Thai ginseng

Snapshot Monograph

Thai ginseng (Kaempferia parviflora)
Most Frequent Reported Uses:

- Antioxidant
- Improved physical performance
- Improved mitochondrial biogenesis
- Weight management support
- SIRT-1 upregulation
- Aphrodisiac; male sexual dysfunction
- Insulin signaling; blood glucose support
- Cognitive support
- Neuroprotection
- Antiviral / effective vs. influenzas

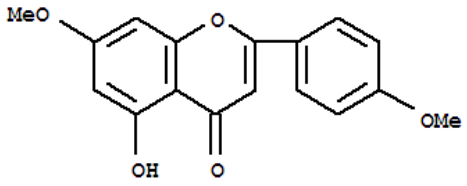
Herb Name(s):
Kaempferia parviflora root/rhizome
Thai ginseng
Black ginger
Krachai dum, Krachai dam

Introduction:
Thai ginseng or Black ginger is a herbaceous plant in the ginger family (*Zingiberaceae*) and is native to Thailand. Traditionally, Krachai dum (*Kaempferia parviflora*) is mainly used as a male tonic – aphrodisiac to improve male sexual function. It is loosely referred to as "Thai Viagra" around SE Asia. Other traditional uses of *Kaempferia parviflora* in Thailand and SE Asia include:

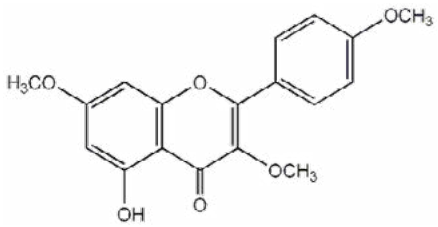
- Management of gastric ulcers
- Improve physical performance and increase vitality
- Anti-malarial
- Weight loss
- Diabetes

Current uses for KP extract include:[1]
- Improved physical performance
- Improved weight loss
- Improved male sexual performance

Major Bioactive Constituents:
The major bioactive constituents found in Kaempferia parviflora (KP) are a group of bioflavonoids (polymethoxyflavonoids), mainly 5,7-dimethoxyflavone, 5,7,4'-trimethoxyflavone and the more recently discovered flavonols, kaempferiaosides A and B.[2,3] Polymethoxyflavonoids such as those found in KP also exist in citrus fruit peels.



5,7-dimethoxyflavone



5-hydroxy-3,7,4'-trimethoxyflavone

Other constituents, the terpenes, including germacene D, β-elemene, α-copaene, and *E*-caryophyllene, are reported to provide adaptogenic properties.[4]

Functions:

- **Aphrodisiac** - *Kaempferia parviflora* (KP) is a traditional remedy used to improve sexual performance.[5] Laboratory animal studies have reported that *KP* improved blood flow, sperm production, and mounting time in rats.[6] The animals treated with KP do not show androgenic activity by altering testosterone levels.[7] A laboratory animal study reported a proposed mechanism for KP's aphrodisiac activity includes improving blood flow to the testes and improving dopamine and serotin levels.[8,9]

- **PDE5 Inhibition** - In laboratory and animal studies, methoxyflavones in KP are reported to have moderate PDE5 inhibition, with 5,7-dimethoxyflavone having the most activity.[10] *Kaempferia parviflora* induces vascular smooth muscle relaxation via endothelial nitric oxide (eNOS) production, thus improving vasodilation and blood flow to penile tissue.[11]

- **Insulin Resistance/Blood Glucose Regulation** –Laboratory animal studies have reported that extract of KP help improve insulin signaling in mice. An *in vitro* study reported potent SIRT1 enzyme-stimulating and anti-glycation activities of an extract of KP, with the KP being approximately 4-5 times more potent with this activity than resveratrol.[12]

- **Weight Loss Support**– Laboratory animal studies report that extracts of KP induce differentiation and adipogenesis in 3T3-L1 pre- and mature adipocytes (white adipose tissue) through activation of adipose tissue triglyceride lipase (ATGL) and hormone-sensitive lipase (HSL), independent of PPARγ transcription.[13]

  Laboratory animal studies also report enhancement of the thermogenic effects of brown adipocytes as well as promotion of brown adipocyte cell differentiation.[14]

  A laboratory animal study reported an extract of KP improved norepinephrine, UCP1 expression and energy expenditure (EE) in mice.[15]

  In humans, an extract of KP improved whole-body energy expenditure (EE) in 20 healthy subjects.[16] Subjects were administered 100mg of a standardized extract of KP. A single dose improved thermogenesis through BAT (brown adipose tissue) activation.

  A 2018 clinical study of 76 overweight and preobese people reported that using 150mg daily of a standardized KP product for 12 weeks led to improve abdominal fat loss, lowered triglyceride levels and improved weight loss.[17]

- **Athletic Performance** – KP is traditionally used to improve physical work capacity. Laboratory animal studies have reported improved cardiorespiratory performance with administration of KP extracts.

  A 2012 clincal study (n=45, healthy elderly individuals) using KP extract, 25 or 90mg daily for 8 weeks.[18] Subjects reported improved physical performance (30-second chair stand test and 6 min walk test) and decreased malondialdehyde (MDA) levels (indicating decreased oxidative stress).

  A 2015 double blind, placebo-controlled clinical study (n=60) studied the effects of using 180mg KP standardized extract daily or placebo for 12 weeks in the physical fitness of soccer players using cardiorespiratory fitness testing.[19] Right hand grip strength was the only parameter tested that significantly improved in the KP group over placebo.

  A 2010 randomized, double-blind crossover study (n=19) reported extract of KP did not improve exercise performance during repeated sprint exercise or submaximal exercise to exhaustion.[20] Chronic use of KP in exercise performance should be studied.

- **Antiviral –** KP reported have antiviral activity, including H5N1 avian influenza.
  KP is reported *in-vitro* to:[21,22]
  - Inhibit viral proteases
  - Inhibits viral replication
  - Upregulates TNF-alpha and IFN-beta expression – active against cytokine "storm" seen with viral infections

Other Uses:

- **Neuroprotective** - cognitive enhancing flavonoids. May help improve serotonin, dopamine and norepinephrine levels.[23]
- **Anti-allergenic** – phenolic glycosides including methoxyflavones are reported to have anti-allergenic properties via inhibition of cellular degranulation via decreased calcium influx.[24]
- **Hepatoprotection** - 5,3'-dihydroxy-3,7,4'-trimethoxyflavone found in KP is reported to have higher activity than silybin, found in the commercial hepatoprotective agent milk thistle (S*ilybum marianum*).[1,25]
- **Anti-inflammatory/pain control**– laboratory animal studies report 5,6-dimethoxyflavone has significant anti-inflammatory activity, being comparable to aspirin in rat paw edema models without affecting platelet activity.[26]

MECHANISMS OF ACTION

Mitochondrial biogenesis[27,28,29]

- Upregulates mitochondrial number
- Upregulates Peroxisome Proliferator-Activated Receptor Gamma Coactivator-1alpha (PGC-1α)
- Upregulates transcription factors for mitochondrial biogenesis (estrogen-related receptor-α [ERRα], nuclear respiratory factor-1 [Nrf-1], and mitochondrial transcription factor A [TFAM]) through activation of PGC-1α

Improves Mitochondrial function[30,31,32,33]

- Upregulates AMP-Activated Protein Kinase (AMPK)
- Promotes ATP production (output of mitochondrial oxidative phosphorylation)
- Promotes mitochondrial ß-oxidation (fatty acid metabolism) – upregulates peroxisome proliferator-activated receptor gamma (PPARγ) and delta (PPARδ)

Exercise performance (ergogenic effects) [34,35,36,37]

- Supports endurance performance
- Supports post-exercise recovery
- Supports muscle strength
- Supports muscle metabolism (upregulates glycogen synthase and increases glycogen content)

Metabolic Support[38,39]
- Supports healthy insulin sensitivity
- Promotes cell metabolism (muscle cell precursors [myoblasts] in vitro): promotes glucose uptake and the downregulation of lactic acid production; promotes the expression of glucose transporter 4 (GLUT4) and monocarboxylate transporter 1 (MCT1)

Body weight management[40,41]
- Downregulates fat accumulation and blood/liver lipid levels
- Promotes differentiation of brown adipocyte cells
- Upregulates uncoupling protein 1 (UCP1) in brown adipose tissue - supports thermogenesis of brown adipose tissue
- Promotes whole-body energy expenditure through activation of brown adipose tissue
- Promotes lean body mass

Antioxidant defense[42]
- Polymethoxyflavones - antioxidants
- Upregulates antioxidant enzymes (superoxide dismutase [SOD], catalase [CAT], glutathione peroxidase [GPx])

Healthy aging and longevity [43]
- Upregulates SIRT-1 ; 4-5 x that of resveratrol
- Downregulates the production of advanced glycation end-products (AGEs)

Cardiovascular support[44,45,46]
- Promotes healthy nitric oxide (NO) signaling pathway function
- Upregulates endothelial NO synthase (eNOS)
- Inhibits phosphodiesterase 5 (PDE-5), the enzyme that cleaves the NO mediator cyclic guanosine monophosphate (cGMP) to 5'GMP
- Positive effect on NO signaling pathway in cardiac tissue via upreglated cGMP levels
- Promotes vasodilation via the NO signaling pathway

Neurological Support[47,48,49]
- Acetylcholinesterase inhibition (by the methoxyflavonoid 5,7-dimethoxyflavone [DMF])
- Neuroprotection from glutamate excitotoxicity (by the methoxyflavonoid 5-Hydroxy-3,7,3′,4′-tetramethoxyflavone)
- Increased levels of monoamine neurotransmitters

Reproductive function support[50,51]
- Inhibits phosphodiesterase-5 (PDE-5)15 and supports relaxation of the corpus cavernosum
- Improved blood flow to penis

Dosage:
- Standardized extract: 100-180mg daily, in divided doses. 100mg/day, 50mg BID, commonly used clinical dosage standardized to 4% 5,7-dimethoxyflavone (DMF). If 2%, 180mg daily should be used.
- Freeze Dried root powder: 1,200mg daily in divided doses

Standardization:
- Standardized to 4% or > 5,7-dimethoxyflavone (DMF).
- Standardizations of 2% are also available

Side Effects and Warnings:
- Based on traditional use and clinical studies, *Kaempferia parviflora* (KP) is reported safe in recommended doses.
- Safety during pregnancy and breastfeeding has not been established.
- Use *Kaempferia parviflora* (KP) with caution if using other PDE5 inhibitors including sildenafil (Viagra), vardenafil (Levitra, Staxyn), tadalafil (Cialis), and avanafil (Stendra). A laboratory animal study reported co-administration of a single dose of\KP and a cGMP-specific phosphodiesterase type 5 (PDE5) inhibitor sildenafil led to a pharmacokinetic interaction where the plasma level of sildenafil was decreased significantly.[52] The area under the curve (AUC), maximum concentration (Cmax), and half-life (T 1/2) were decreased significantly on co-administration of KP and sildenafil, by 60-65, 40-52, and 32-54 %

respectively. The eliminate rate constant (Ke) was increased by 37-77%. Similarly, administration of KP extract and sildenafil reduced the plasma concentrations of the methoxyflavones found in KP, including AUC, Cmax and T ½, with Ke (elimination rate constant) increased.

- In laboratory studies, *Kaempferia* is reported to inhibit several CYP450 enzyme activities, thus it has the potential to cause drug interactions.[53] If narrow therapeutic drugs are being used, monitor carefully.

Thai ginseng (*Kaempferia parviflora)*
Patient Snapshot

Uses:

- Thai ginseng is reported to help improve problems with erectile dysfunction (ED) in men, and is used traditionally as an aphrodisiac.
- Along with an appropriate diet and exercise program, Thai ginseng may help improve weight loss.
- Thai ginseng may help improve physical performance.
- Thai ginseng may help improve your body's ability to regulate blood sugar levels, helping to improve glucose and insulin utilization.

Dosage:*

- The recommended dosage of Thai ginseng is 100-180mg daily, standardized to 4% dimethoxyflavone. The general dosage is 50mg 2 times daily, 4% standardization.
- A freeze-dried product is also available, 1,200mg daily (600mg 2 times daily).

*Note: There may be various products with different dosages and standardizations to choose from. When choosing a dietary supplement, select those from reputable manufacturers. Talk to your doctor of pharmacist.

Special Concerns:

- If you are taking prescription or non-prescription medications, have a pre-existing medical condition, or are pregnant and/or breastfeeding, talk with your healthcare provider before taking any dietary supplement.
- Do not take if there is an allergy to any component of this dietary supplement.
- If you are taking drugs for erectile dysfunction (ED) such as Viagra, Levitra or Cialis, it is best not take Thai ginseng without talking to a doctor or pharmacist first.

DISCLAIMER: Statements made are for educational purposes and have not been evaluated by the US Food and Drug Administration. They are not intended to diagnose, treat, cure, or prevent any disease. If you have a medical condition or disease, please talk to your doctor prior to using the recommendations given.

Endnotes

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