

***Eurycoma longifolia* Increases Sexual Motivation in Sexually Naive Male Rats**

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The aim of this study is to provide evidence on the aphrodisiac property of *Eurycoma longifolia* Jack. An electric grid was used as an obstruction in the electrical copulation cage in order to determine how much an aversive stimulus the sexually naive male rat for both the treated with *E. longifolia* Jack and control groups were willing to overcome to reach the estrous receptive female in the goal cage. The intensity of the grid current was maintained at 0.12 mA and this was the intensity in which the male rats in the control group failed to crossover to reach the goal cage. Results showed that *E. longifolia* Jack continued to enhance and also maintain a high level of both the total number of successful crossovers, mountings, intromissions and ejaculations during the 9-12 th week observation period. In conclusion, these results further enhanced and strengthened the aphrodisiac property of *E. longifolia* Jack.

Key words : *Eurycoma longifolia*, Simaroubaceae, Sexual Motivation, Successful crossovers, Mountings, Intromissions, Ejaculations, Aphrodisiac

INTRODUCTION

Eurycoma longifolia Jack which is known as tongkat Ali or Ali's walking stick is a plant which grows up to 10 m high and is found in primary and secondary, evergreen and mixed deciduous forests in Burma, IndoChina, Thailand, Malaysia, Sumatra, Borneo and the Phillipines. Over the years, this plant has been shown to exhibit antimalarial (Chan *et al.*, 1986, 1989; Kardono *et al.*, 1991; Ang *et al.*, 1995, 1995a), cytotoxic (Morita *et al.*, 1990, 1993; Kardono *et al.*, 1991; Itokawa *et al.*, 1992, 1993), antiulcer (Tada *et al.*, 1991) and antipyretic (Chan *et al.*, 1995) activities and these may have been attributed to various quassinoids, squalene derivatives, biphenylneolignans, tirucallane-type triterpenes, canthine-6-one and β -carboline alkaloids.

However, in Malaysia, this plant has gained notoreity as a sexual enhancer since it is reputed to improve strength and power during sexual activities; it increases male virility and sexual prowess (Gimlette and Thomson, 1997) and it is usually taken as a decoction of the roots in water. But this claim is largely based on subjective opinion rather than scientific verification.

Hence, in this paper, we investigated the sexual motivation in sexually naive male rats using an electrical copulation cage after treating the male rats with different fractions of *E. longifolia* Jack daily and were observed for 12 consecutive weeks.

MATERIALS AND METHODS

Animals and surgery

Two hundred and sixty sexually naive male Sprague-Dawley rats, without prior copulatory experience and approximately 100 days of age were used in this study. They were housed individually in a standard wire-mesh cage in animal house in standard conditions and fed with commercial diet and water ad libitum.

Female rats were rendered sexually receptive by bilaterally ovariectomized via lumbar incisions under phenobarbitone anaesthesia approximately 1 month prior to testing. They were later brought on heat manually with a single subcutaneous dose of 10 μ g estradiol benzoate (Sigma Chemical, USA) and 500 μ g of progesterone (Sigma Chemical, USA), 48 hours and 4 hours before testing, respectively. Estradiol benzoate induced a specific urge to seek contact with a sexual active male in the ovariectomized rat (Meyerson and Lindstrom, 1971, 1973). Furthermore, only receptive females were chosen in this study and this was shown by the lordotic reflex

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in response to manual stimulation of the vaginal region and also confirmed by the vaginal smear. Lordosis is actually a posture consisting of an arching of the back and elevation of the pelvis frequently accompanied by tail deviation (Kuehn and Beach, 1963; Sachs and Barfield, 1970; Komisaruk and Diakow, 1973; Diskvow, 1975). In addition, they were further tested with non-experimental male rats and only those females exhibiting good receptive with no rejection behaviour with the non-experimental male rats were used.

Test compounds

E. longifolia Jack roots were obtained from Langkawi Island in Malaysia. This plant was identified by comparison with an authentic sample previously deposited at the School of Pharmaceutical Sciences, University of Science Malaysia. The roots were then milled and later, defatted with petroleum ether before being extracted with methanol. The dried methanol residue (% yield: 3% w/w) was then partitioned between chloroform and water (2:1) to yield the chloroform extract (% yield: 0.1% w/w) and the aqueous layer (% yield: 0.5% w/w). The aqueous layer was then extracted with *n*-butanol (% yield: 0.45% w/w). The various solvents were then evaporated at reduced pressure to constant weight and stored in a refrigerator.

When required, test compounds were given daily using an appropriate oral needle and were observed for copulatory behaviour for 12 consecutive weeks. Each male rat in the respective group received 200, 400 and 800 mg/kg of one of the following fractions: chloroform, methanol, water and *n*-butanol whilst the control group received 3 ml/kg of saline. Vehicles used

were propylene glycol and distilled water for chloroform and non-chloroform fractions respectively.

Test apparatus

An electric grid was used as an obstruction in the electrical copulation cage in order to determine how much an aversive stimulus the sexually naive male rat was willing to overcome to reach the sexual contact. Sexually naive male rat was separated from the electric grid by a plexiglass door and this door would be automatically opened when the male rat was deposited in a starting cage. Once the door was opened, the male rat would then cross the electric grid to the goal cage which housed an estrous receptive female rat. The intensity of the grid current was maintained at 0.12 mA and this was the intensity in which the male rats in the control group failed to crossover to reach the goal cage.

Copulatory behaviour test

Tests were performed in the above electrical copulation cage during the dark phase of the light-dark cycle (2000~0700 hours) and under dim illumination. Unless stated otherwise, all tests lasted for 30 minutes prior to 20 minutes adaptation and this was observed daily until 12 consecutive weeks.

The normal copulatory behaviour of the male rats begins with a mount. A mount is scored when the male mounts the female, clasps and palpates her body with his forelegs, and displays pelvic thrusting, yet fails to effect insertion. The male normally pursues the running female for a few seconds before catching her and mounting, usually from the rear (Sachs and

Table 1. Total number of copulation activities, successful crossovers and subsequent mountings in sexually naive male rats after treating them with 200, 400 and 800 mg/kg of *E. longifolia* Jack daily and were observed for 12 consecutive weeks

Duration (weekly copulatory test)	Control	Chloroform ^a			Methanol ^a			Water ^a			Butanol ^a		
		200*	400*	800*	200*	400*	800*	200*	400*	800*	200*	400*	800*
1-4													
Successful crossover	0	4	7	8	4	5	7	4	5	6	5	7	8
Mounting	0	3	6	6	3	4	6	3	4	3	3	3	4
Intromission	0	2	4	4	2	3	4	2	2	2	2	2	2
Ejaculation	0	2	2	2	2	2	2	1	1	1	1	1	1
5-8													
Successful crossover	0	5	8	9	5	6	9	5	6	9	6	8	10
Mounting	0	4	7	8	4	5	8	4	5	8	5	7	9
Intromission	0	3	3	6	3	4	6	3	4	6	4	5	7
Ejaculation	0	2	2	3	2	3	3	2	3	4	3	4	6
9-12													
Successful crossover	0	12	18	19	14	16	18	12	14	10	16	18	20
Mounting	0	10	16	18	12	14	16	10	12	9	9	9	12
Intromission	0	8	15	16	10	12	14	9	11	8	8	8	10
Ejaculation	0	7	14	15	9	10	12	7	10	7	7	6	8

Note: n_{each group}=20; ^afractions obtained from *E. longifolia* Jack; *mg/kg body weight

Barfield, 1970).

RESULTS AND DISCUSSION

Table I shows the total number of successful crossovers and subsequent mountings in sexually naive male rats after treating them with 200, 400 and 800 mg/kg of *E. longifolia* Jack daily and were observed for 12 consecutive weeks. Results showed that all the control male rats failed to crossover to the estrous receptive female rat throughout the 12-week observation period.

However, repeated and chronic dosing of various fractions of *E. longifolia* Jack enabled the treated male rats to crossover the electrical grid to reach the estrous receptive female and subsequently, elicited mountings, intromissions and ejaculations onto the incentive animals in the goal cage after 4th week observation period. Further results also indicated that *E. longifolia* Jack continued to enhance and also maintain a high level of the total number of successful crossovers, mountings, intromissions and ejaculations during the 9~12 th week observation period.

Results from this study showed that not much difference was observed among the different fractions of *E. longifolia* Jack and this may be attributed to the presence of the active compounds in more than one fraction. In fact, the synergistic effect observed in the various fractions of *E. longifolia* Jack may responsible for the male virility and sexual prowess while taking the whole plant as a decoction of the roots in water by the Malaysian community. Although this study failed to determine which fraction of *E. longifolia* Jack is the most superior, nevertheless, it lends further support that *E. longifolia* Jack has aphrodisiac quality.

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