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INSILICO AND INVIVO PHARMACOLOGICAL EVALUATION OF IMPATIENS BALSAMINA FOR ANTI DEPRESSANT ACTIVITY

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ABSTRACT

Impatiens balsamina is an annual herb, belongs to the family balsamaceous, commonly seen in India, China, Korea. it is an erect plant commonly known as rose balsam and garden balsam The plant is used in traditional medicines of Ayurveda, siddha. It is a sparsely-branched annual herbaceous plant and grow about 0.3 to 1 m tall. The leaves are about 4to12 cm long and 1.5 to 3cm wide. Flowers of the plant is used as dye in pastry. seeds of this plantare edible. Leaves and steam are also edible when boiled. leaves, steam, flowers are also having medicinal properties. Some of the pharmacological actions of the plant include (antimicrobial, anti-pruritic, anti-inflammatory, anti-depression. The study aims to screen compounds from ethanolic extract of impatiens balsamina (EEIB) by docking studies on potential targets of depression. The best test ligands were selected and molecular docking tests against the target protein (moa –a, moa –b, sert,) compared to that of control ligands present in the plant ofImpatiens balsamina (kaempferol, flavonoids, saponins, glycosides). Thepresentwork summarizes all the insilico and invivo work carried out on this plant in order to provide updated information for future work.

KEYWORDS: Impatiens balsamina, anti-depression, MAO-a, MAO-b, SERT.

INTRODUCTION

A common form of mood disorder is bipolar disorders with cyclically alternating manic and depressive phase. The relapsing mood disorder may also be unipolar [mania or depression] with waxing and warming source < depression is a mood disorder characterized by persistent feeling of sadness or a loss of interest on activities, significantly impacting low a person feels, things and behaves.[1]

TYPES[2][3]

Depression is two types.

(1) Unipolar depression

In which mood swings are always in the same directions. it is commonly about non –familial, clearly associated with stressful life –events and accompanied by symptoms of anxiety and agitation, this type is sometimes termed reactive or secondary depression as it occurs in response to real stimuli such as illness etc.

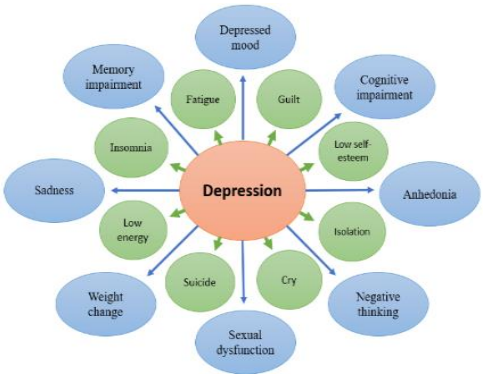


Fig. 1: Depression: Core Symptoms and Effects.

- **Reactive depression**

It is also known as situationaldepression, is a type of depression that occurs as a direct response to a specific stressful or traumatic life event. Unlike clinical or major depressive disorder, which may not have an obvious cause, reactive depression is clearly linked to a particular situation.

Symptoms

- Persistent sadness or low mood Fatigue or lack of energy
- Difficulty sleepingsleeping too much
- Changes in appetite
- Trouble concentrating
- Feelings of hopelessness or helplessness
- Social withdrawal
- b) Endogenous depression

Endogenousdepressing is a type of depression that appears to develop internally without any obvious external causes or stressful life event. The term endogenous comes from the Greek word meaning from within highlight the idea that this from of depression originates primarily due to biological or genetic factors rather than environmental triggers.

Risk Factors[4][5]

Imbalances in brain chemicals such as serotonin, dopamine, norepinephrine

Genetic per dis position- a family history of depression increases the riskHormonal changes are neurological conditions unlike reactive depression, which is typically triggered by all life events, endogenous depression can occur without warning or any identifiable external stressor

(2) Bipolar depression[6][7]

Depression, also known as depressive disorder, is a widespread mental health issue that can affect individuals from all lifestyles. It goes beyond the typical difficulties of daily living Instead, it involves a persistent low mood or a marked loss of interest or pleasure in usual activities, lasting most of the day, nearly every day, for a minimum of two weeks.



Fig. 2: Dissociative identity disorder (DID).

Unlike temporary emotional reactions to life's challenges, depression is more enduring and disruptive. Those experiencing it often face a range of symptoms, including difficulty sleeping, changes in appetite, low self-esteem, fatigue, trouble concentrating, and in severe cases, hopelessness or thoughts of death or suicide. The causes of depression are complex and multifaceted, involving a combination of biological psychological, and social influences. Individuals who have experienced trauma, significant loss, or ongoing adversity are at a higher risk. Challenges in environments such as school or the workplace can also contribute to the development of depressive symptoms. Despite being treatable through psychological therapies and medications, access to proper care remains a major issue. Preventative strategies have shown promise in reducing the incidence of depression, but in many low- and middle-income countries, more than 75% of those affected do not receive the help they need due to lack of resources or support services. Depression ranks among the most widespread and serious mental health disorders, posing substantial risks to both individual well-being and public health. It contributes heavily to global disability and is linked to increased mortality rates. Current estimates suggest that a significant portion of the global population potentially over one-fifth experiences depressive symptoms at some point in their lives, underscoring the urgent need for comprehensive mental health strategies. Depression is a psychological condition marked by persistent low mood and a reluctance to engage in activities.[6][7]

- As of 2020, it affected approximately280 million individuals worldwide—around 3.5% of the global population. Effects on Individuals.
- It influences how people think, feel, and behave, often diminishing their overall sense
- Enjoyment from previously pleasurable experiences tends to decrease.

- **Common symptoms include**
- Persistent sadness or hopelessness
- Difficulty concentrating or making decisions
- Changes in sleep patterns (excessive sleep or insomnia)
- Altered appetite (overeating or loss of appetite)
- Thoughts of self-harm or suicide

Epidemiology of Depression[8][9]

Global Impact: Depression affects over 300 million people globallwith women, youth, and the elderly most affected.

- WHO reports a 4.4% global prevalence and an 18% rise in cases from 2005 to 2015?
- Public Health Consequences
- Depression contributes to disability, increased risk of dementia, early death from physical illness, and negative effects on child development due to maternal depression.
- Treatment Gaps

- In low- and middle-income countries, 76–85% of individuals with depression go untreated.
- Barriers include misdiagnosis, lack of trained professionals, stigma, and resource limitations.
- Social Stigma and Environment
- Misconceptions about mental illness led to privacy concerns and avoidance of treatment.
- Competitive academic environments correlate with higher rates of depression and anxiety.
- Unemployment significantly increases the risk of developing depression.

MATERIALS AND METHODS[10][11]

Animals

Swiss male albino mice (3months old), weighing around 25g were procured from Mahaveer enterprise was used for this study. Animals had free access to food and water and were maintained under standard laboratory conditions with a small amount of refined vegetable oil. The animals were acclimatized for at least 5 days before behavioural experiments. Experiments were carried out between 08.00 and 13.00h. Male Wistar rats (168-237gm,14 weeks old) were obtained from animal house of Adithya university (east Godavari) were housed in group of 5 per cage in polypropylene cages at 22+2 on 10:14h light-dark cycle. All animals were given access to standard food pellet and water ad libitum. All conditions were maintained as per CPCSEA guidelines.

Plant material collection and extraction

The plant impatiens balsa mina was collected from rural belt of Rajahmundry (E.G) in the month of October. It was confirmed by Dr. Srinivas sir in VJs college of pharmacy research scientist, Regional Plant Resource Centre, Kakinada and a voucher specimen copy was preserved in department for further works. Impatiens balsa mina was thoroughly washed with in order to remove the dirt and then dried for 5 days. Shade-dry the leaves at room temperature (to preserve heat-sensitive compounds). Alternatively, use an oven at **40–50°C** if faster drying is needed. Ensure leaves are completely dry to prevent microbial growth. Pulverize the dried leaves into fine powder using a grinder or mortar and pestle. Store the powder in an airtight container until extraction. The above obtained powder was packed Soxhlet apparatus and subjected to continuous hot percolation at temperature 63 c using alcohol as solvent till clear solvent was observed in siphon tube. Extract was then concentrated by using rotary vacuum evaporator. Concentrated extract was dried and packed in an air tight container.

PyRx

An open-source platform for molecular docking and virtual screening. It integrates AutoDock/Vina, supports batch docking, and provides a simple interface for ligand/receptor preparation and scoring. Widely used in early drug discovery and natural product research.

BIOVIA Discovery Studio

A commercial modeling suite offering advanced visualization. It generates 2D/3D interaction maps, analyzes binding energies, and produces publication-ready diagrams. Often used to validate and illustrate docking results obtained from PyRx.

Workflow

1. Prepare protein and ligands in PyRx.
2. Run docking simulations with AutoDock Vina.
3. Rank compounds by binding affinity.
4. Import results into BIOVIA for interaction mapping.
5. Select promising leads for experimental testing.

Key Points

- Docking scores are predictive, not definitive.
- PyRx is free and accessible; BIOVIA adds advanced visualization.
- Used together, they complement each other in structure-based drug discovery.

Preliminaryphytochemical screening of extracts[12]

Test for alkaloids

1. Dragendroff" s reagent

Alkaloids give reddish brown precipitate with dandruff's reagent (potassium bismuth iodide solution).

2. Mayer's reagent

Alkaloids give cream colour precipitate with Mayer's reagent (potassium mercuric iodide solution).

Test for amino acids

1. Millon's test

To the test solution add about 2 ml of millions reagent white precipitate indicates
Prescence of amino acids.

2. Ninhydrine test

To the test solution add ninhydrin solution, boil, violet colour indicates presence of amino acids.

Test for carbohydrates[13]

1. Molisch test

To the test solution add few drops of alcoholic alpha – naphthol, then add few drops of concentrated sulphuric acid through sides of test tube, purple to violet colour ring appears at the junction.

2. Barford's test

1 ml of test solution is heated with 1 ml of Barford's reagent on water bath, if red cupric oxide is formed, monosaccharide is present. Disaccharides on prolong heating may also cause reduction, owing to partial hydrolysis to monosaccharides.

Test for tannins[14]

1. Goldbeaters:

Add 2% hydrochloric acid to a small piece of gold beat skin, rise it with distilled water and place in the solution to be tested for five mins. Then give wash of distilled

water and transfer to a 1% ferrous sulphate solution. A brown or black colour on the skin indicates Prescence of tannins.

Test for cardiac glycosides[15]

1. Keller-killian's test

Extract the drug with chloroform evaporates dryness. Add 0.4 ml of glacial acetic acid containing traces amount of ferric chloride transfer to a small test tube add carefully 0.5ml concentrated sulphuric acid by the side of the test tube. Acetic acid layers show blue colour.

Test for Steroids and triterpenoids[16]

1. Salkowski test

Extract with few drops of concentrated sulphuric acid, red colour at lower layer indicates presence of steroids formation of yellow coloured lower layer indicates presence of triterpenoids.

Treatment group

Group I: Control group received Vehicle (Veh) Saline (1mL, i.p.)
Group II: Disease Control received Reserpine) s.c.
Group III: Standard group received Imipramine (i.p.)
Group IV: Test group received EEIB(500 mg/kg, p.o.)
Each group contains 6 rats.

Exploratory behaviour[17][18][19]

1. FORCED SWMMING TEST[19]

In the FST, a rodent is placed in a container (cylinder, tank) filled with water deep enough so that it cannot escape or touch the bottom to stand. Initially, the animal will actively try to escape by swimming, climbing the walls, or diving. After some time, it tends to give up and adopt a posture of immobility, making only the minimal movements needed to keep its head above water. This "floating" is called immobility The key measured variable is the time spent immobile (or latency to become immobile) in a defined period. Animals given antidepressants typically show reduced immobility time (i.e. more active behaviour) compared to control animals.
1. There are a few protocol variants (especially between mice and rats). For example:
2. In rats: a two-session approach is common. On Day 1, a 15-minute "pretest" swim is done (not scored). After 24 hours, a 5-minute test session is done and immobility is measured.
3. In mice, often a single 6-minute session is used, scoring immobility in the last 4 minutes.
4. The rationale is that animals with "depression-like" traits will give up (become immobile) sooner, while antidepressant treatments will promote more active behaviour (less immobility).

2. LOCOMOTOR ACTIVITY[20]

The spontaneous locomotor activity of animal was recorded individually for 10mins using actophotometer. The locomotor activity (horizontal activity) can be easily measured using an actophotometer, which operates on photoelectric cells, which are connected in circuits with the counter. When the animals cut off a beam of light falling on photocell, a count is recorded. Both rats and mice made be used for testing in this equipment. Difference locomotor activity before and after administration of drug was used for assessing the effect.

3. TAIL SUSPENSION TEST[21]

1. Immobility is taken as a proxy for behavioural despair or learned helplessness. The longer the immobility, the more "depression-like" the behaviour is presumed to be.
2. When an animal is treated with known antidepressants (SSRIs, tricyclics, etc.), immobility is typically reduced (i.e. more escape-oriented behaviour).

Steps

Mice are transported from home cages, allowed to acclimate in the test room.

The mouses tail is tapped [or clipped] near the tip [but leaving a bit of tail free]

Tape should be gentle enough to avoid injury. often mice are suspended~50cm above the floor.

Some strains [e. Gc57BL/6] try to climb their tails. To prevent that, a hallow

Cylinder[tube] is sometime placed around the base of Usually lasts about 6 minutes. The first ~1-2 minutes the animals struggles; Immobility is often scored over the entire period or in the last 4 minutes.

4. ROTAROD TEST[22]

The Rotarod test is a widely used behavioural test in neuroscience andpharmacology to assess motorcoordination, balance, and motor learning in rodents (typically mice or rats). It evaluates how well an animal can maintain balance while walking on a rotating rod.

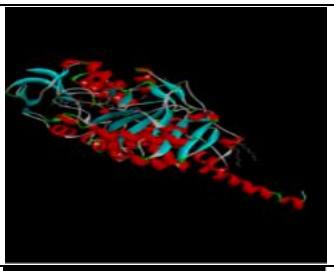
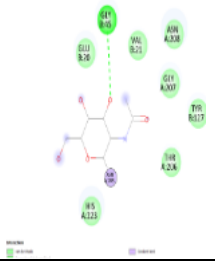
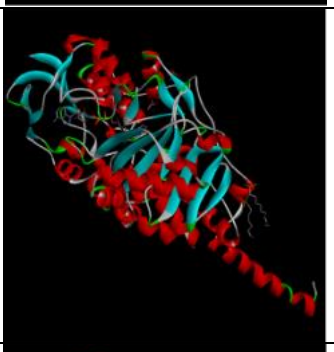
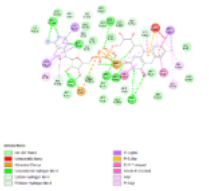
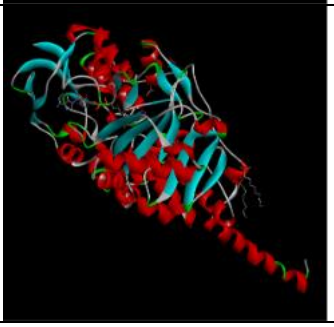
The Rotarod test measures an animal's coordination, motor skills, and sometimes fatigue or motorlearning, by recording how long it can stay on a rotating rod without falling.

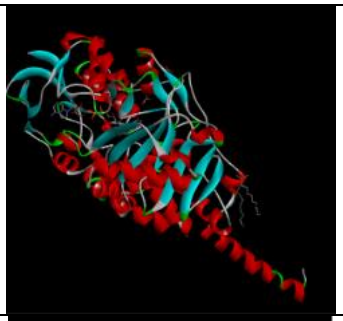
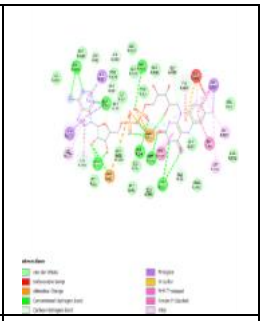
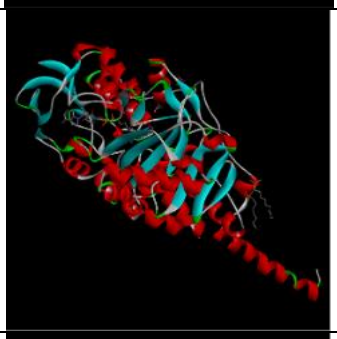
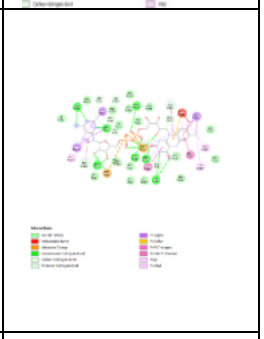
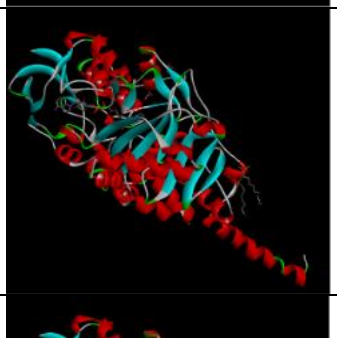
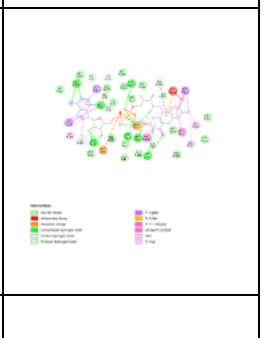
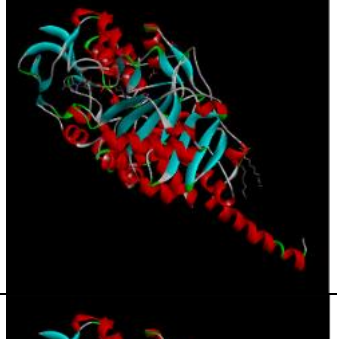
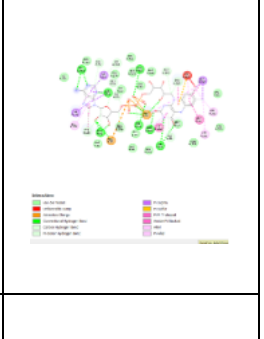
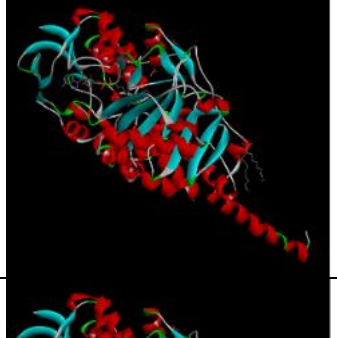
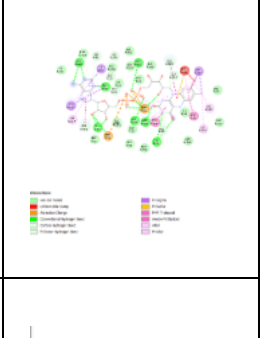
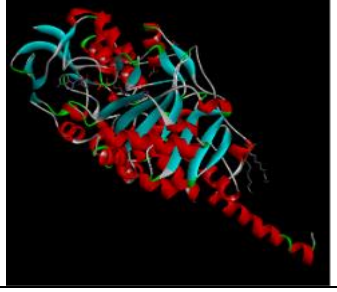
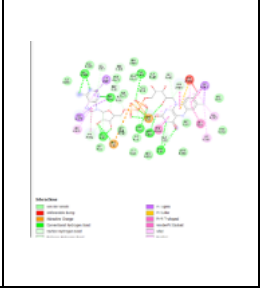
Experimental Procedure

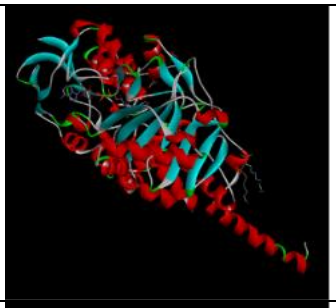
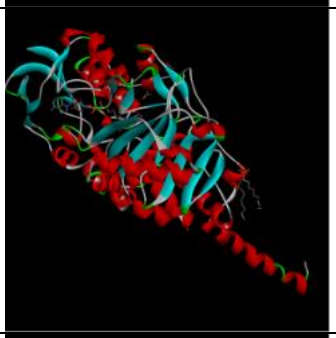
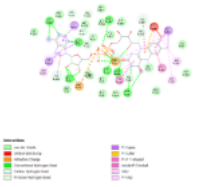
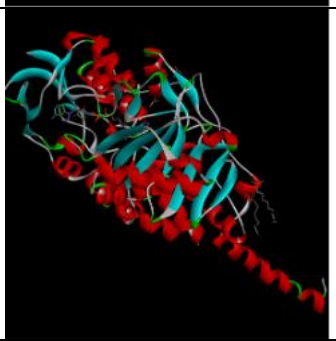
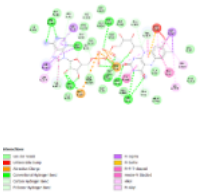
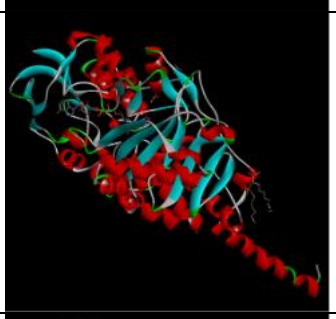
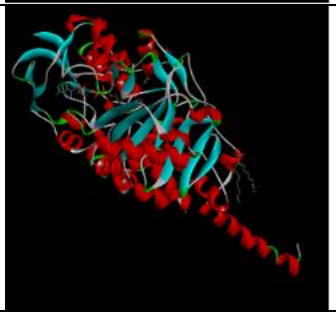
1. The animal (mouse or rat) is placed on the central platform, facing an open or closed arm.
2. The test typically runs for 5 minutes.
3. The animal is allowed to freely explore the maze.
4. Behavior is recorded manually or with video tracking software.

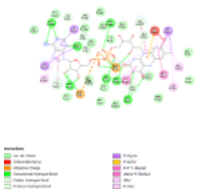
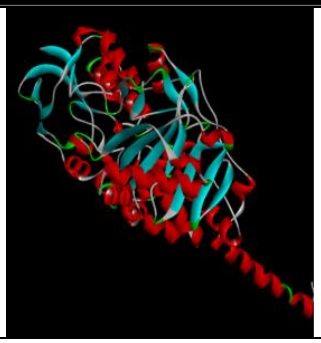
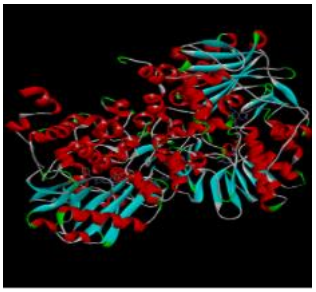
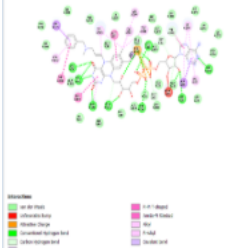
RESULTS

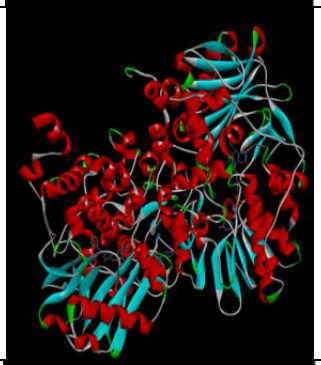
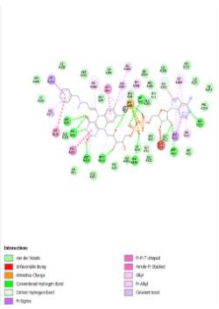
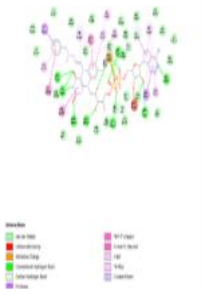
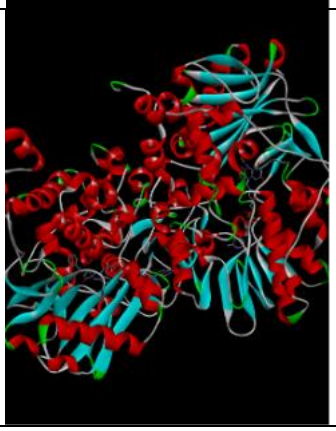
I. DOCKING RESULTS

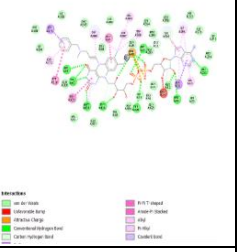
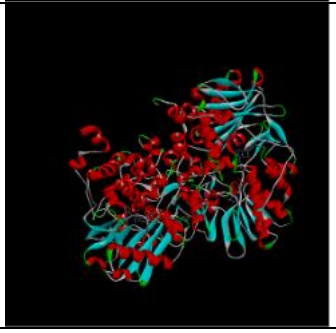
S.NO	LIGAND NAME	NIH LIGAND ID	TARGET ID	DOCKING SCORE	DOCKING PHOTO	2D - INTREACTIONS
1	**IMIPRAMINE**	**3696**	**MAO-A [2BXR]**	**-7.0**		
2	QUERCETIN	5280343	MA0-A	**-9.3**		
3	MYRICETIN	5281672	MAO-A	**-9.5**		
4	FLAVONE	10680	MAO-A	**-8.2**		
5	FLAVANOL	11349	MAO-A	**-7.9**		

6	FLAVANONE	10251	MAO-A	**-7.9**		
7	LAWSONE(2-HYDROXY-1,4-NAPTHOQUINONE)	6755	MAO-A	**-6.8**		
8	BALSAMINOSIDE-A	9798203	MAO-A	**-9.0**		
9	ALKALOID-A	5372257	MAO-A	**-7.2**		
10	P-HYDROXY BENZOIC ACID	135	MAO-A	**-4,3**		
11	FERULIC ACID	445858	MAO-A	**-6.3**		

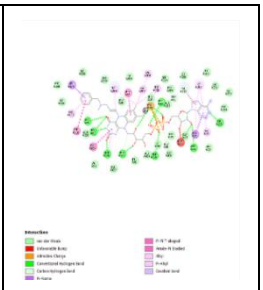
12	SINAPIC ACID	10743	MAO=A	**-6.4**		
13	SCOPOLETIN	5280460	MAO-A	**-6.9**		
14	ISOFRAXIDIN	5318565	MAO-A	**-6.7**		
15	β-SITOSTEROL	222284	MAO-A	**-7.6**		
16	α- AMYRIN	73170	MAO-A	**-8.5**		
17	α- SPINASTEROL	5281331	MAO-A	**-8.4**		

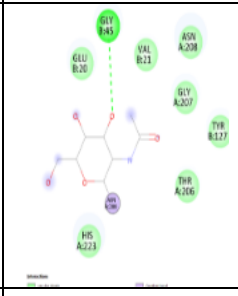
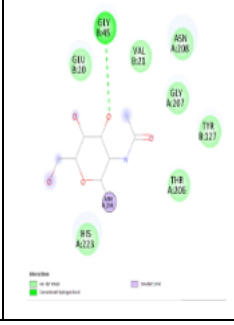
18	ETHYL OLEATE	5363269	MAO=A	**-4.9**		
19	ETHYL STERATE	8122	MAO-A	**-5.0**		
20	ETHYL PALMITATE	12366	MAO-A	**-4.5**		
S.NO	**LIGAND NAME**	**NIH LIGAND ID**	**TARGET ID**	**DOCKING SCORE**	**DOCKING PHOTO**	**2D-INTERACTIONS**
1	IMIPRAMINE	3696	**MAO-B [2V5Z]**	-7.4		
2	KAEMPFEROL	5280863	MAO-B	-8.3		

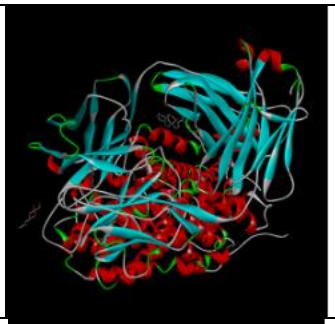
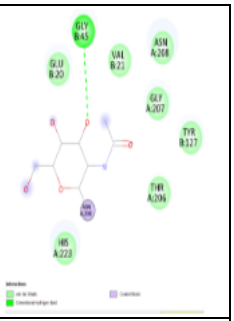
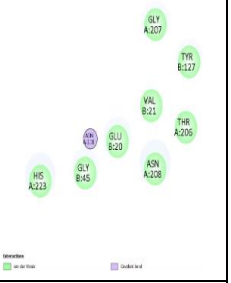
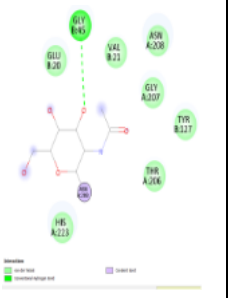
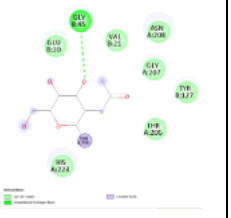
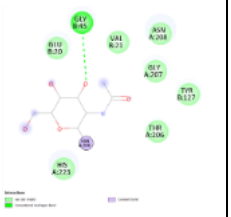
3	MYRICETIN	5281672	MAO-B	-8.1		
4	FLAVANONE	10251	MAO-B	-8.0		
5	LAWSONE(2-HYDROXY-1,4-NAPTHOQUINONE)	6755	MAO-B	-6.8		
6	METHYLENE-3,3-BILAWSONE	736158	MAO-B	-10.8		
7	SAPONINS	198016	MAO-B	-7.0		

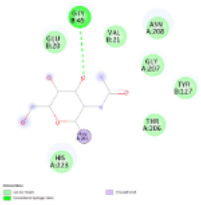
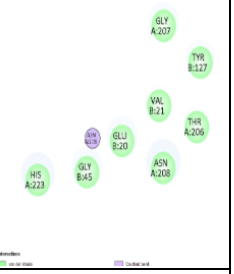
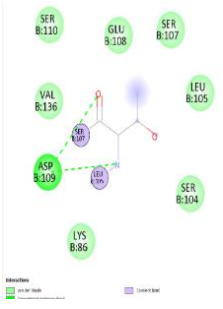
8	BALSAMINOSIDE-A	9798203	MAO-B	-9.0		
9	ALKALOID-A	5372257	MAO-B	-6.6		
10	P-HYDROXY BENZOIC ACID	135	MAO-B	-5.5		
11	FERULIC ACID	445858	MAO-B	-5.6		
12	SINAPIC ACID	10743	MAO-B	-6.2		

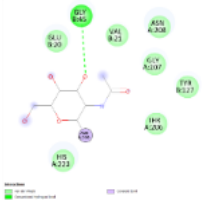
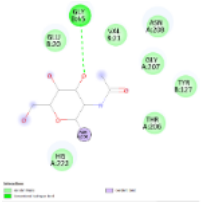
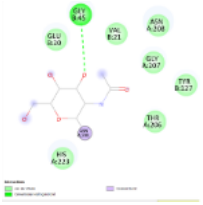
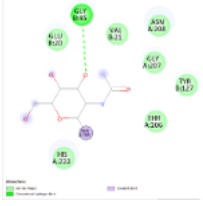
13	SCOPOLETIN	5280460	MAO-B	-6.3		
14	ISOFRAXIDIN	5318565	MAO-B	-6.4		
15	α- AMYRIN	73170	MAO-B	-7.9		
16	α- SPINASTEROL	5281331	MAO-B	-7.2		
17	ETHYL OLEATE	5363269	MAO-B	-5.3		

18	ETHYL STERATE	8122	MAO-B	-5.5		
19	ERGOCRISTINE	31116	MAO-B	-8.1		
20	ETHYI PALIMITATE	12366	MAO-B	-5.2		

S.NO	LIGAND NAME	NIH LIGAND ID	TARGET ID	DOCKING SCORE	DOCKING PHOTO	2D-INTERACTIONS
1	IMIPRAMINE	3696	**SERT [516X]**	-6.5		
2	KAEMPFEROL	5280863	SERT	-7.4		

3	QUERCETIN	5280343	SERT	-7.6		
4	MYRICETIN	5281672	SERT	-7.8		
5	GLYCOSIDE-H_2	73852569	SERT	-9.0		
6	FLAVONE	10680	SERT	-6.6		
7	FLAVANONE	10251	SERT	-7.0		
8	LAWSONE(2-HYDROXY-1,4-NAPTHOQUINONE)	6755	SERT	-6.0		

9	SAPONINS	198016	SERT	-8.7		
10	BALSAMINOSIDE-A	9798203	SERT	-8.7		
11	ALKALOID-A	5372257	SERT	-5.9		
12	P-HYDROXY BENZOIC ACID	135	SERT	-4.8		
13	FERULIC ACID	445858	SERT	-5.5		
14	SINAPIC ACID	10743	SERT	-5.8		

15	SCOPOLETIN	5280460	SERT	-5.8		
16	ISOFRAXIDIN	5318565	SERT	-6.0		
17	β-SITOSTEROL	222284	SERT	7.5		
18	α- AMYRIN	73170	SERT	8.7		
19	α- SPINASTEROL	5281331	SERT	7.2		
20	ETHYL OLEATE	5363269	SERT	4.6		
21	ETHYL STERATE	8122	SERT	-4.1		

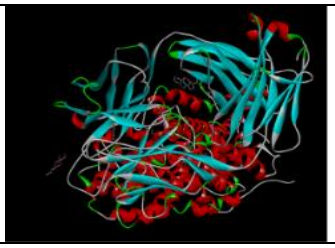
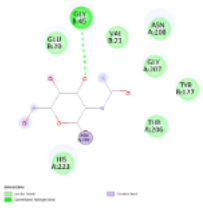
22	ETHYL PALMITATE	12366	SERT	-4.5		

Table 02: Preliminary phytochemical Screening.

Phytochemical constituents	Results
Alkaloids	+
Amino acids	+
Carbohydrates	+
Tannins	+
Glycosides	+
Steroids	+

Table 3: Effect of "Impatient Balsamina" Extracts on Forced Swimming Test.

Group No.	Treatment Group	Immobility(sec) (Avg ±Sem)
1.	Vehicle	48.35±0.5937
2.	Standard	41.76±0.3373
3.	Test	40.66±0.4513

The observations are mean ± SEM of 6 animals.
p<0.05 as compared to that of vehicles treated group (One -way ANOVA followed by Dunnett's test).

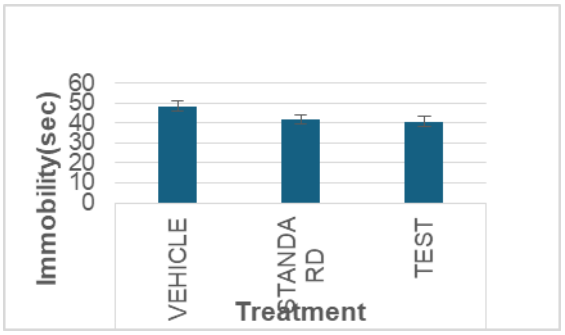


Fig.03 Effect of "Impatient Balsamina" Extracts on Forced Swimming Test.

Table 4: Effect of "impatiens balsa mina" Extracts on Tail Suspension Test.

Group No.	Treatment Group	Immobility(sec) (Avg±Sem)
1.	Vehicle	32±1.154
2.	Standard	21±2.7080
3.	Test	20.26±4.031

*The observations are mean ± SEM of 6 animals.
*p>0.05 as compared to that of vehicle treated group, (One way ANOVA followed by Dunnett's test).

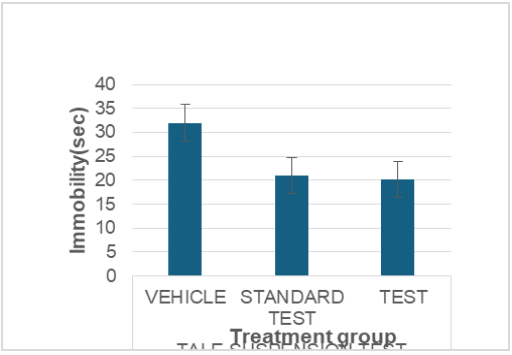


Fig. 04: Effect of "impatiens balsa mina" Extracts on Tail Suspension Test.

Table 5: Effect of "Impatiens Balsamina" Extracts on Locomotor Activity.

Group No.	Treatment Group	Count for 10mins (Avg±Sem)
1.	Vehicle	44.16±9.235
2.	Standard	205±8.819
3.	Test	195±4.409

The observations are mean ± SEM of 6 animals.
*p <0.05 as compared to that of vehicle treated group, (One-way ANOVA followed by Dunnett's test).

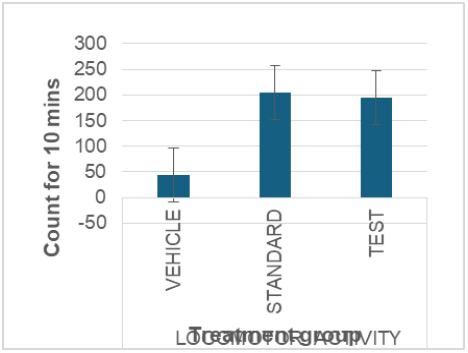


Fig. 05: Effect of "impatiens balsa mina" Extracts on Locomotor Activity.

Table 6: Effect of "Impatiens Balsamina" Extracts for Duration of stay on Rotarod.

Group No.	Treatment Group	Duration of stay on Rotarod (sec) (Avg±Sem)
1.	Vehicle	10±2.206
2.	Standard	26.66±1.744
3.	Test	20.83±2.300

*The observations are mean ± SEM of 6 animals.
*The effect was not significant statistically. (One-way ANOVA followed by Dunnett's test).

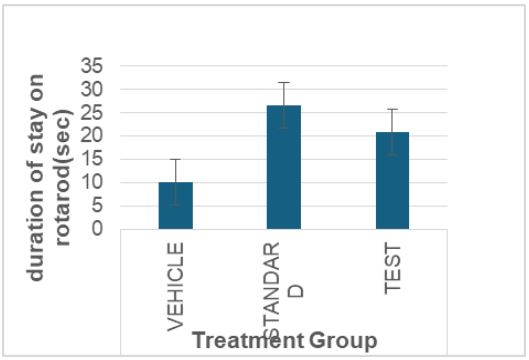


Fig. 06: Effect of "Impatiens Balsamina" Extracts for Duration of stay on Rotarod.

DISCUSSION

MAO-A and MAO-B are key enzymes in neurotransmitter breakdown. Their inhibition is therapeutically relevant, and docking scores (more negative = stronger binding) help identify potential inhibitors.

MAO-A Findings

- **Reference**: Imipramine (-7.0).
- **High affinity**: Myricetin (-9.5), Quercetin (-9.3), Balsaminoside-A (-9.0), α-Amyrin (-8.5), α-Spinasterol (-8.4).
- **Moderate**: Flavone, Flavanol, Flavanone, β-Sitosterol, Alkaloid-A.
- **Weak**: Phenolic acids and ethyl esters.
  → Flavonoids and glycosides emerge as strong candidates.

MAO-B Findings

- **Reference**: Imipramine (-7.4).
- **High affinity**: Methylene-bilawsone (-10.8), Balsaminoside-A (-9.0), Kaempferol (-8.3), Myricetin (-8.1), Ergocristine (-8.1).
- **Moderate**: α-Amyrin, α-Spinasterol, Saponins.
- **Weak**: Phenolic acids and ethyl esters.
  → Methylene-bilawsone shows exceptional potency and selectivity for MAO-B.

Comparative Notes

- Myricetin and Balsaminoside-A bind strongly to both isoforms.
- Methylene-bilawsone is highly selective for MAO-B.
- Several natural compounds outperform Imipramine in predicted binding.

Flavonoids, glycosides, and triterpenoids demonstrate strong inhibitory potential against MAO enzymes, while simple phenolic acids and fatty esters are weak. These natural products may serve as promising leads for antidepressant or neuroprotective drug development.

SERT controls serotonin reuptake, and its inhibition is central to antidepressant action. Docking scores (more negative = stronger binding) indicate ligand affinity.

SERT Findings

- **Reference: Imipramine (-6.5).**
- **High affinity ligands**: Glycoside-H2 (-9.0), Saponins (-8.7), Balsaminoside-A (-8.7), Myricetin (-7.8), Quercetin (-7.6), Kaempferol (-7.4).
- **Moderate binders**: Flavanone, Flavone, Lawson, Isofraxidin (-6.0 to -7.0).
- **Weak binders**: Phenolic acids and ethyl esters (-4.1 to -5.8).
- **Sterols/triterpenoids**: β-Sitosterol, α-Amyrin, α-Spinasterol showed positive scores, suggesting poor binding.

Insights

- Flavonoids and glycosides outperform Imipramine, highlighting strong inhibitory potential.
- Sterols and simple phenolic acids are weak candidates.
- Glycoside-H2, Saponins, and Balsaminoside-A stand out as promising natural inhibitors of SERT.

Natural flavonoids and glycosides show significant potential as SERT inhibitors, while sterols and phenolic acids are less effective. These compounds may serve as leads for antidepressant development Phytochemical screening confirmed the presence of alkaloids, amino acids, carbohydrates, tannins, glycosides, and steroids. **Alkaloids** are notable for their central nervous system activity, while **amino acids and carbohydrates** provide nutritional support. **Tannins** suggest antioxidant and antimicrobial potential, and **glycosides** may contribute cardiotonic or neuroactive effects. The detection of **steroids** points to anti-inflammatory properties.

Overall, the extract contains diverse secondary metabolites with possible synergistic actions, supporting its evaluation for antidepressant and neuroprotective activity.

The Forced Swimming Test results show that *Impatiens balsamina* extract reduced immobility time (40.66 s) compared to the vehicle group (48.35 s), with significance at $p < 0.05$. Its effect was close to the standard drug (41.76 s), indicating antidepressant-like activity. These findings suggest that the plant extract contains active compounds capable of modulating neurotransmitter systems, supporting its potential as a natural source for antidepressant development and warranting further investigation.

In the Tail Suspension Test, the vehicle group showed the longest immobility (32 s), while the standard drug reduced immobility to 21 s. The *Impatiens balsamina* extract produced a similar effect, lowering immobility to 20.26 s. This marked reduction suggests that the plant extract exhibits antidepressant-like activity comparable to the standard treatment, supporting its potential as a natural source of mood-regulating compounds.

In the locomotor activity study, the vehicle group showed the lowest activity count (44.16), while the standard drug produced a marked increase (205). The *Impatiens balsamina* extract also enhanced activity (195), nearly matching the standard. Statistical analysis confirmed significance ($p < 0.05$ vs. vehicle), indicating that the extract improves locomotor performance and supports its antidepressant-like potential.

In the rotarod test, the vehicle group showed the shortest duration of stay (10 ± 2.21 sec). The standard drug increased performance (26.66 ± 1.74 sec), while treatment with *Impatiens balsamina* extract produced an intermediate effect (20.83 ± 2.30 sec). Statistical analysis using one-way ANOVA followed by Dunnett's test revealed that these differences were not significant. Thus, although the extract improved motor coordination compared to the vehicle group, the effect did not reach statistical significance.

CONCLUSION

From the above experiment, it has been concluded that the test impatiens balsamina ethanolic extract possesses a significant anti-depressant activity. Further studies have been carried out to find out the extract mechanism of this activity.

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