



ROSA DAMASCENA: AN OVERVIEW

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ABSTRACT

Rosa damascene Mill. commonly known as Damask rose is used in successful management of different ailments by Unani physicians since antiquity. As a cardiotoxic it is useful in the management of Palpitation, syncope, endocarditis. It can be used in pulmonary and uterine haemorrhage. In recent years, antioxidant, antispasmodic, cardiovascular preventive, antibacterial, and skin protective effects of extracts from this plant have been reported in the medical literature. In Unani system of medicine it has been described as tonic for principal organs, general tonic, stomachic, analgesic, antiseptic, brain tonic, exhilarant, carminative, expectorant, refrigerant and cardiotoxic. In this article an attempt has been made to summarize classical Unani literature and modern researches on Damask rose.

KEY WORDS: *Rosa damascene Mill.*, stomachic, analgesic, antiseptic, brain tonic.

INTRODUCTION

Rosa damascene Mill. commonly known as Damask rose is a deciduous shrub growing up to 2.2 meters height. Apart from the use of *R. damascena* as an ornamental plants in parks, gardens, and houses its flowers are renowned for their fine fragrance, and are commercially harvested for use in perfumery and to make rose water and "rose concrete". The flower petals are also sometimes used directly to flavor food or to make tea and are considered safe for human consumption. Rose flowers are commonly used in all traditional system of medicine (Tariq M, 2013). The total world production of rose oil is approximately metric tons, with Bulgaria and Turkey being the major producers, followed by Morocco, Egypt, China, Russia, Iran and India. (Verma RS et al, 2011). The flower of *R. damascena* is enriched in essential oil. The flowers are renowned for their fine fragrance, and are commercially harvested for rose oil and to make rose water. The essential oil of *R. damascena* flower is precious and is used in perfumery. (Sadraei H et al, 2013) Although this rose species is mainly known for its perfuming effects, it has many medicinal uses. In recent years, antioxidant, antispasmodic, cardiovascular preventive, antibacterial, and skin protective effects of extracts from this plant have been reported in the medical literature (Jafari M et al, 2008).

Macroscopic: Flower stalked, pinkish-yellow, consists of sepals, petals and stamens attached to pedicel with thalamus at the base; stalk 0.6-3.5 cm long, light green,

slender, covered with numerous prickles and hairs; thalamus 1.0-1.8 cm long, light greenish-brown, covered with numerous prickles and hairs; sepals 5, free, 1.3 – 2.4 cm long, unequal, leaf-like, upper part creamish-green and light yellowish-green on lower part, having glandular hairs; petals numerous, pinkish-yellow, 1.5-4.2 cm long, 1.3 – 2.5 cm wide, smooth obovate to subcordate; stamens numerous, free, unequal, dorsifixed, dark-brown; filament 0.3-0.5 cm long; carpels many free, ovary inferior; styles lateral, hairy, free; stigma terminal; taste astringent; odour aromatic.

Microscopic: Sepal- Shows single layered epidermis on both surfaces; numerous long, unicellular hairs present on upper surface, a few glandular hairs on lower surface; both epidermises followed by a wide zone of mesophyll consisting of round to oval, thin-walled, parenchymatous cells; a number of vascular bundles found scattered in this region.

Petal- Shows lower epidermis papillose and without cuticle; upper epidermis single layered with thin striated cuticle, followed by mesophyll consisting of oval to polygonal, elliptical, thin-walled, parenchymatous cells; a number of vascular bundles found scattered in this zone.

Powder: Light-brown in colour; fragments of petal of epidermis consisting of thin-walled, sinuous cells extended to form papillae; xylem vessel with spiral thickenings long, pointed, uniseriate, unicellular hair and

stalked capitate glandular hairs; abundant, smooth spherical pollen grains, measuring 27- 41 μ in diameter having clear intine and exine with three distinct germ pores. (Anonymous, 2007).

Family: Rosaceae. (Nadkarni KM, 2009, Khare CP, 2007, Anonymous, 2007)

Habitat and distribution

The origin of Damask rose is the Middle East and some evidences indicate that the origin of rose water is Iran, but the origin of its fragrant oil and extracts is Greece. This plant is cultivated all over the world including Iran, Europe, Bulgaria, Turkey and India. In India Rosa damascena is cultivated chiefly in Aligarh, Ghazipur and Kannauj. (Khare CP, 2007) Vast number of wild hill roses grows throughout Bengal, Himalayas, Patna and Kashmir. (Nadkarni KM, 2009)

Temperament

Murakkabul quwa. (Anonymous, 2007)

Sard in 1st degree *khushk* in 2nd degree. (Ghani N, 2011, Hubal I, 2005, Kabiruddin H, YNM, Ibn Rushd, 1987, Haleem A, YNM)

Af'aal: Tonic for principal organs (Anonymous, 2006), General tonic (Kirtikar KR, 2006), stomachic (Anonymous, 2006), Analgesic, (Anonymous, 2006), Antiseptic (Anonymous, 2006), Brain tonic (Ghani N, Ynm), Exhilarant (Ghani N, Ynm), Carminative (Nadkarni KM, 1976), Astringent (dry flowers), (Anonymous, 2006; Kirtikar KR, 2006; Nadkarni KM, 1976; Khare CP, 2007), Purgative (fresh flowers) (Kirtikar KR, 2006; Khare CP, 2007), Expectorant (Kirtikar KR, 2006; Khare CP, 2007), Refrigerent (Nadkarni KM, 1976 Khare CP, 2007; Anonymous, 2006), Cardiotoxic (Kirtikar KR, 2006; Nadkarni KM, 1976; Khare CP, 2007), Anti-inflammatory (Khare CP, 2007).

ISTEMAL

As a cardiotoxic it is useful in the management of Palpitation, sycops, endocarditis. It can be used in pulmonary and uterine haemorrhage. It is also used in Jaundice, Hepatitis, sore throat, enlarged tonsils, skin irritation. (Aslam M et al, 2013) Preparations of Rose are used for the prevention and treatment of colds and influenza-type infections, for the treatment vitamin C deficiencies and for increasing resistance. (Khare CP, 2007).

Phyto-Chemical Studies: All parts of the rose plant yielded quercetin, kaempferol and cyanidin. Lycopene, rubixanthin, zeaxanthin, xanthophyll and taraxanthin have been isolated from the hips. Th flowers contain an essential oil with citronellol, nerol, geraniol, beta-phenylethanol and its glucoside, eugenol and methyl eugenol; other constituents include organic acids, chlorogenic acid, tannin, cyanin, cyanidin and its diglucoside, quercitrin, carotene and sugars. Pollen from

flowers contain carotene (0.76 mg / 100 g), sugars (1%) and chlorogenic acid (1.5%). Their proline content is found unusually high.

The red colouring matter consists of cyanin (9-10% on dry weight basis); a yellow glucoside of quercetin and quercitrin is also present. Flowers, usually, yield 0.04% oil or otto of rose. Dog Rose, extensively cultivated in Europe, North Africa and parts of Asia, is equated with *Rosa canina* Lin. Th rose hip contains vitamin C (0.2-2%), malic and citric acid, pectins (15%), invert sugar (12-15%), tannins (2%), carotenoids, flavonoids. (Khare CP, 2007)

Pharmacological Activities

Antibacterial activity: Kurhade et al have investigated the effects of water and acetone extracts of *Rosa Damascena* Miller. Petal against E.coli and B.subtilis. The preliminary phytochemical screening of water and acetone extract showed presence of Carbohydrates, proteins, fats and oils, steroids, volatile oil, glycosides flavonoids, alkaloids, tannins, organic acids and vitamins. The crude drug evaluation of Rosa Damascena Mill petals showed Total Ash value 6.5%, Acid insoluble ash value 0.9% and water soluble ash value 1.8%.The Cup plate method expressed that zone of inhibition of high concentration of acetone and water extractives were found to produce a typical dark red color zone which signifies the alter the growth of both Gram +ve and Gram – ve bacteria. (Kurhade BB, 2011)

Anti-inflammatory and Analgesic activity

The hydro-alcoholic extract and essential oil of the *Rosa damascena* were investigated for its possible anti-inflammatory and analgesic activities by Hajhashemi et al. The extract was administered at the doses (p.o.) of 250, 500 and 1000 mg/kg and the doses of essential oil were 100, 200 and 400 μ L/kg. The acetic acid-induced writhing response, formalin-induced paw licking time in the early and late phases and light tail flick test were used in mice to assess analgesic activity. For evaluation of anti-inflammatory effect carrageenan-induced paw edema served as a valid animal model in rats. The extract significantly attenuated the writhing responses induced by an intraperitoneal injection of acetic acid and also showed potent analgesic effect in both phases of formalin test but not in light tail flick test. In addition, the higher dose of the extract significantly ($P < 0.05$) reduced carrageenan-induced paw edema. Essential oil of the plant at all administered doses failed to show any analgesic or anti-inflammatory effect in above mentioned tests. These results provide support for the use of hydroalcoholic extract of *Rosa damascena* in relieving inflammatory pain, and insight into the development of new agents for treating inflammatory diseases. (Hajhashemia V et al, 2010).

Antioxidant activity

In a study, the antioxidant activity of hydro-alcoholic extract of petals and essential oil was measured using

free radical scavenging activity with 2,2-diphenyl, 1-picrylhydrazyl (DPPH) and lipid peroxidation (ferric ammonium thiocyanate) methods. Hydro-alcoholic extract showed strong free radical scavenging capacity compared to lipid peroxidation inhibitory effects. IC₅₀ values of the extract were 2.24 µg/mL and 520 µg/mL in free radical scavenging and lipid peroxidation assays, respectively. The major components of essential oil were linalool (3.8%), nerol (3.05%), geraniol (15.05%), 1-nonadecene (18.56%), n-tricosane (16.68%), hexatriacontane (24.6%) and n-pentacosane (3.37%). (Yassa N *et al.*, 2009)

Hypnotic activity

In a study hypnotic effect of ethanolic, aqueous and chloroformic extracts of *Rosa damascena* was investigated in mice. Hypnotic method was based on potentiation of pentobarbital induced sleeping time by extracts. Three doses of extracts (100, 500 and 1000 mg/kg) were injected intraperitoneally in comparison with diazepam (3 mg/kg) as the positive control and saline as the negative control. Thirty min after injection of extracts, pentobarbital (30 mg/kg) was injected and any increase in the sleeping time due to the extracts was recorded. Results showed that the ethanolic and aqueous extracts in doses of 500 and 1000 mg/kg significantly increased the pentobarbital induced sleeping time ($P < 0.001$, compared to the negative control), which was comparable to diazepam. (Rakhshandah H *et al.*, 2004)

Antibacterial Activities

The antioxidant and antibacterial activities and total phenolic contents of *Rosa damascena* Mill. flower extracts (absolute, essential oil and hydrosol) were investigated in a study. The chemical compositions of these extracts were analysed by GC-MS. Phenylethyl alcohol (78.38%) was found to be the main constituent of rose absolute, while citrenellol and geraniol were the major compounds (>55%) of rose essential oil and hydrosol. Tocopherol and carotene levels were determined by high performance liquid chromatography (HPLC) analysis. The levels of beta carotene (422.3±35.6 ppm), alpha tocopherol (2397.1±72.5 ppm) and gamma tocopherol (343.1±28.4 ppm) of rose absolute were found to be higher than that of essential oil and hydrosol. Their total phenolic contents were also evaluated. The total phenolic content of the tested extracts varied from 5.2 to 2134.3 GAE/mg L(-1). Rose absolute and essential oil contained high levels of phenolics and demonstrated strong antibacterial activity against *Escherichia coli* (ATCC 25922), *Pseudomonas aeruginosa* (ATCC 27853), *Bacillus subtilis* (ATCC 6633), *Staphylococcus aureus* (ATCC 6538), *Chromobacterium violaceum* (ATCC 12472) and *Erwinia carotovora* (ATCC 39048) strains. (Ulusoy S *et al.*, 2009)

Antioxidant Activity: A variety of flavonoids, lignans, an alkaloid, a bisbenzyl, coumarins and terpenes isolated from Chinese herbs was tested for antioxidant activity as

reflected in the ability to inhibit lipid peroxidation in rat brain and kidney homogenates and rat erythrocyte hemolysis. The pro-oxidant activities of the aforementioned compounds were assessed by their effects on bleomycin-induced DNA damage. The flavonoids baicalin and luteolin-7-glucuronide-6'-methyl ester, the lignan 4'-demethyldeoxydopodophyllotoxin, the alkaloid tetrahydropalmatine, the bisbenzyl erianin and the coumarin xanthotoxol exhibited potent antioxidative activity in both lipid peroxidation and hemolysis assays. The flavonoid rutin and the terpene tanshinone I manifested potent antioxidative activity in the lipid peroxidation assay but no inhibitory activity in the hemolysis assay. The lignan deoxydopodophyllotoxin, the flavonoid naringin and the coumarins columbianetin, bergapten and angelicin slightly inhibited lipid peroxidation in brain and kidney homogenates. It is worth stressing that the compounds with antioxidant effects in this assay, with the exception of tetrahydropalmatin and tanshinone I, have at least one free aromatic hydroxyl group in structure. Obviously, the aromatic hydroxyl group is very important for antioxidative effects of the compounds. None of the compounds tested exerted an obvious pro-oxidant effect. (Ng TB, 2000)

Relaxing Effect: Hongratanaworakit T investigated the relaxing effect of rose oil on human autonomic parameters and emotional responses in healthy subjects after transdermal absorption. In order to exclude any olfactory stimulation the inhalation of the fragrances was prevented by breathing masks. Forty healthy volunteers participated in the experiments. Five autonomic parameters, i.e. blood pressure, breathing rate, blood oxygen saturation, pulse rate, and skin temperature, were recorded. Emotional responses were assessed by means of rating scales. Compared to placebo, rose oil caused significant decreases of breathing rate, blood oxygen saturation and systolic blood pressure, which indicate a decrease of autonomic arousal. At the emotional level, subjects in the rose oil group rated themselves as more calm, more relaxed and less alert than subjects in the control group. These findings are likely to represent a relaxing effect of the rose oil and provide some evidence for the use of rose oil in aromatherapy, such as causing relief of depression and stress in humans. (Hongratanaworakit T, 2009)

Cardioprotective activity

In a study it was reported that administration of aqueous and ethanolic extract of *Rosa damascena* increases heart rate and heart contractility in animal model. However, the effect of the extract on heart contractility (inotropic effect) was more pronounced in hypocalcaemia conditions which results in low systolic intracellular free calcium concentration and in heart failure patients, *Rosa damascena* would increase the contractile response, thereby improving cardiac pumping function. (Boskabady MH *et al.*, 2011)

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