Effects of *Rosa damascena* (Damask rose) on menstruation-related pain, headache, fatigue, anxiety, and bloating: A systematic review and meta-analysis of randomized controlled trials

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**Abstract:**
Recent studies have reported inconclusive results regarding the therapeutic effects of *Rosa damascena* on the outcomes of primary dysmenorrhea (PD) and premenstrual syndrome (PMS). Hence, this study is aimed to summarize the findings of randomized controlled trials (RCTs) regarding the effects of this treatment on menstruation-related pain as the primary outcome and menstruation-related headache, fatigue, anxiety, and bloating as the secondary outcomes. This study evaluated parallel-group and cross-over RCTs on aromatherapy, topical treatment, or oral intake of *R. damascena* products for the treatment groups versus placebo, nontreated, or conventional treatment groups. Seven electronic databases (Web of Science Core Collection, Scopus, Embase, CENTRAL, CINAHL, SID, and Magiran) and one search engine (PubMed) were searched from inception to January 15, 2021. Of 1468 trials found in the initial search, 983 potentially relevant articles were screened by title and abstract. After examining the full-text of 13 studies for compliance with the inclusion criteria, seven studies were considered eligible for this review. A random-effects model was used to pool the data; otherwise, a narrative summary was presented. The retrieved studies were conducted on females with PD or PMS, aged 18–35 years. The total sample size of the intervention and comparator arms was 276 and 272. The results showed that *R. damascena* had a nonsignificant alleviating effect on the menstruation-related pain (weighted mean difference [WMD]: −0.47; 95% confidence interval [CI]: −1.25, 0.31; *P* = 0.234). Such findings were also found for menstruation-related anxiety (WMD: −0.40; 95% CI: −0.91, 0.11; *P* = 0.125). However, the treatment significantly reduced the menstruation-related headache (WMD: −0.42; 95% CI: −0.74, −0.11; *P* = 0.008), fatigue (WMD: −0.48; 95% CI: −0.87, −0.09; *P* = 0.015), and bloating (WMD: −0.72; 95% CI: −1.21, −0.22; *P* = 0.005). Since *R. damascena* had no significant effects on menstruation-related pain and anxiety, further studies with improved methodological quality are suggested to evaluate the effects of the treatment on these symptoms, using different dosages and durations.

**Keywords:** Dysmenorrhea, herbal medicine, menstruation, review, *Rosa damascena*

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Menstruation-related symptoms (MRSs) are common gynecological complaints in female adolescents and young adults. These symptoms include dysmenorrhea, heavy menstrual bleeding, headaches, premenstrual abdominal pain, and premenstrual mood disorders with different prevalence rates. During the menstrual period, women with MRSs experience a low quality of life in psychological, physical, behavioral, and social domains. Furthermore, MRSs may impose significant economic burdens on individuals, mainly due to the loss of work productivity and the costs of medical appointments, nonprescription medications, and medical treatments.

Recently, some complementary and alternative medicine (CAM) approaches, including herbal remedies, have attracted the researchers’ attention for the management of common MRSs worldwide, especially in Iranian traditional medicine (ITM). Rosa damascena (R. damascena), commonly known as Damask rose, has been used in different forms of administration for the treatment of MRSs. In ITM, the decoction of R. damascena flowers is used in the case of menstrual bleeding and other menstrual problems. Moreover, R. damascena is recognized as an important Unani medicine for the treatment of primary dysmenorrhea (PD), due to its anti-spasmodic properties. In Taiwan, women with severe menstrual symptoms use rose tea before menstruation to regulate hormonal secretion and manage painful and irregular periods. Furthermore, in Indian traditional medicine, the petals of R. damascena are used to treat uterine hemorrhage and menstrual bleeding.

Today, the effects of both oral and inhaled use of R. damascena on different MRSs have been investigated; however, the findings are conflicting. Recent studies have reported that inhalation and oral intake of R. damascena could improve some psychological, physical, and social outcomes of premenstrual syndrome (PMS). Other studies showed that supplementation with R. damascena extract during PD only induced alleviating effects on bloating and sweating or pain and fatigue. On the other hand, a study reported similar rates of menstrual pain among the students who received mefenamic acid and R. damascena capsules. Furthermore, some studies showed that aromatherapy massage of the abdomen with R. damascena essential oil was more effective against menstrual pain than massage alone in the second cycle of menstruation.

Nowadays, women’s health needs significant attention because it might affect family and society’s health. In most low-income countries, women use self-prescribed medicinal herbs for the treatment of MRSs, and healthcare providers do not routinely prescribe these herbal remedies due to the lack of evidence-based reports. However, in some developed countries, different herbs are prescribed for MRSs in the health-care setting. Although R. damascena has been recently used as a herbal medicine in different communities, to the best of our knowledge, no review has yet synthesized the conflicting findings of recent trials on the potential effects of this herbal medicine in treating MRSs. Therefore, this review was carried out to summarize and statistically pool the findings of recent randomized controlled trials (RCTs) regarding the effects of R. damascena on menstruation-related pain as the primary outcome and menstruation-related headache, fatigue, anxiety, and bloating as the secondary outcomes.

Materials and Methods

Search strategy
To retrieve relevant articles, we searched five electronic databases, including Web of Science Core Collection, Embase, Scopus, Cochrane Central Register of Controlled Trials, and Cumulative Index to Nursing and Allied Health Literature (Plus with Full Text). Furthermore, a search was conducted in the PubMed search engine and two Iranian databases including Scientific Information Database (http://www.sid.ir/) and MagIran (http://www.magiran.com). Moreover, the reference lists of relevant studies were searched.

To avoid missing any relevant studies, we performed an extensive search strategy by two investigators independently, with no limitations in language or publication date [Table 1]. First, all data sources were searched on August 22, 2020. Then, a search was conducted on January 15, 2021, to retrieve relevant new eligible studies. Screening of the retrieved studies and extracting the data of the included studies in the first search were performed by two investigators independently from September to November 2020. The same investigators screened the retrieved studies in the second search, but no eligible study was found. Any uncertainty or disagreement between the investigators was resolved by discussion. If the articles contained any unclear data, the main trial investigators were contacted via E-mail to obtain additional information.

Eligibility criteria of studies
Parallel-group and cross-over RCTs were included in this review if they: (1) recruited women of reproductive age, experiencing moderate to severe MRSs during the menstrual cycle (according to the reported baseline score), (2) used R. damascena products (i.e. dried rosebuds, dried petals, rose hips, oil, syrup, extract, juice, water,
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Table 1: Search characteristics in selected data sources for the effects of Rosa damascena on menstruation-related symptoms

| Data sources          | Search strategy                                                                                                                                               | Search results |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| PubMed                | (Rosa[MH] OR Rosa[TAIB] OR Rose[TAIB] OR Rosaceae[TAIB] OR Rosewater[TAIB] OR “Rose water”[TAIB] OR “Rose oil”[TAIB] OR “Rosa damascena”[TW] OR “Damask rose”[TW] AND (“Menstruation disturbances”[MH] OR Dysmenorrhea[MH] OR Dysmenorrhea[TAIB] OR “Menstrual pain”[TAIB] OR “Painful menstruation”[TAIB] OR “Painful period”[TAIB] OR “Period pain”[TAIB] OR “Pelvic pain”[TAIB] OR “Menstrual cramp”[TAIB] OR Menstrua*[TAIB] OR Amenorrhea[MH] OR Amenorrhea[TAIB] OR Menorrhagia[MH] OR Menorrhagia[TAIB] OR Polyenorrhagia[TAIB] OR Hypomenorrhagia[TAIB] OR Hypermenorrhagia[TAIB] OR Oligomenorrhagia[TAIB] OR Oligomenorrhagia[TAIB] OR “Irregular periods”[TAIB] OR “Premenstrual syndrome”[MH] OR “Premenstrual syndrome”[TAIB] OR “PMS”[TAIB] OR Premenstrual[TAIB]) | 52             |
| Scopus                | (TITLE-ABS-KEY (“Rosa”) OR TITLE-ABS-KEY (Rose) OR TITLE-ABS-KEY (“Rosa damascena”) OR TITLE-ABS-KEY (“Damask rose”) OR TITLE-ABS-KEY (Rose water) AND TITLE-ABS-KEY (Menstrua*) OR TITLE-ABS-KEY (Dysmenorrhea*) OR TITLE-ABS-KEY (“Menstrual pain”) OR TITLE-ABS-KEY (“Painful menstruation”) OR TITLE-ABS-KEY (“Period pain”) OR TITLE-ABS-KEY (“Pelvic pain”) OR TITLE-ABS-KEY (“Menstrual cramp”) OR TITLE-ABS-KEY (Amenorrhea) OR TITLE-ABS-KEY (Menorrhagia) OR TITLE-ABS-KEY (Polyenorrhagia) OR TITLE-ABS-KEY (Hypomenorrhagia) OR TITLE-ABS-KEY (Hypermenorrhagia) OR TITLE-ABS-KEY (Oligomenorrhagia) OR TITLE-ABS-KEY (Irregular periods) OR TITLE-ABS-KEY (“Premenstrual syndrome”)) | 846            |
| Web of Science Core   | (TS=(Rosa) OR TS=(Rosaceae) OR TS=(Rosa damascena) OR TS=(Damask rose) OR TS=(Rose damascena) OR TS=(Damask rose) OR TS=(Rose) OR TS=(Rose water)) AND (TS=(Menstrua*) OR TS=(Dysmenorrhea*) OR TS=(Menstrual pain) OR TS=(Painful menstruation) OR TS=(Period pain) OR TS=(Painful period*) OR TS=(Menstrual cramp*) OR TS=(Amenorrhea) OR TS=(Menorrhagia) OR TS=(Polyenorrhagia) OR TS=(Hypomenorrhagia) OR TS=(Hypermenorrhagia) OR TS=(Oligomenorrhagia) OR TS=(Premenstrual syndrome)) | 133            |
| Embase               | (“Rosa damascena”/exp OR ‘Rosa damascena’ OR ‘Damask rose’ OR ‘Rose damasc’ OR ‘Rose water’ OR ‘Rosewater’ OR ‘Gole Mohammadni’ OR ‘Gol-E-Mohammadni’ OR ‘Gol-E-Mohammadni’) AND (‘Menstruation’/exp OR ‘Menstruation’ OR ‘Dysmenorrhea’ OR ‘Menstrual pain’ OR ‘Painful menstruation’ OR ‘Painful period’ OR ‘Period pain’ OR ‘Pelvic pain’ OR ‘Menstrual cramp’ OR ‘Amenorrhea’ OR ‘Polyenorrhagia’ OR ‘Hypomenorrhagia’ OR ‘Hypermenorrhagia’ OR ‘Oligomenorrhagia’ OR ‘Irregular periods’ OR ‘Premenstrual syndrome’) | 16             |
| CENTRAL              | (Rosa OR Rose OR Rosewater OR “Rose water” OR “Rose oil” OR “Rosa damascena” OR “Damask rose” OR “Rose damasc”) in Title Abstract Keyword AND (Dysmenorrhea* OR “Menstrual pain” OR “Painful menstruation” OR “Painful period” OR “Period pain” OR “Pelvic pain” OR “Menstrual cramp” OR “Menstrua*” OR Amenorrhea OR Polyenorrhagia OR Hypomenorrhagia OR Hypermenorrhagia OR Oligomenorrhagia OR “Irregular periods” OR “Premenstrual syndrome” in Title Abstract Keyword - (Word variations have been searched) | 88             |
| CINAHL Plus with Full Text | Rosa OR Rose OR Rosewater OR “Rose water” OR “Rose oil” OR “Rosa damascena” OR “Damask rose” OR “Rose damasc” AND Dysmenorrhea* OR “Menstrual pain” OR “Painful menstruation” OR “Painful period” OR “Period pain” OR “Pelvic pain” OR “Menstrual cramp” OR “Menstrua*” OR Amenorrhea OR Polyenorrhagia OR Hypomenorrhagia OR Hypermenorrhagia OR Oligomenorrhagia OR “Irregular periods” OR “Premenstrual syndrome” (All keywords have been searched based on “all fields” box) | 63             |
| MagIran               | Dysmenorrhea OR Menstruation AND Rosa OR Rose OR Rosa damascena OR Damask rose OR Rosewater OR Gole Mohammadni OR Gol-E-Mohammadni OR Gol-E-Mohammadni (All keywords have been searched based on “all fields” box) | 138            |
| SID                   | Dysmenorrhea OR Menstrua* AND Rose OR Rose water OR Rosa damascena OR Damask rose OR Rosewater OR Gole Mohammadni OR Gol-E-Mohammadni (Database have been searched in Persian and English) | 132            |

Note: CINAHL=Cumulative Index to Nursing and Allied Health Literature, SID=Scientific Information Database, CENTRAL: Cochrane Central Register of Controlled Trials

Tea, and Gulkand) in the form of aromatherapy, topical application, or oral intake for the treatment groups versus placebo, nontreated, or conventional treatment groups, and (3) measured menstruation-related pain or menstrual-related headache, fatigue, anxiety, and bloating by using standardized questionnaires with established reliability and validity. On the other hand, studies were excluded if R. damascena was administered.
in combination with other herbal products or species other than \textit{R. damascena} was used.

**Selection of studies**

The initial search identified 1468 trials. Also, nine additional citations were retrieved from the reference lists of eligible trials. After duplicate removal, 983 potentially relevant articles were screened as to the title and abstract. The full-text of 13 studies was examined for compliance with the inclusion criteria. Four studies were excluded for using other \textit{Rosa} species (e.g., \textit{Rosa gallica} and \textit{Rosa centifolia})\cite{17,27} or administering \textit{R. damascena} in combination with other herbal extracts.\cite{28,30} Also, two articles were multiple publications from the same dataset and were excluded from the final analysis.\cite{18,20} Finally, seven studies were considered eligible for this review\cite{19,21-26} [Figure 1].

**Assessment of risk of bias**

The risk of bias was assessed, using the Cochrane risk-of-bias tool by two investigators independently. This tool consists of seven items, including random sequence generation (selection bias), allocation concealment (selection bias), performance bias, detection bias, attrition bias, reporting bias, and other bias. Each item is rated as “low risk of bias,” “unclear risk of bias,” and “high risk of bias.”\cite{31}

**Data analysis and synthesis**

If sufficient studies (at least three studies) reported the same outcomes, they were pooled in the meta-analysis, using a random-effects model; otherwise, a narrative synthesis was presented. The effect sizes were presented as weighted mean differences (WMDs) with 95\% confidence intervals (CIs). To assess the heterogeneity among the studies, Cochran’s \textit{Q} test and \textit{I}^2 were used. Also, subgroup analysis and sensitivity analysis were performed if needed. To assess the potential publication bias, we used the Begg test. All statistical analyses were performed using Stata version 11.2 (Stata Corp., College Station, TX, USA). \textit{P} < 0.05 were considered to be significant.

**Ethical considerations**

The formal ethical assessment was not needed for this study, as collected data were anonymized and synthesized from previous RCTs in which consent had already been obtained by the trial investigators. When each main
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Results

The retrieved studies were conducted on females with PD or PMS, aged 18–35 years. Of seven included studies, one was performed in Turkey, while the rest were conducted in Iran. Most studies were published in the English language, and only two were published in Farsi. Most studies had two arms with a parallel-group design. The total sample size of the intervention and comparator arms was 276 and 272. The included trials investigated the effects of R. damascena oil or extract, using aromatherapy (i.e., massage, inhalation, and vapor diffusion) or oral intake (i.e., drops or capsules) on different MRSs. The comparators included conventional and placebo treatments, administered in the same method and duration as R. damascena. Three studies recorded the adverse effects; only one of them reported headache associated with nausea and vomiting. The results of trials indicated that R. damascena might be suitable for reducing the adverse effects of MRSs on the psychological, physical, and social aspects of life.

Of five studies which measured menstruation-related pain, all used a 0–10 scale (visual analog scale [VAS] or McGill pain questionnaire). However, there were some variations in the time of data recording. Hence, to compare the pain, the changes of mean and standard deviation in each group were calculated by considering the baseline value in the first menstrual cycle, as well as the end-of-trial value for either the first or second menstrual cycle. In one cross-over trial, data were extracted from the first study period before cross-over, because carry-over of the treatment effect was thought to be a problem. In one trial with both placebo and nontreated groups, data were only extracted from the placebo group for comparison. Based on the combined effect sizes of five trials, R. damascena could nonsignificantly reduce the menstrual pain in females with PD (WMD: −0.47; 95% CI: −1.25, 0.31; P = 0.234) [Figure 2]. Furthermore, sensitivity analysis did not change the results of primary meta-analysis after excluding the cross-over trial from the primary meta-analysis (WMD: −0.63; 95% CI: −1.60, 0.35; P = 0.206). The subgroup analysis suggested the administration route and dosage of R. damascena as sources of heterogeneity.

The results of four studies regarding headache, fatigue, bloating, and anxiety were suitable for meta-analysis. The same as pain, there were some variations in the time of data recording. Hence, we calculated the changes of mean and standard deviation for all symptoms in each group by considering the baseline value in the first menstrual cycle, as well as the end-of-trial value for either the second or third menstrual cycle. Of four studies, three used a 0–3 scale, while one study used a scale of 0–10 (VAS). To compare the variables, we converted the data of this study to a value in the range of 0–3, using standard methods. Based on the combined effect sizes, R. damascena significantly reduced the menstruation-related headache (WMD: −0.42; 95% CI: −0.74, −0.11; P = 0.008)

| Study ID | WMD (95% CI) | Weight |
|---------|--------------|--------|
| Bani et al. (2014) | 0.14 (-0.26, 0.54) | 19.87 |
| Sadeghi Aval Shah et al. (2015) | -1.16 (-1.57, -0.75) | 19.81 |
| Uysal et al. (2016) | -0.59 (-0.87, -0.31) | 20.39 |
| Atollabi et al. (2016) | -1.38 (-1.91, -0.85) | 19.09 |
| Davanbeh et al. (2017) | 0.55 (0.41, 0.69) | 20.83 |
| Overall (I² = 96.9%, p = 0.000) | -0.47 (-1.25, 0.31) | 100.00 |

NOTE: Weights are from random effects analysis

Figure 2: Forest plot for the effect of Rosa damascena on menstruation-related pain
### Table 2: Characteristics of the studies included in the review

| Authors (publication date) | Study design | Participants | Sample size/age | Intervention | Dosage/duration |
|----------------------------|--------------|--------------|-----------------|--------------|-----------------|
| Heydari et al. (2019) [19] | Double-blind, placebo-controlled, 3-arm, parallel-group, single-center | College students with moderate to severe PMS (PSST>20) | Intervention: 33/22.66±3.41 Control: 31/21.84±1.50 | Self-aromatherapy (inhalation) a | 10 topical drops (BID) during 5 days of luteal phase for 2 subsequent MC, total dosage: 200 drops |
| Davaneghi et al. (2017) [24] | Double-blind, placebo-controlled, 4-arm, parallel-group, multi-center | Individual with moderate to severe PD | Intervention: 27/22.63±0.47 Control: 25/22.68±0.39 | Oral intake | One capsule of each product daily from first day of menstruation until 60 consecutive days, total dosage: 480 g |
| Uysal et al. (2016) [26] | Nonblind, placebo-controlled, 2-arm, parallel-group, single-center | Individual with moderate to severe PD (VAS≥5) | Intervention: 50/20.74±2.13 Control: 50/20.59±2.13 | Aromatherapy (vapour diffusion) b |  |
| Ataollahi et al. (2016) [22] | Double-blind, placebo-controlled, 2-arm, parallel-group, multi-center | College student with moderate to severe PD | Intervention: 55/21.41±1.49 Control: 55/21.38±1.72 | Oral intake | 10 oral drops (BID) during first 3 days of menstruation for 2 subsequent MC, total dosage: 120 drops |
| Sadeghi Aval Shahr et al. (2015) [21] | Single-blind, placebo-controlled, 3-arm, parallel-group, single-center | College student with moderate to severe PD (VAS≥5) | Intervention: 25/26±3.6 Control: 25/24.6±3.1 | Self-aromatherapy (massage) c | 5 topical drops at the 1st day of menstruation for 2 subsequent MC, total dosage: 10 drops |
| Bani et al. (2014) [23] | Double-blind, placebo-controlled, 2-arm, cross-over groups, single-center | College student with moderate to severe PD (VAS≥5) | Intervention: 46/22.20±2.11 Control: 46/22.13±2.06 | Oral intake | One capsule (QID, every 6 h) during first 3 days (72 h) of menstruation for 2 subsequent MC, total dosage: 4800 mg |
| Jamilian et al. (2013) [25] | Double-blind, placebo-controlled, 3-arm, parallel-group, single-center | Women with moderate to severe PMS | Intervention: 40/25.93±4.68 Control: 40/26.56±3.53 | Oral intake | 15 oral drops (BID) from 14 days before menstruation until end of menstruation for 3 subsequent MC, total dosage: 200 drops |

| Authors (publication date) | Outcome (measures)/time | Findings | Cochrane risk-of-bias assessment |
|----------------------------|--------------------------|----------|---------------------------------|
| Heydari et al. (2019) [19] | Psychological, physical, and social symptoms (PSST) Baseline, at the end of 2nd cycle | Anxiety, decreased interest in work activities, decreased interest in home activities, decreased interest in social activities, feeling overwhelmed or out of control, overeating, insomnia, work efficiency or productivity | NS | Fair quality† |
| Jamilian et al. (2013) [25] | Psychological, physical, and social symptoms (PSST) Baseline, at the end of 1st and 2nd cycles | Psychological, physical, and social symptoms, total score of PSST | Significantly* |

Contd...
### Table 2: Contd...

| Authors (publication date) | Outcome (measures) | time | Findings | Cochrane risk-of-bias assessment |
|----------------------------|--------------------|------|----------|---------------------------------|
| Davaneghi et al. (2017)   | Systemic symptoms (VAS) | Baseline, 30th day and 6th day | NS | Nausea, vomiting, diarrhea, cramp, low back pain, headache, fatigue, anxiety, weakness, dizziness, drowsiness, feeling cold | Fair quality |
| Uysal et al. (2016)       | Menstrual-related pain (VAS) + vital signs | Baseline, 10 min and 30 min after intervention | Significantly* | Bloating, sweet, NS | Pain at 10 min after intervention, systolic arterial blood pressure; diastolic arterial blood pressure; mean arterial blood pressure; heart rate | Fair quality |
| Ataollahi et al. (2016)   | Menstrual-related pain (McGill) | Baseline, at the end of 2nd cycle | Significantly* | Nausea and vomiting, diarrhea, headache, emotional liability, lack of energy, syncope | Fair quality |
| Sadeghi Aval Shahr et al. (2015) | Menstrual-related pain (VAS) | Before and after intervention in 1st and 2nd cycles | Significantly* | Fatigue, total score | Good quality |
| Bani et al. (2014)        | Menstrual-related pain (VAS) | Baseline and 1, 2, 3, 6, 12, 24, 48, 72 h after taking the first drug in 1st and the 2nd cycles | Significantly* | Headache, forgetfulness, palpitation, edematous extremities, bloating, breast tenderness | Good quality |
| Jamilian et al. (2013)    | Affective, psychological, and physical symptoms of PMS (DSRS) | Baseline, at the end of 3rd cycle | Significantly* | Nervous tension, irritability, emotional liability, anxiety, depression, fatigue, desire to eat sweets, crying, impaired concentration, difficulty in sleeping, suicidal thoughts, overeating | Fair quality |

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*The products were poured on an eye pad and then it was held at a distance of 30 cm from the participants' nose and they were asked to inhale the products for 5 min with normal breathing. †The products were poured on an electronic vaporizer and it was set to spray the products every 10 min in a room of the emergency ward. ‡Abdomen was massage for 15 min with clockwise circular movements using the products. §Significantly lower in the intervention group compared to the comparison group after the intervention. †One criterion not met (high risk of bias for one domain) or two criteria unclear. ‡All criteria met (low for each domain). BID=Bis in die (2 times a day), DS=Diclofenac sodium, DSRS=Daily symptom rating scale, DW=Distilled water, MC=Menstrual cycle, McGill=McGill pain questionnaire, NS=Not significant, N/S=Normal saline, PD=Primary dysmenorrhea, PMS=Premenstrual syndrome, PSST=Premenstrual symptoms screening tool, RCT=Randomized controlled trial, RD=Rosa damascena, QID=Quarter in die (4 times a day); VAS=Visual analogue scale, VMS=Verbal multidimensional scale
Figure 3], fatigue (WMD: −0.48; 95% CI: −0.87, −0.09; \( P = 0.015 \)) [Figure 4], and bloating (WMD: −0.72; 95% CI: −1.21, −0.22; \( P = 0.005 \)) [Figure 5]. However, the treatment had nonsignificant alleviating effects on menstruation-related anxiety (WMD: −0.40; 95% CI: −0.91, 0.11; \( P = 0.125 \)) [Figure 6]. After excluding one study,\(^{[24]}\) which used different points scale, the same results were found for menstruation-related headache (WMD: −0.52; 95% CI: −0.76, −0.28; \( P < 0.001 \)), fatigue (WMD: −0.64; 95% CI: −0.92, −0.36; \( P < 0.001 \)), and bloating (WMD: −0.95; 95% CI: −1.08, −0.81; \( P < 0.001 \)). Also, a significant reducing effect of treatment was found on menstruation-related anxiety (WMD: −0.60; 95% CI: −0.96, −0.24; \( P = 0.001 \)).

All predefined variables were potential sources of heterogeneity for headache and fatigue [Table 3].

Overall, three studies had a low risk of bias for all criteria.\(^{[19,23,24]}\) Other studies showed fair quality, mostly due to the high risk in reporting bias or other bias [Figures 7 and 8]. Based on the results of Begg test, no evidence of publication bias was found for menstrual-related pain (\( P = 0.221 \)), headache (\( P = 0.734 \)), fatigue (\( P = 0.734 \)), bloating (\( P = 1.000 \)), and anxiety (\( P = 1.000 \)).

### Table 3: Subgroup analysis for the effects of Rosa damascena on menstruation-related symptoms

| Variables                  | Effect sizes (n) | \( P \) (%) | Cochran’s Q test | WMD (95% CI) | \( P \)-within | \( P \)-between |
|----------------------------|------------------|-------------|------------------|--------------|----------------|-----------------|
| **Menstruation-related pain** |                  |             |                  |              |                |                 |
| Administration route       |                  |             |                  |              |                |                 |
| Aromatherapy               | 2                | 80.1        | 0.025            | −0.86 (−1.41−0.30) | 0.003          | <0.001         |
| Oral intake using drop     | 1                | -           | -                | −1.38 (−1.91−0.85) | <0.001         |                 |
| Oral intake using capsule   | 2                | 72.4        | 0.057            | 0.39 (−0.01−0.78) | 0.052          |                 |
| Total administration dosage|                  |             |                  |              |                |                 |
| \( \leq 120 \) drops       | 3                | 78.2        | 0.010            | −1.01 (−1.50−0.51) | <0.001         | <0.001         |
| \( \leq 480 \) mg           | 1                | -           | -                | 0.55 (0.41−0.69)  | <0.001         |                 |
| \( >481 \) mg              | 1                | -           | -                | 0.14 (−0.26−0.54) | 0.491          |                 |
| Administration duration    |                  |             |                  |              |                |                 |
| 1 menstruation cycle       | 2                | 88.3        | 0.003            | −0.24 (−0.95−0.48) | 0.512          | 0.197          |
| 2 menstruation cycles      | 3                | 98.0        | <0.001           | −0.65 (−2.06−0.76) | 0.293          |                 |
| **Menstruation-related headache** |              |             |                  |              |                |                 |
| Patient’s condition        |                  |             |                  |              |                |                 |
| PD                         | 2                | 85.8        | 0.0018           | −0.19 (−0.41−0.02) | 0.074          | <0.001         |
| PMS                        | 2                | 41.9        | 0.190            | −0.65 (−0.93−0.37) | <0.001         |                 |
| Administration route       |                  |             |                  |              |                |                 |
| Aromatherapy               | 1                | -           | -                | −0.91 (−1.41−0.41) | <0.001         | <0.001         |
| Oral intake using drop     | 2                | 84.3        | 0.012            | −0.45 (−0.70−0.21) | <0.001         |                 |
| Oral intake using capsule   | 1                | -           | -                | −0.10 (−0.12−0.08) | <0.001         |                 |
| Total administration dosage|                  |             |                  |              |                |                 |
| \( \leq 120 \) drops       | 2                | 41.9        | 0.190            | −0.65 (−0.93−0.37) | <0.001         | <0.001         |
| \( >121 \) drops           | 1                | -           | -                | −0.32 (−0.48−0.16) | <0.001         |                 |
| \( \leq 480 \) mg           | 1                | -           | -                | −0.10 (−0.12−0.08) | <0.001         |                 |
| Administration duration    |                  |             |                  |              |                |                 |
| 2 menstruation cycles      | 3                | 88.4        | <0.001           | −0.33 (−0.61−0.05) | 0.020          | <0.001         |
| 3 menstruation cycles      | 1                | -           | -                | −0.57 (−0.68−0.46) | <0.001         |                 |
| **Menstruation-related fatigue** |              |             |                  |              |                |                 |
| Patient’s condition        |                  |             |                  |              |                |                 |
| PD                         | 2                | 98.9        | <0.001           | −0.39 (−1.15−0.36) | 0.310          | <0.001         |
| PMS                        | 2                | 66.3        | 0.085            | −0.55 (−0.88−0.23) | 0.001          |                 |
| Administration route       |                  |             |                  |              |                |                 |
| Aromatherapy               | 1                | -           | -                | −0.78 (−1.17−0.39) | <0.001         | <0.001         |
| Oral intake using drop     | 2                | 92.7        | <0.001           | −0.60 (−0.94−0.26) | 0.001          |                 |
| Oral intake using capsule   | 1                | -           | -                | −0.01 (−0.05−0.03) | 0.633          |                 |
| Total administration dosage|                  |             |                  |              |                |                 |
| \( \leq 120 \) drops       | 1                | -           | -                | −0.78 (−0.94−0.62) | <0.001         | <0.001         |
| \( >121 \) drops           | 2                | 66.3        | 0.085            | −0.55 (−0.88−0.23) | 0.001          |                 |
| \( \leq 480 \) mg           | 1                | -           | -                | −0.01 (−0.05−0.03) | 0.633          |                 |
| Administration duration    |                  |             |                  |              |                |                 |
| 2 menstruation cycles      | 3                | 98.0        | <0.001           | −0.51 (−1.13−0.11) | 0.107          | <0.001         |
| 3 menstruation cycles      | 1                | -           | -                | −0.43 (−0.53−0.33) | <0.001         |                 |

CI=Confidence interval, PD=Primary dysmenorrhea, PMS=Premenstrual syndrome, WMD=Weighted mean difference

CI = Confidence interval, PD = Primary dysmenorrhea, PMS = Premenstrual syndrome, WMD = Weighted mean difference.
Discussion

The systematic review indicated that the administration of R. damascena had potentially positive effects on different psychological, physical, and social symptoms. On the other hand, the results of the meta-analysis indicated that R. damascena caused a significant reduction in menstruation-related headache, fatigue, and bloating, while it had nonsignificant alleviating effects on pain and anxiety. These findings can significantly contribute to the existing literature on the potential of R. damascena as a traditional agent for the treatment of MRSs.

Based on the present findings, the administration of R. damascena reduced menstrual pain and headache; however, the effect was significant only for headache. The findings substantiated the available information regarding the analgesic effects of R. damascena on menstruation. In a systematic review of RCTs which evaluated the effects of aromatherapy on the management of PD, the oil extract of R. damascena was one of the main methods of aromatherapy for reducing the menstrual cramps. In another systematic review on the efficacy and safety of R. damascena, the analgesic and antinociceptive effects of the oral intake of this medicinal herb were reported against menstruation-related pain. Moreover, in another systematic review of 13 RCTs, five
trials evaluated the analgesic effects of aromatherapy with *R. damascena* oil and reported that treatment could be effective in reducing different painful conditions, such as menstruation-related pain.\[33\]

Inconsistent with our findings, a meta-analysis indicated a significant difference between menstrual pain 48 h after receiving mefenamic acid and *R. damascena* (WMD: −0.23; 95% CI: −0.24, −0.22).\[34\] In the current review, the effect sizes of five RCTs that addressed administration of *R. damascena* in the form of aromatherapy, topical treatment, or oral intake were pooled comparing the baseline and final posttreatment values of the outcomes, while the previously mentioned review considered the oral administration of any supplements and reported data of a single cross-over trial of 92 women in a subgroup analysis 48 h after receiving the treatments. Based on the subgroup findings in the current review, oral intake of *R. damascena* using capsule caused a nonsignificant reduction in menstruation-related pain (two RCTs), while the oral drop of the treatment had a significant pain-alleviating effect (one RCT). On the other, a meta-analysis of 16 RCTs over the effect of aromatherapy with *R. damascena* on alleviating the adults’ acute pain reported the potential effects of treatment on menstruation-related pain using subgroup analysis (three RCTs, WMD: −1.18; 95% CI: −1.92, −0.43).\[35\] Similarly, the subgroup findings in this review indicated a significant effect of *R. damascena* in the form of aromatherapy on menstruation-related pain (two RCTs).
These discrepancies could be attributed to different study objectives and the number of included RCTs.

Moreover, the findings of the meta-analysis indicated that the administration of *R. damascena* had a nonsignificant alleviating effect on menstruation-related anxiety, but it had significant alleviating effects on menstruation-related bloating and fatigue. In the literature review, no similar review regarding the effects of *R. damascena* on these menstruation outcomes was found. Nevertheless, the present review adds information to previous systematic and narrative reviews on the anxiolytic effects of *R. damascena*.17,36,37

Although this review showed that *R. damascena* might be an effective treatment for some MRSs, the mechanism of its effectiveness remains unclear. Previously, it was suggested that aromatherapy with *R. damascena* stimulated the olfactory system, increased the parasympathetic activity, reduced the sympathetic activity, and released neurotransmitters (i.e., enkephalin and endorphin), all of which might be effective in reducing pain and anxiety.36 It is known that one cause of PMS is the reduction of parasympathetic activity. Pink roses (*Rosa Dekora*) seem to enhance the activity of the parasympathetic nervous system, but reduce the activity of the sympathetic nervous system.38 It has been shown that aromatherapy with *R. damascena* reduces some physiological indicators of the sympathetic nervous system, such as blood pressure, heart rate, and respiratory rate in women with PD, which may be effective in reducing anxiety and pain.26 Moreover, the beneficial effects of *R. damascena* have been attributed to the high levels of flavonoid components,39 which seem to have pain-alleviating effects on dysmenorrhea.40 Furthermore, the effect of *R. damascena* on the gamma-aminobutyric acid-ergic (GABAergic) system may underpin its beneficial effects on MRSs, as progesterone metabolites binding to GABA receptors contribute to MRSs, especially in females with PMS.19 Furthermore, *R. damascena* induces anti-inflammatory effects and may have positive effects on the reduction of menstruation-related pain and the severity of other MRSs by decreasing prostaglandins in the blood flow.24

Implications for future research and clinical practice

Based on the findings of the present review, further research is suggested to evaluate different applications of *R. damascena* and design new effective interventions. The included studies used different dosages and durations of *R. damascena* administration, using aromatherapy or oral intake on individuals with PD or PMS. Based on the subgroup analysis, the condition and administration route as well as treatment dosage and duration were potential sources of heterogeneity for menstruation-related pain, headache, and fatigue. Accordingly, further studies are suggested to compare the effects of aromatherapy and oral intake of *R. damascena* on different MRSs, especially pain and anxiety. Further research is also recommended to determine the exact dosage of *R. damascena* that must be administered to bring positive effects. Moreover, to reach evidence-based conclusions, it is of merit to specify the administration durations and intervals of *R. damascena*.

Overall, the findings of the present review can increase our understanding of the value of *R. damascena* as a noninvasive and nonpharmacological option. Of three trials reporting the adverse effects of *R. damascena* administration, one reported minor side effects (headache, nausea, and vomiting).19 Treatment was reported to be safe and free of side effects in most included RCTs. Considering the low cost and simple application of *R. damascena*, the use of this herbal plant can be considered as a CAM method, along with other routine treatments for MRSs. Furthermore, the use of

![Figure 7: Risk of bias graph (review of the authors’ judgments about each risk of bias item presented as percentages across all included studies)](image)

![Figure 8: Risk of bias summary (review of the authors’ judgments about each risk of bias item for each included study)](image)
this method can help us concentrate on the individual as a whole, not merely the disease; therefore, we can apply a holistic care approach, as described by Martha Rogers’ theory in 1970. Nevertheless, the safety data are too scarce to confirm the use of *R. damascena* during menstruation as an evidence-based approach. It is also recommended to evaluate the adverse effects of treatment, especially by measuring safety laboratory parameters, to reach reliable conclusions about the possible adverse effects of *R. damascena*.

**Strengths and limitations**

To the best of our knowledge, this is the first review on the effect of *R. damascena* on menstruation-related pain, headache, fatigue, anxiety, and bloating. We pooled data using a meta-analysis, while most previous reviews reported the findings using systematic design. Also, previous meta-analyses have either restricted the administration route of *R. damascena* or focused on the properties of *R. damascena* in alleviating different painful conditions. Likewise, they missed some relevant studies. Accordingly, we summarized and statistically pooled the findings of studies that used aromatherapy, topical treatment, or oral intake of *Rosa damascena* on menstruation-related pain as the primary outcome and menstruation-related headache, fatigue, anxiety, and bloating as the secondary outcomes, using a comprehensive search. To investigate any possible differences regarding the effect of the administration route on the outcome, we used subgroup analysis.

Despite the aforesaid strengths, the findings should be cautiously interpreted due to some limitations. First, although we applied a random-effects model to take between-study variation into account, evidence of between-study heterogeneity was found in the main analysis. Subgroup analysis showed that some predefined variables were potential sources of heterogeneity. Moreover, we compared the baseline and final post-treatment values of the outcomes. Hence, different choices of endpoint may lead to heterogeneities; therefore, caution is necessary when interpreting the findings. Second, only three studies recorded the adverse effects; therefore, the available data are too limited to reach any definite conclusions about the safety of *R. damascena*. Third, dosages and durations of *R. damascena* administration were unknown in some studies; therefore, estimations were made based on consensus. Finally, the present findings cannot be generalized to all conditions because most trials were conducted in Iran, where the culture is relatively different from other countries.

**Conclusion**

This meta-analysis indicated that administration of *R. damascena* could nonsignificantly reduce the menstruation-related pain and anxiety, but it might have a significant reducing effect on menstruation-related headache, fatigue, and bloating. Therefore, further robust studies are suggested to compare the effects of aromatherapy and oral intake of *R. damascena* on different MRSs (especially pain and anxiety), using different dosages and durations and also safety laboratory parameters. Likewise, further studies are recommended to precisely determine the biochemical mechanisms responsible for the activity of *R. damascena* against MRSs.

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**Conflicts of interest**

There are no conflicts of interest.

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