The comparative effects of chamomile's hydro alcoholic extract and imipramine on decreasing depression in mice

Fateme Rahnavard (1)
Mehrdad Modaresi (2)
Hadi Farhadi (3)

(1) Dept. of Psychology, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran
(2) Dept. of Physiology, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran
(3) Dept. of Psychology, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran

Corresponding author:
Mehrdad Modaresi
Dept. of Physiology, Isfahan (Khorasgan) Branch, Islamic Azad University,
Isfahan, Iran
Email: mehrdad_modaresi@hotmail.com

Abstract

Background and Objective: The goal of this study was to compare the effects of chamomile's hydro alcoholic extract and imipramine on decreasing depression of laboratory mice.

Method: Sixty mice in the weight range of 25 to 30 gram were divided into six groups: control, depression, imipramine and 50, 100 and 200 mg/kg doses of chamomile's extract. Injections were done intraperitoneal. Depression was induced by the use of tetrabenazine. Then, the rate of depression was assessed by forced swimming test and tail suspension test. Duration of movement and immobility of the animal in each test indicates the degree of depression. Obtained data were analyzed using SPSS program.

Results: According to results, 50 and 100 mg/kg doses could not reduce the depression comparing to imipramine but 200 mg/kg dose significantly increased mobility time which shows decrease in depression level.

Conclusion: Therefore, it can be said that chamomile extract can be a replacement for imipramine to reduce the depression symptoms, dose dependently.

Key words: chamomile, depression, imipramine, forced swimming test, tail suspension test, little laboratory mice

Please cite this article as: Modaresi M. et al. The comparative effects of chamomile's hydro alcoholic extract and imipramine on decreasing depression in mice. World Family Medicine. 2018;16(1):198-203
DOI: 10.5742/MEWFM.2018.93219

Introduction

Depression is one of the common diseases of psychiatry and one of disabling mental problems among different societies (Kaplan et al. 2014). Depression is from intensive emotional disorders and about 21% of people of developing countries are suffering from it (Potdar and Kibile .2011). Depression is result of brain's biochemical changes and is one of common adult diseases. This mental disease has been reported in United States population and about 30% of adults face with depression at least once along their life time. Suicide percentage of depressed people is high. The rate of infection in women is 2-3 times higher than that of men. 70% of depressed people respond to anti-depressant drugs. The most important treatment for treating depression is medication that can be combined with psychotherapy (Cryan et al. 2002). Reports of World Health Organization show that depression is the second most debilitating factor after cardiovascular disease, causing severe social and economic losses.

Tricyclic anti-depressant drugs prevent norepinefrin absorption and somewhat serotonin after releasing into the synapse. These drugs were accidentally discovered, so that the first tricyclic drug (imipramine) was studying as a medication for schizophrenia because it was thought to be effective to raise the mood. It has been revealed the theory which these drugs increase the activity of norepinephrine was simplistic (Beck and Alford. 2009).

Also, it is appeared that when tricyclic drugs are used for weeks, change some other aspects of cell performance including how the receptors act and how the cells respond to the activation of receptors and the combination of neurotransmitters. Because these changes in cell performance occur along the period of inducing anti-depressant effects, one or more of these changes are involved in mediating mentioned effects (Bucher et al. 2015). Metabolism of imipramine causes the formation of oxygen free radicals which can affect DNA (Madrigal-Bujaidar et al. 2010).

The forced swim model has a number of advantages over previous methods in that it utilizes very mild stress, is short in duration, is easily standardized, requires only a video camera and either a manual or automatic behavioral scoring system to measure immobility and distance swum, and can be readily used for time course studies of onset of drug action. Moreover, since it utilizes a greater swimming area than the traditional (Porsolt) method it can be used to study interactions of depressive behavior with behavioral flexibility and perseveration. Finally, its use of mice makes it readily amenable to genetic and molecular analyses (Eric et al. 2011).

Chamomile is one of the oldest medicinal plants which has been proposed for anxiety and general depression (Srivastava et al. 2010). Active chemical elements in chamomile flowers are flavonoids of apigenin, quercetin, luteolin, and tripoides of α- bisabolol and its oxides and chamazuline (Gardiner. 1999).

There is no extant clinical study about chamomile but it has been used for various diseases such as nervous disorders (migraine, facial nerves), digestion disorders (bloating, difficult digestion, gastric and ulcerous ulcers), menstrual disorders, skin disorders (eczema, hives), conjunctivitis, rheumatic pains and gout (Vallen. 2002).

The existence of a number of classes of antidepressant drugs with diverse pharmacological effects would lead one to expect that antidepressant drugs acting through different pharmacological mechanisms should produce different behavioral effects. Animal behavioral tests used to screen antidepressant drugs do not, however, discriminate between drugs that selectively enhance serotonin or norepinephrine transmission. Several components of human depression are differently affected by drugs selectively interacting with either serotonin or norepinephrine transmission. The ideal animal model for detecting antidepressant drug effects should thus be sensitive to all antidepressant drugs and should also display multiple components that are sensitive to specific drug classes. The revised scoring of the forced swimming test corresponds to a behavioral test for antidepressant drugs that meet these criteria (Lucki. 1997).

This study was carried to compare hydro alcoholic extract of chamomile and imipramine on depression of laboratory mice. This study was carried out to compare the effects of chamomile's hydro alcoholic extract and imipramine on decreasing depression of laboratory mice.

Materials and Methods

In this study sixty mature mice in the weight range of 25 to 30g were kept in a temperature and humidity controlled room with 12:12 hour photoperiod for 10 days with free access to food and water.

Prepared chamomile flowers were grinded. 200 grams of obtained powder were poured in a sterilized erlen and 1000 cc of ethanol was added to it and was kept in moderate condition for 72 hours. After that, erlen contents were shaken using shaker for five minutes. Erlen contents were filtered using Whatman paper. The obtained material was placed in a rotary machine for one and a half hours to evaporate its alcohol (Modaresi and Resalatpour. 2012). This extract was used to prepare 50, 100, and 200 mg/kg concentrations.

Sixty female mice in the weight range of 25 to 30g were divided into six groups:
- Control group: this group didn't receive any injection.
- Depression group: consisted of ten mice that were depressed by tetrabenazine.
- Imipramine group: this group consisted of ten mice treated with imipramine at a dose of 1.2 mg.kg after induction of depression.
- Treatment groups: Included 30 samples in three experimental groups that received intraperitoneal injections of chamomile extract 50, 100, and 200 mg.kg doses.

Depression was induced by injection of tetrabenazine in all samples (except the control group). To evaluate the depression, forced swimming test and tail suspension test were used for six minutes. Immobility time was ascribed to depression increment whereas increase in mobility was taken as antidepressant effect.

Obtained data were analyzed at two descriptive and inferential levels. Average and standard deviation were calculated in descriptive level whereas variance were used for inferential.

Results

According to Table 1 (next page) , average mobility time (in seconds) of control group was more than other groups and 100mg group had the least time. The situation was the opposite for immobility and 100 mg/kg had the highest time whereas control group had the least time ($P<0.05$).

In forced swimming test also average mobility time (in seconds) of control group was more than other groups and 100 mg/kg group had the least time. Furthermore, 100 mg/kg group had the highest immobility time whereas control group had the least one ($P<0.05$).

Figure 1 shows the mobility time (in seconds) of suspension test. The differences of 50 mg/kg and 100 mg/kg groups from imipramine and control groups were significant ($p<0.05$ and $p<0.01$) but not from depressed group.

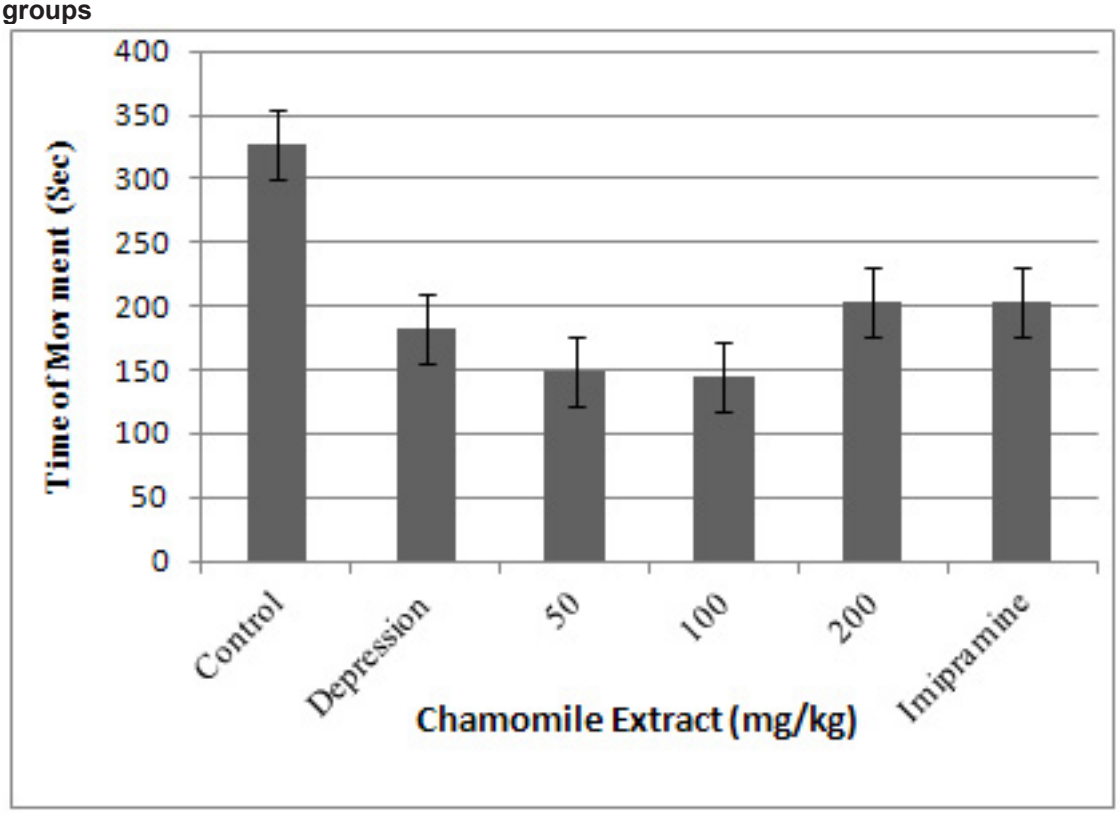
The difference of 200 mg/kg group from control group was significant ($p<0.01$) but this group was not different from imipramine group.

Figure 2 shows the immobility time (in seconds) of suspension test. The differences of 50 mg/kg group from imipramine and control groups were significant ($p<0.05$ and $p<0.01$) but not from depressed group. The differences of 100 mg/kg group from imipramine and control groups were significant ($p<0.01$) but not from depressed group.

Table 1. Average and standard deviation of variables

Group	Tail Suspension Test (Mobility)		Tail Suspension Test (Immobility)		Forced Swimming Test (Mobility)		Forced Swimming Test (Immobility)	
	average	Standard deviation	average	Standard deviation	average	Standard deviation	average	Standard deviation
Imipramine	204.2	43.25	155.8	43.25	150	32.13	210	32.13
Depressed	183.1	27.83	176.9	27.83	89.1	7.26	270.9	7.26
Control	326.7	27.03	32.3	27.02	250.3	38.67	109.7	38.67
50 mg/kg	148.3	35.83	211.7	35.83	81.7	19.97	278.3	19.97
100 mg/kg	144.4	25.58	215.5	25.58	74.1	8.41	285.9	8.41
200 mg/kg	203.7	50.73	156.3	50.73	222.3	10.11	137.7	10.11

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



The difference of 200mg.kg group from control groups was significant ($p<0.01$) but this group was not different from imipramine and depressed groups.

Figure 3 shows the mobility time (in seconds) of forced swimming test. According to graph, 200 mg/kg group increased mobility time, which is considered as an indicator of reducing depression.

The difference of 200 mg/kg group from control group was not significant but this group was significantly different from depressed group.

Figure 4 (page 202) shows the immobility time (in seconds) of forced swimming test. The difference of 200 mg/kg group from control group was not significant but this group was significantly different from depressed group.

Discussion

Drugs for depression include antidepressant medicines, such as imipramine, which increase the nerve conduction of monoamines, mainly norepinephrine and less serotonin that has potentially dangerous, sometimes fatal, side effects. Monoamine oxidase inhibitors, which prevent the activity of monoamine oxidase, which, unfortunately, have some unpleasant side effects for some people. For this reason, most patients do not continue to take enough medication to reveal their anti-depressant effect (Machado et al. 2009).

Herbal medicine has many effects in facilitating the treatment of chronic diseases and related problems. Sometimes certain herbaceous species are sometimes used as medicinal plants, which have not yet been acquired by the new sciences and can be achieved through the experience of indigenous people. Akhundzadeh et al. (2005) showed a depressive effect of saffron extract compared to placebo (Milajerdi et al. 2016).

Figure 2: Time of immobility in the tail suspension test in Control, Depression, Imipramine and three experimental groups

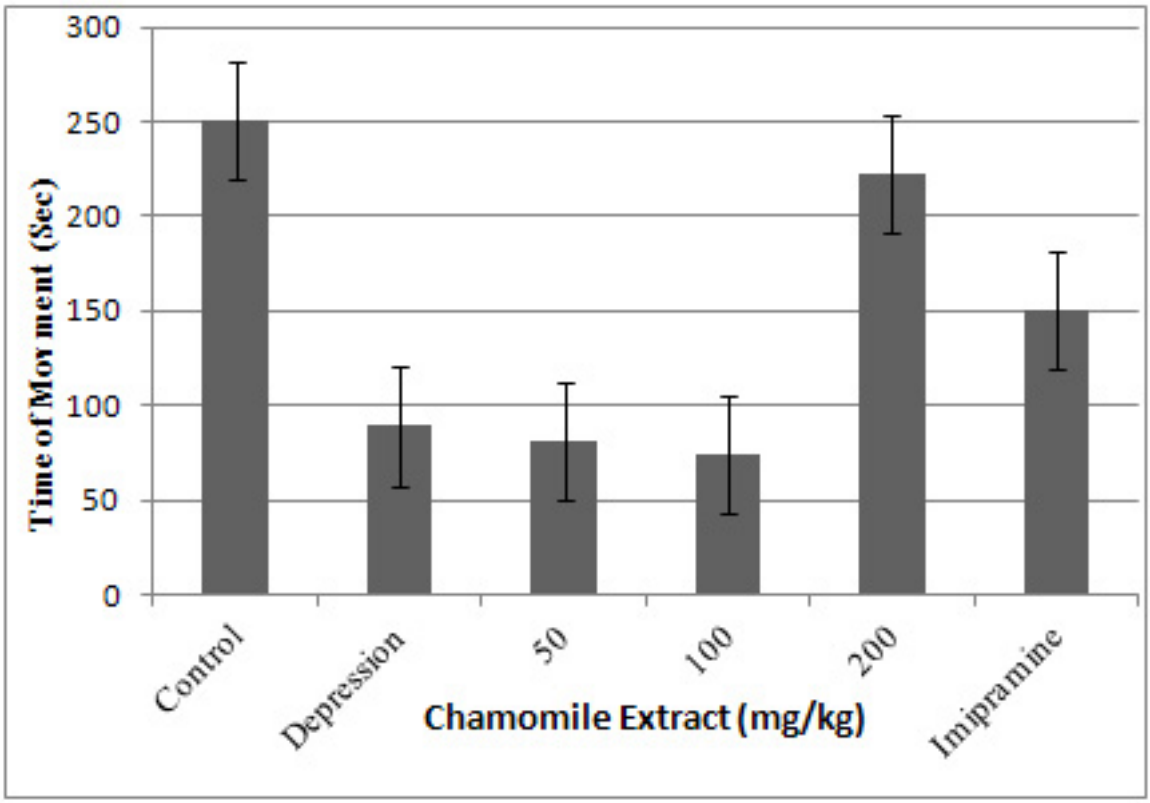


Figure 3: Time of movement in the forced swimming test in Control, Depression, Imipramine and three experimental groups

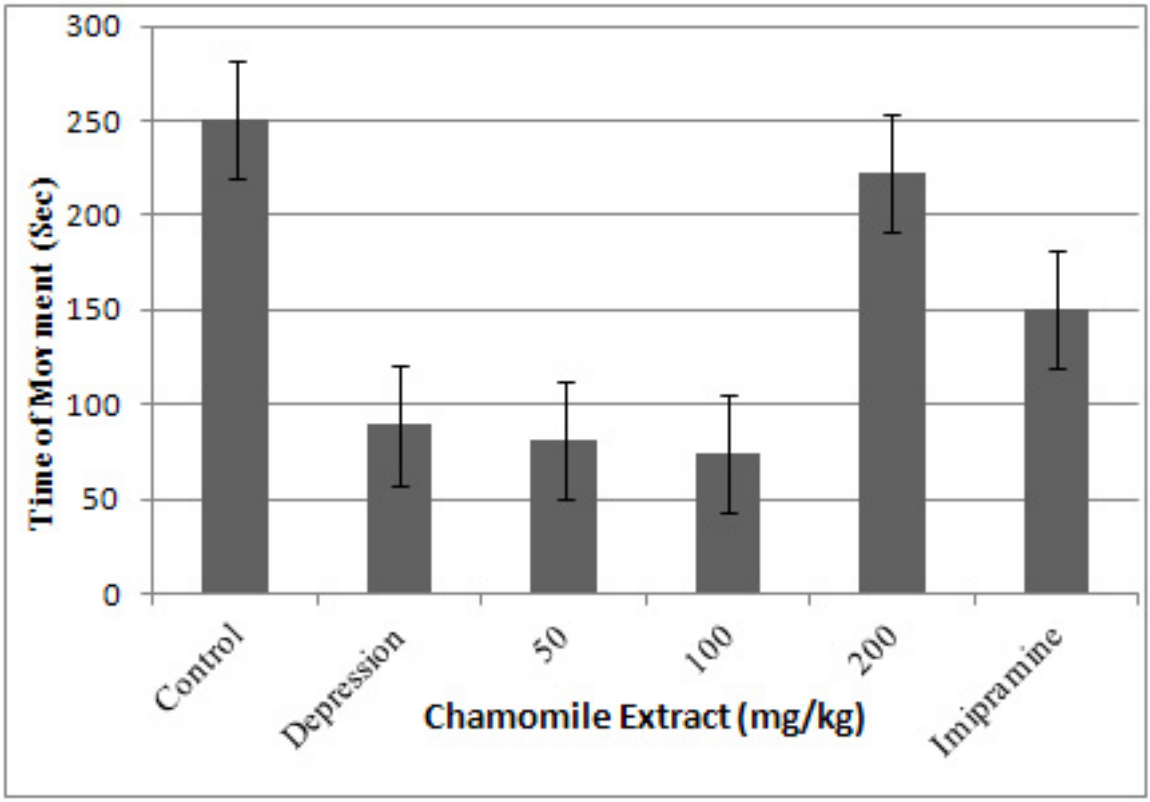
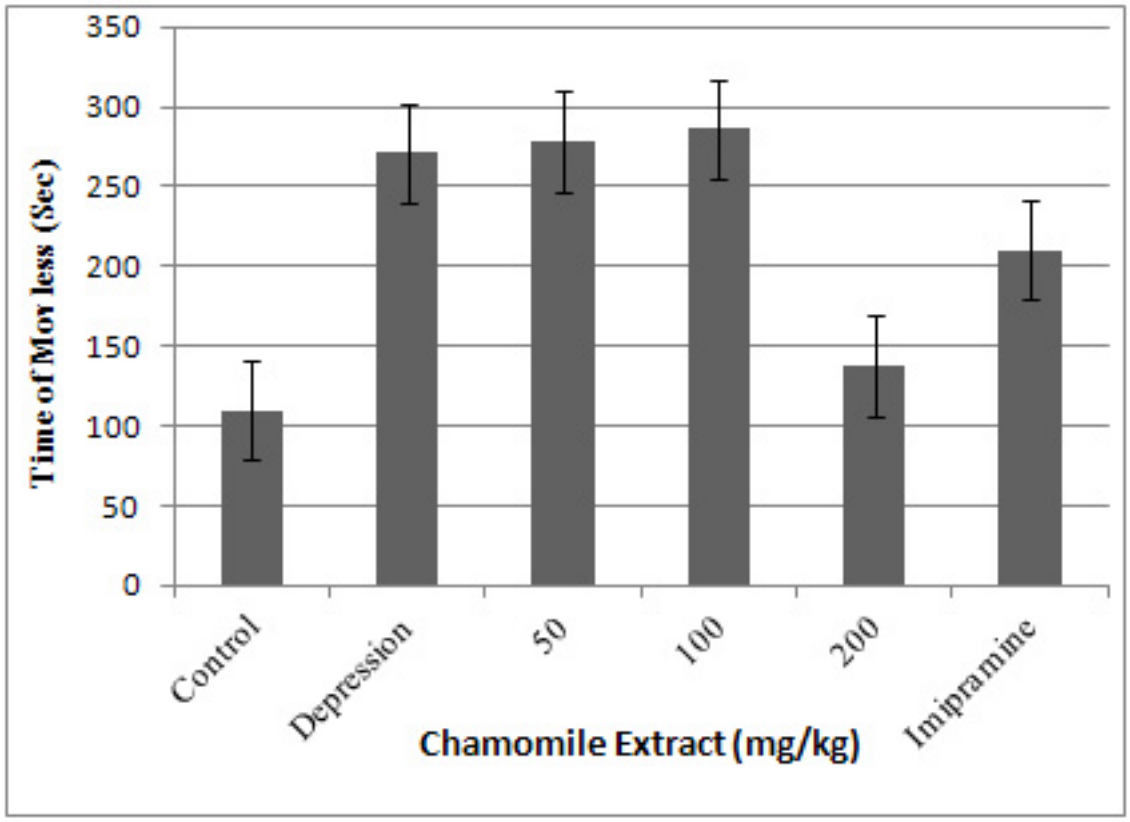


Figure 4: Time of immobility in the forced swimming test in Control, Depression, Imipramine and three experimental groups



Shiravi and Topal (2013) In the study of the effect of imipramine hydrochloride on anti-depressant effects of NMRI mice, the anomalies caused by imipramine include skeletal abnormalities, decreased growth, increased fetal deaths, and in cases of convulsion and maternal death (Shiravi and Potal. 2014).

Jafari et al. (2013) in a study titled Comparison of anti-depressant properties of different extracts of common petals of petals by forced swimming model in experimental mice, found that intraperitoneal injection (20 and 30 mg/kg and intravenous (10 and 50 mg/kg) of Rosa canina blue extract significantly reduced the immobilization time of the mouse in the forced swimming test, which was similar to that of fluoxetine (Jafari et al. 2013).

Machado et al. (2009) investigated the effect of hydro alcoholic extract of stems and rosemary leaves in two models of forced swimming test and tail tensile test in mice and found that in the forced swimming test at a dose of 100 mg/kg, and in the suspension test at a dose of 10- 100 mg/kg, the immobilization time was significantly reduced compared to the control group (Machado et al. 2009).

The results showed that the difference of some groups in the variables of both tests was significant and chamomile extract at doses of 50 and 100 mg/kg did not significantly differ from the groups of imipramine and the control group in both variables, both different tests were. Extract consumption at 200 mg/kg in both suspension and swimming tests with control group did not differ significantly.

Conclusion

Chamomile's extract in 200 mg/kg doses increased movement time in forced swimming test significantly in proportion to control group which is depression reducing index. Therefore, Chamomile's extract is effective for reducing depression, dose dependently. On the whole, chamomile's extract with its antidepressant effects dose dependently can be a good replacement for imipramine.

References

Beck At, Alford Ba, 2009. Depression: Causes and Treatment. Univ of Pennsylvania Press.

Bucher C, Holly C, Minka S. 2015. Psychological Pathology Volume 2. Translated by Seyed Mohammadi, Sept. 16th Edition. Tehran: Second Edition.

Cryan Gf, Markou A and Lucki I. 2002. Assessing Antidepressant Activity In Rodents: Recent Developments And Future Needs. Trends Pharmacol. Sci; 23: 238-45.

Eric A. Stone, Yan Lin, 2011, Open-Space Forced Swim Model of Depression for Mice. Curr Protoc Neurosci. chapter: Unit9.36. doi: 10.1002/0471142301.ns0936s54.

Gardiner P. 1999. Chamomile (Matricaria Recutita, Anthemis Nobilis).Longwood Herbal Task Force.

Jafari et al, 2013, Comparison of anti-depressant effect of different extracts of common petal (Rosa Canina L.) petals by forced swimming model in mice. Journal of physiology and pharmacology: 17(2); 231-239.

Kaplan B, Saduk and, Ruiz C. 2014. Summary of psychiatry. Translation Ganji, Tehran: Publication Sawalan. 528 pages.

Lucki I. 1997. The forced swimming test as a model for core and component behavioral effects of antidepressant drugs. Behavioural Pharmacology, 8 (6–7), 523.
Machado DG, Bettio LE, Cunha MP, Capra JC, Dalmarco JB, Pizzolatti MG, Rodrigues AL.2009, Antidepressant-like effect of the extract of Rosmarinus officinalis in mice: involvement of the monoaminergic system. Prog Neuropsychopharmacol Biol Psychiatry. 15; 33(4):642-50. doi: 10.1016/j.pnpbp.
Madrigal-Bujaidar E, Cárdenas García Y, Alvarez-González I. 2010. Chromosomal aberrations induced by imipramine and desipramine in mouse. Hum Exp Toxicol; 29(4):297-302. doi: 10.1177/0960327110361751.
Milajerdi A1, Maghsoudi Z2, Ghiasvand R, 2016, Different consumed oils and metabolic parameters in type 2 diabetes patients in diabetes society of Natanz. Diabetes Metab Syndr. doi: 10.1016/j.dsx.2016.01.010.
Modaresi M, Resalatpour N, 2012, The effect of Taraxacum officinale hydroalcoholic extract on blood cells in mice. Advances in hematology, Volume 2012, Article ID 653412, 4 pages.
Potdar VH, Kibile SJ. 2011. Evaluation of Antidepressant-like Effect of Citrus Maxima Leaves in Animal Models of Depression. Iranian journal of basic medical sciences. 14(5):478-83.
Shiravi A, Potal M, 2014, Effect of Imipramine Hydrochloride Antidepressant on NMRI Mouse Embryo Abnormalities. Journal of Zoology Biology, Vol. 6, No. 4, 31-36.
Srivastava, J. K., Shankar, E., & Gupta, S. 2010. Chamomile: A Herbal Medicine of the Past with a Bright Future (Review). Molecular Medicine Reports, 3(6), 895-901.
Vallen, G, 2002, Herbal Medicine (treating diseases by herbs). Translation by Emami, Ahmed et al. 1. Proceedings of the Kamal Road, Tehran, Pages: 6-4, 32.