CSIRO PUBLISHING
The Royal New Zealand College of General Practitioners
Te Whare Tohu Rata o Aotearoa
CHARMS AND HARMS
https://doi.org/10.1071/HC22143
Journal of Primary Health Care

Tongkat Ali/Long Jack

E Lyn Lee[A] and Joanne Barnes[A,*]

For full list of author affiliations and declarations see end of paper

*Correspondence to:
Jo Barnes
School of Pharmacy, University of Auckland, New Zealand
Email: j.barnes@auckland.ac.nz

Received: 23 November 2022
Accepted: 23 November 2022
Published: 8 December 2022

Cite this:
Lee EL and Barnes J
Journal of Primary Health Care 2022; **14**(4): 380–382.
doi:10.1071/HC22143

Tongkat Ali (*Eurycoma longifolia* Jack; Simaroubaceae) is native to Southeast Asian countries, such as Malaysia, Indonesia, and Vietnam, and is also found in some areas of Cambodia, Myanmar, Laos and Thailand. The plant is a tall, slender, shrubby tree; the leaves are pinnate, and the flowers are tiny and reddish. It is used in traditional medicine for its aphrodisiac effects and for treating malaria. Most parts of the plant, and root extracts in particular, have a history of human consumption and use for various health reasons. Decoctions of *Eurycoma longifolia* leaves have been used for washing itches, while the rootbark is used traditionally to treat diarrhoea and fever. Root extracts are used for sexual dysfunction, syphilis, glandular swelling, malaria, fever, aches, exercise recovery, increased energy, increased strength, ageing, cancer, diabetes, leukaemia, osteoporosis, stress, and anxiety; additionally, root extracts are used as an aphrodisiac, antibiotic, appetite stimulant and health supplement. Traditionally, tongkat ali is used by men; however, it is also reputed to have aphrodisiac properties in females.

Approximately 21 000 kg of *Eurycoma longifolia* is harvested each year, and there is substantial demand for the raw material, giving rise to the potential for financially motivated adulteration of raw material and manufactured products. For example, due to tongkat ali's reputation for effects on libido, intentional product adulteration with phosphodiesterase-5 inhibitors (tadalafil, sildenafil, vardenafil) has been reported.

Common names

Tongkat ali, tongkat baginda, setunjang bumi, penawar pahit, [*Malay*]; long jack, Malaysian ginseng, eurycoma root [*English*] and many others. N.B. the name tongkat ali is also sometimes used to refer to *Smilax myosotiflora* A.DC. [Smilacaceae] and *Polyalthia bullata* King [Annonaceae], which are entirely different species. Accidental botanical substitution with plant species with similar common names has occurred.

Summary message

Evidence from preclinical studies of tongkat ali and/or its major constituents supports male fertility enhancement, ergogenic, anti-malarial, anti-proliferative, antimicrobial, anti-inflammatory, anti-anxiety, anti-diabetic, and osteoporosis preventive effects. Clinical research with tongkat ali has focussed on male fertility enhancement, ergogenic (performance-enhancing) effects and reducing stress, but, at present, there is no definitive evidence for efficacy in these conditions: few clinical trials have been published, and many existing studies have methodological limitations. Most clinical trials and reviews have involved a specific tongkat ali product, although it is unclear if the products tested across studies were identical. Large, robust, long-term studies using well-defined extracts of *Eurycoma longifolia* that meet accepted standards for pharmaceutical quality are required. At present, tongkat ali has not been associated with serious adverse effects when used at usual doses for limited periods, but, in general, pharmacovigilance for herbal medicines is limited. Reported side effects of tongkat ali include insomnia, anxiety and restlessness. Caution is advised with concomitant use of tongkat ali and propranolol. A recent review by the EFSA raised concerns about the potential for tongkat ali to induce DNA damage. Comprehensive investigation of the clinical safety profile of tongkat ali, its constituents, and contemporary products, including when used in a pharmaceutical/medicinal context, is required.

Preparations

Traditional preparations of *Eurycoma longifolia* root typically comprised water decoctions. Contemporary preparations in the global market usually consist of preparations of crude root powder, or are solid dose forms (typically capsules), formulated as single- and multi-ingredient products with other herbal and non-herbal ingredients. In New Zealand, tongkat ali is available as capsules, liquid extracts and powders.

Manufacturers' claims

Tongkat ali products are promoted/marketed to support general health/vitality, sexual drive in men, healthy energy levels, and healthy blood circulation, among other claims.

Active constituents

The important bioactive compounds of tongkat ali include quassinoids, canthin-6-one alkaloids, β-carboline alkaloids, and bioactive steroids, among others; the quassinoid compounds make up a substantial proportion of the constituents of *Eurycoma longifolia* root.

Evidence for efficacy

Preclinical studies have provided some evidence for male fertility enhancement, anti-malarial, cytotoxic and anti-proliferative, antimicrobial, anti-inflammatory, anti-anxiety, anti-diabetic, and osteoporosis preventive effects of *Eurycoma longifolia.*

Clinical research with tongkat ali preparations has focussed on male fertility enhancement, ergogenic (performance-enhancing) effects and reducing stress, but, at present, there is no definitive evidence for efficacy in these conditions.

A meta-analysis included two randomised controlled trials of tongkat ali extracts for 12 weeks on erectile function improvement in 139 healthy men aged 30–65 years. The two trials used two different proprietary freeze-dried water extracts of *Eurycoma longifolia* root: a single herb daily dose of 300 mg and a multi-herb product (200 mg tongkat ali + 100 mg *Polygonum minus* (synonym for *Persicaria minor* (Huds.) Opiz) daily). At baseline, patients' International Index of Erectile Function (IIEF-5) scores were 12.36–15.77 in one study and 21.30–22.29 in the other (IIEF-5 scores of <21 indicate erectile dysfunction), but the trials did not specify a medical diagnosis of erectile dysfunction as an inclusion criteria. The meta-analysis found no significant effect of tongkat ali on erectile dysfunction; subgroup analysis suggests that patients with more severe erectile dysfunction may benefit from tongkat ali, but confirmation is needed in further well-designed clinical trials. Both trials were rated by reviewers as prone to a high risk of bias because there was selective reporting of outcomes, and the amount of active ingredients or quality assurance of the tongkat ali preparation was not reported. An open study investigated the effects of tongkat ali on sperm parameters in 350 men with idiopathic male infertility who consumed 200 mg of a proprietary water-soluble extract of *Eurycoma longifolia* Jack root daily for 9 months. Some significant improvements in sperm concentration and normal sperm morphology were reported, compared with baseline data, but the findings of this study are limited by the lack of randomisation, control and blinding.

Randomised, placebo-controlled trials have explored the effects of *Eurycoma longifolia* root in adults experiencing moderate levels of stress, but provide very limited evidence of efficacy. In one study, 63 participants received a standardised water extract of *Eurycoma longifolia* root 200 mg/day or placebo for 4 weeks. Mood state parameters showed mixed results: there was no difference in depression, vigour, and fatigue between groups, whereas tension, anger and confusion significantly improved in the tongkat ali group, compared with placebo. In another study, a proprietary water extract of *Eurycoma longifolia* root 50 mg plus multivitamins daily for 24 weeks did not significantly improve total mood disturbance, tension, depression, anger, fatigue, confusion and vigour, compared with placebo.

Two small randomised, placebo-controlled trials have evaluated the ergogenic effects of tongkat ali in athletes. One study involved young cyclists who used a herbal drink containing *Eurycoma longifolia* and *Cinnamomum cassia*, while the other study involved recreational athletes taking *Eurycoma longifolia* capsules 150 mg/day for 7 days. In both studies, no significant effect on endurance cycling time and running capacity was reported, respectively. Resistance training with tongkat ali (200 mg/day for 8 weeks) supplementation in young males significantly improved lower limb power within the group post-intervention, but the difference between groups (compared to resistance training alone) was not reported. All three studies involved very small numbers of participants, were conducted in one country (Malaysia), and provided only brief details of the tongkat ali extract used. Larger trials are required involving patients sampled from other population groups; studies should report comprehensive descriptions of tongkat ali extracts used, including whether the product meets accepted standards for pharmaceutical quality.

Adverse effects

Secondary sources report that adverse effects associated with tongkat ali include insomnia, anxiety and restlessness. At present, there are no known safety concerns with tongkat

ali (*Eurycoma longifolia*) when consumed in usual quantities. However, a comprehensive investigation of the clinical safety profile of tongkat ali, its constituents, and contemporary products, including where used in a pharmaceutical/medicinal context, is required.

In 2021, the European Food Safety Authority (EFSA) reviewed the safety of a standardised water extract prepared from dried ground root chips of *Eurycoma longifolia* Jack as a novel food supplement in quantities up to 200 mg/day. The panel concluded that tongkat ali has the potential to induce DNA damage and that its safety has not been established under any condition of use.

Due to insufficient safety data, use of tongkat ali in children and pregnant and breastfeeding women should be avoided.

Interactions

Caution is advised with respect to use of tongkat ali in individuals taking propranolol on the basis of a study involving healthy males who took a water-based extract of *Eurycoma longifolia* and in whom bioavailability of propranolol decreased. According to secondary sources, tongkat ali should be used cautiously in patients using hypoglycaemic agents, those with weakened immune systems, and men with breast cancer, prostate cancer, heart disease, kidney disease, liver disease or sleep apnoea. *E. longifolia* inhibits certain cytochrome P450 drug-metabolising enzymes (CYP1A2, CYP2A6, CYP2C19) *in vitro*. The clinical significance of this for patients taking tongkat ali with conventional drugs that are metabolised by these CYP enzymes is not yet known.

Key references

1 Rehman SU, Choe K, Yoo HH. Review on a traditional herbal medicine, *Eurycoma longifolia* Jack (Tongkat Ali): its traditional uses, chemistry, evidence-based pharmacology and toxicology. *Molecules*. 2016; 21(3): 331. doi:10.3390/molecules21030331

2 Ulbricht C, Conquer J, Flanagan K, *et al.* An evidence-based systematic review of tongkat ali (*Eurycoma longifolia*) by the Natural Standard Research Collaboration. *J Diet Suppl* 2013; 10(1): 54–83. doi:10.3109/19390211.2012.761467

3 Kotirum S, Ismail SB, Chaiyakunapruk N. Efficacy of Tongkat Ali (*Eurycoma longifolia*) on erectile function improvement: systematic review and meta-analysis of randomized controlled trials. *Complement Ther Med* 2015; 23(5): 693–8. doi:10.1016/j.ctim.2015.07.009 [Epub 31 July 2015. PMID: 26365449]

4 EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA) Turck D, Bohn T, *et al.* Safety of *Eurycoma longifolia* (Tongkat Ali) root extract as a novel food pursuant to Regulation (EU) 2015/2283. *EFSA J* 2021; 19(12): e06937. doi:10.2903/j.efsa.2021.6937 [PMID: 34987621; PMCID: PMC8693240]

Data availability. Data sharing is not applicable as no new data were generated or analysed for this article.

Conflicts of interest. J. B. is a co-author/co-editor of books on scientific aspects of herbal medicines and receives/has received royalties from Pharmaceutical Press, Elsevier, and SpringerNature/MacMillan Education. The authors declare no other conflicts of interest.

Declaration of funding. This research did not receive any specific funding.

Author affiliation
[A]School of Pharmacy, University of Auckland, New Zealand.