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COMPARING THE EFFECTS OF GINGER AND IMIPRAMINE ON REDUCING DEPRESSION SYMPTOMS OF ANIMAL MODEL

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Abstract:
Depression is one of the most common mental disorders which is classified in temper mood disorders. In traditional medicine, ginger is used to increase memory and cure vomiting, bloating, indigestion, colic, and abdominal pain. Current study was carried to compare ginger extract and imipramine effects on reducing depression symptoms. Sixty mature mice in the weight range of 25 to 30$_g$ were divided into six groups: control, depression, imipramine, and 50, 100, 200 $_{mg/ml}$ of ginger's hydro alcoholic extract which was injected intraperitoneal. In the morning of experiment, desired drug was injected and after 55 minutes, suspension test was carried out. Forced swimming and tail suspension test was done One hour after suspension test. Immobility and mobility time was measured as depression index. Obtained data were analyzed using SPSS program. In both tests, results showed that ginger extract in 200 mg/kg doses increased mobility time and movement activity of animal significantly in proportion to control and imipramine groups ($p<0.05$) which shows depression reduction. According to results, ginger's extract in 200 $_{mg/kg}$ dose can be a good replacement for imipramine.

Keywords: *ginger, depression, imipramine, laboratory mice*

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INTRODUCTION:

Aromatic plants and herbal products have been used woridwide as natural additives for medicinal purposesbecause they have been accepted by consumers as natural additives [1]. All people feel uncomfortable at times. Most of these feelings are usually transient and are forgotten within a few days but when the person has a depressive disorder, this depression affects his life and his usual activities and causes the suffering of the person and those who are in contact with him. Depression seems ordinary while it is a serious disease and most of its patients need treatment. Most of patients who suffers from depression do not seek treatment, while even most of sever depressions can be cured. Improvement in drugs, psychotherapy and new methods for curing these patients are results of concentrated researches on this disease [2].

Although many compounds such as monoamine oxidase controllers (MADIS), tricyclic antidepressant drugs (TCAS), and serotonin reuptake inhibitors (SSRIS) are used for curing depression, most of these drugs cause several unwanted reactions, including anticholinergic effects, a decrease in blood pressure and arrhythmias [3, 4, 5]. Imipramine is from tricyclic anti-depressant drugs which its effect is due to preventing neuronal reabsorption of noradrenaline and nowadays is prescribed for children's enuresis due to its anticholinergic properties [6, 7]. In imipramine group, anticholinergic effects such as unexpected dry mouth and urinary retention are observed [8]. Therefore, more effective drugs with less toxicity are needed [9]. Herbal extracts are from the most attractive new drugs which have shown promising results in the treatment of depression [10, 11].

Ginger (*Zingiber officialis*) is a perennial plant with maximum height of 1.3 m with a tubercular creeping rhizome, bayonet or linear-bayonet narrow leaves without petioles, a circular inflorescence with a maximum height of 25 cm, oval bracts with a narrow, long, green tip, up to 2.5 cm in length. The components of the flower include Flower sepal (one centimeter) with a crescent margin, Green-Yellow flower bowl with a 2_{cm} tube about, sterilized petal like stigma (Purple with yellow spots), dark purple stigmas, [12, 13].

Zingibern was main component (31.79%) and arkor koman, beta sesquiphellandrene and beta bisabolene were in next ranks. Wide use of ginger in food and medicine of many countries has caused lots of pharmacological studies on this plant. For instance, the effect of gingerols on preventing proliferation of human cancer cells from the pathway of apoptosis has been proven [14, 15]. Anti-depressant effects of this drug may be related to its main identified compounds including albiflorin, paoniflorin, floric acid, ligostrazim, logostilid, atracetyl linoid.

Ferolic acid is a phenolic compound and is used in preventing and curing types of cardiovascular Diseases by the China Food and Drug Administration. This drug causes anti-depressant effects by affecting the serotonergic system [16].

Ginger enforces its analgesic effects probably by a competitive mechanism for inhibiting muscarinic acetylcholine receptors.

The effect of hyoscine on the control of somatic pain is an interesting case study with contradictory results. Based on mentioned points, current study was carried out to compare the effects of ginger extract and imipramine on reducing depression symptoms of animal models.

MATERIAL AND METHODS:

Sixty mature mice in the weight range of 25 to 30_g were kept in standard cages made from polycarbonate with lattice steel ceilings. Animals were kept for two weeks to adapt to environment. Samples had free access to food and water, 20-22 $^{\circ}C$ temperature and 60% humidity. Cage floor were covered with sawdust which were replaced every 2 days. In the present study, ethical principles were observed in accordance with the rules of support and maintenance of laboratory animals and statements of animal researches committee, Vale do Paraiba University (Brasilia).

- Treatment were:

1. Experimental groups: received 50, 100, and 200 $_{mg/kg}$ of ginger's extract (n=30)
2. Imipramine group: received 1.2 $_{mg/kg}$ of imipramine drug (n=10)
3. Depression group: received tetrabenazine intraperitoneal (n=10)
4. Control group: no injection (n=10)

- Preparing hydro alcoholic extract:

Ginger was cut to small pieces and grinded by mill. One hundred grams of this powder was weighed by digital weigh and poured into a sterilized erlen plus 40cc of ethylen alcohol. Erlen was shaken well to mix powder and alcohol, then was sealed and placed in a cool place for 48 hours. After two days, erlen was shaken again for five minutes. Extract was filtered by using whatman paper. At first paper was weighed. Then mixture was passed into a sterilized Becher [17].

-Depression evaluating

To evaluate the depression, samples were injected tetrabenazine intraperitoneal for two days and by appearing depression symptoms, animals were placed in Plexiglas column ($20*40_{cm}$) filled by 25_{cm} of clean water with a temperature of $25^{\circ C}$ (training). After 24 hours, samples were tested for five minutes and the time that animal remained immobile, delay in primary stop, and total immobility time were recorded as depression behaviors, increase in total immobility time and decrease in initial stop shows depression increment and vice versa [18].

Tail suspension test was also used in this study. In this test, metal bases with 70cm height plus 50 cm ropes between two bases were used. Mice tails were tied up to this rope and hanged from tail, then, test was begun with a severe movement of the mouse. Total test time was six minutes. The times when the animal did not show any movement and reaction were measured by chronometer in seconds and considered as immobility time.

Obtained data were analyzed at two descriptive and inferential levels. Average and standard deviation were calculated in descriptive level whereas one-way variance analysis plus Tukey test were used for inferential. Data were analyzed using SPSS 22 program.

RESULTS AND DISCUSSION:

The amounts of mobility and immobility times were measured in six groups of control, depression, imipramine and 50, 100 and 200_{mg} of ginger's extract in suspension and forced swimming tests.

The results of this study showed that prescription of 200 mg/kg extracts leads to increase movement and decrease move less time in tail suspension test (Figure 1 and 2).

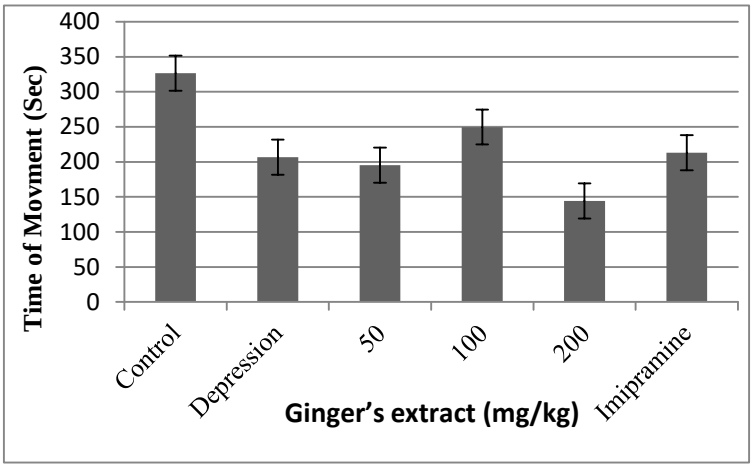

Fig. 1: Time of movement in the tail suspension test in Control, Depression, Imipramine and three experimental groups

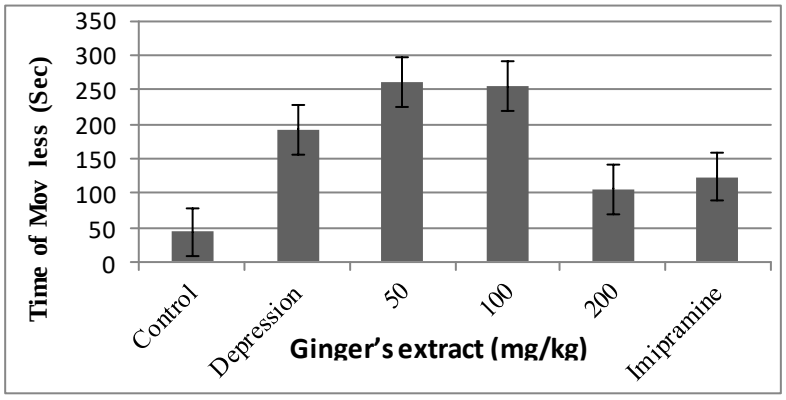

Fig. 2: Time of move less in the tail suspension test in Control, Depression, Imipramine and three experimental groups

The results of this study showed that prescription of 200 mg/kg extracts leads to increase movement time in subjects (Figure3).

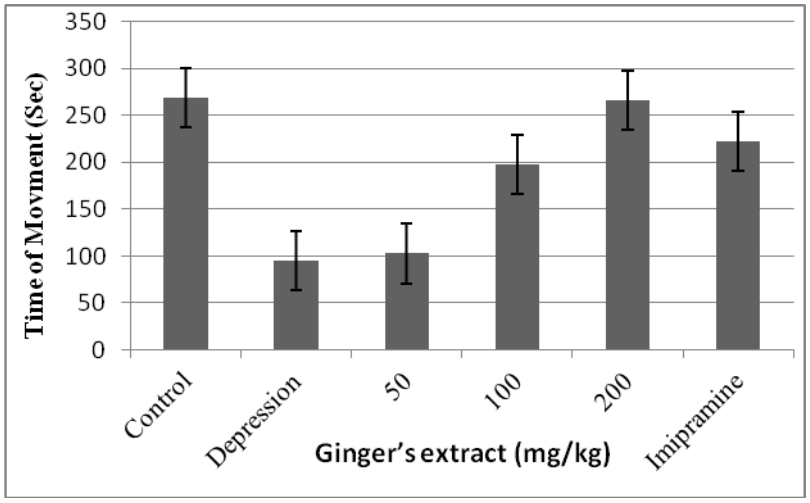

Fig. 3: Time of movement in the forced swimming test in Control, Depression, Imipramine and three experimental groups

The time of move less shows significant effect of extract on reducing the depression in 100 and 200 mg/kg (Figure 4).

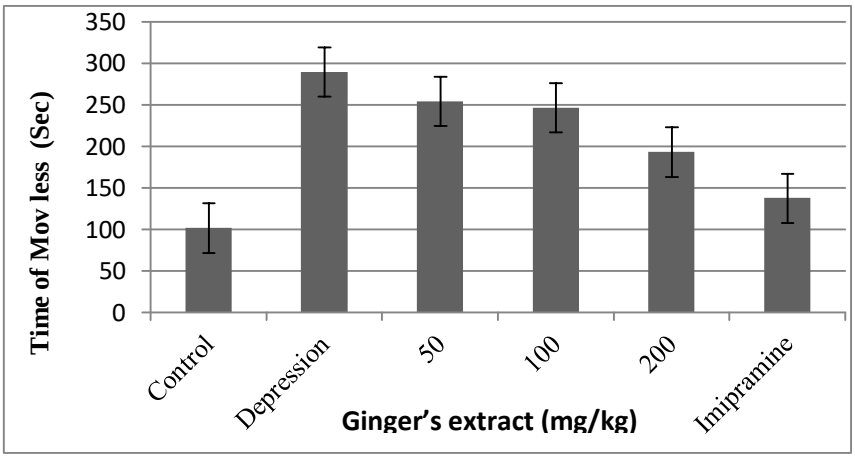

Fig. 4: Time of move less in the forced swimming test in Control, Depression, Imipramine and three experimental groups

Current study was carried out to investigate the effects of ginger and imipramine on reducing depression symptoms of animal models.

Sixty mature mice in the weight range of 25 to 30$_g$ were studied in six groups of control, depression, imipramine and 50, 100 and 200$_{mg}$ of ginger's extract. After last dose, all groups were evaluated by suspension test and forced swimming test, and mobility time was measured in comparison with immobility time as depression index.

200$_{mg/kg}$ dose of ginger's hydro alcoholic extract increased mobility time of mice significantly ($p<0.01$) in proportion to control and imipramine which indicates antidepressant effect of this dose and indicates this dose can be a good replacement for imipramine in reducing depression symptoms. But, 50 and 100 $_{mg/kg}$ doses did not have this ability. In a study on the effects of saffron (*crocus sativus*) on curing mild to average depression which was carried out clinically, patients became better significantly after six weeks. The clinical effect of these findings

was confirmed by the improvement in Hamilton Scale scores [19].

In other study entitled herbal medicine for anxious depression and insomnia, profits of herbal medicine were proven for these diseases. So, these researchers proposed to study the activity of various pharmaceutical plants because these plants act dose dependently [20]. Results of current study also confirms this.

CONCLUSION:

According to results, plus significant differences between groups, pair comparisons showed that ginger in $200_{mg/kg}$ dose was significantly different from other groups in suspension test but not in forced swimming test. It means that ginger's extract in 50 and 100 $_{mg/kg}$ doses could not improve depression symptoms like imipramine.

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CONFLICT OF INTEREST

Authors claim that there is no conflict of interest.

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