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Using Local Nigella Sativa Oil to Relief Premenstrual Syndrome Symptoms

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ABSTRACT

Background: Premenstrual Syndrome (PMS) is a common problem in women. *Nigella sativa* has been suggested for its anti-inflammation and analgesic effects. This study was conducted to evaluate the effect of *Nigella sativa* oil on PMS. **Methods:** This double-blind clinical trial was conducted on 124 female students within the age range of 18-25 years living in the dormitories of Sabzevar University of Medical Sciences. Participants were randomly divided into two groups. The intervention group (IG) rubbed 1-2 drops of *Nigella sativa* oil on their fontanels at night for seven days before their three menstrual cycles. The placebo group (PG) rubbed placebo in the same way. After three cycles, pain severity was measured by the visual analog scale. Data analysis was carried out using the Mann-Whitney U test and analysis of covariance. **Results:** The mean age of participants, the mean age of menarche, and the mean age of PMS onset were 20.55 ± 0.2, 13.52 ± 0.15, and 15.35 ± 0.3 years old, respectively. The results showed that *Nigella sativa* oil reduced the severity of all PMS symptoms except in terms of depression and abdominal bloating in IG compare to the PG. **Conclusion:** *Nigella sativa* oil in women with premenstrual syndrome can be a promising, safe, and easily available analgesic supplement.

Keywords: *Premenstrual Syndrome; Nigella sativa; Menstruation*

Introduction

Premenstrual Syndrome (PMS) is a common problem in women, which includes series of psychological and physical symptoms experienced by some women 7 to 14 days before onset of their menses (Akbarzadeh Pasha and Akbarzadeh Pasha, 2007). So far, about 200 different symptoms have been listed for PMS such as depression, nervousness, bloating, breast tenderness, weight gain, headache, insomnia, and increased appetites (Rocha Filho *et al.*, 2011). It is estimated that 85%-90% women of childbearing age may experience physical and mental changes before their cycle. In 5%-40% of women, symptoms of PMS are so severe interfering with their daily-life activities, work and social relationships (Bertone-Johnson *et al.*,

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2005, Rocha Filho *et al.*, 2011). Although the etiology of PMS is clear, fluctuations have been cited in estrogen and progesterone, as well as genetic, and neurobiological factors as contributing factors associated with the incidence of PMS (Skrzypulec-Plinta *et al.*, 2010). Diet and lifestyle are also among important factors affecting the occurrence of this syndrome.

A systematic review in Iran showed that a wide range of pharmacological and non-pharmacological interventions such as diuretics, gonadotropins, progesterone, and supplements (vitamins and minerals), exercise, massage, yoga, phototherapy, dietary changes, and herbal remedies could control this syndrome (Babazadeh and Keramat, 2011).

On the other hand, pharmacological interventions are expensive, may cause side effects, and their effectiveness are under question (Babazadeh and Keramat, 2011, Bertone-Johnson *et al.*, 2005, Bertone-Johnson *et al.*, 2010). The results of a telephone survey in America showed that approximately 80% of patients with PMS used complementary therapies (Zouari *et al.*, 2012). Application of traditional medicine as a new source of prevention and treatment of different medical problems has become prevalent worldwide (Ocaña and Reglero, 2012, Zouari *et al.*, 2012). Herbal products such as Zataria multi-flora Boiss (Sodouri *et al.*, 2013), Saffron (Agha-Hosseini *et al.*, 2008), Vitexagnus- castus (Pakgohar *et al.*, 2009), Ginkgo (Ozgoli *et al.*, 2009), and Hypericum (Pak *et al.*, 2005) have been suggested for the treatment of PMS.

Nigella sativa is an annual flowering plant, which belongs to the family Ranunculaceae (Al-Khalaf and Ramadan, 2013). *Nigella sativa* oil and seed have been widely used in the management of different diseases for centuries and it is regarded as an important drug in traditional medicine in Asian and Middle East countries (Ayurveda, Unani, Arabic and Chinese medicines) (Nasir *et al.*, 2014, Randhawa and Alghamdi, 2011).

Nigella sativa has several positive effects such as antibacterial, anti-diabetic, antioxidant, anticancer, anti-inflammatory, analgesic, contraceptive, and anti-fertility properties (Ahmad *et al.*, 2013).

The seeds of *Nigella sativa* contain protein (26.7%), fat (28.5%), carbohydrates (24.9%), and crude fiber (8.4%). The seeds also contain several vitamins and minerals such as carotene, cooper, phosphor, zinc, and iron (Nickavar *et al.*, 2003).

Given the high prevalence of PMS in Iranian women (62.4%-66.5%) (Kiani *et al.*, 2009, Soltan Ahmadi *et al.*, 2007) and the beneficial effects of *N. sativa* fixed oil for mastalgia, as comparable to diclofenac (Huseini et al., 2016), we conducted this study to investigate the relieving effect of *Nigella sativa* oil on PMS symptoms.

Materials and Methods

Study design and participants: This double-blind clinical trial was carried out on 124 female students within the age range of 18-25 years living in the dormitories of Sabzevar University of Medical Sciences. Data were gathered from October 2013 to March 2014. The inclusion criteria for participants were: having 18–25 years of age, having regular menstrual cycle, not having an acute or chronic disease, and not taking medicines or supplements.

The sample size was determined based on a study by Samadipour at the significant level of 0.05, test power of 80%, and correlation coefficient of 0.7 (Samadipour *et al.*, 2020).

The exclusion criteria were being pregnant, having willingness to use hormonal contraceptive methods or taking any hormonal treatments, and not using the suggested intervention not filling out the study forms regularly.

Patrticipants were randomly allocated to either intervention (IG) or placebo groups (PG) by block randomization method. To maintain blinding, the researchers and participants remained blind for randomization and allocation until the end of data analyses. Participants in both groups were matched in terms of the type and number of sedative drugs, duration of PMS, and

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pain severity. The IG was suggested to rub 0.5 ml drops of *Nigella sativa* oil on their fontanels at night (seven days before menstruation for three menstrual cycles). The PG rubbed the placebo (liquid vegetable oil) in the same way. *Nigella sativa* oil and placebo were purchased from Barij Essence Kashan Compay.

Measurements: To assess the status of PMS, the form of temporary diagnosis of premenstrual syndrome was used. This questionnaire consists of 11 questions and a positive answer to at least 5 questions is required for classification in the affected group. The Iranian version of Premenstrual Syndrome Symptoms Screening Questionnaire (PSST) was used to assess and record the severity of PMS (Siahbazi et al). The questionnaire consists of 19 questions in two parts, the first part includes 14 questions related to mood, physical, and behavioral symptoms. The second part is related to the effect of these symptoms on people's lives and includes 5 questions. Each question has 4 options of 'not at all, mild, moderate, and severe'.

The following procedure was used to determine the severity of PMS. In order to be in the group of premenstrual disorder or very severe PMS, a person should meet the following conditions: A) From the first 4 questions, at least one case should be selected as strongly; B) From the first 14 questions, at least 4 cases should be responded as moderate or severe; C) Of the last 5 questions, at least one item should be answered. To be in the moderate to severe group, a person should meet the following conditions: a) At least one of the first 4 questions should be answered as moderately or severely. b) From the first 14 questions, at least 4 cases should be answered as moderate or severe. c) At least one of the last 5 questions should be answered moderately or severely. The other respondents are categorized in the mild group (Siahbazi et al).

The diagnosis of PMS was confirmed through an interview. The criteria for selecting the participants with PMS were having at least one symptom in three consecutive periods, occurring 5 days before the onset of menses. After finalizing the participants, a diagnostic questionnaire was developed based on the diagnostic criteria presented by the American College of Obstetrics and Gynecology (Tofighiyan *et al.*, 2013). The participants filled out the questionnaire 3 consecutive months before undergoing the intervention. The students had to have one or more somatic (i.e. breast tenderness, abdominal bloating, headache, and edema) or mood symptoms (i.e. depression, nervousness, jitteriness, anxiety, low concentration, and being incapable of doing social activities) lasting for 5 days for the three previous periods.

After a primary examination, students who had moderate and sever pain intensity and met the inclusion criteria entered the study. Height and weight of the selected participants were measured by standard methods.

Before and after three menstrual cycles, participants completed the pain intensity form. A visual analogue scale (VAS) was designed to evaluate the severity of each symptom.

Ethical considerations: The Ethics committee of Sabzevar university of Medical science approved the research proposal. All students signed a written informed consent form (Ethical Code: MEDSAB.REC.92.30) and the study was registered in the Iranian Registry of Clinical Trials (Number 2014033117109 N1).

Data analysis: It was carried out using SPSS software version 16. The mean of premenstrual syndrome symptoms was measured before and three cycles after the intervention. The difference between the two groups was analyzed using the Mann-Whitney U test. Data were compared in pairs via the analysis of covariance (ANCOVA) at the significance level of p-value < 0.050.

Results

This study was conducted on 124 female students. We determined the degree of compliance for each participant according to the volume of oil left in the jar. The compliance of all participants was more than 90% and no

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adverse effects was reported.

The mean age of the participants, the mean age of menarche, and the mean age of PMS onset were 20.55 ± 0.2, 13.52 ± 0.15, and 15.35 ± 0.30 years old, respectively. Participants' demographic characteristics are presented in **Table 1**. Two groups did not differ significantly in terms of mean age, mean age of first menorah, PMS severity, and body mass index (BMI) ($P > 0.05$).

Severity of all symptoms in two groups before and after the intervention is presented in **Table 2**. Our findings revealed that *Nigella sativa* oil reduced the severity of all PMS symptoms, except depression and abdominal bloating in the intervention group compared to the control group.

Table 1. Participants' characteristics in the Nigella sativa and placebo groups

Variables	Total	Nigella sativa oil	Placebo	P-value[a]
Age (y)	20.55 ± 0.20[b]	20.89 ± 0.23	20.23 ± 0.31	0.1
Menarche age (y)	13.52 ± 0.15	13.68 ± 0.19	13.34 ± 0.24	0.33
Age of experiencing dysmenorrhea (y)	15.35 ± 0.30	15.55 ± 0.38	15.20 ± 0.31	0.62
Body mass index (kg/m^2)	21.27 ± 0.40	21.44 ± 1.59	21.49 ± 1.70	0.46

[a]: *Mann-Whitney U test* [b]: *Mean ± SD*

Table 2. Severity of each symptom in the two groups before and after the intervention

Symptoms	Group	Before	After	P-value[a]
Depression	Nigella sativa oil	4.22 ± 1.11[b]	4.41 ± 1.12	0.10
	Placebo	4.21 ± 1.13	4.40 ± 1.15	0.10
Nervousness	Nigella sativa oil	3.97 ± 1.11	3.37 ± 1.13	0.01
	Placebo	4.38 ± 1.12	4.45 ± 1.16	0.10
Jitteriness	Nigella sativa oil	4.40 ± 0.70	4.06 ± 0.09	0.02
	Placebo	4.30 ± 1.16	5.05 ± 0.10	0.01
Anxiety	Nigella sativa oil	4.13 ± 1.12	3.48 ± 1.10	0.01
	Placebo	4.43 ± 2.15	4.57 ± 2.05	0.50
Low concentration	Nigella sativa oil	3.03 ± 0.11	2.84 ± 0.13	0.05
	Placebo	3.34 ± 0.16	3.23 ± 0.15	0.10
Social activity	Nigella sativa oil	3.90 ± 0.10	3.43 ± 0.13	0.01
	Placebo	4.43 ± 1.16	4.50 ± 1.17	0.60
Breast tenderness	Nigella sativa oil	5.22 ± 0.14	4.63 ± 0.13	0.01
	Placebo	5.52 ± 0.14	5.55 ± 0.11	0.90
Bloating	Nigella sativa oil	3.56 ± 1.10	3.75 ± 1.00	0.10
	Placebo	3.84 ± 0.12	3.87 ± 0.63	0.90
Headache	Nigella sativa oil	4.22 ± 0. 40	3.63 ± 0.20	0.01
	Placebo	4.52 ± 0.14	4.55 ± 0.11	0.90
Edema	Nigella sativa oil	2.41 ± 0.12	2.18 ± 0.13	0.05
	Placebo	2.27 ± 0.15	2.41 ± 0.17	0.10

[a]:*ANCOVA test* [b]: *Mean ± SD*

Discussion

In the present study, *Nigella sativa* oil reduced the overall severity of symptoms associated with PMS including mental and physical ones. Given that we found no research investigating on the effect of *Nigella sativa* on PMS symptoms, it was not possible for us to compare our results with those of other studies. However, some studies reported the effects of *Nigella sativa* on different human body systems and organs. For instance,

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Al-Negar *et al*. reported the analgesic effect of *Nigella sativa* on CNS (Al-Naggar *et al.*, 2003). Several studies showed that *Nigella sativa* could inhibit inflammation by reducing the production of nitric oxide, cytokine interleukin-1, and interleukin-6 as well as inhibiting the transcription Kβ factor. Some studies yielded that Nigella sativa reduced the levels of pro-inflammatory mediators MCP-1, TNF-α, interlukin-β1, and Cox-2, inhibited histone deacetylase enzyme, and induced histone hyper acetylation. The anti-inflammatory and analgesic effects of Nigella sativa were also reported in previous investigations. Most of the pharmacological properties of *Nigella sativa* are attributed to quinine constituents, of which tiomoquinon (TQ) is the most abundant (Ahmad *et al.*, 2013, Al-Naggar *et al.*, 2003, Darakhshan *et al.*, 2015). A recent study found an association between PMS and chronic inflammation (Bertone-Johnson, 2016).

Sohrabi *et al*. investigated the effect of omega-3 fatty acids on the psychiatric as well as somatic symptoms of PMS (Sohrabi *et al.*, 2010). They found that the intervention not only reduced PMS psychiatric symptoms, including depression, nervousness, anxiety, and lack of concentration, but also decreased somatic symptoms induced by PMS, namely abdominal bloating, headache, and breast tenderness. In another study, Rocha Filho et al. showed that omega-3 oil relieved PMS symptoms (Rocha Filho *et al.*, 2011). However, kooshki *et al*. found that treatment with omega-3 did not significantly reduce PMS symptoms in the intervention group compared to the control group (Tofighiyan *et al.*, 2013). In another study, Sodouri *et al*. showed that Zataria Multiflora Boiss could not improve PMS symptoms significantly (Sodouri *et al.*, 2013). Additionally, Khayat *et al*. demonstrated that ginger was effective in relieving mood, physical, and behavioral symptoms of PMS (Khayat *et al.*, 2014).

Effects of the volatile oil of *Nigella sativa seeds* on the uterine smooth muscle of rats and guinea pigs were investigated in vitro using isolated uterine horns by Aqel (Aqel and Shaheen, 1996). The volatile oil of *Nigella seeds* inhibited the spontaneous movements of rat and guinea pig uterine smooth muscle and also the contractions induced by oxytocin stimulation. They finally yielded anti- oxytocic potential effects of the volatile oil of Nigella seeds (Reiter and Brandt, 1985).

Nigella sativa oil is easier to use in the fontanels than on the abdomen and its aromatherapy effects at night facilitates a restful sleep, which reduces the psychological effects of PMS. We also suggest applying a little of *Nigella sativa* oil in fontanel at night due to its antispasmodic, analgesic, anti- inflammatory, and anti- oxytocic effects (Younesy *et al.*, 2014) that help to release both physically and psychologically premenstrual pain. Given that many women with PMS suffer from increased uterine contractions, *Nigella sativa* oil is suggested for relieving the symptoms of PMS according to findings of this study.

Conclusion

The finding of the present study showed that *Nigella sativa* oil was effective in relieving the syndrome of PMS. Considering that gentle massage is an inexpensive method with little or no side effects, the participants' compliance was high.

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Conflict interests

The authors declare that they have no competing interests.

Authors' contributions

Kooshki A, Samadi E, and Akbarzadeh R designed research; Kooshki A and Samadi E conducted research; Kooshki A analyzed data; and Kooshki A, Samadi E, and Akbarzadeh R composed the paper. Kooshki A had primary

responsibility for final content. All authors read and approved the final manuscript.

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