ORGINAL ARTICLE

The Ginger Supplementation Effects on Aerobic Capacity and Dysmenorrhea in Overweight Girls

Halima Vahdatpoor[1], Said Shakerian[2*], Ali Akbar Alizadeh[2], Seyed Reza FatemiTabatabaei[3]

1. MSc, Faculty of Physical Education Shahid Chamran University of Ahvaz, Ahvaz, Iran.
2. Assistant Professor, Department of Exercise Physiology, Shahid Chamran University of Ahvaz, Ahvaz, Iran.
3. Associate Professor, Department of Veterinary Physiology Shahid Chamran University of Ahvaz, Ahvaz, Iran.

***Correspondence:**
Said Shakerian, Assistant Professor, Department of Exercise Physiology, Shahid Chamran University of Ahvaz, Ahvaz, Iran.
Tel: (98) 916 314 3363
Email: sashakeryan@gmail.com

Received: 21 May 2019

Accepted: 10 September 2019

Published in November 2019

Abstract

Objective: Dysmenorrhea is common and disturbs the quality of life of women. Therefore, the aim of this study was to evaluate the effect of ginger supplement on aerobic capaciy and dysmenorrhea in overweight girls.

Materials and Methods: In this semi-experimental study, 52 overweight female students of Shahid Chamran university of Ahwaz were randomly divided into two groups. The supplement group consumed 2 grams of ginger powder daily for two weeks before meals. The aerobic capaciy included two sessions of exhausting activity. The symptoms of dysmenorrhea were measured through a questionnaire, in two consecutive menstrual cycles (once before and one after the supplementation).

Results: The results showed that after two weeks of ginger supplementation there was no significant difference in the aerobic capaciy of two supplement and placebo groups (*P*-value≥ 0.05). A comparison between groups showed that two weeks of ginger supplementation had a significant reduction in the physical and psychological symptoms of dysmenorrhea in the supplement group compared to placebo (*P*-value: 0.001).

Conclusion: According to the results, consumption of ginger supplement for 14 days did not affect aerobic capacity improvement, but it reduced the pain and symptoms of menstruation.

Keywords: Ginger, Aerobic capacity, Dysmenorrhea, Overweight

Introduction

Primary dysmenorrhea is the painful menstruation without pelvic pathology; this pain is one of the most common disorders in women (1). The prevalence of dysmenorrhea is different, due to the failure to apply the same diagnostic criteria, and according to the World Health Organization (WHO), its incidence is 1.7 to 97 %. In Iran, the prevalence of primary dysmenorrhea is 72% (3,2). Dysmenorrhea means pain along with menstruation, which usually has a cramping nature and is concentrated in the lower abdomen (4). Dysmenorrhea causes many problems in individual and social life affect the quality of life of women. Dysmenorrhea influences the job and education efficiency. Severe dysmenorrhea

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[DOI: 10.18502/ijdo.v11i2.2654]

almost results in a loss of 600 million hours of annual work-hour (5).

Several factors are associated with primary dysmenorrhea, including family history, age, body mass index and high caffeine intake (5). For reducing dysmenorrhea, moderate physical activity, massage, use of biofeedback techniques, relaxation, thermotherapy, diet and Nonsteroidal anti-inflammatory drugs are recommended. Prostaglandin synthesis inhibitors are generally effective in 80% of cases (6). In addition, use of herbs along with chemical drugs can be helpful in the treatment of dysmenorrhea (3).Any kind of exercise and at any rate reduce the symptoms of dysmenorrhea because exercise improves pelvic blood flow (7). Ginger is one of the medicinal herbs used in the treatment of nausea in pregnancy and chemotherapy, reducing joint pain and treating inflammatory diseases, such as rheumatoid arthritis, osteoarthritis, and pain relief from dysmenorrhea (8). Ginger has anti-inflammatory effects that can inhibit the production of prostaglandins and leukotrienes (9). Physical inactivity related with obesity, diabetes mellitus, increased dysmenorrhea and some cancers. Despite the effect of continuous and intermittent exercises on weight loss, it seems that physical activity in obese people is not easy due to their low pleasure and low exercise potential. Therefore, the continuation of therapeutic interventions and the follow up of these individuals by the therapist in the long-term in maintaining lost weight and preventing overweight is great importance (10). Many athletes use chemical supplements to improve their performance and increase body efficiency during exercise. While these substances may be harmful to the body, they may also be banned supplements in exercise (11,12). The exercise and supplementation by preventing platelet aggregation and activating fibrinolysis factors increase blood fluidity, thereby increasing blood supply to the muscles and enhancing one's ability to exercise (13). Therefore, the purpose of this study is to determine the use of ginger supplements can improve aerobic capacity and reduce dysmenorrhea in overweight girls.

Materials and Methods

The study was semi-experimental on 52 female overweight students of Shahid Chamran university of Ahvaz with moderate to severe primary dysmenorrhea. The sampling method was convenient and simple randomization was done. The inclusion criteria was physical fitness, no use of any medication or nutritional supplement, no alcohol, tobacco and contraceptives use, no sports limitation, regular menstrual cycles, signs of primary dysmenorrhea (requiring medication) and being single. These students were close to menstrual cycles, menstrual periods before the age of 16, having menstrual cycles of 35-35 days, the start and duration of menstruation from a few hours before bleeding to the third day of the menstruation. The mean age of students was 25 years (range of 23-28 years old) and BMI of 28.42 (±0.33), after explaining the goals and protocol, written consent was received from all subjects. The subjects were randomly divided into two groups: supplement (n= 27) and placebo (n= 25). The MDQ questionnaire was completed by subjects, once in the first menstruation and then in the second menstrual period. In this questionnaire, the severity of symptoms classification was; 0= non-symptom, 1= mild symptoms, 2= moderate symptoms, 3= severe symptoms and 4= very severe symptoms. Afterwards, the subjects in the supplement group received 2 grams of ginger powder and placebo group received 2 grams of starch powder in two meals (1 g each), before lunch and dinner for two weeks (capsule). In addition, by choosing dormitory students and by providing a 24-hour record-keeping questionnaire, nutritional conditions of subjects were identical. Eccentric exercise activity was done using treadmill (h/ p/ cosmos model, built in Germany).

The stages of the test run

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[DOI: 10.18502/ijdo.v11i2.2654]

The test performed in two sessions (one session before supplements and one session after supplements) as an exhaust and negative slope on the treadmill. At first, the students learn the exercise. After 5 to 10 minutes of light stretching and warm-up, the subject asked to perform the test on the treadmill. The test consisted of 15 steps. It first started at a speed of 5.5 km/ h with a slope of zero, in the second minute, the steady speed and slope increased by 2%, every minute; one percent added to the slope until fatigue and exhaustion. The speed is constant until the end of the test. Data analysis carried out before and after the completion of the protocol. Exercise intensity controlled using Pollard pulse rate and Borg index.

Statistical analysis

To determine the mean and standard deviation (SD) of each variable descriptive statistics used and to determine the normal distribution of data Shapiro-Wilkes test done. In order to investigate intra-group changes paired T-test was used and for comparison between groups of covariance analysis. All calculations done with SPSS-23 and significant level was *P*-value ≤ 0.05.

Ethical considerations

This study was approved by Committee of Ethics in Research of Shahid Chamran University of Ahvaz, Ahvaz, Iran with number of IR.SSRI.REC.1396.133, then was registered in the Iranian Clinical Trial Registration Center with IRCT2017090217756N26 code.

Results

The mean and SD of the anthropometric and physiological indices are presented in Table (1). The results showed that there was no significant difference in the aerobic capaciy of two supplemental and placebo groups after two weeks of supplementation (*P*-value 0.13). According to Table 2, the mean aerobic capacity in the supplement group, although slightly increased, but these changes were no significant in comparison with the placebo group. Also, results of two weeks of ginger supplementation on primary dysmenorrhea showed a significant difference between the supplement and placebo groups before and after the use of ginger supplement in terms of decreasing the symptoms of dysmenorrhea (*P*-value: 0.001), the statistical results of dysmenorrhea stated in the table 3.

Table 1. Physical and Anthropometric Characteristics of the Subjects

Characteristics of the subjects	Groups		*P*-value
	Supplemental group	Placebo group	
Age (year)	26.18 (± 0.46)	26.34 (± 0.46)	0.87
Height (cm)	163.12 (± 1.3)	162.32 (± 1.12)	0.92
Weight (kg)	73.45 (± 2.16)	72.38 (± 2.33)	0.64
Body fat (%)	35.56 (± 0.68)	35.47 (± 0.86)	0.83
BMI(kg/m^2)	28.53 (± 0.43)	28.32 (± 0.62)	0.86
VO_{2MAX}(ml/Kg/min)	24.98 (± 1.14)	25.02 (± 1.23)	0.77

Table 2. Comparison of intra-group and inter-group variation of aerobic capaciy in two complement and placebo groups

Index	Groups	Duration of activity (stage before supplementation)	Duration of activity (stage after supplementation)	*P*-value (Inter- group)	*P*-value (between- groups)
Aerobic capacitance	Supplement	17.47 (± 1.61)	19.72 (± 1.42)	0.04	0.13
	placebo	18.77 (± 1.1)	18.85 (± 1.15)	0.6	

Table 3. Comparison of intra-group and inter-group changes in dysmenorrhea between two groups of supplement and placebo

Index	Group	First menstrual period (stage before supplementation)	Second menstrual period (stage after supplementation)	*P*-value (Inter group)	*P*-value (between groups)
Dysmenorrhea	Supplement	3.35 (± 0.22)	2.23 (± 0.28)	0.001*	0.001*
	Placebo	3.37 (± 0.24)	3.36 (± 0.26)	0.86	

The * symbol is significant.

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[DOI: 10.18502/ijdo.v11i2.2654]

Discussion

The results of the present study showed that ginger supplementation improved slightly aerobic capacity in the supplement group compared to pre-supplementation. This difference was not significant in comparison to the placebo group. Karimi et al. (2015) showed that 6 weeks of water activity plus ginger supplementation improved the aerobic capacity of obese women with cancer (14). In another study, the effect of 10 weeks of high intensity intermittent exercise with supplementation on aerobic capacity of overweight women showed that aerobic capacity increased significantly after 10 weeks in the exercise group with supplementation, which is inconsistent with the results of this study. Naebipour et al. (2016), performed 10 weeks of high intensity intermittent activity and 10 weeks of adaptive activity (15). The results of the present study were also inconsistent with the findings of Attai et al. (2010) who examined the effect of ginger extract on aerobic fitness of endurance athletes and observed that 4 weeks ginger supplementation significantly increased aerobic power in supplement group. The reasons for the inconsistency of the present study include the duration of supplementation and the type of test and the quality of ginger used (16). In this regard, Vishnapria and Roger Ahsavaram (2012) showed that aerobic activity reduces pain and has a beneficial effect on reducing the symptoms of dysmenorrhea. There was no decrease in the placebo group dysmenorrhea. The reasons for the inconsistency of this research are the duration of exercise, the type of exercise program and the intensity of exercise (17).

Taking two weeks of ginger supplementation significantly reduced the physical and psychological symptoms of dysmenorrhea in the supplement group compared to placebo. The results of this study showed that consumption of ginger significantly reduced the physical and psychological symptoms of primary dysmenorrhea. In a 2017 study, the effect of two months of ginger supplementation with exercise on ddysmenorrhea investigated. Results consistent with the present study showed that exercise and ginger supplementation reduced the symptoms and severity of dysmenorrhea (18). Various studies confirm the effect of stretching exercises and ginger supplementation on pain relief of ddysmenorrhea. The reason for the reduced duration of pain with exercise can be due to the faster transfer of prostaglandins. Also some of the mechanisms of pain reduction in dysmenorrhea that are common between ginger consumption and exercise are that exercise improves pelvic circulation, which prevents the accumulation of prostaglandins (19,20). Dawlatabadi et al. showed the comparison of the effects of ginger and hyacinth on the severity of primary dysmenorrhea. For two consecutive cycles, the ginger supplement group used a capsule containing 250 mg of ginger powder and the hyacinth group used a capsule containing 350 mg of rootstock and rhizome. The menstrual pain questionnaire was completed once in the first menstruation and then in the second menstrual period. The results showed that the use of ginger supplement and hyaluronic acid had a significant effect on menstruation pain relief (21). The study also showed that ginger is effective in reducing the pain of the primary dysmenorrhea as NSAIDs. The women with dysmenorrhea have higher concentrations of prostaglandins in their menstrual cycle. Anti-prostaglandin drugs such as ginger (herbal anti-inflammatory) improve dysmenorrhea (22,23). Rahnama et al., concluded that consuming 500 mgr. ginger, three times a day, has an acceptable effect on reducing the pain of the primary dysmenorrhea (24). Our findings consistent with past studies, but in all mentioned studies, symptoms of dysmenorrhea are generally cited. The physical and psychological symptoms of dysmenorrhea distinguished. Ginger not only reduces the physical symptoms of dysmenorrhea, but also affects the psychological factors. Ginger reduces edema caused by Karazhynyn

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(Carrageenin) through inhibition of cyclooxygenase enzyme activity decreases, and effect on the origin of pain, In this regard; Saadat Nezhad and colleagues compared the effect of ginger and exercise on primary dysmenorrhea. The results showed that the symptoms of dysmenorrhea in the ginger supplement group were significantly lower than other groups (25). In another study, which was done on 90 subjects with primary dysmenorrhea, the daily supplemental group received 5 capsules of fescue, each containing 46 mg of fennel extract, during the first three days of menstruation. The results showed that there was no significant decrease in the severity of pain and symptoms of dysmenorrhea. One of the signs of the heterogeneity of this research, with the present research, can be seen in the complementary form and the difference in the execution of the research (26).

Conclusions

This study showed that ginger was effective in reducing the physical and psychological symptoms of primary dysmenorrhea. However, because there was no significant effect on the improvement of aerobic capacity, we suggested that studies with a different dose of supplement, more sample sizes, different populations, longer duration of supplementation and physical activity should be done to check its accuracy. The limitations of the research were the lack of precise control of the psychological and motivational conditions of the subjects as well as the daily activities of the subjects.

Acknowledgments

This article based on the master's thesis approved by Shahid Chamran university of Ahvaz and approved by the ethics committee of this university.

Funding

This article is based on the master's thesis approved by Shahid Chamran University of Ahwaz.

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