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INVESTIGATION OF ETHANOLIC EXTRACTS OF CHRYSANTHEMUM BALSAMITA AND APONYCEPUM VENETUM FOR ANTI DEPRESSANT ACTIVITY

Dr. Mehnoor Farheeen*[1], Neha Jabeen[2], Syeda Qadar Unnisa[1] and Zehra Fatima[1]

Head of Department – Pharmacology Shadan Women's college of pharmacy -khairtabad-500004-Hyderabad.

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***Corresponding Author**
Dr. Mehnoor Farheeen
Head of Department – Pharmacology Shadan Women's college of pharmacy -khairtabad-500004-Hyderabad.

ABSTRACT

The testimony presented hereby fortify the entrenched use of Apocynum *venetum* and Chrysanthemum *balsamita* to alleviate depression. Regardless of extensive use of Apocynum *venetum* and Chrysanthemum *balsamita* for treating assorted affictions there is no report/ knowledge of scientific appraisal in combination of Apocynum *venetum* and Chrysanthemum *balsamita* of its anti-depressant activity. Investigation performed shows that, when the extracts of Chrysanthemum *balsamita* and Apocynum *venetum* administered to an animal model (mice), had conspicuous effects on depression pertinent related behavioral parameter's on vulnerability to TAIL SUSPENSION TEST &FST in mice. Extracts of A. *venetum* and C. *balsamita* in combination causes anti-depressant behavior comparable with the effects of imipramine. Further investigations should be focused on neurobiological MOA and potential synergy of Chrysanthemum *balsamita and* Apocynum *venetum* extracts in combination with phytoconstituent (s) and neurotransmitters responsible for observed central actions has to be confined and recognized.

KEYWORDS: Chrysanthemum *balsamita and* Apocynum *venetum.*

INTRODUCTION

Depression: Depression is a major depressive disorder which is prevalent and sober prophylactic ailment that negatively alter the way you think, how you feel and how you act. It can drive to array of pigment and gross problems and can decrease a person's capacity to function and work. Depression causes perception of poignancy or loss of interest in activities once enjoyed. Token for depression can vary from tepid to split and include.[1]

- Sense of sadness.
- Loss of concern
- Feeling of bogus or remorseful
- Speculation of death or suicide

Pathophysiology

Depression disorder are portrayed by an assortment of neuroendocrine, neuroanatomical disruption and neurotransmitters. Manifestation of mood disorders are speculation to result in part from severance in the balance of activity in emotional centres of the brain somewhat than in the higher. Brain uses glucose as its preeminent source of energy. In evolve brain, neurons pursue molecular signals from regulatory cells like astrocytes. Neurons disseminate with each other via neurotransmitters liberated into the synaptic space, which is 21-51 nanometer space amid the neurons. The neurons that liberate the neurotransmitters into the synaptic amid is called the presynaptic neurons, and the neurons that obtain the neurotransmitters is called the postsynaptic neurons. The neurotransmitters migrate to postsynaptic neurons and strap with receptors to influence its activity. Neurotransmitters are briskly evacuated from the synaptic amid by enzymes. Brain cells routinely produce levels of neurotransmitters that preserve senses, movements, learning and mod impregnate along. But in some subjects who are sorely depressed manic the complex system that conclude this go astray.[2]

Few kinds of neurotransmitters regard to play a role in depression are

- Acetylcholine intensify memory and is sophisticated in learning and recall.
- Serotonin help rectify doze, zest and emotion and hinder pain. Low levels of serotonin have found in some depressed subjects' low levels of serotonin appendage have been allied to a higher risk of suicide.
- Norepinephrine tauten blood vessels, exalt blood pressure. It may provoke some kinds of depression.
- Dopamine is imperative to movement. It also leverages impetus and play role in how a subject grasp reality. It is also muddled in brain's reward system, so it is speculated to play a role in substance abuse
- Glutamate is tiny molecule admit to act as an excitatory neurotransmitter and to cavort a role in bipolar disorder and schizophrenia.

- Gamma-aminobutyric acid (GABA) is an amino acid that scholars act as an inhibitory neurotransmitter.[3]

Plants use in healing process is an old mankind. Medicinal plants are inter-continentally gainful pedigree of new drugs. They have been taking part in the augmentation of human culture and to treat health disorders, to add zest and content food and alert disease contagious.[4] The secondary metabolites originated by the plants are ordinarily compelled for the biological streak of plant stripe passed down right through the world. Human beings have been relying on nature for their cinch requirements as being the originator of medicines, shutters, food stuffs, fragrances, clothing flavors, fertilizers and modes of transportation throughout the edges.The chrysalis and remembrance of salutary and financial aids of these plants are on rise both automated and flourishing nations.There is a propitious prospective of Aesculapian plants as there are about half million plants around the globe, and most of them are not scrutinized yet for their remedial activities and their cloaked potential of remedial activities could be incisive in the treatment of present and decisive future studies.[5]

Plant Profile

Chrysanthemum balsamita

Chrysanthemum balsamita (L) Baill (Tanacetum balsamita) is a perpetual balmy hemp whichever is customarily acknowledged as balsam herb, costmary, mint geranium, alcost.

Also, in substitute phraseology, it is yoked with the Virgin Mary, presumably by virtue of it is intermittently worn to medicate women's maladies.

Provenience and Suffusion

The biennial alludes to have commenced in the Mediterranean.

Costmary was extensively grown subsequent to the gothic epoch in biennial orchards until the late 19th and early 20th century for curative purpose.

Now-a-days, it has predominantly evanesced in Europe, but is nevertheless extensively worn in Southwest Asia.

Scientific Classification

Kingdom: Plantae
Clade: Tracheophytes
Order: Asterales
Family: Asteraceae
Genus: Tanecetum
Species: T. balsamita

Chemical Constituents

Fronds of the shrub accredited to comprise align of essential oils. Preeminent component is Carvone, synchronously with trifling heap of C-carveol, t-carvol, beta-thujone, C-dihydrocarvane, t-dihydrocarvane and dihydrocarveol isomer.[6]

Apocynum venetum

Apocynum venetum, customarily acknowledged as sword-leaf dogbane, is a biennial breed in dogbane family, worn as an in format of elixir, fiber and amrita for honey fructification. Apocynum venetum leaves has been worn in customary counteractant for disequilibrium, hypertension, peevishness, cephalalgia, insomnia, conjunctivitis, dyspnea, dysuria.

Provenience

The biennial Apocynum *venetum*, allude to commenced in Liaoning, Gansu, Qinghai, Jiangsu, Nei Mongal Shanxi, Xizang (China), north eastern India, Pakistan, Mongalia & Russia.

Scientific Classification

Kingdom: Plantae
Clade: Tracheophytes
Order: Gentionales
Family: Apocynaceae
Genus: Apocynum
Species: A.venetum

Metonym

- Trachomitum venetum (L.) woodson
- Apocynum armenum Pobed
- Nerium sibiricum Medik

Chemical Constituents

Fronts of the shrub comprises of Flavonol glycosides, were futher secluded and their structures were dogged to be quercetin 3-0-(6^{1}-0-malony)-beta-D-glucoside (1); quercetin 3-0-(6^{11}-0-malonyl)-beta-D-galactoside (2). Both glycosides divulged steady scavenging exertion contrary to 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical.[7]

AIM AND OBJECTIVES

AIM: The contemporary probe has been barbed for the reckoning of psychopharmacological inquisition of Herbal glean that has not been premeditated in amalgamation by exploiting Albino mice as probation brute.

Objectives

1. Assortment and substantiation of Plants.
2. Plants extraction by Soxhlet technique.
3. Phytochemical secludes of plants.
4. Affirmation of chemical chunks.
5. Screening of psychopharmacological proceedings
6. Biochemical reckonings such as Neurotransmitter test (Serotonin, Dopamine, GABA, Glutamate).
7. Histopathological appraisal of brain tissue.
8. Results and Conclusion.

Materials And Methodology[8]

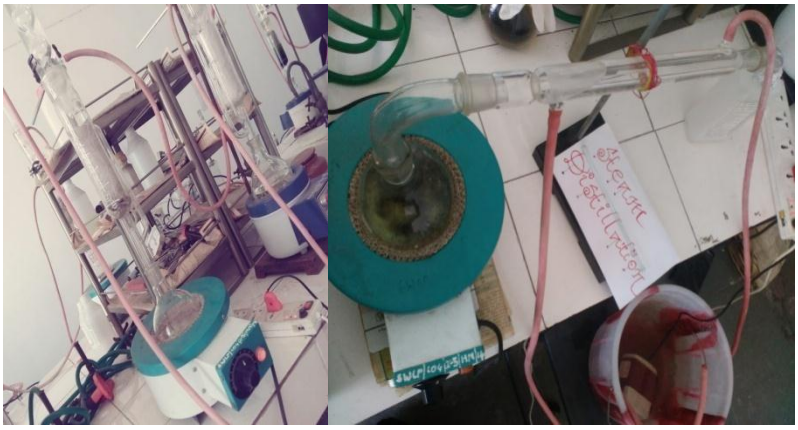
Acquisition of paraphernnalias and methods operated

Plant materials

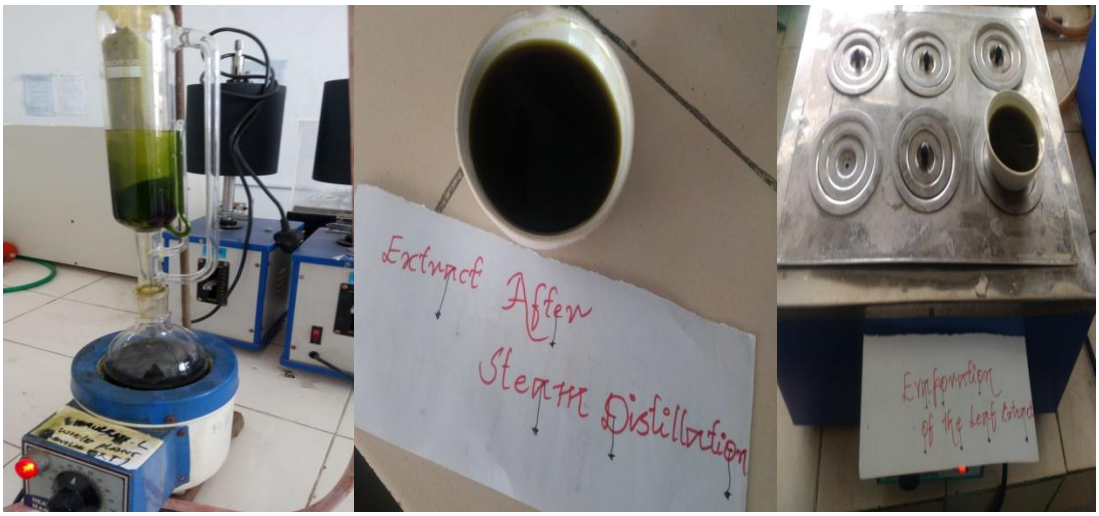
The powdered desiccated leaves of Chrysanthemum *balsamita* and Apocynum *venetum* were procured and customary from Dr.K. Madhava Chatty, aide teacher, Department of Botany, Sri Venkateshwara College, Tripathi, A.P, India.

Ethanolic Extracts Preparation

The glean was processed by Soxhlet apparatus and was prepared by using ethanol (99.9%) in Soxhlet apparatus and then percolated. The percolate was evanesced to wangle desiccated glean.



Soxhlet Apparatus Steam distillation



Experimental Animals

The experimental studies are performed on albino mice (weighing 18-25gms) at Shadan Institute of Medical Sciences, Preerancheru. All the animals are reconciled to the animal house antecedent to use. They are housed in cages in animal house with a 12hrs light/dark cycle. Animals are fed with boilerplate pellets diet and water ad. Libitum. Animals are haphazardly tabbed for grouping. The surveillance and supervision of mice were in consonance with the multiculturally endorsed boilerplate guidelines of use of animals (CPCSEA). Consent and ratification for animal studies was acquired from the Institutional Animal Ethics Committee (IAEC).

PROTOCOL NO: IAEC-011/SES/2019/003

Acute Oral Toxicity Studies[9]

To clinch the dose of herbal formulations, acute oral toxicity studies was done as per OECD guidelines no.425 of CPCSEA. No lethality and no manifestation of toxicity were beginning after the administration of 100mg/kg; 200mg/kg; 500mg/kg; 1000mg/kg; and 2000mg/kg by oral route of herbal formulations. No casualty detected up to dose of 2000mg/kg. Thence the LD^{50} of ethanolic extracts of leaves of Apocynum *venetum* and Chrysanthemum *balsamita* was found further 2000mg/kg. So, for the present preliminary studies the 200mg/kg as a low dose and 400mg/kg as a max dose of Apocynum *venetum* and Chrysanthemum *balsamita* is taken.

Experimental Design

GROUPS	DRUGS	DOSE ROUTE
GROUP- I	Normal saline	1 ml – p. o
GROUP- II	Toxic control	1 mg/kg – i. p
GROUP-III	Toxic control + Standard drug	2 mg/kg – i. p
GROUP-1V	Toxic control + *A. venetum* (Dose 1)	200 mg/kg – p. o
GROUP-V	Toxic control + *A. venetum* (Dose 2)	400 mg/kg – p. o
GROUP-VI	Toxic control + *C. balsamita* (Dose 1)	200 mg/kg – p. o
GROUP-VII	Toxic control + *C. balsamita* (Dose 2)	400 mg/kg – p. o
GROUP-VIII	Toxic control + *A. venetum* + *C. balsamita* (Dose 1)	100 + 100 mg/kg – p. o
GROUP-IX	Toxic control + *A. venetum* + *C. balsamita* (Dose 2)	200 + 200 mg/kg – p. o

Screening methods for antidepressants

Forced swimming test[10]

Principle

This method was proposed by Porsolt et al. when mice or rat are inflicting to constrain swim in a narrow space with no access to depart, then a peculiar passivity builds up in rats or mice after sometime of forced swimming. The anti-depressant decreases the duration of passivity. This is the widely worn screening method for acute anti-depressants.

Procedure

Mice were bestowed to forced swim in a cylindrical container filled with water, with no circumvention, incipiently it was overzealous for roughly 5min. later the exertion curtails and the stage of passivity was started.

15min. later mice were taken out and bestowed to dry. The span of passivity was measured. The same procedure was performed for test and standard groups and the drug was administrated 1hr earlier to the test starts.

Tail Suspension Test[11]

Principle

When a mouse is dangling by its tail, the passivity is palpable because of inevitable stress. It emulates behavioural despondency.

The anti-depressant agent decreases the passivity in a tail dangling mouse.

Procedure

Mice weighing 18-25 grams where divided into 9 groups, each group containing 6 mice and housed in plastic cages with water and food. Drugs and vehicles were given by I.P route. After 30min., mice are suspended in upside down stance at 5cm above a reliable top roughly 1cm from tail til. Incipiently mice try to elude but is helpless to wlude and becomes stagnant. Extent of passivity is documented for 5min. Mice are regarded as stagnant when they suspend serenely and completely static for at least 1min.

In-vitro Screening for Anti-depressant activity:[12]

Inhibition of [3H]-Norepinephrine uptake in rat brain synaptosomes

Most prominent corporeal process for eradicating and in stimulating norepinephrine in the synaptic cleft. Restrain by cocaine definite anti-depressants and phenyetheylamines. The hypothalamus exhibits the high-level and immense uptake of noradrenaline. Thence, this segment is used for estimating promising antidepressant drugs.

Procedure: Tissue Preparation

Rat is decapitated and its brain is promptly evacuated. Hypothalamic segment is heft, homogenized in 9 vols of ice cold 0.31 sucrose solution. This homogenate was centrifugated at 1000g at 0.4º for 10minutes. Buoyant is decanted and worn for investigation.

Assay: Inhibition Of [3h]-Norepinephrine Uptake In Rat Brain Synaptosomes

In Kerb's – Henselelit bicarbonate buffer, tissue suspension of 200µl are hatched with 800µl, 62.5nm 3H-norepinephrine 20µl of the pertinent drug conc./vehicle at 37º celcius under 95 percent O_2/5% CO_2 atmosphere for 5minutes. For each one assay, in an ice bath at 0 º celcius, three tubes are incubated with vehicle of about 20µl. The buoyant fluid is aspirated and the pellets are dissolved by adding 1ml solubilizer i.e., Triton X-100 plus 50 percent ethanol, in the ratio of 1:4. The tubes are actively shaken, decanded into scintillation cocktail of 10ml. Effective uptake is the disparity 'tween cpm at 37º celcius and 0-degree celcius.

Evaluation: Inhibition Of [3h]-Norepinephrine Uptake In Rat Brain Synaptosomes

- The percent inhibition at each drug concentration is the mean of 3 determinations
- Ic50 values are derived from log-probit analysis.
- Ic50 values of the std. drugs desipramine and nortriptyline are around 20nm.

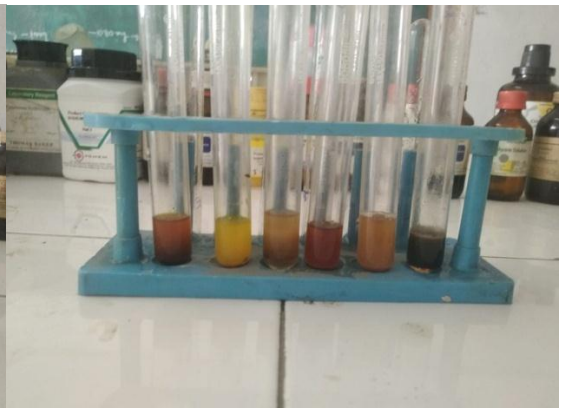
Statistical Analysis

The denouements were expressed as Mean ± Standard Error of Mean (SEM).

RESULTS

Phytochemical Screening Test
Preliminary phytochemical Screening

Screening test for glean of Chrysanthemum *balsamita* and Apocynum *venetum* based on standard methods as follows.

Screening of C. *balsamita* extracts Screening of A. *venetum* extracts

The following table shows the screening outcomes of the concurred gleans.

Table 2: Phytochemical Screening Test results.

Chemical constituents	**Test**	***C. balsamita***	***A. venetum***
Tannins	Ferric chloride test	++	++
Alkaloids	Mayer's test	++	+
	Dragendroff's test	+	++
	Hager's test	+	+
	Wagner's test	++	++
Glycosides			
A. Cardiac glycosides	Keller-Killani Test	+	+++
	Liebermann's Test	+	+
B. Steriods	Salkowski test	-	+
	Libermann burchand test	+	-
C. Saponins	Foam test	+	+
D. Flavonoids	Schinoda test	+++	+++
	Lead Acetate	+	+
	Alkaline reagent test	++	++
E. Anthraquinones	Borntrager's test	-	-
Carbohydrates	Molish test	+	+
	Fehling's test	+	+
	Benedict's test	+	+

Animal Model For Activity
Forced Swimming Test

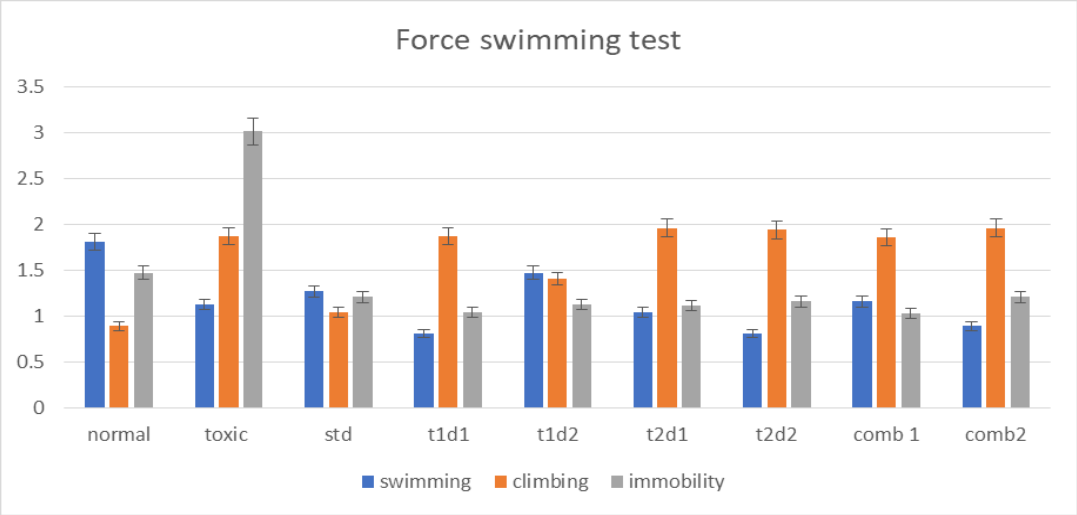


Mice were premediated to be stagnant when they were sailing still. The session of traversing water was chronicleded for 5-min.

Forced Swimming Test

The table mentioned below shows group 3 gas more no. of climbing as, it is administered with std drug and another group shows less no. of climbing when compared to group 3.

GROUPS	SWIMMING	CLIMBING	IMMOBILITY	DRUGS
Group 1	0.81±0.33	1.04±0.42	1.03±0.42	Normal saline
Group 2	1.16±0.47	1.87±0.76	3.01±1.22	Toxic control
Group 3	3.27±1.33	1.04±0.42	1.47±0.60	Toxic control + Standard
Group 4	0.81±0.33	1.87±0.76	1.04±0.42	T.C+C. balsamita
Group 5	1.47±0.60	1.41±0.57	1.21±0.49	T.C + C. balsamita dose 2
Group 6	1.04±0.42	1.96±0.80	1.41±0.57	T.C+ A. venetum dose 1
Group 7	0.81±0.33	1.94±0.79	1.22±0.55	T.C+ A. venetum dose 2
Group 8	1.16±0.47	1.86±0.76	1.21±0.49	T.C + C. balsamita + A. venetm d1
Group 9	0.89±0.36	1.96±0.80	1.21±0.49	T.C + C. balsamita + A. venetm d2



Forced Swimming Test Graph

Data represented here as Mean ± SEM, P <0.05 compared to toxicant, *=P< 0.05 compared to toxicant, **P < 0.001 compared to toxicant, ***=P < 0.0001.

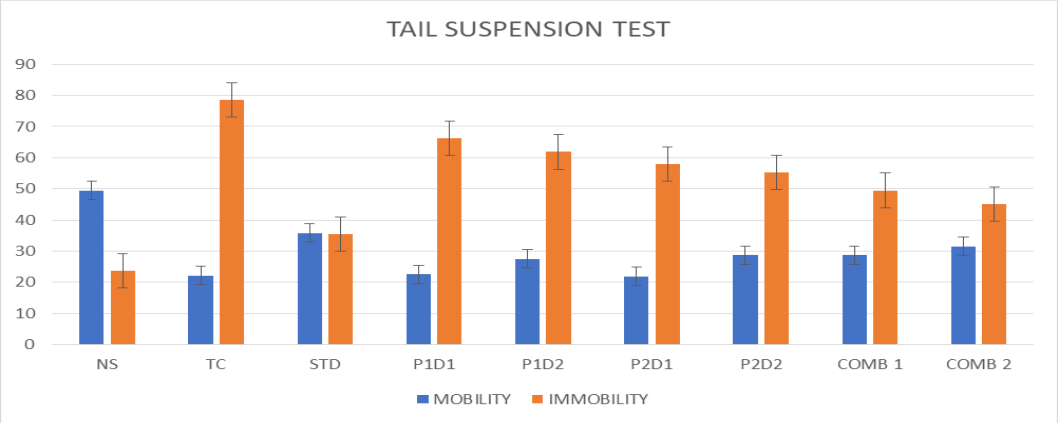
Tail Suspension Test

The tail suspension test was executed acquiesce to method illustrated already.

Tail Suspension Test

The table mentioned below shows group 3 has more no. of mobility as it is administered with std drug and other groups shows less no. of mobility when compared to group 3.

Treatments	Mobility	Immobility
Group 1	49.5±0.76	23.66±0.61
Group 2	22.16±0.60	78.5±0.92
Group 3	35.83±0.65	35.33±0.80
Group 4	22.5±0.76	66.166±0.60
Group 5	27.5±0.42	61.83±0.60
Group 6	21.833±0.47	57.83±0.40
Group 7	28.16±0.74	55.33±0.66
Group 8	28.66±0.61	49.5±0.76
Group 9	31.5±0.42	45±0.93



Tail Suspension Test Graph

Data represented here as Mean ± SEM, P <0.05 compared to toxicant, *=P< 0.05 compared to toxicant, **P < 0.001 compared to toxicant, ***=P < 0.0001.

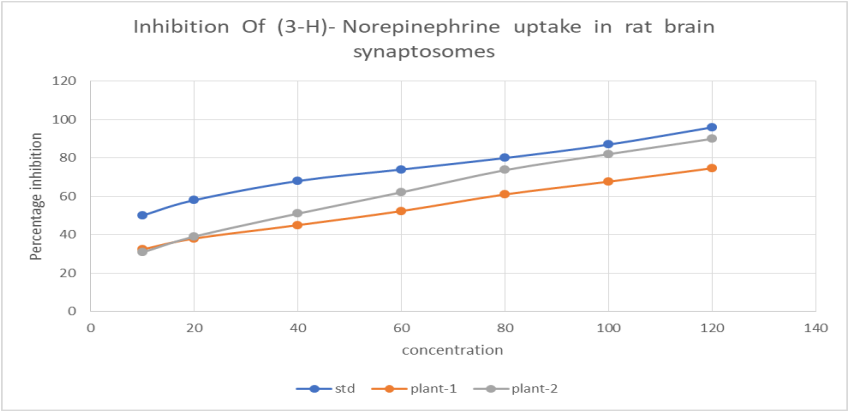
In-Vitro Method Evaluation For Antidepressant Activity

Evaluation of inhibition of [3h]-norepinephrine uptake in rat brain synaptosomes

- The percent inhibition at each drug concentration is the mean of 3 determinations
- Ic50 values are derived from log-probit analysis.
- Ic50 values of the std. drug imipramine is 1.68µg/ml

Evaluation of Ic50 Value of Standard drug i.e., Imipramine, Plant 1 i.e., *Chrysanthemum balsamita* and Plant 2 i.e., *Apocynum venetum*.

Concentration µg/ml	STANDARD	PLANT 1	PLANT 2
120	96±0.57	74.6±1.45	90±0.57
100	87±0.33	67.66±1.45	81±0.57
80	79±0.57	61±1.73	72±0.57
60	74±0.57	52.33±2.02	64±1.15
40	68±0.57	45±1.52	52±0.57
20	58±0.57	38±1.15	39±1.20
10	50±0.57	32.33±1.20	30±0.66



Percentage Inhibition Graph

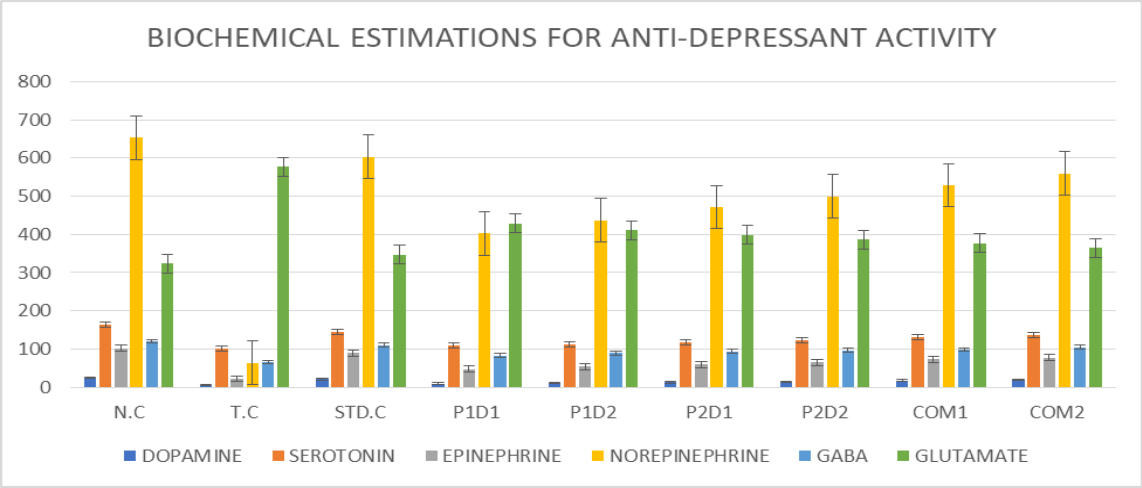
Ic50 values of Standard drug i.e., Imipramine was found to be 1.68µg/ml

Ic50 values of Plant 1 i.e., Chrysanthemum *balsamita* was found to be 53.63µg/ml

Ic50 values of Plant 2 i.e., *Apocynum venetum* was found to be 41.39µg/ml.

Biochemical Estimations of Neurotransmitters like Dopamine, Serotonin, Epinephrine, Norepinephrine, GABA and Glutamate for Anti-depressant activity.

Treatment	Dopamine	Serotonin	Epinephrine	Norepinephrine	GABA	Glutamate
Group 1	25.33±0.49	164.66±0.71	102±0.57	653.66±1.05	120.33±0.33	323.17±1.01
Group 2	5.83±0.47	100.5±0.76	22.16±0.60	63.66±1.11	65.83±1.74	577±1.52
Group 3	21.5±0.56	144.16±0.79	89.5±0.76	603.33±0.88	110.16±0.60	346.37±3.64
Group 4	9.5±0.42	109±0.36	47.83±0.60	402.83±2.12	83.33±0.88	428.17±4.60
Group 5	11±0.36	112±0.36	54±0.57	436.16±1.90	89.5±0.76	410.17±5.57
Group 6	13.33±0.42	117.5±0.42	59.83±0.60	471.33±1.92	93.5±0.22	398±1.52
Group 7	14.66±0.33	123.83±0.60	65.33±0.88	499.16±1.64	96.33±0.33	386.57±7.76
Group 8	17.83±0.30	131.5±0.42	73.16667±1.30	528.5±2.04	98.5±0.22	376.57±8.56
Group 9	20±0.36	137.33±0.76	77.5±0.67	559.5±0.76	105±1.46	365±1.39

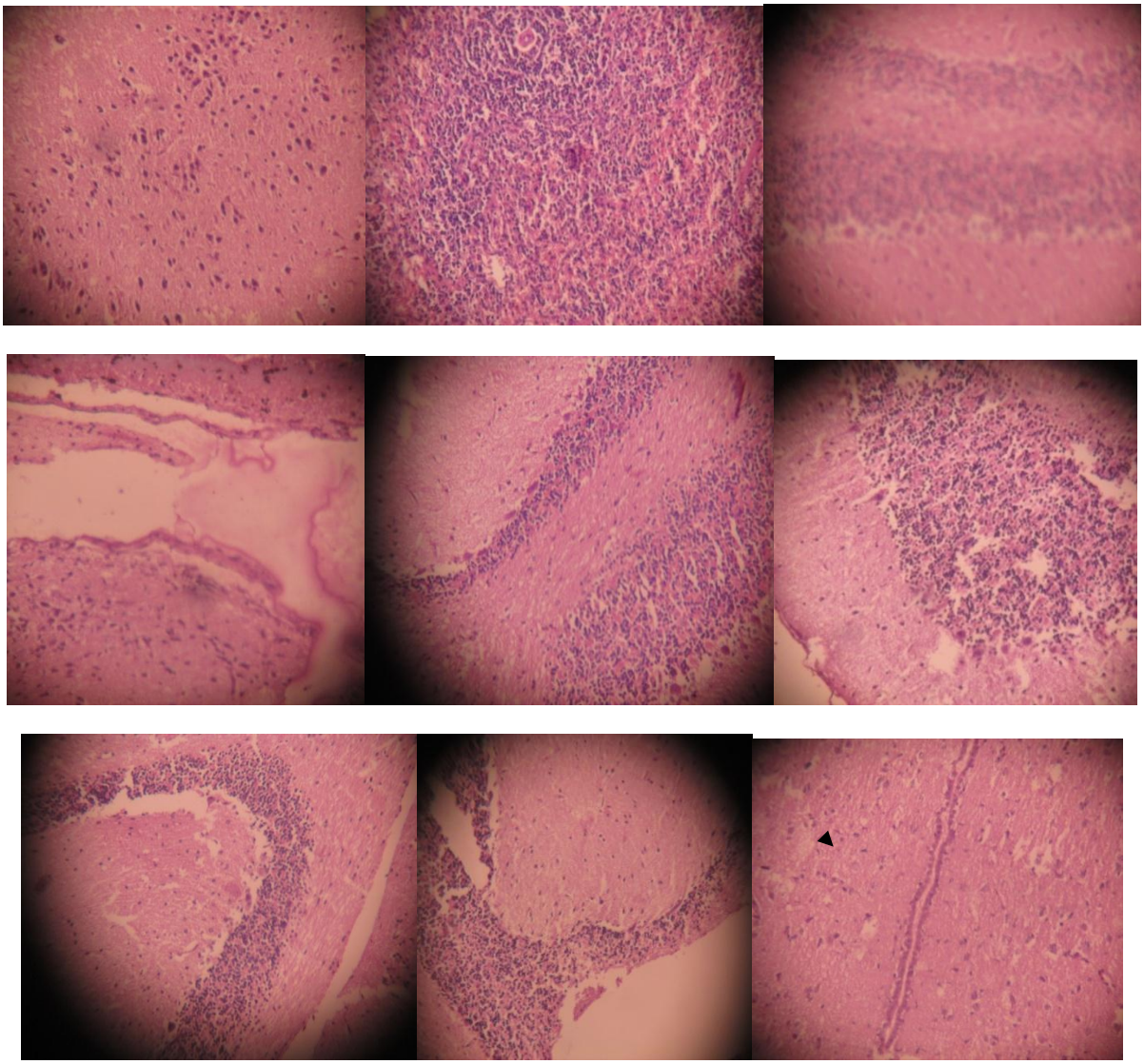


Histopathological results

Histopathological assessment of the hippocampus tissue was done.

Histopathology of tissues of hippocampus of mice (×40, light microscope).

Histological Pictures in series. Histological Slides of Depressed Brain



1. Mice of group 1, which were healthy and administered with normal saline had chiefly ordinary healthful neurons in CA3 region of the hippocampus tissue. Hippocampal CA3 neurons in majority had shown normal arrangement definite brink.
2. Mice of group 2, which are treated with toxic control, had shown broad no. offlame shaped CA3 hippocampal neurons (soma). Mice of toxic group, manifested noxious cellular composition with erratically organized cells. It also showed intense no of Deteriorated cells, basophilic appearance and karyopyknosis.
3. Mice of group 3, given with standard Drug i.e., imipramine 2mg/kg by i.p route had demonstrated CA3 region with healthy cells of hippocampus. This group of mice had recoverd their cells very closely to healthy cells.
4. These 4groups mice's had showed larger shaped neurons & apoptosis of neurons in hippocampus. It showed very less effective action of *C.balsamita* in dose of 100mg/kg.
5. Group 5 showed damaged or degenerated cells but no. of demerited cells were less & damaged cells where less when compared to group 4. It demonstrated better effect when compared to group 4 when administrated at a dose of 200mg/kg.
6. These tissues shows apoptotic neurons or multi-focal necrotic along with glial celss infiltration as well as inflammatory cells are noticed. It demonstrated a anti-depressant activity very when administered at a dose of 100mg/kg.
7. Mice in group 7, administered with dose of 200mg/kg had a tissue of hippocampus with foci of apoptotic neurons but with no inflammatory cells. It showed better results in increased dose when compared to group 6 with dosage of 100mg/kg.
8. Mice when treated with *C. balsamita* and *A. venetum* in combination with a dose of 100mg/kg each, they demonstrated a good respone and recover of cells in hippocampus region but also showed degeneration of some cells in dentate gyrus.
9. Mice of this group were administered with *C. balsamita* and *A. venetum* in combination with dose 200mg/kg each. So, 400mg/kg dose was given by oral route. In combination at a dose of 400mg/kg they demonstrated better effect and cells in

hippocampus were nearer to standard when compared to other groups.

DISCUSSION

Circumstantial factors like trauma can alter the neurobehavioral characterization of the creature and expediate an depression like ailment. Behavioural factors are fruitful augur of stress susceptibility.

Present work indicates that Apocynum *venetum* and Chrysanthemum *balsamita* (100-200 mg/kg) unlike of diazepam (2mg/kg) had no momentous impact on motor coordination.

Extracts of Apocynum *venetum* and Chrysanthemum *balsamita* shows much better effect when used in combination., group 9 showed 60% effect. In combination, A. *venetum* and C. *balsamita* extracts showed marked anti-depressant without inducing any neuromuscular aftereffect.

Outcomes of present work were staunchly backed by the investigation of Ting Wu *Apocynum venetum* leaf extract exerts antidepressant-like effects and inhibits hippocampal and cortical apoptosis of rats exposed to chronic unpredictable mild stress.

A. venetum and Chrysanthemum *balsamita* has been shown to have antioxidant and immunostimulant activities.

Phytochemical screening gas demonstrated that extracts of A. *venetum*& C. *balsamita* possess Flavanoids, glycosides, alkaloids, tannins, cardiac glycosides, steroids, saponins, carbohydrates and anthraquinones.

Oral administration of aq. gleans of A. *venetum* and C. *balsamita* in increasing dosage from 100mg/kg augment the preliminary demeanor of mice in FST and TST.

Medicinal plants such as Baccopa monniera, O. sanctum, C. sinensis and various other plants have shown anti-depressant activity. Thence, the anti-depressant activity of A. *venetum and* C. *balsamita* can be correlated with these medicinal plant's investigations.

The accurate mechanisms by which A. *venetum* and C. *balsamita* induces anti-depressant like actions are not entirely understood.

Administration of A. *venetum* and Chrysanthemum *balsamita* had minimal actions when given individually.

Histological slides of group 4 and showed very less effective action when compared to the slides of group 8 & group 9.

Groups 7 and group 5 showed minimal effects when compared to group 4 and group 6.

Effects of group 8 and group 9 where effective when compared to groups 4, 6, 7, 5 but when compared to group 3 it had effects less than group 3.

When A. *venetum* and C. *balsamita* administrated in combination in dose of 200mg/kg showed 60% of normalizing action and controlled alteration's in the levels of neurotransmitters due to stress.

CONCLUSION

The testimony presented hereby fortify the entrenched use of Apocynum *venetum* and Chrysanthemum *balsamita* to alleviate depression.

Regardless of extensive use of Apocynum *venetum* and Chrysanthemum *balsamita* for treating assorted affictions there is no report/ knowledge of scientific appraisal in combination of Apocynum *venetum* and Chrysanthemum *balsamita* of its anti-depressant activity.

Investigation performed shows that, when the extracts of Chrysanthemum *balsamita* and Apocynum *venetum* administered to an animal model (mice), had conspicuous effects on depression pertinent related behavioral parameter's on vulnerability to FST, and to TST in mice.

Extracts of A. *venetum* and C. *balsamita* in combination causes anti-depressant behavior comparable with the effects of imipramine.

Further investigations should be focused on neurobiological MOA and potential synergy of Chrysanthemum *balsamita and* Apocynum *venetum* extracts in combination with phytoconstituent (s) and neurotransmitters responsible for observed central actions has to be confined and recognized.

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