

Effects of *Eurycoma longifolia* Jack on sexual qualities in middle aged male rats

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Summary

The effects of *Eurycoma longifolia* Jack were studied on the sexual qualities of middle aged male rats after dosing them with 0.5 g/kg of various fractions of *E. longifolia* whilst the control group received 3 ml/kg of normal saline daily for 12 weeks. Results showed that *E. longifolia* Jack enhanced the sexual qualities of the middle aged male rats by decreasing their hesitation time as compared to controls with various fractions of *E. longifolia* Jack produced 865–916 (91–96), 860–914 (92–98), 850–904 (93–99), 854–890 (95–99), 844–880 (94–98), 840–875 (94–98), 830–870 (94–98), 825–860 (94–98), 820–850 (96–99), 800–840 (93–98), 750–795 (94–99) and 650–754 sec (82–95%) in contrast to controls which produced 950 (100), 934 (100), 910 (100), 900 (100), 895 (100), 890 (100), 885 (100), 880 (100), 855 (100), 860 (100), 800 (100) and 790 sec (100%) throughout the investigation period. Besides these, there was a transient increase in the % of the male rats responding to the right choice after chronic administration of 0.5 g/kg *E. longifolia* Jack, with more than 50% of the male rats scored right choice after 2 weeks post-treatment and the effect was more prominent at the dose of the observation period. However, there was no sexual enhancement of the middle aged male rats which consumed normal saline since only 45–55% of the male rats responded to right choice throughout the investigation period. Hence, this study shows that *E. longifolia* Jack enhanced the sexual qualities of the middle aged male rats, further supports the folkuse of *E. longifolia* Jack as an aphrodisiac.

Key words: *Eurycoma longifolia* Jack, preference of choice, hesitation times, electrical grid, sexual qualities, middle aged

■ Introduction

The word aphrodisiac is derived from 'Aphrodite', the Greek goddess of love, beauty and sexuality, and aphrodisiacs are the substances which stimulate sexual desire (Choudhary and Rahman, 1997). The possibility of bioactive aphrodisiacs which may be derived from plants, animals or minerals, has been attractive throughout recorded history. *Punica granatum* has been a symbol of love, fertility and immortality in oriental regions (Farnsworth et al. 1975). The yohimbine rich bark of *Corynanthe yohimbe*, has been employed for centuries as an aphrodisiac (Johanson and Diamond, 1968) whilst *Chelidonium majus*, *Heracleum sphondylium* and *Sat-*

ureja montana have been formulated into topical preparations by the European community for vaginal douches to increase sexual desire in women (Messeigne, 1973). Similarly, Hindu medicine still claims *Aristolochia indica*, *Crocus sativus*, *Alpinia galanga* and *Allium cepa* as potent aphrodisiacs (Puri, 1971).

In Malaysia, *Eurycoma longifolia* Jack commonly known as Tongkat Ali, is well-known among various ethnic groups in Malaysia for treating disease and enhancing health and as such, it is sometimes referred to as 'Malaysian ginseng' (Jagananth and Ng, 2000). Besides this, it has also gained reputation as male aphro-

disiac since it is claimed to increase virility and sexual prowess (Gimlette and Thomson, 1977) when it is taken as a decoction of roots in water. Over the years, pharmacological evaluations of this plant showed that it exhibited antimalarial (Ang et al. 1995, 1995a; Chan et al. 1986, 1989; Kardono et al. 1991), cytotoxic (Itokawa et al. 1992, 1993; Kardono et al. 1991; Morita et al. 1990, 1993), antiulcer (Tada et al. 1991) and antipyretic (Chan et al. 1995) activities.

In this paper, we investigated the effects of different fractions of *E. longifolia* roots on sexual qualities in middle aged male rats using an electrical copulation cage after treating them and were observed for 12 consecutive weeks.

■ Materials and Methods

Test compounds

E. longifolia roots, collected in January, 2000 from Langkawi Island in Malaysia and identified by comparison with an authentic sample previously deposited at the School of Pharmaceutical Sciences, University Science Malaysia, Malaysia.

The roots were then milled and subsequently defatted with petroleum ether (40–60 °C) before being extracted with methanol. The methanol residue was dried to a constant weight and then sequentially partitioned between chloroform, water and *n*-butanol. Phytochemical screening (Farnsworth, 1966) carried out on these fractions gave positive tests, with different intensities, only for alkaloids, lactones and phenolics. The various solvents were then evaporated at reduced pressure to constant weight and stored in a refrigerator.

Animals

Adult male Sprague-Dawley rats, 9 months old and retired breeders were used as experimental subjects in this study. On arrival, they were placed in individual cages containing wood shavings as bedding material and were fed with commercial diet and water *ad libitum*.

Female rats used as mating stimuli were later brought to heat artificially with single subcutaneous doses of estradiol benzoate (10 µg) and progesterone (500 µg), 48 and 4 hr before testing, respectively. It was shown that estradiol benzoate induced a specific urge to seek contact with a sexual active male in the ovariectomized rat (Meyerson and Lindstrom, 1971, 1973).

Copulatory behaviour test

During the study, test compounds were given daily by gavage for 12 consecutive weeks and animals were observed for copulatory behaviour for the above duration.

Each male rat in the respective groups received 0.5 g/kg of one of the test *E. longifolia* whilst the control groups received 3 ml/kg of saline. Vehicles used were propylene glycol for the chloroform fraction and distilled water for the other fractions.

Test apparatus

Tests were performed in the middle aged male rats with an electrical copulation cage during the dark phase of the light-dark cycle (2000–0700 hr) and in subdued light. An electric grid, maintained at 0.10 mA was used as an obstruction in the electrical copulation cage in order to determine how much an aversive negative stimulus (crossing an electric grid) the male rat was willing to overcome to reach the estrous receptive female in the goal cage. 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 was then crossed the electric grid to the goal cage which housed either an estrous receptive female, sexually vigorous male or no rat, a measurement of right, wrong or no choice respectively. The time spent before the sexually naive male rat crossed the electric grid is hesitation time. However, the contact between the male rat and the caged animals was restricted by a wire mesh screen preventing direct sexual intercourse. The intensity of the grid current was maintained at 0.10 mA and this was the intensity in which male rats in the control group failed to crossover to reach the goal cage.

Unless stated otherwise, all copulation tests lasted for 30 min, prior to 20 min adaptation and this was observed daily until 12 consecutive weeks.

Statistical analysis

The mean values for the hesitation time of the treated and the control groups were statistically analysed by analysis of variance (ANOVA) 2-way layout completely randomised design followed by ANOVA 1-way layout completely randomised design and subsequently, Duncan's multiple test at 0.05 significant level (Scheffler, 1984).

■ Results and Discussion

Table 1 shows the effects of different fractions of *E. longifolia* Jack and normal saline on hesitation time of the male rats until 12 weeks post-treatment using the electrical copulation cage. Results showed that *E. longifolia* Jack enhanced the sexual qualities of the middle aged male rats by decreasing their hesitation time as compared to controls with various fractions of *E. longifolia* Jack produced 865–916, 860–914,

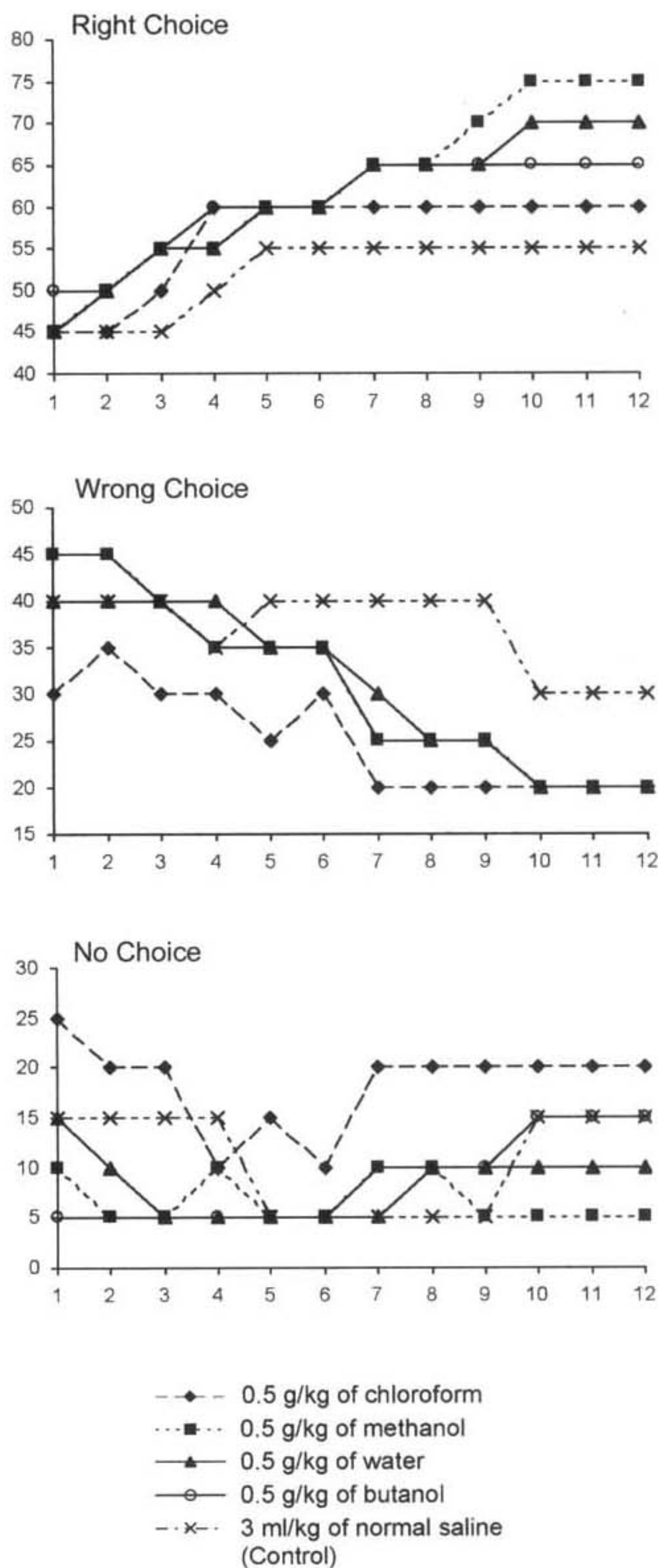


Fig. 1. Effects of different fractions of *E. longifolia* Jack and normal saline in middle aged male rats ($n_{\text{each group}} = 20$) until 12 weeks post-treatment. Results were expressed as mean \pm standard deviation ($n_{\text{each group}} = 20$) and were significantly different ($p < 0.05$) when compared with the controls of the same group.

Table 1. Effect of different fractions of *E. longifolia* Jack and normal saline on hesitation time of the middle aged male rats until 12 weeks post-treatment using the electrical copulation cage.

	Time (week post-treatment)											
	1	2	3	4	5	6	7	8	9	10	11	12
*chloroform	916 \pm 44	914 \pm 40	904 \pm 45	890 \pm 13	880 \pm 31	875 \pm 36	870 \pm 36	860 \pm 31	850 \pm 36	840 \pm 45	780 \pm 22	750 \pm 22
*methanol	902 \pm 54	890 \pm 54	885 \pm 67	880 \pm 45	875 \pm 45	870 \pm 31	860 \pm 36	855 \pm 40	840 \pm 40	814 \pm 45	750 \pm 36	730 \pm 36
*water	870 \pm 31	860 \pm 36	858 \pm 45	854 \pm 40	850 \pm 45	844 \pm 49	840 \pm 54	838 \pm 67	835 \pm 40	800 \pm 45	795 \pm 36	650 \pm 54
*butanol	865 \pm 45	862 \pm 22	850 \pm 27	856 \pm 36	844 \pm 40	840 \pm 40	830 \pm 36	825 \pm 36	820 \pm 36	808 \pm 40	790 \pm 31	754 \pm 36
*control	950 \pm 36	934 \pm 31	910 \pm 36	900 \pm 40	895 \pm 36	890 \pm 36	885 \pm 36	880 \pm 27	855 \pm 27	860 \pm 18	800 \pm 36	790 \pm 27

*Fractions were obtained from *E. longifolia* Jack. Results were presented as mean \pm standard deviation ($n_{\text{each group}} = 20$) and were significantly different ($p < 0.05$) when compared with the controls of the same group.

850–904, 854–890, 844–880, 840–875, 830–870, 825–860, 820–850, 800–840, 750–795 and 650–754 sec in contrast to controls which produced 950, 934, 910, 900, 895, 890, 885, 880, 855, 860, 800 and 790 sec throughout the investigation period.

In addition, Fig. 1 also shows that there was a transient increase in the % of the female rats responding to the right choice after chronic administration of 0.5 g/kg *E. longifolia* Jack, with more than 50% of the male rats scored right choice after 2 weeks post-treatment for methanol, water and butanol fractions but after 3 weeks post-treatment for chloroform fraction. Furthermore, more than 65% of the male rats scored right choice after 9 and 10 weeks post-treatment for methanol and water fractions respectively using the electrical copulation cage. However, there was no sexual enhancement of the middle aged male rats which consumed normal saline since only 45–55% of the male rats responded to right choice throughout the investigation period.

Generally, these results showed that there was not much difference on the sexual qualities exhibited by the various fractions of *E. longifolia* Jack and this may be attributed to the presence of active constituents in more than one fraction.

In conclusion, this study shows that *E. longifolia* Jack enhanced the sexual qualities of the middle aged male rats, and as such, further studies should be conducted to determine if this plant has the above property in middle aged men.

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