



ISSN 0975-413X  
CODEN (USA): PCHHAX

Der Pharma Chemica, 2017, 9(4):10-12  
(<http://www.derpharmachemica.com/archive.html>)

## Comparing the Effects of Cannabis and Paroxetine on Depressive Symptoms by Using Forced Swimming Test in Mice

Samaneh Ebrahimi<sup>1</sup>, Mehrdad Modaresi<sup>2\*</sup>, Ilnaz Sajjadian<sup>1</sup>

<sup>1</sup>Department of Psychology, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran

<sup>2</sup>Department of Animal science, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran

### ABSTRACT

Current study was carried out to compare the effects of cannabis and paroxetine on laboratory depressive symptoms of mice using forced swimming test. Sixty female mice from weight range of 25-30 were divided into 6 groups. Depression was enforced by injecting tetrabenazine. Hydroalcoholic extract of cannabis was injected intraperitoneal in 50, 100 and 200 mg/kg of weight, paroxetine was injected in 1/4 mg/kg dose for paroxetine group and control group did not receive any thing to evaluate depression. Forced swimming test was used and increased movement time (in seconds) or reduced immobility time were used as depression indices. Multivariate covariance analysis showed that 50 and 100 mg/kg doses increased movement time and decreased immobility time in proportion to control and paroxetine significantly, which indicates depression reduction. Therefore, extract in mentioned doses can be a good replacement for paroxetine.

**Keywords:** Depression, Paroxetine, Cannabis plant, Tail suspension test, Forced swimming test, Laboratory mice

### INTRODUCTION

Depression is defined by five traits commonly: sadness and apathy, negative self-concept and self-shaming, tend to avoid others, reduced sleep, appetite and sex desire, changes in activities, plus drowsiness and sometimes confusion [1].

Almost everyone has been depressed at least in mild or transient forms. But in clinical depression, frequency, duration and severity of depressive symptoms do not fit with the position of one's life. For example, chemical drugs, used in depression disorders have side effects. Some of these effects are Drowsiness, insomnia, low blood pressure when standing, agitation (restlessness), cardiac arrhythmia, weight gain, anticholinergics side effects, lethargy, gastroenteritis problems, sexual problems and digestive problems [2].

Many drugs have been introduced for depression treatment such as paroxetine which is an anti-depressant drug from selective serotonin reuptake inhibitors (SSRI). Paroxetine is used for curing depression, obsessive compulsive disorder, eating disorders and panic attacks (sudden and unpredictable episodes of intense fear) and some type of premenstrual syndrome [3].

This drug increases serotonin (chemical matter in the brain that helps maintain mental balance). Other uses of paroxetine are treatment of alcoholism, attention deficit disorder, borderline personality disorder, sleep disorders, headaches, mental illness, post-traumatic stress disorder, Tourette syndrome, obesity, sexual problems and phobias and some other problems depend on doctors' opinion [4].

In spite of using this drug for curing diseases, many side effects of it have been reported. Using herbal replacement have been considered always, and researches for finding effective drug with less side effects are continued. Since effective matters of plants' extracts are balanced biologically with other extant materials, they will not be accumulated in body and don't have side effects or have less side effects. Therefore, they are superior to chemical drugs.

### MATERIALS AND METHODS

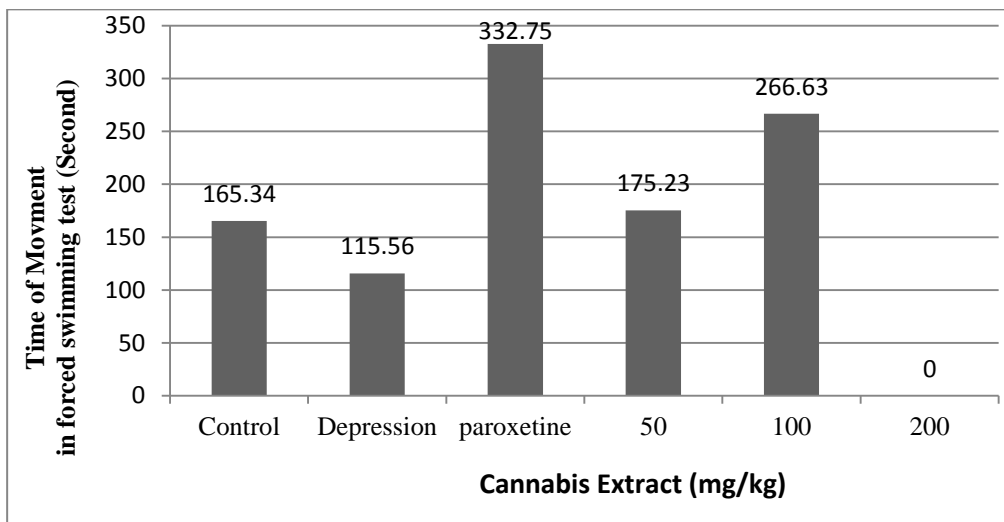
Sixty female mice from weight range of 25-30 g were selected and kept in a temperature and humidity controlled room with natural photo period. Mice had free access to food and water and 24 h before test were transferred to laboratory. Extract was injected intraperitoneal in 50, 100 and 200 mg/kg of weight, 50 min before test. Paroxetine group received 1.2 mg/kg of drug. Prior to test, mice were kept for two weeks to adapt to nest. 24 h before the experiment tetrabenazine was injected to appear depression symptoms. In experiment day, various doses of extract was injected and 55 min later, mice were placed separately in a tub (25 × 12 × 8) containing 25°C water.

Lack of hands and legs activities was considered as immobility time. Total time of test was 8 min which first 2 min was considered as adaption time. In next 6 min, immobility time, swimming time and rising time were recorded by chronometer (in seconds). Active movements of hands and legs and spinning around column were considered as swimming and active movement of animal on column wall was considered as climbing. Lack of movements was recorded as depression [5].

Obtained data were analyzed using SPSS program, in both descriptive and inferential levels. Average, standard deviation and various analysis were used plus univariate and multivariate analysis of variance and Tukey test for mean comparisons.

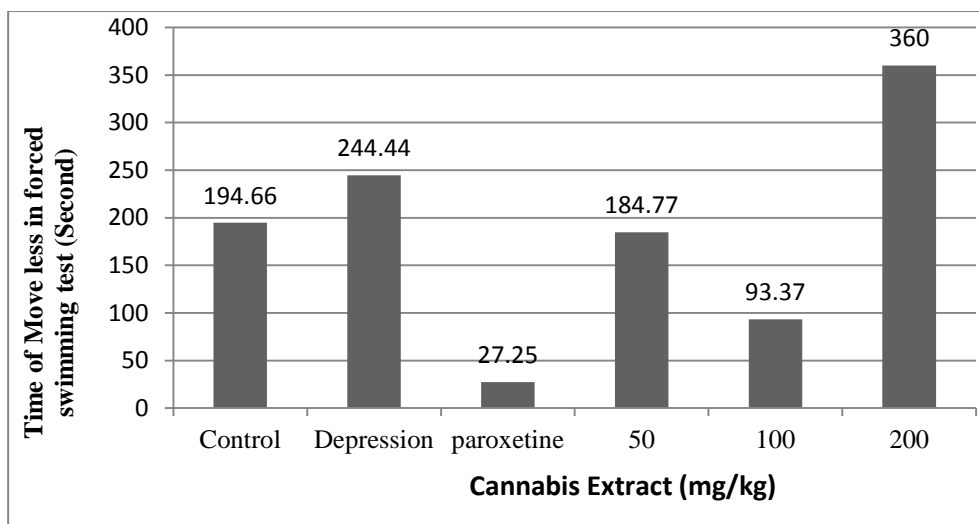
**RESULTS AND DISCUSSION**

In forced swimming test, movements' average of paroxetine group (in second) was the highest (332.75 s) whereas cannabis at 200 mg/kg dose had the least activity (0 s). 100 mg/kg dose had higher average (266.63 s) than control group (165.34 s) (Figure 1).



**Figure 1: Time of movement in second at the forced swimming test in all groups**

Average of immobility time of paroxetine group (in seconds) was less than other groups (27.25 s) but 200 mg/kg group had the highest amount (360 s) (Figure 2).



**Figure 2: Time of move less in second at the forced swimming test in all groups**

In this study, the effects of cannabis and paroxetine on laboratory depressive symptoms of mice were compared. Action of neurotransmitters such as serotonin, epinephrine and dopamine cause depression and all of anti-depression drugs increase at least the activity of one of these chemical messengers [6].

Results of this study showed that plus significant differences between various variables of groups such as movement and immobility time, the effect of cannabis extract in treatment of depression was obvious. Cannabis extract in 50 mg/kg dose was at control level (natural amount). In 100 mg/kg dose, average time of movement and immobility were better than control group so that movement time was higher than control group and about paroxetine group. Also immobility time was less than control group.

200 mg/kg group showed absolute immobility in forced swimming test so that movement time of this group was zero whereas the immobility was maximum (360 and 480 s, respectively). These results explain that 200 mg/kg dose of cannabis extract not only couldn't reduce depression symptoms but also can be considered as a dose with negative effects on behavioral performance. On the whole, depression as most common disorder has economical, excitement and social costs for patients and their families. It is estimated that twelve month rate of this disorders is about 2.9 to 12.6% [7]. It seems that hydro alcoholic extract of Passionfruit in 50 and 200 mg/kg doses has considerable effects in proportion to fluoxetine which Can help to find herbal antidepressants drugs.

#### CONCLUSION

Cannabis extract in 50 and 100 mg/kg doses increased movement time in forced swimming test significantly in proportion to control group which is depression reducing index. Therefore, cannabis extract is effective for reducing depression, dose dependently.

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