Arch. Pharm. Res. Vol.20, No.6, pp. 656-658, 1997 Note

Effects of *Eurycoma longifolia* Jack on Sexual Behaviour of Male Rats

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(Received November 22, 1997)

The effects of *Eurycoma longifolia* Jack were studied on the sexual behaviour of male rats. Sexually normal male rats were treated twice daily with 500 mg kg^{-1} of different fractions of *E. longifolia* Jack for 10 days prior to test and were then observed for their copulatory behaviour with a receptive female in a copulation cage. Results showed that was a significant increase ($p<0.05$) in EL-1, EL-2, EL-3 but significant decrease ($p<0.05$) in both PEI-1 and PEI-2 in treated male rats as compared to the control male rats indicating that *E. longifolia* Jack increased the sexual performance of the treated male rats by extending the duration of coitus and decreasing the refractory period between the different series of copulation. Hence, this preliminary work supports the folk use of this plant as having aphrodisiac property.

Key words : *Eurycoma longifolia* Jack, Simaroubaceace, Sexual behaviour, Mounting, Intromission, Ejaculation

INTRODUCTION

Eurycoma longifolia Jack, from the Simaroubaceae family and identified locally as 'Tongkat Ali', has gained notoriety as male aphrodisiac since it increases male prowess (Gimlette and Thomson, 1977). But, however, this claim is largely based on subjective opinion rather than scientific verification. This plant has been shown to exhibit antimalarial (Chan *et al.*, 1986, 1989; Kardono *et al.*, 1991; Ang *et al.*, 1995, 1995a), cytotoxic (Kardono *et al.*, 1991; Morita *et al.*, 1990, 1993; Itokawa *et al.*, 1992, 1993), antiulcer (Tada *et al.*, 1991) and antipyretic (Chan *et al.*, 1995) activities.

In this paper, we investigated the effects of *E. longifolia* Jack on sexual behaviour of male rats in a copulation cage after treating them with *E. longifolia* Jack for 10 days with different fractions of *E. longifolia* Jack.

MATERIALS AND METHODS

Animals and surgery

Adult male and female Sprague-Dawley rats, weighing 300 and 250 g, respectively, were used as experimental subjects. They were housed individually in a standard wire-mesh cage in animal house under standard conditions with *ad libitum* access to food and water.

The female rats were bilaterally ovariectomized via lumbar incisions under phenobarbitone anaesthesia approximately 1 month prior to testing. They were later brought on heat artificially with a single subcutaneous dose of 10 μg estradiol benzoate (Sigma Chemical, USA) and 500 μg 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 showed by testing the lordotic reflex in response to manual stimulation of the vaginal region and the vaginal smear. In addition, they were further tested with non-experimental male rats to further ensure receptivity before testing.

Test compounds

The milled roots of *E. longifolia* Jack were extracted to yield chloroform (yield: 0.1% w/w), methanol (yield: 3% w/w), water (yield: 0.5% w/w) and *n*-butanol (yield: 0.45% w/w) fractions following the method previously described (Chan *et al.*, 1986). Test compounds were given twice daily at 0800 and 1600 hours with an appropriate oral needle for 10 days prior to test. Each male rat in the respective groups received 500 mg kg^{-1} of one of the following fractions:- chloroform, meth-

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anol, water and *n*-butanol whilst the control group received 3 mL kg^{-1} of saline. Vehicles used were propylene glycol and distilled water for chloroform and non-chloroform fractions respectively.

Sexual behaviour test

All male rats were given at least 10 screening tests for masculine sexual behaviour activity prior to each test. Testing was performed in a copulation cage (Mendelson and Gorzalka, 1987) during the dark phase of the light-dark cycle (2000-0700 hours) and in subdued light. Unless stated otherwise, all tests lasted for 30 minutes after a 20-min adaptation period.

The normal copulatory behaviour of the male rats consists of bouts or series of mounts (without intromission) and vaginal intromissions, with each complete series terminated by an ejaculation (Sachs, 1970).

The following measures of copulatory behaviour were recorded: mount latency [(ML): -the period from the introduction of the female to the first mount], intromission latency [(IL): -the period until the first intromission], ejaculation latency [(EL): -the period from the first intromission of a series until the ejaculation which terminates the series], postejaculatory interval [(PEI): -the time from the occurence of ejaculation until the initiation of a new series, as indicated by the next intromission], inter-intromission interval [(III): -ejaculation latency/number of intromissions], mean inter-intromission interval [(MIII): -the mean interval separating the intromissions of a series including the interval between the last intromission and ejaculation]. Individual series are designated by a hyphen and the appropriate number, ex. EL-3.

Copulation tests were terminated when one of the three conditions was fulfilled: no intromission within 30 minutes from the start of the test, no ejaculation within 30 minutes of the first intromission or no intromission within 15 minutes after ejaculation.

Statistical Analysis

The values of the observed parameters of the treated and control groups were statistically analysed using 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 (Schefler *et al.*, 1984).

RESULTS AND DISCUSION

Tables I and II show copulatory behaviour of both treated and control male rats on receptive females. Table I shows that the mean values of EL-1, EL-2 and EL-3 of control male rats were 192.80 sec, 167.60 sec and 162.50 sec but were significantly ($p<0.05$) increased to 249.00~292.60 sec, 242.60~364.40 sec and 210.50~262.00 sec respectively in the chloroform-methanol, methanol-butanol-water and butanol-methanol treated male rats. The increase in EL-1, EL-2 and EL-3 shows that *E. longifolia* Jack increases the sexual performance of the male rats by extending the duration of coitus (Beach and Whalen, 1959, Ferrari *et al.*, 1985).

Besides this, Table II also indicates that PEI-1 and PEI-2 of the control group were 139.60 sec and 215.

Table I. Effects of *E. longifolia* Jack (500 mg kg^{-1}, p·o) on Mean Latency of Copulatory Behaviour in Male Rats

Mean Latency±S.E.M (Sec)					
	ML	IL	EL-1	EL-2	EL-3
Normal Saline (Control)	70.00±5.66[a]	70.00±5.66[b]	192.80±5.60	167.60±9.72	162.50±4.92
Chloroform	234.00±9.04	234.00±9.04	249.00±3.67	56.20±2.00	94.00±4.12[c]
Methanol	191.00±3.24	191.00±3.24	292.60±3.60	242.60±2.06	262.00±8.50
Water	47.80±1.99	47.80±1.99	60.00±1.90	364.40±9.52	92.80±9.57[c]
Butanol	68.61±3.73[a]	68.61±3.73[b]	82.00±7.55	255.80±1.02	210.50±2.45

$n_{each\ group}$=20; ML=mount latency, IL=intromission latency, EL=ejaculation latency; NS $p>0.05$ for [a,b and c] on ML, IL and EL-3 respectively; S $p<0.05$ for comparisons of all test compounds on each parameter.

Table II. Effects of *E. longifolia* Jack (500 mg/kg, p·o) on Mean Interval of Copulatory Behaviour in Male Rats

Mean Interval±S.E.M (Sec)								
	PEI-1	PEI-2	III-1	III-2	III-3	MIII-1	MIII-2	MIII-3
Normal Saline (Control)	139.60±8.44	215.00±9.23	58.18±4.23	87.83±9.21	51.88±2.16	75.27±6.11	122.42±5.20	44.56±3.32
Chloroform	56.20±2.04	244.00±4.23	72.61±3.38	9.05±3.52	35.39±2.52	119.97±1.50	39.79±1.65	165.88±1.91
Methanol	61.20±4.63	121.67±8.50	54.25±9.77	46.76±2.75	58.24±3.19[e]	85.74±4.45	63.81±3.66[f]	64.94±6.87[g]
Water	72.00±4.35[d]	287.60±5.87	38.85±3.92	52.33±4.58	57.01±2.96[e]	79.80±5.96	61.20±4.73[f]	66.96±6.36[g]
Butanol	73.80±9.75[d]	20.00±4.54	23.89±7.52	27.93±3.88	77.92±4.56	68.53±2.73	46.30±5.79	80.70±3.49

$n_{each\ group}$=20; PEI=postejaculatory interval, III=interintromission interval, MIII=mean interintromission interval; NS $p>0.05$ for [d,e,f and g] on PEI-1, III-3, MIII-2 and MIII-3 respectively; S $p<0.05$ for comparisons of all test compounds on each parameter.

00 sec but were significantly ($p<0.05$) decreased to 56.20~73.80 sec and 20.00~121.67 sec respectively in the chloroform-methanol-water-butanol and butanol-methanol treated male rats. The increase in EL-1, EL-2, EL-3 and a decrease in both PEI-1 and PEI-2 show that *E. longifolia* Jack intensifies the sexual activity of the male rats in a sustained manner by decreasing the refractory period between the different series of copulation. The differences in the activity of each fraction may be attributed to the presence of different chemical constituents in each fraction of *E. longifolia* Jack.

In general, this study showed that various fractions of *E. longifolia* Jack speed up arousal and increase sexual activity of the male rats to a moderate extent but only sustains it for a longer time as shown by the increase in ejaculation latecy and decrease in postejaculation interval. However, it failed to determine which fraction of *E. longifolia* Jack is the most superior. Nevertheless, this work lends further support to the use of *E. longifolia* Jack by the indigenous population as a traditional medicine for aphrodisiac property.

ACKNOWLEDGEMENTS

One of the authors, H. H. Ang wishes to express her gratitude to Malaysian Toray Science Foundation and Toray Industries Inc., Japan for the financial support, Association of the Southeast Asian Institute of Higher Learning for the Exchange of Scientists Fellowship Scheme Award and to University of Science Malaysia for her research leave at the National University of Singapore.

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