

PHARMACOLOGICAL EFFECTS OF ROSA DAMASCENE MILL AND ITS VARIOUS ISOLATED CONSTITUENTS FROM FLOWERS, AN IMPORTANT DRUG OF UNANI MEDICINE. A REVIEW

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Abstract

Rosa damascena Mill is one of the most well-known decorative plants cultivated all over the world mostly for perfumery industries. The R. damascene and its preparations have been used therapeutically since over hundreds of years. The actions of R. damascene in Unani classical books described as anti-inflammatory, anti-viral, anti-bacterial, sedative, strengthens nerves, aphrodisiac, soothing, brain and heart tonic and anti-stress, antidote of poisons etc. The most therapeutic effects of R. damascena in Unani medicine are including treatment of abdominal and chest pain, strengthening the heart, digestive problems, tonic for heart, Stomach, liver and uterus. This plant is also used as a gentle laxative. Rose oil heals depression, grief, nervous stress and tension, general body tonic) for the purpose of improving functions of vital organs, increasing Hararat-eghareezi (metabolic heat) and Rooh (vital energy or life force) for boosting the immune systems and blood purifier. The authors searched the Unani medicine book available in the library of Regional Research Institute of Unani Medicine, Mumbai for information related to R. damascena, many important books of Unani Medicine were reviewed. Systematic searched also was electronically conducted in following databases: PUBMED, SCOPUS and WEB OF SCIENCE, all from the inception date till the end of May 2020 to identify all published investigations on Rosa Damascena Mill.

Keywords: Gule Surkh ; Vital energy; Metabolic heat; Mufarreh; PUBMED.

Introduction

Unani medicine is one of the most popular and ancient system of medicine has been known for the use of plants, Mineral, and animal origin drugs. The *Rosa damascena* is commonly known as the Damask rose and is renowned for its fine fragrance. It is well known for its relaxing effects; traditionally, rose oil is used as a remedy for anxiety, depression and for the treatment of stress related conditions in many parts of the world (T. Hongratanaworakit et al; 2009). The *Rosa damascena* is one of the plant origin drug which actions and properties are known to Unani ancient physicians. Several pharmacological properties including anti-HIV, antibacterial, antioxidant, antitussive, hypnotic, antidiuretic, and relaxant effect on tracheal have been reported in studies. (Boskabady; 2011). The ancient Unani physicians described all the above said pharmacological actions of *R. damascena* in their ancient Unani books. The *R. damascena* and its preparations have been used therapeutically since over hundreds of years. The actions described in Unani ancient books are as brain and heart tonic (Hakim; 2002); soothing (mufarreh), brain and heart tonic, anti-stress. (Ghani;1926; Rafiquddin;1985; hakim;2002). The most therapeutic effects of *R. damascena* in Unani medicine are including treatment of abdominal and chest pain, strengthening the heart, digestive problems, tonic for heart, Stomach, liver and uterus. This plant is also used as a gentle laxative. (Ghani;1993, Masihi;ynm, Ghani;1926, hakim,;2002, Anonymous;1993, Rafiquddin;1985.) Rose oil heals depression, grief, nervous stress and tension, general body tonic) for the purpose of improving functions of vital organs, increasing Hararat-e-ghareezi (metabolic heat) and Rooh (vital energy or life force) for boosting the immune systems, blood purifier, and antidote of poisons etc. (Ghani, 1926; Chughtai and Chughtai; 1963). *Rosa damascena* mill L, commonly known as Damask rose (Kumar. N et al; 2006), is known as Gole Mohammadi in Iran and commonly known as Gulab. It is one of the most important species of Rosaceae family. Rosaceae are well-known ornamental plants and have been referred to as the king of flowers. (Boskabady; 2011) At present time, over 200 rose species and more than 18000 cultivars form of the plant have been identified. (Boskabady et al; 2011,). There are different products from *R. damascena* in the world. The major products are Rose water, Rose oil, dried flowers and gulqand. Other different products are including hydrosol, absolute, ethanolic, aqueous, and chloroformic extractions from flowers, petals, and hips (seed-pot) of this plant. In comparison with rose oil, hydrosol and absolute are less expensive. The ethanolic, aqueous, and chloroform extracts are also prepared for research purposes (KHC et al; 2003 and Boskabady; 2011). The whole plant is used medicinally, Flowers, flower- buds, petals, stamens, and a volatile oil, essence of Rose and Rose water. (Hakim;2002; Ghani, 1926; Chughtai and Chughtai; 1963; Nadkarni, 1976; Anonymous, 1993, Boskabady et al; 2011).

Methodology

Search strategy

The authors searched the Unani medicine book available in the library of Regional Research Institute of Unani Medicine, Mumbai for information related to *R. damascena*, many important books of Unani Medicine were reviewed. Systematic searched also was electronically conducted in following databases: PUBMED, SCOPUS and WEB OF SCIENCE, all from the inception date till the end of May 2020 to identify all published investigations on *Rosa Damascena* Mill. The database named .The selected search terms were (“*Rosa*

damascena” OR Damask Rose). In PUBMED database the search field was “Title/Abstract” and in SCOPUS database was Title/Abstracts/Keywords” and in WEB was “Topic.

Vernacular Names

English: Damask Rose, Damascus Rose, **Latin:** *Rosa damascena* Mill. **Persian:** Gule Surkh, **Urdu:** Gulab, **Hindi:** Gulab, **Sanskrit:** Satapatrika, Shatapatrika, Lakshapushpa, **Marathi:** Gulab, **Gujarati:** Moshamee, **Gulab Bengla:** Gulap; Roja-puvou, (Hakim; 2002, Nadkarni, 1976; Dymock et al., 1890; Warriar et al., 1994; Husain; 1993, Ghani 1926; Rafiquddin; Hakim; 2002).

Habitat and Distribution

This plant is cultivated in all over the world including Iran, Europe, Bulgaria, Turkey and India (G.krussman; 1981; Dymock et al; 1890). Numerous species and forms are cultivated in India *R. damascena* with its red double flowers is the utmost important; and it is cultivated in rose gardens in numerous places in Bengal, Kashmir, Punjab, and chiefly near Patna and Ghazipur. Massive quantity of wild hill roses grows all over the north-West Himalayas and Kashmir throughout India; and cultivated mainly in Uttar Pradesh and Rajasthan (Nadkarni, 1976; Anonymous, 1993; Husain, 1993).

Botanical Description

R. damascena is a shrubby plant, with numerous unequal with strong prickles, dilated at the base. The leaves are imparipinnate and compound with 5-7 leaflets (Libster et al; 2002, Boskabady; 2011; K. Rechinger et al; 2012), sepals deflexed after the flower have open; tube elongated, often dilated at the top; fruit ovate, pulpy; calyx and peduncles glandulose hispid viscid; colour of flower light red (Dymock et al, 1890). Stems generally with many stout and hooked prickles, occasionally mixed with glandular bristles. Leaflets usually 5, some times 7, ovate-oblong, serrate, more or less pubescent beneath, 2.5 6.3 cm long; stipules scarcely dilated, sometimes pectinate; petioles prickly. Flowers generally corymbose, double, red, pink or white, occasionally striped; pedicels and receptacles glandular-hispid. Sepals deciduous, reflexing during flowering-time. Fruit obovate (Warriar et al., 1994).



The plant of *R. damascena*

Chemical composition

Volatile essential oil, fat, resin, manic, tartaric and tannic acids. Red rose petals contain an aromatic volatile oil, a glucoside querictrin, gallie acid quercitannic acid and red colouring matter (Nadkarni, 1976). The rose oil contains minute quantities of damascenone, ketone with powerful fragrance characterized as trans-2, 6, 6-trimethyl-1 crotonoylcyclohexa-1, 3-diene and four related, more saturated ketones, damascone. Other constituents include methanol, ethanol, hexanol, heptanol, octanol, nonanol, citronellol, geraniol, nerol, linalool, terpinen-4-ol, phenylethyl alcohol, farnesol, acetalehyde, cinnamaldehyde, salicylalde, neral, geranial, hexylactate, tate, linalyl acetate, carvone, tran-damascenone, methyheptenone, eugenol, methyleugenol, alfa and beta –pine, camphene, myrcene and propionic, butyric, veleric and caproic acids are also. All parts of the rose plant yielded quercetin, kaempferol and cyaniding (Husain, 1993; Balz et al., 1999). Numerous components were isolated from flowers, petals and hips (seed-pot) of *R. damascena* with terpenes, glycosides, flavonoids, and anthocyanins (Oka N;1998, Kumar N; 2006). This plant contains carboxylic acid (Green M;1999) myrcene (Buckle J; 1997), kaempferol and quarcetin (Mahmood N;1996). Flowers also contain a bitter principle, tanning matter, fatty oil and organic acids (Nyeem et al;2006). Loghmani-Khouzani et al; 2007) found more than 95 macro- and micro-components in the essential oil of *R. damascena* from the Kashan regions, eighteen compounds represented more than 95% of the total oil. The identified compounds were; β -citronellol (14.5-47.5%), nonadecane (10.5-40.5%), geraniol (5.5-18%), and nerol and kaempferol were the major components of the oil (2). Analyses of rose absolute showed that phenyl ethylalcohol (78.38%), citrenellol (9.91%), nonadecane (4.35%) and geraniol (3.71%) ethanol (0.00-13.43%), and heneicosane were the major compounds (Ulusoy S; 2009). In another study, the composition of rose was phenyl ethylalcohol (72.73–73.80%), citrenellol (10.62–11.26%), nerol (2.42–2.47%), and geranial (5.58–5.65%) (Aydinli M; 2003). Hydrosol was also found to contain four constituents; geraniol was the major compound (30.74%) followed by citrenellol (29.44%), phenyl ethylalcohol (23.74%), and nerol (16.12%) (Yassa N; 2009 Ulusoy S; 2009). The medicinal functions of Rosaceae are partly attributed to their abundance of phenolics compound. Phenolics possess a wide range of pharmacological activities, such as antioxidants, free-radical scavengers, anticancer, anti-inflammatory, anti-mutagenic, and antidepressant (Hongratanaworakit et al; 2009).

Part Used

Flowers, flower- buds, petals, stamens, and a volatile oil (Oleum Rosae), attar or Otto of Rose (Ghani; 1926, Rafiquddin; 1985, Nadkarni; 1976; Anonymous; 1993).

Mizaj (Constitution)

Murakkab-ul-quwa (dominated by cold) (Hakim; 2002; Ghani; 1926).

Actions

Mildly astringent, carminative, and refrigerant, cardiac tonic. (Nadkarni, 1976; Anonymous; 1993). The flower is bitter, acrid, with a good odor; cooling, laxative, aphrodisiac, antipyretic; (Ghani; 1926, Rafiquddin; 1985, Al Masihi; ynm) burning sensations; removes bad odor from the mouth, improves appetite. The flower is bitter, sweetish; tonic, laxative, expectorant, cardiac tonic, good for the eyes, headache, toothache, stomatitis; benefits the lungs, the kidneys, the liver; used in heat of body, chronic fevers inflammation, intestinal affections; excessive perspiration; astringent when dry (Al Masihi; ynm, Ghani;1926, Hakim;2002, Anonymous;1993,

Rafiquddin;1985). Strengthening, astringent, expectorant; slightly laxative, promotes wounds healing, and scar formation, hemostatic, antiseptic, and anti-inflammatory, anti-viral and anti-bacterial, sedative, strengthens nerves, aphrodisiac (Usmani;2008, Balz et al., 1999 Rafiquddin; 1985,) brain and heart tonic (Hakim; 2002); soothing (Mufarreh) for brain and heart tonic, anti-stress. (Ghani; 1926, Rafiquddin; 1985).

Therapeutic Uses in Unani Medicine

Petal – astringent; gulkand made from petal – tonic; bud – cordial (Ghani; 1926, Husain, 1993). In India, rose buds are preferred for medicinal use, as they are more astringent than the expanded flowers; they are considered to be cold and dry, cephalic, cardiac, removing bile and cold humours. A conserve made from equal parts of rose petals and white sugar beaten together, known as gulkand, is considered tonic and fattening, and is much used by women and old people. (Ghani; 1926).

Tonic for heart, Stomach, liver and uterus (Rafiquddin; 1985, Ghani;1926, Balz et al., 1999); useful in palpitation, abdominal cramps, pain in liver and spleen, headache (Ghani,1926; Chughtai and Chughtai; 1963 Rafiquddin; 1985, Ghani;1926). Vital organ tonic (Ghani;1926, Usmani;2008, anonymous; 1993).

Side effects

It produces nasal catarrh and brings early graying of hairs (Hakim, 2002). It also produces headache and is harmful to those persons who have tendency of Catarrh (Ghani; 1926).

Correctives (Musleh)

Rose syrup and Misri (Hakim; 2002) Arq-e-nilofar, raw sugar (Ghani; 1926). Honey (Rafiquddin; 1985)

Dose:

Up to 60ml (Ghani; 1926) 50-100 ml (Hakim; 2002). (Anonymous; 1993).

Effects of *R. damascena* on Health and recent studies

A wide range of studies have been conducted concerning the biological activities and curative properties of *R. damascena* is used in the treatment of various diseases globally, especially against diseases such constipation, diabetes, cardiovascular, palpitation, abdominal cramps, pain in liver and spleen, headache and in general debility etc.

Antimicrobial activity

In Butool's study on albino mice, investigate the toxicological and prophylactic potential of ethanolic extracts of *Rosa damascena* and *Nymphaea alba* and their mixture. The Results confirmed that these extracts are potent source of antimicrobial compounds and that they have synergistic effect in combined form. (Butool et al; 2018) It is notable that no antimicrobial effect of its hydrosol has been reported. Anti-fungal activity was only detected by its aqueous extract against *Candida albicans*. (TalibWH;2010, Mahmood et al; 2010) tested the isolated constituents of its methanolic extract against HIV virus and detected different antiviral mechanisms indicating the synergistic effect of components together in the whole plant. Mahmood N; 1996). In another study showed that ten essential oils, were tested for their antibacterial activities towards *Propionibacterium acnes* and in vitro toxicology against three human cancer cell lines. Thyme, cinnamon and rose essential oils

exhibited the best antibacterial activities towards *P. acnes*, with inhibition diameters of 40 ± 1.2 mm, 33.5 ± 1.5 mm and 16.5 ± 0.7 mm, and minimal inhibitory concentrations of 0.016% (v/v), 0.016% (v/v) and 0.031% (v/v), respectively. (Zu ; et al 2010). Mahmood et al. tested the isolated constituents of its methanolic extract against HIV virus and detected different antiviral mechanisms indicating the synergistic effect of components together in the whole plant. It is notable that no antimicrobial effect of its hydrosol has been reported and anti-fungal activity was only detected by its aqueous extract against *Candida albicans*. (Mahmood et al;1996).

Anti-inflammatory and Analgesic effect

Zaidi et al study on effect of selected indigenous medicinal plants of Pakistan, evaluated on the secretion of interleukin-8 (IL-8) and generation of reactive oxygen species (ROS) in a bid to rationalize their medicinal use and to examine the anti-inflammatory and cytoprotective effects in gastric epithelial cells. The Study shown, 70% hydro-alcoholic extract of *R. damascena* Mill with 100µg/ml concentration exhibited potent inhibition on IL-8 secretion, in *Helicobacter pylori* infection. (Zaidi et al; 2012).

Antioxidant activity

A variety of polyphenolic compounds, mostly the glycosides of kaempferol and quercetin were derived from the methanolic extract and suggested as active antioxidative components and DNA protective agents. They determined antioxidant activity of this extract compare to standard antioxidant L-ascorbic acid by 1, 1-diphenyl-2-picryl hydrazyl (DPPH) free-radical method. This study showed that *R. damascena* has high antioxidant activities.

(Kalim MD;2010, Kumar N; 2010). However, after comparing the antioxidant properties of 10 medicinal plants, Moein et al; 2012 concluded and noted the DPPH radical scavenging effect of the ethanolic extract, as a consequence of existing non-phenolic compounds. (Moein S; 2012). Sedighi et al, also has demonstrated the antioxidant activity of a 70% hydro-alcoholic extract of Damask rose by the ferric thiocyanate method, 78% equivalent to rutin (a standard flavonoid compound) (Sedighi M ;2014).A study was showed on *Rosa damascena* Mill. (Rosaceae) that the petal of cultivated rose has no bitter taste because of its potential antioxidant activity and good taste, can be used as food flavor and a preventing agent for many diseases. (Yassa N et al; 2008).

Effect on cardiovascular

Fatima et al, evaluated the cardio protective effect of *Rosa damascena* petals called rose on isoproterenol-induced myocardial infarction in experimental rats. The results of the present study indicated that ethanolic extract of *Rosa damascena* showed myocardial retrieval by restoring the cardiac marker enzymes and decreasing the level of plasma lipid profiles along with an increase in HDL. Additionally, level of myocardial antioxidants increased along with a lessening in the content of malondialdehyde. The cardioprotective effect was compared with Metoprolol which was used as the standard. Histopathological findings revealed a decrease in the degree of necrosis and inflammation following pretreatment with *Rosa damascena*. The present investigation indicates that *Rosa damascena* exerts cardio protective activity against isoproterenol-induced cardiac damage in rats. (Fatima et al; 2019).

Neuropharmacological effects

Numerous Pharmacological studies have been performed on *R. damascena* to assess their effects on the central nervous system (CNS). Ethanolic extract of the flowering tops of *R. damascena* has been shown to possess a potent depressant activity on CNS in mice. Some of these effects that evaluated are hypnotic, anticonvulsant, anti-depressant, anti-anxiety, analgesic effects, and nerve growth (Boskabady MH; 2011) Nazi et al, conducted double-blind, placebo-controlled cross-over trial and evaluated the effect of topical formulation of Rosa damascena Mill. (*R. damascena*) oil on migraine headache, applying syndrome differentiation model. The result showed that syndrome differentiation can help in selection of patients who may benefit from the topical *R. damascena* oil in short-term relief of pain intensity in migraine headache. (Nazi et al; 2017)

Anti-aging effects

In an experimental trial was done, rose-flower extract, (*Rosa damascene*) on the mortality rate of *Drosophila melanogaster*. The result showed statistically significant decrease in mortality. They have presented evidence that *R. damascena* can extend *Drosophila* life span without impacting physiological mechanisms that can result in an artifactual longevity benefit. (Jafri et al; 2008).

Laxative and Prokinetic Effects

An animal study was conducted to assess the possible laxative and prokinetic effects of the boiled extract of *Rosa damascena*. The result showed that boiled extract of *R. damascena* significantly increased faeces number and its percentage of water, but had no effects on the transit time of intestinal ingesta. The volume of the contents in jejunum segments had significantly increased with the extract or lactulose compared to placebo and finally concluded that Boiled extract of *R. damascena* apparently exerts its laxative effects, at least in part, via osmotic infiltration of fluids into the intestine. (Arezoomandan et al; 2011)

Improved sexual dysfunction

A double-blind, randomized, and placebo-controlled clinical trial was conducted by Vahid Farnia et al and found *Rosa damascena* oil improves ssri-induced sexual dysfunction in male patients suffering from major depressive disorders. The clinical trial shows that the administration of *R. damascena* oil improved sexual dysfunction in male patients suffering from both MDD and SSRI-I SD. Further, the symptoms of depression reduced as sexual dysfunction improved. (Vahid Farnia et al; 2105).

Conclusion

The ancient Unani physicians who described the actions of *R. damascena* Mill in their classical books validated in recent studies done by researchers and scientist. This plant contains several components such as terpenes, glycosides, flavonoids, and anthocyanins that have beneficial effects on human health. In conclusion, there are promising evidences for the effectiveness of *Rosa damascena* Mill in various positive findings in depression, sexual function, relaxation, anti-ageing, laxative and respiration. In multiple studies representing significant analgesic and anti-inflammatory outcomes are more considerable. The respiratory, cardiovascular, laxative, antimicrobial, anti-inflammatory, and antioxidant are other effects of this plant as described by Unani physicians in their classical books.

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