psychological shortfalls of Alzheimer's sickness (Bartus et

al.,1982; Coyle et al., 1983). Consequently, the medications which improve cholinergic capacity can be utilized for the treatment of dementia personally identified with Alzheimer's illness.

Anxiety, like all emotions, has a cognitive, neurobiological, and behavioral mechanism. It is an unconstructive emotion that occurs in answer to perceived threats that can come from internal or external sources and can be real or probable (Moser, 2007). The frequency of anxiety in the group of people is very high and associated with a lot of morbidity (Ghoshal & Dutta,1972). Ethnomedical and pharmacological information about the plant under learning would allow us to evaluate central nervous organization activity, which could be used to delight anxiety type of disorders.

In our investigation of Flavonoid division, the vehicle-treated mice (10 ml/kg, p. o. typical saline) invested more energy in the shut arm and demonstrated fewer passages in the open arm contrasted with the shut arm of the labyrinth at 5 min. Creature treated with diazepam (1 mg/kg, p. o.) demonstrated huge ($P < 0.001$) increment in the level of open arms sections just as time spent in the open arm while in shut arm number of passages and time spent were all together ($P < 0.001$) diminished. Oral organization of Flavonoid portion in 25 and 50 mg/kg, separately displayed critical ($P < 0.01$) increment in the level of a number of open arm sections and time spent in the open arm while in the shut arm number of passages and time spent was all together ($P < 0.01$) decreased when contrasted with vehicle-treated gathering.

CONCLUSION

Home grown prescriptions coming about because of plant removes are in effect progressively used to treat a wide variety of illnesses, albeit moderately unobtrusive partner about their method of activity is existing. There is creating interest in the pharmacological assessment of different plants utilized in Indian conventional frameworks of medication. The outcomes acquired in this examination have uncovered that Flavonoid division showed critical memory upgrading movement.

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