Effects of *Eurycoma longifolia* Jack Supplementation on Recreational Athletes’ Endurance Running Capacity and Physiological Responses in the Heat

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This study investigated the effects of supplementation of the nutraceutical product *Eurycoma longifolia* Jack on recreational athletes’ endurance running capacity and physiological responses in the heat. Twelve Malaysian healthy male recreational athletes (Age: 23.3 (3.7) years old; VO$_{2\max}$: 45.1 (8.1) ml.kg$^{-1}$.min$^{-1}$) were recruited in this double blind, placebo-controlled, cross-over study. Subjects completed two endurance running trials in the heat (31°C, 70% relative humidity), performed on separate days, after consuming either 2 capsules of *Eurycoma longifolia* Jack (75 mg per capsule) or a placebo per day for 7 days before and one hour prior to the experimental trial. On trial day, after 5 minutes of warm-up at 50 % VO$_{2\max}$, the subjects were requested to run on the treadmill at 60 % VO$_{2\max}$ for 60 minutes. This was immediately followed by a 20-minute time trial for determining endurance running capacity. Blood samples were taken before warm up, after warm-up, and every 20 minutes during the trial. Statistical analysis was performed using one-way ANOVA with repeated measures. Results showed that the endurance running capacity of *E. longifolia* was not significantly different from that of the placebo trial. Similarly, oxygen uptake, heart rate, skin temperature, tympanic temperature, ratings of perceived exertion, haemoglobin concentration, haematocrit level, plasma glucose concentration, and plasma free fatty acid concentration were not significantly different between the trials. These findings suggested that supplementation of the *E. longifolia* product at a dosage of 150 mg.day$^{-1}$ for 7 days has not provided beneficial effects on endurance running capacity and physiological responses of recreational athletes in the heat. Higher dosage and longer duration of supplementation of the product may be warranted to evaluate further its endurance capacity during exercise.

**key words:** Ergogenic aids, *Eurycoma longifolia* Jack, endurance running capacity

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Introduction

Exercise capacity has been impaired in the heat as reported by many studies previously (Nadel, 1980; Galloway & Maughan, 1997; Chen et al., 2004). This condition could be due to increased core temperature, dehydration, and muscle glycogen depletion (Carter, 2003). Thus, ergogenic aids have been recommended to cope with these problems.

Ergogenic aids are substances or devices that can enhance energy production, use or recovery and provide athletes with a competitive advantage (Ahrendt, 2001). They are also known as external influences that can positively affect physical or mental performance especially by eliminating fatigue symptoms.

To date, herbs or plant products that have been investigated as nutritional ergogenic aids for enhancing endurance capacity are caffeine, ginseng, mahuang, ephedrine and related alkaloids (Bucci, 2000). *Eurycoma longifolia* Jack is one of the most popular herbs found in Malaysia. It is commonly known as ‘Tongkat Ali’ in Malaysia and as ‘Pasak Bumi’ in Indonesia. It is also referred to as ‘Malaysian ginseng’ since it is well-known among various ethnic groups in Malaysia for treating various diseases and enhancing health (Jagananth and Ng, 2000).

*E. longifolia* Jack is a tall, single-stemmed, slender, shrubby, and slow growing tree, and it can be found on the sandy soil (Ang et al., 2002; Husen et al., 2004). It belongs to the Simaroubaceae family and grows wildly in South-east Asian countries, i.e. Malaysia, Indonesia, Thailand, Myanmar, Laos, and Cambodia (Jagananth & Ng, 2000; Ang et al., 2000; Osman et al., 2003). Its active ingredients called quassinoids (Ang et al., 2002) are concentrated in the tap root and reach its reproductive age after five years or more (Husen et al., 2004).

Traditionally, people believe that this herb can be used as an anticoagulant for complications during childbirth, treatment for dysentery (Osman et al., 2003), aphrodisiac (Ang & Sim, 1997; Choudhary & Rahman, 1997; Ang & Sim, 1998a; Ang & Sim, 1998b; Ang et al., 2000; Ang & Cheang, 2001; Ang & Ngai, 2001; Ang et al., 2001; Ang & Lee, 2002a; Ang & Lee, 2002b; Ang et al., 2003a; Ang et al., 2003b; Ang et al., 2004), antimalarial (Chan et al., 1986; Chan et al., 1989; Kardono, 1991; Ang et al., 1995), antibacterial (Farouk & Benafri, 2007), anticancer (Tee et al., 2007), antihyperglycemic (Husen et al., 2004), anxiolytic (antianxiety) (Ang & Cheang, 1999), diarrhea, fever, hypertension, relief of pain in the bone, and its pounded bark has been used to treat wounds, syphilitic sores, and headache