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REVIEW ARTICLE

A comprehensive review on phytochemistry, pharmacology and therapeutic applications of *Rosa damascena* Mill.

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Abstract

Rosa damascena, commonly known as the Damask rose, is a plant of beauty and medicinal significance. This review explores its botanical characteristics, chemical composition and diverse pharmacological activities. *Rosa damascena* rich in phytochemicals like anthocyanins, flavonoids and essential oils and demonstrates a wide range of therapeutic properties. Studies have shown its potential in antimicrobial, antioxidant, antidiabetic, analgesic and anti-inflammatory applications. The plant also shows promise in promoting cardiovascular health, respiratory issues and neurological functions. Its relaxing and soothing properties make it valuable in aromatherapy and stress management. Clinical studies support its efficacy in treating conditions such as sexual dysfunction, pain and apnea in premature newborns. While current evidence is promising, further research is needed to fully understand its mechanisms of action, optimize dosages and explore potential drug interactions. This comprehensive review underscores the significant therapeutic potential of *Rosa damascena* in complementary and alternative medicine.

Keywords: ethnomedicine; essential oil: pharmacological activity; phytochemicals; therapeutic properties

Introduction

The Rosaceae family includes species of high ornamental, medicinal and economic value. Due to their widespread ornamental appeal, members of the Rosaceae family are often referred to as the 'queen of flowers'. Currently, over 200 species and more than 18000 rose cultivars have been documented (1). Apart from their visual charm in diverse environments like parks, gardens and residences, roses are predominantly cultivated for their utility in perfumery, pharmaceuticals and the culinary domain. Specifically, *Rosa damascena* is distinguished for its fragrant properties(2). Historically, rose water has been employed in nuptial ceremonies to bestow blessings upon unions and symbolize fondness and purity. Furthermore, it is used in spiritual rituals to amplify concentration during meditation and prayer. The trend towards employing plant-derived natural substances in sectors such as perfumery, cosmetics and food is steadily rising (3). Nonetheless, the amount of oil present in the *Rosa damascena* flower is relatively low compared to other essential oil crops like sunflower, lavender, jasmine etc.

Pharmacological studies link its therapeutic effects to rich polyphenolic content. Major bioactives include terpenes, flavonoids, anthocyanins and glycosides (4, 5). Other components include Vitamins A, B_1, B_2, B_3, C and K, malic acid, citric acid, carotenoids, tannins and pectin. The principal active phenolic compounds include gallic acid, cyanidin 3, 5, D-glycoside, kaempferol and quercetin (5). Henicosane, geraniol, nonadecane and β Citronellol constitute the primary chemical elements of its volatile oil (6). Despite variations in concentrations of rose oil components across different regions of the globe (7), limited research has compared the constituents of diverse extract variants (8).

A considerable percentage of floral agricultural products are distinguished by an extensive array of phytochemical characteristics; for example, Safflower possesses a diverse range of chemical constituents (secondary metabolites) that display anticoagulant and antioxidant properties, in addition to further benefits relevant to human health with pharmacological significance, encompassing therapeutic roles in the treatment of cardiovascular, reproductive and gastrointestinal conditions. The extracts and essential oil derived from *L. camara* demonstrate a diverse array of bioactive properties, particularly with respect to antibacterial efficacy. *In vitro* studies were conducted to evaluate the effectiveness of aqueous and chloroform extracts

of *L. camara* against four bacterial species: *Xanthomonas axonopodis* and *Pseudomonas syringae* (both classified as gram -negative bacteria), in addition to *C. minutissimum* and *Clostridium difficile* (which are gram-positive bacteria). Indigenous populations have utilized medicinal flora for the treatment of dermatological conditions, relying on knowledge that has been amassed over generations. We systematically compile and underscore the critical aspects of ethnodermatology; specifically, the traditional knowledge pertaining to the most frequently cited medicinal plants that combat the microorganism responsible for the skin ailment erythrasma.

The essential oil derived from *Rosa damascena* is comprised of key components like geraniol and citronellol, which play a pivotal role in its pharmacological effects. Various products originating from *Rosa damascena* are commercially accessible, such as gulkand (rose jam), rose water, essential oil, syrup and rose tea, each offering distinct advantages and significance. This review critically evaluates current research on *Rosa damascena*, shedding light on its therapeutic applications for medical practitioners.

Despite its various pharmacological effects, including anti-diabetic, neuroprotective and antioxidant properties, few studies have examined its clinical efficacy and safety. The main goal of this review is to synthesize current evidence on the clinical applications and safety of *Rosa Damascena* Mill., along its phytopharmacological properties.

History

Rosa Damascena commonly known as the Damask rose, got its name because it was originally introduced to Europe from Damascus (9). *Rosa damascena* originally grew wild and continues to self-propagate in the Caucasus, Syria, Morocco and Andalusia, with Iran also noted as a possible origin (10). In Iran, the cultivation and utilization of *Rosa damascena* have a lengthy historical background. The origins of distilling roses for their oil are believed to have begun in Persia during the late 7th century A.D., eventually extending to the regions of the Ottoman Empire in the 14th century. Until the 16th century, Iran was the leading producer of rose oil, supplying it to markets around the world.

Botany

Rosa damascena is a perennial bushy shrub, typically reaching a height of 1-2 m and possessing a longevity of up to 50 years. Its flowers are large and vibrantly colored, often light red. The leaf arrangement is characterized by an odd-pinnate orientation, featuring 5-7 leaflets. *Rosa damascena,* belonging to the Rosaceae family, is characterized by its shrubby form, numerous uneven strong prickles that are broader at the base and leaves composed of 5-7 ovate, somewhat stiff leaflets. The flower bud is oblong, with sepals that curve backward after blooming and the elongated tube often widens at the tip. The fruit is pulpy and ovate, while the calyx and peduncles are covered in glandular bristles and are sticky. The plant bears light red flowers (11, 12).

Chemical constituents

Roses contain a wide range of phytochemicals with notable bioactive compounds. The main phytochemicals include anthocyanins, carotenoids and flavanols, such as cyanidin 3,5-diglucoside, pelargonidin 3, 5-diglucoside, cyanidin 3, 5-di-O-glucoside, luteoxanthin, violaxanthin, zeaxanthin, β-carotene, lutein epoxide, lutein, quercetin, myricetin 3,5-di-O-glucoside, quercetin 3,4-di-O-glucoside, kaempferol 3,4-di-O-glucoside and quercetin 3-O-glucosyl-xyloside (13).

Phytochemicals

Phytomedicine, referred to as the implementation of compounds extracted from plant resources for therapeutic objectives, consists of a heterogeneous collection of natural substances, such as plant extracts, essential oils and isolated phytochemicals (14). Isolated petals of *Rosa damascena* are found to harbor anthocyanins, terpenes, flavonoids and glycosides (15, 16). Among its constituents are myrcene (17), geranic acid (18), kaempferol, quercetin (19) and vitamin C. Furthermore, the flower is known to contain fatty oil, tanning matter and organic acids.

Loghmani and Khouzani discovered over 95 micro and macro components in the essential oil of *Rosa damascena*. Geraniol (5.5-18 %), β-citronellol (14.5-47.5 %) and nonadecane (10.5-40.5 %) were identified as chemical compounds, with kaempferol being the predominant constituents of the oil (Fig. 1). Examination of the absolute rose essence indicated the presence of citronellol (9.91 %), heneicosane, nonadecane (4.35 %), geraniol (3.71 %), ethanol (0.00–13.43 %) and phenylethyl alcohol (78.38 %) as the main components. Additionally, the hydrosol was observed to comprise four primary constituents, namely citronellol (29.44%), %), phenylethyl alcohol (23.74 %), nerol (16.12 %) and geraniol (30.74 %) (20) (Fig. 2).

The cumulative phenolic concentrations of the essential and absolute oil derived from roses surpass that of the hydrosol, which is essentially water imbued with aroma. Predominantly, rose absolute and rose water volatiles are characterized by the presence of phenyl ethyl alcohol. In contrast, citronellol and geraniol collectively account for over 55 % of the composition of rose essential oil and hydrosol.

The essential oil of *Rosa damascena* contains flavour compounds such as β-damascenone, β-ionone and β-damascone, which are typically formed through the breakdown of carotenoids (21). The mineral composition of *Rosa damascena* comprises potassium, calcium, sodium, boron, manganese, phosphorus, magnesium, iron and zinc. Phenolic compounds, abundant in Rosaceae, play a crucial role in its medicinal properties. These phenolics exhibit a diverse array of pharmacological effects, such as, free-radical scavenging, antioxidant, anti-inflammatory, anticancer, antimutagenic and antidepressant activities (22).

Medicinal uses

Rosa damascena-based nervine tonic is recommended for patients with depressive symptoms. Gulkand, a herbal concoction derived from rose petals, is effective in treating constipation. The tonic aids in mood enhancement and serves as a preventive measure against depression. Furthermore, it demonstrates antistress properties and is beneficial for individuals experiencing nervous tension (23). Its benefits extend to the treatment of gastric ulcers and cardiovascular

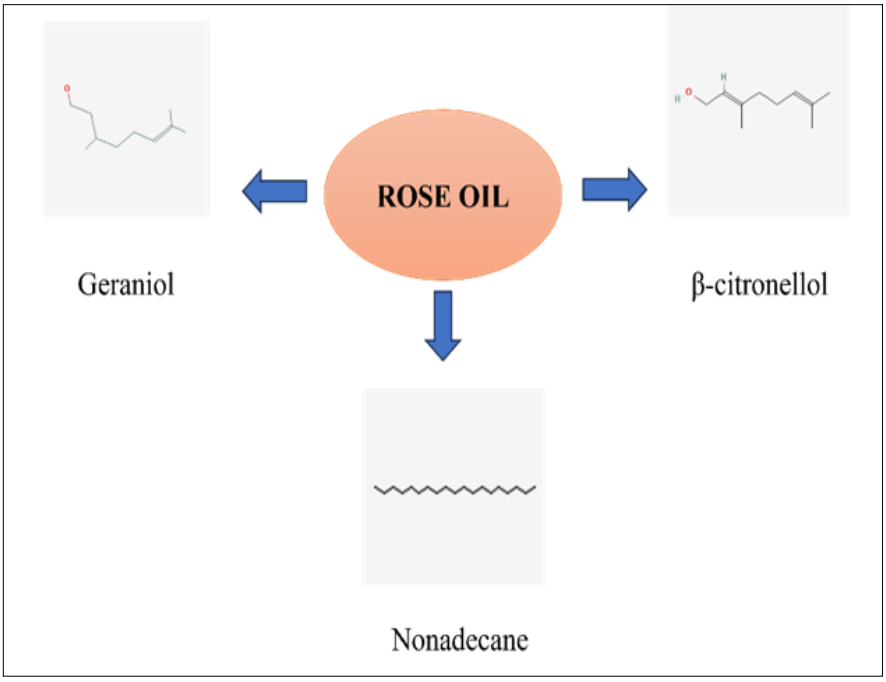

Fig. 1. Major compounds present in the rose oil.

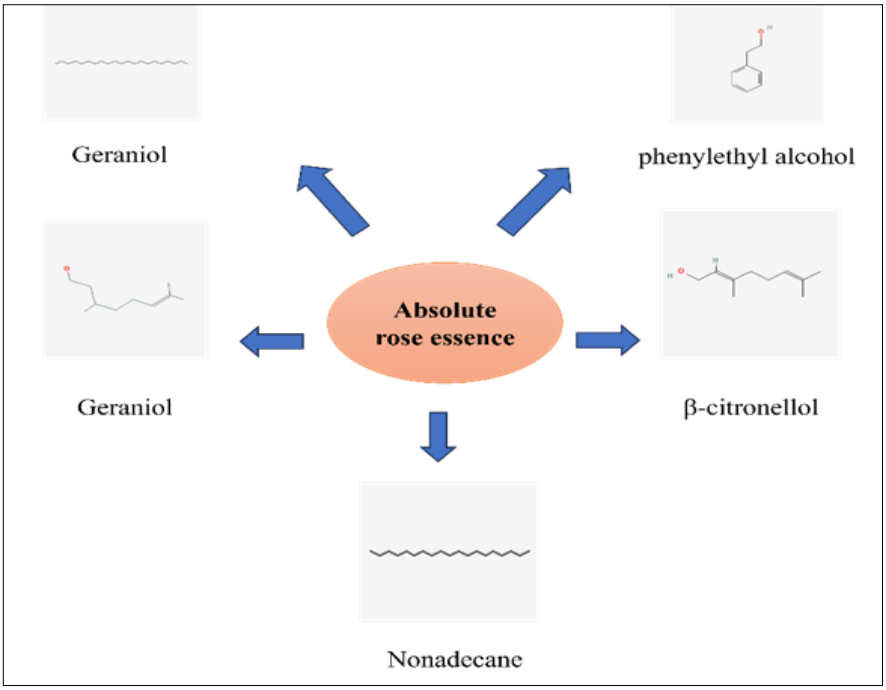

Fig. 2. Major compounds present in the absolute rose essence.

ailments. Moreover, it facilitates digestion and stimulates bile production. In addition, it is known to alleviate uterine disorders and high blood pressure (21). Rose tonic is frequently used for dealing with depression, stress and nervous tension. Gulkand also called rose petal preserve or jam, is another herbal item derived from rose petals that helps with alleviating constipation and functions as a natural laxative (23). Consumption of rose tea can combat digestive infections and restore the normal bacterial flora of the intestine. It is renowned for its efficacy in addressing painful and irregular menstrual cycles, as well as alleviating uterine congestion and associated heavy bleeding.

Additionally, *Rosa damascena* finds application in the production of perfumes, creams, hand lotions and cosmetics. The distinguished Iranian academic Avicenna conducted a study on the essential oil of *Rosa damascena* in the 10th century for the treatment of various ailments. Additionally, the infusion of dried flowers was utilized to reduce fever, address menstrual issues and alleviate breast pain, often recommended as a diuretic. The combination of rose petals with sugar and honey induces a calming effect on both the mind and body. In Iranian culture, rose hips were ingested with bread due to their recognized blood-purifying properties. Furthermore, rose water was administered as an oral disinfectant (24).

Pharmacological activity

The presence of various active phytoconstituents is responsible for the diverse pharmacological effects attributed to *Rosa damascena*. These biologically active compounds comprise the plant's medicinal properties. Pharmacological activity of *Rosa damascena* is given in Table 1 and some

experimental approaches on animal and human also mentioned in Table 2. Essential oils are composed of a complex mix of phytochemicals and are known for their potential health benefits. These include reducing the risk of cancers, inflammatory diseases and autoimmune conditions. They also exhibit neuroprotective properties that may help mitigate neurodegenerative disorders like Alzheimer's and Parkinson's disease. However, many studies on their use in athletic performance show significant methodological flaws.

Pharmacological activity of *Rosa damascena*

The essential oil components of *Rosa damascena* are utilized in herbal eye drop formulations for treating ophthalmic conditions, as evidenced by clinical studies (25). Phenylethyl and key essential oil components have been shown to offer neuroprotective effects and improve cognitive function through the inhibition of acetylcholinesterase (AChE). Juice extracted from fresh flowers demonstrates hepatoprotective properties based on DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay. Essential oil has antiepileptic properties, which are studied using pentylenetetrazol (PTZ) to induce seizures in rats. Antimicrobial activity was demonstrated via well diffusion, disc diffusion and microdilution assays. Aqueous or ethanol extracts are known for their hypnotic effects, tested by pentobarbital-induced sleep time. Methanol extract exhibited antidiabetic activity by inhibiting α-glucosidase enzyme activity. Flavonoid compounds exhibit anti-HIV activity by affecting H9 human T cells chronically infected with HIV-1MN and C8166 human T lymphoblastoid cells. Methanol extract also possesses antilipase activity, reducing the turbidity of a triolein by inhibiting porcine pancreatic lipase. Ethanol extract provides antisolar effects, determined by SPF and has anti-aging properties demonstrated by a decreased death rate in adult Drosophila flies. Additionally, aqueous or ethanol extracts enhanced contractility and heart rate in isolated pig hearts. Antitussive effects were also observed using the citric acid-induced cough model (refer to Tables 1 and 2).

Antimicrobial effect

Antimicrobial resistance (AMR) represents a considerable and pressing global health issue, thus necessitating the investigation of alternative and adjunctive therapeutic approaches to conventional antibiotics. Phytomedicine, which harnesses compounds derived from plants, presents potential therapeutic avenues owing to its multifaceted mechanisms of action. Several research articles published in academic resources have discussed the antimicrobial properties of *Rosa damascena* Mill. due to its notable phenolic composition including phenylethyl alcohol, flavonoids and terpenoids (26). A study highlighted the anti-acne potential of *Rosa damascena* essential oil against *Propionibacterium acnes* (27). The absolute rose extract exhibits antimicrobial activity against both *Gram-negative* bacteria and *Gram-positive* bacteria (28, 29). Another study reported the antilisterial effect of *Rosa damascena* through their investigation of its antimicrobial activity against *Listeria monocytogenes* in albino mice.

Antioxidant effects

A plethora of academic studies have illuminated the antioxidative properties of the damask rose, especially concerning its hepatoprotective effects. In particular, a dedicated research study revealed that the administration of the aqueous extract at doses ranging from 250-1000 mg/kg on a daily basis led to a dose-dependent improvement in oxidative damage caused by acetaminophen in the hepatic tissues of rats, thus mitigating the related biochemical, enzymatic and histopathological toxic manifestations (30). Furthermore, multiple research endeavours have pinpointed the antioxidant prowess of *Rosa damascena* Mill. through the utilization of the 1,1-diphenyl-2-picryl hydrazyl (DPPH) assay. The methanolic extract revealed various polyphenolic compounds, predominantly glycosides of quercetin and kaempferol, which were identified and postulated to be the active antioxidant constituents and DNA protective agents (31, 32).

The antioxidant characteristics of *Rosa damascena* are notable. The evaluation of the hydro-alcoholic extract of petals and essential oil from this plant was conducted to assess its free radical scavenging activity using the DPPH method and to determine its lipid peroxidation properties through the ferric ammonium thiocyanate approach. Moreover, the ethanolic extract unveiled three flavanol glycosides, namely, kaempferol-3-O-arabinoside, kaempferol -3-O-rhamnoside and quercetin-3-O-glucoside, all exhibiting antioxidant properties. The antioxidant activity is likely due to quercetin 3-O-glucoside and other flavonoids (33).

Antidiabetic effect

The antidiabetic potential of *Rosa damascene* was assessed. In a study involving both normal and diabetic rats, the oral consumption of 100 to1000 mg/kg of the methanolic extract of damask rose led to a significant dose-dependent reduction in postprandial glucose levels. Notably, the extract displayed a robust noncompetitive α-glucosidase inhibitory effect comparable to acarbose, highlighting its potency as an inhibitor of the α-glucosidase enzyme (34). Consequently, it can be inferred that the anti-diabetic efficacy of this plant may be linked to the suppression of α-glucosidase activity, thereby impeding carbohydrate uptake in the small intestine, leading to a reduction in blood sugar levels after meals (34).

Cardiovascular effect

Damask rose may have increased heart rate and contractility in an isolated pig heart. Nevertheless, a potential activating impact of the botanical on the β-adrenoceptor of an isolated pig heart is implied (35). Cyanidin-3-O-β-glucoside was extracted from the blossoms of damask rose, exhibiting significant suppression of angiotensin I-converting enzyme (ACE) activity. This is noteworthy as ACE plays a crucial role in the synthesis of angiotensin II; hence, *Rosa damascena* could potentially enhance cardiovascular function (22).

Analgesic and antinociceptive effect

Several studies have delved into the analgesic properties of damask rose. For instance, a study on 50 cases with severe burn wounds explored the pre-emptive use of 40 % essential oil inhalation therapy, observing significant pain relief at 15

and 30 min after wound dressing following aromatherapy (36). Similarly, a post-surgical analysis on children aged 3-6 years revealed effective pain alleviation through aromatic oil aromatherapy (37). Shirazi demonstrated that topical application of rose oil twice daily for a month significantly alleviated low back pain in 120 pregnant women compared to those using almond oil or receiving no treatment (28). Moreover, a study on patients experiencing recurring mouth ulcers illustrated notable reductions in pain and inflammation indicators, significant healing of the ulcer area was observed after a two-week mouthwash treatment with the aqueous extract.

Respiratory effect

The application of a 10 % distillate of damask rose via aromatherapy to premature newborns babies in the initial days of life notably reduced apnea attacks compared to the control group. Furthermore, this plant demonstrated a reduction in cough frequency induced by citric acid in guinea pigs, showcasing a potent relaxant effect similar to theophylline on the tracheal smooth muscle of the animals (38). This effect is possibly attributed to the presence of tachykinin inhibitory substances within the extract and essential oil, mediating both bronchodilatory and antitussive effects (39). Certain components of *Rosa damascena* may activate β-adrenergic receptors or hinder histamine (H1) receptors, pointing towards a potential stimulatory impact on β-adrenoceptors and/or a blocking effect on histamine (H1) receptors. Considering the bronchodilatory effects of calcium channel blockers, there is also a suggestion of an inhibitory effect of this plant on the calcium channels of the guinea pig tracheal chain (21).

Anti-HIV effects

The impact of aqueous and methanolic extracts derived from damask rose on HIV infection was investigated *in vitro* (26). An evaluation of the anti-HIV properties of nine compounds, including a novel compound, 2-phenylethanol-O-(6-O-galloyl)-β-D-glucopyranoside, was conducted. The compounds were tested on C8166 human T lymphoblastoid cells infected with HIV-1MN and H9 human T-cell lymphoma cells persistently infected with HIV-1IIIB. Among these compounds, Kaempferol 1 and its 3-O-β-D-glucopyranosides 3 and 6 demonstrated the most significant efficacy against HIV infection of C8166 cells, while kaempferol-7-O-β-D-glucopyranoside exhibited no impact. Likewise, quercetin-7-O-β-D-glucopyranoside was inactive in comparison to quercetin. A new natural compound, compound 8, displayed some anti-HIV activity, likely attributed to the presence of the galloyl moiety, since 2-phenylethanol-O-β-D-glucopyranoside was inactive. The authors of the study compared the anti-HIV effects of the nine compounds and demonstrated that the efficacy of the crude extract stems from the integrated actions of different compounds working together to target various stages of virus replication (40).

Relaxing effects

The relaxing effects of *Rosa damascena* aromatherapy were investigated using an artificial air chamber for 90 seconds and a 24-L odor bag infused with 0.2 µL of essential oil. They observed a notable reduction in oxyhemoglobin concentration in the right frontal cortex, serving as an indicator of neural activity, among twenty young female students. Moreover, they documented substantial subjective feelings of relaxation. Their investigation highlighted significant psychological relaxation effects alongside physiological alterations in the brain (41). In a separate study involving forty healthy female and male participants, a 5-minute self-abdominal massage with one ml of diluted essential oil (20 % concentration) devoid of olfactory cues showed significant relaxation. This relaxation was not only evident through reduced autonomic reactions but also through personal reports (42).

Effect on learning and memory

The oral administration of methanolic extract of *Rosa damascena* (300, 600, 1200 mg/kg/day for 1 month) ameliorated memory abnormalities related to amyloid β in rats, as assessed through Morris water maze (MWM) and passive avoidance tests. High-performance liquid chromatography (HPLC) analysis indicated that these effects could be attributed to the presence of antioxidant compounds, such as flavonoids and polyphenols, in the extract of *Rosa damascena*. Treatment with 250 mg/kg of hydroalcoholic extract of *Rosa damascena* for 2 weeks mitigated scopolamine-induced memory impairments. The research revealed that the extract reduces brain oxidative damage by reducing malondialdehyde (MDA) levels and increasing thiol concentration (43).

Cardiac effects

In an investigation, the daily oral administration of 1.5 g/kg *Rosa damascena* Mill. methanolic extract in diet-induced hyperlipidemic rabbits over a period of 45 days demonstrated a moderate reduction in the formation of atherosclerotic plaques, alongside enhancements in lipid profiles (44). Another study utilizing the same approach observed a noteworthy elevation in the left ventricular systolic pressure in hyperlipidemic rabbits, while normal rabbits did not exhibit the same response (45). Baniasad's research revealed that the intraperitoneal administration of 250-1000 mg/kg of hydroalcoholic extract led to a dose-dependent decrease in arterial pressure in normal rats without impacting heart rate (46).

Soothing effect

The soothing properties of *Rosa damascena* were explored through the utilization of ethanolic, aqueous and chloroformic extracts in mice. The ethanolic and aqueous extracts, administered at doses of 500 and 1000 mg/kg, significantly prolonged the sleeping time induced by pentobarbital in mice, comparable to the effects of diazepam. Conversely, the chloroformic extract did not exhibit any soothing effects (47). *Rosa damascena* has the potential to extend pentobarbital-induced sleeping time akin to diazepam due to its composition of various components such as flavonoids and terpenes, known for their calming effects (48). It is therefore postulated that these bioactive compounds play a crucial role in the soothing properties of *Rosa damascena*, with flavonoids specifically recognized for their anxiolytic and antidepressant activities (30) (29).

Table 1. Experimental approaches to assessing pharmacological activity

Action	Extract	Dose level	Model	References
Gastro-protective	'VARD' formula consisting of Rosa damascena Mill. (Rosaceae)	45 mg/kg	Rats	(49)
Immunoregulant	Methanol extract	10, 50, 100 lg/ml	Peripheral blood mononuclear cells (PBMC)	(50)
Anticonvulsant	Hydroalcoholic extract Aqueous extract Hydroalcoholic extract	50-200 mg/kg 100-1000 mg/kg 200-400 mg/kg	Rats Mice Rats	(51, 52)
Anti-inflammatory	Hydroalcoholic extract	250, 500 and 1000 mg/kg	Rats, Mice	(53)
Antihypertensive	Hydroalcoholic extract	250, 500 and 1000 mg/kg	Rats	(46)
Relaxant	Essential oil	2.5-160 lg/ml	Rats	(54)
Hypnotic activity	Ethanol and aqueous extracts Hydroalcoholic extrac	500 and 1000 mg/kg 250 and 400 mg/kg	Mice	(55) (56)

Table 2. Human research on the effects of *Rosa damascena* Mill.

By product	No. Participants	Dose level and duration	Outcome	Undesirable effects	Reference
Rose oil	Fifty male patients with opioid use disorder undergoing methadone maintenance therapy.	Daily consumption of 2 ml taken orally each morning for 8 weeks.	Compared to the control group, there was a decrease in sexual dysfunction and an increase in serum testosterone levels, though not consistently.	R.D oil enhanced sexual function and raised serum testosterone levels in patients receiving methadone maintenance therapy.	(57)
Rose oil	120 women aged 18-35 with pregnancy-related low back pain.	Apply 7 drops of oil topically to 100 cm^2 of the painful area, without massage, twice daily for 4 weeks.	Compared to the control group, there was a significant reduction in pain intensity according to the Visual Analogue Scale.	One patient in the extract group experienced mild allergic rhinitis, while topical rose oil showed potential for relieving low back pain.	(58)
Rose oil	Fifty female patients (mean age: 34 years) with Major Depressive Disorder (MDD) and sexual dysfunction induced by selective serotonin reuptake inhibitors (SSRI-ISD).	Take 2 ml orally each morning for 8 weeks.	Compared to placebo, sexual scores improved over time, though not significantly. There was no change in depressive symptoms, but self-reports indicated a decrease in pain in the extract group.	Number/modest effects on sexual function in females experiencing both Major Depressive Disorder (MDD) and sexual dysfunction due to selective serotonin reuptake inhibitors (SSRI-ISD).	(59)
***Rosa damascena* essence**	64 children aged 3 to 6 years post-operatively.	Aromatherapy involving one to two drops, applied 30 cm from the head, for 30 minutes upon arrival at the postoperative ward and then again 3, 6, 9 and 12 hours after surgery.	After each aromatherapy session and at the end of the trial, the pain score, measured by TPPPS, was significantly lower compared to the controls.	Number/Significant adjunctive effects in reducing postoperative pain in children	(37)
***Rosa damascena* fruit ethanol extract**	Ninety-two single female students aged 18 to 24 years with dysmenorrhea (pain score: 5-8 on the VAS).	One 200 mg extract capsule taken orally four times daily during the first 3 days of menstruation, across two consecutive menstrual cycles.	No significant difference in average pain intensity based on the VAS was observed between the two groups.	No side effects observed, with pain relief comparable to Mefenamic acid in primary dysmenorrhea.	(60)
Rose fruit alcoholic extract	Ninety-two patients aged 19 to 38 years undergoing elective cesarean sections.	An 800 mg extract capsule taken orally 15 minutes before spinal anesthesia.	The total dosage of analgesics and the severity of pain, as measured by the VAS, were significantly lower at all times compared to the controls.	No side effects were observed on newborns or breastfeeding in either group. Rosehip extract can be used as an alternative analgesic in elective surgical patients.	(61)
10% *Rosa damascena* distillate (Barij Essence Co.).	Sixty premature newborns.	Daily aromatherapy with two drops (0.1 cc) starting on the second day after birth, administered every 3 hours for 12 hours over 3 days.	Compared to controls, there was a significant decrease in the number of apnea attacks, bradycardia rates and SpO2 reductions both daily and over the sum of the three days.	Number/R.D aromatherapy provided additional benefits for managing apnea in premature neonates alongside routine treatment.	(62)
***Rosa damascena* essence at 40% concentration in distilled water.**	Fifty patients with second- and third-degree burn wounds, with a mean age of 33.2 ± 10.6 years in the I group and 34 ± 12.4 years in the C group.	Inhale 5 drops for 20 minutes daily, 30 minutes before dressing, for 2 days.	Compared to controls, there was a significant decrease in pain intensity based on the VAS at 15 and 30 minutes after the intervention.	Number/aromatherapy with R.D essence could potentially alleviate pain following dressing changes for burn wounds.	(36)

Conclusion

In conclusion, the comprehensive examination of the chemical constituents and pharmacological properties of *Rosa damascena* underscores its significant therapeutic potential. The essential oils, flavonoids and phenolic compounds present in this plant have demonstrated a wide range of biological activities, including antioxidant, anti-inflammatory, antimicrobial and antidepressant effects. Clinical studies further support its efficacy in managing various health conditions, such as skin disorders, respiratory issues and mood -related disorders. Nevertheless, despite these encouraging findings, additional research is essential to clarify its mechanisms of action, optimize dosages and assess potential drug interactions. This knowledge could pave the way for the development of new, natural therapeutics derived from *Rosa damascena*, offering a valuable addition to the field of complementary and alternative medicine.

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Authors' contributions

KP and BA contributed to conceptualization, writing and revision of the manuscript draft, inclusion of tables and figures and performed proof reading. KP, BA, RKR, AT and SKP were involved in revision, formatting and supervision. All the authors read and approved the final version of the manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests.

Ethical issues: None

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