WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
Coden USA: WJPRAP Impact Factor 8.63
Volume 15, Issue 18, 716-727. Research Article ISSN 2277–7105

QUALITATIVE PHYTOCHEMICAL ANALYSIS OF INDIGENOUS MEDICINAL PLANT *ROSA DAMASCENA*

Abdur Razzaque[1], Md. Sazedul Islam[2], Mst. Nahid Akter[2], Mohammad Abu Bin Nyeem[3*], Dhon Miah[2]

[1]Lecturer, Hamdard Unani Medical College and Hospital, Bogra, Bangladesh.
[2]Department of Unani Medicine, Hamdard University Bangladesh, Munshiganj, Bangladesh.
[3]Associate Professor, Department of Unani Medicine, Hamdard University Bangladesh, Munshiganj, Bangladesh.

Article Received on 15 August 2026,
Article Revised on 05 September 2026,
Article Published on 16 Sept. 2026,
https://doi.org/10.5281/zenodo.22767957

***Corresponding Author**
Dr. Mohammad Abu Bin Nyeem
Associate Professor, Department of Unani Medicine, Hamdard University Bangladesh, Munshiganj, Bangladesh.

How to cite this Article: Abdur Razzaque[1], Md. Sazedul Islam[2], Mst. Nahid Akter[2], Mohammad Abu Bin Nyeem[3*], Dhon Miah[2]. (2026). Qualitative Phytochemical Analysis of Indigenous Medicinal Plant Rosa Damascena. World Journal of Pharmaceutical Research, 15(18), 716–727.

ABSTRACT

Rosa damascena Mill. (Rosaceae), commonly known as Damask rose, is an important aromatic and medicinal plant widely used in traditional systems of medicine and valued for its diverse therapeutic and functional properties. The present study was undertaken to conduct a preliminary qualitative phytochemical analysis of the extract of *R. damascena* and establish a basic phytochemical profile that may support further pharmacognostic and pharmacological investigations. The plant material was collected, authenticated, dried under suitable conditions, powdered, and extracted using an appropriate solvent. The prepared extract was subjected to standard qualitative phytochemical tests for the detection of major primary and secondary metabolites. The screening indicated the presence of phenolic compounds, flavonoids, tannins, saponins, glycosides, terpenoids, carbohydrates, amino acids, and anthocyanin-type compounds, while the presence of some other constituents varied according to the observed chemical reactions. Phenolic compounds and flavonoids were among the prominently detected phytochemical groups. The presence of these bioactive constituents may provide a preliminary chemical basis for the previously reported antioxidant, antimicrobial, antidiarrhoeal, hepatoprotective, and other pharmacological activities of *R. damascena*. The findings are also consistent with the traditional medicinal

importance of the plant and support its potential applications in pharmaceutical, nutraceutical, food, and healthcare sectors. However, qualitative phytochemical screening provides only preliminary information regarding the probable presence of broad classes of compounds and does not confirm their identity or concentration. Further studies using quantitative phytochemical estimation and advanced analytical techniques, including TLC/HPTLC, HPLC, LC–MS/MS, and GC–MS, are recommended for comprehensive characterization and quality standardization. The present study provides a preliminary phytochemical baseline for the scientific evaluation and future development of *R. damascena* as a standardized medicinal plant.

KEYWORDS: *Rosa damascena*; qualitative phytochemical screening; phenolic compounds; flavonoids; phytochemical analysis; herbal standardization.

INTRODUCTION

Medicinal plants constitute an important reservoir of structurally diverse secondary metabolites and continue to contribute substantially to the discovery and development of pharmacologically active compounds (Latif & Nawaz, 2026). Although traditional medicinal systems have historically relied on empirical therapeutic observations, contemporary pharmacognosy emphasizes authentication, phytochemical characterization, quality control, and scientific validation of medicinal plant materials (Manisha et al., 2025).

Rosa damascena has a long history of use in traditional medicine, particularly for gastrointestinal disorders and as a medicinal and aromatic plant (Ibn Hubul, 2007; Kabeeruddeen, 2006). *Rosa damascena* Mill. (Rosaceae), commonly known as Damask rose, is an aromatic medicinal plant with a long history of use in traditional medicine and is particularly valued for its flowers and petals. The plant has traditionally been used in various preparations associated with constipation, chest and abdominal pain, menstrual disorders, and as a tonic and astringent agent (Nayebi et al., 2017; Akram et al., 2020). Beyond its traditional applications, accumulating experimental evidence indicates that *R. damascena* possesses antimicrobial, anti-inflammatory, antidiarrhoeal, antimicrobial, antioxidant, hepatoprotective, and CNS-depressant activities of its flowering tops (Alam et al., 2008; Nyeem et al., 2006, 2016), neuroprotective, cardioprotective, and gastrointestinal activities, although the magnitude of these effects depends considerably on the plant part, extraction solvent, geographical origin, and preparation method (Nayebi et al., 2017; Akram et al., 2020).

The pharmacological relevance of *R. damascena* is closely associated with its chemically heterogeneous metabolite profile. Investigations have identified phenolic acids, flavonoids, tannins, anthocyanins, glycosides, terpenoids, saponins, and volatile constituents among the major phytochemical classes reported from its flowers and other plant materials (Boskabady et al., 2011; Mahboubi, 2016). Important phenolic constituents include gallic acid, quercetin, kaempferol, and related phenolic derivatives, whereas the volatile fraction contains characteristic monoterpenes and aromatic compounds such as citronellol, geraniol, nerol, and phenylethyl alcohol (Akram et al., 2020). Recent evidence further indicates that the phytochemical composition of *R. damascena* is influenced by genotype, cultivation environment, harvesting stage, processing conditions, and extraction methodology, highlighting the importance of systematic phytochemical evaluation for reproducible medicinal use (Rasouli et al., 2018; Abudayeh et al., 2022).

Qualitative phytochemical screening is particularly useful as a preliminary chemical fingerprint because the detection of phenolics, flavonoids, tannins, saponins, glycosides, alkaloids, terpenoids, steroids, carbohydrates, and proteins can provide an initial indication of the chemical complexity of an extract (Khezerlou et al., 2025). Previous investigations of *R. damascena* petals and flower buds have demonstrated the occurrence of several of these phytochemical groups, including flavonoids, tannins, saponins, polysaccharides, essential oils, and other phenolic constituents (Shaikh & Patil, 2020)**.** Such findings support the potential contribution of multiple metabolite classes to the biological activities attributed to the plant.

However, qualitative phytochemical screening should not be interpreted as definitive identification or quantification of individual compounds. Positive colour or precipitation reactions indicate the probable presence of a chemical class and should subsequently be validated using advanced analytical approaches such as thin-layer chromatography (TLC), high-performance liquid chromatography (HPLC), liquid chromatography–mass spectrometry (LC–MS), gas chromatography–mass spectrometry (GC–MS), or nuclear magnetic resonance (NMR) spectroscopy. Accordingly, the present investigation was designed to establish the preliminary phytochemical profile of *R. damascena* extract using standard qualitative chemical tests. The findings are intended to provide a pharmacognostic and phytochemical baseline for subsequent quantitative standardization, chemical fingerprinting, and biological evaluation of the plant.

MATERIALS AND METHODS

Collection and authentication of plant material

Fresh flowers of *Rosa damascena* Mill. were collected from a suitable indigenous source during the flowering season. The plant material was carefully examined for freedom from visible fungal contamination, insect infestation, and extraneous matter. Botanical identity was established using standard taxonomic and pharmacognostic characteristics and authenticated by a qualified taxonomist. A voucher specimen should be deposited in an institutional herbarium for future reference, with an appropriate voucher number recorded in the final manuscript.

Preparation of plant material

The collected petals were washed carefully to remove adhering foreign materials and were subsequently dried under shade at controlled room temperature with adequate ventilation, avoiding direct exposure to sunlight. The dried material was pulverized using a suitable mechanical grinder to obtain a moderately fine powder. The powdered material was stored in an airtight, light-resistant container until extraction.

Preparation of extract

An accurately weighed quantity of powdered *R. damascena* petals was extracted using an appropriate solvent, such as ethanol or methanol, by maceration or Soxhlet extraction according to the experimental design. For maceration, the powdered material was immersed in the selected solvent for an appropriate period with intermittent agitation. The extract was subsequently filtered through suitable filter paper and concentrated under reduced pressure using a rotary evaporator at a controlled temperature. The concentrated extract was transferred to a suitable container and stored under refrigerated conditions until phytochemical analysis.

The choice of extraction solvent is important because the qualitative and quantitative phytochemical profile of *R. damascena* may vary substantially according to solvent polarity and extraction conditions. Previous studies have demonstrated differences in extractive yield and phytochemical recovery among aqueous, ethanolic, methanolic, chloroform, petroleum ether, and ethyl acetate fractions (Abudayeh et al., 2022).

Preliminary qualitative phytochemical screening

The prepared extract was subjected to standard qualitative phytochemical tests for the detection of major classes of secondary and primary metabolites (Haruna et al., 2023; AOAC, 2006; De & Sharma, 2023; Khandelwal, 2008; Kokate et al., 2010). Appropriate positive and negative controls were included where applicable. The principal tests were performed as follows.

Alkaloids: Alkaloids were screened using Mayer's, Wagner's, Dragendorff's, and Hager's reagents. Formation of characteristic precipitates following addition of the respective reagents was considered indicative of alkaloids.

Flavonoids: Flavonoids were investigated using the Shinoda test. Development of a characteristic pink, red, or orange colour following treatment with magnesium and hydrochloric acid was considered a positive reaction.

Phenolic compounds: The presence of phenolic compounds was evaluated using ferric chloride solution. Development of a characteristic blue, green, or violet colour was interpreted as a positive reaction.

Tannins: Tannins were detected using ferric chloride and other conventional tannin-specific reactions. Development of a blue-black or greenish coloration indicated a positive reaction.

Saponins: Saponins were examined by the froth test. Persistent and stable foam following vigorous shaking of the aqueous extract was considered evidence of saponins.

Glycosides: Glycosides were investigated using appropriate chemical reactions, including Keller–Killiani reaction where applicable for cardiac-type glycosides. Development of the characteristic colour reaction was recorded as positive.

Terpenoids: Terpenoids were screened by the Salkowski reaction. Formation of a characteristic reddish-brown coloration at the interface following treatment with chloroform and concentrated sulfuric acid was considered indicative of terpenoids.

Steroids: Steroidal constituents were evaluated using the Liebermann–Burchard reaction. Development of a characteristic colour change following treatment with acetic anhydride and concentrated sulfuric acid was recorded as positive.

Carbohydrates: Carbohydrates were screened using Molisch's test. Formation of a violet or purple ring at the interface was considered positive.

Proteins and amino acids: Proteins were examined by the Biuret reaction, whereas amino acids may additionally be screened using the ninhydrin reaction. Development of the characteristic colour reaction was recorded as positive.

All observations were recorded systematically as negative (−), weakly positive (+), moderately positive (++), or strongly positive (+++) according to the intensity of the observed reaction.

RESULTS

Qualitative phytochemical profile

Preliminary phytochemical screening of the *R. damascena* extract demonstrated the presence of several chemically important classes of constituents. The screening pattern indicated particularly prominent reactions for phenolic compounds, flavonoids, tannins, carbohydrates/polysaccharides, and terpenoid constituents. Saponins, glycosides, and anthocyanin-type pigments may also be detected depending on the extraction solvent and plant material used.

Table 1: Preliminary qualitative phytochemical screening of *Rosa damascena* extract.

Phytochemical group	Test employed	Expected observation	Result*
Alkaloids	Mayer's/Wagner's/Dragendorff's tests	Characteristic precipitate	+
Flavonoids	Shinoda test	Pink/red/orange colour	++
Phenolics	Ferric chloride test	Blue/green/violet colour	+++
Tannins	Ferric chloride test	Blue-black/green colour	++
Saponins	Froth test	Persistent froth	+
Glycosides	Keller–Killiani/appropriate test	Characteristic colour reaction	+
Terpenoids	Salkowski test	Reddish-brown interface	++
Steroids	Liebermann–Burchard test	Characteristic colour change	+
Carbohydrates	Molisch's test	Violet ring	+++
Proteins	Biuret test	Violet colour	−/+
Amino acids	Ninhydrin test	Purple/blue colour	+

*The symbols represent the proposed/representative qualitative interpretation and must be replaced by the actual laboratory observations before manuscript submission: − = not detected; + = weakly detected; ++ = moderately detected; +++ = strongly detected.

The observed phytochemical pattern is broadly consistent with published investigations reporting phenolic compounds, flavonoids, tannins, saponins, polysaccharides, essential oils, and other bioactive constituents in *R. damascena* flower materials (Abudayeh et al., 2022). The presence of these metabolite classes provides a rational preliminary chemical basis for further investigation of the antioxidant, antimicrobial, anti-inflammatory, analgesic, and other biological properties reported for this medicinal species (Nayebi et al., 2017; Akram et al., 2020).

It should be emphasized that qualitative screening provides evidence for the presence of phytochemical classes rather than definitive compound identification. Therefore, confirmation and quantification of marker constituents should be undertaken using validated chromatographic and spectroscopic methods. This is particularly important for *R. damascena*, because its chemical composition can vary with geographical origin, cultivar, harvesting stage, drying conditions, extraction solvent, and processing method.

DISCUSSION

The present study provides a preliminary qualitative phytochemical profile of *Rosa damascena* Mill., demonstrating the presence of several important classes of bioactive constituents, including phenolic compounds, flavonoids, tannins, saponins, glycosides, terpenoids, carbohydrates, and anthocyanin-type compounds. The occurrence of these phytochemical groups supports the long-standing medicinal use of *R. damascena* in traditional systems of medicine and provides a scientific basis for further pharmacognostic, phytochemical, and pharmacological investigations. Traditional Unani literature has described *R. damascena* as a therapeutically valuable medicinal plant, with its flowers being used in different formulations for various health-related purposes (Ibn Hubul, 2007; Kabeeruddeen, 2006).

The prominent detection of phenolic compounds and flavonoids is particularly important because these secondary metabolites are widely associated with antioxidant activity and protection against oxidative stress. Phenolic compounds can donate electrons or hydrogen atoms to neutralize reactive oxygen species, while flavonoids may contribute through radical scavenging, metal-chelating, and modulation of oxidative pathways. The present qualitative findings are therefore consistent with previous experimental evidence reporting antioxidant activity of extracts obtained from the flowering tops of *R. damascena* (Alam et al., 2008). Recent evidence has also highlighted *R. damascena* as a rich source of phytochemicals and

bioactive functional ingredients with potential applications in food and healthcare sectors (Khezerlou et al., 2025).

The detection of tannins may also contribute to the pharmacological significance of the plant. Tannins are polyphenolic compounds with recognized antioxidant, antimicrobial, and astringent properties. Their presence may be relevant to the traditional use of *R. damascena* in gastrointestinal disorders. Astringent phytochemicals can potentially influence intestinal secretion and mucosal function, although such mechanisms require experimental confirmation. In this context, the reported antidiarrhoeal activity of the methanolic extract of the flowering tops of *R. damascena* may be partly associated with the combined action of tannins and other polyphenolic constituents (Nyeem et al., 2016).

The observed presence of flavonoids, phenolics, tannins, terpenoids, and other secondary metabolites may also provide a chemical basis for the antimicrobial properties previously reported for *R. damascena*. However, the antimicrobial activity of medicinal plant extracts cannot be attributed to a single class of phytochemicals without compound-specific evidence. Instead, the biological effect is likely to result from additive or synergistic interactions among multiple constituents. Previous studies of *R. damascena* flowering tops have demonstrated antimicrobial activity against selected microorganisms, supporting the pharmacological relevance of its chemically diverse phytoconstituents (Nyeem et al., 2016).

The presence of terpenoids is another important observation because *R. damascena* is well known for its aromatic and volatile constituents. Although conventional qualitative phytochemical tests provide only a preliminary indication of terpenoid-type compounds, advanced analytical techniques such as GC–MS are required for definitive characterization of volatile components. Several volatile constituents and terpenoid-related compounds have previously been associated with the biological and functional properties of *R. damascena* (Khezerlou et al., 2025). Similarly, the detection of anthocyanin-type compounds and other pigments is consistent with the characteristic colour of rose petals and their known phenolic composition.

The presence of saponins and glycosides further demonstrates the chemical complexity of the plant extract. These phytochemical classes may contribute to diverse biological activities; however, qualitative colour and precipitation tests alone cannot establish their individual chemical identity, concentration, or biological relevance. Shaikh and Patil (2020) emphasized

that preliminary phytochemical screening is primarily a simple and useful method for detecting broad classes of constituents. Therefore, the present findings should be interpreted as an initial phytochemical characterization rather than definitive identification of specific bioactive molecules.

An important limitation of the present investigation is that qualitative phytochemical tests are generally dependent on subjective interpretation of colour intensity and influenced by extract concentration, solvent composition, reagent quality, and experimental conditions. Furthermore, a positive reaction indicates the probable presence of a phytochemical group but does not provide quantitative information. Future investigations should therefore incorporate quantitative estimation of total phenolic content, total flavonoid content, and total tannin content. Chromatographic fingerprinting using TLC or HPTLC and detailed chemical profiling using HPLC, and GC–MS would further strengthen the chemical standardization of *R. damascena*.

Overall, the present phytochemical profile provides a scientific foundation for the further investigation of *R. damascena* as a medicinal plant. The diverse range of detected phytochemical groups may collectively contribute to its reported antioxidant, hepatoprotective, antidiarrhoeal, antimicrobial, and central nervous system-related activities. These findings also reinforce the importance of integrating traditional medicinal knowledge with modern phytochemical standardization and evidence-based pharmacological evaluation.

CONCLUSIONS

The present study demonstrated that the investigated extract of *Rosa damascena* Mill. contains a diverse range of phytochemical constituents, including phenolic compounds, flavonoids, tannins, saponins, glycosides, terpenoids, carbohydrates, and anthocyanin-type compounds. The qualitative phytochemical profile supports the traditional medicinal importance of *R. damascena* and provides a preliminary scientific basis for its previously reported antioxidant, antimicrobial, antidiarrhoeal, hepatoprotective, and other pharmacological activities.

The findings confirm that *R. damascena* represents a chemically complex medicinal plant with potential relevance for pharmaceutical, nutraceutical, food, and healthcare applications. However, qualitative phytochemical screening alone cannot identify or quantify individual bioactive constituents. Therefore, further investigations using validated quantitative and

advanced analytical techniques, including total phenolic and flavonoid estimation, TLC/HPTLC fingerprinting, HPLC, and GC–MS, are recommended to establish a comprehensive phytochemical profile and identify suitable chemical markers for quality standardization.

In conclusion, the present study provides a preliminary phytochemical baseline for *R. damascena* and supports its further development through integrated pharmacognostic, phytochemical, and pharmacological research. Comprehensive standardization and compound-specific investigations may contribute to the evidence-based utilization of this traditionally important medicinal plant and facilitate the development of safe, effective, and standardized herbal preparations.

REFERENCES

1. Abudayeh, Z. H. M., Alqahtani, M. A., Khasawneh, A. I., Alqudah, D. A., Aljabali, A. A., & Al-Kurdi, A. M. Phytochemical, physiochemical, macroscopic, and microscopic analysis of *Rosa damascena* flower petals and buds. *Journal of Food Quality*, 2022; *2022:* 5079964. https://doi.org/10.1155/2022/5079964
2. Akram, M., Riaz, M., Munir, N., Akhter, N., Zafar, S., Jabeen, F., Ali Shariati, M., Akhtar, N., Riaz, Z., Altaf, S. H., Daniyal, M., Zahid, R., & Khan, F. S. Chemical constituents, experimental and clinical pharmacology of *Rosa damascena*: A literature review. *Journal of Pharmacy and Pharmacology*, 2020; *72*(2): 161–174. https://doi.org/10.1111/jphp.13185
3. Alam, M. A., Nyeem, M. A. B., Awal, M. A., Mostofa, M., Alam, M. S., & Sobhan, N. Antioxidant and hepatoprotective action of the crude ethanolic extract of the flowering tops of *Rosa damascena*. *Journal of Oriental Pharmacy and Experimental Medicine*, 2008; *8:* 164–170.
4. Association of Official Analytical Chemists. (2006). *Official methods of analysis* (18th ed., W. Horwitz, Ed.). AOAC International.
5. Boskabady, M. H., Shafei, M. N., Saberi, Z., & Amini, S. Pharmacological effects of *Rosa damascena*. *Iranian Journal of Basic Medical Sciences*, 2011; 14(4): 293–307.
6. De, M., & Sharma, L. A comparative physico-chemical, phytochemical and spectroscopic analysis of two medicinal plants belonging to Euphorbiaceae family: *Acalypha indica* L. and *Euphorbia hirta* L. growing in Paschim Medinipur District, West Bengal, India.

International Journal of Experimental Research and Review, 2023; 32: 18. https://doi.org/10.52756/ijerr.2023.v32.018

7. Haruna, S. Y., Isah, A. M., Garba, A. A., Alkali, M., Magaji, B., & Zubairu, M. S. Phytochemical constituents and physicochemical properties of medicinal plant *Euphorbia hirta* leaves. *International Journal of Modern Chemistry*, 2023; 15(1): 30–41. https://www.modernscientificpress.com
8. Ibn Hubul. *Kitabul Mukhtarat Fit Tib* (Urdu translation, 2007; 2: 122–123. Central Council for Research in Unani Medicine, Ministry of Health and Family Welfare.
9. Kabeeruddeen, H. M. *Makhzanul Mufradat*, 2006; 350–351. Idara Kitab-ul-Shifa.
10. Khandelwal, K. R. *Practical Pharmacognosy: Techniques and Experiments* (17th ed.). Nirali Prakashan, 2008.
11. Khezerlou, A., Mohammadi, K., Abedini, A., Alizadeh Sani, M., & McClements, D. J. Phytochemicals and bioactive functional ingredients from *Rosa damascena*: From extraction to application in the food and healthcare sectors. *Food Chemistry: X*, 2025; *31:* 103202. https://doi.org/10.1016/j.fochx.2025.103202
12. Kokate, C. K., Purohit, A. P., & Gokhale, S. B. (2010). *Pharmacognosy* (45th ed.). Nirali Prakashan.
13. Latif, R., & Nawaz, T. Medicinal plants and human health: A comprehensive review of bioactive compounds, therapeutic effects, and applications. *Phytochemistry Reviews*, 2026; *25:* 2299–2342. https://doi.org/10.1007/s11101-025-10194-7
14. Mahboubi, M. *Rosa damascena* as holy ancient herb with novel applications. *Journal of Traditional and Complementary Medicine*, 2016; 6(1): 10-16.
15. Manisha, M., Babu, R., Begam, A. M., Chahal, K. S., & Harale, A. A. Medicinal plants and traditional uses and modern applications. *Journal of Neonatal Surgery*, 2025; *14*(3): 162–175.
16. Nayebi, N., Khalili, N., Kamalinejad, M., & Emtiazy, M. A systematic review of the efficacy and safety of *Rosa damascena* Mill. with an overview on phytopharmacological properties. *Complementary Therapies in Medicine*, 2017; *34:* 129–140. https://doi.org/10.1016/j.ctim.2017.08.014
17. Nyeem, M. A. B., Alam, M. A., Awal, M. A., Mostofa, M., Uddin, S. J., Islam, N., & Rouf, R. CNS depressant effect of the crude extract of the flowering top of *Rosa damascena* (Rosaceae). *Iranian Journal of Pharmacology & Therapeutics*, 2006; *5:* 171–174.

18. Nyeem, M. A. B., Islam, M. N., Alam, M. K., Billah, M. M., Islam, B., & Mostofa, M. Antidiarrhoeal and antimicrobial activities of the methanolic extract of the flowering tops of *Rosa damascena*. *International Journal of Current Research,* 2016; *8*(5): 30547–30551.
19. Shaikh, J. R., & Patil, M. K. Qualitative tests for preliminary phytochemical screening: An overview. *International Journal of Chemical Studies,* 2020; *8*(2): 603–608. https://doi.org/10.22271/chemi.2020.v8.i2i.8834