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File: ■ Tongkat Ali (*Eurycoma longifolia*)
■ Androgen Deficiency
■ Male Osteoporosis

HC 091267-465

Date: January 31, 2013

RE: Tongkat Ali – A Potent Complementary Treatment for Male Osteoporosis

Mohd Effendy N, Mohamed N, Muhammad N, Naina Mohamad I, Shuid AN. *Eurycoma longifolia*: medicinal plant in the prevention and treatment of male osteoporosis due to androgen deficiency. *Evid Based Complement Alternat Med*. July 15, 2012;2012:125761. doi: 10.1155/2012/125761.

This review focuses on the traditional Malaysian plant tongkat ali (*Eurycoma longifolia*) and its safety and efficacy in potentially treating male osteoporosis. Tongkat ali, a member of the Simaroubaceae family, has been used traditionally for male sexual problems. The dried root is typically ground and sold as powder or extracted for a component in drinks. Oral delivery may avoid toxic effects observed with other forms of administration. The compounds eurycomanone, eurycomanol, eurycomalactone, as well as phenolics, tannins, quassinoids, and triterpenes have been isolated from tongkat ali. Although the root has been shown to have a variety of bioactivity including antimalarial and antitumor activities, a well-known use is as an aphrodisiac. It is thought that this may translate to the use of tongkat ali for the treatment of male osteoporosis caused by testosterone deficiency.

Osteoporosis is a serious condition that involves a decrease in bone mass, degeneration of bone tissue, and ultimately, fractures. Bone formation and resorption naturally cycles; however, the process of bone formation and "replacement" is longer than that of resorption. This can lead to declining bone mass if the cycle is sped up by factors such as low hormone levels. Osteoporosis can be the result of hypogonadism (low levels of male sex hormones), alcohol use, arthritis, or a family history.

Typical treatments include testosterone replacement therapy (TRT) or bisphosphonates. Both treatments have drawbacks such as expense or bothersome adverse side effects such as prostate cancer, liver damage, marrow fibrosis, and headaches, among others. It is suggested that other treatments are necessary that may be more affordable, safe, and efficacious.

Previous studies have shown that tongkat ali may be effective in osteoporosis treatment and prevention. For example, a study reported that male rats with surgically removed

testes did not lose calcium, a mineral integral to bone cycling. Additional rat studies showed heightened testosterone levels and more sexual performance after supplementation with tongkat ali. Elevated serum testosterone concentrations were also measured in a clinical study after consumption of the plant. Polypeptides are thought to be responsible for the bioactivity reported and have been shown to modulate androgens. One suggested mechanism behind this is the indirect stimulation of testosterone, and thus bone formation.

In addition, nitric oxide (NO), found in tongkat ali, is a regulator of bone formation and resorption, among other modulatory properties. It is suggested that tongkat ali may impact bone cycling indirectly via NO content or production through other mechanisms. Also, as reactive oxygen species (ROS) and resulting oxidative stress may cause apoptosis or other cellular damage in bone-forming cells, it has been reported that tongkat ali may alleviate this via the antioxidants superoxide dismutase (SOD), alkaloids, or triterpenes.

In regards to safety in mice and rats, the Lethal Dose 50% (LD₅₀) of the alcoholic extract of tongkat ali was found to be between 1500 mg/kg and 2000 mg/kg, and the LD₅₀ of the water extract was reported to be between 3000 mg/kg and 5000 mg/kg. Using a formula to convert these numbers to human dosages, the LD₅₀ in human males is 810 mg/kg. The normal dosage is between 200 mg/day and 400 mg/day for men. Liver damage has been reported in rats consuming dosages of 1200 mg/kg and 2400 mg/kg, while a clinical study did not observe any toxicity at 600 mg/kg.

In summary, the bioactivity associated with tongkat ali may be due to a variety of mechanisms, and more research is needed on the potential safety and efficacy of this plant in treating male osteoporosis.

—Amy C. Keller, PhD

Referenced article can be found at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3403331/pdf/ECAM2012-125761.pdf>.

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