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Curcumin attenuates severity of premenstrual syndrome symptoms: A randomized, double-blind, placebo-controlled trial

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Summary
Background: Most women experience premenstrual syndrome (PMS) at their reproductive age. PMS is a combination of psychological, physical and behavioral changes that interfere with familial communication and social activities.
Objectives: Different methods have been suggested for treating PMS and one of them is herbal medicine. This study was done to evaluate the effects of curcumin on severity of PMS symptoms.
Methods: This research was a clinical trial, double-blinded study. After having identified persons suffering from PMS, participants were randomly allocated to placebo ($n = 35$) and curcumin

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($n = 35$) groups. Then each participant received two capsules daily for seven days before menstruation and for three days after menstruation for three successive cycles and they recorded severity of the symptoms by daily record questionnaire.
Results: The baseline level of PMS symptoms of before intervention did not differ between groups. While after three consecutive cycles treatment with curcumin, total severity of PMS score had reduced from 102.06 ± 39.64 to 42.47 ± 16.37 (mean change: 59.59; 95% confidence interval [CI]: 46.19-72.99) and in Placebo, total severity of PMS score changed from 106.06 ± 44.12 to 91.60 ± 43.56 (mean change: 14.45; 95% CI: 2.69 to 26.22). Furthermore, difference between mean changes was significant (mean difference: 45.14; 95% CI: 6.10—14.98).
Conclusions: Our results for the first time showed a potential advantageous effect of curcumin in attenuating severity of PMS symptoms, which were probably mediated by modulation of neurotransmitters and anti-inflammatory effects of curcumin.

Introduction

During reproductive age of women, periodical, physiological and hormonal changes lead to some mood and physical problems known as Premenstrual syndrome (PMS) [1—3]. PMS is defined as the recurrent mood and physical symptoms which is usually in the luteal phase [1]. Epidemiological studies have reported high prevalence of PMS (approximately 80% of women had mild premenstrual symptoms, 20—50% moderate symptoms, and about 5—15% of women severe symptoms, respectively) [1,2]. Nowadays, varieties of chemical drugs are used to relieving premenstrual symptoms [1,4]. Nonetheless, due to side effects of chemical drugs its consumption is not recommended except in severe cases [1,5]. On the other hand, as an alternative to chemical drug, complementary and herbal medicine are commonly used in the treatment of many chronic conditions such as PMS, menopausal symptoms, and dysmenorrhea[1,5]. Curcumin is the principal curcuminoid of the spice turmeric, which is a member of the ginger family (Zingiberaceae) [6,7]. Many studies demonstrated that curcumin have beneficial effects in physiological and pathological conditions (e.g. antidepressant, anti-inflammatory, antioxidant, anti-carcinogenic, anti-arthritic, thrombosuppressive, antimicrobial, and hypoglycemic) [6,7].

Changes of prostaglandins and neurotransmitters levels are known to perform major role in the pathophysiology of PMS. Prostaglandins mostly result in outbreak of physical symptoms and neurotransmitters mainly have responsibility in incidence of mood and behavioral symptoms during PMS [1,8—12]. Studies of the last decade have shown curcumin reduces prostaglandins synthesis through inhibition of cyclooxygenase-2 (COX-2) enzyme [6,7,13—15]. Also, studies on animal model of depression demonstrated curcumin through modulation of neurotransmitters (serotonin, dopamine, and norepinephrine) levels exert antidepressant effects [6,7,16,17]. Therefore, based on the role of prostaglandins and neurotransmitters in the pathophysiology of PMS and effects of curcumin on prostaglandins biosynthesis and modulation of neurotransmitters levels, this study was designed to evaluate the effects of curcumin on the severity of mood, behavioral and physical symptoms of PMS.

Materials and methods

This study was a randomized, double-blinded and placebo-controlled research.

All the voluntary participants were informed that they could leave the study whenever they want. Aims and methods of the study were fully explained to the participants, and written informed consent was received from all the participants. Sample size was determined based on 80% power and $\acute{\alpha} = 0.05$ and it was estimated that 35 patients were required for each group. The study was done on 70 female students in dormitories of Tehran University of Medical Sciences in the year 2013. Data were collected during 8 months.

In addition, the ethics committee of Tehran University of Medical Sciences have approved the study (No. 97/130/D/92) and was registered at Iranian Registry of Clinical Trial.

Inclusion criteria observed; Healthy premenopausal women with regular menstrual cycles of 21—35 days, being single, lack of sensitivity to curcumin, not taking any medication, not drinking alcohol, no smoking, no stressful events in the last 3 months. The participants recorded symptoms with daily record questionnaires [this form contains a table with 19 symptoms of premenstrual syndrome questionnaire based on the DSM-IV (the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association), Self-Rating Scale] for two cycles before the intervention [1].

This questionnaire determines the severity of PMS using 3 items, including: mood symptoms (restlessness, irritability, anxiety, depression or sadness, crying, feeling of isolation), physical symptoms (headache, breast tenderness, backache, abdominal pain, weight gain, swelling of extremities, muscle stiffness, gastrointestinal symptoms and nausea) and behavioral characteristics (fatigue, lack of energy, insomnia, difficulty in concentrating, increased or decreased appetite). Then the severity of premenstrual syndrome was evaluated for all participants ((0) absence of symptoms, (1) mild symptoms may not interfere with everyday activities, (2) moderate symptoms that interfere with daily activities, (3) severe symptoms that impede doing daily activities). Each participant with at least five symptoms was finally diagnosed as a person with PMS. After identifying participants with PMS, they were randomly allocated to two groups