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EVALUATION OF ANTI-DEPRESSANT ACTIVITY OF SEED EXTRACT OF *ELEUSINE CORACANA* L. IN EXPERIMENTAL RATS

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ABSTRACT

Objective: Depression is a serious contributor to the global risk factor of disease and affects people in all communities, worldwide 20%`of total population is suffering from depression. *Eleusine coracana* L. is millet category, cultivated all over India having different pharmacological properties like hypoglycaemic, hypolipidaemic, wound healing, hepatoprotective, anticancer. In this study, antidepressant effect of both ethanolic and aqueous extracts of *Eleusine coracana* L. seeds was studied in rat. **Method**: Water wheel Model was used to evaluate effects of extracts in 200mg/kg to 400mg/kg by oral administration to rat. **Result**: 200-400mg/kg of both extract showed antidepressants effect. In this model Imipramine was used as a standard drug and result were compared with control. **Conclusion**: The information shows that seed of *Eleusine coracana* L. millet exert antidepressant like behaviour in rat. This can be attributed to the chemical constituents present in both extract of *Eleusine coracana* L. which are yet to be elucidated by fractionation studies.

KEYWORDS: Depression, *Eleusine coracana* L., Water Wheel Model, Immobility time.

INTRODUCTION

In today's world depression is estimated to effect 350 million people, according to survey conducted by world mental health in 17countries found that on average about 1in 20 people

reported to have an episode of depression in previous years.[1] Almost 1 million lives are lost yearly due to suicide, which translate to 2500 suicide death every day. Depression is a common mental disorder; it is a feeling of severe discouragement and dejection. Depression is normally called as major depressive disorder and which is caused by changes in monoamine neurotransmitter mainly dopamine, serotonin or epinephrine.[2] Although depression occurs once in your life, people experience multiple episodes, symptoms occur most of the day, nearly every day. Various antidepressant drugs which are widely available in the market like SSRIs, Tricyclic, MAOIs etc. but the treatment from these drugs comes along with various adverse events includes headache, nausea, jitters, dizziness, skin rashes, amongst other and serious adverse events on health like affecting heart rate and blood pressure.[3] The role of plant amino acids and polyphenols in treating oxidative stress. amino acid such as threonine, valine, glutamic acid, aspartic acid , isoleucine and methionine and polyphenols such as gallic acid, vanillic acid, P-hydroxy benzoic acid.

In present study it was therefore of interest to investigate the ethanolic and aqueous extract of *Eleusine coracana* L. seeds to detect antidepressant activity using Water Wheel animal model.[4,5,6]

MATERIAL AND METHODS

Eleusine coracana L. seeds were collected from local market of Belgaum and seed authentication was done from ICMR by Dr. Harsha Hegde having authentication no. RMRC-1662.

Preparation of Ethanolic and Aqueous extract

The seeds were washed thoroughly under running water followed by sterile distilled water and soaked for 4 hour at room temperature. These were further allowed to germinate and then dried under sun for three days, powdered then used for extraction using ethanol and aqueous as a solvent by maceration process. The crude extract thus obtained after removal of solvent was stored in close container for further investigation.[4,5]

Animal Used

To study the antidepressant effect of finger millet extract Wistar rats (either male or female) were used. In each group for water wheel model studies. All experiments protocols were approved by the institutional animal ethics committee. (IAEC NO.2021-22/IAEC/02) Studies were performed in accordance with CPCSEA Guidelines. Wistar rats (180-220 gm) were

procured from Maratha Mandal Animal House Belgaum. All animals were maintained under controlled environment conditions at room temperature (22± 2) with 50% relative humidity. Animals were acclimatized for 1 week prior to experimentation.[4,8,9]

Experimental design

One rat model was used to study the antidepressant like effect of crude ethanol and aqueous extract of *Eleusine coracana* L. seeds. Model- Water Wheel Model

Screening methods for antidepressant activity[4, 5, 10]

Group 1: control – will receive normal saline

Group 2: standard –will receive Imipramine (30mg/kg)

Group 3: will receive low dose of Aqueous Extract.

Group 4: will receive high dose of Aqueous Extract.

Group 5: will receive Low dose of Ethanolic Extract.

Group 6: will receive High dose of Ethanolic Extract

Water Wheel Model[11]

This model uses the concept of "Behavioural Despair Activity" to assess if the test medication has antidepressant properties. The animal is trapped in a water tank and forced to swim against its will. The possibility of escape is provided via a turning wheel in the water tank, but this only heightens the animal's desperation because it must continue rotating the wheel in order to stay afloat. The animal reaches its endpoint when it becomes immobile, ceases struggling, and continues to float still, making only the motions required to maintain its head above water. This is a behavioural form of despair.

The device is a 20 cm by 8 cm by 18 cm Plexiglas water tank with a water wheel in the middle. The water wheel is composed of a 3 cm long by 6 cm wide Plexiglas shaft on which six 0.5 cm wide paddles move when loads greater than 5 g are added and the number of rotations of the water wheel is measured. The tank was filled with water that was 25°C up to a height of 9 cm, such that the paddles barely brushed the water's surface. The rat actively searched for a means to escape the water when they were originally placed into apparatus. They discovered the water wheel and, using their weight to turn it, climbed upon it. Following several minutes of unsuccessful attempts to flee, they cling to the wheel and simply float in the water, displaying imperfect immobility.

For this technique, different groups were given either normal saline (control group), the standard medicine Imipramine (30 mg/kg, p.o.) and the test drug *Eleusine coracana* L. Ethanolic and aqueous extract (200 and 400mg/kg p.o.), before being challenged on the water wheel test again. The number of counts of water wheel revolutions that enhanced the effort to escape was the criterion for measuring antidepressant activity.

Histopathology

Brain tissue samples were fixed in 10% formaldehyde solution for light microscopic analysis, dried in an alcohol solution, embedded in paraffin, utilised for histological analysis. Under a light microscope, 4µm thick slices were cut, deparaffinised, hydrated, and stained with haematoxylin and eosin. An experienced histologist who was not informed of the groups evaluated all tissue sections under a microscope to characterise the histological alterations.

Statistical Analysis

The results of various studies were expressed as Mean ± SEM and Statistical analysis was performed with one-way ANOVA followed Dunnett's comparison method, to find out the level of significance. Data were considered statistically significant at minimum level of $P< 0.05$.

RESULT AND DISCUSSION

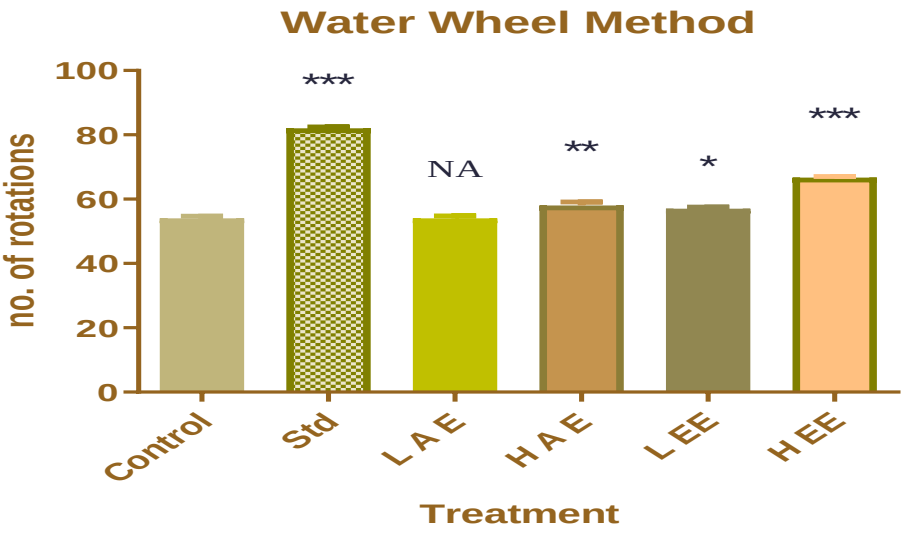
The results revealed that all rats treated with Ethanolic and Aqueous extracts of *Eleusine coracana* L. seeds had significant increase in number of rotations in both the doses of 200mg/kg and 400mg/kg for Water Wheel compared to control. The results were similar to Standard compound used. 30mg/kg Imipramine administered orally. Stress exposure is a significant factor in depression. This Animal model cause mental stress, physical stress and depression. An efficient and reliable behavior screening test for antidepressants is provided by the WW model of depression. The decrease in number of rotation (decrease in loco motor activity) is related to despairs thinking and the depression like effect. The increased number of rotations (increase in locomotor activity) of treatment group is significantly enhanced compare with negative control (vehicle treated) and it also has comparable effect as that of positive control (standard), Selective serotonin reuptake inhibitor (SSRI), Imipramine significant increase in number of rotation (increase in locomotor activity) was observed for Water wheel model. In animals given Ethanolic and Aqueous extract 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).

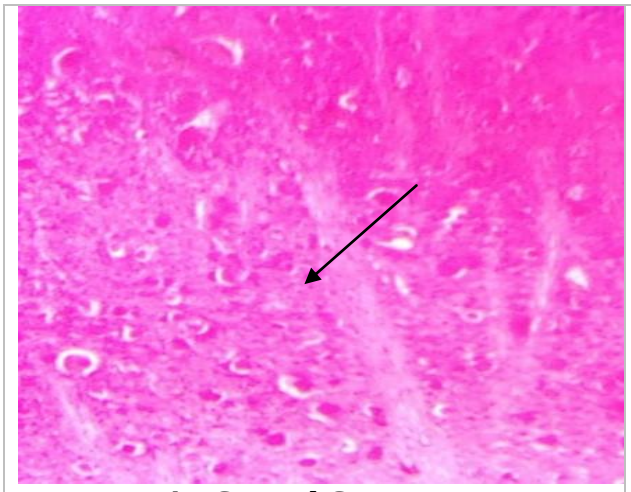
Table 1: Effect of *Eleusine coracana* L. seed extract on Water wheel model.

Sr.No.	Treatment	W.W Model
1.	Control	54
2.	200mg/kg EEEC	57*
3.	400mg/kg EEEC	66.67***
4.	200mg/kg AEEC	54 NS
5.	400mg/kg AEEC	58**
6.	30mg/kg Imipramine	82***

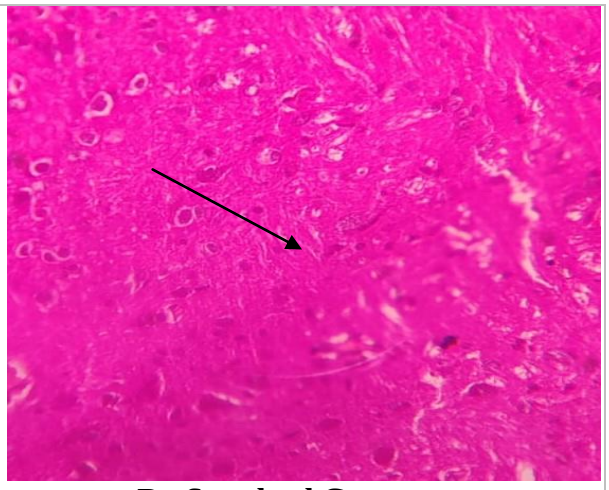
Values are expressed as (n=6), mean± SEM *P<0.05, **P<0.01, ***P<0.001 when compared with control by using one way ANOVA followed by Dunnett's comparison method.



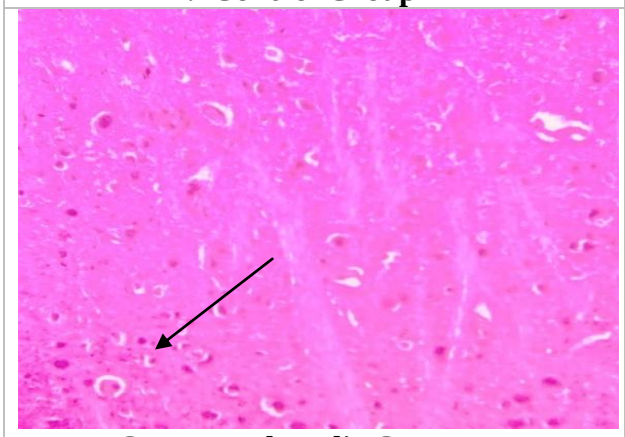
Values are expressed as (n=6), mean± SEM *P<0.05, **P<0.01, ***P<0.001 when compared with control by using one way ANOVA followed by Dunnett's comparison method.



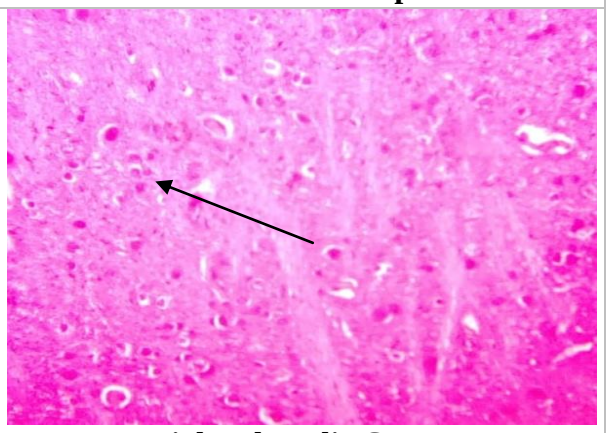
A. Control Group



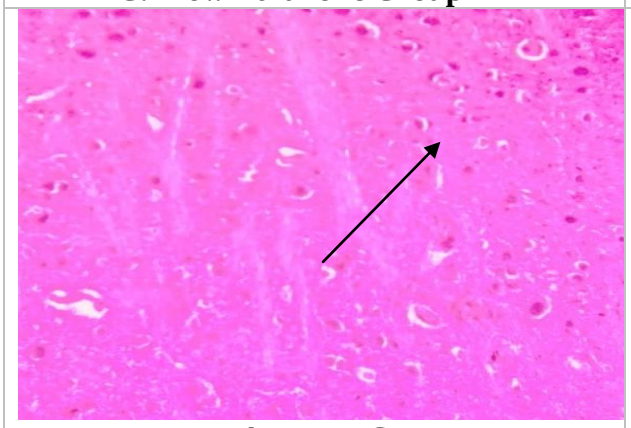
B. Standard Group



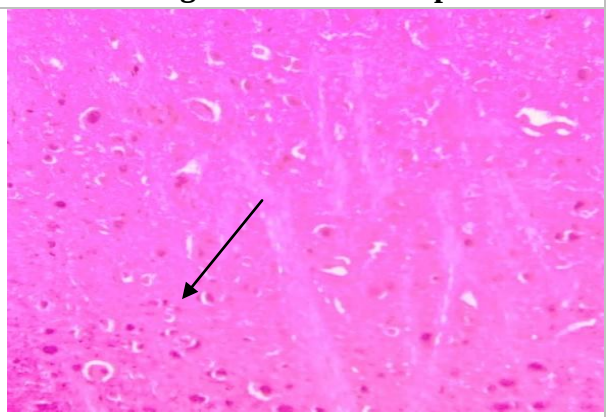
C. Low Ethanolic Group



D. High Ethanolic Group



E. Low Aqueous Group



F. High Aqueous Group

CONCLUSION

The antidepressant activity of *Eleusine coracana* L. Ethanolic and Aqueous extracts was explored. This plant was widely used by traditional practisoner to treat many ailments and also depression. The Ethanolic and Aqueous extracts were prepared using seeds to test the antidepressant effect. Both dose of Ethanolic extract showed significant antidepressant activity compared to aqueous extract. The results obtained could be because of presence of

phytoconstituents like aspartic acid, glutamic acid, methionin, phenylalanine, P-hydroxyl benzoic acid, Gallic acid and some polyphenols.

The exact phytoconstituent involved in antidepressant activity need to be explored. The present finding indicates potential use of this plant for the treatment of depression and is to be confirmed clinically.

REFERENCES

1. Marcus M, Yasamy MT, van Ommeren MV, Chisholm D, Saxena S. Depression: A global public health concern, 2012; 1-4.
2. Elkin I Et al. National Institute of Mental Health treatment of depression collaborative research program: General effectiveness of treatments. Archives of general psychiatry, 1989 Nov 1; 46(11): 971-82.
3. Khushboo SB, Sharma BJ. Antidepressants: mechanism of action, toxicity and possible amelioration. J Appl Biotechnology Bioeng, 2017; 3(5): 437-48.
4. Sharma S, Saxena J. Evaluation of antidepressant potential of ethanolic extract of *paspalum scrobiculatum* linn. World Journal of Pharmaceutical Research, 2017 Jan 13; 6(3): 1159-65.
5. Mannan A, Abir AB, Rahman R. Antidepressant-like effects of methanolic extract of *Bacopa monniera* in mice. BMC complementary and alternative medicine, 2015 Dec; 15(1): 1-8.
6. Pathak L, Agrawal Y, Dhir A. Natural polyphenols in the management of major depression. Expert opinion on investigational drugs, 2013 Nov 1; 22(7): 863-80.
7. OECD Guideline acute oral toxicity Fixed Dose Procedure, 425.2008.
8. Shahamat Z, Abbasi-Maleki S, Motamed SM. Evaluation of antidepressant-like effects of aqueous and ethanolic extracts of *Pimpinella anisum* fruit in mice. Avicenna journal of phytomedicine, 2016 May; 6(3): 322.
9. Pingle BR, Apte KG, Gupta M, Chakraborthy GS. Hepatoprotective activity of different extracts of grains of *Eleusine coracana* L. Pharmacology Online, 2011; 2: 279-86.
10. Shahamat Z, Abbasi-Maleki S, Motamed SM. Evaluation of antidepressant-like effects of aqueous and ethanolic extracts of *Pimpinella anisum* fruit in mice. Avicenna journal of phytomedicine, 2016 May; 6(3): 322.
11. Rathore rs, bhargava m. a comparative study of antidepressant effect of amoxapine with fluoxetine on mice using water wheel tests group. Sept- October, 2020; 7(5): 39-43.