

A REVIEW ON PHARMACOLOGICAL ACTIVITIES OF *COFFEA ARABICA*

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ABSTRACT

Coffea arabica is a globose, evergreen plant. It is usually found as a compact shrub 1.5 - 3 metres tall, though in time, if not pruned back, is able to become a small tree growing 3 - 10 metres tall with a spreading crown. The bole can become up to 8cm in diameter. coffee is one of the most common drinks in the world, its seeds have long been valued for their stimulating qualities. The plant is widely cultivated in many tropical regions for this seed, which is roasted to make the drink. The plant is also often grown as an ornamental in gardens. Arabica coffee's first domestication in Ethiopia is obscure, but cultivation in Yemen is well documented by the 12th century. *Coffea Arabica* accounts for 60% of the world's coffee production. *Coffea Arabica* takes approximately seven years to mature fully, and it does best with 1.0–1.5 meters (about 40–59 inches) of rain, evenly distributed throughout the year. It is usually cultivated between 1,300 and 1,500 m altitude but there are plantations that grow it as low as sea level and as high as 2,800 m. The plant can tolerate low temperatures, but not frost, and it does best with an average temperature between 15 and 24 °C (59 and 75 °F). Commercial cultivars mostly only grow to about 5 m, and are frequently trimmed as low as 2 m to facilitate harvesting. Unlike *Coffea canephora*, *C. arabica* prefers to be grown in light shade. *Coffea arabica*, a source of caffeine, is an important cash crop in Cameroon, and a decoction of the leaves in water is used as an antimalarial remedy. *Coffea arabica* is a natural ingredient that has promising efficacy in the topical treatment of oxidative stress-induced pathologies (e.g., premature skin aging, dermatoses), and its seed oil is widely used in cosmetic formulations. The properties of coffee are well known it is stimulant of central nervous system has a slightly Diuretic effect and lipolytic action when used externally.

Keywords: *Coffea arabica*, Diuretic, Stimulant, Antioxidant.

INTRODUCTION

Traditional herbal medicines are naturally occurring, plant-derived substances with minimal or no industrial processing that have been used to treat illness within local or regional healing practices. Traditional herbal medicines are getting significant attention in global health debates. In China, traditional herbal medicine played a prominent role in the strategy to contain and treat severe acute respiratory syndrome (SARS).¹ Eighty per cent of African populations use some form of traditional herbal medicine,^{2,3} and the worldwide annual market for these products approaches US\$ 60 billion.² Many hope traditional herbal medicine research will play a critical role in global health. China, India, Nigeria, the United States of America (USA) and WHO have all made substantial research investments in traditional herbal medicines.² Industry has also invested millions of US dollars looking for promising medicinal herbs and novel chemical compounds.⁴ This is still a relatively modest investment compared to the

overall pharmaceutical industry; however, it raises interesting ethical questions, some of which are not faced in more conventional drug development.

Coffea Arabica belongs to the family Rubiaceae. In equatorial regions, the plant can be grown at elevations from 1,300 to 2,800 metres, with 1,500 - 1,900 metres being most common. The minimum elevation reduces to about 500 metres at a latitude around 15°N or S, whilst in the subtropics it can be grown from sea level to 1,000 meters. It grows best in areas where annual daytime temperatures are within the range 14 - 28°C, but can tolerate 10 - 34°C. One to 2 months of less than 50mm rain facilitates uniform flowering. Heavy rain during and after harvest is not desirable.

Family: Rubiaceae

Common Name: coffee

DESCRIPTION

Coffea arabica is a Evergreen, glabrous shrub or small tree, up to 5 m tall when unpruned; leaves opposite, dark green, glossy, elliptical, acuminate-tipped, short-petioled, 5-20 cm long, 1.5-7.5 cm broad, usually 10-15 cm long and 6 cm broad; flowers white, fragrant, in axillary clusters, opening simultaneously 8-12 days after wetting; corolla tubular, 1 cm long, 5-lobed; calyx small, cup-shaped; fruit a drupe, about 1.5 cm long, oval-elliptic, green when immature, ripening yellow and then crimson, black upon drying, 7-9 months to maturity; seeds usually 2, ellipsoidal, 8.5-12.5 mm long, inner surface deeply grooved, consisting mainly of green corneous endosperm and small embryo; polyembryony recorded. 2,500 dried seed/kg.

Plant

Coffea Arabica is a small upright evergreen shrub or small tree that is grown in tropical climates. Grown as a houseplant in temperate climates with well-draining potting soil. Needs bright light and high humidity indoors but if taken outdoors prefers some partial shade.

Leaves: Leaves are simple, alternate, opposite, thin, dark-green, shiny surfaced, fairly stiff; axillary and sub-axillary buds often develop into reproductive lateral branches. Leaves petiolate, sometimes bearing interpetiolar stipules. Prominent leaf midrib and lateral veins

Flowers: Both the flower shoot and the fruit set of the coffee flower, the fragrance, shape and colour of which are reminiscent of jasmine, give some indication of the possible quantity of the expected coffee crop.

Fruit: the coffee fruit is red or purple colour usually known as cherry. Just like ordinary cherries, the coffee fruit is also a so-called stone fruit.

Cultivation: *Coffea arabica* prefers locations in light to semi-shady locations in airy places, at temperature between 20 to 25 degrees. Direct sunlight should be avoided, especially around noon, since it could burn the leaves. During winter it can be a little cooler. To be perfectly well, the coffee plant also needs high humidity. This can be achieved by a daily spraying. During summer the plant is especially well if it is kept in nature. *Coffea arabica* accounts for about three-quarters of coffee cultivated worldwide. It is grown throughout Latin America, Central and East Africa, India and, to some extent, Indonesia.



Coffea arabica

Chemical constituents⁵:

The main constituent present in *Coffea arabica* or coffee is caffeine. other than that *coffea Arabica* consists of other constituents such as chlorogenic acid , Trigonelline ,aqueous extract , amino acids , and polyphenols

Therapeutic uses⁶:

Astringent: The flavonoids present in the seeds are responsible for Astringent effect. The decoction of seeds was used orally for fever and as an astringent drug in Nicaragua

Aphrodisiac: In Cuba the hot water extract of the seeds was known as an aphrodisiac drug.

Anemia: The infusion of the leaves and the roasted seeds were used for anemia

Diarrhea: Glycosides present in *coffea Arabica* is responsible for anti-diarrheal effect. The leaf sap of Arabic coffee was consumed to treat diarrhea and intestinal pain in Africa.

PHARMACOLOGICAL ACTIVITES:

Antioxidant potential

In oxidative stress, reactive oxygen species (ROS) have been suggested to participate in the initiation and propagation of chronic diseases such as cardiovascular and inflammatory disease, cancer, or diabetes⁷. Antioxidants, which are found naturally in many foods and beverages, provide health benefits in the prevention of heart diseases and cancer by fighting cellular damage that caused by free radicals in the body. In general, consumers prefer natural antioxidants because they are considered to be safe and environmental friendly⁸.

Anticancer effect

The regular consumption of coffee reduces the feasibility of cancers of kidney, liver, premenopausal breast, and colon also due to caffeine, diterpenoids, caffeic acid, polyphenols, essential oil content, and heterocyclic molecules. However, no correlation was found between coffee intake and prostate, pancreatic, and ovarian cancers nowadays⁹. The anticancer effect of the fruit extracts of *C. arabica* has also been confirmed in mouse studies¹⁰.

Gastrointestinal and systemic effects

A cup of coffee contains about 80 mg of caffeine, but e.g. the high quality Hungarian short coffee contains only approximately 50 mg of caffeine, exactly as much as a cup of tea. Caffeine is rapidly absorbed in the gastrointestinal system bounding to proteins and being transported to many places in the human body. The blood plasma level reaches its maximum 30 min after the intake, and the half-life is 5 h. In the metabolic phase, caffeine is dimethylated and degraded to theobromine, theophylline, and paraxanthine. Due to caffeine, coffee beverage has a diuretic and a temporarily hypertensive effect, increases the secretion of the stomach acid, as well as stimulates the function of the heart and the kidney. The theobromine content of the seed also has a diuretic and spasmolytic effect similarly to theophylline¹¹.

Dermatological use

The powdered leaf and stem of *C. arabica* can provoke allergic reactions. Scientific tests have proven the anti-inflammatory activity of locally applied green seed extracts¹⁰. Kaempferol, rutoside, and quercetin showed an antiulcer activity in rats¹², and antiviral, antifungal, antibacterial, anticellulitic, anti-aging, anti-inflammatory, and antiallergic activity, as well¹². Coffee coal possesses astringent effect, while *in vitro* and *in vivo* studies showed that the hydroalcoholic extracts of the silverskin has no irritating effect on the skin and can be used by the cosmetic industry¹³.

Cardiovascular effects

Isoquercitrin and rutoside extracted from coffee seeds that can be used for atherosclerosis, while quercitrin has positive chronotropic, positive inotropic, and antiarrhythmic effects, as well as protected LDL against oxidative modifications in guinea pig. Quercetin and rutoside have been used in

the treatment of capillary fragility and phleboscclerosis¹².

Coffee seeds can also decrease the blood sugar level¹⁰. In the therapy, caffeine can be used for patients with mild cardiovascular diseases to increase blood pressure, body temperature, and blood circulation. The single ingestion of coffee polyphenols improved the peripheral endothelial function after glucose loading in healthy subjects¹⁴. The aqueous extract of *C. Arabica* possessed *in-vitro* anti-inflammatory effect against protein denaturation on egg albumins which is also due to the polyphenol content¹⁵.

Effects on the nervous system

Coffee has a well-known stimulant effect on the central nervous system¹⁶. It can increase the effect of painkillers¹⁷ or reduce tiredness¹⁷. American researchers have shown that the regular consumption of coffee and cola may reduce the incidence of Parkinson's disease. In addition, coffee can be used in migraine therapy combined with ergotamine, because caffeine has a vasoconstrictor activity in the brain. Coffee may facilitate sleeping in small concentration, which potential is used by homeopathic remedies¹⁸.

Respiratory effects

Coffee seeds can be used, as a respiratory stimulant an unexpected effect of caffeine is to promote quitting smoking¹⁹.

Use for obesity

Although, some data suggest that caffeine is effective in weight-loss diets through e.g. thermogenesis and fat oxidation²⁰, it is still not fully known. The topical anticellulite effect of siloxanetriol alginate caffeine has also been shown by histological evaluation of fatty tissues in Wistar rats (the diameter of the fatty cells was reduced by 17%)²¹.

CONCLUSION

The present review reveals the description, active constituents, therapeutic uses and pharmacological activities of *coffea arabica*. The main constituent in *coffea Arabica* or coffee is caffeine. It also reveals that *coffea arabica* contains several phytoconstituents including as chlorogenic acid, Trigonelline, aqueous extract, amino acids, and polyphenols. *Coffea Arabica* contains flavonoids such as Kaempferol, rutoside. The plant has been studied for its various pharmacological activities like antioxidant activity, anti-inflammatory activity, anticancer activity, cardiovascular effect, antifungal, antibacterial, anti-aging, anti allergic. *Coffea*

Arabica has a great perspective for the treatment of diseases like heart diseases, respiratory, nervous effect etc. Further studies and investigations can be performed on the plant for its various pharmacological activities.

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