

# Therapeutic and Medicinal Uses of Draksha - A Review

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**Abstract:** *Vitis vinifera*, known as the grapevine, is native to southern Europe and Western Asia. *Vitis vinifera* is a perennial woody, climbing tree belongs to family Vitaceae. It is commonly known as grape and draksha. The ripe fruit is laxative and purgative, fattening, diuretic, aphrodisiac, appetizer, and the throat; cures thirst, asthma, vata and vatarakta, jaundice, strangury, blood disease. The ashes of stem are good for pains in joints, swelling of the testicle, and piles. The flowers are expectorant and haematinic, and are useful in bronchitis. In Iran, grape leaves are used in a traditional food and for treatment of diarrhea and bleeding<sup>1</sup> Grape seed and skin contain several active components including flavonoids, polyphenols, anthocyanins, proanthocyanidins, procyanidines, and the stilbene derivative resveratrol. Grape seed extract in particular has been reported to possess a broad spectrum of pharmacological and therapeutic effects such as antioxidative, anti-inflammatory, and antimicrobial activities, as well as having cardioprotective, hepatoprotective, and neuroprotective effects. The study of plants that have been traditionally used should still be seen as a fruitful and logical research strategy, in the search. In this review, several therapeutic and medicinal uses of draksha are described.

**Keywords:** *Vitis vinifera*; grape seed; haematinic, vatarakta

## 1. Introduction

Common Grape Vine (*Vitis Vinifera*) is known as Draksha in ayurveda. This is widely grown in western parts of India, Punjab, Kashmir, central Europe, Turkey, Morocco and Portugal. The grape vine has long, woody stems rooted to ground. Stems are covered with flaky bark. The grapevine usually grows up to 35 meters. It has alternative, broad, palmate leaves. The unripe fruit is usually green and ripe fruit is dark purple in color. Ripe fruits are covered with light grey wax coat. Grape vine has acquired numerous names by virtue of its shape and medicinal properties. These names have been coined by ayurveda acharyas. It is known as "Draksha" as it is liked by one and all. Due to its medicinal properties it increases the moistness of our body tissues and softens the dried ones. Hence the name "Mrudweeka". Grapes get the name "Gosthani" as the shape of fruits resemble mammary glands (udder) of cow.

Botanical Name: *Vitis vinifera* L.

Family: *Vitaceae*

English names: Grape, raisin.

Hindi: *angūr*

Sanskrit: Draksha, svādhupalā, madhurasā, mridvīkā, hārahūrā, gōstanī.

Ecological Status: An important cultivar under threat from climate change.

Plant Part Used: Fruit, leaves

## 2. Properties

Grapes that are more sour in taste, whether by variety or because they are unripe, will be light in property and tend to increase pitta, kapha and bleeding disorders. Sweet and astringent grapes (like concord grapes) are preferred and their properties, when well-ripened, are as follows:

Taste: Sweet (Madhura), astringent (kshaya)

Energy: Cooling (shita)

Post-digestive effect: Sweet (madhura)

Property: Heavy (guru)

Balances all three doshas

Dhatus: Rasa, rakta, shukra

Srotansi: Ambu, rasa, rakta, shukra, mutra

Fruits of *Vitisvinifera* have been used for thousands of years because of their nutritional and medicinal benefits. They are rich in sugars, flavonoids, anthocyanins and proanthocyanins, organic acids, tannin, mineral salts and vitamins. Grapes skin, especially from the red and black species is rich in resveratrol which is a derivative of stilben. Studies have shown that resveratrol is one of the strongest known natural antioxidants. It is found in a large quantity in black grape juice, skin and seed<sup>2</sup>. The seeds and the leaves of the grapevine are used in herbal medicine and its fruits are utilized as a dietary supplement<sup>3</sup>. Parts of this plant are known by several trade names throughout the world: Grape seed extract, grape seed, activin, and others<sup>4</sup>. The seeds and the leaves of the grapevine are used in herbal medicine and its fruits are utilized as a dietary supplement<sup>5</sup>.

## 3. Origin and Distribution

The grapevine (*Vitisvinifera*) is indigenous to southern Europe and Western Asia and is cultivated today in all temperature regions of the world<sup>6</sup> which comprises about 60 inter-fertile wild *Vitis* species distributed in Asia, North America and Europe under subtropical, Mediterranean and continental temperate climatic condition<sup>7</sup>.

### Description

*Vitisvinifera* is a perennial, woody climbing vine; stems up to 35 m long, but in cultivation usually reduced by annual pruning to 13 m; leaves thin, circular to circular-ovate, 5-12 cm broad, margins dentate or jagged, basal sinus deep and lobes often overlapping, 5-7-lobed, glabrescent above, often with persistent tomentum beneath; tendrils branched,

normally opposite 2 leaves out of three; flowers numerous, in dense panicles or thyrses opposite leaves; flower clusters and tendrils absent at every third node; calyx very shortly 5-lobed; petals about 5 mm, pale green, sweet-scented; fruit a soft, pulpy berry, skin adhering to pulp, oval or oblong, ellipsoid to globose, skin green, yellow, red or purplish-black, in large, long clusters; seeds 23, sometimes none, pyriform, with rather long beak. Temperatures coupled with high humidity of tropics. Humidity promotes disease.

### Active Constituents

**Flavonoids.** Grape seeds contain flavonoids (4–5%), including kaempferol-3-O-glucosides, quercetin-3-O-glucosides, quercetin and myricetin.

**Polyphenols.** Grapes are rich in polyphenols and 60–70% of grape polyphenols are found in grape seeds. The grape seed polyphenols are flavan-3-ol derivatives. The major compounds are (+)-catechins, (–)-epicatechin, (–)-epicatechin-3-O-gallate, procyanidins dimers (B1B5), procyanidin C1, and procyanidin B5-3'-gallate. Grape seeds contain procyanidins or proanthocyanidins (mostly hexamers) <sup>8</sup>.

All of the acylated procyanidins of grape seeds are esters of gallic acid <sup>9</sup>; however, monomers of (+)-catechin, (–)-epicatechin, and (–)-epicatechin-3-O-gallate, 14 dimeric, 11 trimeric, and one tetrameric procyanidin have also been reported <sup>10</sup>.

**Anthocyanins.** The anthocyanins that have been reported for *V. Vinifera* include 3-glucosides, 3-acetylglucosides, 3-coumaroylglucosides, 3-caffeoylglucosides, 3,5-diglucosides, 3-acetyl-5-diglucosides, 3-coumaroyl-5-diglucosides, and 3-caffeoyl-5-diglucosides of cyanidin, delphinidin, peonidin, petunidin, and malvidin <sup>11</sup>.

**Stilbene derivatives.** trans-Resveratrol (trans-3,5,40trihydroxystilbene) has also been reported in grapes <sup>12</sup>.

### Actions

- Laxative
- Beneficial for eyes (chakshushya)
- Nourishing (brimhana)
- Promotes urine flow
- Aphrodisiac
- Promotes taste
- Iron-rich

Used in:

- Thirst
- Fever
- Asthma and breathlessness
- Vāta conditions
- Arthritis with skin lesions
- Jaundice
- Urinary problems
- Haemorrhage
- Drowsiness

- Burning sensations
- Emaciation
- Hangover

### Ayurveda Medicinal Properties of Grapes

Grapes are sweet to taste and act as body coolants. They are soft, heavy to digest and increase the moistness of body tissues. By virtue of these properties this fruit alleviates vata and pitta. Hence these berries are used in diseases which arise due to vitiation of vata and pitta.

Usefulness of grape berries on different organ systems are given below.

**Nervous system:** Due to their property of alleviating vata the use of grapes is recommended as nervine. It boosts memory power and acts as a brain tonic.

**Digestive system:** Vata and pitta regulate functions of digestive system. Since grapes alleviate vata and pitta, they are widely used in digestive disorders like constipation, jaundice and thirst.

**Circulatory System:** These berries act as cardiac tonic. They strengthen the muscles of heart and increase the nutrient components (hemoglobin) of blood. Grapes are very useful in diseases which arise due to vitiation of rakta (blood) and pitta. Therefore the use of this fruit is recommended in Gout and allergies.

**Respiratory System:** Draksha or grapes help to strengthen lungs. Expectoration of kapha or Phlegm can be very easily achieved with the help of this fruit. Thus grapes are used as main ingredients in ayurvedic preparations which are administered in respiratory conditions like Tuberculosis, cough, bronchitis etc.

**Urinary System:** Grapes act as diuretics and increase frequency and volume of urine. It soothes the inner layers of bladder. For this reason grapes are recommended in burning micturition and cystitis.

**Reproductive system:** Grapes help to increase fertility of Men and women. It increases quality and quantity of semen, sperm count and sperm motility. It also helps to strengthen the female reproductive system. These berries are known as “Vrishya”, which means they help in erectile dysfunction and premature ejaculation.

**Effect on skin:** Grapes help to reduce burning sensation of skin and skin allergies. It boosts the immunity of skin and detoxifies it. It also helps to prevent various skin diseases.

**General health:** Grapes facilitate a good supply of nutrients for recuperating patients. This fruit is of immense help to persons who want to increase their body weight. Excess thirst: Drink 1 cup diluted Concord grape juice with a little sandalwood powder, vetiver and honey.

**Excess thirst:** Instill drops of diluted concord grape juice into the nostrils.

Excess heat: drink 1 cup diluted concord grape juice with two tablespoons aloe vera and a few drops of rosewater.

Burning sensations: If burning stomach or urination, or hotheadedness, drink 1 cup diluted concord grape juice with ½ tsp. cumin powder, ½ tsp. fennel powder and ½ tsp. sandalwood powder.

Fever: drink 1 cup diluted Concord grape juice with ½ tsp. cumin powder, ½ tsp. fennel powder and ½ tsp. sandalwood powder.

Constipation: Soak a handful of raisins in water overnight and eat in the morning.

Shortness of breath, chest pain: 1 cup diluted concord grape juice with 1 tsp. honey and ½ tsp. dry ginger powder.

Cough: boil a handful of raisins and drink the raisin tea.

Low libido, sexual debility: 1 cup diluted Concord grape juice, 1 pinch pippali (long pepper), ½ tsp. turbinado sugar. For vata add ½ tsp. ashwagandha, for pitta ½ tsp. shatavari and drink one hour before bedtime.

Cystitis: 1 cup diluted Concord grape juice with 1 tsp. cumin powder and 1 pinch rock salt 2-3 times daily.

Anaemia: For iron deficiency, soak a handful of raisins in water overnight and eat in the morning with a teaspoon of honey.

Benefits of *Draksha*:

Semi ripened grapes tastes more sour which improves appetite and taste.

Ripened grapes are very useful in treating bleeding disorders.

A ripened grape helps relieve thirst, acts as a natural coolant and has a soothing effect.

Dry grapes or raisins help to ease bowel movement and to cool eyes.

Raisins are used in treating excessive thirst, respiratory problems, fever, vomiting, gout, liver problems, burning sensation etc.

Raisins can relieve stress, anxiety and clams the mind.

Raisins are also used treat intestinal disorders.

Even though *Draksha* is the main ingredient in wine making, they can reduce the hangover caused by excessive alcohol intake.

It is advisable for students to regularly eat the raisins soaked in water to avoid tiredness.

Raisins help to increase male and female fertility. It helps to increase the quality of semen, sperm count and its motility. It is also known to strengthen female reproductive organs. They are also used to treat erectile dysfunction and premature ejaculation.

#### 4. Pharmacological Activities

Antioxidant effects

Grape seed extract has antioxidant and free radical scavenging activity<sup>13</sup>. The sparing/recycling effect of procyanidins from *V. vinifera* seeds on alpha-tocopherol was established in phosphatidylcholine liposomes and red blood cells. Procyanidines, in addition to scavenging free radicals, strongly and non-competitively inhibit xanthine oxidase activity, the enzyme which triggers the oxy-radical cascade<sup>14</sup>. In one study, polyunsaturated fatty acid peroxidation was inhibited by low concentrations of grape seed proanthocyanidins (2 mg/ l). Other studies have confirmed that grape seed proanthocyanidin extract (GSPE) (50 mg/l) provided protection against free radicals in in vitro free radical scavenging assay and this effect was better than vitamins C and E. Moreover, GSPE (100 mg/kg), compared to other antioxidants, provided significant protection against 12-O-tetradecanoylphorbol - 13- acetate (TPA)-induced oxidative damage. In addition, procyanidin B4, catechin, and gallic acid at low concentrations (10mol/l, 25 mol/l) were reported to be good cellular preventive agents against DNA oxidative damage. However, these compounds may induce cellular DNA damage at higher concentrations (150mol/l). Similarly, GSPE demonstrated significant protective ability against oxidative damage in rat leukocytes. Recently, co-administration of grape seed extract (75 mg/kg) and Marjoram volatile oil (0.16 ml/kg) prevented oxidative damages and resulted in a reduction of the hazardous effects of ethanol toxicity on male fertility, liver, and brain tissues. In this study, rats received ethyl alcohol (10 ml/kg body weight, 25% v/ v), daily orally by gavage for 10 week. Also, pretreatment with resveratrol (10 mol) prevented ethanol-induced disruption of embryonic development in blastocysts and ESC-B5 embryonic stem cells. Resveratrol has also shown protective effects against ischemia reperfusion in the skeletal muscles of rat due to its potent antioxidant properties.

Cardioprotective effects

Oral consumption of standardized grape extract (100 and 200 mg/kg) provided significant cardioprotection by improving post-ischemic ventricular recovery and reducing the amount of myocardial infarction in rats. In an Ex-vivo experiment using rat aortic rings, ExGrape seeds (7 g/ml) induced 77% endothelium-dependent relaxation, whereas ExGrape total and grape seed extract (30 /ml) induced 84 and 72%, respectively. Dietary grape seed tannins (2% monomers or 2% polymers, 3 or 9 weeks) have a pronounced antihypercholesterolemic effect resulting from enhanced reverse cholesterol transport and also by reduced intestinal cholesterol absorption and increased bile acid excretion in rats. Procyanidin

supplementation in rat and rabbit reduced ischemia/reperfusion damage in the heart and this was associated with an increase in plasma antioxidant activity. Also, it was able to prevent a peroxynitrite attack to vascular cells by layering on the surface of coronary endothelial cells, and enhancing endothelial NO-synthase-mediated relaxation in human internal mammary aortic rings. On the other hand, it was shown that the modest vascular relaxations observed with catechin and epicatechin are not endothelium-dependent, but rather the relaxing effects of procyanidin from grape seed and anthocyanins were both related to the integrity of the endothelium and the synthesis and release of nitric oxide (NO). Polyphenolic compounds of grape seed extracts caused an endothelium dependent relaxation of blood vessels. It was suggested that the endothelium dependent relaxation evoked by the grape seed extract was mediated by activation of the AKT/ PI3 kinase signaling pathway through a redox-sensitive mechanism resulting in the phosphorylation of eNOS rabbit aortic rings. Similarly, proanthocyanidins-rich extract of grape seed had cardioprotective effects against reperfusion-induced injury in isolated rat hearts. The ability to reduce or remove, directly or indirectly, free radicals in myocardium that is reperfused after ischemia has been suggested as a possible mechanism. However, the ability to block the antideath signal through the inhibition of the proapoptotic transcription factor and gene, JNK-1 and c-Jun has been discussed as another possible mechanism. Quercetin (50100 mol/l) and catechin (1020 mol/l) synergistically inhibited platelet adhesion to collagen and collagen-induced platelet aggregation. Also, resveratrol-inhibited platelet aggregation (10 1000mol/l) and (4 mg/kg.d) respectively both in vitro and in vivo.

#### Hepatoprotective effects

It has been shown that pre-exposure of grape seed extract (3 or 7 days, 100 mg/kg, p.o.), followed by hepatotoxic doses of acetaminophen (400 and 500 mg/ kg, i.p.) significantly attenuated acetaminophen-induced hepatic DNA damage, apoptotic and necrotic cell death of liver cells, and counteracted the influence of acetaminophen-induced changes in bcl-XL expression in mice. In one study, grape seed extract (50 mg/kg a day orally for 28 days) protected the liver from oxidative damage following bile duct ligation in rats. Also, in another study, administrations of grape seed extract at a dose of 50 mg/kg/day orally for 15 days before ischemia/reperfusion injury and repeated before the reperfusion period, reduced hepatic ischemia/reperfusion injury in rats.

#### Anticarcinogenic effects

Topical application of a polyphenolic fraction isolated from grape seeds or commercial grape seeds resulted in highly effective protection against phorbol ester induced tumor promotion in chemical carcinogen initiated mouse skin. This effect may be largely due to the significant antioxidant activity of the procyanidins. In recent studies, mixed polyphenolic fractions on atoyopearlmatrix (TP-2, TP-4, and TP-6) from grape cell culture acted as potent catalytic inhibitors in a human DNA topoisomerase II

assay for cancer chemoprevention. Treatments that combined anthocyanin-rich fractions (TP-2; 0.5 or 2.0 g of dried material/ml), fractions containing catechins, procyanidin dimers, and flavanones (TP-4; 0.25 g of dried material/ml), and/or fractions enriched with procyanidin oligomers and polymers (TP-6; 0.15 or 0.5 g of dried material/ml) showed additive effects toward catalytic inhibition of the enzyme. TP-6, a procyanidin-rich fraction, and its subfractions were selectively cytotoxic to cancerous cell lines tested (maximal toxicity = 67.2%; ED (50) = 50.5 M). The red grape skin polyphenolic extract (25 g/ml) also prevented and inhibited angiogenesis in the Matrigel model by decreasing the basal motility of endothelial and cancer cells, and reversing the chemotactic effect of sphingosine-1-phosphate (S1P) and vascular endothelial growth factor (VEGF).

#### Antimicrobial and antiviral effects

Antimicrobial activity has been reported in several components of grapes including gallic acid, hydroxycinnamic acids, flavanols, trans-resveratrol, and tannins. Moreover, antilisterial activity has been reported for grape seed extract (1%). The seed and skin of Ribier grapes extracts decreased *L. monocytogenes* numbers from 10<sup>6</sup> CFU/ml to not detectable colonies within 10 min.

#### CNS effects

Grape seed extract (50 mg/kg) reduced the incidence of free-radical-induced lipid peroxidation in the central nervous system of aged rats and reduced hypoxic ischemic brain injury in neonatal rat. Grape seed extract (60 mg/kg) also showed neuroprotective effects on neuronal injury induced by transient forebrain ischemia in gerbil achieved by inhibiting DNA damage in the gerbil hippocampus. Furthermore, the extract (100 mg/ kg, 30 days) could inhibit the accumulation of age-related oxidative DNA damage in the spinal cord and in various brain regions. The administration of grape seed extract (100 mg/kg, 30 days) to aged rats increased memory performance and reduced reactive oxygen species production, which may be related to enhancement of the antioxidant status in the central nervous system. Proanthocyanidin intake (75 mg/kg, 9 weeks) was effective at up-regulating the antioxidant defense mechanism by attenuating lipid peroxidation and protein oxidation in the adult rat brain. Changes in the cholinergic system, however, indicated an increase in the Ach concentration with a moderate reduction in AChE activity, further suggesting that proanthocyanidin may have a potent role in enhancing cognition in older rats.

#### Dermatological studies

The combination GSPE containing 5000 ppm resveratrol could accelerate wound contraction and healing in mice. The application of topical GSPE facilitates oxidant-induced vascular endothelial growth factor (VEGF) expression in keratinocytes by modulating pathways that are common to both H<sub>2</sub>O<sub>2</sub> as well as TNF- $\alpha$  signalling.

#### Antidiabetic effects

GSPE has been reported to be effective in treating diabetic nephropathy, though little is known about the functional protein changes. After GSPE therapy in diabetic rats, only nine kidney proteins were found to return to normal levels. It was shown that these proteins are involved in oxidative stress, glycosylation damage, and amino acid metabolism. GPSE (250 mg/kg body weight/d) also ameliorated glycation-associated cardiac damage in diabetic rats<sup>15</sup>.

#### Other effects

Administration of grape seed extract, which contains 38.5% procyanidins, to hereditary cataractous rats (ICR/f rats) prevented the progression of cataract formation by their antioxidative action. Studies by on rat mandibles in the growth phase suggested that supplementation of the diet with GSPE could increase bone quality and bone strength of the mandibles. The protective effects of a vinifera grape skin extract (200 mg/kg/day) were shown against the deleterious effects of experimental preeclampsia in rats, a condition where reduced nitric oxide production and increases in oxidative stress are present. It seems that an endothelium dependent vasodilator effect and an antioxidant action play an important role in mediating the effects of GSE in experimental preeclampsia.

## 5. Conclusion

In summary, *V. vinifera* and its bioactive compounds have several pharmacological activities such as antioxidative, anti-inflammatory and antimicrobial activities, as well as in vitro activity against several cancer cell lines and hepatoprotective and cardioprotective effects. It seems that grape seed extract and its active components such as proanthocyanidins, resveratrol, and quercetin are potent antioxidants. The consumption of grapes and grape juice is likely to have positive effects on human health and especially in postmenopausal women. These results suggest that grape seeds and their active components should be studied in more detail for development as agents to assist in the treatment of cardiovascular, gastrointestinal, and neurodegenerative diseases.

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