



Therapeutics and pharmacology – phytochemical's of Gul-e-Surkh (*Rosa damascena* Mill)an important Unani drug : A Review article

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Abstract:

Rosa damascena, commonly known as Damask rose, holds a revered status as the "king of flowers," symbolizing inspiration, purity, love, happiness, and beauty. Beyond its ornamental value, this precious herb carries modern pharmacological significance, finding applications in various medicines and the perfumery industry worldwide. Traditionally, it has been utilized for its astringent, analgesic, cardiac, and intestinal tonic properties.

Despite its rich historical usage, there's a need for authoritative monographs to consolidate its clinical effectiveness and safety. Recognizing this gap, a comprehensive review of existing literature becomes imperative to shed light on *Rosa damascena*'s potential in both traditional and contemporary medicine.

Indeed, *Rosa damascena* emerges as a cost-effective and essential plant with therapeutic applications in modern medicine. However, further studies are warranted to delve into the characterization of its chemical constituents and the scientific basis of its pharmacological activities. These investigations are crucial not only to evaluate its impact on traditional medicine systems but also to harness its potential for pharmaceutical applications.

In the context of the twenty-first century's increasing prevalence and morbidity of chronic diseases, exploring novel treatment modalities has become paramount. Herbal medicine, being one of the oldest and most popular forms of treatment, has garnered significant attention from scientific circles. *Rosa damascena*'s inclusion in this discourse underscores its enduring relevance and potential in addressing contemporary healthcare challenges.

Moving forward, large-scale preclinical and clinical trials hold promise in unraveling the therapeutic mechanisms and efficacy of *Rosa damascena*. Such endeavors are essential steps towards unlocking its full potential and integrating it into mainstream pharmaceutical practices.

Key words: Gull e surkh Therapeutics and pharmacology unani

Introduction:

Rosa damascena Mill. is commonly known as Damask rose that is flower's king^[1] and is the sign of inspiration, purity, love, happiness and beauty. It is an ornamental and a precious herb with modern pharmacological importance, which are used in medicines.^[2,3] There are 18 000 cultivars and more than 200 species of *Rosa* around the world^[4] Rose (*Rosa damascena*) is the most famous than any other flower throughout the world. It belongs to the family Rosaceae. Its actual place is India but because of its beauty and fragrance, it is cultivated throughout the world^[5] . . It was brought to Europe and has been cultivated in European countries. Nowadays, Bulgaria and Turkey are the main producers of *R. damascena* essential oil in the world and the Bulgarian *R. damascena* oil is the known best ones. The Iranian people called it, Gol-E-Mohammadi (the flower of Prophet "Mohammad"). *R. damascena* flowers should handpick daily at early morning and are used immediately after harvesting for industrial purposes.^[6] This plant contains several components such as terpenes, glycosides, flavonoids, and anthocyanins that have beneficial effects on human health. The pharmacological effects of *Rosa damascene* are widespread. Most of the CNS effects are hypnotic, analgesic, and anticonvulsant effects. The respiratory, cardiovascular, laxative, antidiabetic, antimicrobial, anti-HIV, anti-inflammatory, and antioxidant are other effects of this plant. It is suggested that lipid soluble (non-polar) constituents of this plant are mainly responsible for most of the above-mentioned effects^[7]

Vernacular Names

Arabic:

English:

Hindi:

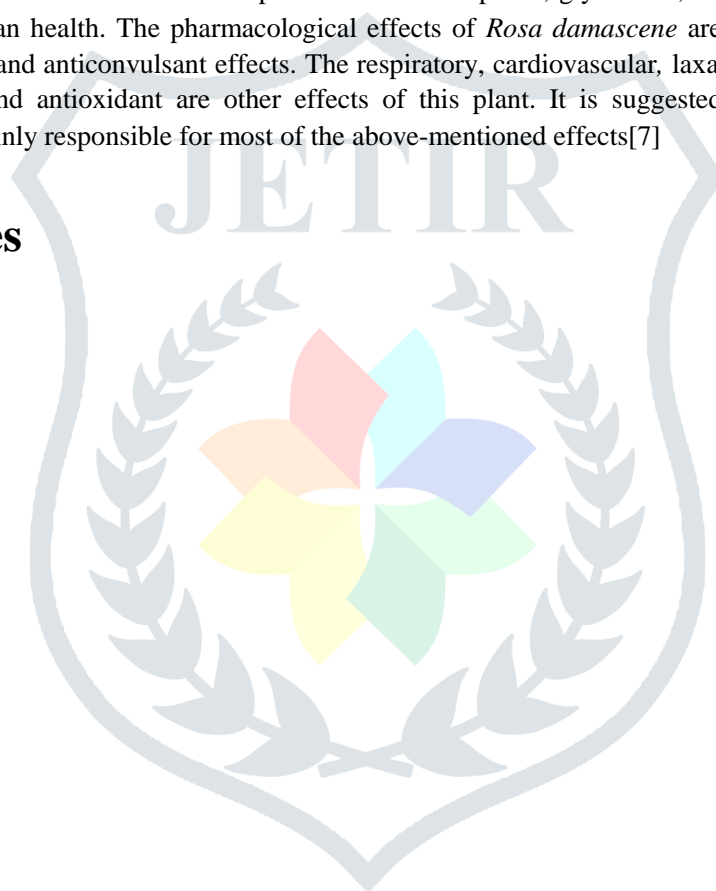
Malyalam:

Persian:

Sanskrit:

Tamil:

Telugu:



Warde Ahmar
Bussora Rose, Damascus Rose
Gulab
Penimirpush
Gule surkh
Atimanjula
Irosa
Gulab

Scientific Classification

Kingdom:
Division:
Class:
Order:
Family:
Genus:
Species:

Plantae
Magnoliophyta
Magnoliopsida
Rosales
Rosaceae
Rosa
Rosa damascene



Habitat and Distribution

There is a general belief that it is derived from native European species but from an oriental source and it is possible that the mild stock has been correctly recognised a plant of Persia, Assyria and the East Caucasian regions. The species cultivated all over India for the production of *otto* is *Rosa damascene*. It was introduced to Europeans from Asia Minor damascena in Iran are Kashan, Fars and Azerbaijan, among them Kashan is the most famous one^[8]

Description

Rosa damascena Mill (F-Rosaceae) is a small and aromatic plant, which appears in spring [9]. It is an erect shrub, up to 2 m in height, Branches long, arching.[10]

Stem: The stem is usually with numerous stout and hooked prickles, sometimes mixed with glandular bristles [11].

Leaves: The leaves are pinnate, stipules adnate [12] and scarcely dilated stipules. Leaflets are usually 5- 7 in number and 2.5- 6.3 cm long, ovate-oblong, serrate, more or less pubescent beneath [11]

Flowers: There are several flowers, arranged in a corymb, double, pink, red or white, born on glandularhispid and prickly pedicles, sweet-scented [12] and sometimes striped. The flowers are bitter and sweetish [11]

Pedicles: The pedicles and receptacles are glandularhispid [11]

Sepals: The sepals are deciduous, reflexing during flowering time [11].

Fruit: The fruits are obovate (Kirtikar and Basu, 1991) or ovoid, bristly, pulpy and bright red [12].

Mizaj (Temperament)

Unani physicians described the Mizaj of Roghan-e-Gul as Murakkabul Quwa [13]. According to Ibn Sina, it is Mail baEtedal [13]. Unani physician Masihi described that the Mizaj of Gulab is cold in 1st degree and dry in 2nd degree [14] while few others described it as Murakkabul Quwa [15].

Afaal (Pharmacological Action)^[16,17,18,19,20,21,22]: According to classical Unani literature there are following action of *Gul-e-Surkh* as a single drug and as a compound formulations. Action of *Gul-e-Surkh*.

Qafe Humma (Antipyretic)	ali (Detergent)	Muffathe Sudad (Antioobstructive)
Qafe Taffun (Antiseptic)	lane Nobat (Antiperiodic)	Mujaffif (Desiccant)
Mazim (Digestive)	lane Qai (Antiemetic)	Mulaiyan (Aperiant)
Mabis-ud-dam (Styptic)	Mohallile Varam (Anti-inflammatory)	Moqawi-e-Meda (Stomachic)
Masire Riyah (Carminative)	Mufarreh (Exhilarant)	Muqawi-e-Jigar (Liver Tonic)
Muqawi-e- dam (General Tonic)	Muqawi-e-Qalb (Cardiac Tonic)	Muqawi- Snanwa Lissa (Teeth and gum Tonic)
Musakkin (Analgesic)	Maf-e-Khafqan (Useful in Palpitation)	Mabiz (Astringent)
Mulattif (Demulcent)	Mushil-e-Safrawa (Malgam Raqeeq (Bile and phlegm purgative)	Muqawi-e- Memagh (Brain Tonic)

Istemaal:

Gul-e-Surkh (Rosa damascene flower) therapeutically used in various diseases such as dar-e-sar, dard-e-chashm, dard-e-uzan, dard-e-maqad, dard-e-lissa, dard-e-ama'amustaqeem, dard-e-rahem, dard-e-meda, martooob mizaj meda, surkhbadah, kharish, zakhm, nafasud-dam, ishal, sudda-e-jigar, amraz-e-halaque, zukam, khafqan, ghashi and qulae dahan. Rose is very effective to heal injuries of groin and axillary region[14]

Use of Gulqand in empty stomach followed by hot water drink is very effective in excessive ratubat-emed. Razi advised prohibition of its use to person suffering from hot temperament and inflammatory diseases especially in summer as it produces more heat and thrust. Ahmad bin Khalid said that use of Arque Gulab with Shakar Application of Nutool of Roghan-e-Gul alone or along with vinegar and rose cures headache and acts as brain tonic [13]

And cures insomnia and meningitis. Its local application on head, its inhalation and instillation in nose also relieves headache. On oral administration it excretes the safrawi dast through stool. Its oral intake cures safrawi dast (bilious dysentery), gastritis and intestinal wound. Its local application cures blepharitis, stomatitis and oral thrush caused by lime chewing. It is applied on the wounds of small pox, also helpful in burns when used along with egg yolk. Cloth wet with rose oil is applied on scalp to cure insomnia. Instillation of rose oil in ear is beneficial in toothache, headache and dryness of brain. Its gargle also helps to reduce toothache [13].

Muzir (Adverse effect)

Gul-e-Surkh and Roghan-e-Gul both have the adverse effect on baah (libido) [23]

Musleh (Corrective)

Marzanjosh and Anisoon are used as corrective for the adverse effect of Gul-e-Surkh (Anonymous, YNM) while Anisoon and Roghan Badam Shireen are used as corrective for the adverse effect of Roghan-e-Gul [23]

Badal (Substitute)

Banafsha is used as the substitute of Gul-e-Surkh (Anonymous, YNM) while Roghan-e-Banafsha is used as a substitute of Roghan-e-Gul [23].

Miqdar Khorak (Dose)

Gul-e-Surkh: 5-7 gm [24]

Chemical constituents**Phytochemicals**

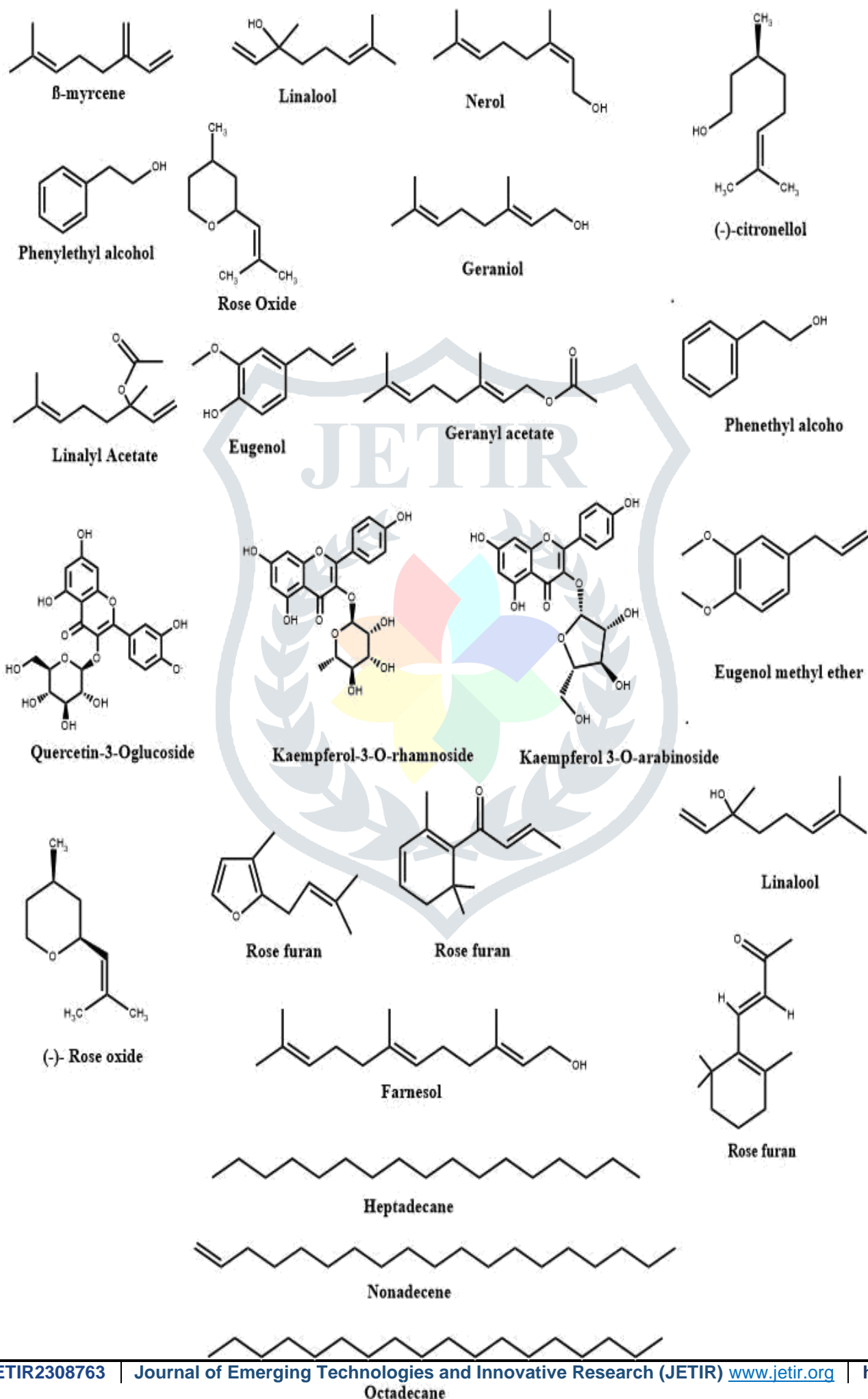
Isolated petals of *R. damascena* contain anthocyanins, terpenes, flavonoids and glycosides.^[25,26] It contains myrcene,^[27] carboxylic acid,^[28] kaempferol, quercetin^[29] and vitamin C. Flower contains fatty oil, tanning matter and organic acids. In the essential oil of *R. damascena*, more than 95 micro and macro components were found by LoghmaniKhouzani. Geraniols (5.5–18%), b-citronellol (14.5–

47.5%) and nonadecane (10.5–40.5%) were discovered compounds, and nerol and kaempferol were the major constituents of the oil.^[30] Investigation of absolute rose reveals that heneicosane, ethanol (0.00–13.43%), geraniol (3.71%), citronellol (9.91%), nonadecane (4.35%) and phenylethyl alcohol (78.38%) are the major components.^[31] Hydrosol was also found to contain four components that are nerol (16.12%), phenylethyl alcohol (23.74%), citronellol (29.44%) and geraniol (30.74%) as the major compounds.^[32,33,34]

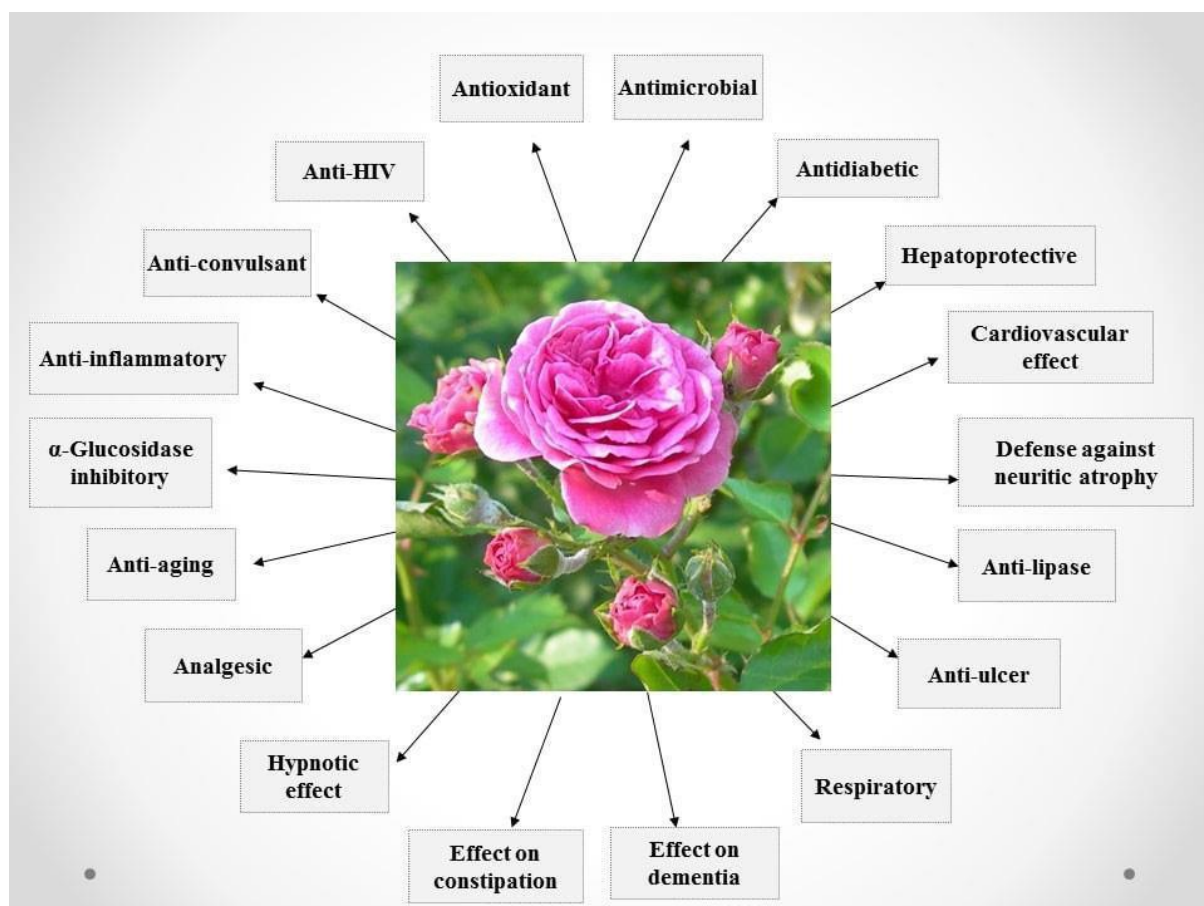
Flavouring compounds that are present in the *R. damascena* essential oil are b-damascone, b-ionone and b-damascenone, usually obtained from carotenoid degradation.^[30] Phosphorus, calcium, sodium, potassium, magnesium, iron, manganese, boron and zinc are the mineral contents of *R. damascena*.

Phenolic compounds are mostly responsible for medicinal functions of Rosaceae, which are present in large amount. Wide range of pharmacological activity is shown by phenolics such as antimutagenic, antioxidants, anti-inflammatory, anticancer, free-radical scavenger and antidepressant.^[33, 35] Aliphatic components, alkaloids, anthocyanins, α -cadinol, α -santalene, α -selinene, β -bisabolol, β -citronellol, β -citronellol trimethylsilyl ether, β -gurjunene, β -linalool, β -patchoulene, β -selinene, γ -cadinene, benzoic acid trimethylsilyl ester, Bis-(trimethylsilyl)-1,2 butanediol, bourbonene, carboxylic acid, carbohydrates, cadinene, caryophyllene, carotene, cis-rose oxide, citronellol, citronellyl formate, citronellyl-n-butyrate, ϵ -yamasene, docosane, eicosane, elemene, elemol, eugenol, eugenol methyl ether, farnesol, flavonoids, fatty oil, gallic acid, geraniol, geraniol trimethyl ether, germacrene D, geranyl acetate, geranyl isobutyrate, geranyl propionate, globulol, glycosides, 4-bH, 5a-eremophil-1(10)-ene, 11-trimethylsiloxy, heneicosane, heptadecane, humulene, hydrosol, ionone, 2-isopropyl-5-methylcyclohexyl ester, kaempferol, linalool, methyl octadecane, 2-methoxy-4-(1-propenyl) phenoxy trimethyl silane, methyl abietate, 1-methyl-pimar-7-en-8-oate, monoterpenes, myrcene, nerol, nerol trimethyl ether, n-hexacosane, n-hexyl benzoate, n-nonacosane, n-octacosane, n-octadecanol, nerol, nonadecane, nerolidol, organic acids, oxalic acid, decyl 2-phenyl ester, patchouli alcohol, 2,2,4,7,7 pentamethyl-3,6-dioxo-2,7-disila-octane, pinene, phenylethyl alcohol, 2-phenylethyl trimethylsilyl ether, proteins/amino acids, quercetin, quercetin, quercitannic acid, rhodinol, sabinene, saponins, sesquiterpenes, stearoptene, T-cadinol, tannins, terpenes, terpineol, T-cadinol, thymol, 2,2,11,11 tetramethyl-3,4,10-trioxo-2,11-disiladodecane, tetradecanol, trans-cadina-1,4-diene, trans-2-hexyl-n-octanoate, trans rose oxide, trimethylsilane, 1-ceudesmol, viridiflorol and vitamin C are the important phytoconstituents of *R. damascena*.^[35, 36] Some of the chemical constituents of *R. damascena*.





Various pharmacological activity of rosa damascena



The medicinal properties of *R. damascene* Antibacterial effects

R. damascena has wide spectrum antibacterial activities against *Escherichia coli*, *Pseudomonas aeruginosa*, *B. subtilis*, *Staph. aureus*, *Chromobacterium violaceum* and *Erwinia carotovora* strains. The most sensitive microorganism against rose essential oil was *C. violaceum*. *E. coli* was also sensitive against rose essential. Rose absolute also showed antibacterial activity against both gram-negative and gram-positive bacteria [37]. The essential oil of *R. damascena* remarkably inhibited the growth of the three strains of *Xanthomonas axonopodis* spp. The *in vitro* antibacterial activities of essential oil from *R. damasce* were also shown by disk diffusion testing against *E. coli*, *Staph. aureus* and *Ps. aeruginosa*. *R. Damascena* showed antimicrobial activity against *Staph. aureus* in this study [38]. Antibacterial effect of major components of rose oil (citronellol, geraniol and nerol) was reported. Therefore, Antibacterial effect of rose oil maybe mediated by these components. Antibacterial properties of rose absolute could be attributed to its high phenylethyl alcohol content. The antimicrobial properties of alcohols have been known for a long time

Antioxidant and anti-inflammatory effects

R. damascena posse's antioxidant properties. The antioxidant activity of hydro-alcoholic extract of petals and essential oil of this plant was also evaluated by DPPH for measurement of free radical scavenging activity and by ferric ammonium thiocyanate method for evaluation of lipid peroxidation properties. Additionally, three flavonol glycosides of ethanolic extract including quercetin-3-O-glucoside, kaempferol-3-O-rhamnoside and kaempferol-3-O-arabinoside have antioxidant activity. However, the potential of this effect is maybe due to existence of quercetin 3-O-glucoside and other flavonoids in the extract [40]. Damask Rose showed a potent antioxidant and lipid peroxidation inhibitory effects comparable to Vitamin E suggesting that the rose can be a method of treatment and prevention of many free radical diseases. The rose also contains vitamin C which has antioxidant and anti-inflammatory effects [41]. In a recent study, the effects of a rose-flower extract on the mortality rate of *Drosophila melanogaster* was evaluated. Supplementing *Drosophila* with the plant extract resulted in a statistically significant decrease in mortality rate in male and female flies. The

study also observed anti-aging effects of the flower Therefore; *R. damascena* can extend *Drosophila* life span without affecting physiological mechanisms [42].

***R. damascena* effect on respiratory function:**

This plant significantly reduce number of coughs induced by citric acid, in guinea pigs. The potent relaxant effect of extract and essential oil that was comparable to that of theophylline on tracheal smooth muscle of guinea pigs [43]. This effect might be due to its possible tachykinin inhibitory substance(s) content mediating both bronchodilatory and antitussive effects [44].

Some components of *R. damascena* can stimulate β adrenergic receptors or inhibit histamine (H_1) receptors. These results indicated a stimulator effect for this plant on β adrenoceptors and/or histamine (H_1) receptors blocking effect. Based on bronchodilatory effect of calcium channel blockers, an inhibitory effect of this plant on calcium channels of guinea pig tracheal chain also suggested [45].

There is also arelaxant effect on tracheal smooth muscle of guinea pigs of the aqueous, ethyl acetate and n-butanol fractions of *R. damascena* surpassing theophylline, The greater relaxant effect of ethyl acetate fraction compared to the other two fractions suggests that lipid soluble (non-polar) constituents of this plant are mainly responsible for its relaxant effect on tracheal smooth muscle [46].

***R. damascena* effect on cardiovascular functions:**

R. damascena potentially increased heart rate and contractility in isolated guinea pig heart. However, a possible stimulatory effect of the plant on β -adrenoceptor of isolated guinea pig heart is suggested. Cyanidin-3-O- β -glucoside was isolated from the buds of *R. damascena*.

Which can significantly suppressed angiotensin I-converting enzyme (ACE) activity. Because ACE is a key enzyme in production of angiotensin II, *R. damascena* may be effective to improve the cardiovascular function [47].

Neuropharmacological effects

Ethanollic extract of the flowering tops of *R. damascena* has been shown to possess a potent depressant activity on CNS in mice [48]. Some of these effects that evaluated are described below.

Soothing effect

The ethanolic, aqueous and chloroformic extracts from *R. damascena* were used for soothing effect in mice. The ethanolic and aqueous extracts in doses of 500 and 1000 mg/kg significantly increased the pentobarbital induced sleeping time in mice which was comparable to diazepam. However, the chloroformic extract has not shown to have soothing effect [49]. Damask Rose can prolong the pentobarbital induced sleeping time comparable to diazepam. *R. damascena* contains several components such as flavonoids and terpenes [50]. These compounds have soothing effect [51]. Therefore, it is suggested that these compounds may be responsible for the soothing effect of *R. damascena*. Flavonoids have been shown to have anxiolytic and/or antidepressant activity in numerous studies. Flavonoids were suggested to contribute to the soothing effect [52].

The analgesic effect

R. damascena contains flavonoid. It is suggested that quercetin and kaempferol which are not soluble in water may be responsible for this effect [537]. It has been suggested that antioxidants in *R. damascena* reduce pain. Therefore, it seems that these compounds have some role in the analgesic effect of the plant [54].

Protective effects against dementia

R. damascena is considered beneficial in the treatment of dementia. studies found that the chloroformic extract of the *R. damascena* significantly induced the neurite outgrowth activity and inhibited the amyloid β ($A\beta$), the major cause of Alzheimer [55, 56].

Anticonvulsant effect

Flavonoids and other components of essential oil of *R. damascena* such as geraniol and eugenol maybe involved in protecting against epileptic seizures and showed a significant reduction in the mean frequency of seizures in patients using essential oil of the rose.

Therefore, the essential oil of *R. damascena* has beneficial antiepileptic effect in children with refractory seizures

8, 59].

Anti-HIV effects

The effect of water and methanol extracts of *R. damascena* has shown anti-HIV infection activities. Kaempferol 1 and its 3-O- β -D-glucopyranosides 3 and 6 exhibited the greatest activity against HIV infection of C8166 cells. Compound 8, a new natural product exhibited some anti-HIV activity, due to the presence of the galloyl moiety since 2-phenylethanol-O- β D-glucopyranoside was inactive [60].

Glucose lowering effect

Oral administration of the methanol extract of *R. damascena* plant significantly decreased blood glucose. Anti-diabetic effect of this rose maybe mediated by inhibition of α glucosidase that suppressed carbohydrate absorption from the small intestine and can reduce the postprandial glucose level In addition, methanol extract inhibited postprandial hyperglycemia similar to of acarbose. *R. damascena* is a potent inhibitor of α -glucosidase enzyme [61,62].

Antidiabetic

In this study, browning process was applied to rose flower to determine whether the processed or non processed rose flower has an antidiabetic effect on the streptozotocin induced diabetic mouse. Aqueous extracts of processed and non processed rose flowers were analyzed using liquid chromatography/ mass spectrometry. The results show that the polyphenol content decreased with browning. The hemoglobin A1c level, an indicator of long-term diabetes, in diabetic mice after administration of extracts of browned rose flowers for 24 and 48 h were lower than those after administration of extracts of non-browned rose flowers. Moreover, the activity of aspartate transaminase, which is often high in diabetic patients, was low in all groups treated with rose flowers, whether they were non-browned or browned. Taken together, these results indicate that extracts from red rose flowers have long-term anti-diabetic effects and that this effect is independent of the level of polyphenols in the extract ^[63].

Culinary uses

Damask roses are used in cooking as a flavoring ingredient or spice. Rose water and powdered roses are used in Middle Eastern cuisines. Rose water is often sprinkled on meat dishes, while rose powder is added to sauces. Whole flowers, or petals, are also used in the herbal tea "zuhurat" or the flower tea which is very common in Syria and it is believed to have medicinal use during winter to fight cold and flu. In other countries of the Middle East, the most popular use is in the flavoring of desserts such as ice cream, jam, Turkish delights, rice pudding, and yogurt.

Western cuisines do not use roses or their products much although it was a popular ingredient in ancient times and continued to be popular well into the Renaissance. It was most commonly used in desserts, and still is a flavor in traditional desserts.

Conclusion

The *R. damascena* is one of the most important species of *Rosaceae* family mainly known for its perfume and rose water. This plant contains several components such as terpenes, glycosides, flavonoids, and anthocyanins that have medicinal properties. The pharmacological effects of *R. damascene* are widespread. Most of the CNS effects are soothing, analgesic, and anticonvulsant effects. The respiratory, cardiovascular, laxative, anti-diabetic, antimicrobial, anti-HIV, anti-inflammatory, and antioxidant are other effects of this plant. It is suggested that lipid soluble (non-polar) constituents of this plant are mainly responsible for most of the above-mentioned effects.

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