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Eurycoma longifolia aqueous extract increases sexual activities in male and female rats

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In order to elucidate the mechanism of action of *E. longifolia* aqueous extract which has been reported to evince aphrodisiac properties, *in vivo* studies using male and female rats were carried out. Male and female Spraque Dawley rats were given various concentrations of aqueous extract of *E. longifolia* (0, 30, 60, 90, 150 mg/kg) orally for 7 days. The sexual behaviour of both male and female rats were evaluated by conducting the sexual attraction test. The results showed that the aqueous extract of *E. longifolia* significantly increased sexual behavior in male and female rats ($P<0.05$). In order to determine the mechanism of action of *E. longifolia*, the effect of this extract on testosterone and dihydrotestosterone (DHT) were monitored. In female rats, the estrogen and progesterone levels were also assessed. Results showed that the testosterone levels in male rats increased with treatment duration and was greatly augmented (4.0 ± 1.6 ng/ml) on day 7 at 90mg/kg BW of *E. longifolia* extract. At the highest concentration (150 mg/kg BW) used in this experiment, testosterone levels subsided. DHT levels in male rats increased slowly from day 3 onwards at 30mg/kg BW. The highest level of DHT was 1380 ± 15.0pg/ml BW on day 7. In female rats, testosterone levels also increased but 'slogged off' with days of treatment. Nevertheless, DHT levels increased on days 6 and 7 in a concentration dependent manner. There is significant increase in progesterone levels in female rats ($P<0.05$). *E. longifolia* extract increased the levels of estradiol in the early days of treatment . Then, the estradiol levels 'slogged off' with treatment duration. On days 6 and 7, estradiol levels equalled to that of control. Nitric oxide (NO) which is a neurotransmitter in penile erection was assessed in this studies by measuring the rate limiting enzyme nitric oxide synthase (NOS). Neuronal NOS (nNOS) in male and female brain increased with *E. Longifolia* concentration. However, in male rats, the expression of brain nNOS were higher (700%) than female rats (640%). nNOS and endothelial NOS (eNOS) in penis were also measured. Penile nNOS increased with increasing concentration of aqueous extract of *E. longifolia* and treatment duration. Levels of penile nNOS enhanced on day 3 until day 7 which is about 833.3% increase compared to controls at 150mg/kg BW. eNOS also increased with increasing concentration of aqueous extract of *E. longifolia* and treatment duration. The percentage increase of eNOS expression was 680% on day 7 at 150mg/kg BW of *E. longifolia* extract. Phosphodiesterase 3 (PDE3), phosphodiesterase 4 (PDE4) and phosphodiesterase 5 (PDE5) which occur in penis are also responsible for the erection process. The effect of the aqueous extract of *E. longifolia* on these PDEs were assessed to see whether this extract inhibited these enzymes or not. Results showed that this extract inhibited all three isoforms of PDE with increasing concentration and duration of treatment. Statistically, there is significant inhibition of PDE expression ($P<0.05$); 89.2% inhibition of PDE3, 84.3% of PDE4 and 88.3% of PDE5 at concentration 150mg/kg BW *E. longifolia* extract following a 7 day treatment duration.. Thus, the aqueous extract of *E. longifolia* acts specifically on sex hormones testosterone and DHT; NO and PDE in an effort to enhance sexual performance and increase libido. Hence, these findings may explain the profound erectogenic effect of *E. longifolia* extract in *in vivo* models.