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The effect of *butea superba roxb.*, a Thai traditional medicine, on endogenous steroid levels in males

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Abstract

Butea superba Roxb. (Red Kwao Krua), a herb in the family *Papilionaceas*, has been used as a traditional medicine for the promotion of physical strength. This communication reports the study on the effect of *Butea superba Roxb.* on endogenous steroid profile and LH (luteinizing hormone) from healthy male volunteers. After oral administration of ground *Butea superba Roxb.* root and tuber, twenty-four hour urines were collected and analysed for endogenous steroids by GC/MS. The amount of LH was also determined in the same sample by fluoroimmunoassay. The alteration in serum enzymes indicating liver and kidney functions were studied in order to evaluate the toxicity of this herb. Elevations of several endogenous steroids were observed after short term administration of *Butea superba Roxb.* Among these are androstendione, testosterone, estradiol and estriol. The concentration of the glucocorticosteroids, cortisol and tetrahydrocortisol, were unaffected. Slight increase in urinary LH was observed. No significant change in T/DHT, androsterone/etiocholanolone and T/estradiol ratios were observed. Implications from overall effects of *Butea superba Roxb.* is discussed

Introduction

Natural food supplement derived from plant rich in phytoestrogens have been used as hormone replacement therapy for elderly men (1). Effective uses are in the treatment of menopausal and andropausal symptoms (2). Phytoestrogens were reported to have several effects, such as on the enzymes involved in steroidogenesis, on steroid receptors and on active steroid levels by elevation of sex hormone binding protein (3). *Butea superba Roxb.* (Red

Kwao Krua) is a herb in the family *Papilionaceas*. It has been used for a long time by Thai males as a herbal medicine for the purpose of rejuvenation. It is believed that it provides physical strength and increase male sexual performance. The tuber roots consist of isoflavone, flavonoids, flavonoid glycosides and phytosterols. Unlike White Kwao Krua, Red Kwao Krua does not contain the potent phytoestrogen, miroestrol. The activities of some of these compounds have been reported. *In vitro* studies showed that flavonoids and flavonoid glycosides possess cAMP phosphodiesterase inhibitory activity (4). Moreover, it was found to act as anti-proliferation of MCF-7 cells (breast cancer cell line), indicating anti-estrogenic activity on estrogen receptor cells (ER⁺) (5). *In vivo* studies have shown that *Butea superba Roxb.* produced an increase in sperm counts and sperm motility in male rat (6).

This work aimed to study the effects of *Butea superba Roxb.* on endogenous steroid production and gonadotropin secretion in healthy males in order to understand the mechanism of *Butea superba Roxb.* on steroid biosynthesis after short-term use.

Experimental

This study with human subjects was approved by ethical committee on human rights from the Faculty of Medicine, Ramathibodi Hospital, Mahidol University. Fifteen healthy male volunteers, age between 20 -50 years were recruited. Three tablets/day (540 mg) of *Butea superba Roxb.* or placebo was given to volunteers for 7 day. Twenty-four hour urine samples were collected before, during drug administration and for 2 consecutive days after cessation the drug. Endogenous steroid level, both free and conjugated forms, in urine were determined by GC/MS using screening 4B procedure. Urinary luteinizing hormone (LH) concentration was determined using DELFIA[®] hLH Spec assay which has been calibrated with hLH standard spiked in urine. The endogenous LH level in blank urine (UNC) was determined by standard addition method.

Results

Results indicated that short-term administration of 540 mg/day (7days) of *Butea superba* can elevate LH secretion throughout the treatment and post treatment period (Figure 1). Even after discontinuing the drug for 2 days the LH levels remained elevated.

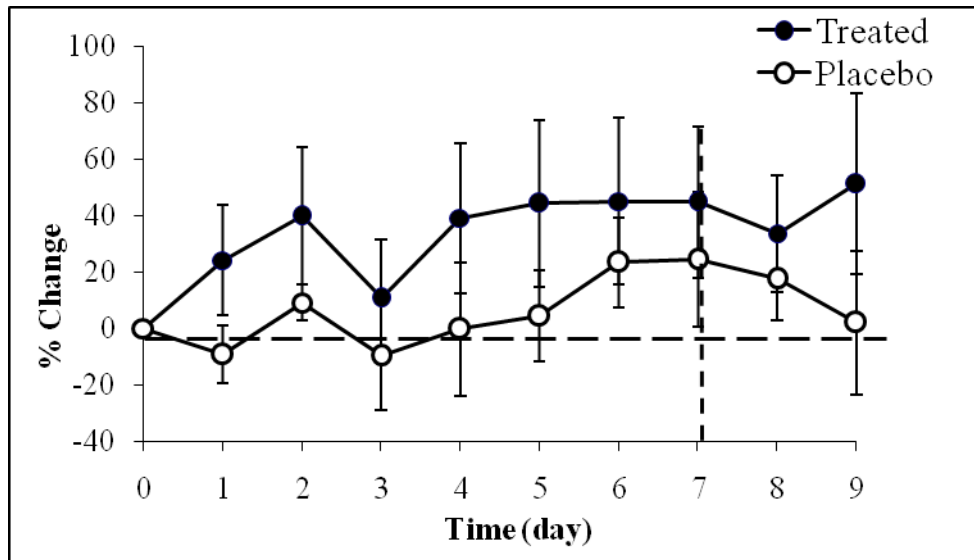


Figure 1. The effect of 7 days oral administration of 540 mg/day *Butea superba Roxb.* on urinary LH levels. Vertical dash-line separate the treatment and post treatment periods; horizontal dash-line indicates the basal level of LH. Data are expressed as mean \pm S.E.M.

Butea superba Roxb. produced an increase in the endogenous steroid as shown in Figure 2a-2b. Their effects on some endogenous steroid ratios are indicated in Figure 3a-3b. From paired T-test analysis, there is significant increase in androstenedione (A_dione) level on the days of drug administration compared to basal level ($p < 0.05$), but testosterone is only slightly increased. Estrogens, estradiol (E_2) and estriol (E_3) levels also show a tendency to increase during *Butea superba Roxb.* administration. The ratios of T/DHT, T/ E_2 , T/ E_3 , Andro/Etio and T/A_dione did not change during and for 2 days after the treatment (Figure 3a, 3b).

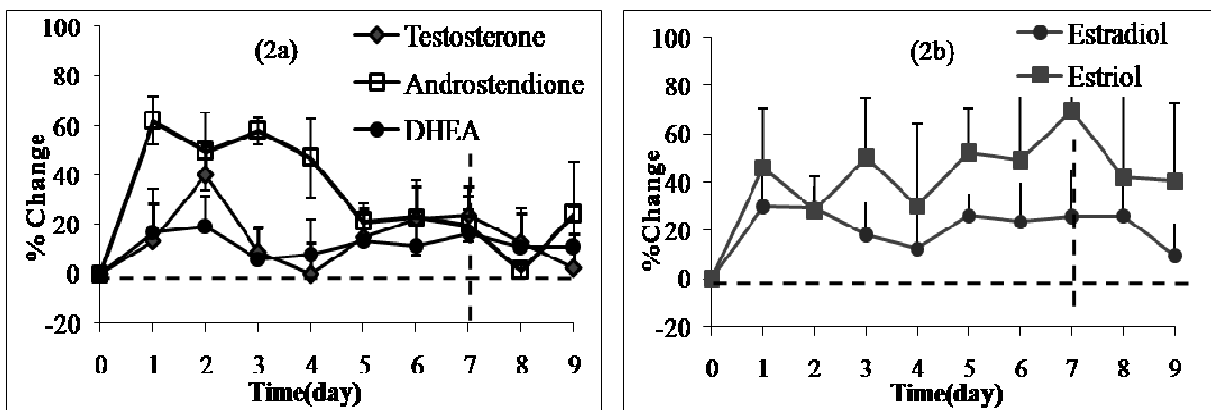


Figure 2. The effect of 7 days oral administration of 540 mg/day *Butea superba Roxb.* on endogenous steroid levels, (a) androgens, (b) estrogens.

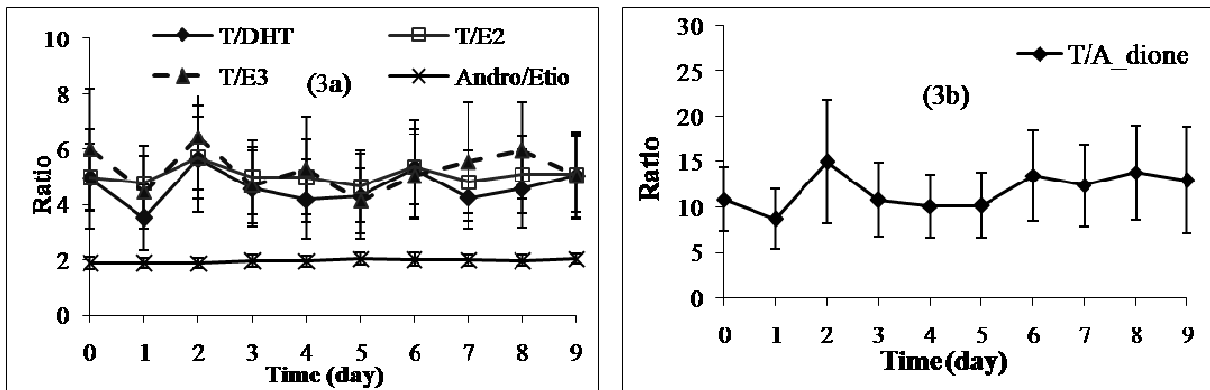


Figure 3. The effect of 7 days oral administration of 540 mg/day *Butea superba Roxb.* on steroid ratio.

Discussion

The selective elevation of some endogenous steroids secretions without any effect on its metabolite ratios after short term oral administration of *Butea superba Roxb.* suggests that *Butea superba Roxb.* may not act directly on certain key enzyme in steroid biosynthesis such as aromatase, 5 α -reductase and 17 β -HSD. The slight but consistent increase in LH levels indicate the role of LH in the activities of *Butea superba Roxb.* It is more likely that *Butea superba Roxb.* may act through gonadol axis by stimulating LH activity with the final result in the elevation of some endogenous steroids in particular those with male hormone activities. Extended study with increasing dose of *Butea superba Roxb.* should be included in further study in order to verify the proposed hypothesis.

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