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Evaluation Of The Antimicrobial Effect Of Rosa Damascene Against The Main Causative Agents Of Urinary Tract Infections In Women

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Abstract

Background: Urinary tract infection (UTI) is popular, specifically in women. The rising in antimicrobial resistance is driving interest to find alternative compounds to inhibit or kill harmful bacteria. **Objective:** This study aimed to isolate *E. coli* from young women with UTIs and evaluate the antimicrobial effect of Rosa damascena extract against these isolates. **Methods:** A total 20 samples were collected from women suffering from UTIs, then, *E. coli* were isolated and identified using VITEK technique, Finally, we evaluate the inhibitory effect of *R. damascena* using buer- Kirby technique (in vitro study). **Result:** Our research shows that young adults were the highest age group infected with urinary tract infection (UTIs). Furthermore, there is no clear zone of inhibition formed (using well diffusion technique), but there wase a noticeable reduction in colony density\growth around the wells containing plant extract, compared to a dense growth around control wells. **Conclusion:** Although R. damascene possesses a mild to moderate antimicrobial against *E. coli*, warranting further investigation using quantitate methods such as minimum inhibitory concentration (MIC) assay to better characterize its efficacy.

Keyword : plant extract, urinary tract infection, antimicrobial activity, specifically
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INTRODUCTION

Infection associated with urinary tract represent one of the most common diseases occurring across various age groups seen in routine medical practice today [1]. Urinary tract infection (UTIs) in women exhibit a significantly higher incidence as compared to me, primarily due to anatomical differences, urothelial mucosal adherence to the mucopolysaccharide lining and various host factors [2,3]. Approximately 35% of healthy women suffer from urinary tract infection (UTIs) signs and symptoms at some point in their life. About 5% of women each year suffer with the problem of painful urination (dysuria) and frequency" [3,4]. "Many types of bacteria causing (UTIs) inducing inflammation within the urinary tract. Nearly 95% of cases of UTIs are caused by bacteria that typically multiply at the opening of the urethra and travel up to the bladder. Organisms causing UTI are derived primarily from the aerobic members of the fecal flora". [5].

From medical prospective, the use of certain medical plants is strongly encouraged and widely practiced particularly these plants reflect a rich biodiversity and embody a unique blend of African, Asian and European cultural traditions [6,7]. Some properties, specifically antimicrobial effect of these plants extractsand separated compounds have been evaluated by a number of researchers around the world [8,9]. In Brazil, the consumption of herbal medicine has increased by 20%driven by global re-assessment of their therapeutic purpose and disease management [10].

Due inadequate amount of oil in plant and lake of true natural and synthetic substitutes, essential rose oil derived from *R. damascena* is the most exorbitant components on the global market [11]. The *R. damascena* has also been used for medicinal purpose [12,13,14]. Traditionally, a decoction of its flowers was used to treat abdominal and chest pain, heavy menstrual bleeding, and digestive aliments. It is well known for its cardiotonic and its ability to support heart function [10,12]. In tenth century rose essential oil was extracted by an Iranian scintist, AveSina and was used for managing and treat various ailments. Historically, rose water served as antiseptic solution for cleaning the eye [14,15]. Furthermore, it serve as disinfecting and as antispasmodic agent used effectively used to relief abdominal pains as well as bronchial and chest congestions [16,17,18]. For hundreds of years, humans have relied on the healing properties of plants, which account for roughly 80% of available therapeutics [19,20]. Many research demonstrates that plants exhibit broad therapeutic properties, spanning from antimicrobial action to tumor suppression. Plant-derived antimicrobial activity plays a vital role across multiple fields, from preserving raw and processed foods to advancing natural and alternative therapies [21].

MATERIALS AND METHODS

Collection urine sample

Urine sample were collected from women suffering from urinary tract infection. After that, the sample were inoculation on MacConkey agar for preliminary purification on to Eosin Methylene Blue agar (EMB) for further identification test.

Detection of *E. coli*

The bacteria were detected by using Vitek technique to confirm presence of bacteria.

Preparation of plant extract: Ethanol extract

The plant (*R. damascena*) was ground using electric grinder. Subsequently, 200 mg of the powdered plant material was stored in sterile container in the refrigerator, after that power extracted by using ethanol. Moreover one milgram diluted by using DMSO solution to be redy for use

Detection of antibacterial activity by agar diffusion assay

Bacterial suspensions were uniformly spread onto agar plates to form a bacterial lawn, and wells were prepared in the agar and filled with the plant extract. Following incubation, the zone of inhibition were measured to evaluate the antibacterial activity of extract.

RESULT AND DISCUSSION

As shown in table (1) outlines the demographic distribution of the 20 enrolled patients (n=20) were divided in to three age categories, spanned from 24-68 years. The young adult group (24-39 years) constituted the vast majority of cases, representing 80% (n =16) of the study population with the mean age 31.00 ± 4.47 years. Middle age adults (40-55 years) and older adults (56-68 years) each comprised 10% (n = 2) of total population, with mean ages 42.50 ± 0.71 and

67.00 ± 1.41 years, respectively. The overall mean age of the studied population was 35.75 ± 11.94 years.

Table 1. show the demographic distribution of patients.

No.	Age range (24-68 years)	No. of patients	%	Mean ±	Age range (24-68 years)
1.	Young adults: (24-39 years)	16	80%	31.00 ± 4.47	Young adults: (24-39 years)
2.	Middle- aged adults: (40-55 years)	2	10%	42.50 ± 0.71	Middle- aged adults: (40-55 years)
3.	Older Adults: (56-68 years)	2	10%	67.00 ± 1.41	Older Adults: (56-68 years)
Total		20	100%	35.75 ± 11.94	Total

In our study the young adult group revealed the highest incidence of urinary tract infections (UTIs) among other age group (80%). This result aligns with [22,23], who find that population with age group 26-35 were more porn to recurrent UTIs. Therefore, this group exhibit a higher vulnerability to UTIs.

In this study we conclude that *E. coli* was the predominant causative agent, accounting for 85% of the cases, while other isolates comprised the remaining 15 %. Bacterial identification was confirmed by using VITEK technique as shown in Table (2).

Table 2. Incidence of causative agent in urinary tract infection.

Bacterial isolates	No. (%)
E. coli	17 (85 %)
Other isolates	3 (15 %)
Total	20 (100%)

The current study demonstrate that *E. coli* was the main causative agent, our findings align with [24], who identified *Escherichia coli* as the predominant pathogen causing community-acquired urinary tract infections (UTIs). Moreover, [25,26], reported that *Escherichia coli* was the most common etiological agent of UTI (74.6%), the high incidence of *E. coli* in UTIs can be attributed to several factors. Firstly, *E. coli* is the most common organism that naturally inhabits the human gastrointestinal tract, serving as a continuous reservoir for potential infection. Secondly, anatomical factors in females-specifically the shorter urethral length and the close proximity of the urethral meatus to the anus- significantly facilitate the colonization and ascending migration of the bacteria. Furthermore, the pathogenic potential of E. coli is facilitated by specialized virulence factors- notably adhesive structures such as fimbria and pili, which permit robust attachment to the uroepithelium and counter urinary tract flushing, alongside its rapid proliferative capacity, [27].

The antimicrobial efficacy of the methanolic plant extract against *E. coli* was assessed using agar diffusion assay. A marked decrease in bacterial colony density was observed in the zone immediately adjacent to the extract well compared to the heavy confluent growth across the rest of the plate. This partial zone of inhibition indicates the antibacterial potential of methanolic extract against the target organism (Figure 1).

Figure 1. The antimicrobial efficacy of plant extract (methanolic) against *E. coli*, demonstrate a distinct zone of partial inhibition surrounding the diffusion well.

The partial zone of inhibition surrounding the well can be attributed to the crud natural compounds present in the plant extract, where the concentration of active phytochemicals may not be high enough to inhibit growth or complete eradication of bacteria. Furthermore, the large molecular-weight compounds hinder diffusion through the agar medium, thereby preventing the formation of clear inhibition zone. Additionally, *E. coli* special structures in the outer membrane act as barrier, resisting the penetration of certain antimicrobial compounds

CONCLUSION

our findings indicate that E.coli- mediated urinary tract infections (UTIs) were the most prevalent among studied population. In addition, *Rosa damascene* extract did not produce clear inhibition zone at tested concentration (in vitro study). Conversely, instead of forming a clear inhibition zone , it induce a noticeable reduction in colony density across the plate. This effect may attribute to the presence of specific active constituents such as lupeol. Isolation and evaluate the antibacterial activity of individual compounds separately could yield a more distinct inhibition zone.

Recommendation

Further study should focus on isolating individual bioactive constituents and evaluating their *in vitro* efficacy independently to delineate their specific role in inhibiting colony growth. Furthermore, we suggest *in vivo* study to evaluate systemic biological response, pharmacokinetic and safety profile of extracted plants compounds within live tissues.

REFERENCES

1. Raju, C. B., & Tiwari, S. C. (2004). Urinary tract infection—A suitable approach. *Journal of the Indian Academy of Clinical Medicine, 2*(4), 331–334.
2. Alsafi, A., & Al-Kaabi, S. J. (2023). Aqueous Rosa damascena extract: Antibacterial activity and its role of adhesion to human epithelial cells in vitro. Cell Biochemistry and Function, 41, 365 - 374. https://doi.org/10.1002/cbf.3788
3. Bayrak, B., Yuca, H., Budak, Y. B., Alkuyruk, S. B., Özer, E. B., Bona, G. E., Aydın, B., Karadayı, M., Atila, A., Göger, G., & Karakaya, S. (2026). Comprehensive Chemical and

Biological Evaluation of Rosa damascena Plant Parts and Industrial Residues Using FTIR-ATR and LC–MS/MS. Food Science & Nutrition, 14. https://doi.org/10.1002/fsn3.72072
4. Shahid, A., Vaseem, M., Arshad, M., Khushtar, M., Ahmad, M. A., Ajmal, M., Chauhan, S. K., Abubakar, & Arif, M. (2025). A comprehensive review on chemical composition and pharmacological properties of Rosa damascena Mill. Current Pharmacology Reports, 11, Article 33. https://doi.org/10.1007/s40495-025-00412-3
5. Chroho, M., Bouymajane, A., Majdoub, Y. O. E., Cacciola, F., Mondello, L., Aazza, M., Zair, T., & Bouissane, L. (2022). Phenolic Composition, Antioxidant and Antibacterial Activities of Extract from Flowers of Rosa damascena from Morocco. Separations. https://doi.org/10.3390/separations9090247
6. Ghavam, M. (2024). Rosa × damascena Herrm. From Azaran region, Kashan: rich in saturated and unsaturated fatty acids with inhibitory effect against Proteus mirabilis. BMC Complementary Medicine and Therapies, 24. https://doi.org/10.1186/s12906-024-04562-7
7. Ghavam, M., Afzali, A., & Manca, M. (2021). Chemotype of damask rose with oleic acid (9 octadecenoic acid) and its antimicrobial effectiveness. Scientific Reports, 11. https://doi.org/10.1038/s41598-021-87604-1
8. Halawani, E. (2014). Antimicrobial activity of Rosa damascena petals extracts and chemical composition by gas chromatography-mass spectrometry (GC/MS) analysis. African Journal of Microbiology Research, 8, 2359-2367. https://doi.org/10.5897/ajmr2014.6829
9. Kaddar, R., Hasan, N., & Al-Diab, D. (2023). Antibacterial activity of Rosa damascene petals mill extracts. Research Journal of Pharmacy and Technology. https://doi.org/10.52711/0974-360x.2023.00822
10. Lebkiri, N., Diria, G., Gaboun, F., Saghir, K., Iraqi, D., Kamli, E. T., Hamdani, M. E., Benali, A., Yachou, H., Abdelwahd, R., & Abbas, Y. (2025). Assessing the volatile composition by GC/MS-MS and biological efficacy of Rosa damascena essential oil: Examining its antimicrobial and antioxidant capabilities. Arabian Journal of Chemistry. https://doi.org/10.25259/ajc_148_2025
11. Lương, N., Lan, L., Nguyen, L., Nguyễn, Q. N., Loan, L. T. T., Truong, H., & Tran, H. T. (2019). Study on antibacterial activities of Hibiscus rosa-sinensis L. Leaf and flower extracts against Proteus mirabilis, Pseudomonas aeruginosa, and Klebsiella pneumoniae. Science and Technology Development Journal - Natural Sciences. https://doi.org/10.32508/stdjns.v2i1.669
12. Maher, S. (2018). GC-MS analysis of antibacterial compounds from floral part of methanolic extract of Rosa damascene. Pure and Applied Biology. https://doi.org/10.19045/bspab.2018.700206
13. Nazir, I. (2021). Antibacterial Activity of Medicinal Flowers against Multi Drug Resistant E. coli. The Pakistan Veterinary Journal. https://doi.org/10.29261/pakvetj/2021.019
14. Niazi, P., Hejran, A., & Alimyar, O. (2025). Assessment of Antibacterial and Antifungal Activities of Ethanolic Flower Extracts from Rosa damascena against Pathogenic Micro-Organisms. Black Sea Journal of Agriculture. https://doi.org/10.47115/bsagriculture.1583192
15. Peeran, S., Murugan, M., Fageeh, H., Ibraheem, W., Fageeh, H., & Basheer, S. N. (2024). Antibacterial Activity, Antiadherence Activity, Antioxidant Activity, and Molecular Docking Analysis of Arab Rose (Rosa Damascena) Extract on Periodontopathic Bacteria: Porphyromonas Gingivalis and Aggregatibacter Actinomycetemcomitans - An In vitro Study. Journal of Pharmacy & Bioallied Sciences, 16, S4678 - S4687. https://doi.org/10.4103/jpbs.jpbs_1300_24
16. Ramdan, B., Ben Mrid, R., Ramdan, R., El Karbane, M., & Nhiri, M. (2021). Promising effects of Rosa damascena petal extracts as antioxidant and antibacterial agents. Pakistan Journal of Pharmaceutical Sciences, 34(1), 1–8. https://doi.org/10.36721/PJPS.2021.34.1.REG.001-008.1

17. Saghafi, F., Mirzaie, F., Gorji, E., Nabimeybodi, R., Fattahi, M., Mahmoodian, H., & Zareshahi, R. (2021). Antibacterial and anti-Trichomonas Vaginalis effects of Rosa Damascena mill petal oil (a persian medicine product), aqueous and hydroalcoholic extracts. BMC Complementary Medicine and Therapies, 21. https://doi.org/10.1186/s12906-021-03434-8
18. Bouymajane, A., Oumam, M., El Yadini, A., & Mansouri, F. (2022). Phenolic composition, antioxidant and antibacterial activities of extract from flowers of Rosa damascena from Morocco. Separations, 9(9), 247. https://doi.org/10.3390/separations9090247
19. Thallaj, N., Agha, M., Nattouf, A., Khatib, C., Kara-Ali, A., Moustapha, A., & Labban, L. (2020). Evaluation of Antimicrobial Activities and Bioactive Compounds of Different Extracts Related to Syrian Traditional Products of Damask Rose (Rosa damascena). OALib. https://doi.org/10.4236/oalib.1106302
20. Trendafilova, A., Staleva, P., Petkova, Z. S., Ivanova, V., Evstatieva, Y., Nikolova, D., Rasheva, I., Atanasov, N., Topouzova-Hristova, T., Veleva, R., Moskova-Doumanova, V., Dimitrov, V., & Simova, S. (2023). Phytochemical Profile, Antioxidant Potential, Antimicrobial Activity, and Cytotoxicity of Dry Extract from Rosa damascena Mill. Molecules, 28. https://doi.org/10.3390/molecules28227666
21. Vaou, N., Voidarou, C., Dimitroulia, E., Rozos, G., Skoufou, M., Saldari, C., Stavropoulou, E., Vrioni, G., & Tsakris, A. (2026). Evaluation of Plant-Guided Strategies Against Clinical Multidrug-Resistant Pathogens: Preliminary Phytochemical Screening, Antioxidant Capacity, and Antibacterial/Antibiofilm Activity of Rosa canina and Colchicum autumnale Extracts. Antibiotics, 15. https://doi.org/10.3390/antibiotics15050508
22. Bouymajane, A., Oumam, M., El Yadini, A., & Mansouri, F. (2022). Phenolic composition, antioxidant and antibacterial activities of extract from flowers of Rosa damascena from Morocco. Separations, 9(9), Article 247. https://doi.org/10.3390/separations9090247
23. 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., & Said Khan, F. (2020). Chemical constituents, experimental and clinical pharmacology of Rosa damascena: A literature review. Journal of Pharmacy and Pharmacology, 72(2), 161–174. https://doi.org/10.1111/jphp.13185
24. Motamedi, H., Darabpour, E., Gholipour, M., & Seyyed Nejad, S. M. (2010). Antibacterial effect of ethanolic and methanolic extracts of Plantago ovata and Oliveria decumbens endemic in Iran against some pathogenic bacteria. International Journal of Pharmacology, 6(2), 117–122. https://doi.org/10.3923/ijp.2010.117.122
25. Alsafi, A., & Al-Kaabi, S. J. (2023). Aqueous Rosa damascena extract: Antibacterial activity and its role of adhesion to human epithelial cells in vitro. Cell Biochemistry and Function, 41, 365 - 374. https://doi.org/10.1002/cbf.3788
26. Halawani, E. (2014). Antimicrobial activity of Rosa damascena petals extracts and chemical composition by gas chromatography-mass spectrometry (GC/MS) analysis. African Journal of Microbiology Research, 8, 2359-2367. https://doi.org/10.5897/ajmr2014.6829
27. Ghavam, M. (2024). Rosa × damascena Herrm. From Azaran region, Kashan: rich in saturated and unsaturated fatty acids with inhibitory effect against Proteus mirabilis. BMC Complementary Medicine and Therapies, 24. https://doi.org/10.1186/s12906-024-04562-7

دراسة مخبرية لتقييم التأثير المضاد للميكروبات لنبات الورد الدمشقي (Rosa damascena) ضد المسببات الرئيسية لعدوى المسالك البولية لدى النساء

الملخص

الخلفية: تُعد عدوى المسالك البولية (UTI) حالة شائعة، لا سيما بين النساء. وقد أدى تزايد مقاومة الميكروبات للعلاجات التقليدية إلى تزايد الاهتمام بالبحث عن مركبات بديلة قادرة على تثبيط البكتيريا الضارة أو القضاء عليها. الهدف: هدفت هذه الدراسة إلى عزل بكتيريا الإشريكية القولونية (E. coli) من شابات مصابات بعدوى المسالك البولية، وتقييم التأثير المضاد للميكروبات لمستخلص الورد الدمشقي (*Rosa damascena*) ضد هذه العزلات. الطريقة: جُمعت 20 عينة من نساء يعانين من عدوى المسالك البولية، ثم عُزلت بكتيريا E. coli وجرى تحديد هويتها باستخدام تقنية "VITEK". وأخيراً، قُيّم التأثير المثبط لمستخلص الورد الدمشقي باستخدام طريقة "كيربي-باور" (Kirby-Bauer) (دراسة مخبرية). النتائج: أظهرت الدراسة أن فئة الشابات كانت الأكثر عرضة للإصابة بعدوى المسالك البولية. وعلاوة على ذلك، لم تتشكل منطقة تثبيط واضحة (عند استخدام طريقة الانتشار في الحفر)، ولكن لوحظ انخفاض ملموس في كثافة ونمو المستعمرات البكتيرية حول الحفر التي تحتوي على المستخلص النباتي، مقارنة بالنمو الكثيف الملاحظ حول حفر التحكم (الضابطة). الاستنتاج: يمتلك الورد الدمشقي تأثيراً مضاداً للميكروبات يتراوح بين الطفيف والمتوسط ضد بكتيريا E. coli، مما يستدعي إجراء المزيد من الدراسات باستخدام طرق كمية - مثل تحديد الحد الأدنى للتركيز المثبط (MIC) - لتوصيف فعاليته بشكل أدق.

الكلمات المفتاحية: مستخلص نباتي، عدوى المسالك البولية، نشاط مضاد للميكروبات.