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A Study on Antidepressant Activity of Eugenol Excluded Clove Extract

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ABSTRACT

The antidepressant activity of eugenol excluded clove extract was investigated using two different models of stress induced depression (forced swim test and Tail suspension method). Animals were divided into different groups each group receiving specific agent ranging from 2% Gum acacia, Standard drug, Eugenol and Eugenol excluded clove extract. Standard drug produced significant results where as eugenol excluded clove extract has got values which are nearly comparable to the standard when compared with the other groups. Higher doses of eugenol produced muscular in coordination activity which was not seen with the other one.

Keywords: Antidepressant, Eugenol, Clove extract, Forced swim test, Tail suspension.

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INTRODUCTION

Depression refers to a state of low mood and aversion to activity charecterised by depressed mood, loss of interese, reduced energy and concentration etc. 1-5% patients may have major depression disorder and 10-35%may show the charecters of minor depression disorders. [1,11]

The reasons for the disease include stimulation of MAO-A, inhibition of NA and 5-HT. Symptoms include depressed mood, diminished interest of pleasure (anhedonia), feelings of worthlessness or inappropriate guilt, decrease in appetite and libido, insomnia, and recurrent thoughts of death or suicide [2,8,9,11].

Many drugs are available for the treatment of this disease. MAO-A Inhibitors, NA and 5-HT reuptake inhibitors etc, and their side effects include anticholinergic effects, sedation, mental confusion, cardiac arrhythmias [2,10], most drugs for depression are synthetic nitrogen-bearing compounds that have many adverse side effects, such as hypotension, arrhythmias, insomnia and sexual dysfunction etc and hence research should be carried out to minimize the side effects and to deliver better therapeutic service [2,10,11].

The rich floral biodiversity of India has provided herbal health practitioners and other traditional healers in the country with an impressive pool of 'natural pharmacy' from which plants are selected as ingredients to prepare herbal remedies and medicines for the treatment, management and control of a variety of human ailments. One of such therapeutically-useful medicinal plants of India is Eugenia caryophyllus (L.) Pers. [family: Myrtaceae]. Commonly known as "Long" in India.

Eugenia caryophyllus [3] is indigenous to Amboynas and Molucca islands, also cultivated in Sri Lanka, Madagascar, Caribbean islands and India. In India, cloves are grown in Nilgiri, Kanyakumari district, Kottayam and Quilon districts of Kerala. The plant grows up to a height of 100-150 cm tall and possesses tapered leaves and bears flowers after 7 to 8 years and a satisfactory yield are achieved only after 15 to 20 years of growth. The extract was prepared from flower buds which are crimson to dark brown in colour with slightly aromatic odour, pungent and aromatic followed by numbness.

The plant possesses analgesic [4], antiepileptic activity [5]. But, the antidepressant activity of Eugenol excluded clove extract is not yet validated. Hence in the current research work the antidepressant activity of flower bud extract of Eugenia caryophyllus was designed and carried out in validated animal models.

Methodology

Preparation of extract:

The aqueous extract of flower buds of Eugenia caryophyllus was prepared by cold maceration followed by evaporation. After complete evaporation of eugenol we get the eugenol free clove extract as eugenol is highly volatile and easily evaporable.

Preliminary Phytochemical Investigation:

Preliminary Phytochemical investigation was carried for the above extract to find out the various chemical components present in it and the results are shown below [3,7]

Determination of Acute toxicity:

The acute toxicity [12-14] for aqueous extracts of the powders of Eugenia Caryophyllus was determined in albino mice of either sex, those maintained under standard conditions. (Standard conditions of 12/12 hours dark and light phase with a maintained temparature of 25±2 ·Cwith adequate supply of water) Animals were administered with different doses of the extract by following up and down methods. From LD_{50} dose $1/5^{th}$ dose is to be selected and will be considered All the animals were divided in to four different groups, each group consist of six animals. The results obtained from above experiments were reported in the table no: 01 and table no: 02

Antidepressant activity screening:

Forced swim test: The procedure used for the FST was previously described [7,13,14]. Rats were placed in the individual glass cylinders (40cm high×20cm in diameter) containing 30cm of water (maintained at 24±1 ◦C) so that they could not support themselves by touching the bottom with their feet. Water was replaced between every trial. The FST were done during the dark phase of the cycle and under a dim red light; After both swimming sessions, the rats were removed from the cylinders, dried with towels, and returned to their home cages. A time-sampling technique was employed to score several behaviors during a single viewing. This method has previously been described and shown to be a reliable and valid method for detecting the effects of different antidepressant drugs. At the end of each 5s period during the 5-min test, the scorer rated the mice's behavior as one of the following behavioral categories:

(a) Immobility, floating without struggling and making only those movements necessary to keep the head above the water;

(b) Swimming, active motions, i.e., moving and diving around in the cylinders; or fore paws in and out of the water, usually directed against the wall. Increases in active responses, such as climbing or swimming, and reduction in immobility are considered as behavioral profiles consistent with an antidepressant-like action. The final score for each behavior was the total behavioral counts per 5-min session. Thus, a total of 60 counts including immobility, swimming and climbing were scored in that period.

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Tail suspension test: Mice were brought to the experimental room in order that the mice get accommodated with the environment of that room. Before the starting of the experiment the mice were administered orally with a different samples under test.

Each mouse was individually suspended by its tail using a clamp (2 cm from the end) for 6 min in a box (25×25×30 cm) with the head 5 cm from the bottom. Testing was carried out in a with minimal background noise. The vehicle or test drugs were administered 30 min before a test session via gastric intubation or oral feeding. The duration of immobility was recorded during the 5 min test period. The total duration of immobility was recorded.

RESULTS AND DISCUSSION

Result of preliminary phytochemical investigation.

Carbohydrates, Alkaloids, Glycosides and Fixed oils are present in the aqueous extract of Eugenia caryophyllus.

Table 2: Result of forced swim test.

GROUP	NO OF ANIMALS	NO OF IMMOBILE STATES IN SWIM TEST	AVERAGE DURATION OF IMMOBILITY(SEC)	TOTAL DURATION OF IMMOBILITY (SEC)	TOTAL DURATION OF MOBILITY (SEC)
Control	6	18±1.317	11.6	210	90
Standard	6	09±1.183**	10.2**	92**	208
Eugenol	6	14±1.390	12.8	180	120
Clove extract excluding eugenol	6	12±1.732*	12.1	146*	154

Values are mean ± SEM; n=6; One way analysis of variance (ANOVA) followed by Student's test. P** =P<0.01, P*=<0.05

Figure no: 01: Result of forced swim test

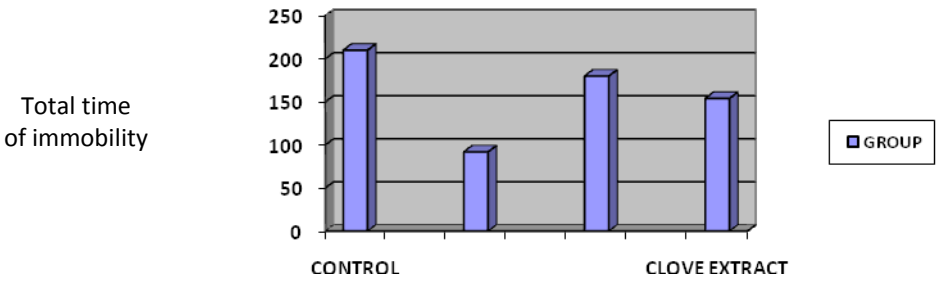

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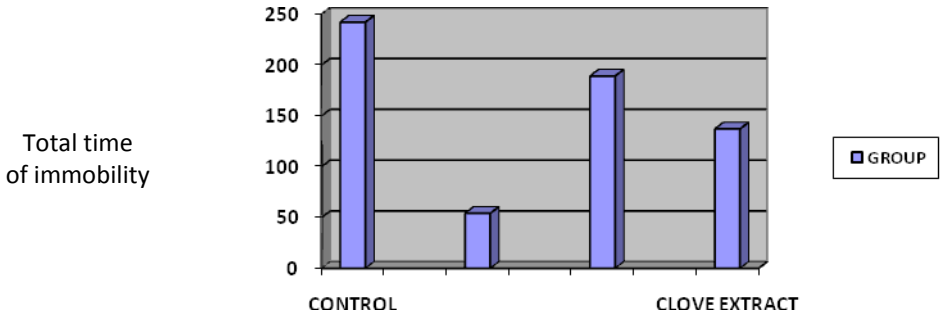
Table 03: Result of Tail suspension test.

GROUP	NO OF ANIMALS	NO OF IMMOBILE STATES IN SUSPENSION (mean±SEM)	AVERAGE DURATION OF IMMOBILE (sec)	TOTAL DURATION OF IMMOBILITY (sec)	TOTAL DURATION OF MOBILITY (sec)
Control	6	15±0.966	16.1	242	58
Standard	6	04±0.577**	13.5	54**	246
Eugenol	6	12±0.966	15.7	189	111
Clove extract excluding eugenol	6	09±0.577*	15.2	137*	163

Values are mean ± SEM; n=6; One way analysis of variance (ANOVA) followed by Student's test. P ** =P<0.01 *=P<0.05

Figure no: 02: Result of Tail suspension test



There are a number of synthetic antidepressant drugs currently available for use in the management, control and treatment of individuals with depression. However, most of the synthetic drugs are not only inaccessible and unaffordable, but also possess many toxic adverse effects [2]. Therefore, there is a great need for the development of cheap, effective and safe antidepressant agents from plants and other sources.

The antidepressant activity of eugenol has already been established [15]. Based on this, the antidepressant activity of eugenol excluded clove extract was studied in different experimental models employing mice.

The reasons for the disease include stimulation of MAO-A, inhibition of NA and 5-HT [2,6].

Main neurotransmitters are nor-adrenaline, serotonin (5-HT) and dopamine. This theory emerged from the finding that both monoaminooxidase inhibitors (MAOIs) and tricyclic antidepressants appear to be increase neurotransmitter amines, particularly noradrenaline, at important sites in the brain [2,10].

The concept of noradrenergic and serotonergic forms of depression has not gained wide spread support, and there is little justification in measuring noradrenaline or serotonin metabolites in routine practice [2,6].

In the present study we have selected a plant Eugenia caryophyllus and aqueous extract was prepared from the clove buds and tested for its antidepressant activity in validated animal models.

Preliminary phytochemical investigation of aqueous extract of flower buds of Eugenia caryophyllus revealed the presence of amino acids, fixed oils, alkaloids, glycosides.

LD50 studies of the extract reveal that, extracts are safe up to the dose level of 3000mg/kg.

In stress induced depression model, aqueous clove extract had significantly reduced the response of immobility, indicating the antidepressant activity.

In the all models, depression induced by either chemical, stress or lack of neurotransmitter amines the aqueous extract of clove buds exhibited a fairly good antidepressant effect.

However, long term studies in different animals and depressed subjects may further substantial our study result.

REFERENCES

[1] Beckman et al, BR Journal of Psychiatry-1999.
[2] Goodman and Gilman's., The Pharmacological basics of therapeutics;10th Ed; 449.
[3] Pharmacognosy by Dr. Kokate CK. Purohit AP, Gokhale SB. 32nd edition, ISBN no 31-85790-001; 370.
[4] Jaffar sadiq M, Vigneshwaran E, Shareen taj S, Srinath B, Padmanabha Reddy Y, Chandrasekhar B. J Advances in Drug Res jan 2011; 1(2):29-35.
[5] Apparecido N Daniel et al. Brazillian J Pharmacognosy- jan/mar-2009;19(1B):212-217.
[6] //http:www.bpg.bg.com. dated-dec-2010
[7] Pharmacognosy by Dr. Kokate CK. Purohit AP, Gokhale SB. 32nd edition, ISBN no 31-85790-001; 593.
[8] Anderson LM. Depress Anxiety 2000; 7: 11–17.
[9] Archer J. Animal Behaviour 1973; 21:205–235.
[10] Arieti S, Bemporad J. Am J Psychiatry 1980; 137: 1360–1365.
[11] Beckham EE, Leber WR, Youll LK. The diagnostic classification of depression. In: Handbook of Depression, 2nd ed. Guilford, New York 1995; 36–60.
[12] Beckman SE, Roger WS, Switzer J. Pharmacotherapy 2000; 20: 568–574.

[13] Bonilla-Jaime H, Retana-Marquez S, Vazquez-Palacios G, Velazquez-Moctezuma J. Behavior Pharmacology 2003; 14: 357–362.
[14] Cano ALM. Flora Medicinal de Veracruz. Inventario Etnobotanico. Universidad Veracruzana, Veracruz, Mexico 1997; 318. (OECD Guidelines No 425)
[15] Kurain R et.al. IJP 2006; 38(5): 341-345.