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Rosa Damascene - Unveiling Its Therapeutic Potential and Sustainable Applications

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Abstract

Rosa damascena, commonly known as Damask rose, has gained widespread attention for its diverse pharmacological properties and therapeutic potential. Traditionally used in herbal medicine, recent studies have highlighted its multifaceted applications, including anti-inflammatory, antioxidant, analgesic, and anxiolytic effects. This review examines the current literature on the medicinal properties of Rosa damascena, exploring its antimicrobial, anticancer, anti-HIV, cardiovascular, and anti-diabetic effects. Additionally, the plant's role in managing mental health conditions, menstrual-related symptoms, and its potential for sustainable product development, such as eco-friendly sanitary napkins and natural cosmetics, is discussed. While evidence supports its efficacy, the mechanisms underlying these therapeutic effects remain poorly understood, and further research is needed to elucidate the plant's bioactive compounds and their interaction with the human body. Future studies should also focus on the scalability of Rosa damascena in product development, its long-term efficacy in treating chronic conditions, and its environmental sustainability. This paper emphasizes the need for more comprehensive clinical trials, molecular studies, and eco-friendly production techniques to unlock the full therapeutic and commercial potential of Rosa damascena.

Keywords: Rosa Damascene, Pharmacological Properties, Medicinal Applications, Sustainable Products, Mental Health

1. Introduction

Rosa damascena, commonly known as Damask Rose, is a plant of great historical and cultural significance, widely celebrated for its extensive applications in traditional medicine, perfumery, and culinary practices. Native to the Middle East and cultivated globally, this rose species has not only contributed to various cultural practices but has also garnered attention for its therapeutic and pharmacological properties. The plant is rich in bioactive compounds, including flavonoids, terpenes, and glycosides, which are responsible for its diverse range of health benefits (Boskabady *et al.,* 2011).

Recent scientific research has highlighted the potential of Rosa damascena in modern medicine and sustainable innovation. One of its most prominent uses is in the management of menstruation-related symptoms, where it has been shown to alleviate pain, bloating, anxiety, and fatigue, offering a natural remedy for women's health (Koohpayeh *et al.,* 2021). In addition to its role in women's health, Rosa damascena has proven to be valuable in the development of eco-friendly products. For example, biodegradable sanitary napkins made from Rosa damascena extracts have shown promise, reflecting the plant's contribution to sustainable practices (Mekala, 2021).

The medicinal properties of Rosa damascena are also noteworthy, with various studies demonstrating its antioxidant, anti-inflammatory, and antimicrobial effects, reinforcing its value in both traditional and complementary medicine. These effects have been explored through its potential as a treatment for conditions ranging from skin diseases to digestive issues (Labban & Thallaj, 2020). Moreover, its pharmacological effects on the nervous system, such as stress reduction and mood improvement, further highlight the therapeutic potential of this ancient herb (Mahboubi, 2016).

This review synthesizes key studies to examine the multifaceted applications of Rosa damascena, focusing on its pharmacological properties, its impact on menstrual health, and its role in innovative, sustainable product development. By bridging historical uses with modern research, this paper aims to provide a comprehensive overview of Rosa damascena's significance in both health and sustainability.

2. Review of Literature

Akram *et al.*, (2020) [14] emphasize the significant **anti-inflammatory and antioxidant properties** of *Rosa damascena*, highlighting its therapeutic potential in addressing chronic inflammatory diseases and oxidative stress-related disorders. Their study suggests that these properties make *Rosa damascena* a valuable candidate for treating various conditions associated with oxidative damage.

Hosseini *et al.*, (2018) [11] focus on the **analgesic effects** of *Rosa damascena*, particularly in preclinical studies. Their findings suggest that the plant's extracts hold promise for pain management applications, offering a natural alternative to synthetic analgesics.

Shah *et al.*, (2021) [21] investigate the **antimicrobial properties** of *Rosa damascena*, demonstrating its efficacy against both Gram-positive and Gram-negative bacteria. This highlights the plant's potential as a natural antimicrobial agent, which could be beneficial in combating multidrug-resistant pathogens.

Bukhari *et al.*, (2020) [15] explore the **anticancer properties** of *Rosa damascena*. Their research reveals promising cytotoxic effects on certain cancer cell lines, attributing these properties to the plant's rich phenolic and flavonoid content, which are known for their antioxidant and anticancer activities.

Mohammadinia *et al.*, (2017) [10] validate the **anxiolytic and sedative effects** of *Rosa damascena* through clinical trials. They report significant reductions in anxiety and stress symptoms, reinforcing the plant's traditional use as a calming agent.

Rakhshandeh *et al.*, (2018) [12] examine the role of *Rosa damascena* in **alleviating menstrual-related symptoms**, such as dysmenorrhea. Their double-blind, randomized, placebo-controlled trial shows a significant improvement in pain scores among users of its extracts, indicating its potential as a natural remedy for menstrual discomfort.

Kaur and Singh (2022) [25] explore the **sustainable applications** of *Rosa damascena*, particularly in the production of eco-friendly sanitary napkins. They highlight the plant's antimicrobial and absorbent properties, suggesting its potential as a biodegradable alternative to conventional materials in sanitary products.

Gupta and Sharma (2021) [24] review the role of *Rosa damascena* in **natural cosmetics**, emphasizing its skin-soothing and rejuvenating qualities. They note that its inclusion in cosmetic formulations aligns with the growing demand for eco-friendly and natural products in the beauty industry.

Boskabady *et al.*, (2011) investigated the antimicrobial potential of essential oils derived from *Rosa damascena*. Their findings demonstrated significant inhibition of bacterial and fungal strains, highlighting its potential applications in antimicrobial formulations for medical and cosmetic uses.

Mahboubi and Kazempour (2016) reported the antimicrobial efficacy of *Rosa damascena* hydrosol, particularly against foodborne pathogens. Their study emphasizes its potential role in food preservation.

Safaei-Ghomi *et al.*, (2014) [4] explored the antioxidant properties of *Rosa damascena*, focusing on its ability to scavenge free radicals. Their research underscores its role in preventing oxidative stress-related diseases.

Esmailidehaj *et al.*, (2017) [9] investigated the cardioprotective effects of *Rosa damascena* extract. Their study demonstrated that the extract mitigates myocardial infarction in experimental models by reducing oxidative damage, suggesting its therapeutic potential in cardiovascular health.

Kumar *et al.*, (2019) [13] examined the anti-diabetic potential of *Rosa damascena*. Their research revealed that the plant's extracts effectively reduce blood glucose levels and improve insulin sensitivity in diabetic rats. These effects were attributed to the phenolic compounds that enhance glucose metabolism and insulin signaling pathways.

Moshiri *et al.*, (2015) [5] focused on the anxiolytic and antidepressant properties of *Rosa damascena*. Their findings revealed that inhalation of its essential oil significantly alleviates symptoms of depression in patients with stress-related disorders, suggesting its use as a complementary therapy in mental health management.

Nayak *et al.*, (2012) [3] highlighted the wound healing properties of *Rosa damascena*. Their study demonstrated that topical application of its extracts accelerates wound closure and enhances tissue regeneration due to its antimicrobial and anti-inflammatory effects.

Patel *et al.*, (2021) [22] explored the integration of *Rosa damascena* into biodegradable packaging and sanitary products. Their research emphasized the plant's antimicrobial properties, showcasing its potential in reducing reliance on synthetic materials and promoting environmental sustainability.

3. Pharmacological Properties of Rosa Damascena

Rosa damascena, commonly known as the Damask rose, is widely recognized for its diverse pharmacological properties, which contribute to its medicinal value in both traditional and modern health practices. Research has highlighted its multifaceted therapeutic potential, ranging from respiratory benefits to improvements in mental health.

Studies have demonstrated that Rosa damascena possesses antispasmodic, antioxidant, and anti-inflammatory properties, which are particularly beneficial for managing conditions such as respiratory disorders, gastrointestinal issues, and pain (Boskabady *et al.,* 2011). These therapeutic effects are attributed to the plant's bioactive compounds, including flavonoids, terpenes, and glycosides, which are responsible for its antioxidant and anti-inflammatory activities, making it an important component in complementary medicine.

Beyond its physical health benefits, Rosa damascena has also shown significant effects on mental well-being. Its essential oils and extracts are widely used in aromatherapy and stress management due to their anxiolytic and antidepressant effects (Labban & Thallaj, 2020). The soothing properties of the rose make it a popular choice for mood improvement and anxiety reduction, further solidifying its importance in holistic health practices.

Rosa damascena has long been used in traditional medicine to address a variety of health concerns. For instance, it has been effective in managing mood disorders, digestive issues, and sleep disturbances (Mahboubi, 2016). This highlights the plant's broad therapeutic potential and demonstrates its enduring relevance in modern pharmacological practices. The research connects the plant's historical uses with contemporary scientific understanding, offering a bridge between ancient knowledge and modern healthcare.

The plant's impact on health is further supported by systematic research. Koohpayeh *et al.,* (2021) conducted a meta-analysis to examine the effects of Rosa damascena on menstruation-related symptoms, including pain, headache, fatigue, anxiety, and bloating. The results confirmed that Rosa damascena is effective in alleviating these symptoms, which enhances its relevance in women's health.

Additionally, Rosa damascena has found applications in the development of eco-friendly products, such as sanitary napkins infused with its extracts. Mekala (2021) emphasized the potential of using Rosa damascena extracts in creating environmentally sustainable sanitary napkins, showcasing how the plant's pharmacological properties can be applied to produce health-conscious and eco-friendly products.

The pharmacological properties of Rosa damascena underscore its significant role in both contemporary and traditional medicine. From managing physical ailments to improving mental health, the therapeutic benefits of this versatile plant continue to be recognized across various health domains.

Table 1: Key pharmacological properties and applications of *Rosa damascena*

Property/Application	Description	Reference
Antispasmodic, Antioxidant, Anti-inflammatory	Helps manage respiratory, gastrointestinal disorders, and pain.	Boskabady *et al.,* 2011
Mental Health Benefits	Anxiolytic and antidepressant effects; used in aromatherapy for stress management.	Labban & Thallaj, 2020
Traditional Medicine	Used to treat mood disorders, digestive issues, and sleep disturbances.	Mahboubi, 2016
Menstruation-related Symptoms	Effective in alleviating symptoms like pain, fatigue, headache, and anxiety.	Koohpayeh *et al.,* 2021
Eco-friendly Products	Rosa damascena extracts used in eco-friendly sanitary napkins.	Mekala, 2021

4. Impact on Menstruation-Related Symptoms

Menstrual discomfort, which includes symptoms such as pain, headaches, fatigue, anxiety, and bloating, is a widespread issue that significantly impacts women's quality of life. Rosa damascena has emerged as a promising natural remedy for alleviating these symptoms due to its unique pharmacological properties, including its soothing, antispasmodic, and anti-inflammatory effects.

Research indicates that Rosa damascena can effectively reduce pain intensity and anxiety, providing relief from both the physical and psychological aspects of menstrual discomfort. A systematic review and meta-analysis of randomized controlled trials by Koohpayeh *et al.,* (2021) found a significant reduction in pain and anxiety among participants using Rosa damascena-based interventions. This study also highlighted the plant's role in alleviating bloating and fatigue, making it a comprehensive remedy for menstrual health.

Earlier studies, such as those by Boskabady *et al.,* (2011), emphasize the antispasmodic and anti-inflammatory properties of Rosa damascena. The plant's bioactive compounds, including flavonoids and terpenes, contribute to its ability to relax smooth muscles and reduce inflammation, thereby alleviating menstrual pain and cramping. Additionally, Rosa damascena's antioxidant properties help combat oxidative stress, which is often associated with pain and fatigue during menstruation.

Mahboubi (2016) further supports the traditional use of Rosa damascena for pain management and relaxation. He notes its historical use in easing menstrual cramps and enhancing emotional well-being. This traditional knowledge is validated by modern scientific findings, bridging ancient practices with contemporary research.

Labban and Thallaj (2020) explored the medicinal and pharmacological properties of Rosa damascena, highlighting its anxiolytic and mood-enhancing effects. These properties are particularly beneficial during menstruation, a time often marked by heightened emotional distress, including anxiety and irritability. The study attributed these effects to the aromatic compounds in Rosa damascena, which exert a calming influence on the central nervous system, thus supporting emotional balance.

Beyond its medicinal benefits, Rosa damascena has been integrated into sustainable products for menstrual health. Mekala (2021) developed eco-friendly sanitary napkins made from fibers of *Sansevieria trifasciata*, coated with Rosa damascena extracts. These napkins address environmental concerns related to conventional products while utilizing the soothing and antibacterial properties of Rosa damascena for additional benefits. This innovative application highlights the potential of Rosa damascena as a functional ingredient in sustainable health solutions.

These findings underscore the holistic benefits of Rosa damascena in managing menstruation-related symptoms. Its pharmacological properties, traditional use, and modern applications make it a valuable natural remedy for improving menstrual health and overall well-being. By addressing both physical and emotional discomforts, Rosa damascena offers an effective and sustainable solution for women's health care (Boskabady *et al.,* 2011; Koohpayeh *et al.,* 2021; Mahboubi, 2016; Labban & Thallaj, 2020; Mekala, 2021).

Table 2: Key studies on Rosa damascena and its effects on menstrual discomfort

Study	Focus	Findings
Koohpayeh *et al.,* 2021	Systematic review and meta-analysis	Reduced pain intensity and anxiety, alleviated bloating and fatigue during menstruation.
Boskabady *et al.,* 2011	Antispasmodic and anti-inflammatory properties	Relaxed smooth muscles, reduced inflammation, and alleviated menstrual pain and cramping.
Mahboubi, 2016	Traditional use for pain management and relaxation	Supported the historical use of Rosa damascena for easing menstrual cramps and improving emotional well-being.
Labban & Thallaj, 2020	Anxiolytic and mood-enhancing effects	Calmed the central nervous system, aiding in emotional balance during menstruation.
Mekala, 2021	Eco-friendly sanitary napkins with Rosa damascena	Developed napkins using Rosa damascena extracts for soothing, antibacterial, and environmental benefits.

5. Novel Applications in Sustainable Product Development

The exploration of *Rosa damascena* in the development of sustainable and eco-friendly products has gained significant attention, particularly in the context of biodegradable sanitary napkins. Mekala (2021) utilized fibers from *Sansevieria trifasciata* to create biodegradable sanitary napkins, which were further coated with extracts of *Rosa damascena*. This innovation aims to address the environmental impact of conventional sanitary products, which are often made from non-biodegradable materials. *Rosa damascena* contributes to the sustainability of these products while also providing valuable health benefits due to its well-documented antibacterial properties. Boskabady *et al.,* (2011) and Labban and Thallaj (2020) highlight the antibacterial efficacy of *Rosa damascena*, emphasizing its potential to prevent microbial growth and, consequently, enhance the hygiene and safety of sanitary napkins.

In addition to its antibacterial properties, *Rosa damascena* is known for its soothing and anti-inflammatory effects, making it a promising addition to products designed for intimate use. Mahboubi (2016) discusses the calming and healing properties of *Rosa damascena*, which have been valued for centuries in traditional medicine. These properties are particularly beneficial for sanitary napkins, where comfort is a primary concern. The inclusion of *Rosa damascena* not only contributes to the product's environmental friendliness but also enhances user comfort by providing a soothing effect during use.

Furthermore, *Rosa damascena* has been shown to alleviate common symptoms associated with menstruation, such as pain, fatigue, and anxiety. Koohpayeh *et al.,* (2021) conducted a systematic review and meta-analysis, concluding that *Rosa damascena* significantly reduces menstruation-related discomfort. This adds further value to its use in eco-friendly sanitary napkins, as it could potentially offer both physical and emotional relief to users.

The integration of *Rosa damascena* into biodegradable sanitary napkins, as explored by Mekala (2021), not only addresses sustainability challenges but also enhances the product's health benefits. The antibacterial, anti-inflammatory, and soothing properties of *Rosa damascena*, as demonstrated by several pharmacological studies (Boskabady *et al.,* 2011; Labban & Thallaj, 2020; Mahboubi, 2016; Koohpayeh *et al.,* 2021), make it an ideal candidate for use in such innovations, contributing to both environmental sustainability and improved consumer well-being.

Table 3: Aspects of *Rosa damascena* and its application in biodegradable sanitary napkins

Aspect	Details
Sustainability	Contributes to the biodegradability of sanitary napkins, addressing the environmental impact of conventional products (Mekala, 2021).
Antibacterial Properties	Prevents microbial growth, enhancing hygiene and safety (Boskabady *et al.,* 2011; Labban & Thallaj, 2020).
Soothing & Anti-inflammatory	Provides calming and healing effects, offering comfort during use (Mahboubi, 2016).
Menstrual Discomfort Relief	Alleviates pain, fatigue, and anxiety associated with menstruation (Koohpayeh *et al.,* 2021).
Overall Benefits	Enhances environmental sustainability, user comfort, and health benefits, making it an ideal ingredient for eco-friendly sanitary products.

6. Traditional and Complementary Medicine Applications

Rosa damascena has long been celebrated for its diverse applications in traditional medicine, ranging from treating physical ailments to promoting mental well-being. Mahboubi (2016) highlighted its historical significance as a "holistic ancient herb" and emphasized its therapeutic properties, especially in addressing digestive disorders, skin conditions, and mood disturbances. The essential oil extracted from Rosa damascena, rich in bioactive compounds, has been shown to exert calming effects, making it a key ingredient in stress relief and sleep enhancement protocols. This is supported by findings from Boskabady *et al.,* (2011), who reported its antispasmodic and anti-inflammatory properties, further validating its use in alleviating gastrointestinal discomfort and soothing skin irritations.

The calming aroma of Rosa damascena essential oil has proven particularly effective in reducing anxiety and promoting relaxation, as noted by Labban and Thallaj (2020). Their review emphasized its anxiolytic and antidepressant properties, complementing traditional practices that used rose oil in aromatherapy for mental clarity and emotional balance. Similarly, Koohpayeh *et al.,* (2021) confirmed its efficacy in reducing symptoms of anxiety and fatigue, especially in women experiencing menstruation-related discomfort, showcasing its broad applicability in complementary medicine.

Furthermore, modern innovations, such as incorporating Rosa damascena extracts into eco-friendly products, demonstrate the expanding scope of its applications. Mekala (2021) highlighted its antibacterial and soothing properties by developing sanitary napkins infused with Rosa damascena, reinforcing its traditional role as a natural healer while addressing contemporary sustainability challenges.

These studies collectively link the traditional knowledge of Rosa damascena with modern scientific insights, showcasing its multifaceted therapeutic potential. Its integration into both ancient and contemporary health practices highlights its enduring relevance in complementary medicine (Mahboubi, 2016; Boskabady *et al.,* 2011; Labban & Thallaj, 2020; Koohpayeh *et al.,* 2021; Mekala, 2021).

Table 4: The medicinal properties of Rosa damascena

Medicinal Property	Explanation	Reference
Anti-inflammatory effects	Rosa damascena has been shown to reduce inflammation, helping in conditions like arthritis and skin inflammation.	**Boskabady *et al.*, (2011)** suggest that Rosa damascena contains compounds with anti-inflammatory properties.
Antioxidant activity	The plant is rich in antioxidants that protect cells from oxidative damage, promoting overall health and preventing chronic diseases.	**Mahboubi (2016)** highlights that Rosa damascena has potent antioxidant properties, making it beneficial in preventing oxidative stress.
Pain relief	Rosa damascena is traditionally used to reduce pain, particularly menstruation-related discomfort, headaches, and muscle pain.	**Koohpayeh *et al.*, (2021)** report that Rosa damascena has pain-relieving properties.
Anxiolytic effects	The extract of Rosa damascena has calming and sedative effects, reducing anxiety and promoting a sense of calm.	**Labban and Thallaj (2020)** describe Rosa damascena's anxiolytic effects.
Digestive aid (reduces bloating)	Rosa damascena improves digestion and reduces bloating, traditionally used to soothe stomach-related issues.	**Koohpayeh *et al.*, (2021)** report that Rosa damascena is effective in reducing bloating and improving digestion.
Fatigue reduction	Rosa damascena helps reduce fatigue, enhances energy, and restores vitality. Its soothing properties improve overall mental and physical well-being.	**Koohpayeh *et al.*, (2021)** mention that Rosa damascena helps in reducing fatigue.
Menstruation-related symptoms relief	Rosa damascena helps relieve symptoms like pain, bloating, and fatigue during menstruation by balancing hormones and regulating menstrual cycles.	**Koohpayeh *et al.*, (2021)** discuss Rosa damascena's benefits for alleviating menstruation-related symptoms.
Antibacterial and Antifungal properties	Rosa damascena has natural antibacterial and antifungal properties, making it useful for preventing infections, especially on the skin.	**Labban and Thallaj (2020)** and **Mekala (2021)** indicate Rosa damascena's antimicrobial effects.
Antimicrobial properties	Rosa damascena inhibits the growth of various bacteria and fungi, making it effective in treating infections and wounds.	**Boskabady *et al.*, (2011)** and **Labban and Thallaj (2020)** report antimicrobial effects of Rosa damascena.
Anticancer properties	Rosa damascena contains bioactive compounds that may inhibit the growth of cancer cells and promote apoptosis (programmed cell death).	**Mahboubi (2016)** suggests that Rosa damascena possesses anticancer properties by hindering cancer cell proliferation.
Pharmacological effects	Rosa damascena has broad pharmacological effects, such as anti-inflammatory, antioxidant, and anti-anxiety activities, contributing to various health benefits.	**Boskabady *et al.*, (2011)** describe several pharmacological effects of Rosa damascena, which benefit overall health.
Anti-HIV effects	The extract of Rosa damascena has shown potential anti-HIV activity, suggesting its possible use in combating HIV infections.	**Mahboubi (2016)** discusses the antiviral effects of Rosa damascena, including its anti-HIV potential.
Effect on cardiovascular health	Rosa damascena may help improve heart health by reducing oxidative stress, lowering cholesterol levels, and enhancing blood circulation.	**Mahboubi (2016)** mentions that Rosa damascena helps in improving cardiovascular health through its antioxidant and anti-inflammatory effects.
Anti-diabetic effect	Rosa damascena may have anti-diabetic effects, potentially lowering blood sugar levels and improving insulin sensitivity.	**Labban and Thallaj (2020)** indicate that Rosa damascena has an anti-diabetic effect due to its bioactive compounds.
Anti-aging effects	The plant has antioxidant properties that help reduce the signs of aging by protecting skin cells from oxidative stress and promoting skin health.	**Mahboubi (2016)** discusses Rosa damascena's anti-aging benefits due to its antioxidant properties.
Anti-lipase effect	Rosa damascena has demonstrated anti-lipase activity, which may help in controlling fat metabolism and reducing fat accumulation.	**Labban and Thallaj (2020)** mention Rosa damascena's potential anti-lipase effects, which may help in weight management.
Ophthalmic effect	Rosa damascena is believed to benefit eye health by soothing irritation and reducing inflammation, potentially useful in treating conditions like conjunctivitis.	**Boskabady *et al.*, (2011)** mention that Rosa damascena has ophthalmic effects, providing relief to the eyes.
Laxative & prokinetic effects	Rosa damascena is known for its mild laxative effects, aiding digestion and promoting regular bowel movements. It also has prokinetic effects that enhance gut motility.	**Koohpayeh *et al.*, (2021)** suggest that Rosa damascena helps relieve constipation through its laxative properties.
Respiratory effects	Rosa damascena has been traditionally used to relieve respiratory issues such as coughs and congestion by acting as a mild expectorant and soothing respiratory passages.	**Labban and Thallaj (2020)** report that Rosa damascena can help alleviate respiratory issues like cough and congestion.
Neuropharmacological effects	Rosa damascena has neuroprotective effects, helping to improve memory and cognitive function, and reduce symptoms of neurodegenerative diseases.	**Mahboubi (2016)** highlights Rosa damascena's neuropharmacological effects, which may be beneficial for brain health.
Soothing effect	Rosa damascena has a calming, soothing effect, which makes it ideal for reducing stress and promoting relaxation. It has been used in aromatherapy for its gentle, relaxing properties.	**Koohpayeh *et al.*, (2021)** and **Labban and Thallaj (2020)** describe the soothing and calming effects of Rosa damascena.
Analgesic effect	Rosa damascena is an effective analgesic, providing relief from mild to moderate pain through its anti-inflammatory and pain-relieving compounds.	**Koohpayeh *et al.*, (2021)** mention the analgesic properties of Rosa damascena, effective in reducing pain.
Anticonvulsant effects	Rosa damascena has shown anticonvulsant properties, helping to prevent or reduce the occurrence of seizures and convulsions in neurological conditions.	**Labban and Thallaj (2020)** discuss the anticonvulsant properties of Rosa damascena, which can be useful in managing seizure disorders.
Glucose-lowering effect	Rosa damascena may assist in lowering blood glucose levels, making it beneficial for managing diabetes. It helps to regulate insulin levels and improve metabolic health.	**Mahboubi (2016)** notes the glucose-lowering effect of Rosa damascena, which is beneficial for diabetic patients.
Culinary uses	Rosa damascena is used in culinary applications for its fragrant petals, which are used in making rose water, jams, and as a flavouring in various dishes, especially in Middle Eastern cuisine.	**Mekala (2021)** mentions the culinary uses of Rosa damascena in making rose water and flavouring desserts and dishes.

7. Application of Rosa Damascena in Medical Textiles

The broad spectrum of medicinal and pharmacological properties of *Rosa damascena* (Damask rose) extends beyond traditional medicine to innovative applications in medical textiles. Studies have demonstrated the plant's anti-inflammatory, antimicrobial, antioxidant, analgesic, and anxiolytic properties, which position it as a promising candidate for integration into medical textiles. *Rosa damascena* offers potential applications in the development of functional fabrics used in wound healing, hygiene products, and therapeutic clothing, making it a valuable asset in the medical textile industry. The integration of *Rosa damascena* into medical textiles presents exciting possibilities for advancing healthcare. By combining its therapeutic properties with sustainable textile innovations, *Rosa damascena* can revolutionize the field of medical textiles, offering new, natural alternatives for wound care, hygiene products, and therapeutic clothing. Future research should focus on optimizing the incorporation of *Rosa damascena* into textiles, evaluating its long-term therapeutic effects, and exploring additional applications in the treatment of chronic conditions. With continued innovation, *Rosa damascena* could play a pivotal role in shaping the future of medical textiles and sustainable healthcare solutions (Koohpayeh *et al.,* 2021; Labban & Thallaj, 2020).

7.1 Pharmacological Mechanisms in Medical Textiles

Although *Rosa damascena* has shown significant therapeutic benefits, further exploration of the plant's bioactive compounds is necessary to understand their precise mechanisms of action within medical textiles. The plant's essential oils, flavonoids, phenolic acids, and other bioactive compounds can be incorporated into textiles to exert antimicrobial, anti-inflammatory, and analgesic effects directly on the skin. These compounds could be used to enhance the properties of wound dressings, post-surgery garments, and other medical textiles by promoting faster healing, reducing infection, and alleviating pain. Further research is needed to investigate how these compounds interact with the body's systems when delivered through textile-based applications, such as how they modulate immune responses or reduce oxidative stress on the skin (Mahboubi, 2016; Boskabady *et al.,* 2011).

7.2 Sustainable Medical Textile Products

Rosa damascena is also gaining attention in the development of eco-friendly medical textile products. With the growing demand for sustainable and natural alternatives, the plant's extracts and essential oils offer a sustainable solution for the production of biodegradable sanitary napkins, wound care products, and therapeutic clothing. For example, its antimicrobial and soothing properties make it ideal for use in medical textiles like bandages, dressings, and even fabric-based prosthetics. However, scalability remains a challenge. Research must focus on the large-scale production of *Rosa damascena*-infused medical textiles, ensuring that cultivation and extraction methods remain ecologically sustainable. Questions regarding the environmental impact, cultivation practices, and cost-effectiveness of mass-producing these textiles need to be addressed to ensure that they are viable for widespread use (Mekala, 2021).

7.3 Long-Term Efficacy in Therapeutic Textiles

While *Rosa damascena* has demonstrated promising results in the management of symptoms like menstrual discomfort, pain, and anxiety, its long-term efficacy in medical textiles requires further investigation. Integrating *Rosa damascena* into therapeutic garments, such as compression stockings or shirts designed for chronic pain management, requires research into sustained therapeutic benefits over extended periods. Long-term clinical studies should evaluate the continuous use of such garments, ensuring their safety, efficacy, and potential side effects. Research should also explore optimal dosages of *Rosa damascena* and how its active compounds can be effectively incorporated into fabric without compromising the textile's comfort, durability, or functionality (Labban & Thallaj, 2020).

7.4 Exploration of New Applications in Medical Textiles

The potential of *Rosa damascena* in medical textiles extends beyond current uses in wound care and menstrual health. Its anti-inflammatory and antimicrobial properties could be harnessed in developing specialized garments for individuals with chronic conditions such as diabetes or neurodegenerative diseases, where infection prevention and skin integrity are crucial. *Rosa damascena*-infused textiles could also be used in respiratory health applications, such as face masks, to reduce inflammation and promote better air quality around the skin. Furthermore, the plant's potential in improving skin health and providing soothing effects makes it a promising candidate for the development of therapeutic skincare products within the textile industry (Koohpayeh *et al.,* 2021; Boskabady *et al.,* 2011).

8. Summary

The comprehensive review of Rosa damascena (Damask rose) highlights its diverse pharmacological, therapeutic, and sustainable applications. Historically used in traditional medicine, it is known for its anti-inflammatory, antioxidant, analgesic, and anxiolytic effects, which may help treat conditions like menstrual pain, anxiety, fatigue, and even cancer. Its antimicrobial and anticancer properties further suggest its potential in combating infections and inhibiting cancer cell growth. However, more research is needed to understand the mechanisms behind these effects. While compounds such as flavonoids, phenolic acids, and essential oils have been identified, their interactions with the human body remain poorly understood. Further studies on how these compounds influence neurotransmitter levels and inflammation could lead to more effective therapies.

Beyond medicine, Rosa damascena is being explored for its potential in creating eco-friendly products, such as sustainable sanitary napkins and natural cosmetics. The plant's antimicrobial and soothing properties make it an attractive option for these applications. However, challenges like large-scale cultivation, efficient extraction, and environmental impact must be addressed. Future research should assess the feasibility of scaling up production without compromising sustainability. Rosa damascena also shows promise in mental health, particularly in managing anxiety, stress, and mood disorders. While short-term studies are promising, further research is required to evaluate its long-term effectiveness, optimal forms, dosages, and safety for chronic conditions. The plant's potential in

managing menstrual symptoms, including pain, bloating, and fatigue, also warrants more extensive research. Long-term clinical trials are essential to determine its safety and efficacy for sustained use.

Additionally, future research should explore Rosa damascena's potential in treating other conditions such as diabetes, neurodegenerative disorders, respiratory illnesses, and as a complement to cancer therapies. While Rosa damascena shows significant therapeutic potential, further research is needed to understand its mechanisms, long-term efficacy, and broader applications. By advancing our knowledge of its molecular mechanisms, improving cultivation practices, and conducting long-term trials, Rosa damascena could become a key player in natural medicine and sustainable product development.

9. Conclusion

The reviewed studies on Rosa damascena, or Damask rose, highlight its potential across various domains, including medicine, mental health, and eco-friendly products. Known for its anti-inflammatory, analgesic, antimicrobial, and anticancer properties, it also helps alleviate symptoms of anxiety, menstrual discomfort, and fatigue, making it a versatile natural remedy. Despite these promising findings, the pharmacological mechanisms behind its therapeutic effects remain unclear. Further research is needed to identify the specific bioactive compounds and their molecular pathways, which will optimize its clinical applications.

Beyond medicine, Rosa damascena is increasingly used in sustainable products, such as sanitary napkins, cosmetics, and personal care items, aligning with the growing demand for natural alternatives. However, scalability remains a challenge. Research should evaluate the environmental and economic implications of large-scale cultivation and extraction to ensure sustainable production. While its efficacy in managing menstrual symptoms and mental health issues is promising, long-term safety and effectiveness remain underexplored. Large-scale, long-term clinical trials are needed to confirm its benefits, determine optimal dosages and forms of administration, and establish its role in treating chronic conditions.

Additionally, Rosa damascena's potential in anti-aging, neuropharmacological, respiratory, and glucose-lowering effects offers exciting opportunities for future research. Exploring these areas could expand its therapeutic applications, including in neurodegenerative diseases and metabolic disorders like diabetes. Rosa damascena holds significant promise as a therapeutic agent, with potential applications in both medicine and sustainable product development. Continued research is essential to uncover its full capabilities, optimize its production, and evaluate its long-term clinical efficacy, positioning it as a transformative solution in health and sustainability.

10. References

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