# *Cissus quadrangularis*

## TAXONOMIC CLASSIFICATION:[1]

- Kingdom : Plantae – Plants
- Subkingdom : Tracheobionta – Vascular plants
- Superdivision : Spermatophyta – Seed plants
- Division : Magnoliophyta – Flowering plants
- Class : Magnoliopsida – Dicotyledons
- Subclass : Rosidae
- Order : Rhamnales
- Family : Vitaceae – Grape family
- Genus : *Cissus L.* – treebine P
- Species : *Cissus quadrangularis L.* – veldt-grape

## INTRODUCTION:

*Cissus quadrangularis* is commonly known as Hadjod (Bengali) Vajravalli in Sanskrit, Hadjod in Hindi, Kandvel in Marathi, Haddjor in Punjabi, Hadbhanga in Oria, Vedhari in Gujrati, Perandi in Tamil, Nalleru in Telugu and Veldgrap, Edible Stemmed Vine in English is an annual or perennial herb, entire leaves, buff colored with greenish ting and requires warm tropical climate and propagated by stem cuttings in months of June and July. It can be found throughout hotter parts of India alongside hedges, neighboring countries like Pakistan, Bangladesh, Srilanka and Malaysia. It can be cultivated in plains coastal areas, jungles and wastelands up to 500m elevation. It is a climbing herb, tendrils simple, opposite to the leaves, leafless when old. Leaves simple or lobed, cordate, broadly ovate or reniform, serrate, dentate, sometimes 3-foliate and glabrous. Flowers small, greenish white, bisexual, tetramerous, in umbellate cymes, opposite to the leaves. Calyx is cup shaped. Fruit globose or obovoid fleshy berries, succulent, very acrid, dark purple to black, one seeded; seeds ellipsoid or pyriform. Stem is buff colored with greenish ting, dichotomously branched, sub-angular, glabrous, fibrous and smoothAlthough it has many

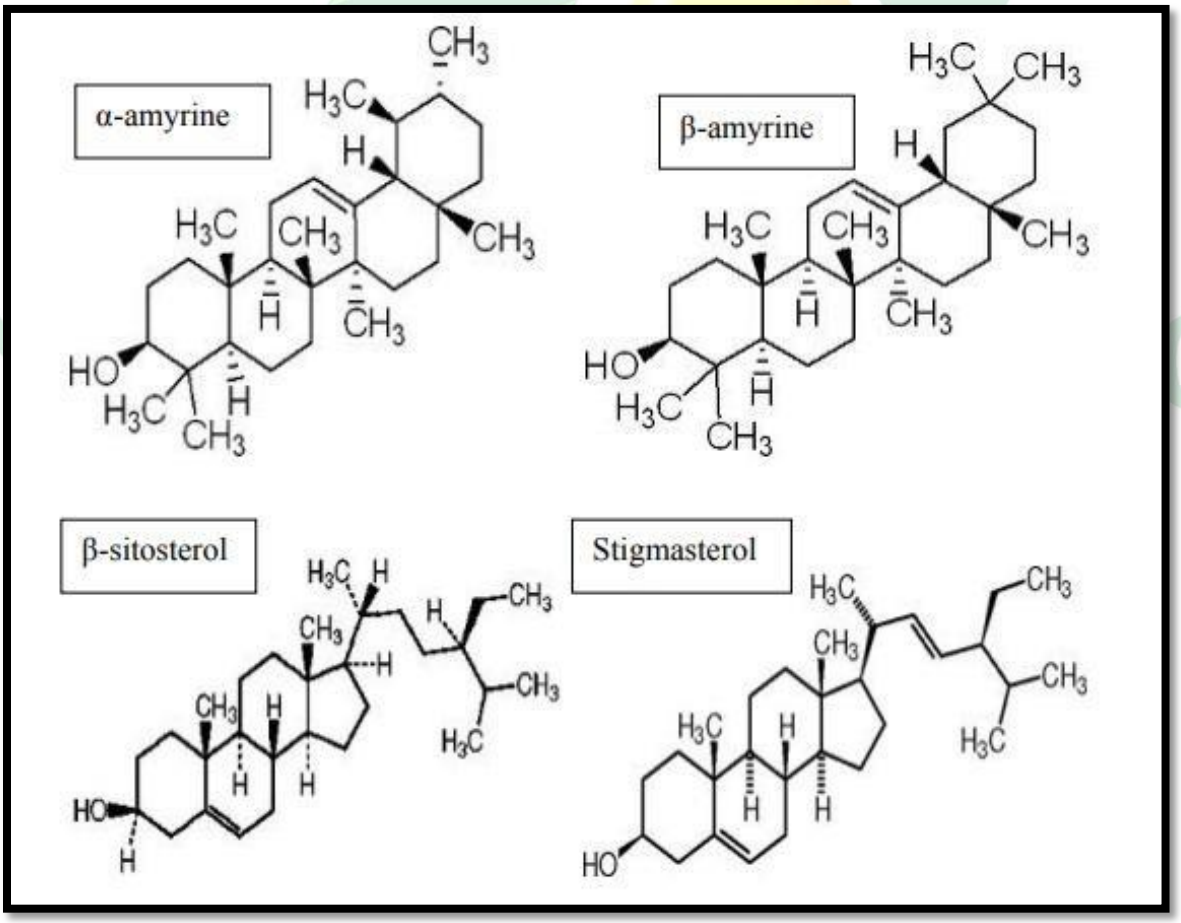
Cissus Quadrangularis Plant

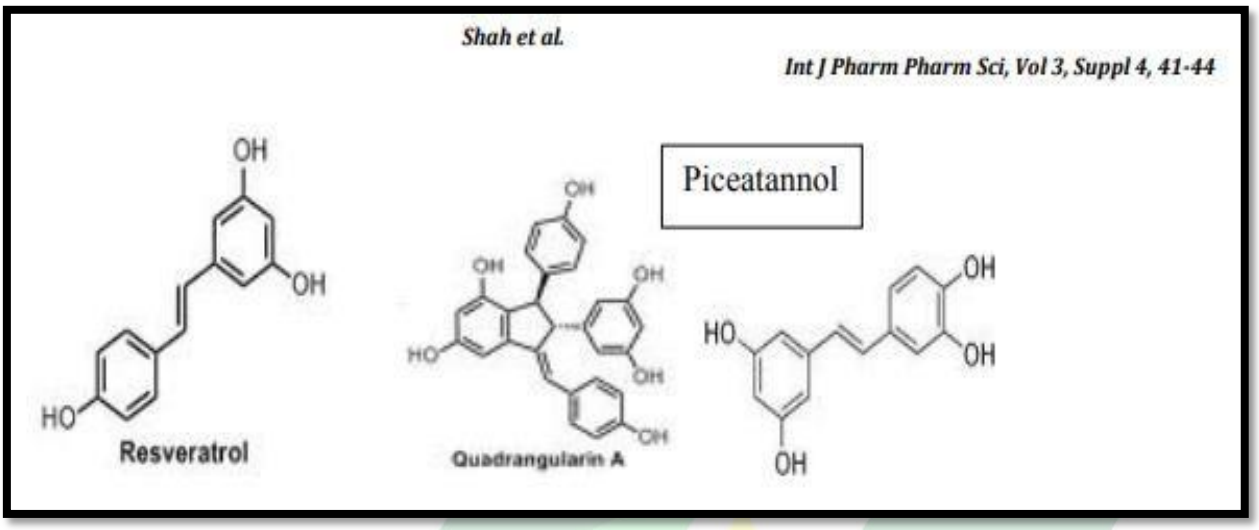
**https://www.ayurtimes.com/cissus-quadrangularis-hadjod/**

medicinal properties, it is particularly used to reduce body weight, anthelmintic, muscular pains, asthma, broken bones, antiulcer, antihemorrhoidal, antimicrobial etc. It has been prescribed in Ayurveda as an alternative, anthelmintic, dyspeptic, digestive, tonic, analgesic in eye and ear diseases, and in the treatment of irregular menstruation and asthma. *Cissus quadrangularis* justifies its effectiveness in management of obesity and complications associated with metabolic disorders, as well as its antioxidant and free radical scavenging activity *in vitro*[2][3]

**CHEMICAL CONSTITUENTS:[4]**

Phytochemical studies on methanol extract revealed the presence of triterpenes including α- and β- amyrins, β-sitosterol, ketosteroids, phenols, tannins, carotene and vitamin C. Seven alicyclic lipids constituents have also been reported from Cissus quadrangularis. Several unsymmetric tetracyclic triterpenoids such as d-amyrin, onocer-7-ene-3a, 21b-diol, d-amyrone and 3,3',4,4'-tetra hydroxy biphenyl, 3,3',4,4'-tetrahydroxybiphenyl have been isolated from plant Several other constituents such as flavonoids quercetin and kaempferol, and stilbene derivatives, quadrangularins A,B,C and many others e.g. resveratrol, piceatanon, pallidol, perthenocissi and phyto sterols have been isolated from plant. Stem extract contains a high percentage of calcium ions and phosphorus, both essential for bone growth.






**Traditional uses**

The roots and stems are most useful for healing of fracture of the bones. The stem is bitter; it is given internally and applied topically in broken bones, used in complaints of the back and spine. A paste of stem is useful for muscular pains. The plant has been documented in Ayurveda for the treatment of osteoarthritis, rheumatoid arthritis and osteoporosis. The stem juice of plant is used to treat scurvy, menstrual disorders, otorrhoea and epistaxis. The use of sap with tamarind has been reported in East Africa for the treatment of gonorrhoea. The herb is fed to cattle to induce flow of milk. The ash of plant is useful as a substitute for baking powder. A paste of stem is given in asthma, burns and wounds, bites of poisonous insects and for saddle sores of horses and camels. Decoction of shoots with dry ginger and black pepper is given for body pain the infusion of plant is anthelmintic. Leaves and young shoots are powerful alternatives, dried and powdered; they are administering in certain bowel infections connected with indigestion. The plant is useful in helminthiasis, anorexia, dyspepsia, colic, flatulence, skin diseases, leprosy, hemorrhage, epilepsy, convulsion, haemoptysis, tumors, chronic ulcers, swellings. The stout fleshy quadrangular stem is traditionally used for treatment of gastritis constipation, eye diseases, piles and anemia. [4]



**PROPERTIES AND USES:[5]**

**Medicinal Properties**

Cissus Quadrangularis has following medicinal properties:

- Accelerates the rate of fracture healing

- Strengthens bones and joints
- Restores bone mass
- Analgesic- pain relieving
- Anabolic supplement (mainly for bones)
- Hemostatic (styptic) – Check bleeding
- Anti-hemorrhoid – mainly beneficial in bleeding piles
- Digestive stimulant
- Hepatoprotective
- Anti helmintic or vermifuge
- Blood detoxifier
- Aphrodisiac

https://www.verywellhealth.com/the-benefits-of-cissus-quadrangularis-88623

**THERAPEUTIC INDICATIONS**

1. Bone Fracture
2. Low bone mineral density
3. Osteoporosis
4. Osteoarthritis
5. Joint pains in athletes due to exercises
6. Gout (Hyperuricemia)
7. Rickets in children (along with Calcium and Vitamin D supplementation) – helps to strengthen the bones and promote bone growth
8. Weight Loss (Obesity) – mainly beneficial for reducing abdominal adiposity, central obesity, accumulation of fat around pelvis, belly, buttocks, and upper thighs
9. Internal Bleeding
10. Hemorrhoid – mainly bleeding piles
11. Improve Digestion

12. Syphilis
13. Menorrhagia
14. Pyorrhea & Gingivitis (gargling with Fresh Hadjod Juice)

**DOSAGE:**

In Ayurveda, the fresh juice of *Cissus quadrangularis* (Hadjod) plant in a dosage of 20 ml twice daily is used to accelerate fracture healing rate and restoring the bone mass in several diseases including low bone mineral density and osteoporosis.[2]

The typical recommended daily dosage of *Cissus* extract as reported is between 10 mg and 500 mg depending upon the concentration of extract and the severity of symptoms for the powder of the dried plants. The Ayurvedic literature recommends a dosage of 3-6 g to accelerate fracture healing. Safety studies showed no toxic effect at dosage as high as 200mg/kg of body weight. It is also quite safe in either the dried powder form or the commercially available extract.[6]

As mentioned in Ayurvedic Pharmacology, 12 ml to 24 ml of is stalk and leaf juice is safe for consumption which also helps to unite bones faster in case of bone fracture [7]

**FORMULATION AND DOSAGE: [8]**

- Decoction of dried stalks: 10-30 ml bid
- Juice: 10-20 ml bid
- Powder: 3-6 g bid

**AYURVEDIC PREPARATIONS**: [8]

- Flexi-Muv Oil (Anti-inflammatory, Anti-arthritic)
- Boneforte Capsule (Calcium supplement)
- Laksha Gogglu (Analgesic, anti-inflammatory)



**SIDE-EFFECTS:**

Most of the side effects occur when *Cissus quadrangularis* is used in extract form (unnatural form) in a dosage of more than 1200 mg, *C. quadrangularis* juice in a dosage of more than 40 ml, or *C. quadrangularis* powder (Hadjod Churna) in a dosage of more than 6 grams per day.[5]

Cissus Quadrangularis can cause the following side effects:[5]

1. Dry mouth (common)

2. Feeling of increased heat (common)
3. Burning sensation
4. Sleeplessness
5. Headache
6. Restlessness
7. Vertigo
8. Excessive sweating
9. Diarrhea (rare)

## PRECAUTIONS & WARNINGS:[9]

**Pregnancy and breast-feeding**: As there isn't enough reliable information available to know if *Cissus quadrangularis* is safe to use when pregnant or breast-feeding, it is always recommended to stay on the safe side and avoid use.

https://www.1mg.com/otc/yuvika-hadjod-ci 1

**Diabetes**: *Cissus quadrangularis* might lower blood sugar. Taking *Cissus quadrangularis* along with medications for diabetes might lower blood sugar too much (hypoglycemia)

**Surgery**: *Cissus quadrangularis* might lower blood sugar and could interfere with blood sugar control during and after surgical procedures. Hence, one should top using *Cissus quadrangularis* at least 2 weeks before a scheduled surgery.

## MEDICATIONS FOR DIABETES (ANTI-DIABETES DRUGS) INTERACTION: [11]

Cissus quadrangularis might lower blood sugar. Diabetes medications are also used to lower blood sugar. Taking Cissus quadrangularis along with diabetes medications might cause your blood sugar to go too low. Some medications used for diabetes include glimepiride (Amaryl), glyburide (DiaBeta, Glynase PresTab, Micronase), insulin, pioglitazone (Actos), rosiglitazone (Avandia), chlorpropamide (Diabinese), glipizide (Glucotrol), tolbutamide (Orinase), and others.

**RESEARCH:**

1. **Antimicrobial activity:** Antimicrobial activity of ethanol, diethyl ether and aqueous leaf extract of *C. quadrangularis* against bacterial pathogens such as *E. coli*, *K. pneumonia*, *S. aureus* and fungal pathogens such as *A. flavus*, *C. albicans*, *F. solani* by *in vitro* agar well diffusion assay have been evaluated. The ethanol extract of the plant was found to posses strong antimicrobial activity against tested pathogens. Methanol extract (90%) and dichloromethane of stems have been reported to possess antibacterial activity against *S. aureus*, *E. coli*, and *P. aeruginosa* and mutagenicity against Salmonella microsome. Antimicrobial activity has also been reported from stem and root extract. The alcohol extract of aerial part was found to possess antiprotozoal activity against *Entamoeba histolytica*. Alcoholic extract of the stem has been reported to posses activity against E.coli[6]
2. **Antiarthritic activity:** A study was conducted to evaluate the antiarthritic activity of active fraction of *C. quadrangularis* (AFCQ) extract of *C. quadrangularis* by employing CFA (complete Freunds Adjuvant) induced arthritis model in Wistar rats as *in-vivo* experimental model. Results obtained revealed that AFCQ at the dose of 100mg/kg b.w. was found to be more efficient in inhibiting rat paw edema as comparable to standard drugs celecoxib and methotrexate. This indicated that AFCQ having a significant anti arthritic activity against CFA induced arthritis[6]
3. **Anti-osteoporosis activity:** Ethanol extract was evaluated for its antiosteoprotic activity in ovariectomized rat model of osteoporosis at two different dose levels of 500 and 750 mg/kg per day. The rats were divided into five groups. First group served as control. All the remaining groups were ovariectomized control. Group 2 was fed with saline and served as ovarectomized control. Group 3-5 were orally treated with Raloxifen (5.4mg/kg) and ethanol extract of *C. quadrangularis* (500 and 750mg/kg), respectively. The biomechanical, biochemical and histopathological parameters showed that ethanol had a significant antiosteoporotic effect[6]
4. **Analgesic, anti-inflammatory and stimulatory activity** : Methanol extract possess analgesic, anti-inflammatory and venotonic effects associated with hemorrhoids, anti-inflammatory activity is due to flavonoids especially luteolin and by β-sitosterol. β-sitosterol present in methanol extract has ability to reduce the enzymes MPO indicating a reduction of neutrophils influx in the inflamed tissue. Calcium oxalate, carotene, tetraterpenoids, βsitosterol, amyrin and anabolic ketosteroids, which are responsible for acceleration of healing and possess anti-inflammatory and analgesic activity. Ethanol extract exhibit protective effect on neutrophils mediated tissue injury induced by aspirin in rats 34. Methanol extract (90%) and dichloromethane extract of stems possess anti-inflammatory activity against COX-2. The stimulatory effect of extract is probably due to vitamins and is greater than that of the anabolic hormone durabolin.[4]
5. **Central nervous system activity**: The root extract possess central nervous system depressant activity indicated by decrease in exploratory behavior. Methanol extract of roots contains saponins which show potent sedative activity and also inhibit spontaneous motor activity in mice[4]

6. **Anti-ulcer activity**: Methanol extract showed significant antiulcer activity in experimentally induced ulcer in rat model by decreasing gastric secretions and by enhancing glycoprotein levels. Methanol extract produce healing effect on aspirin induced gastric mucosal damage in rats through its antioxidative mechanism. Triterpenoids and βsitosterol present in methanol extract possess anti-lipid peroxidating effect and thus prevent gastric damage[4]
7. **Healing of fractured bones***: Cissus quadrangularis* Linn. is an indigenous medicinal plant, grown in India, which helps to increase healing process of fractured bone. Fracture of maxillofacial skeletal takes reasonably long time of about of 6–8 weeks to heal. In this study, the effect of *C. quadrangularis* in healing process of maxillofacial fracture was evaluated. All the patients were treated by open reduction internal fixation method and in postoperative management, antibiotics, and analgesics. Patients were divided into two groups. In Group 1, one capsule of *C. quadrangularis* (500 mg) thrice a day for 6 weeks was administered and in Group 2 (control group), no supplementary medication was administered. Pain, swelling, fragment mobility, serum calcium, and serum phosphorus were evaluated pre- and post-operatively on day-1, -21, and -45. Pain, swelling, and fragment mobility were low in Group 1 compared to Group 2. Serum calcium and serum phosphorus were also high, and healing of bone was clearly seen in Group 1 on day 21 as compared to control group. Thus, the results proved that *C. quadrangularis* helps in reducing pain, swelling, and fracture mobility and accelerate the healing of fracture jaw bones.[10]
8. **Antiobesity activity:** The aqueous extract of *C. quadrangularis* stems and leaves contains flavanoids and stilbenes, which inhibit enzymes lipase, amylase and α-glucosidase and support the antiobesity of plant. In study lipase and amylase were much more susceptible for inhibition by components of *C. quadrangularis* as compared to α-glucosidase. Inhibition of such enzymes by *C. quadrangularis* claimed that this plant may be used as drugs to treat obesity and diabetes type 2 [6]
9. **Anticancer activity:** An *in-vitro* study was conducted to explore the anticancer activity of *C. quadrangularis* along with its safety profile on normal skin cells. For this purpose spheroid HeLa culture *in vitro* model was generated to evaluate the response of ethanolic extract of *C. quadrangularis* on the growth of HeLa tumoroid. Observation of the study indicated that *C. quadrangularis* selectively induced cytotoxicity, ROS liberation and G1 phase cell cycle arrested only in HeLa cancer cells without affecting the normal skin cells at similar dose. It also significantly inhibited growth of tumoroid and eventually leaded to cell death as exhibited by phase contrast microscopy. Therefore it can be concluded that *C. quadrangularis* extract had targeted anticancer activity. In another study ethanol and chloroform extract showed anticancer activity. The $IC_{50}$ value was found to be at the concentration of 62.5 µg/ml against HeLa cell line and 125 µg/ml in vitro cell line respectively. Cell death in HeLa cell line was studied and confirmed as apoptosis by DNA fragmentation experiments[6].

**PATENTS:**

1. The present invention relates to a composition containing *Cissus quadrangularis* from the family *Cissus* sp. or its extracts for use in a nutritional product, dietary supplement or pharmaceutical composition wherein the composition provides prevention and treatment of osteo-health related disorders and diseases as well as effective fracture healing through the use of anabolic steroid properties that increase the therapeutic process.A general object of this invention is to provide a beneficial compound that is extracted from a natural Source for use in a nutritional product, dietary Supplement or pharmaceutical composition. A more particularized object of this invention is to provide a high potency composition derived from the plant family Cissus sp.. The general purpose of this composition is to maintain and restore bone Strength safely and effectively. Increase in bone mineral density has been shown to decrease future fracture risk. A more particularized purpose of this composition is to provide generalized fracture healing through the use of the composition and the action of the compositions anabolic Steroidal properties on Osteo tissues specifically for the prevention and mitigation of degenerative diseases related to Osteo health, for use in fracture healing and anabolic increase in Osteo tissues.[12]

2. This invention method comprises washing, drying and grinding the roots to provide powdered root - *Cissus Quadrangularis* . A first solvent is added to the powdered root to extract a mixture comprising one or more keto-steroids and impurities. A second solvent is added to the mixture of the partially extracted powdered root and first solvent, wherein the one or more keto-steroids is substantially soluble in the second solvent and the impurities are soluble in the first solvent. A highly purified composition obtained by the method may be further combined with at least one excipient to provide a high yield keto-sterone composition having a predetermined keto-sterone content. A dose of the keto-sterone composition may be administered to a person to promote lean body mass, treat damaged or diseased connective tissue and provide an analgesic effect while reducing cortisol. The dose may be a daily dose of about 2 grams to about 8 grams of the *Cissus Quadrangularis* keto-sterone composition, or a daily dose of about 3 grams to about 6 grams of the *Cissus Quadrangularis* keto-sterone composition. The dose may divide into a plurality of individual doses of the *Cissus Quadrangularis* keto-sterone composition. [13]

TABLE 1

Some Physical Properties of an Example Keto-sterone Composition Root Extract from Cissus q.

| | |
|---|---|
| Appearance | Brown powder |
| Odor | Characteristic wheat bread odor |
| Thin Layer Chromatography | Complies with a standard |
| Weight loss on Drying | Not greater than 10% |
| Water Solubility | Insoluble |
| Ethanol Solubility | Not less than 45% |
| Heavy Metals | Not greater than 2 parts per million |
| Arsenic | Not greater than 1 part per million |
| Lead | Not greater than 4 parts per million |
| Bulk Density | About 0.4 to about 0.7 grams/milliliter |
| Particle Size | Not less than 100% passes through 20 size mesh; Not less than 75% passes through 40 size mesh; Not less than 50% passes through 80 size mesh. |
| HPLC | Between about 10% and 11% |

3. The present invention relates generally to methods and related compositions using flavonoids and/or indanes extracted from the stems and leaves of *C. quadrangularis* to reduce weight and inhibit lipase, α-amylase and α-glucosidase activity in mammals. By example and not by way of limitation, embodiments of the present disclosure, a composition and related methods for reducing body weight and/or inhibiting any combination of lipase, α-amylase and α-glucosidase is provided. The composition contains an effective amount of one or more flavonoids or indanes selected from 3-O-rhamnopyranosylkaempferol, 3-(4-hydroxybenzylidene)-2-(2,5-dihydroxyphenyl)-1-(4-hydroxyphenyl)indane-4,6-diol, quercitrin, rhamnitrin, rhamnocitrin, quercitrin-3-O″-acetate and parthenocissin A. A method for reducing body weight in a mammal comprising: a. providing a composition containing an effective amount of purified and isolated 3-(4-hydroxybenzylidene)-2-(2,5-dihydroxyohenyI)-1-(4-hydroxyphenyl)indane-4,6-diol; administering the composition to a mammal in need thereof wherein the effective amount of the composition is 10 mg to 900 mg daily. The effective amount of the composition provided to the mammal is 50 mg to 200 mg daily.[14]

4. The invention relates to compositions and methods for controlling food, energy, and calorie intake a combination of a Mulberry leaf extract and *CissusQuadrangularis* extract or plant powder. A composition comprising:

a) a mulberry leaf extract; and b) a *Cissus quadrangularis* extract or a *Cissus quadrangularis* plant powder[15]

5. A composition comprising an effective amount of *Cissus quadrangularis* to reduce fat and cause weight loss in a mammal. Such compositions have beneficial activity principally in controlling weight gain and obesity[16] This formulation for human consumption and demonstrate one or more of the following other properties:

- Reduces the amount of fat absorbed by the body,
- Increases the amount of fat in feces,
- Increases fecal bulk,
- Reduces carbohydrate breakdown in vitro,
- Reduces carbohydrate breakdown in vivo,
- Inhibits salivary amylase activity,
- Inhibits intestinal amylase activity,
- Decreases the acidity of the stomach,
- Increases the amount of cholesterol in feces,
- Reduces post-prandial blood glucose,
- Inhibits intestinal lipase activity,
- Reduces the body mass index (weight) of subjects

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