



“ANTIDEPRESSANT EFFECT OF POLYPHENOL AND AMINO ACID RICH EXTRACTS OF *ELEUSINE CORACANA* L. SEED BY USING FST AND TST MODELS”

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ABSTRACT

Objective: Depression is normally called major depressive disorder and potentially life-threatening illness which is caused by changes in monoamine neurotransmitters mainly dopamine, serotonin or nor epinephrine. To evaluate anti-depressant activity of ethanolic and aqueous seed extract of *Eleusine Coracana* L. against forced swim test and tail suspension test in rats.

Methodology: Wistar albino rats of either sex were divided into 6 groups (n=6). Group I (normal control) received normal feed and water. Group II standard received Imipramine (1mg/kg). Group III received low dose of aqueous extract. Group IV received high dose of aqueous extract. Group V received low dose of ethanolic extract. Group VI received high dose of ethanolic seed extract of *Eleusine Coracana* L. at the end of the study period, animals were sacrificed brain dissected out and its histopathology was studied.

Results: The results revealed that all rats treated with ethanolic and aqueous extract in FST and TST had a significant reduction of immobility time in both the doses of 200 mg/kg and 400 mg/kg when compared to control. In animals given ethanolic extract extracts at doses of 200 mg/kg and 400 mg/kg, the histopathology of the brain revealed an increase in the number of pyramidal cells, indicating that the compounds had a protective effect on the brain and prevented the damaging effects of oxidative stress on the central nervous system (CNS).

Conclusion: The present study provides the evidence indicating that ethanolic and aqueous extract of *Eleusine Coracana* L. showed significant antidepressant effect in TST and FST models of depression. Further research is required to know the mechanism of its action as an antidepressant; therefore this plant should be further investigated as an alternative therapeutic approach for the treatment of depression.

Key Words: Antidepressant, *Eleusine Coracana* L., Imipramine, Immobility time

INTRODUCTION:

Depression is a common mental disorder, is a feeling of severe despondency and dejection. Almost 1 million lives are lost yearly due to suicide, which translates to 3000 suicide death every day.¹ Although depression may occur only once during life, people typically have multiple episodes.² During these episodes, symptoms occur most of the day, nearly every day and may include: Feelings of sadness, fearfulness, emptiness or hopelessness, Angry outbursts, irritability or frustration, even over small matters, Loss of interest or pleasure in most or all normal activities such as sex, hobbies or sports, Sleep disturbances, including insomnia or sleeping too much, Tiredness and lack of energy so even small tasks take extra effort, Reduced appetite and weight loss or increased craving for food or weight gain, Anxiety agitation or restlessness, Slowed thinking, speaking or body movements. Many modern and synthetic medicines are used to treat depression like Imipramine, Citalopram, Escitalopram, Fluoxetine, Fluvoxamine, Sertraline etc., but these have more side effects. Herbal drugs are in huge demand in developed as well as developing countries for primary health care because of their wide biological and medicinal properties and high safety margin. Many herbal drugs are used to treat depression example *Hypericum perforatum*, *Bacopa monniera*, *Rhizome coptidis*, *Fructus evodiac* etc.^{3,4}

Millets are a group of cereal crops grown worldwide for food and staples, in harsh environments such as those at risk of drought. The millets include species in several genera, mostly in the sub-family *Panicoideae*, of the grass family *Poaceae*.⁵ Finger millet also called as 'ragi' which is consumed without dehulling is a principal food grain of people belonging to low-income groups. Finger millet (*Eleusine coracana* L.) is also a medicinal plant. Its roots, leaves, fruits and seeds are evaluated for the treatment of various activities like Anti-diabetic, Anti-fungal, Hepatoprotective, Cardiotonic etc.⁶ It also has many medicinal properties such as Antioxidant⁷; Ant ulcerative, Anticancer, Antihyperlipidemic, and Wound healing properties. It is rich in polyphenols and amino acids and is also reported as a good source of antioxidants. Studies are reported with respect to the contents of phenolic acids and tannins in different varieties of ragi. Polyphenols^{8,9} and amino acids are the most important phytochemicals of the millet because of this nutraceutical they have antioxidant activity, antidepressant, anti-inflammatory, anti-carcinogenic, antimicrobial, ant diarrheal, antiulcer, and anti-cardiovascular properties.^{3,4}

Keeping in view the potential medicinal uses and chemical constituents of *Eleusine coracana* L. which may be responsible for the antidepressant activity, this study is intended to evaluate the antidepressant activity by using different antidepressant animal models.

EXPERIMENTAL ANIMALS:

Albino rats of Wistar strain weighing 150-200 g were used for the study. Animals were procured from Adita Biosys Private Limited, Madhugiri road, Tumakuru, Karnataka and housed in polypropylene cages. The animals were maintained at standard laboratory conditions (25° ± 2°C) and 12hr light and dark cycle. Animals were fed with standard pellet diet and water. The experimental protocol was approved by the Institutional Animal Ethical Committee (IAEC/02/2022) and experiment was conducted under the CPCSEA guidelines on the use and care of experimental animals.^{10,11}

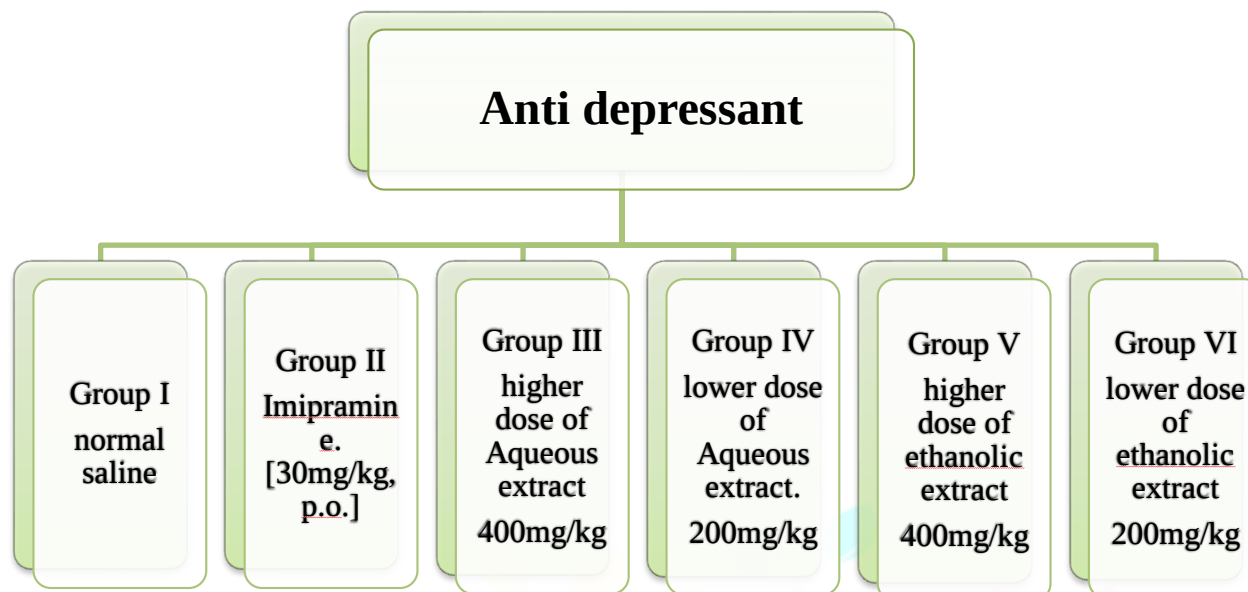


Figure no. 1 Experimental Grouping

1) FORCED SWIM METHOD

PROCEDURE:

Adult rats are allowed to swim in a cylinder with no escape filled with water at 25 °C. When the rats are forced to swim in water initially it remains hyperactive, but approximately 5 min later the activity slows down and the phase of immobility starts. After 15 min the rats are removed and allowed to dry. The duration of immobility is measured. The same activity is done for standard and test groups and the drug is administered 1 h earlier when the test starts.^{12, 13, 14}

Evaluation: The duration of immobility is measured for test, control and standard groups treated with various drugs. The antidepressants drugs decrease the duration of immobility.

2) TAIL SUSPENSION METHOD

PROCEDURE:

Three groups of rats are divided and proper food and water are given. Control, test, and standard groups are divided and are subjected to respective drugs. The rats are suspended upside down through its tail. At the start of the test, the rat tries to escape, but is unable and become immobile after some time. The readings are taken for 6 min by using camera and computer count the time for activity and immobility is recorded and compared with the test and standard groups.^{14, 15}

Evaluation: The duration of immobility of standard and test is compared with control groups and decrease in duration of immobility is calculated.

RESULT AND DISCUSSION

Animal models cause mental stress, physical stress and depression. An efficient and reliable behavior screening test for antidepressants is provided by the TST and FST of depression. It has been predicted that immobility reflects a condition of behavioral hopelessness and a failure to adjust the stress. Drugs that treat depression shorten the immobility period on the FST and TST. The majority of studies have utilized Imipramine as a conventional treatment because of its ability to suppress NE reuptake. It appears that imipramine has a positive effect on the FST model, as these are caused by an increase in the bioavailability of serotonin & epinephrine at the postsynaptic location as a result of reuptake inhibition. The data of these experiments revealed a significant decrease ($p < 0.01$) in Immobility time in animals treated with ethanolic extract of *Eleusine coracana* L. Seed at a dose of 200mg/kg and 400mg/kg. Whereas moderate decrease ($p < 0.05$) was found in animals treated with aqueous extract of *Eleusine coracana* L. seed at 200mg/kg and 400mg/kg dose when compared with standard and control groups. 200mg/kg and 400mg/kg of *Eleusine coracana* L. Ethanolic and Aqueous extract for 7 successive days had no harmful effect on the brain histology of tested animals, which was similar to control (saline solution) and standard (Imipramine 10mg/kg). The brain histology of all rats was well arranged with normal pyramidal cells in density and size; besides, we noted a total absence of hemorrhage or lesion.

EFFECT OF *ELEUSINE CORACANA* L. SEED EXTRACT ON FORCED SWIM TEST AND TAIL SUSPENSION TEST

SR.NO.	TREATMENT	FST	TST
1.	Control	197.5	210
2.	200mg/kg EEEC	154.8**	192.5**
3.	400mg/kg EEEC	148.5***	143.2***
4.	200mg/kg AEEC	186.7 NS	205 NS
5.	400mg/kg AEEC	178.2**	197**
6.	30mg/kg Imipramine	84.83***	100.5***

Values are represented in mean $\pm$ SEM. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$ when compared with control by using one-way ANOVA followed by Dunnett's comparison method.

Table No. 1 Immobility Time Comparison of FST and TST

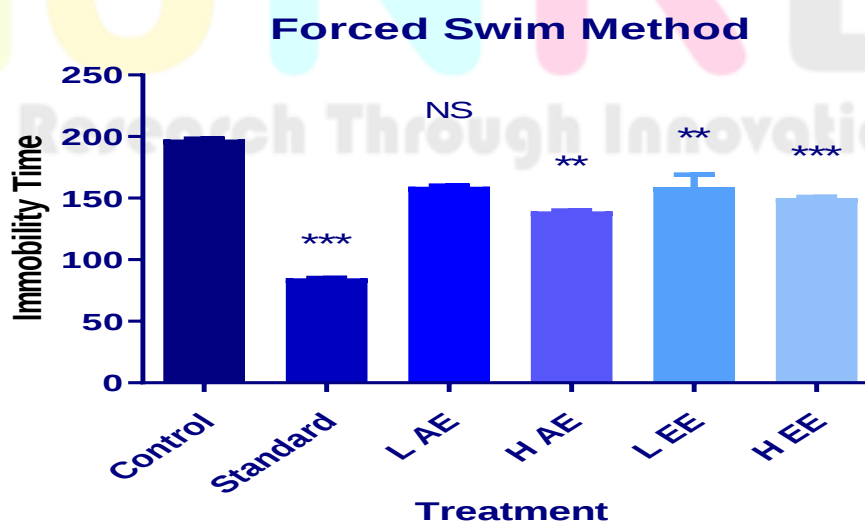
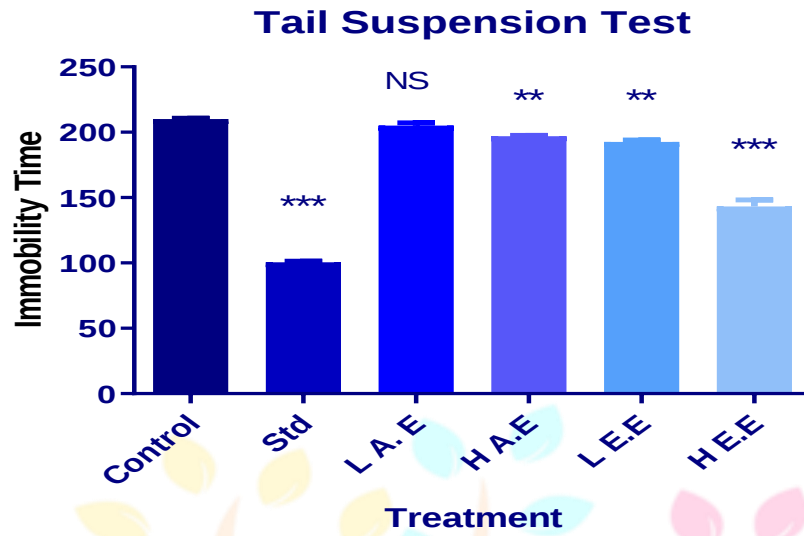
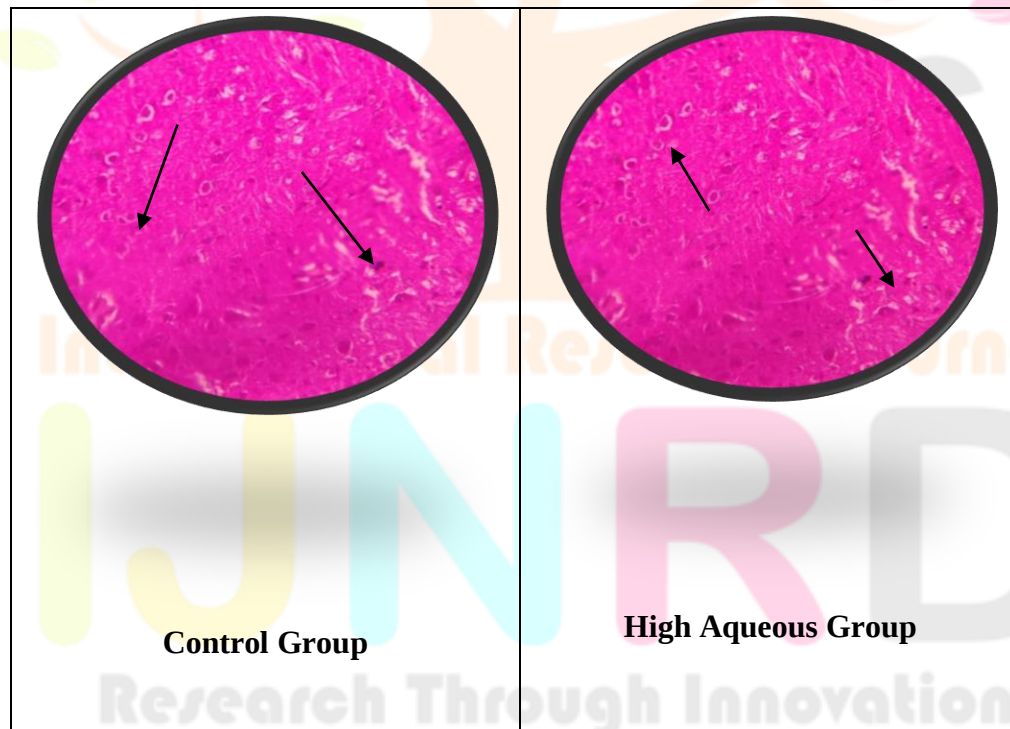


Figure no. 2 Forced Swim Method**Figure no. 3** Tail Suspension Method

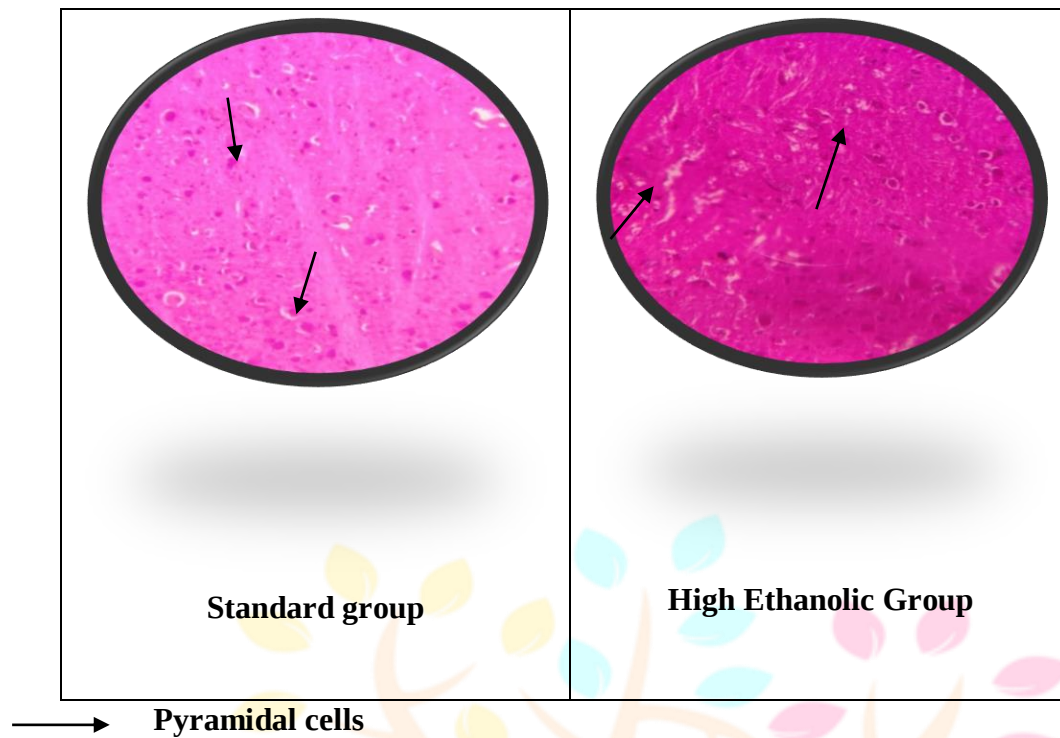


Figure no. 4 Histopathology of Brain

SUMMARY AND CONCLUSION

Eleusine coracana L. ethanolic and aqueous extracts were studied for their potential antidepressant properties. Traditional healers used this herb extensively to cure a variety of illnesses, including depression. To assess the antidepressant effect, seeds were used to create the alcoholic and aqueous extracts. When compared to water extracts, both alcoholic extracts had significant antidepressant efficacy. The presence of phytoconstituents such as aspartic acid, glutamic acid, methionine, phenylalanine, P-hydroxyl benzoic acid, gallic acid, and certain polyphenols may have contributed to the results.

It is necessary to investigate the precise phytoconstituents responsible for antidepressant action. The current study suggests that there is clinical support for the prospective use of this plant in the treatment of depression.

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