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Research Article

Pharmacology for drug discovery

Evaluation of The Antidepressant Properties of Aqueous Extract *Terminalia Chebula* Fruit Pulp in Wistar Albino Rats.

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Abstract: Between 9 and 46% of those being treated for major depressive disorder had a partial or no response to antidepressants. Research is needed to produce a more effective and safer antidepressant. *Terminalia chebula* stimulates the CNS. The major goal of this research is to determine whether chronic administration of aqueous extract of *Terminalia chebula* fruit pulp dosages of (100, 200, and 400 mg/kg) have antidepressant effects. *Terminalia chebula* behavioural model of rats when supplied over three to four months in experimental rats. Wistar albino rats weighing 200 to 300 grams and one to two months old were utilized. For all experiments, healthy wistar albino rats of either sex were separated into six groups with equal numbers of animals. The antidepressant properties of *Terminalia chebula* fruit pulp were investigated using two different experimental methods. Both the forced swimming and the tail suspension tests fall into this category. *Terminalia chebula* fruit pulp was given at doses of 100 mg/kg, 200 mg/kg, and 400 mg/kg. To treat depression, a standard dose of antidepressant medication (10 mg/kg) of imipramine was administered. Each group of rats was tested one hour after treatment. A rat behavioural stress paradigm found that *Terminalia chebula* had a nephroprotective effect. Antioxidant phytochemicals like *Terminalia chebula* were extracted and quantified. The abundance of phytochemicals implies that this might be a good source for antioxidants and depression therapy. The current evidence is intriguing and may be employed as a medicine candidate after additional study and clinical tests.

Keywords: *Terminalia chebula;* Forced Swimming Test(FST); Tail Suspension Test, (TST); antidepressant; imipramine; neuroprotective; Fruit pulp

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1. INTRODUCTION

According to the WHO, depression affects 121 million people worldwide, making it a leading cause of disability (WHO). By 2025, it will be the second leading cause of worldwide sickness, behind cardiovascular disease[1]. Antidepressants prescribed for depression include selective serotonin reuptake inhibitors (imipramine, citalopram, sertraline, and fluoxetine), monoamine oxidase inhibitors (phenelzine and moclobemide), tricyclic antidepressants (amitriptyline, imipramine, and nortriptyline), and a newer heterocyclic antidepressant[2]. Current antidepressants cause tiredness, dry mouth, urinary retention, cardiac arrhythmias, gastrointestinal disturbance, and sexual dysfunction. They also pose a risk of overdose in persons who are already sensitive to their effects. 29 to 46% of major depressive disorder patients show a partial or no response to antidepressants. A more effective and safer antidepressant is needed[3]. According to Ayurvedic scripture, *Terminalia chebula* (TCh) is advised for "weakness of brain and nerves," which has been connected to Alzheimer's disease, forgetfulness, and dementia. *Terminalia chebula* has diverse CNS action. In an ischemia-neuronal damage model, Terminalia chebulaRetzius (95 percent water, methanol, ethanol) was neuroprotective[4]. Animal models have explored the antidepressant and antianxiety properties of BR-16 (Mentat), which includes TCh and PE. According to the available literature, no one experimental inquiry has evaluated the antidepressant potential of TCh. Ayurveda suggests PE for several diseases[5]. It's safe for long-term use and widely used in the Indian subcontinent. TCh has been discovered to be effective as 'adaptogens' in animal models of stress. In Ayurveda, rasayanas boost longevity, infection resistance, memory, and intellect. Adaptogens establish non-specific resistance in the body and help it adjust [6]. This helps the body fight against physical, chemical, or biological stressors. Because stress increases the likelihood of depression, adaptogen herbs like TCh may help cure the mental disorder [7]. In view of the above, it was decided to perform the current investigation to determine whether TCh has an antidepressant effect and to strengthen the evidence for PE's antidepressant impact in rat behavioral models of depression [8]. TCh's antidepressant effects were also studied. Monoaminergic antagonists help explain how these two drugs act. This study aimed to determine whether chronic dosing of *Terminalia chebula* at regularly used dosages (100, 200, and 400 mg/kg) showed antidepressant activity on days 7, 14, and 21 in depression-model rats. To comprehend efficacy *Terminalia chebula on* behaviour model of rats delivered over three to four months.

2. MATERIALS AND METHODS

2.1 Selection of the plant

Selection of the plants for screening may be guided by taxonomy, phytochemistry, ecology or ethnobotany. Based on the discussion with the traditional medical practioners and the ethanopharmacological literatures the plant *Terminalia chebula* selected for the neuroprotective acivity .

2.2. Collection and authentication of plant

The mature fruits of the plants, *Terminalia chebula* were collected from the saththyamanglam forest Erode Dt, Tamilnadu, in September 2020. The plant materials were identified and authenticated by the Dr. Chandrashekar R, Ayurvedic Physician and Researcher in the Department of Pharmacology at the A.J. Institute of Medical Sciences and Research Centre in Mangalore, Karnataka, India, A voucher specimen (TCMA-1) has been deposited in the Department of Pharmacology, Vinayaka Mission's Kirupananda Variyar Medical College,Salem for future reference. The fruits were shade dried at room temperature for 10 days and coarsely powdered and passed through sieve No. A.N.16-A/2020 DATED : 05/10/2020.

2.3. Extraction and Phytochemical analysis

The fruit pulp was then shade dried at room temperature for 10 days and coarsely powdered and stored in an air-tight container. About 500 g of coarsely powdered dried fruit pulp were taken and subjected to continuous hot percolation with different solvents of increasing order of polarity such as pet ether, chloroform, acetone, ethanol, and aqueous. The extracts were dried under the rotary evaporator and the percentage yield of the extracts were calculated. Then the extracts were tested for various phytochemical constituents like alkaloids, flavonoids, glycosides, phenols, saponins, sterols, tannins, proteins, and carbohydrates. Percentage yield and phytochemical screening. Conventional qualitative methods described by a number of authors were used to conduct a phytochemical analysis of the plant extracts' major phytoconstituents (Vogel, 1958; Kapoor et al., 1969; Fadeyi et al., 1989; Odebiyi and Sofowora, 1990). Compounds such as glycosides, alkaloids, flavonoids, phenolic compounds, saponin, steroids, quinine, and tannin were looked for in the plant extracts (Harborne, 1973). Standardized chemical analyses are performed on both the aqueous extract and the powdered form of each plant sample (Edeoga et al., 2005)[9].

a. *Test for Alkaloids: Dragendroffs reagents*

Solution A: 0.6g of Bismuth sulphate dissolved in 20ml of water.
Solution B: 6g of Potassium iodide was dissolved in 50ml of water.
Solution A and Solution B were mixed and allowed to strand for some time.The supernatant was decanted from potassium iodide and make up to 100ml.

b. *Test for Flavonoids:* 1ml of stock alcoholic solution with few drops of neutral FeCl3 and 5ml of extract with 1ml of alcohol subjected to the Ferric chloride test.

c. *Test for Phenolic compounds*: 1ml of extract with 5ml of alcohol and few drops of neutral FeCl3.

d. *Test for Tannin*: 1ml of extract with minimum amount of H20. Filtered and to the filtrate add few drops of FeCl3 solution.

e. *Test for Saponins*: 1ml of extract with 20ml of distilled water agitated vigorously for 15 minutes.

f. *Test for Steroids*: 1ml of extract with 1ml of methanolic extract of drug and 1ml of chloroform, 2 -3ml of acetic anhydride and 1 -2 drops of conc. H2SO4 were added.

g. *Test for Quinine*: 1ml of extract with few drops of alcoholic KOH was added.

h. *Test for Glycosides*: 1g powder with dissolved in 2 -3 ml of distilled water and 2 -3 drops of 1per cent solution of alcoholic -napthol added side of test tube.

Table 1: Phytochemical analysis in *Terminalia chebula* Retz with different solvents

S. No	Extract	Phytochemicals							
		A	F	S	S	Q	PC	T	G
1.	Acetone	+	+	-	-	-	+	+	-
2.	Ethyl acetate	+	+	-	-	-	+	+	-
3.	Hexane	+	+	-	-	-	+	+	-
4.	Ethanol	+	+	-	-	-	+	+	+
5.	petroleum ether	+	+	-	-	-	+	+	+
6.	Chloroform	+	+	-	-	-	+	+	+
7.	Diethyl ether	-	+	-	-	+	+	+	+
8.	n-propyl alcohol	+	+	-	-	-	+	+	+
9.	n-butanol	+	+	-	-	-	+	+	+
10.	Methanol	+	+	-	-	+	+	+	+
11.	Water	+	+	-	-	-	+	+	+

A -Alkaloid, PC - Phenolic compound, F - Flavonoid, T - Tannin S - Steroid, G -Glycoside S -Saponin, CA - Carboxylic acid and Q -Quinine. (indicates absence of compounds)

2.4. Experimental animals

The study employed 1-month-old, 200-300-gram Wistar albino rats of either sex. These rats came from the Government Erode Medical College's animal house. They were acclimated to the lab's conditions before the experiment. They were kept in polypropylene cages at 252°F. 12 hours of light were followed by 12 hours of darkness. 50 to 55% humidity, unlimited food and water. Each animal was only utilized once throughout the experiment, which was completed between 10:00 and 16:00. The Institutional Animal Ethics Committee approved experiment 588/GO/Re/S/02/CPCSEA. dated 22nd September 2020 (Ref No Ph. D 001/1AEC/GEMCH/Dated 2020, CPCSEA-compliant study) date of registration: 05/04/2002;

2.5. Acute oral toxicity study

The fixed-dose acute toxicity test followed OECD guideline 420. The method provides information on hazardous properties and ranks and classifies substances according to the GHS for acutely toxic chemicals. OECD guidelines recommend testing one sex (usually females). Six 8-10-week-old Wistar rats were acclimatized for 7 days. In a 300 mg/kg dose study on one rat, no toxicity symptoms were found, so the dose was increased to 2,000 mg/kg. Further tests at 2,000 mg/kg showed no toxicity. In the main test, 4 rats received 2,000 mg/kg. Each animal was observed for 24 h and 14 days for toxicity symptoms. The compound will then be ranked and classified using the GHS for acutely toxic chemicals[10].

2.6 Timeline of research

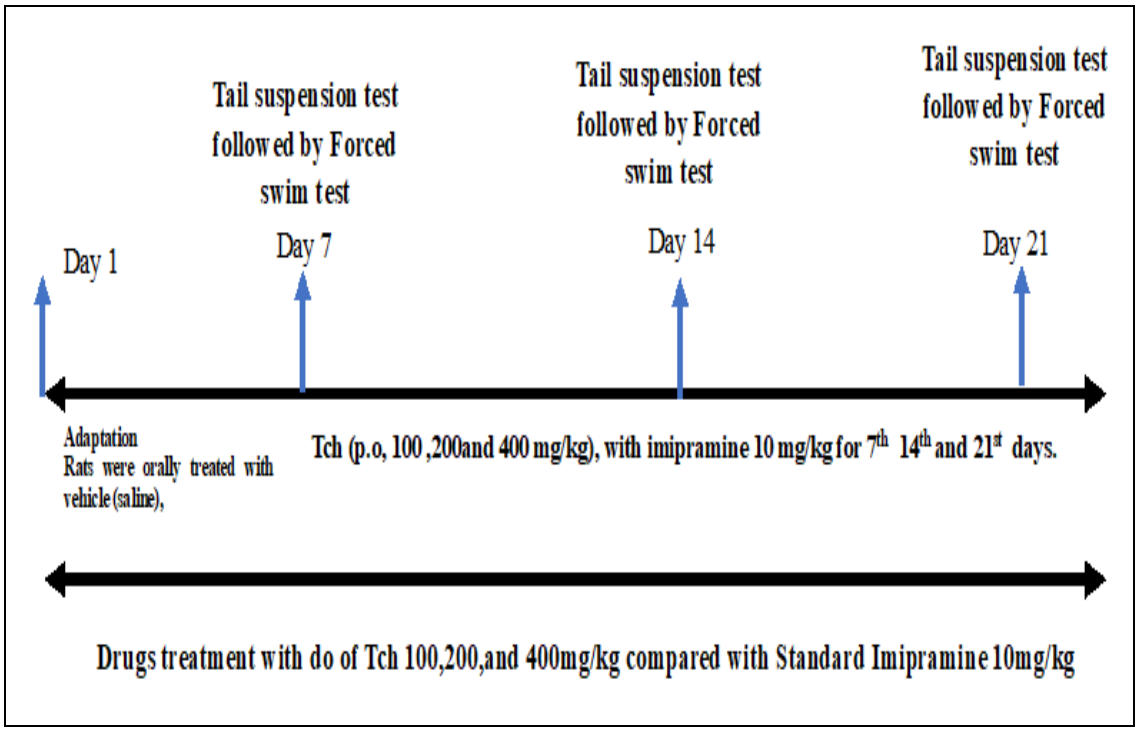

Fig.1: Timeline of drug administration for Evaluation of antidepressant *T.chebula* extract.

Fig.1. Schematic description of the experimental design. After a 1-week adaptation Wistar albino rats were orally treated with vehicle (saline), TCh(100, 200, and 400 mg/kg), or imipramine (10 mg/kg) for 7th, 14th, and 21st day days. All the rats were handled according to the animal welfare guidelines issued by CPCSEA

2.7. EXPERIMENTAL DESIGN

2.7.1. Experimental Design for anti-depressant activity

For all the tests healthy Wistar albino rats of either sex were divided into five (5) groups, having an equal number of animals, as under Group-I: control group. It was administered Control (1% Gum acacia) *p.o.* Group-II: serves as stress control group. It was administered 1ml/kg b.w saline Group-III Standard received 15 mg/kg Imipramine. Group IV, Test group Aqueous extract of *Terminalia chebula* dried fruit pulp (AETCFP) 100 mg/kg *p.o* Group-V: AETCFP 200 mg/kg *p.o and Group* VI: AETCFP 400 mg/kg *p.o.* Two experimental approaches were used to examine the antidepressant qualities of *Terminalia chebula* fruit pulp. These include the Forced Swimming Test and the Tail Suspension Test. 100 mg/kg, 200 mg/kg, and 400 mg/kg of *Terminalia chebula* fruit pulp were administered. 10 mg/kg of imipramine was used as a conventional antidepressant. One hour following each mouse treatment, the test was done[11].

2.7.2. Behavioural tests for antidepressants

Tail Suspension Test (TST) was conducted in accordance with Steru et al. Individually, the rats were suspended 60 cm above a table using adhesive tape placed 1cm from the tip of each mouse's tail. The duration of immobility was measured during the final five minutes of the six-minute test. Rats were considered immobile only when they hung passively and completely motionless[12]. Force swimming test (FST) was done for all groups as previously described Hosseini et al 60. Each rat was compelled to swim in a cylindrical glass tank (60 cm in hight and diameter of 38 cm) which was filled with water (40 cm depth) at 24±1 °C. The total duration of immobility was calculated by a single observer for 5 min. The immobility was considered when the rats made no effort to escape, except necessary movements which enabled them to keep their head above the water. The active and climbing times were also recorded for 5 min[13].

2.8. DRUGS AND DOSAGE

Imipramine was procured from our institution's pharmacy at Govt. Erode Medical College (formally IRT-Perundurai Medical College). *Terminalia chebula* was bought from Laxmi ayurveda shop in Mangalore and validated by Dr. Chandrashekar R, Ayurvedic Physician and Researcher in the Department of Pharmacology at the A.J. Institute of Medical Sciences and Research Centre in Mangalore, Karnataka, India. The resultant powder was extracted for eight hours at 70 °C–80 °C using Soxhlet equipment with 70% hydro alcohol. The extract was then concentrated in a water bath and the yield percentage was calculated, resulting in a yield of 22.51 percent by weight. Except for haloperidol, which was diluted in distilled water and administered intraperitoneally, all of the drug solutions were newly prepared and administered to the animals by gavage using a guide cannula (4 cm OD) (*o.p*).

2.9. ETHICS

The Institutional Animal Ethics Committee granted ethical clearance 588/GO/Re/S/02/CPCSEA to the experimental protocol. Date of Registration: 05/04/2002) dated 22nd September 2020 (Ref No Ph.D 001/1AEC/GEMCH/Dated 2020,

2.10. STATISTICAL ANALYSIS

The findings from the several behavioural investigations were summarized using the mean value together with the standard error (SEM). The data that were obtained were evaluated using a one-way analysis of variance (ANOVA), and the Tukey HSD multiple comparisons test was used to assess the differences that were found between the groups. The most up-to-date release of SPSS Statistics is version 26 IBM, SPSS Inc. In order to conduct statistical analysis, the most recent version of SPSS Statistics was utilized. P-values that were lower than 0.05 were regarded as being statistically significant.

3. RESULTS

3.1 Extractive Values

Table 2. Extractive Values of Aqueous extract of *Terminalia chebula* dried fruit pulp

Extraction	Colour	Consistency	Percentage Yield % w/w
Pet. Ether	Dark Greenish	Semi Solid	2.8
Chloroform	Dark Black	Thick Liquid	1.5,
Acetone	Light Greenish	Semi Solid	2.1
Ethanol	Green	Thick Solid	7.2
Water	Dark Bluish	Semi Liquid	13.8

The percentage yield of the extracts was calculated and found to be 2.8, 1.5, 2.1, 7.2 and 13.8 %w/w for petether, chloroform, acetone, ethanol, and aqueous extracts shown in table 2. The glycosides, carbohydrates, phenols, saponins, terpenoids, tannins, and flavonoids were present in the acetone, ethanol, and aqueous extracts. Alkaloids and terpenoids were present in chloroform extract. Gums and fixed oils were present in petroleum ether extract. Thus, the phytochemical analysis confirmed the presence of bioactive compounds, and this might serve as a potential source in the treatment of neurological disorders. Hence, based on the percentage yield and phytochemical results, aqueous extract of dried fruit pulp of Terminalia chebula(AETC) was selected for its neuroprotective studies.

3.2 Behavioural tests for antidepressants

Table 3. Antidepressant effect of aqueous extract *Terminalia chebula* fruit (AETCFP) pulp by tail suspension test in Wistar albino rats.

s.no	Groups	Doses	Tail suspension Immobility time (Sec)		
			Day 7	Day 14	Day 21
I.	Control	1ml/kg b.w	159±5.85	141±9.31	153±6.59
II.	Stress control	1ml/kg b.w	135.50±0.76[a]	120.16±2.32[a]	124.33±1.62[a]
III.	Standard Imipramine	15mg/kg b.w	219±3.89[a]	219±4.99[a]	216±4.40[a]
IV.	AETCFP	100mg/kg b.w	147±3.53[c]	147±8.42[b]	173±6.19[b]
V.	AETCFP	200mg/kg b.w	194±4.34[b]	222±5.02[a]	216±3.75[a]
VI.	AETCFP	400mg/kg b.w	222±1.74[a]	221±3.81[a]	215±3.37[a]

Values are expressed as mean± SEM of 6 animals. Data were analysed by One-way ANOVA followed by Tukey's multiple comparison tests. a P<0.001, indicates that Group II (negative control) was compared with group I(control). b P<0.001 indicates that Group III, IV V, and VI was compared with group. Effect of AETCFP tail suspension test was studied in rats and the results were presented in table 3 & fig 2. The animals were subjected to suspend in air by fixing the tail for 5 minutes. At various time intervals, the immobility time in seconds were observed. Imipramine, 1 mg/kg, i.p., was used as a standard antidepressant. Imipramine significantly (P<0.001) reduced the immobility time compared to stress control. 100 mg/kg b.w were shown less significant against standard as well as stress control where as Both the doses of AETCFPF (200& 400 mg/kg) showed significant (P<0.001) decrease in immobilization time, which is an indication of antidepressant effect comparison to stress control. On 7th, 14th, and 21st of observations AETCFP 200 mg/kg showed 194±4.34, 222±5.02, and 216±3.75 seconds of immobility time respectively and AETCFP 400 mg/kg showed 222±1.74, 221±3.81 and 215±3.37 seconds of immobility time respectively.

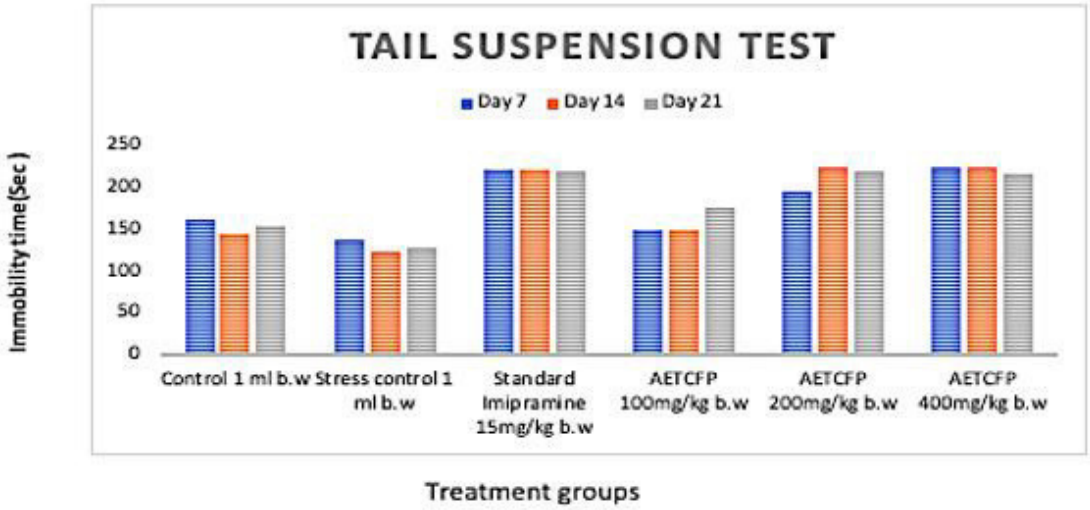

Fig 2. Effect of aqueous extract *Terminalia chebula* fruit pulp on Tail Suspension Test in Rats

The immobility time was significantly increased in stress treated animals as compared to the control group P < 0.001. But Imipramine tended to reduce the immobility time. However, there was a significant (P < 0.001) dose-dependent reduction of immobility time on animals treated with AETCFP at 200 and 400 mg/kg. b.w when compared with those treated with imipramine.

Table 4. Antidepressant effect of aqueous extract *Terminalia chebula* fruit pulp (AETCFP) by Forced Swim test in Wistar albino rats

s.no	Groups	Doses	Forced Swim test Immobility time (Sec)		
			Day 7	Day 14	Day 21
I.	Control	1ml/kg b.w	164±3.57	149±6.21	150±19.31
II.	Stress control	1ml/kg b.w	211±1.96[a]	213±2.65[a]	220±3.02[a]
III.	Standard Imipramine	15mg/kg b.w	184±6.58[b]	171±6.55[b]	163±11.15[b]
IV.	AETCFP	100mg/kg b.w	217±5.04[a]	213±2.81[a]	212±3.11[a]
V.	AETCFP	200mg/kg b.w	213±3.75[a]	214±4.04[a]	217±3.34[a]
VI.	AETCFP	400mg/kg b.w	164±3.57[c]	149±6.21[b]	150±19.31[b]

Values are expressed as mean± SEM of 6 animals. Data were analysed by One-way ANOVA followed by Tukey's multiple comparison tests. a P<0.001, indicates that Group II (negative control) was compared with group I(control). b P<0.001 indicates that Group III, IV V, and VI was compared with group. Effect of AETCFP on forced swim test was studied in

rats and the results were presented in table 4& fig 3. The animals were subjected to forced swim test for 5 minutes at various time intervals and immobility time in seconds were observed. Imipramine, 1mg/kg, i.p., was used as a standard antidepressant. Imipramine significantly (P<0.001) reduced the immobility time compared to stress control. Both the doses of AETCFP (200& 400 mg/kg) showed antidepressant activity (P<0.001) in terms of a decrease in the immobility time period comparison to stress control. On 7th, 14th and 21st of observations AETCFP, 100 mg/kg b.w were shown less significant against standard as well as stress control whereas 200 mg/kg showed 213±3.75, 214±4.04, and 217±3.34 seconds of immobility time respectively and AETCFP 400 mg/kg showed 164±3.57, 149±6.21, and 150±19.31seconds of immobility time respectively. The immobility time was significantly increased in stress treated animals as compared to the control group P < 0.001. But Imipramine tended to reduce the immobility time. However, there was a significant (P < 0.001) dose-dependent reduction of immobility time on animals treated with AETCFP at 200 and 400 mg/kg. b.w when compared with those treated with imipramine.

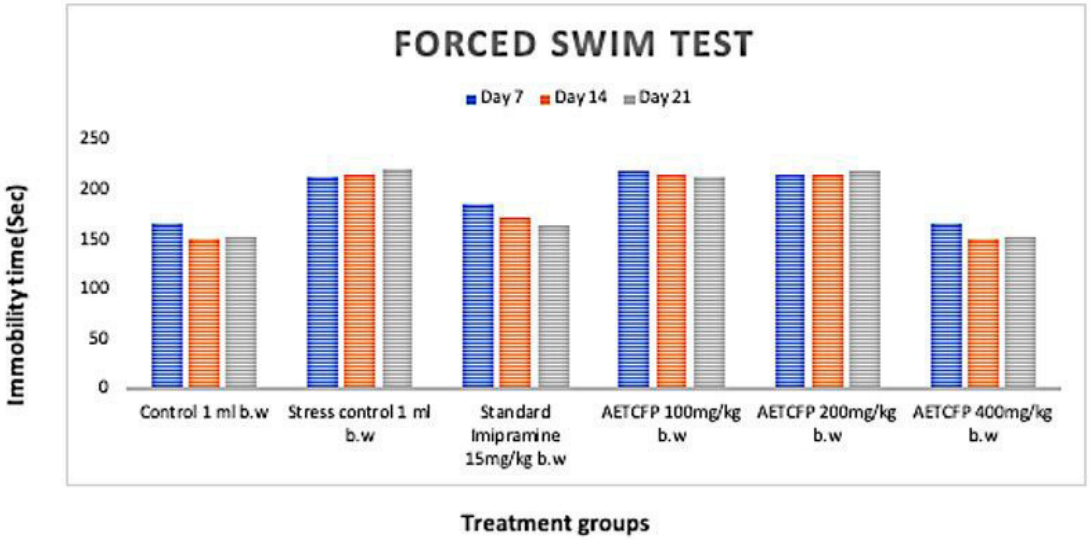

Fig 3. Effect of aqueous extract *Terminalia chebula* fruit pulp on Forced Swim test in Rats

4. DISCUSSION

Phytochemical research found neuroactive substances. *Terminalia chebula* fruit pulp aqueous extract was chosen based on yield and phytochemical data. T.chebula Alkaloids, flavonoids, saponins, phenolic compounds, steroids, carboxylic acid, tannins, and glycosides were present. Different solvents extracted fruit differently in terms of phytochemicals. Both factories' researchers agreed. Alkaloids in fruit extracts react with Dragendroffs reagents to form a reddish brown precipitate Fruit extract and ferric chloride produced blue precipitate. Observations suggest T contains tannins. extract. Retz. Glycosides make napthol and sulpuric acid brick red. Chloroform, acetic anhydride, and concentrated sulphuric acid can be used to detect steroid use. Saponin and mercuric chloride formed a white precipitate[14]. Flavonoids are present because ferric chloride and water turn blackish red in their presence. Quinine turned blue in alcoholic NaOH solution. Neutral and phenolic chemicals interacted. According to the findings of our investigation, *Terminalia chebula* displayed a behavioural profile that is in line with the actions of an antidepressant as well as an anxiolytic. Both the forced swim test and the tail suspension test were used to investigate the antidepressant effect of an aqueous extract of *Terminalia chebula* given at dose levels of 100, 200, and 400 mg/kg of body weight. These experiments were performed on rats as the test subject. The findings suggest that the extract possesses characteristics that are analogous to those of an antidepressant. The acute administration of an aqueous extract of *Termenalia chebula* at a dose of 400 mg/kg demonstrated a statistically significant (P < 0.001) reduction in the length of immobility in both of the methods of depression, in comparison to the group that served as the control [15]. This was the case regardless of the method that was utilised to cause the depression Vonshak A et al. In the forced swim test, the chronic administration of aqueous extract of *Terminalia chebula* at both doses (200 and 400 mg/kg) significantly (P < 0.001) decreased the duration of immobility. This was measured by the percentage of time that the subject was unable to move[16] When contrasted with the control group, the Tail suspension test results for only the 400 mg/kg dose demonstrated a statistically significant (P < 0.001) reduction in the amount of time spent immobile. Because the extract's locomotor activity did not exhibit any significant change at a dose of 400 mg/kg body weight, this finding suggests that the reduction in the amount of time spent immobile is not the result of a CNS stimulant effect[17]. This is because the finding suggests that the reduction in the amount of time spent immobile is not the result of a CNS stimulant effect. This finding rather suggests that the decrease in the amount of time spent immobile is the result of the decrease in the amount of time spent immobile. As a result of this, the aqueous extract of *Terminalia chebula* may have the potential to be of therapeutic utility in the treatment and management of depressive conditions [18,19]. Specifically, this may be the case if The forced swimming test and the tail suspension test are two of the most common methods that are used in the pharmacological in-vivo model evaluation of antidepressants. Both of these tests involve the animal being suspended by its tail. Rats are utilized in either of these two types of tests[20]. The consumption of *Terminalia chebula* in this particular experiment led to a considerable decrease in the amount of time spent immobile, which is suggestive of an effect similar to that of an antidepressant. People have, for a long time, held the belief that the underlying cause of the etiology of mood disorders is an abnormal concentration of the

neurotransmitters serotonin and norepinephrine within synapses[21]. However, recent neuroimaging and post-mortem morphometric research has shown that people who suffer from depression have specific structural and morphological (macroscopic and microscopic) abnormalities across a variety of limbic and non-limbic circuits in their brains. The effects of stress and treatment with antidepressants have the opposite relationship with one another. It's possible that the intracellular signalling, transcription factors, and target genes are to blame for this. Plasticity, also known as the capacity of brain systems to adapt or change, is a relatively new theory that is gaining ground in the study of the pathogenesis of depression as well as the treatment of depression. Plasticity is also known as the capacity of brain systems to change. It's possible that being unable to respond in an appropriate and adaptive manner to stressful situations or negative stimuli could lead to depression[22]. This is not completely out of the question. It is possible that treatment with antidepressants could combat these deleterious cellular consequences, which could be interpreted as a reduction in brain plasticity. Inhibiting or reversing the atrophy that occurs in neurons, in addition to improving cell survival and function, would be the means by which this goal would be achieved[23]. Because it contains a wide variety of important phytoconstituents, such as gallotannic acid, bellericanin, ellagic acid, gallic acid, termilignan, thanni lignan, flavone, and anolignan B, tannins, ellagic acid, ethyl gallate, galloyl glucose, and chebulaginic acid, as well as phenyllemblin, sitosterol[24], and As a result of the presence of these compounds, it demonstrates a diverse array of pharmacological activities, some of which include antisecretory, analgesic, antihypertensive, antidiarrheal activity, antimicrobial activity, anti-diabetic, antioxidant, anti-ulcer, antipyretic, hepatoprotective, anticancer, angiogenesis, and antidepressant-like activity[25,26]. *Terminalia chebula* has the ability to inhibit the growth of bacteria, which may lead to the discovery of novel antimicrobial compounds. These compounds could be used in the treatment of a wide variety of illnesses, as well as in the production of brand new medications. It is conceivable that, in the not too distant future, the pharmaceutical industry might put it to use in a variety of different applications. It is able to act as an antioxidant, which has a number of positive effects on one's health, and it provides a number of benefits[27]. In addition, the extracts of *Terminalia chebula* contain components that have demonstrated potential as a potential treatment for cancer. However, additional research is required to determine the identity of these potentially effective active principles as well as the underlying mechanism that gives *Terminalia chebula* its anticancer activity. These questions will be addressed in the next section of this article. The following clause will provide responses to these questions: In terms of its angiogenic properties, *Terminalia chebula* reveals promising signs of having a very interesting potential[28]. The effect that *Terminalia chebula* and its extracts have on the body is comparable to that of nephroprotective agents. There is a possibility that it will stop the kidney from accumulating any more CaOx crystals. This would be a beneficial effect[29].

5. CONCLUSION

Suffering from depression is a leading contributor to illness and lost productivity around the world. loss. Depressing people are more likely to attempt suicide, which is a major cause of death. group of people in their forties and fifties who are incredibly productive. When diseases are detected and treated early, they can be prevented or at least lessened. morbidity and mortality from depression, and may also be able to depression. The tail suspension method was used to assess the antidepressant efficacy of an aqueous extract of *Terminalia chebula* fruit in this study. A 21-day forced swim test revealed that the experimental medication has antidepressant properties on par with the gold standard tricyclic antidepressant, imipramine is helpful in treating depression. Therefore, the purpose of the study has been fulfilled. The fruit of the *Terminalia chebula* tree can work against depression via various mechanisms, including via its ability to decrease inflammation and stimulate the production of feel-good chemicals like serotonin and alpha-adrenergic amines. The need for additional animal experiments, ideally using a bigger sample size and other It is possible to gain a deeper grasp of the *Terminalia chebula* mode of action, and it can be used as an alternative potential depression drug's lead chemical.

6. ABBREVIATIONS

AETCFP:	Aqueous extract of Terminalia *chebula* fruit pulp
ANOVA:	Analysis of Variance
CPCSEA:	Committee for the Purpose of Control and Supervision of Experiments on Animals
FST:	Force swim test
MAO-A:	Monoamine Oxidase A
OECD:	Organization for Economic Co-operation and Development
p.o:	per oral
SEM:	Standard Error
T.chebula:	*Terminalia chebula*
Tch:	*Terminalia chebula*
TST:	Tail Suspension Test
EA:	Ellagic acid's

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8. AUTHOR CONTRIBUTION STATEMENT

The authors confirm contribution to the paper as follows: study conception and design: Arbind Kumar Choudhary , and Dr Kothai Ramalingam, data collection: Arbind Kumar Choudhary; analysis and interpretation of results: Dr E Manivannan Dr V. Sivasankari, Dr Arul Balasubramanian ; draft manuscript preparation: Arbind Kumar Choudhary and Dr Chandrashekar Rajan. All authors reviewed the results and approved the final version of the manuscript.

9. DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

10. CONFLICT OF INTEREST

Conflict of interest declared none.

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