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EVALUATION OF ANTIDEPRESSANT ACTIVITY OF PUNICA GRANATUM

Pharmacology

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ABSTRACT

AIMS AND OBJECTIVE: To evaluate the antidepressant activity of punica granatum in Swiss albino mice.

MATERIALS AND METHODS: Thirty inbred male albino mice weighing 20-25 grams were selected from central animal house. They were divided into five groups of six animals each. The control group I received normal saline 10 ml/kg intraperitoneally, standard group II received fluoxetine (20 mg / kg, intraperitoneally) and test groups III, IV, V received ethanolic extract of punica granatum in graded doses 100mg/kg, 200mg/kg and 400 mg /kg per orally . Antidepressant activity was assessed by using Forced swim test. The results were tabulated and analysed with suitable statistical method.

RESULTS: Ethanaolic extract of Punica granatum showed statistically significant antidepressant activity at all the three test doses ($P < 0.05$). The results were comparable to that produced by standard drug fluoxetine.

CONCLUSION: Punica granatum has antidepressant activity which is comparable to fluoxetine. Further, studies are essential to prove the antidepressant effect of Punica granatum in human.

KEYWORDS

Antidepressant, Fluoxetine, Punica granatum , Forced swim test, Mice.

1. INTRODUCTION:

Depression is a common mental disorder which presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration. Depression is a disorder of public health importance, in terms of its prevalence and suffering, dysfunction, morbidity, and economic burden. It's more common in women than men. According to global burden of disease study conducted by the world health organisation unipolar major depression ranked fourth among all diseases in term of disability adjusted life years and was projected to rank second by the year 2020.[1] The prevalence of depression is 7.9 to 8.9 per thousand population in India and the prevalence rate were nearly twice in the urban areas of India[2]

Depression is most commonly associated with chronic medical illness, between 20 to 30 % of cardiac patient's manifest as depressive disorder [1]. pain is the cardinal symptom of somatic disease. In conditions where pain is unremitting, despite attempts to avoid the offending stimuli can lead to affective disorders like depression and anxiety. There is a close relation between chronic pain and depression. The prevalence of depression in chronic pain among general population ranges from 22 to 78 % worldwide[3] The P. granatum (pomegranate), an ancient, mystical, and highly distinctive fruit, is the predominant member of two species comprising the Punicaceae family. The pomegranate has been originally from the Himalayas in northern India to Iran. However, it can also be cultivated over the entire Mediterranean region. Other than India, Southeast Asia, the East Indies, and tropical Africa, the fruit is also cultivated in California and Arizona P. granatum has been shown to have medicinal properties which include antioxidants, anti-infammatory and anti-diabetic effects[4] The antidepressant effects of P. granatum have not been well studied although its estrogenic contents (estrone, estradiol, and estriol) found mainly in the seed have potential as an antidepressant agent[5]

2. AIM AND OBJECTIVES:

Study was aimed to evaluate the antidepressant activity of Ethanolic extract of punica granatum in Swiss albino mice.

3. MATERIALS AND METHODS:

Study centre:

Study was carried out in Central animal house, Madurai Medical College, Madurai, after getting clearance from the Institutional Animal Ethics Committee Ref. 5953/E1/5/2015

Study design:

Thirty inbred male albino mice weighing around 25- 30 grams from central animal house, Madurai medical college were divided into five groups and each group comprised of six mice. They were housed as six per cage and they had free access to food and water. They were maintained in room temperature and 12 hour light dark cycle. Mice were allowed to adapt to their surroundings for one week before the experimentation. All the experimental procedures were carried out between 10.30 and 13.00 hours. Group I served as Control and received normal saline, Group II served as Standard and received fluoxetine 20 mg /kg , Group III, ,IV,V served as test groups and received Ethanolic extract of punica granatum (100 ,200 and 400 mg /kg) respectively.All doses were administered Per orally

METHODOLOGY:

Forced swim test was conducted in all five groups of animals forty minutes after drug administration. Animals were kept in the test room for at least 1 hour for habituation. All mice were forced to swim individually in a glass jar (25x12x25 cm3) containing fresh water of 15 cm height and maintained at room temperature in which mice cannot touch the bottom of the tank or escape. After initial period of vigorous activity the animal assumed an immobile posture, mouse is considered to be immobile when it remained floating in water without struggling making only minimum movements of its limb necessary to keep its head above water. Total duration of immobility was recorded for next 4 minutes in a total of 6 minutes trial. The tests were conducted in a dim light room and each mouse was used only once.

STATISTICAL ANALYSIS:

The results were expressed as Mean ± SD. The data was analysed by one-way ANOVA (F) followed by post hoc comparisons using the Dunnett's test for multiple comparison. P values < 0.05 were considered statistically significant.

Table No: 1: Period of Immobility – Forced Swim Test

Group	Treatment	N	Mean ± S.D
I control	Normal saline	6	188.33 ± 7.1
II standard	C.flouoxetine 20 mg /kg	6	70.83 ± 4.6*
III test group	Ethanolic extract Punica granatum 100 mg/kg PO	6	172.33 ± 3.2*
IV test group	Ethanolic extract Punica granatum 200 mg /kg PO	6	150 ± 3.5*
V test group	Ethanolic extract Punica granatum 400 mg /kg PO	6	132.67 ± 3.5*

*p value < 0.05 significant

4. RESULTS AND DISCUSSION

In this study it was found that there was statically significant difference in the immobility period existed between the groups and the control by doing a one way ANOVA ($p < 0.05$). Post hoc comparisons was done using the Dunnett's test which showed that there was a statistically

significant ($p<0.05$) decrease in the immobility period in the test groups III, IV, V when compared to control group.

Anti-depressant activity was evaluated in our study using forced swim test. It is based on the principle of behaviour despair. Mice were forced to swim in a cylinder with no escape, animal becomes immobile after an initial struggling phase. The total duration of immobility was measured for a period of four minutes. Immobility period reflects despair reaction. Anti-depressants decrease the immobility period. Forced swim test is the most commonly used behaviour model to test antidepressant activity.[6] From this study it was found that all the three test doses of punica granatum produced significant anti-depressant activity compared to control. Punica granatum at dose of 400 mg/kg produced more significant antidepressant activity when compared to control animal. Study done by Heftmann et al[7] showed pomegranate seeds contain estrogenic compounds, estrone, and estradiol which are similar in a chemical sense to the estrogenic compounds that are biosynthesized in the human body; and as mentioned by Klaiber et al.[8] and Wickelgren [9], it has been suggested that estrogens may enhance the function of central adrenergic systems by increasing the noradrenaline content and decreasing the MAO activity. MAO is an enzyme that is important and responsible for the degradation of catecholamines and serotonin. Its inhibition causes an increase in the concentration of neurotransmitter available to be released at the synapse.Further studies are needed to prove the antidepressant effect in various animal models for depression so that punica granatum can be used for depression associated with chronic medical illness.

5. CONCLUSION:

The present study demonstrates that punica granatum can produce significant antidepressant activity and we recommend further testing in various models of depression to prove its effect so that it can be used in depression associated with chronic pain.

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