

A Review on Medicinal Properties of *Rosa Damascena*

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Abstract—*Rosa damascena*, commonly known as damask rose, is considered as one of the most important species of rosaceae family. It is a perennial bushy shrub of about 1-2 meters in height with large colorful flowers having imparipinnate and compound leaves. Besides its traditional ornamental use, perfuming effect and food values, rose water and rose oil also have a vast range of medicinal properties like: anti-diabetic, anti-mutagenic, anti-depressant, hypnotic effect, anti-inflammatory, anti-tussive, analgesic effect, anti-HIV properties and anti-oxidant effects etc. Further its essential oils and various other extracts have shown to have anti microbial activities also specially towards gram positive bacteria and fungi. The major types of constituent found in the *Rosa damascena* extract are the phenolics which are reported to contribute to its medicinal properties. Other constituents include flavonoids, terpenes, glycosides, anthocyanins, myrcene, carboxylic acid etc. Among these constituents, kaempferol and quercetin are widely reported compounds to be important for the medicinal values of this plant. These constituents have also been considered to produce nano particles which are found to be nontoxic and have been suggested to treat cancer. The present article reviews the medicinal properties of this plant with scientific evidences.

Keywords: *Rosa damascena* anti-analgesic, anti-mutagenic, anti-depressant, hypnotic effect rose nano particle.

1. INTRODUCTION

Out of 200 species *R. damascena* is the important species with essential oil bearing property. It is known by different names in different parts of the world which originated from Iran (1). Nowadays, Bulgaria and Turkey are the main producers of *R. damascena* essential oil in the world and the Bulgarian essential oil is the known best ones. *R. damascena* is a small plant with aromatic light pink flowers, which appear in spring and today are highly cultivated all over the world for visual beauty and its use in production of fragrances(2). This plant contains flavonoids such as kaempferol and quercetin and their glycoside derivatives carboxylic acids terpene, myrcene, tannins and vitamin C. Essential oil obtained from *Rosa damascena* is mainly consisted of beta-citronellol, nonadecane, geraniol and docosane (2)

R. damascena petals are most expensive in the world market because of its global demand of high grade rose oil and with

other secondary metabolites obtained from its petals which are used in various disciplines like pharmaceuticals, flavors and fragrance industries (2).

Rose essential oil is the important industrial product for different applications but its yield is very low. Ecological, geographical and environmental conditions, soil composition, harvesting and storage condition, distillation methods are the factors which might affect on chemical composition of rose essential oil from different places (2). The best rose essential oil is the oil with high amounts of monoterpenes. Therefore, finding the methods for increasing the oil yield and decreasing the expense of oil production are important issues for future. Apart from essential oil there are various commercial products obtained from *R. damascena* such as rose water, dried flowers used as laxative agents, rose hips rich in vitamins, tannins, minerals, polyphenols, fatty acids and tanners.

2. CHEMICAL COMPOSITION

The chemical composition of *R. damascena* obtained from different parts of the worlds has been reported to have heneicosane, tricosane, citronellol, geraniol, nerol, phenyl ethyl alcohol, nonadecane, nonadecene, eicosane, a-guaiene, geranyl acetate and eugenol (2).

Several components have been extracted from the petals and sees-pot of this flower like terpenes, glycosides, flavonoids, anthocyanins, carboxylic acid, myrcene, vitamin C, kaempferol and quercetin (2). Flower also contains fatty oils and organic acids. In a study the plant extract has been reported to have phenyl ethyl alcohol (72.73–73.80%), citronellol (10.62–11.26%), nerol (2.42–2.47%), and geraniol (5.58–5.65%) (3). The medicinal properties of this plant is majorly reported due to the presence of phenolic compounds which gave it a wide range of pharmacological uses such as anti-cancer, anti-mutagenic, etc.(2).

The modern investigations on *R. damascena* have confirmed the antioxidant, anti-inflammatory, analgesic, antiviral, antibacterial, anticancer, antidepressant, anticonvulsant activities and its relaxant and hypnotic effects(1). The present

review explains various medicinal values have been reported to be associated with this plant.

3. ANTI-OXIDANT EFFECTS

The anti-oxidant property is majorly due to the phenolic content in the *R. damascena* extract. This property is exhibited by various medicinal plants and *R. damascena* (4). Also, the other three flavanol glycosides of the ethanolic extract comprising of quercetin-3-O-glucoside, kaempferol-3-O-rhamnoside and kaempferol-3-O-arabinoside also have been reported to contribute to the anti-oxidant effect. It is found that phenolic extract from the fresh flowers has more anti-oxidant property than the spent flowers extract (4). Various studies have shown that the treatment of many free radical diseases through the use of phenolic extract.

4. ANTI-INFLAMMATORY PROPERTIES

Inflammation which is considered as a pathophysiological response of mammalian tissues with wide diversity hostile agents including infectious organisms, physical injury or tumor growth, toxic chemical substances leading to plasma fluid and blood cells accumulation (5). The non-steroidal anti-inflammatory drugs (NSAIDs) exert their anti-inflammatory effects by inhibiting biosynthesis pathway of prostaglandins. However, the side effects of the currently available anti-inflammatory drugs including renal damage, gastric injury and ulceration, cardiac abnormalities (6). Therefore, a need arises for the development of the natural origin with more powerful activity and with lesser side effects.

In a study, on male Wistar rats and male mice the anti-inflammatory properties of *R. damascena* extract was done. The anti-inflammatory activity was evaluated by the carrageenan-induced paw edema test, which acts by inhibiting the mediators of acute inflammation (7).

The test showed that the essential oil of *R. damascena* had no anti-inflammatory activity while the extract at a dose of 1000 mg/kg significantly ($P < 0.05$) reduced carrageenan-induced edema which provided us the results that this plant can be used as a remedy against inflammatory conditions (8).

5. ANTINOCICEPTIVE EFFECTS

The analgesic effect of the aqueous, ethanolic and chloroformic extract of this plant was studied on mice and the analgesic effects of these were evaluated using hot plate and tail flick methods. This showed that ethanolic extract had significant analgesic effect, while no effect was found from aqueous and chloroformic extract. The ethanolic extract had effect comparable to 0.9 mg/kg of morphine (9).

6. ANTI-BACTERIAL EFFECT

The essential oils of this the plant are reported broad spectrum antimicrobial activity. This plant antibacterial property has

been showed in a study conducted by *Ulusoy et al*(2009) against both gram positive and gram negative organism like *E.coli*, *P. aeruginosa*, *B. subtilis*, *S. aureus*, *Chromobacterium violaceus*, *Erwinia carotovora* strains (3). The essential oils of the plant were tested against gram-positive *S. Aureus* (ATCC 25923), gram-negative *E. coli* (ATCC 25922), gram negative *P. aeruginosa* (ATCC 27853), and yeast *Candida albicans* (ATCC14053). The tested essential oils exhibited inhibitory and bactericidal activities against all tested microorganisms (10).

7. ANTI-VIRAL AND ANTI-HIV

Various medicinal plants are used for the treatment for variety of human viral infection as they are found to be broad spectrum and less toxic. Compounds like kaempferol and kaempferol-7-O-glucoside have potent anti-HSV-1 activity and inhibit HIV-1 replication (11). Researchers have reported that kaempferol isolated from *R. damascena* has shown inhibitory effect for reverse transcriptase, viral protease and binding of gp120 to lymphocytes CD4, might account for anti-HIV activity Kaempferol (11). In a study evaluated on C8166 human T lymphoblastoid cells infected with HIV-1MN and H9 human T-cell lymphoma cells chronically infected with HIV-1IIIB, Kaempferol and 3-O- β -D-glucopyranosides have shown anti-HIV activity (11).

8. ANTI-CANCER EFFECTS

Several medicinal plants have been studied for a variety of human cancer as they are believed to be bio-compatibility.

Scientists are now been trying new technology also to improve the anticancer property of the plant. In a study the anti-cancer property of these silver nano-particles (AGNPs) were evaluated against Dalton's lymphoma ascites (DLA) cell line in-vitro and in-vivo and it was found that AGNPs work by inhibiting caspase 3 enzyme of the DLA cell line, which confirms the anti-tumor property of AGNPs (12). Though these AGNPs provide a cost-effective alternative for cancer treatment but further improvements were done to produce bio-compatible and less toxic silver nano particles.

In another different study conducted by *Vellaichamy et al* (2014) they synthesized green silver nano particles (GNSPs) from the aqueous extract of *R. damascena* petals and checked its anti-cancer activity on human lung adenocarcinoma (A549). They verified biocompatibility of GSNPs by incubating with erythrocytes and anti-cancer property against A549 cells and evaluated the result by performing MTT assay. Due to the synergistic effect of SNP and the pharmacologically active compounds on the surface of green SNPs from *R. damascena* extract, GSNPs showed anti-tumor activity (13). Further studies are needed to unveil the exact mechanism behind the anti-cancer property of GSNP.

9. ANTICONVULSANT EFFECT

In a study by Hosseini et al(2011) aqueous, ethanolic and chloroform extract of *R. damascene* on were checked for anticonvulsant effect on pentylenetetrazol PTZ-induced seizures on mice, it was found that their was a significant increase in MCS(Minimal Clonic Seizures) and GTCS(Generalized Tonic-Clonic Seizures) latencies in aqueous and ethanolic extract only (14).Yet in another study, the hydroalcoholic extract of the plant delay the latency of seizure attack and reduce its efficiency of epileptiform burst discharges induced by PTZ injection (15).

10. HYPNOTIC EFFECT

The aqueous, ethanolic and chloroformic extracts of the Rosa were evaluated for their hypnotic effect on mice.It was found that ethanolic and aqueous extracts in doses of 500 and 1000 mg/kg significantly increased the pentobarbital induced sleeping timecomparable to diazepam (16). Compounds like flavonoids etc. are suggested contributing to its hypnotic effect. This effect has been ascribed to their affinity for the central benzodiazepine receptors (16).

11. CONCLUSION

In this review we have stated some of the medicinal application of *R. damascena* and its various possible beneficial effects on human ailments. Various studies have evaluated aqueous, ethanolic and chloroformic extracts out of which aqueous extract shows the anti-viral and anti nociceptive and hypnotic effect. While the anti-convulsant effect, anti-inflammatory effects are shown by the hydro alcoholic extract. Further, the GSNPs made from the aqueous extract of *R. damascena* have shown the significant effects on the cancerous cell lines. Though, its exact mechanism is still an area of research. To conclude, it can be suggested that *R. damascenais* major naturally occurring species that can be used to cure number of diseases and further extensive research is required to explore the mechanism of action.

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