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Locomotor Activity of Ethanolic Extract of Spondias Mombin Leaf

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ABSTRACT: *This present study was carried out to investigate the effects of ethanolic extract of Spondias mombin leaf on locomotor activity in Wistar rats using the open field test. Thirty rats with average weight of 150g were randomly divided into three groups made up of control and two test groups. Ethanolic extract was given at doses of 250 and 500mg/kg through oral route.The dose at 500m g/kg showed evidence of significantly (P<0.05) reduced locomotor activity recorded in all the open field maze test parameters, while at dose of 250mg/kg, animals exhibited high exploratory activity. The results of this study suggests that at high dose, Spondias mombin has the ability to inhibit locomotion and it supports its use as a sedative since one of the principal properties of sedatives is their ability to inhibit locomotion.*

KEYWORDS: *Locomotion, Exploration, Sedative, Spondias mombin, Open field test.*

I. INTRODUCTION

The ability of an organism to move from one place to another through coordinated limb movement is referred to as locomotion. Locomotion is a fundamental skill required by animals and humans for a large variety of actions and it's a complex neural process characterized by rhythmic activity using varied degrees of freedom (1). Locomotion control is organized in a way that the neural network in the spinal cord generates basic rhythmic patterns necessary for movement, while the higher centres of the brain interact with the spinal circuits for posture control and accurate limb movements (2-3).

Changes in the open field test measurements that are related to locomotor activities have been used to assess sedative or stimulant effects of pharmacological agents (4). Most of the known pharmacological agents are largely derived from plants (5-9). The roles of herbal medicine in the treatment of psychological disorders have been reported for close to two decades (10-13). A lot of herbal plants and their products have been used to treat anxiety, cognitive disabilities and insomnia (14-20). These plant products have been found to contain chemicals that are capable to influence the function of ionotropic receptors in the brain (21-22). *Spondias mombin* (SpM) along with other plants have been reported to possess anxiolytic properties (23-24).

SpM is a medicinal plant widely used in Nigeria to treat various ailments; it belongs to the family *Anarcardiacae* and is commonly known as hog plum tree. The leaf contains phytochemicals such as alkaloids, saponin, Flavonoids, glycosides, tannins, reducing compounds and polyphenols (25-26). The leaf is traditionally used as treatment for stomach aches, diarrhoea, dyspepsia, colic and constipation. It has been reported to possess antimicrobial (27), antibacterial (28), antiviral (29), anthelmintic (30), antifertility (31-32), and lipid lowering (33) activities.

Ayoka et al (23) has reported on the sedative and anxiolytic potential of the plant, we had furthermore also reported that ethanolic leaf extract of this plant exhibited a significant anxiolytic effect compared to its aqueous extract (34). However, there is no scientific data on its locomotor activity; hence this work was carried out to substantiate same.

II. METHODS

The leaves of SpM were collected from a rural community in Akpabuyo, Cross River State, Nigeria. T he plant was authenticated by Mr Frank Apejoye, Chief Herbarium, Department of Botany, University of Calabar. Rats (average weight of 150g) of both sexes were used for this experiment. Animals were provided with standard rat chow and water *ad libitum* and were maintained at a temperature of 27±2^{o}C with a 12 hour light and dark cycle. Animal procedures were approved by the departmental ethics committee on animal use.

III. EXTRACT

The leaves of SpM were thoroughly washed and dried under shade. It was grounded into powder using an electric dry blender. Powdered plant material (150g) was extracted with ethanol (95%) using a soxhlet apparatus. The extract was filtered with Whatmann No 1 paper; filtrate was evaporated to dryness on rotary evaporator with a yield of 35.28%.

IV. LOCOMOTOR ACTIVITY

The open field maze test was employed to assess the locomotion of rats. The animals were randomly divided into three groups of 10 rats per group. Group A served as control while groups B and C were administered ethanolic leaf extract at doses of 250 and 500mg/kg body weights respectively by oral route for 28 days. On the 29th day, the open field test activities such as line crossing, stretch attend posture, rearing, walling, and grooming were recorded. Results obtained from the various tasks were analyzed using the one-way analysis of variance followed by post-hoc student's t-test. P<0.05 was considered significant.

V. RESULTS

Line crossing

The frequency of line crossed by animals in control group A and group B (250mg/kg extract administered) was not significantly different. Group C (500mg/kg extract administered) was significantly (P<0.05) lower than groups A and B. This is represented in Figure 1.

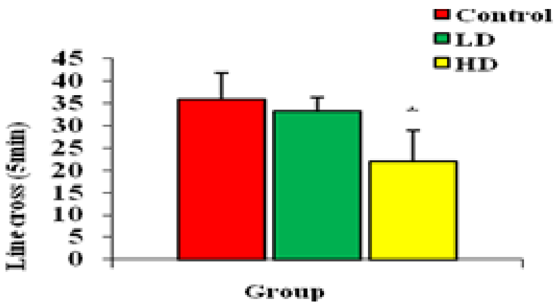

Figure 1: Comparison of the frequency of line crosses in the open field maze in the different experimental groups of rat. Values are mean ± SEM, n = 10. *P<0.05.

Stretch attend posture

Figure 2 shows the frequency of stretch attend postures of animals. Mean values recorded were 3.33±0.95 for control, 1.17±0.75 for group B and 0.50±0.34 for group C. the values in the experimental animals were significantly (P<0.05) lower compared to control.

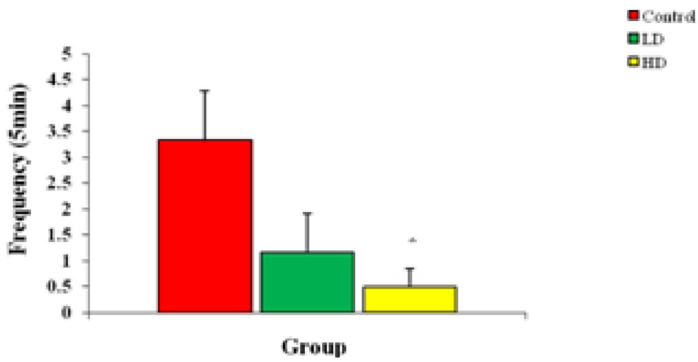

Figure 2: Comparison of the stretch attends postures in open field test in the different experimental group. Values are mean ± SEM, n =10. *P<0.05.

Rearing

The rearing of the control group animals was significantly (P<0.05) higher than the experimental animals with that of group C (high dose) being lowest with a value of 4.33±1.02 against low dose (group B) having value of 5.50±1.09 and control 7.00±2.59 (Figure 3).

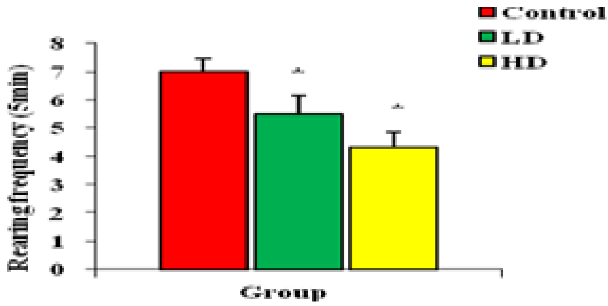

Figure 3: Comparison of the frequency of rearing in the open field maze test in the different experimental groups. Values are mean + SEM, n = 10. *P<0.05

Walling

Walling frequency of the three groups is represented in Figure 4 with mean values of 12.50±2.86, 10.33±2.30 and 7.67±1.74 from control to group C respectively. The walling frequency of the experimental groups administered with ethanolic extract of SpM showed significantly lower values compared to control.

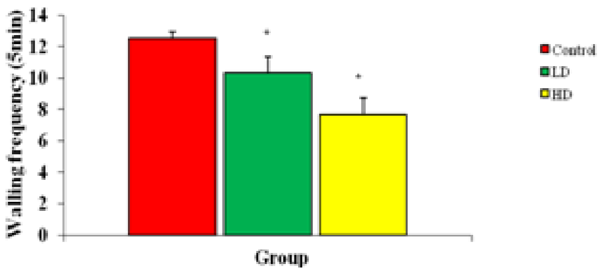

Figure 4: Comparison of the frequency of walling in the open field maze test in the different experimental groups. Values are mean + SEM, n = 10. *P<0.05.

Grooming

Figures 5 and 6 show the grooming frequency and duration of control and experimental animals. The grooming frequency of experimental animals were significantly (P<0.001) lower compared to control with their mean values being 2.83±0.60 and 2.17±0.48 compared to control (5.67±0.67). The duration of grooming in the experimental animals also showed significant differences (P<0.01) compared to control.

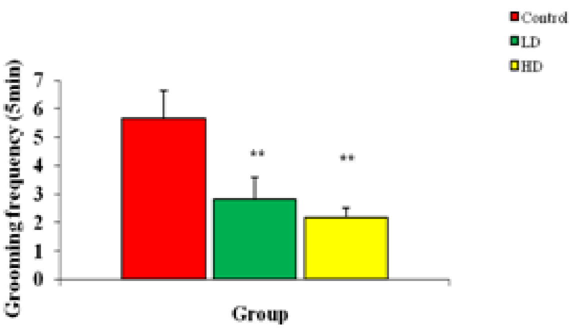

Figure 5: Comparison of the grooming frequency in open field maze test in the different experimental groups. Values are mean + SEM, n = 10. **P<0.01.

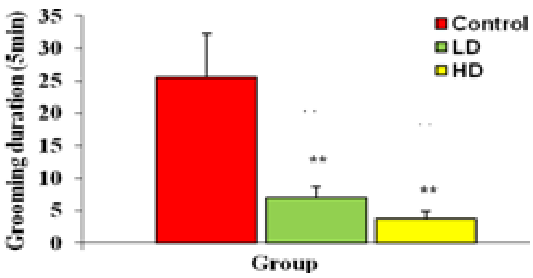

Figure 6: Comparison of the grooming duration in open field maze test in the different experimental groups. Values are mean ± SEM, n = 10. **P<0.01.

VI. DISCUSSION

The present study evaluated the effects of ethanolic extract of SpM leaves on locomotor activity in Wistar rats using the open field maze test. The open field test is a simple assessment used to establish the general activity levels, gross locomotor activity and exploration habits of rodents (35). The number of line crosses and the frequency of rearing are used as measures of locomotor activity, with a high frequency of these behaviours indicating increase in locomotion exploration. In this study, results showed that ethanolic leaf extract of SpM significantly reduced the numbers of line crossed and the frequency of rearing in the experimental animals. This shows that SpM may lead to a decrease in alertness resulting to a decrease in locomotor activity, which had been shown to be as a result of sedative effects (36). Ayoka et al (23) had shown that leaf extract of SpM has sedative effects. We had earlier published that ethanolic extract of SpM has a higher potential as an alternative anxiolytic and sedative agent compared to its aqueous extract (34). Gadekar et al (37) had reported that plants containing sterols, Flavonoids, saponin and tannins have anxiolytic activity and these phytochemicals are found in SpM. Sedative properties of a drug or plant extract are said to be carried out by GABA (Gamma-amino-butyric-acid), the major inhibitory neurotransmitter in the CNS (38), which may be the mechanism through which the extract of SpM acts to influence. This may likely lead to a decrease in the rate of firing of major neurons in the brain or may directly activate GABA receptors (39).

In conclusion, it may be deduced that ethanolic extract of SpM significantly decreased locomotor activity which is indicative of its CNS depressant activity. However, further research is necessary to identify and isolate the active principles responsible for these activities.

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