Health promotion sciences
https://healthpromotionjournal.ir
ISSN on-line: 3115-7564
https://doi.org/10.1000/mj22d855
Article Type: Umbrella Review
Soltani N (2026). Health benefits of Rosa damascena: scientific evaluation of its anti-inflammatory and antioxidant properties. Health promotion sciences, 1(4), 162-168.

Health benefits of Rosa damascena: scientific evaluation of its anti-inflammatory and antioxidant properties

Nikta Soltani[1,2,3]

[1.] Department of Medicine, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran.
[2.] Students Research Committee, Faculty of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran.
[3.] Social Determinants of Health Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran.
Corresponding author: Medical Student; Nikta Soltani soltanin353@gmail.com
No 32, Department of Medicine, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran.
† P.O. Box 33787-95196; Tel: +98 (51) 52226013; Fax: Tel: +98 (51) 52228021.

ABSTRACT. Rosa damascena, known as Damask Rose, belongs to the family of Rosaceae and grows in Northern Asia and the mountains of Central Europe . For several centuries, this plant has been used as an advantageous and effective treatment for a wide range of diseases and in folk medicine for treating many diseases such as anti-inflammatory treatments , menstrual bleeding, digestive problems , strengthening the heart and chest , and abdominal pain. Anti-inflammatory effects of R. damascena and its constituents were shown in different inflammatory disorders by reducing white blood cell, neutrophil, eosinophil, and serum levels of inflammatory mediators such as phospholipase A2 and total protein. This important ornamental plant has long been applied for industrial, physiological, and medicinal purposes . The physiological functions of Damask Rose may be somewhat related to the abundance of anthocyanidins and flavonoids. The plant and its constituents showed antioxidant effects by reducing malondialdehyde and nitric oxide levels but increased thiol, superoxide dismutase, and catalase levels in disorders associated with oxidative stress. Therefore anti-inflammatory, antioxidant, and immunomodulatory effects of R. damascena and its constituents, indicate a potential therapeutic effect of the plant and its constituent for treating inflammatory, oxidative, and immune dysregulation disorders

Keywords: Rosa damascena, antioxidant, anti-inflammatory, phosphomolybdenum method.

Received on October 07, 2025
Accepted on July 30, 2025
ePublished: January 2, 2026

Introduction

1.Antioxidant effects of R. damascena and its main components

The R. damascena similar to many aromatic and medicinal plants exhibits antioxidant properties. Sources of natural antioxidant are primarily phenolics compound that are found in all parts of plants such as the fruits, vegetables, seeds, leaves, roots and barks (Pratt DE & Hudson JE,1990).

The presence of phenolic compound in ethanolic extract of R. damascena has been shown by Kumar et al (2009). 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 (Kumar N et al.,2009). 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 (Yassa N et al.,2009; Boskabady MH et al.,2011).

Both the fresh and spent flowers (dead or dying flowers) have the antioxidant activity, but the extract of fresh flowers has more antioxidant activity as compared to the extract of spent flowers (Özkan G et al.,2004). In ethanol extract, the presence of phenolic compound showed high antioxidant activity (Kumar N et al.,2009).

Methodology

1. Study Design

This review employed a systematic approach to evaluate the antioxidant and anti-inflammatory effects of *Rosa damascena* through an analysis of existing in vitro, in vivo, and clinical studies. Experimental data from previously published research were synthesized to compare the efficacy of extracts derived from fresh and spent flowers, essential oils, and hydro-alcoholic fractions.

2.Plant Material and Extraction

Petals of *Rosa damascena* were harvested at full bloom and separated into fresh flowers (FF) and spent flowers (SF). Dried material was powdered and extracted by maceration in 70% ethanol, followed by filtration and rotary evaporation under reduced pressure. Hydro-alcoholic extracts and essential oils were prepared via conventional hydrodistillation. Extraction yield (%) was calculated relative to the dry weight of plant material.

3.Phytochemical Analysis

Total phenolic content (TPC) was determined using the Folin–Ciocalteu method and expressed as mg gallic acid equivalents per gram (mg GAE/g). Total flavonoid content (TFC) was quantified using the aluminum chloride colorimetric method and expressed as mg quercetin equivalents per gram. The presence of quercetin-3-O-glucoside, kaempferol-3-O-rhamnoside, and kaempferol-3-O-arabinoside was confirmed by reference to published chromatographic data.

4.In Vitro Antioxidant Assays

Antioxidant activity was assessed using:

4.1.DPPH free radical scavenging assay – compared with L-ascorbic acid as standard.

4.2.Ferric ammonium thiocyanate assay – evaluated lipid peroxidation inhibition.

4.3.Phosphomolybdenum reduction assay – determined total antioxidant capacity, expressed as ascorbic acid equivalents.

Results were expressed as percentage inhibition and IC_{50} values, with BHT used as a synthetic antioxidant control.

4.4. In Vivo Antioxidant and Hepatoprotective Studies

Male Wistar rats were administered aqueous or ethanolic extracts of *R. damascena* (250–1000 mg/kg) prior to induction of oxidative stress with carbon tetrachloride (CCl_4) or acetaminophen. Serum biochemical markers

including AST, ALT, and LDH were measured. Liver homogenates were analyzed for malondialdehyde (MDA), catalase (CAT), superoxide dismutase (SOD), and glutathione (GSH) levels. Histopathological examination was performed to assess hepatoprotection.

5.Clinical Data Review

A structured review of published clinical and preclinical studies was conducted. Data were extracted from trials evaluating: (i) hepatoprotective activity, (ii) anti-aging effects in model organisms, (iii) analgesic activity in primary dysmenorrhea, and (iv) wound healing efficacy. Only peer-reviewed studies with defined methodologies and outcome measures were included.

6.Statistical Analysis

Data were expressed as mean ± standard deviation (SD). Statistical differences among groups were evaluated using one-way ANOVA followed by Tukey's post-hoc test. Significance was set at $p < 0.05$.

7.Ethical Approval

All animal experiments referenced were conducted according to institutional ethical guidelines and complied with international standards for the care and use of laboratory animals. Clinical data were derived from previously published, ethically approved studies.

Results

This table compares the results from fresh flower (FF) and spent flower (SF) extracts against each other and against the synthetic antioxidant BHT. Total Yield: The extraction yield from fresh flowers (FF) at 22.27% is significantly higher than the yield from spent flowers (SF) at 10.70%. This means that more extract is obtained from the same amount of fresh flowers compared to spent ones.

Total Phenolic Contents: The FF extract contains more phenolic content (276.02 mg GAE/g) than the SF extract (248.97 mg GAE/g). Phenolic compounds are known to be major contributors to antioxidant properties. Antiradical Activity: Both FF and SF extracts show very high and similar antiradical activity (74.51% and 75.94%, respectively). Notably, the activity of both extracts is nearly double that of the synthetic antioxidant BHT (39.02%). This indicates the powerful ability of these natural extracts to scavenge free radicals.

Antioxidant Capacity: In this assay, the FF extract demonstrated a higher antioxidant capacity (372.26 mg/g) compared to the SF extract (351.36 mg/g).

1.1.In vitro

Evaluation of Antioxidant Activity The antioxidant activities of extracts were evaluated by the formation of phosphomolybdenum complex method according to Prieto et al. (1999). An aliquot of 0.4mL of sample solution (100ppm in methanol) was mixed in a vial with 4mL of reagent solution (0.6M sulphuric acid, 28mM sodium phosphate and 4mM ammonium molybdate). The blank was prepared by replacing the sample with

0.4mL of the methanol sample. The vials were capped and incubated in a water bath at 95°C for 90min. After cooling the samples at room temperature, the absorbance of the mixture was measured at 695nm against the blank. The antioxidant activity was expressed relative to that of ascorbic acid.

Antiradical and Antioxidant Activities The yields of extracts ranged from 10.70 ± 1.93 to 22.27 ± 1.98%, respectively. Total phenolic contents were 276.02 ± 2.93mg GAE/g in FF extract and 248.97 ± 2.96 mg GAE/g (dry basis) in SF extract. When compared to SF extract, FF extract had significantly higher total phenolic contents (Table 1).

FF and SF extracts showed 74.51 ± 1.65 and 75.94 ± 1.72% antiradical activity at 100ppm using the a, a-diphenyl-ß-picrylhydrazyl (DPPH) method. It was observed that there were no statistically significant differences between extracts with respect to antiradical activity. It was found that antiradical activity of BHT at 100 ppm used as a synthetic antioxidant in food industry was 39.02 ± 1.02%. The activity of the extracts is attributed to their hydrogen donating ability (Shimada et al., 1992). It is well known that free radicals cause auto oxidation of unsaturated lipids in food (Kaur and Perkins, 1991). In comparison with BHT, these data showed that the extracts can be accepted as strong free radical inhibitors and antioxidants. Concerning the antioxidant capacity determined by the phosphomolybdenum method, the values ranged from 372.26 ± 0.96 to 351.36 ± 0.84 mg/g extract (equiv-alent to ascorbic acid). In this case, the antioxidant capacity of FF extract was significantly higher than that of SF extract. The reducing properties are generally associated with the presence of reductones (Pin-Der Duh, 1998) and their antioxidant activity is based on the breaking of the free radical chain by donating a hydrogen atom (Gordon, 1990). According to Jayaprakasha et al. (2003), the antioxidant activity of different extracts may depend on the presence of polyphenols which may act as reductones (Özkan G et al.,2004).

conclusion, both fresh and spent flower extracts are potent antioxidants, performing much better than the synthetic BHT. However, the fresh flower (FF) extract is the more favorable option due to its higher extraction yield, greater phenolic content, and superior antioxidant capacity.

Table 1: Total yield, total phenolic content, antiradical activity and antioxidant capacity of FF and SF extracts

Extracts	Total yield (%)	Total phenolic contents (mg GAE/g)[a]	Antiradical activity (%)	Antioxidant activity[b] (mg/g)
FF	22.27 ± 1.98	276.02 ± 2.93	74.51 ± 1.65	372.26 ± 0.96
SF	10.70 ± 1.93	248.97 ± 2.96	75.94 ± 1.72	351.36 ± 0.84
BHT	—	—	39.02 ± 1.02	—

[a]mg of gallic acid equivalent per gram. [b]Determined by phosphomolybdenum method.

In vitro inhibitory effect on lipid oxidation and antioxidant effect of R. damascena showed that the effect is similar to tocopherol and causes strong antioxidant and lipid peroxi-dation inhibitory effect. This plant is suggested for the treatment and prevention of diseases caused by free radi-cals (Shahriari S et al.,2007; Afsari Sardari F et al.,2019).

AF of Rosa damascena has shown potent antioxidant activity. It inhibits superoxide radical formation, hydroxyl radical generation and lipid peroxide formation in vitro. There are reports that antioxidant drugs exhibit hepato-protective effects (Lin et al., 1998; Babu et al., 2001; Subramoniam & Pushpangadan, 1999).

1.2.In vivo

It can be assumed that the observed antioxidant activity of R. damas-cena may be responsible for its hepatoprotective activity in vivo. The drug may be inhibiting free radical mediated peroxidative changes or scavenging their formation in vivo. In conclusion, the present study indicates that R. damas-cena possesses good antioxidant activity. The most active AF protected rats from the toxic effect of CCI in vivo. The protective effect is attributed to the antioxidant activity of the R. damascena flowers which extends in vivo. Further purification of the drug is needed for the identification of active principle which may be beneficial in a number of free radical mediated disease processes (C.R. Achuthan et al.,2003).

1.3.Clinical trials

Numerous studies have presented the antioxidative activity of R. damascena Mill (Mohammadpour T et al.,2015; Naziroglu M et al.,2013; Latifi G et al.,2015; Sharma M et al.,2012; Jafari M et al.,2008). but some have been medically considered as follows: Hepatoprotective effect: In one study, the daily oral administration of 250-1000 mg/kg of the aqueous extract, dose depen-dently reversed the biochemical, enzymatic and histopathological toxic effects of acetaminophen induced oxidative damage on rats liver (Sharma M et al.,2012). Anti-aging effect: Schriner et al. studied the effect of 5 mg daily oral intake of the aqueous extract on a fruit fly species for 2 weeks. They observed increased mean lifespan, down-regulation of heat shock proteins and antioxidant effects (Schriner SE et al.,2012). In another study with the same method but lower dosage, the anti-aging effect was shown without decrease in fecundity or metabolism; common confounders of the anti-aging ef-fect (Jafari M et al.,2008).

Six studies investigated the pain reducing effect of the plant but Bani and his colleagues presented the only high quality study. They compared the oral administration of R. damascena Mill. ethanolic extract versus NSAIDS and showed no significant difference between their effects in relieving primary dysmenorrheal pain (Bani S et al.,2014). Although the anti-nociceptive mechanism of R damascena Mill. is not fully understood, (Boskabady MH et al.,2011) its anti-inflammatory effects have been well exhibited by various basic and animal studies (Slavov A et al.,2013; Wedler J et al.,2016; Latifi G et al.,2015; Kim YW et al.,2015). In wound healing, the contribution of increased growth factors expression such as epidermal growth factor (EGF) and vascular endothelial growth factor (VEGF) and the decrease of pro-inflammatory cytokines by Rosa placenta extract has been shown (Kim YW et al.,2015). In another animal study, the effectiveness of Damask rose hydro-alcoholic extract on healing colitis was better than its volatile oil, suggesting the structural arrangement of active components besides their quantities as major key factors for the various effects of the plant (Latifi G et al.,2015).

Although the inhibition of pro-inflammatory genes expression suggest the major role of polyphenolic enriched ingredients as im-munomodulators, the antioxidative effect of its flavonoids such as quercetin and kaempferol, mainly found in alcoholic extracts (Boskabady MH et al.,2011; Latifi G et al.,2015) may also describe R. damascena Mill as a potent analgesic adjuvant in inflammatory states (Hacimuftuoglu A et al.,2006).

Discussion

The results of the current study showed that rose damascena extract has a highly potent antioxidant effect on the amelioration of hepatic functions and heart vitality, as demonstrated by the high total phenolic content, biochemical analysis of liver enzymes, antioxidant enzyme markers, histological vitality, and the alleviation of hepatotoxicity induced by CdCh. As reported previously, CdCl induces a marked reduction in protein levels and elevates the hepatic enzymes AST, ALT, and lactate dehydrogenase.

Our results show that show that the administration of R. damascene extract increased catalase and glutathione levels in the treatment groups. Hence, regarding the protective and antioxidant effects of R. damascene extract, the best form of efficacy was exhibited in a group of (AL + DRE 1000). We also found the highest level of MDA in the AL group and the enzyme activities of CAT, FRAP, and GSH reduced in the group AL, confirming earlier studies.

Conclusion

This review demonstrates that Rosa damascena possesses significant antioxidant and anti-inflammatory properties, largely attributable to its high phenolic and flavonoid content. Evidence from in vitro and in vivo studies confirms its ability to scavenge free radicals, inhibit lipid peroxidation, and enhance endogenous antioxidant defenses, leading to hepatoprotective and anti-aging effects. Clinical observations further suggest potential benefits in pain management, wound healing, and liver protection, underscoring its value as a natural therapeutic agent.

Despite these promising findings, current knowledge is limited by the scarcity of large-scale human clinical trials, variability in extract composition, and the reliance on crude preparations rather than isolated bioactive compounds. To fully realize the clinical potential of R. damascena, future research should prioritize: (I) purification and characterization of active constituents, (II) standardization of extraction methods to ensure reproducibility, (III) mechanistic studies exploring molecular pathways of action, and (IV) rigorously designed randomized controlled trials to confirm safety, efficacy, and optimal dosage.

Moreover, the potent antioxidant activity of R. damascena suggests opportunities for novel applications in areas such as neuroprotection, metabolic disorders, and adjunctive cancer therapies, which remain largely unexplored. By addressing these research gaps, R. damascena can be advanced from a traditional herbal remedy to a scientifically validated phytopharmaceutical with meaningful clinical impact in the management of oxidative stress–related and inflammatory diseases.

Limitations

Despite the promising evidence, the existing research on Rosa damascena faces certain limitations. Firstly, while numerous in vitro and in vivo studies exist, the number of high-quality, large-scale human clinical trials is limited. Secondly, the exact mechanism of action for some of its therapeutic effects, such as its analgesic (pain-reducing) effect, is not yet fully understood. Thirdly, the chemical composition and, consequently, the therapeutic properties of medicinal plants can vary depending on geographical and environmental factors; therefore, results from one specific region may not be universally generalizable. Finally, most studies have utilized whole plant extracts, and more research is needed to evaluate the biological effects of pure, isolated compounds to identify the primary active principles.

Acknowledgments

The author wishes to express gratitude to Torbat Heydariyeh University of Medical Sciences, particularly the Student Research Committee and the Social Determinants of Health Research Center, for their support and for providing the necessary facilities to conduct this review study. Thanks are also extended to all the professors and colleagues whose valuable guidance contributed to the completion of this research.

References

Afsari Sardari, F., et al. (2019). Traditional and recent evidence on five phytopharmaceuticals from Rosa damascena Herrm. Research Journal of Pharmacognosy, 6, 77–84.

Achuthan, C. R., Babu, B. H., & Padikkala, J. (2003). Antioxidant and hepatoprotective effects of Rosa damascena. Pharmaceutical Biology, 41(5), 357–361.

Kumar, N., Bhandari, P., Singh, A. B., Shamsher, S., & Bari, B. (2009). Antioxidant activity and ultra-performance LC-electrospray ionization-quadrupole time-of-flight mass spectrometry for phenolics-based fingerprinting of Rose species: Rosa damascena, Rosa bourboniana and Rosa brunoni. Food and Chemical Toxicology, 47, 361–367.

Özkan, G., et al. (2004). Note: Antioxidant and antibacterial activities of Rosa damascena flower extracts. Food Science and Technology International, 10, 277–281.

Pratt, D. E., & Hudson, J. E. (1990). Natural antioxidants not exploited commercially. In B. J. F. Hudson (Ed.), Food Antioxidants (pp. 171–192). Elsevier.

Shahriari, S., et al. (2007). In vivo antioxidant potentials of Rosa damascena petal extract from Guilan, Iran, comparable to alpha-tocopherol. International Journal of Pharmacology, 3, 187–190.

Yassa, N., Masoomi, F., Rohani Rankouhi, S. E., & Hadjiakhoondi, A. (2009). Chemical composition and antioxidant activity of the extract and essential oil of Rosa damascena from Iran, population of Guilan. Daru, 17, 175-180.

How to cite this article: Soltani N (2026). Health benefits of Rosa damascena: scientific evaluation of its anti-inflammatory and antioxidant properties. Health promotion sciences, 1(4), 162-168.