IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

EVALUATION OF ANTIDEPRESSANT ACTIVITY OF *LYCOPERSICON ESCULENTUM* IN SWISS ALBINO MICE

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Abstract:

Introduction:
Lycopersicon esculentum (tomato) is a widely consumed fruit known for its rich profile of bioactive compounds, including flavonoids, carotenoids, and phenolic acids. These phytochemicals are increasingly recognized for their potential neuroprotective and mood-enhancing properties
Objective:
This study aimed to evaluate the antidepressant activity of Lycopersicon esculentum extract in Swiss albino mice and to explore its influence on oxidative stress biomarkers along with biochemical and behavioural influences.Methods:
Swiss albino mice were divided into groups and treated with Lycopersicon esculentum extract at doses of 250 and 500 mg/kg (orally). Standard antidepressant imipramine was used as a positive control, and a vehicle-treated group served as the negative control. Phytochemical assessments were conducted to detect the presence of flavonoids, terpenoids, saponins, and phenols. Behavioral evaluations were carried out using the Forced Swim Test (FST) and Tail Suspension Test (TST), validated models for antidepressant-like activity. Biochemical markers of oxidative stress, including malondialdehyde (MDA), superoxide dismutase (SOD), and catalase, were also measured.

Results:
The Lycopersicon esculentum extract demonstrated significant antidepressant-like activity in both FST and TST models, with dose-dependent reductions in immobility time compared to the negative control. Phytochemical analysis confirmed the presence of bioactive compounds such as flavonoids and phenols. Biochemical assessments revealed that the extract significantly reduced MDA levels while enhancing SOD and catalase activity, indicating reduced oxidative stress.

Conclusion:
Lycopersicon esculentum extract exhibited promising antidepressant-like effects in Swiss albino mice, likely mediated by its phytochemical composition and antioxidant properties. These findings support the

therapeutic potential of Lycopersicon esculentum in managing depressive disorders and oxidative stress-related conditions.

KEYWORDS: ANTIDEPRESSANT, LYCOPERISCON ESCULENTUM, SWISS ALBINO,OXIDATIVE STRESS, BIOCHEMICAL, BHEAVIORAL

INDEX TERMS - COMPONENT, FORMATTING, STYLE, STYLING, INSERT.

I. INTRODUCTION

1.1 DEPRESSION:

Depression is a highly prevalent psychological disorder. Depression is a prevalent mental illness. Around five percent of adults worldwide are thought to be affected by the illness. It is typified by a lingering melancholy and a loss of enthusiasm or enjoyment for once fulfilling or pleasurable pursuits. It may also interfere with appetite and sleep. Fatigue and difficulty focusing are prevalent. Depression has played an important part in the global disease burden and is one of the main causes of disability globally. Complex relations between the psychological, biological, and social variables are among the causes of depression. Adversity in infancy, grief, and unemployment are examples of life circumstances that can both contribute to and trigger the onset of depression. One of the most prevalent psychiatric conditions is depression. By 2020, depression has been estimated by the WHO to overtake heart disease as the second most prevalent cause of disability associated with illness. The majority of patients believe that the depression treatments now on the market are ineffective and frequently have multiple unwanted side effects. Over the past ten years, there has been a tremendous advancement in the hunt for innovative medication for psychiatric diseases using medicinal plants. Numerous herbal remedies with antidepressant properties have been studied in a range of animal models.Catecholamines, sympathetic nerves, enterochromaffin cells, and sympathetic ganglia are all produced in the brain (6). The synthesis of these three monoamines—dopamine, norepinephrine, and adrenaline—is normal. In the presence of tyrosine hydroxylase, a precursor termed L-tyrosine is transformed to 3, 4 dihydroxyphenylalanine (DOPA) (rate-limiting step). Tyrosine hydroxylase is an enzyme that is exclusive to catecholaminergic neurons. The enzymes dopa decarboxylase and dopamine-β-hydroxylase subsequently convert DOPA to dopamine and NE, respectively. The adrenal medulla is where the norepinephrine is converted into adrenaline. Adenosine triphosphate, chromogranin A, and dopamine-β-hydroxylase are all stored in synaptic vesicles together with norepinephrine (7).A transmitter called indoleamine serotonin (5-HT) is produced by the nerve ending from the amino acid tryptophan. In the presence of the enzyme tryptophan hydroxylase, tryptophan is converted to 5 - hydroxytryptophan in neurons and chromaffin cells. Decarboxylase converts 5-hydroxytryptophan to serotonin through decarboxylation(8).

The voltage-activated calcium channels open when the action potential reaches the nerve terminals. The process of exocytosis releases monoamine into the synaptic cleft when calcium enters the cell and facilitates vesicle fusion with the presynaptic membrane (9).

On a particular receptor on the presynaptic or postsynaptic membrane, this release neurotransmitter works. The postsynaptic membrane potential is altered by postsynaptic receptor stimulation.

When an ionotropic receptor and a neurotransmitter are coupled, the membrane potential changes, and when a G protein metabotropic receptor and a neurotransmitter are coupled, biochemical changes occur, such as the activation of the intracellular second messenger system. The synaptic cleft neurotransmitter concentration is sustained by the feedback mechanism (10).

The Acute antidepressant effects on the monoamine system include inhibition of neuronal MAO, blockade of the Presynaptic A2 receptor, and Inhibition of monoamine reuptake. The amount of monoamine at the synapse can be greatly raised by these three processes (11).

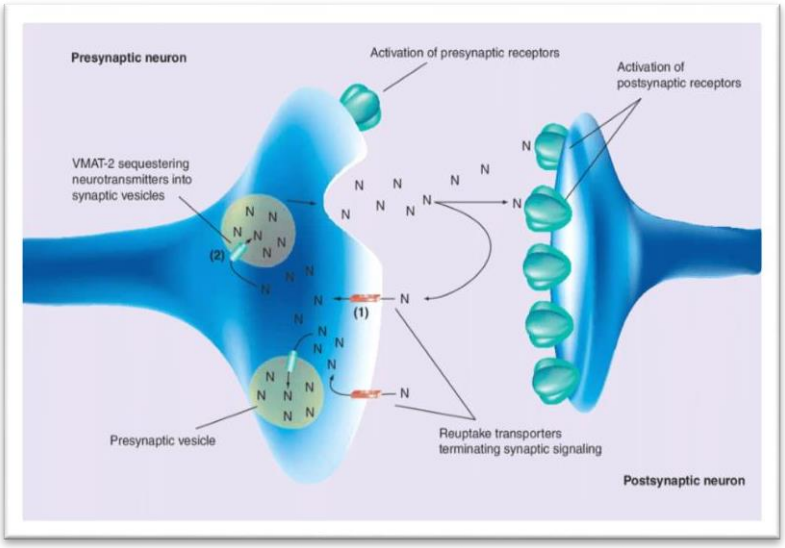


Fig 1: The Monoamine Neuron

1.2 PLANT PROFILLE

***Lycopersicon esculentum*:**

As a species of the Solanaceae family, tomatoes are widely recognized for providing the human diet with phenolic compounds, pigments, antioxidants, and other nutrients [12]. Large volumes of tomatoes are processed to create purees and liquids, which produce waste. Tomato plants are thrown away in the agricultural industry after processing because they are not worth anything for use in industrial procedures. Without seeming to benefit tomato farmers economically, the remaining plant parts are usually fed to livestock (often cattle) as an unbalanced diet. Tomato fruit extracts have been reported to have antimicrobial properties. and anticancer activities [12,13].

Tomato fruits' tendency to serve as antioxidants has been related to their phenolic content. By lowering the quantities of free radicals, these compounds help stop oxidative variations in cells [14,15]. Additionally, epidemiological research indicates a clear link between tomatoes' antioxidant content and a lower risk of cancer and cardiovascular disease [16]. Tomato byproducts, like seeds, offer an alluring source of fiber [17] and have antimicrobial abilities [18], in addition to all of these characteristics. Additionally, tomato plants contain bioactive substances with pharmacologic and nutritional qualities [19].Over the past ten years, there has been significant growth in the body of research discussing the antioxidant and antibacterial properties of plant byproducts, particularly the extracts of grape seeds and olive wastes [20].In the agricultural sector, recovering, analysing, and coming up with improved uses for all of their byproducts—peels, seeds, stems, and leaves—is the current trend. Tomato crop byproducts have commercial importance in the food business because they include bioactive chemicals that may be sources of antioxidant, antiviral, and microbiological compounds.In this regard, the purpose of this study was to examine the antioxidant and antimicrobial properties, in addition to the content (steroidal alkaloid compounds, total flavonoids, phenols, carotenoids, and chlorophyll) of extracts derived from two tomato cultivars (Pitenza and Floradade), which may be helpful in the selection of raw materials for the synthesis of bioactive compounds and nutraceuticals. To prepare an ethanolic extract of *Lycopersicon Esculentum L.* (EELEL)Furthermore evaluate the Pharmacognostic and phytochemical parameters of ethanolic extract of dried leaves of *Lycopersicon Esculentum L.* (EELEL) Moreover investigate the Antidepressant activity of Ethanolic Extract of dried leaves of *Lycopersicon Esculentum L.* (EELEL) in swiss albino mice .and to evaluate oxidative stress parameters such as SOD, CAT, and MDA using mice brain homogenate.

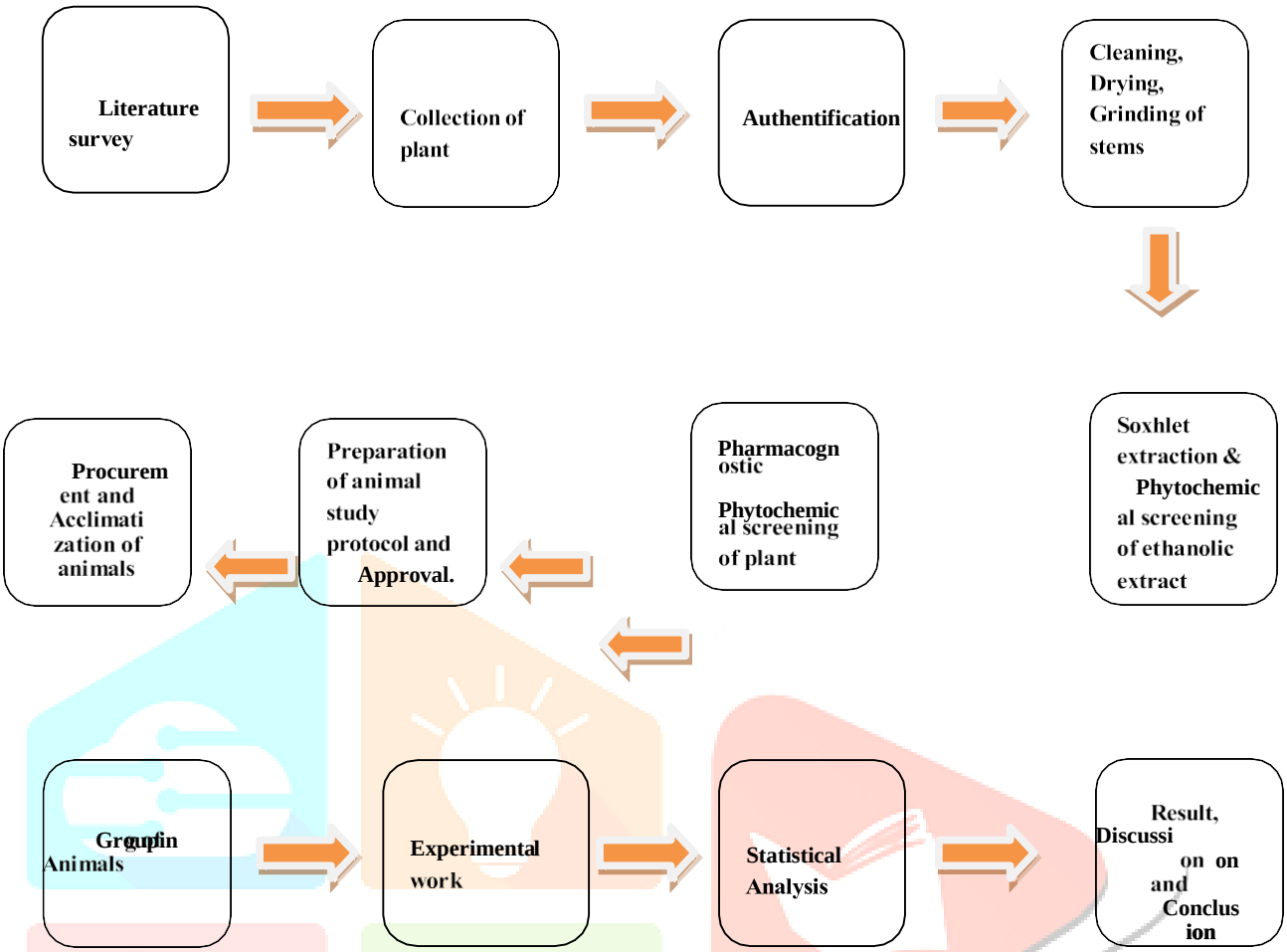
1.2.1 Taxonomical classification:

Table 1. Taxonomical classification

Kingdom:	**Plantae**
Subkingdom	**Tracheobionta**
Super division	**Spermatophyta**
Division	**Magnoliophyta**
Class	**Magnoliopsida**
Order	**Solanales**
Family	**Solanaceae**
Genus	**Lycopersicon**
Species	**S. *lycopersicum***
Synonyms	**Lycopersicon lycopersicum (L. H. Karst.) Lycopersicon esculentum (Mill.)**

Fig 2: Plant Of *Lycopersicon Esculentu*

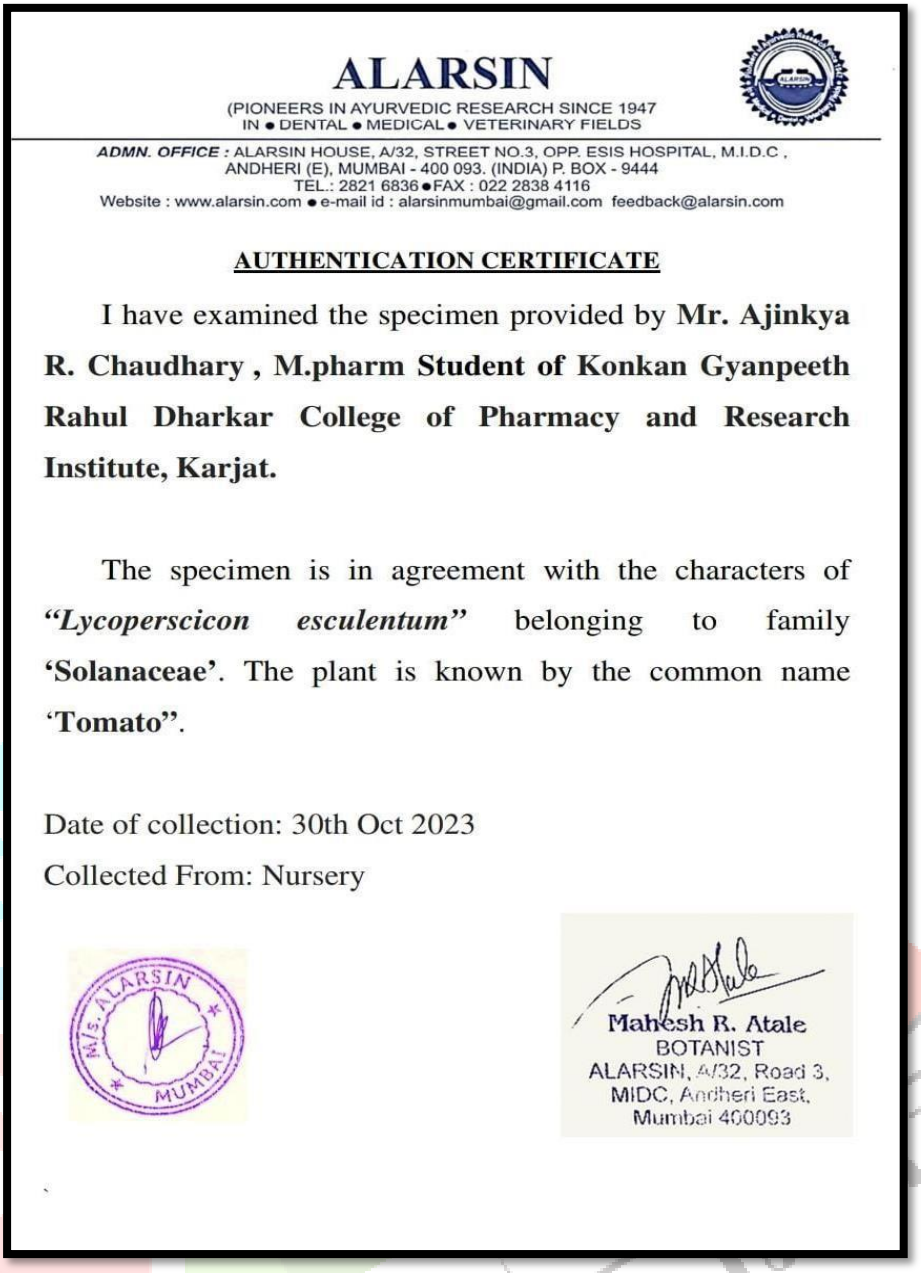
MATERIAL AND METHODOLOGY



2.1 COLLECTION AND AUTHENTIFICATION OF PLANT:

The twigs (Leaves and stems) of *Lycopersicon Esculentum* L. were collected from Junnar Dist. Pine in OCT 2023. Sample specimen voucher was submitted to Dr.Mahesh Atle asst. Professor Dept. of Botany, at Alarsin A/32 Road 3, MIDC, Andheri East MUMBAI 400093.

The plant stems were washed with tap water and shade-dried at normal room temperature with the aid of circulating airflow using a fan. The stem was dried and coarse powder was made of the stem in a mixture and it was stored in a container.



ALARSIN

(PIONEERS IN AYURVEDIC RESEARCH SINCE 1947
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ADMN. OFFICE : ALARSIN HOUSE, A/32, STREET NO.3, OPP. ESIS HOSPITAL, M.I.D.C , ANDHERI (E), MUMBAI - 400 093. (INDIA) P. BOX - 9444
TEL.: 2821 6836 ● FAX : 022 2838 4116
Website : www.alarsin.com ● e-mail id : alarsinmumbai@gmail.com feedback@alarsin.com

AUTHENTICATION CERTIFICATE

I have examined the specimen provided by **Mr. Ajinkya R. Chaudhary , M.pharm Student of Konkan Gyanpeeth Rahul Dharkar College of Pharmacy and Research Institute, Karjat.**

The specimen is in agreement with the characters of ***"Lycoperscicon esculentum"*** belonging to family **'Solanaceae'**. The plant is known by the common name **'Tomato"**.

Date of collection: 30th Oct 2023

Collected From: Nursery

M/s. ALARSIN MUMBAI

Mahesh R. Atale
BOTANIST
ALARSIN, A/32, Road 3,
MIDC, Andheri East,
Mumbai 400093

Fig 3. Authentication of Medicinal Plant

2.2 REPARATION OF EXTRACT:

After the powdered *Lycopersicon Esculentum L.* plant was extracted with ethanol using the Soxhlet apparatus, the solvent that was used was allowed to evaporate and the contents of the round-bottom flask were emptied into a Petri plate. The extract was then evaporated to produce a dry powder, which was then stored in an appropriate container and refrigerated between 0 and 4 °C until it was required.

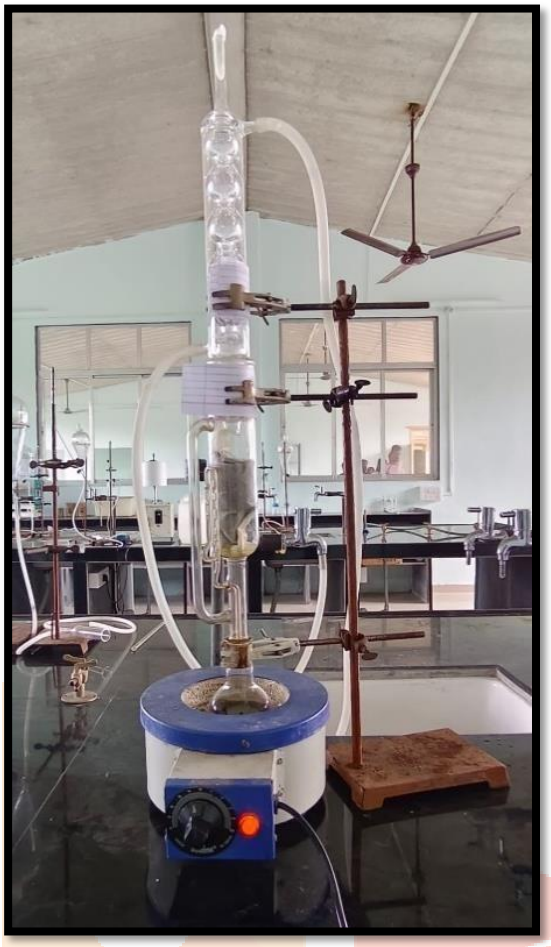

Fig 4 Soxhlet Apparatus

2.3 QUALITATIVE PHYTOCHEMICAL SCREENING:

The presence of phytoconstituents such as flavonoids, alkaloids, steroids, cardiac glycosides, saponins and vitamin C, triterpenoids and tannins, and phenolic substances have been identified through preliminary chemical testing on the ethanol extract of Lycopersicon Esculentum
L. using established methods. (28)

3 EXPERIMENTAL DESIGN:

TABLE 3. REQUIREMENT OF ANIMALS

Mice
Species – Swiss albino mice
Gender – MalesMale
Number – 30
Weight – 25-30 gm

Swiss Albino Mice (25qalbino mice (25-30gm) were used for the study. The animals were obtained from Jay Agro, At-Posari post-toward, Tal -Karjat, Dist- Raigad, Karjat-410201 Reg no: 2131/PO/Bt/S/CPCSEA. The use of these animals and the study protocols were approved by the CPCSEA-recognized local ethical committee of Horizon Research Institute under protocol no. HRFT/IAEC/02. Titled “Evaluation of Antidepressant activity of Ethanolic extract of *Lycopersicon Esculentum* L.in Swiss Albino Mice” of thesis entitled “Evaluation of Pharmacological Activity of Medicinal Plant in Animal Model”. Mice were kept in animal house of Horizon

Research Foundation Trust, Mahape, Navi Mumbai; in polypropylene cages, at 22 ± 2°C, with 12:12 hrs dark: light cycle. They were provided with commercial mice feed and water was given ad libitum.

3.1 SELECTION OF DOSES:

In the literature survey, it was found that the ethanolic extract of *Lycopersicon Esculentum* was safe. LD50 of the ethanolic extract is reported to be 5000 mg/kg. The plant is often eaten by animals, which is also an indicator to prove it is less toxic. Thus, for the research study, the doses of EELEL were finalized are 250mg/kg and 500 mg/kg(29).

3.2 SCREENING OF ANTIDEPRESSANT ACTIVITY:

Thirty mice will be randomly divided into six experimental groups. Group-I (normal control) mice will receive normal saline (1.0 mL/kg, p.o.) daily for 14 days; Group-II (stress control) mice will receive normal saline (1.0 mL/kg, p.o) daily for 14 days and will be subjected to restraint stress on 15th day. Group III (Standard control) mice will receive Imipramine (10 mg/kg) daily for 14 days. Group-IV and V mice will be treated with EELEL (250mg/kg, 500 mg/kg) daily for 14 days and subjected to ARS on the 15th day.

Stress-like behavior was assessed by subjecting the mice to behavioral paradigms such as the tail-suspension test (TST), the 40-minute post-restraint stress procedure. A pretest of 10 minutes for a forced swim test (FST) was also given to each mouse simultaneously. Then

23.5 hours later, the relevant samples were administered and the main test was performed 30 minutes later. Oxidative stress parameters such as SOD, CAT, and MDA were analyzed in restraint stress-induced animals and a control group, following a forced swim test on the 15th day.

3.3 GROUPING OF ANIMALS

Sr.No	Group	Test substances	Swiss albino mice either sex required per group	Dose	Total
1	GROUP 1 (Normal control)	Normal saline	6	1.0 ml/kg	6
2	GROUP 2 (Stress Control)	Normal saline	6	1.0 ml/kg	6
3	GROUP 3 (Standard control)	Imipramine	6	20 mg/kg	6
4	GROUP 4 Test-1(Extract)	EELEL	6	250mg/kg	6
5	GROUP 5 Test-2(Extract)	EELEL	6	500mg/kg	6
Total animals required					30

Table 4. Grouping of animals.

***EELEL= Ethanolic extract of *Lycopersicon Esculentum* Leaves.**

3.4 PROCEDURE FOR ACUTE RESTRAINT STRESS:

Mice were placed for a duration of 12 hours in a single plastic mouse restraint device to achieve acute restraint stress. This prevented the animal from experiencing any pain while restricting its mobility. For the duration of their stress exposure, the animals were denied access to food and drink. The animals were taken out of their enclosure after 12 hours, and forty minutes later, they were put through behavioural tests and biochemical analyses. The mice in the usual control group were housed in the laboratory's animal cage. (30)

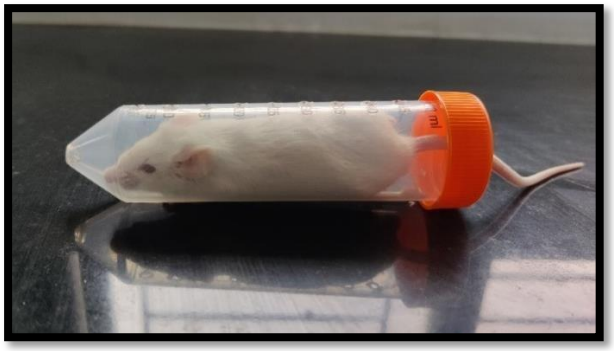

Fig 5. Acute restrain stress.

3.5 BEHAVIOURAL TESTS:

Tail-suspension test (TST)

Adhesive tape, positioned about 1 cm from the tip of the tail, will be used to suspend mice from the leading edge of a table 50 centimetre above the ground. During the next four minutes of a six-minute test, the total amount of time the subject was immobile will be noted. A mouse is only deemed immobile if it hangs motionlessly and passively. A third party who is blind to the treatment the research animals receive will record the amount of time the animals remain immobile. The mice's immobility in this test is reduced by antidepressants (31).

Forced Swim Test (FST):

On day 14, all the mice were allowed to swim individually for 10 min for adaptation. Then 23.5 hours later, the relevant samples were administered and the main test wa s performed 30 minutes later i.e. on day 15. Mice were forced to swim in a cylinder (diameter 40 cm, height 60 cm) containing 30 cm of freshwater maintained at 25°C ± 1°C. Water in the cylinder was changed after each animal to prevent behavioral alteration among animals due to t h e use o f water. Each animal showed vigorous movement during the initial 2-minute period of the test. Duration of immobility will be manually recorded during the next 4 min of a total 6 min testing period by the observer. Mice were considered to be immobile when they floated in an upright position, making only small movements to keep their head above the water level. Following the swimming session, mice were dried using a cotton towel and returned to home cages after the experiment. A decrease in the duration of immobility is indicative of an antidepressant-like effect, whereas an increase in immobility time, when compared with the control group, is associated with depressive-like effects.

3.6 BIOCHEMICAL ESTIMATION:

Preparation of Brain homogenate: After completing the behavioral study, animals were euthanized using a CO_2 chamber. The brains were removed quickly and placed on ice-cold saline. The tissue was weighed and homogenized using 0.1M Phosphate buffer (pH 7.5). Then centrifuge the sample the supernatant obtained was used for performing CAT, SOD & MDA activity.

3.7 Catalase activity:

The supernatant (50µl) was added to a cuvette containing 2.95 ml of 19 mM/L solution of H_2O_2 prepared in potassium phosphate buffer. The change in absorbance was monitored at 240 nm wavelength at the 1-minute interval for 3 minutes. The presence of catalase decomposes H2O2 leading to a decrease in absorbance.

3.7.1 Sodium oxide Dismutase activity:

The SOD activity in the supernatant was measured by the method of Misra and Fridovich. The supernatant (500 µl) was added to 0.800ml of carbonate buffer (100mM, pH 10.2) and 100 µl of epinephrine (3mM). The change in absorbance of each sample was then recorded at 480 nm in a spectrophotometer for 2 min at an interval of 15 sec. Parallel blank and standard were run for determination of SOD activity. The reaction mixtures are diluted 1/10 just before taking the readings in a spectrophotometer.

3.7.2 Determination of malondialdehyde (MDA) formation:

1 ml of suspension medium was taken from the 10% tissue homogenate. 0.5 ml of 30% TCA will be added to it, followed by 0.5 ml of 0.8% TBA reagent. The tubes were then covered with aluminum foil and kept in a shaking water bath for 30 minutes at 80 C. After 30 minutes tubes were taken out and kept in ice-cold water for 30 minutes. These were then centrifuged at 3000 rpm for 15 minutes. The absorbance of the supernatant was read at 540 nm at room temperature against an appropriate blank. Blank consists of 1 ml of distilled water, 0.5 ml of 30% TCA, and 0.5 ml of 0.8% TBA

3.8 STATISTICAL ANALYSIS:

Table 5. Statistical analysis Significance.

Significance Level	Interpretation
*p≤ 0.05	Significant
**p≤ 0.01	Highly Significant
***p≤ 0.001	Very Significant

The data obtained from the animal experiments were analyzed using GraphPad Prism software. The results were expressed as mean ± SEM and subjected to one-way ANOVA followed by Dunnett's test to determine the statistical significance between the groups. In this study, Values are expressed in mean ± SEM of n-6 mice/treatment and the significance is *p≤ 0.05. The acute Restrain Stress group was compared with the Normal control and Imipramine group and the Test group was compared with Acute restrain stress.t

Table 6 depicts the presence of various phytoconstituents in the extract

RESULTS

4 QUALITATIVE PHYTOCHEMICAL SCREENING:

Table 6: Results of Phytochemical Screening of *Lycopersicon Esculentum L.* extract

Sr. No.	Phytoconstituents	Test	Inference	*Lycopersicon Esculentum L.* extract
1.	Carbohydrates	Molisch's test	No violet ring at the junction	-ve
		Benedict's test	No colour change	-ve
2.	Proteins	Biuret test	No violet/ pink colour	-ve
3.	Steroids	Sulphur powder test	Sulphur powder sinks at the bottom	-ve
4.	Saponins	Froth test	Persistent foam	+ve
5.	Flavonoids	Lead acetate test	Formation of yellow ppt	+ve
		Shinoda test	Pink to red solution	+ve
6.	Alkaloids	Hager's test	Yellow ppt	+ve
		Dragondroff reagent test	Reddish brown ppt	+ve
7.	Phenols and tannins	Ferric chloride test	Deep black colour	+ve

		Dilute Potassium permanganate test	**Decolouration of KMNO_4**	**+ve**
8.	**Fixed oils and fats**	**Stain test**	**A translucent spot of lipid formed on the filter paper**	**+ve**
9.	**Glycosides**	**Legal test**	**Formation of yellow precipitate**	**+ve**
		Modified Borntrager's test	**Pink to red color**	**+ve**
10.	**Amino acids**	**Million's test**	**No red or pink colored ppt formed**	**-ve**

Fig 6. Phytochemical analysis of *Lycopersicon Esculentum L.* extract

4.1 ANTIDEPRESSION EVALUATION:

Forced swim test:

All doses of the Ethanolic extract of stems of *Lycopersicon Esculentum L* showed a dose-dependent decrease in immobility time when compared against stress control. Figure 7 illustrates the changes in the behavioral parameters between treatment positive control and disease groups.Table 7 depicts value of immobility in mice

Table 7. Effect of Ethanolic Extract of *Lycopersicon Esculentum L* on Immobility Time of Forced Swim Test in Swiss Albino Mice

Group	Mean ±SEM
Control	128.4 ± 3.562
ARS	179.4 ± 5.432
Imipramine	86 ± 4.598
EELEL 1	117.4 ± 5.438
EELEL 2	101.4 ± 6.492

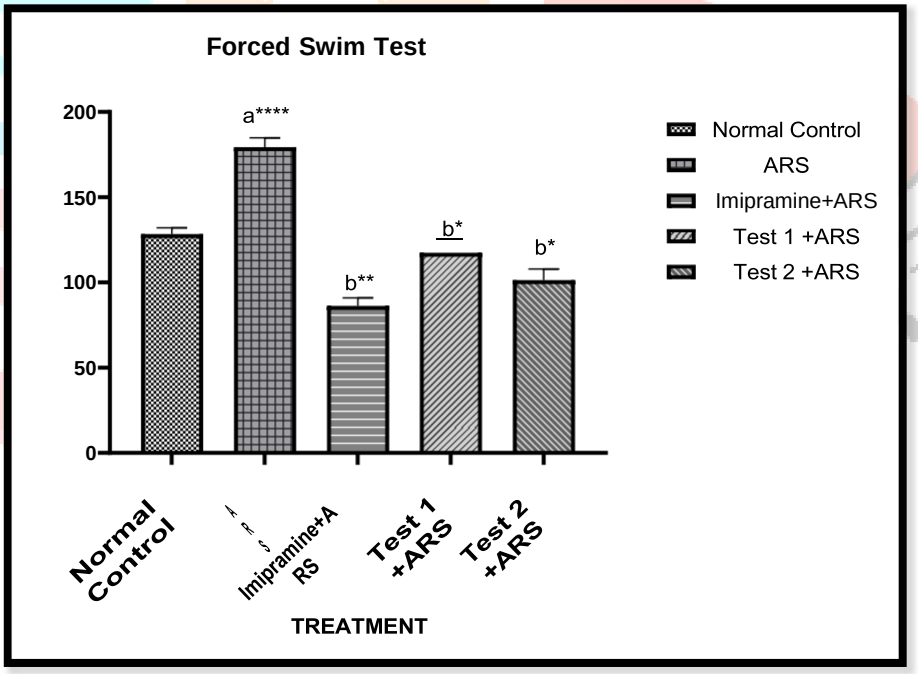

Fig 7. Effect of Ethanolic Extract of *Lycopersicon Esculentum L* on Immobility Time of Forced Swim Test in Swiss Albino Mice

Tail suspension test:

All three doses of the Ethanolic extract of *Lycopersicon Esculentum L.* showed a dose- dependent decrease in immobility time when compared against stress control as well as against imipramine which was used as a standard. Figure 8 depicts the outcomes of behavioral tests for tail suspension test.Table 8 represents Tail suspension tests results

Table.8 Effect of Ethanolic extract of *Lycopersicon Esculentum L* on Immobility time of Tail Suspension Test in Swiss Albino Mice

Group	Mean ± SEM
Control	148.3 ± 2.364
ARS	198.7 ± 3.556
Imipramine	97.67 ± 2.376
EELEL 1	129.8 ± 3.562
EELEL 2	121.5 ± 2.376

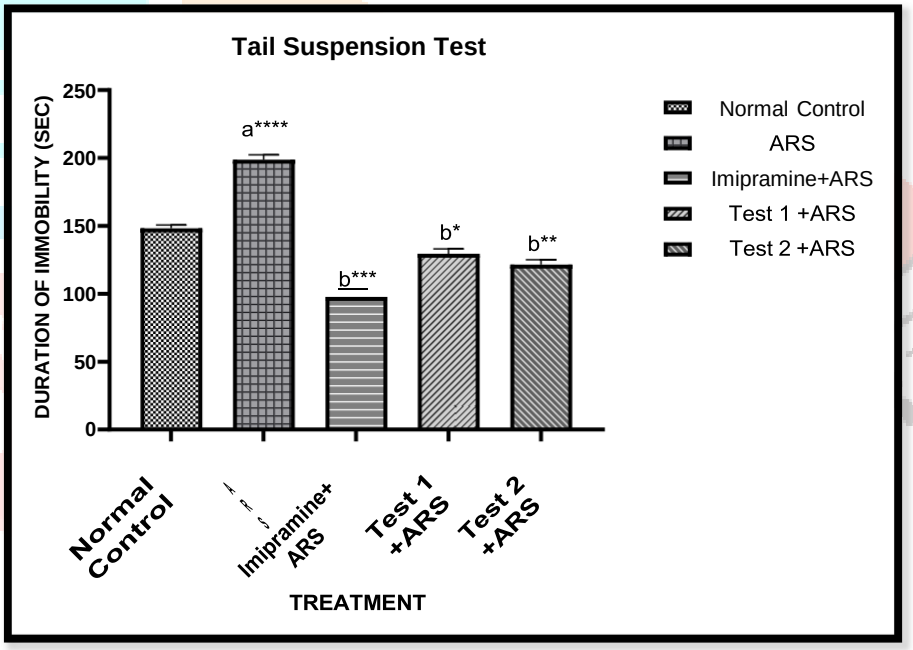

Fig 8. Effect of Ethanolic Extract of *Lycopersicon Esculentum L* on Immobility Time of Tail Suspension Test.

BIOCHEMICAL ESTIMATION:

Catalase activity:

Evaluation of CAT activity revealed that stressed mice presented a significant decrease in CAT activity, which was significantly prevented by EELEL (250 mg/kg, 500 mg/kg) pretreatment when compared to the unstressed group as shown in Table.Figure 9 illustrates the catalase levels in all 5 groups

Table 9. Effect of EELEL pretreatment on ARS-induced changes on catalase activity.

Group	Mean±SEM
Control	11.13±0.230
ARS	8.18±0.177
Imipramine	10.88±0.415
EELEL 1	10.05±0.143
EELEL 2	10.29±0.138

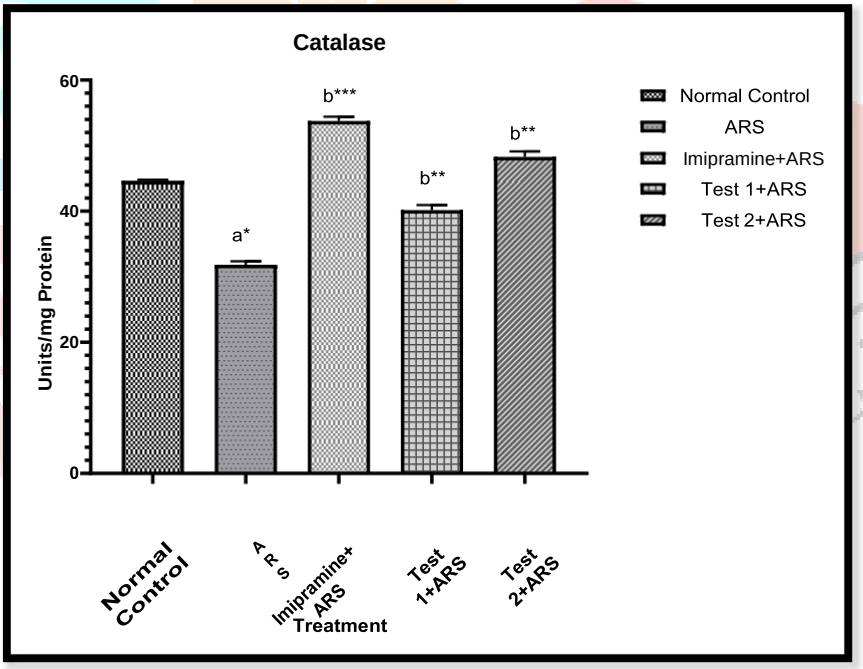

Figure 9.

Effect of EELEL pretreatment on ARS-induced changes on catalase activity. Values are expressed as mean ± standard error of the mean (N=6).

Effect of EELEL pretreatment on ARS-induced changes on catalase activity. NC: Normal control; ARS: Acute restraint stress; EELEL: Ethanolic extract of *Lycopersicon Esculentum* Values are expressed as mean ± standard error of the mean (N=6).

SOD:

In the mice pretreated with EELEL 250mg/kg and 500 mg/kg the level of SOD was significantly increased as compared to ARS mice. Table Shows significant and dose- dependent recovery on ARS-induced increased level of SOD in the animal due to EELEL.

Table 10. Effect of EELEL pretreatment on ARS-induced changes on SOD activity.

Group	Mean ± SEM
Control	3.023±0.019
ARS	4.175±0.023
Imipramine	2.816±0.014
EELEL 1	1.785±0.018
EELEL 2	1.976±0.024

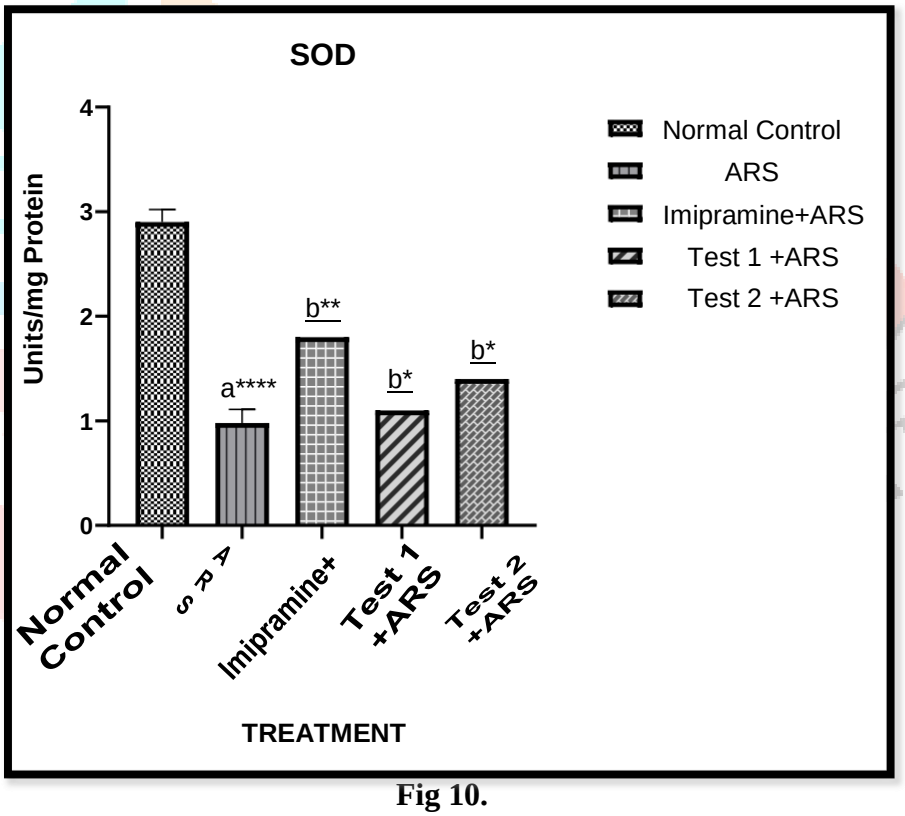

Fig 10.

Effect of EELEL pretreatment on ARS-induced changes on SOD activity. Values are expressed as mean ± standard error of the mean (N=6).

Figure 10 illustrates the SOD activity

MALONDIALDEHYDE (MDA) FORMATION:

The results depicted illustrate that ARS significantly increased MDA levels in mice brains as compared to unstressed mice. The results indicated that EELEL (250mg/kg and 500 mg/kg) pretreatment and imipramine significantly abolished the increase in MDA level caused by ARS.Figure 11 depicts MDA levels

Table 11 Effect of EELEL pretreatment on ARS-induced changes on MDA activity

Group	Mean±SEM
Control	0.041±0.0008
ARS	0.048±0.0001
Imipramine	0.0291 0.0006
EELEL 1	0.0385± .00037
EELEL 2	0.0334±0.0008

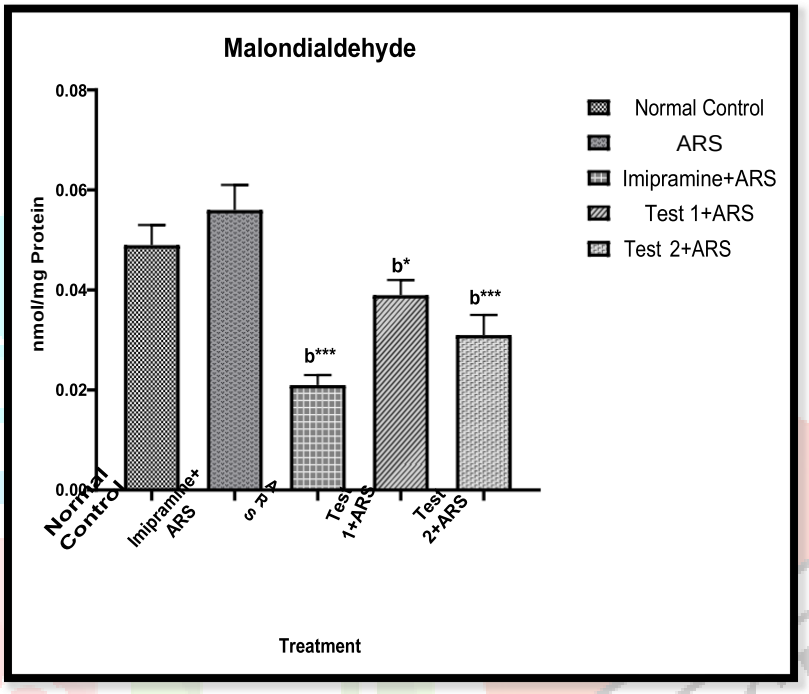

Fig 11. Effect of EELEL pretreatment on ARS-induced changes on MDA activity. Values are expressed as mean ± standard error of the mean (N=6).

Discussion:

Phytochemical analysis showed presence of flavonoids, saponins, terpenoids, phenols and tannins due to positive Shinoda, Foam , Salkowski, Lead acetate ,5%Fecl3 test respectively.

Biochemical Estimations prove that the phytochemical may possess activities which are antioxidants. SOD and catalase levels were reduced while elevated MDA levels in disease hallmark oxidative stress. On treatment with the botanical the SOD and Catalase levels were further improved and MDA levels were less as compared to the disease grouping.Table 9,10,11 represents SOD, Catalase, MDA assay results

Behavioural Parameters like Forced Swim, Tail Suspension tests have shown significant changes after treatment with *Lycopersicon Esculentum*

The results illustrate that ARS significantly increased MDA level in mice brain as compared to unstressed mice. The results indicated that EELEL (250mg/kg and 500 mg/kg) pretreatment and imipramine significantly abolished the increase in MDA level caused by ARS.

Conclusion:

Preliminary phytochemical analysis of the Ethanolic extract of *Lycopersicon Esculentum* leaves showed the presence of Saponins, flavonoids, alkaloids, phenols, tannins, and glycosides. It can be concluded from the study that the ethanolic extract of *Lycopersicon Esculentum* tubers possesses significant antidepressant properties, which is probably due to flavonoids which play an active role in providing an Antidepressant-like effect. *Lycopersicon Esculentum* plant can be used for the treatment of neurological disorders and may be recommended as a supplement for antidepressant activity. In nutshell we can say that Lycoperiscon Esculentum

has plethora of anti-depressant properties and further more studies are required t0 validate and confirm the pharmacological activities

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