



Contents lists available at ScienceDirect

## Taiwanese Journal of Obstetrics &amp; Gynecology

journal homepage: [www.tjog-online.com](http://www.tjog-online.com)

## Original Article

## Effect of Ginger and Novafen on menstrual pain: A cross-over trial

Hajar Adib Rad <sup>a</sup>, Zahra Basirat <sup>a</sup>, Fatemeh Bakouei <sup>a</sup>, Ali Akbar Moghadamnia <sup>b</sup>, Soraya Khafri <sup>c</sup>, Zeynab Farhadi Kotenaei <sup>d,\*</sup>, Maryam Nikpour <sup>e</sup>, Somayeh Kazemi <sup>f</sup><sup>a</sup> Infertility and Health Reproductive Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Islamic Republic of Iran<sup>b</sup> Cellular and Molecular Biology Research Center, Health Research Institute, Department of Pharmacology, Babol University of Medical Sciences, Babol, Islamic Republic of Iran<sup>c</sup> Infertility and Health Reproductive Research Center, Health Research Institute, Department of Statistic and Epidemiology, Babol University of Medical Sciences, Babol, Islamic Republic of Iran<sup>d</sup> Social Determinants of Health Research Center, Health Research Institute, Department of Nursing, Babol University of Medical Sciences, Babol, Islamic Republic of Iran<sup>e</sup> Social Determinants of Health Research Center, Health Research Institute, Department of Midwifery, Babol University of Medical Sciences, Babol, Islamic Republic of Iran<sup>f</sup> Department of Midwifery, Babol University of Medical Sciences, Babol, Islamic Republic of Iran

## ARTICLE INFO

## Article history:

Accepted 9 October 2018

## Keywords:

Novafen  
Ginger  
Primary dysmenorrhea  
Pain relieving

## ABSTRACT

**Objective:** Menstrual pain is a periodic pain which happens during the days of menses. The menstrual disturbances as a health problem among young girls affect not only reproductive, but also psychical health and quality of life. This study was done with the goal of comparing the effect of Ginger and Novafen on the menstrual pain.**Materials and methods:** This crossover clinical trial study was done in Iran on 168 single girl students 18–26 years old in Babol University of Medical Sciences with primary menstrual pain. The participants were randomly allocated to two groups receiving the drugs Novafen and Ginger. At the beginning of pain, in the two groups 200 mg capsule was given every 6 h for two serial cycles. Pain severity was measured by the visual scale before treatment, 1 h after consuming the drug (for 24 h) and 48 h after the onset of drug.**Results:** The mean age of participants was  $21.83 \pm 2.07$  years. It has been reported that the intensity of pain from dysmenorrhea decreased in the Novafen and Ginger groups. Before treatment, the average pain intensity in Novafen and Ginger users were  $7.12 \pm 2.32$  and  $7.60 \pm 1.84$ , respectively and after treatment pain intensity decreased to  $3.10 \pm 2.69$  and  $2.97 \pm 2.69$ , respectively. Differences between two groups each time showed no statistical significance ( $p > 0.05$ ).**Conclusion:** Both drugs reduced menstrual pain. Ginger as well as Novafen is effective in relieving pain in girls with primary dysmenorrhea. Therefore, treatment with natural herbal medicine, non-synthetic drug, to reduce primary dysmenorrhea is recommended.© 2018 Taiwan Association of Obstetrics & Gynecology. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Dysmenorrhea is defined as menstrual pain that starts before menses and continues during menstruation [1]. Primary dysmenorrhea results in different detrimental effects on individuals and communities. School absence, pain interference with daily activities, and the use of drug were correlated with higher intensity of primary dysmenorrhea [2]. Usually, the prevalence of primary dysmenorrhea is estimated at 45.0%–94.4% of women in different

countries and age groups [3–6]. Research has shown that dysmenorrhea is severe in 10% of women, it disturbs ability in the first 3–4 days of their period [7]. Studies have reported that dysmenorrhea is affected by several factors including: young age, low body mass index (BMI), smoking, early menarche, long menses, premenstrual syndrome, pelvic inflammation, mental disorder, and previous sexual attack [8].

Menstrual disorder in adolescent girls not only leads to later reproduction but also affects their quality of life [1]. The results of a study showed that low social support, alexithymia, neuroticism trait, high menstrual bleeding, family history of menstrual pain, and high-caffeine diet are serious risk factors for primary

\* Corresponding author. Fax: +0098 11 32199936.

E-mail address: [Farhadi\\_Zeynab@yahoo.com](mailto:Farhadi_Zeynab@yahoo.com) (Z. Farhadi Kotenaei).

dysmenorrheal [9]. The cause of primary dysmenorrhea is due to an increase prostaglandin leakage of the endometrium during menses [10]. Studies have illustrated that block of cyclooxygenase-2 (COX-2) causes to block the synthesis prostaglandin that could be handled by nonsteroidal anti-inflammatory drugs (NSAIDs) [11]. The most usual dysmenorrhea treatment is non-steroidal drugs which have side effects such as headache, vertigo, dysuria, weakness, lack of appetite, nausea, acne, and gastrointestinal bleeding [12]. Some studies reported that the pain relief of the herbal drugs is more effective than NSAIDs [13,14], and Ginger is the alternative medicine that applies for this purpose [15].

Many studies have reported that Ginger has useful effects to cancer prevention [16], also treatment of nausea and vomiting due to pregnancy and chemotherapy [17,18]. The anti-spasmodic effect of Ginger is due to the blocked of cyclooxygenase and 5-lipoxygenase [19]. A study has reported the effect of Ginger in the reduction the severity and duration of menstrual pain [20]. Novafen is a strong analgesic, and a usual medication that is used to treat menstrual pain with side effects [11]. Therefore, this study was conducted with the goal of comparing the effect of Ginger and Novafen on the menstrual pain in girl students of Babol University of Medical Sciences.

## Materials and methods

### Study design and population

This was a randomized comparative cross-over clinical trial study that was performed in Babol University of Medical Sciences. 168 girl students aged 18–26 years were selected for this study randomly assigned to two groups; receiving Novafen ( $n = 168$ ), and Ginger ( $n = 168$ ). The participants were evaluated for two consecutive cycles. The inclusion criteria included: age of 18–26 years, regular period, menstrual pain during first three days of bleeding, primary dysmenorrhea (grade 2 and grade 3). The exclusion criteria included: secondary dysmenorrhea, mild dysmenorrhea (grade 1), using pain relief medication and hormonal medications, irregular use of medicine, failure to record pain intensity, dissatisfaction of treatment, doing heavy exercises, kidney and liver disease, pelvic operation, severe stress, serious family argument and experiencing severe stress during 6 months before the study.

In this study, data were collected through demographic questionnaire, pain visual analog scale (PVAS), multidimensional verbal rating scale (MVRS), and pictorial blood loss assessment chart (PBAC). The severity of dysmenorrhea was investigated using the PVAS. The PVAS is a valid scale that has been applied in many studies to estimate dysmenorrhea [21]. It contains a horizontal 10 cm indicator. The person marks numbers from 0 to 10, on the intensity of the pain. 0 shows no pain, and number 10 illustrates severe dysmenorrhea. Verbal multidimensional scoring system used to assess the score of dysmenorrhea and systemic symptoms associated with dysmenorrheal were based in four degrees: painless menstruation (nil), menstruation with pain but uncommon consumption of painkiller or restriction of tasks (grade I), menstruation with average pain with effect on daily tasks and consumption of painkiller with relief (grade II), and menstruation with violent pain with serious restriction on daily work, useless consumption of sedative, and such symptoms as headache, affection, nausea, vomiting, and diarrhea (grade III) [22].

To evaluate bleeding, pictorial blood loss assessment chart (PBAC) was used. We recorded all the pads used during the menstruation of each student based on the following score: 1 for each easily stained pad, 5 for each mildly dirty pad and 20 for each fully soaked pad. Thus, we determined score  $<50$  for low

menstruation, score  $\geq 50$  and  $\leq 80$  for average menstruation, and score  $>80$  for high menstruation [23].

All packages of drug include Novafen and Ginger prepared in 200 mg capsules by pharmacologist. The commercial Novafen (prepared from registered pharmacies) dosage forms re-encapsulated into bigger hard gelatin capsule covers. In this way, we didn't have problem with filling Novafen for Ginger, we filled each capsule nearly 200 mg of fine powdered ginger and weighed each one. The range of plus/minus 10 mg ( $200 \pm 10$  mg) was accepted for each capsule. The outer cover of the capsules were completely identical for each group of study and the subjects did not know the type of treatment, at all. Capsules were given to the students in two groups; A and B. They were randomly appointed to two groups. Study design was based on cross-over: 90 subjects in the first group consumed Novafen in the first cycle and Ginger in the second cycle, and 78 subjects in the second group consumed Ginger in the first cycle and Novafen in the second cycle. We explained to the participants that the medicines on the first day of their menstruation with onset of dysmenorrhea and at the every 6 h (for 48 h). We emphasized to them to record their pain intensity before the onset of drug, first hour since every amount of drug (for 24 h) and 48 h post-onset of drug on the PVAS. Also, they reported the satisfaction of treatment in two options (yes, no).

### Ethical considerations

The Ethics Committee of Babol University of Medical Sciences approved the study (ID: 4419). The research was registered in the Iranian Registry of Clinical Trial ([www.irct.ir](http://www.irct.ir)) with number register: ICT201108285683N2. The inform consent forms were signed by all the participants before the intervention on the declaration of Helsinki.

### Data analysis

The SPSS version 22 was used to analyze the data. Repeated measures and Mann–Whitney tests were used for comparing the severity of pain and bleeding between two groups. In the analysis of cross-over trial data, on the non-significant differences in the two groups of Novafen and Ginger in the first and the second cycles of menstruation (no effect on the order prescribing of drugs), the data were analyzed in parallel groups of 168 individuals. The T-test was used for quantitative variables. The Chi–Square test was used to compare categorical variables, satisfaction from pain sedation and recommend medication to other. The Mann–Whitney test was used for comparing the clinical symptoms. A  $p$ -value less than .05 was considered significant.

## Results

The average age of the participants was  $21.83 \pm 2.07$  years (range 18–26 years); mean age menarche and dysmenorrhea were  $13.06 \pm 1.39$  and  $14.78 \pm 2.59$  years respectively. Most of the students (82.1%) lived in dorms. 48.8% subjects experienced dysmenorrhea grade II and 51.2% of them were dysmenorrheal grade III. Subjects' characteristics are presented in Table 1. In the Novafen group, pain intensity decreased from  $7.12 \pm 2.32$  before treatment to  $3.10 \pm 2.69$  in the 48 h after treatment. In Ginger group, pain intensity before treatment was  $7.60 \pm 1.84$  which changed to  $2.97 \pm 2.69$  in the 48 h after treatment. Differences between two groups in each time showed not statistically significant (all of them  $p > 0.05$ ), but trends in pain intensity at different times in each of the two groups show significant differences (both of them  $P < 0.001$ ). Regarding the data obtained and Fig. 1, it can be said that although the reduction of dysmenorrhea in the Ginger group was slightly higher than the

**Table 1**  
Subjects' characteristics according to specific groups.

Groups	Total (n = 168)	First group (n = 90)	Second group (n = 78)	P-value <sup>b</sup>
<b>Characteristics</b>				
Age (mean $\pm$ SD, year)	21.86 $\pm$ 2.25	21.43 $\pm$ 2.28	22.35 $\pm$ 2.10	.008
<b>Residence area</b>				
Dormitory n (%)	138 (82.1)	72 (52.2)	66 (47.8)	.436
Non dormitory n (%)	30 (17.9)	18 (60.0)	12 (40.0)	
BMI <sup>a</sup> (kg/m <sup>2</sup> )	22.06 $\pm$ 3.37	22.21 $\pm$ 3.59	21.87 $\pm$ 3.11	.510
<b>Menstrual status</b>				
Menarche age (mean $\pm$ SD, year)	12.86 $\pm$ 1.29	12.77 $\pm$ 1.48	12.96 $\pm$ 1.02	.331
Age of the first dysmenorrhea (mean $\pm$ SD, year)	14.68 $\pm$ 2.43	14.77 $\pm$ 2.74	14.58 $\pm$ 2.01	.615
Duration (mean $\pm$ SD, day)	6.73 $\pm$ 1.45	6.93 $\pm$ 1.32	6.50 $\pm$ 1.56	.053
Interval (mean $\pm$ SD, day)	30.95 $\pm$ 10.30	32.43 $\pm$ 13.36	29.23 $\pm$ 4.25	.044

<sup>a</sup> Note: Body mass index.

<sup>b</sup> The data were assessed using *t*-test.

Novafen group, this difference was not statistically significant. The comparison of bleeding in the two groups showed no significant difference [Fig. 2], But in general, it can be said that the trends in the changes of the amount of bleeding during the time in both groups are not statistically significant ( $p > 0.05$ ).

According to the Mann–Whitney test no statistically significant differences were found between the two groups in relief, consistency, or severity of clinical symptoms before treatment and 48 h later. The satisfaction rate of pain relief in the Novafen group was 51.9% versus 48.1% in the Ginger group, that was not statistically significant.

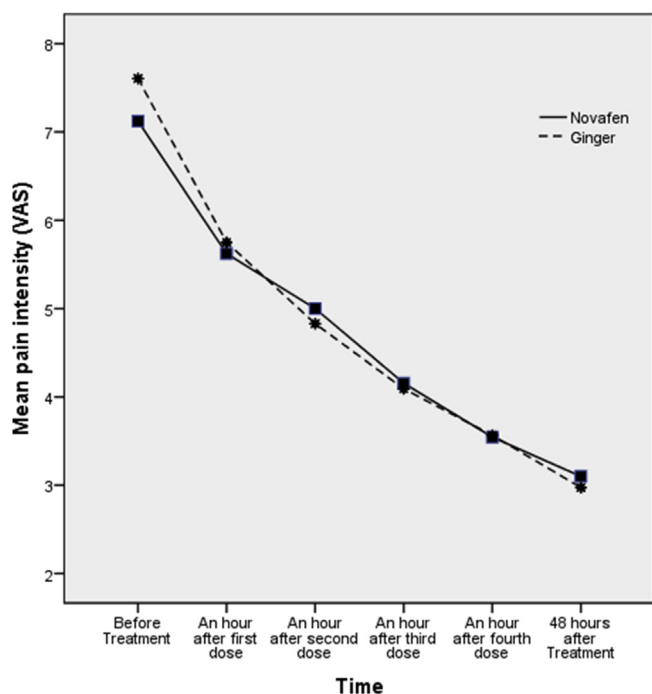
## Discussion

According to the results of our study, Ginger was as effective as Novafen in relieving primary dysmenorrhea. In a study in Iran, it was found that Ginger was as good as mefenamic acid and ibuprofen in reduction of dysmenorrhea [24]. In another study, dysmenorrhea reduction was excellent in the Ginger and Zinc sulfate groups ( $p < 0.001$ ) [25]. In the study of Jenabi, reducing pain

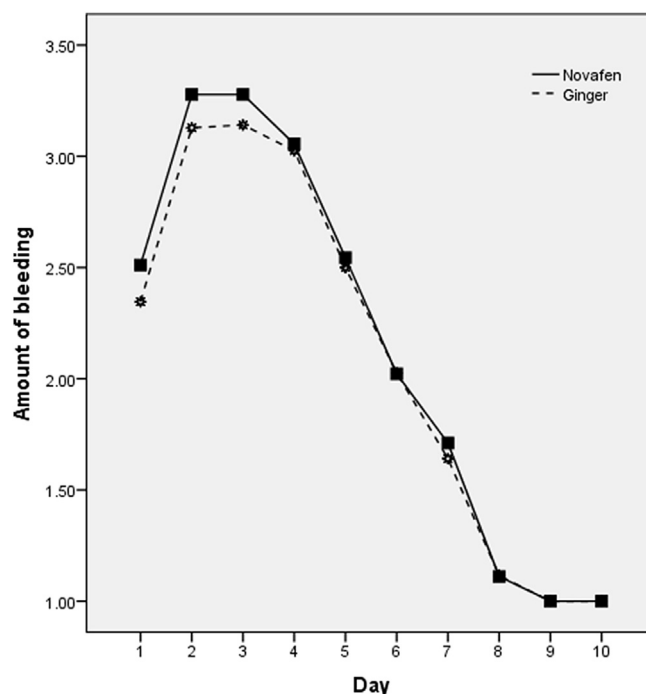
with the visual analog scale in the Ginger group was higher than the placebo group [26]. Furthermore, Rahnama et al. found that there was significant difference in the severity of dysmenorrhea between Ginger and placebo groups [20]. In another study, results showed that Ginger is as efficient as Mefenamic acid on pain relief in primary dysmenorrhea [27]. Halder's study revealed that Ginger has resulted to better progressive muscle relaxation [28]. In the above studies, Ginger has been effective in reducing dysmenorrhea.

Our study is valuable, because Novafen is a strong analgesic and Ginger as well as Novafen reduced primary dysmenorrhea. Ginger inhibits cyclooxygenase and lipoxygenase passages in PGs synthesis [29], thus supports from the PGs synthesis blockage [30,31]. Some studies prefer other herbal complements [32]. Also, Gray and Rutledge have found that herbal supplements are safer than synthetic drugs [33].

In the present study, bleeding in two groups showed no significant difference. Besides, another study had shown that bleeding volume did not significantly differ between two groups [27]. Ozgoli et al.'s study revealed that one person in the Mefenamic acid group and one individual in Ginger group displayed hemorrhage reduction, plus another one in the Ibuprofen group stated increased



**Fig. 1.** The mean intensity of dysmenorrhea in the Ginger and Novafen groups before and after treatment for two consecutive cycles. † The data were assessed using repeated measures test.



**Fig. 2.** The mean amount of bleeding after treatment in the two groups. † The data were assessed using repeated measures test.

duration of menses [24]. In one study, Mefenamic acid has been more effective in hemorrhage reduction compared to chamomile [14]. Based on our study data, the mean total score of the systemic symptoms was related to dysmenorrhea, there was no significant differences in any of the two groups before and after intervention. Dysmenorrhea sometimes causes nausea and vomiting, thus Ginger reduces these problems. Moreover, Ginger has an effect on nausea and vomiting due to pregnancy and postoperative [34,35].

In another study, results showed that 82.85% students of the Ginger group stated a recovery in nausea symptoms compared with 47.05% in the placebo group [26]. Salmalian et al. showed significant differences in nausea, vomiting, diarrhea, and fatigue before and after intervention [13]. Furthermore, one study reported, 5.1% participants experienced heartburn, and another study showed no significant difference between the groups [20,25].

However, it must be mentioned that Ginger is a safe drug with minimal side effects [36]. In the present study, 51.9% in Novafen group versus 48.1% in Ginger group reported more satisfaction with treatment. Whereas is one study reported that many of the participants in thymus vulgaris group stated better recovery than the Ibuprofen group [13].

One of the strengths of our study is that effects Ginger and Novafen on the dysmenorrhea were first performed in Iran and in the worldwide. It is suggested that further research should conducted with larger sample size, in different populations and other antispasmodic medicines on dysmenorrhea. There are several limitations in the present study including the lack of studies on the various doses of Ginger, not to consider the difference in pain tolerance from one person to another. Primary dysmenorrhea is a usual problem of young women. The results declared that Ginger is as effective as Novafen for relieving primary dysmenorrhea. Non-steroidal drugs are considered as a usual treatment for dysmenorrhea which can have side effects. Therefore, we recommend using herbal medicines for dysmenorrhea.

## Conflict of interest

The authors declare no conflict of interest.

## Funding/support

This study was supported by a research grant from the Babol University of Medical Sciences (Grant Number: 9031111).

## Acknowledgments

The authors would like to thank Babol University of Medical Sciences for all their support, students for their participation in this study. The authors would like to thank Babol University of Medical Sciences for all their support, students for their participation in this study and to Dr. Evangeline "Vangie" Foronda (PhD) for the English editing.

## References

- [1] Sultan C, Gaspari L, Paris F. Adolescent dysmenorrhea. *Pediatric and adolescent gynecology*, vol. 22. Karger Publishers; 2012. p. 171–80.
- [2] Pitangui ACR, Gomes MRdA, Lima AS, Schwingel PA, Albuquerque APdS, de Araújo RC. Menstruation disturbances: prevalence, characteristics, and effects on the activities of daily living among adolescent girls from Brazil. *J Pediatr Adolesc Gynecol* 2013;26(3):148–52.
- [3] Molazem Z, Alhani F, Anooshe M, Vagharseyyedin SA. Epidemiology of dysmenorrhea with dietary habits and exercise. *Zahedan J Res Med Sci* 2011; 13(3):41–5.
- [4] Omidvar Sh, Salmalian H, Begum Kh. The relationship between dysmenorrhea and menstrual attitudes among adolescent and young females in Urban area, south India. *World J Med Sci* 2015;12(1):56–61.
- [5] Al-Kindi R, Al-Bulushi A. Prevalence and impact of dysmenorrhoea among Omani high school students. *Sultan Qaboos Univ Med J* 2011;11(4):485.
- [6] Grandi G, Ferrari S, Xholli A, Cannoletta M, Palma F, Romani C, et al. Prevalence of menstrual pain in young women: what is dysmenorrhea. *J Pain Res* 2012; 5(1):169–74.
- [7] Ortiz MI, Rangel-Flores E, Carrillo-Alarcón LC, Veras-Godoy HA. Prevalence and impact of primary dysmenorrhea among Mexican high school students. *Int J Gynecol Obstet* 2009;107(3):240–3.
- [8] Latthe P, Mignini L, Gray R, Hills R, Khan K. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;332(7544):749–55.
- [9] Faramarzi M, Salmalian H. Association of psychologic and nonpsychologic factors with primary dysmenorrhea. *Iran Red Crescent Med J* 2014;16(8).
- [10] Harada T. Dysmenorrhea and endometriosis in young women. *Yonago Acta Med* 2013;56(4):81–4.
- [11] Daniels SE, Torri S, Desjardins PJ. Valdecobix for treatment of primary dysmenorrhea. *J Gen Intern Med* 2005;20(1):62–7.
- [12] Ogunfowokan AA, Babatunde OA. Management of primary dysmenorrhea by school adolescents in ILE-IFE, Nigeria. *J Sch Nurs* 2010;26(2):131–6.
- [13] Salmalian H, Saghebi R, Moghadamnia AA, Bijani A, Faramarzi M, Amiri F Nasiri, et al. Comparative effect of thymus vulgaris and ibuprofen on primary dysmenorrhea: a triple-blind clinical study. *Caspian J Int Med* 2014; 5(2):82.
- [14] Modarres M, Mirmohammad AM, Oshrieh Z, Mehran A. Comparison of the effect of mefenamic acid and matricaria camomilla capsules on primary dysmenorrhea. 2011.
- [15] Kizhakkayil J, Sasikumar B. Diversity, characterization and utilization of ginger: a review. *Plant Genet Res* 2011;9(03):464–77.
- [16] Lee SH, Cekanova M, Baek SJ. Multiple mechanisms are involved in 6-gingerol-induced cell growth arrest and apoptosis in human colorectal cancer cells. *Mol Carcinog* 2008;47(3):197–208.
- [17] Pongrojapaw D, Somprasit C, Chanthasenanon A. A randomized comparison of ginger and dimenhydrinate in the treatment of nausea and vomiting in pregnancy. *J Med Assoc Thailand Chotmaihet thangphaet* 2007;90(9):1703–9.
- [18] Ryan JL, Heckler CE, Roscoe JA, Dakhil SR, Kirshner J, Flynn PJ, et al. Ginger (Zingiber officinale) reduces acute chemotherapy-induced nausea: a URCC CCOP study of 576 patients. *Support Care Cancer* 2012;20(7):1479–89.
- [19] van Breemen RB, Tao Y, Li W. Cyclooxygenase-2 inhibitors in ginger (Zingiber officinale). *Fitoterapia* 2011;82(1):38–43.
- [20] Rahnama P, Montazeri A, Huseini HF, Kianbakht S, Naseri M. Effect of Zingiber officinale R. rhizomes (ginger) on pain relief in primary dysmenorrhea: a placebo randomized trial. *BMC Complement Altern Med* 2012;12(1):1.
- [21] Wong C, Lai K, Tse H. Effects of SP6 acupressure on pain and menstrual distress in young women with dysmenorrhea. *Compl Ther Clin Pract* 2010; 16(2):64–9.
- [22] Andersch B, Milsom I. An epidemiologic study of young women with dysmenorrhea. *Am J Obstet Gynecol* 1982;144(6):655–60.
- [23] Balbi C, Musone R, Mendiato A, Di Prisco L, Cassese E, D'Ajello M, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol* 2000;91(2):143–8.
- [24] Ozgoli G, Goli M, Moattar F. Comparison of effects of ginger, mefenamic acid, and ibuprofen on pain in women with primary dysmenorrhea. *J Alternative Compl Med* 2009;15(2):129–32.
- [25] Kashefi F, Khajehei M, Tabatabaiechehr M, Alavinia M, Asili J. Comparison of the effect of ginger and zinc sulfate on primary dysmenorrhea: a placebo-controlled randomized trial. *Pain Manag Nurs* 2014;15(4):826–33.
- [26] Jenabi E. The effect of ginger for relieving of primary dysmenorrhoea. *Age (year)* 2013;21(16):21.54–78.
- [27] Shirvani MA, Motahari-Tabari N, Alipour A. The effect of mefenamic acid and ginger on pain relief in primary dysmenorrhea: a randomized clinical trial. *Arch Gynecol Obstet* 2015;291(6):1277–81.
- [28] Halder A. Effect of progressive muscle relaxation versus intake of ginger powder on dysmenorrhoea amongst the nursing students in Pune. *Nurs J India* 2012;103(4):152–6.
- [29] Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger (Zingiber officinale Roscoe): a review of recent research. *Food Chem Toxicol* 2008;46(2):409–20.
- [30] Kim J-K, Kim Y, Na K-M, Surh Y-J, Kim T-Y. [6]-Gingerol prevents UVB-induced ROS production and COX-2 expression in vitro and in vivo. *Free Radic Res* 2007;41(5):603–14.
- [31] Parker M, Sneddon A, Arbon P. The menstrual disorder of teenagers (MDOT) study: determining typical menstrual patterns and menstrual disturbance in a large population-based study of Australian teenagers. *BJOG An Int J Obstet Gynaecol* 2010;117(2):185–92.
- [32] Wong LP, Khoo EM. Dysmenorrhea in a multiethnic population of adolescent Asian girls. *Int J Gynecol Obstet* 2010;108(2):139–42.
- [33] Gray DC, Rutledge CM. Herbal supplements in primary care: patient perceptions, motivations, and effects on use. *Holist Nurs Pract* 2013;27(1):6–12.
- [34] Zahra B, Mehrdad K, Atena S-R. The effect of ginger biscuit on nausea and vomiting in early pregnancy. *Acta Med Iran* 2009;47(1):51–6.
- [35] Haji Seid Javadi E, Salehi F, Mashrafi O. Comparing the effectiveness of vitamin b6 and ginger in treatment of pregnancy-induced nausea and vomiting. *Obstet Gynecol Int* 2013;2013.
- [36] Drozdov VN, Kim VA, Tkachenko EV, Varvanina GG. Influence of a specific ginger combination on gastropathy conditions in patients with osteoarthritis of the knee or hip. *J Alternative Compl Med* 2012;18(6):583–8.