

Effectiveness of Group Aerobic Training on Menstrual Cycle Symptoms in Primary Dysmenorrhea

Primer Dismenorede Grup Aerobik Eğitimin Menstrüel Siklus Semptomları Üzerine Etkinliği

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ABSTRACT

Objective: Primary dysmenorrhea is one of the most common gynecological problems among females but the evidence of alternative methods to cope with it is not enough. The aim of this study was to investigate the effectiveness of a four-week group aerobic training program on premenstrual symptoms, menstrual symptoms, emotional state, and quality of life in females with primary dysmenorrhea.

Methods: Participants were randomly assigned to aerobic exercise group (AEG) (n=18) and control group (CG) (n=19). AEG attended to group aerobic training program, three times a week for four weeks while CG did not participate in a regular physical activity. Premenstrual Syndrome scale, Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), and Short Form-36 (SF-36) were conducted to the participants. The intensity of menstrual symptoms was assessed with visual analogue scale at seven different times within the first three days of menstruation phase. Initial and final assessments were performed in two consecutive months.

Results: Premenstrual symptoms (p=0.012) and some of the menstrual symptoms including low back pain at the beginning of bleeding (p=0.012), and abdominal pain at the second hour decreased (p=0.021) in AEG. Additionally, social aspect domain of SF-36 significantly increased (p=0.044) after exercise while there were no significant differences in BAI, and BDI scores (p>0.05).

Conclusion: Four-week group aerobic training program is effective in reducing premenstrual symptoms contributes to reduce menstrual symptoms and improve quality of life in females with primary dysmenorrhea.

Keywords: Anxiety, depression, menstrual symptoms, pain, premenstrual symptoms, quality of life

ÖZ

Amaç: Primer dismenore, kadınlarda en sık görülen jinekolojik sorunlardan birisidir ancak alternatif başa çıkma yöntemleriyle ilgili kanıtlar yeterli değildir. Bu çalışmanın amacı primer dismenore olan kadınlarda dört haftalık aerobik eğitim programının premenstrüel semptomlar, menstrüel semptomlar, emosyonel durum ve yaşam kalitesi üzerine etkinliğini araştırmaktır.

Yöntemler: Katılımcılar randomize olarak aerobik egzersiz grubuna (AEG) (n=18) ve kontrol grubuna (KG) (n=19) ayrıldı. AEG, dört hafta boyunca haftada üç kez aerobik eğitim programına katılırken, KG düzenli bir fiziksel aktiviteye katılmadı. Katılımcılara Premenstrüel Sendrom ölçeği, Beck Anksiyete ölçeği (BAÖ), Beck Depresyon ölçeği (BDÖ) ve Kısa Form-36 (KF-36) uygulandı. Menstrüel semptomların yoğunluğu, vizüel analog skala ile menstrüel fazın ilk üç günü içerisinde yedi farklı zamanda değerlendirildi. İlk ve son değerlendirmeler iki ardışık ayda yapıldı.

Bulgular: Premenstrüel semptomlar (p=0,012) ile kanamanın başlangıcındaki bel ağrısını (p=0,012) ve ikinci saatteki karın ağrısını (p=0,021) içeren bazı menstrüel semptomlar AEG'de azaldı. Ek olarak, KF-36'nın sosyal fonksiyon alanı, egzersizden sonra anlamlı derecede artarken (p=0,044), BAÖ ve BDÖ puanlarında anlamlı bir farklılık bulunmadı (p>0,05).

Sonuç: Primer dismenoreli kadınlarda dört haftalık grup aerobik eğitim programı premenstrüel semptomları azaltmada etkilidir, menstrüel semptomları azaltmaya ve yaşam kalitesini geliştirmeye katkı sağlar.

Anahtar Kelimeler: Anksiyete, depresyon, menstrüel semptomlar, ağrı, premenstrüel semptomlar, yaşam kalitesi

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INTRODUCTION

Most of the young females are experiencing menstruation related symptoms, and these can lead to problems in their academic and social life (1,2). In consequence of painful menstruation is perceived as usual, and ordinary by exposed individuals it is difficult to determine the exact prevalence. But estimates range from 45% to 95% (3-5).

Menstrual pain is mostly perceived in the lower abdomen but can spread to the lower back, and/or upper legs. Researches, and clinical investigations have shown that pain is caused by uterine prostaglandins, and overproduced vasopressin (6-8). Other symptoms associated with menstruation include diarrhea, nausea, vomiting, poor concentration, back pain, fatigue, and even syncope (1). Premenstrual symptoms such as abdominal pain, headache, nausea, swelling, tenderness, and anxiety are also frequent in young females (7).

Although menstrual disorders are so frequent in young females most of them do not consult to a proficient, related to the belief of it will not help (9,10). Drugs alleviate pain or symptoms by affecting prostaglandin production in menstruation. Intra-uterine devices may also be used in the management (6). Gynecologists agree that the multidisciplinary approach should be preferred for the management of symptoms (3). Non-pharmacological treatments include herbal products, dietary supplements, nutritional changes, and physical training.

The idea that exercise is effective in preventing, and reducing symptoms has been dominant for many years (1). It is thought that the symptoms may be reduced during exercise as a result of increased metabolism, and blood flow to the uterus. Therapeutic exercise has also been reported to increase endorphin release in the brain, and increase the body's pain threshold (1,8,9). Several observational and fewer experimental studies have reported that physical activity or exercise is associated with a reduction in menstrual symptoms (4,7,9,11-15). But according to the reviewers, the researches in this field are insufficient particularly in assessment processes and methodology (1,8).

This study was planned extensively in the direction of the deficiencies in the literature and the recommendations of the researchers. Our aim was to investigate the effectiveness of a four-week group aerobic training program on premenstrual symptoms, menstrual symptoms, emotional state, and quality of life in females with primary dysmenorrhea.

METHOD

Study Design and Participants

The current research was performed as a prospective, randomized controlled experimental study. This study was carried out with the students staying in Bülent Ecevit University Dormitories which is located in the Black Sea Region of Turkey and the data were collected between September and December 2017. All the subjects volunteered to participate in this research, and signed the informed consent form approved by the Bülent Ecevit University Clinical Research Ethics Committee (Protocol no: 2017-73-09/08).

Females with self-reported dysmenorrhea in the age group of 18-25 participated in this study. Having regular menstrual cycles (21-35 days), and menstrual pain scoring at least 4 on a 10 cm visual analogue scale (VAS) for previous two consecutive months were inclusion criteria. Pregnancy, known genital and chronic diseases, having intra-uterine contraceptive devices and taking oral contraceptive pills during the study were exclusion criteria. Additionally participants in the control group (CG) who participate any regular physical activity during the study and the participants in aerobic exercise group (AEG) who fail to attend at least 10 of 12 sessions would be excluded from the study.

Forty-five eligible participants were randomly assigned to either AEG, (n=23), or CG (n=22) using the paired numbers for AEG and non-paired numbers for CG. Five participants of AEG and three participants of CG have been excluded from the analyses owing to drug use and low attendance to the training sessions. The final sample size was 37, as the sum of 18 participants from AEG, and 19 participants from CG (Figure 1).

Outcome Measurements

Demographic features of the participants, including age (year), weight (kg), height (m) and menstrual history including menarcheal age (year), menstrual interval (day), menstrual duration (day) were recorded at the baseline. Dependent variables including premenstrual symptoms, menstrual symptoms, emotional state and quality of life were conducted in two consecutive menstrual phases by the observers who were masked to group assignment.

Premenstrual Symptoms: Premenstrual Symptoms were assessed with the premenstrual syndrome scale (PMSS)

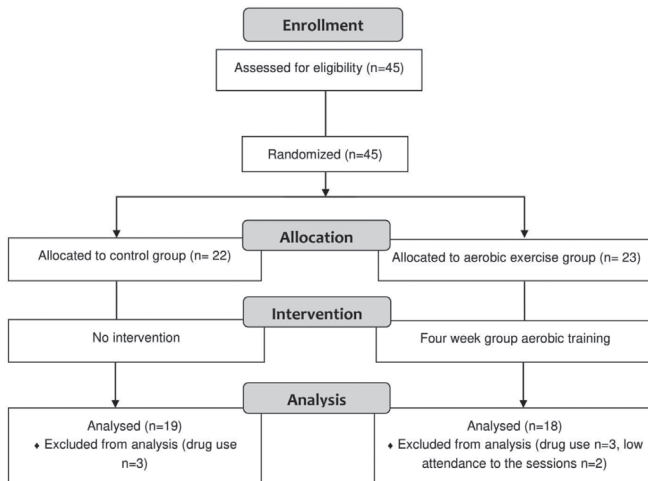


Figure 1: Flow chart

which is a 44-item five-point likert-type scale (16). Scale includes nine dimensions of depressive affect, depressive thoughts, nervousness, sleep changes, anxiety, fatigue, pain, appetite changes, and bloating and total score is the sum of the scores of these nine sub-dimensions. The higher score indicates the greater prevalence of premenstrual syndrome symptoms.

Menstrual Symptoms: An evaluation form was designed to assess the intensity of menstrual symptoms (Appendix). In this form, the intensity of pain, headache, nausea, dizziness, and fatigue parameters were respectively assessed with 10-cm VAS. Upon described of VAS to the participants, seven forms were given to each participant and they were requested to mark the scales at the onset of the bleeding and in the 2nd, 6th, 12th, 24th, 48th, and 72nd hours following the bleeding.

Emotional State: Beck anxiety inventory (BAI) was used to evaluate the anxiety symptoms which is a 21-item self-report questionnaire (17). For the assessment of depressive symptoms, Beck depression inventory (BDI) was used (18). This index is also composed of 21 questions similar to BAI. The higher score indicates a more severe anxiety, and depression according to these scales.

Quality of Life: Short form-36 (SF-36) which is a multidimensional test was used to assess the quality of life of the participants (19). SF-36 is comprised of functional capacity, physical aspects, bodily pain, general health, vitality, social aspect, emotional aspect, and mental health domains and a higher score indicates a better quality of life.

Intervention

Participants in the AEG participated in a four-week group aerobic training program, three times a week during four weeks under the supervision of an experienced physical therapist. The duration of each session was approximately 50 minutes which is comprised five minutes of warming up, 40 minutes of aerobic fitness exercising, and five minutes of cooling down. The trainer demonstrated each exercise using verbal, and visual instructions. All the exercises were performed coordinated in the group.

Statistical Analysis

Statistical analysis was performed with SPSS for Windows release 19.0.0/2010 (IBM-SPSS Inc., Chicago, IL). Level of 5 % was used to determine significant differences. Normality tests (visual, and analytical) revealed that continuous variables were not normally distributed. Demographic data, and baseline outcomes of two groups were compared using Mann-Whitney U test. Intra-group analysis of the dependent variables were conducted using Wilcoxon signed-rank test.

RESULTS

The results of this study showed that there were no significant differences between the AEG, and CG in terms of demographic features including age (years), height (cm), weight (kg), and BMI (kg/m²) ($p>0.05$). Groups were also homogeneous based on menarcheal age (year), menstrual interval (day), menstrual duration (day), and the scores of the PMSS, BAI, BDI, SF-36 ($p>0.05$) (Table 1).

PMSS score significantly decreased in the AEG ($p=0.012$) while such outcomes did not change in CG in the second menstrual phase ($p>0.05$) (Table 2).

There were no significant differences between initial and final outcomes in the both of the groups in terms of anxiety and depression scores ($p>0.05$) (Table 2).

Solely, social aspect domain significantly increased in the second menstrual phase in AEG ($p=0.044$) while none of the domains of quality of life changed in CG between two consecutive menstrual phases ($p>0.05$) (Table 2).

According to menstrual symptom outcomes, low back pain at the beginning of the bleeding ($p=0.012$), and abdominal pain at the 2nd hour decreased ($p=0.021$) in AEG after intervention (Table 3). Abdominal pain at the beginning of bleeding ($p=0.032$), and intensity of nausea at the 12th

hour decreased ($p=0.026$) in CG in the second menstrual phase (Table 4). Remaining of menstrual symptoms did not change in the both of the groups ($p>0.05$).

Table 1: Demographic features and initial outcomes of the participants

	AEG (n=18) $\bar{X} \pm SD$	CG (n=19) $\bar{X} \pm SD$	p $\bar{X} \pm SD$
Age (year)	21.10±1.59	21.20±1.47	0.983
Height (m)	1.62±0.05	1.64±0.05	0.475
Weight (kg)	58.70±6.37	56.60±7.96	0.307
BMI (kg/m ²)	22.17±2.18	20.92±3.01	0.120
Menarcheal age (year)	13.40±0.51	13.90±1.29	0.155
Menstrual interval (day)	29.60±0.84	30.35±8.31	0.286
Menstrual duration (day)	6.10±0.87	6.25±1.99	0.914
PMSS	65.60±19.97	62.25±21.27	0.746
BAI	19.00±8.13	13.50±7.79	0.074
BDI	8.80±4.91	12.65±8.70	0.422
SF36-Functional capacity	83.10±16.35	80.00±17.42	0.588
SF36- Physical aspects	58.10±29.56	77.35±29.92	0.061
SF36- Bodily pain	63.60±24.60	70.05±22.56	0.588
SF36- General health	55.70±10.87	55.65±7.86	0.846
SF36- Vitality	51.50±13.66	58.30±11.56	0.169
SF36- Social aspect	65.40±20.45	64.70±21.81	0.812
SF36- Emotional aspect	63.10±31.86	68.25±25.18	0.779
SF36- Mental health	62.60±11.73	58.75±15.98	0.422

BAI: Beck anxiety inventory, BDI: Beck depression inventory, BMI: Body mass index, PMSS: Premenstrual syndrome scale, SF36: Short form health survey, SD: Standart deviation, AEG: Aerobic exercise group, CG: Control group

DISCUSSION

This study revealed that a four-week group aerobic training program is effective at reducing premenstrual symptoms, slightly decreasing menstrual pain, and contributed quality of life of in terms of social aspect of young females with primary dysmenorrhea. However, this training program did not alter the severity of anxiety and depression. Some of the results of this research are consistent with previous reports while some of them contradict.

Although the averages of menarcheal age, menstrual interval, and menstrual duration concerning the participants were regarded within the normal range for premenopausal women, this could not prevent them from experiencing premenstrual and/or menstrual symptoms.

Premenstrual symptoms are known as the common complaints that begin a few days prior to bleeding (10). The results of the previous studies investigating the relationship between physical activity, and premenstrual symptoms are conflicting (20-27). A cross-sectional descriptive analytical study showed that there was no significant relationship between the frequency of premenstrual syndrome (PMS), and physical activity (21). On the contrary, in another study the occurrence of PMS was observed less in the physically active group than of the sedentary group (22). In the current study premenstrual symptoms of the participants diminished after a four-week group aerobic training program. Our findings related to premenstrual symptoms are similar to the results of some previous

Table 2: Intra-group analysis of premenstrual symptoms, anxiety, depression and quality of life scores of the participants

	AEG (n=18)		p	CG (n=19)		p
	Baseline $\pm SD$	Endpoint $\pm SD$		Baseline $\pm SD$	Endpoint $\pm SD$	
PMSS	65.60±19.97	49.90±16.54	0.012*	62.25±21.27	59.25±17.97	0.550
BAI	19.00±8.13	16.30±7.25	0.080	13.50±7.79	13.70±7.71	0.622
BDI	8.80±4.91	7.90±5.10	0.246	12.65±8.70	11.00±6.83	0.431
SF36- Functional capacity	83.10±16.35	83.30±15.90	0.733	80.00±17.42	84.50±13.16	0.593
SF36- Physical aspects	58.10±29.56	63.30±31.83	0.892	77.35±29.92	76.25±26.25	0.892
SF36- Bodily pain	63.60±24.60	68.30±16.82	0.833	70.05±22.56	99.15±13.70	0.977
SF36- General health	55.70±10.87	60.00±10.37	0.396	55.65±7.86	58.15±10.87	0.180
SF36- Vitality	51.50±13.66	61.40±10.46	0.093	58.30±11.56	54.50±13.36	0.283
SF36- Social Aspect	65.40±20.45	70.50±19.31	0.044*	64.70±21.81	65.07±23.10	0.959
SF36- Emotional aspect	63.10±31.86	52.20±40.46	0.091	68.25±25.18	68.26±25.82	0.611
SF36-Mental Health	62.60±11.73	65.60±13.25	0.396	58.75±15.98	59.40±13.65	0.132

* $p<0.05$, BAI: Beck anxiety inventory, BDI: Beck depression inventory; PMSS: Premenstrual syndrome scale; SF36: Short form health survey, SD: Standart deviation, AEG: Aerobic exercise group, CG: Control group

researches that are conducted with aerobic exercise programs (23-25). However different exercising methods, and training durations were conducted in such studies as distinct from our study. Mechanisms of contributing to reduce premenstrual symptoms had been associated with endorphins in the previous reports (9,28,29). Aerobic activity may produce perception of wellness, decrease stress, and diminish premenstrual symptoms by the way of releasing brain chemicals such as endorphins. When a large amount of endorphin is secreted from the brain, it brings happiness, and relief to the individual.

Premenstrual symptoms with the onset of bleeding leave its place to menstrual symptoms. Pain is the most common menstrual symptom, and is perceived especially in the pelvic region, low back, and thighs. During painful menstruation, uterine contraction is constricted by an excessive increase in prostaglandin, which causes vasospasm of uterine arterioles. It may cause ischemia, and cramps in the abdominal area which evoke menstrual pain (30). Several studies have been carried out to investigate the effectiveness of different exercise methods in menstrual pain, and it has been reported that exercise can reduce pain by increasing lung capacity, metabolism, blood flow to uterine, and endorphin hormone release (30). Indeed, although it seems plausible to encourage exercise as a treatment for menstrual pain, researches in this field have not been able to demonstrate sufficient evidence (31). Methodological quality of these studies is weak, and the data obtained from them are not considered as evidence. One lack is that there is no explanation in such trials about the current time of pain assessment or anatomical localization of the pain. It is known that menstrual pain may begin at the beginning of the bleeding, and lasts for three days with increasing or decreasing intensity. Thus, it is not a realistic approach to assess the pain objectively by a single evaluation for the whole menstrual period. Furthermore, it has not been reported in previous studies that this single assessment was conducted either immediately the participants perceived the pain or long after. We planned our study considering this limitation in the literature, and evaluated pain at seven different times for three different anatomical region during the menstrual period. After four weeks of aerobic exercise training low back pain at the beginning of bleeding, and abdominal pain at the 2nd hour decreased in AEG while abdominal pain at the beginning of bleeding, and intensity of nausea at the 12th hour decreased in CG. It is possible to interpret

Table 3: Intra-group analysis of menstrual symptoms of aerobic exercise group

	VAS at beginning (n=18)			VAS after 2 hours (n=18)			VAS after 6 hours (n=18)			VAS after 12 hours (n=18)			VAS after 24 hours (n=18)			VAS after 48 hours (n=18)			VAS after 72 hours (n=18)		
	B	E	P	B	E	P	B	E	P	B	E	P	B	E	P	B	E	P	B	E	P
Abdominal pain (cm)	5.90±3.06	5.20±2.56	0.160	6.00±2.80	4.70±3.06	0.021*	5.10±2.54	4.15±2.51	0.073	4.85±2.63	4.50±2.60	0.445	4.65±2.59	4.48±2.48	0.623	3.59±2.63	2.85±1.91	0.360	2.80±2.05	2.22±2.46	0.173
Low back pain (cm)	6.10±2.81	4.73±2.36	0.012*	5.80±2.55	5.10±2.56	0.172	5.25±2.54	4.70±1.78	0.344	4.65±2.87	4.25±2.51	0.462	4.30±2.66	4.28±2.57	0.933	3.85±2.50	2.95±2.21	0.400	2.70±2.32	1.93±2.13	0.107
Thigh pain (cm)	5.15±3.39	4.35±2.79	0.120	4.15±3.00	4.45±2.65	0.684	4.40±2.76	3.30±2.17	0.173	4.40±3.38	3.05±2.06	0.270	4.15±3.30	2.60±1.82	0.150	3.70±2.88	2.54±2.71	0.233	2.35±2.31	2.02±3.07	0.553
Headache (cm)	5.90±3.23	4.39±3.06	0.888	3.45±3.17	3.15±2.42	0.611	3.85±3.46	2.50±2.56	0.065	2.70±3.56	2.35±3.03	0.752	1.90±2.27	2.00±2.22	0.753	2.00±2.44	1.24±1.78	0.233	1.45±1.77	1.32±1.68	0.916
Nausea (cm)	5.90±3.01	3.09±2.59	0.833	2.70±2.75	1.70±2.01	0.398	2.70±2.87	2.53±2.22	0.917	2.25±3.01	2.90±3.41	0.345	1.75±2.26	1.62±2.46	0.527	1.80±2.39	1.02±1.87	0.458	1.15±1.24	1.20±1.47	0.914
Dizziness (cm)	5.90±5.90	1.40±1.32	0.673	1.80±1.98	1.75±1.58	0.916	1.40±1.88	1.04±1.02	0.680	1.40±2.44	1.40±1.64	0.750	1.70±1.76	1.30±1.56	0.465	1.65±2.13	0.72±1.04	0.168	1.00±1.02	0.42±0.50	0.088
Fatigue (cm)	5.05±2.10	4.75±2.18	0.332	5.50±2.26	4.60±2.01	0.093	5.00±1.95	4.20±1.88	0.173	4.15±2.32	3.75±2.61	0.672	3.50±2.51	3.40±2.30	0.462	3.45±2.83	2.70±2.00	0.309	2.95±2.85	2.44±2.55	0.102

B: Baseline outcome, E: Endpoint outcome, VAS: Visual analog scale, *p<0.05, SD: Standard deviation

Table 4: Intra-group analysis of menstrual symptoms of control group

	VAS at beginning (n=19)			VAS after 2 hours (n=19)			VAS after 6 hours (n=19)			VAS after 12 hours (n=19)			VAS after 24 hours (n=19)			VAS after 48 hours (n=19)			VAS after 72 hours (n=19)		
	B	E	P	B	E	P	B	E	P	B	E	P	B	E	P	B	E	P	B	E	P
Abdominal pain (cm)	5.73±2.57	5.26±2.37	0.032*	4.75±2.69	4.72±2.60	0.791	5.10±2.53	4.75±2.44	0.172	4.42±2.73	4.02±2.97	0.194	3.70±2.75	4.07±3.01	0.168	2.67±2.60	2.22±2.17	0.153	2.01±2.31	1.51±1.63	0.362
Low back pain (cm)	4.77±3.18	4.70±3.19	0.884	4.05±2.98	3.97±2.69	0.667	4.57±3.08	4.38±3.00	0.301	3.92±2.88	3.77±2.91	0.549	3.65±2.65	3.92±2.86	0.365	2.78±2.52	2.58±2.18	0.573	2.15±2.35	1.35±1.64	0.190
Thigh pain (cm)	3.92±2.99	3.97±2.95	0.714	3.22±2.55	2.80±2.39	0.091	3.09±2.80	3.11±2.30	0.782	3.15±2.62	2.75±2.31	0.053	2.90±2.51	3.10±2.66	0.714	2.33±2.19	2.13±1.97	0.608	1.91±1.92	1.36±1.20	0.174
Headache (cm)	3.62±2.90	3.65±2.71	0.535	3.56±3.08	3.39±2.94	0.888	2.54±2.38	2.97±2.39	0.254	2.45±2.18	2.65±2.05	0.375	2.27±2.26	2.47±2.36	0.449	2.21±2.35	2.09±2.19	0.905	2.09±2.07	1.45±1.77	0.261
Nausea (cm)	2.60±2.53	2.57±2.51	0.891	2.30±2.53	1.90±1.98	0.210	2.62±2.45	2.27±2.07	0.572	2.45±2.49	1.80±1.97	0.026*	1.82±2.34	1.67±2.13	0.667	1.57±1.98	1.22±1.77	0.098	1.35±1.82	0.75±1.09	0.173
Dizziness (cm)	2.13±2.56	1.75±2.33	0.171	1.97±2.41	1.87±1.99	0.673	2.20±2.14	1.57±1.93	0.113	2.35±2.39	1.97±1.99	0.500	1.60±2.11	1.45±1.97	0.670	1.87±2.39	1.07±1.61	0.084	1.10±1.51	0.72±1.16	0.293
Fatigue (cm)	4.31±3.03	4.22±2.58	0.722	3.14±2.11	3.47±2.09	0.208	4.06±2.45	3.97±2.38	0.758	3.65±2.25	3.40±1.92	0.461	4.10±2.94	3.82±2.93	0.590	2.72±2.23	2.60±1.94	0.918	2.24±1.85	1.91±1.41	0.384

*p<0.05, B: Baseline outcome, E: Endpoint outcome, VAS: Visual analog scale, SD: Standard deviation

this result as exercising provides positive effects on pain solely at the initial of the menstruation phase. But also the presence of diminished symptoms in the CG makes it difficult to interpret the results objectively. At this point, our opinion is that other factors that we cannot control such as seasonal changes or personal reasons might affect the result. It is not possible to mention on consistency of our results with the previous studies yet the authors did not report sufficient information about the localization or the current time of pain assessment in those reports (9,28,29).

The intensity of premenstrual, and menstrual symptoms may also lead to stress, and mood disturbances in women (30). Yet there is not enough evidence that aerobic exercise is effective in decreasing depression, and anxiety in healthy populations, or patients with psychiatric disorders, some of the previous studies showed that exercise improves general mood, reduces depression, and anxiety levels in women with dysmenorrhea (24,31). However our study exhibited nonsignificant trends of improvement in anxiety, and depression in the participants.

Painful menstrual cramps cause reduction in quality of life during menstruation and future studies should investigate whether quality of life is restored with effective treatment (32,33). The positive effects of exercise training in quality of life in women with dysmenorrhea, and PMS were previously reported (6). In the consistency with literature, social aspect domain of SF-36 significantly increased after intervention in the current study. Although it could not be possible to completely improve the quality of life of our participants in a relatively short time, the outcomes of intervention group showed a rising trend. We think that performing exercises in the form of group training might be effective in order to ensure a faster improvement in the social aspect domain of quality of life. According to our findings, aerobic exercising can be encouraged to achieve a better quality of life in women during menstruation cycle.

There are several studies investigating the possible benefits of physical activity on menstrual complaints, but such studies vary in terms of human population, exercise protocol, training duration, intensity of exercise, and outcome measurements. The reason of that the results of the current study are in contrast with some of the previous studies may be due to that our assessment method is obviously more detailed, and objective compared to such studies.

Study Limitations

The marked limitation of our study was sample size. Dropped out number was more than expected due to drug using in consequence of unbearable menstrual pain, and low attendance to the training sessions.

CONCLUSION

In conclusion, a four week group aerobic training program was effective in reducing premenstrual symptoms, contributed to the pain reduction, and improved quality of life in women with primary dysmenorrhea. However, this training program could not alter depression, anxiety, or menstrual symptoms except pain. We think that the current study is valuable in terms of providing a new approach related to using of more detailed, and objective assessment methods.

Ethic

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Bülent Ecevit University (Protocol no: 2017-73-09/08).

Informed consent: Informed consent was obtained from all individual participants included in the study.

Peer-review: Externally peer-reviewed.

Author Contributions

Concept: E.U.E., Design: E.A., Data Collection or Processing: E.U.E., Analysis or Interpretation: E.U.E., Literature Search: E.U.E., E.A., Writing: E.U.E

Conflict of Interest: The authors declare that they have no conflicts of interest.

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REFERENCES

- Daley AJ. Exercise and primary dysmenorrhoea : a comprehensive and critical review of the literature. *Sports Med* 2008;38:659-70.
- Osayande AS, Mehulic S. Diagnosis and initial management of dysmenorrhea. *Am Fam Physician* 2014;89:341-6.
- Berkley KJ, McAllister SL. Don't dismiss dysmenorrhea. *Pain* 2011;152:1940-1.
- de Oliveira Nunes JM, do Amaral Rodrigues J, de Freitas Moura MS, Batista SRC, Coutinho SKSF, Hazime FA, et al. Prevalence of dysmenorrhea in university students and its relation to school absenteeism, physical exercise and use of medicines. *Revista Brasileira em Promoção da Saúde* 2013;26:381.
- Sharma P, Malhotra C, Taneja DK, Saha R. Problems related to menstruation amongst adolescent girls. *Indian J Pediatr* 2008;75:125-9.
- Onur O, Gumus I, Derbent A, Kaygusuz I, Simavli S, Urun E, et al. Impact of home-based exercise on quality of life of women with primary dysmenorrhoea. *SAJOG* 2012;18:15-18.
- Rupa Vani K, Veena K, Subitha L, Hemanth Kumar V, Bupathy A. Menstrual Abnormalities in School Going Girls–Are They Related to Dietary and Exercise Pattern? *J Clin Diagn Res* 2013;7:2537-40.
- Brown J, Brown S. Exercise for dysmenorrhoea *Cochrane Database of Systemic Reviews (Online)* 2010;2:142.
- Gamit KS, Sheth MS, Vyas NJ. The effect of stretching exercise on primary dysmenorrhea in adult girls. *Int J Med Sci Public Health* 2014;3:549-51.
- Jahromi M. Premenstrual Syndrome in Adolescents and Body Composition. *Int J Anat Appl Physiol* 2016;2:1-2.
- Abbaspour Z, Rostami M, Najjar S. The effect of exercise on primary dysmenorrhea. *J Res Health Sci* 2006;6:26-31.
- Shahrjerdi S, Shaych Hosaini R. The effect of 8 weeks stretching exercise on primary dysmenorrhea in 15-17 aged high school student girls in Arak. *J Shahrekord Univ Med Sci* 2010;11:84-91.
- Mohammadi B, Jazi AA, Faramarzi M, Shourabeh FF. The effect of aerobic exercise training and detraining on some of the menstrual disorders in non-athlete students in Lorestan Universities. *HMS* 2012;18:5-12.
- Mahvash N, Eidy A, Mehdi K, Zahra MT, Mani M, Shahla H. The effect of physical activity on primary dysmenorrhea of female university students. *World Appl Sci J* 2012;17:1246-52.
- Dehghanzadeh N, Khoshnam E, Nikseresh A. The effect of 8 weeks of aerobic training on primary dysmenorrhea. *Euro J Exp Bio* 2014;4:380-2.
- Ozturk S, Tannirverdi D, Erci B. Premenstrual syndrome and management behaviours in Turkey. *Aust J Adv Nurs* 2011;28:54.
- Beck AT, Steer RA, Carbin MG. Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clin Psychol Rev* 1988;8:77-100.
- Ulusoy M, Sahin N, Erkmen H. Turkish version of the Beck Anxiety Inventory: psychometric properties. *J Cognit Psychother Internat Quart* 1998;12:163-72.
- Kocuyigit H. Reliability and validity of the Turkish version of short form-36 (SF-36): a study in a group of patients with rheumatic diseases. *Turk J Drugs Ther* 1999;12:102-6.
- Blakey H, Chisholm C, Dear F, Harris B, Hartwell R, Daley AJ, et al. Is exercise associated with primary dysmenorrhoea in young women?. *BJOG* 2010;117:222-4.
- Najafi-Sharjabad F, Borazjani F, Avazzadeh Z. Investigation of prevalence and severity of premenstrual syndrome and its relationship with exercise among female students in Bushehr University of Medical Sciences. *Pajouhan Scie J* 2017;15:50-7.
- Arruda LM, Martins LS, Moreira TR. Assessment of the Symptoms of Premenstrual Syndrome in Physically Active and Sedentary Adult Women. *J Nutr Ther* 2017;5:93-102.
- Yekke Fallah L, Azimi H, Sadeghi T. The Effect of Aerobic and Walking Exercise on Physical and Psychological Symptoms and Pain of Premenstrual Syndrome. *Iran Journal of Nursing* 2013;25:46-55.
- Samadi Z, Taghian F, Valiani M. The effects of 8 weeks of regular aerobic exercise on the symptoms of premenstrual syndrome in non-athlete girls. *Iran J Nurs Midwifery Res* 2013;18:14-9.

25. Daley A. Exercise and premenstrual symptomatology: a comprehensive review. *J Womens Health* 2009;18:895-9.
26. Tsai SY. Effect of yoga exercise on premenstrual symptoms among female employees in Taiwan. *Int J Environ Res Public Health* 2016;13:721.
27. Dias M, Kharde NS. Effectiveness of selected relaxation exercises on reducing premenstrual syndrome symptoms among girls. *International Journal of Nursing Care* 2016;4:1-5.
28. Jahromi KM, Gaeini A, Rahimi Z. Influence of a physical fitness course on menstrual cycle characteristics. *Gynecol Endocrinol* 2008;24:659-62.
29. Shahr-Jerdy S, Hosseini RS, Gh ME. Effects of stretching exercises on primary dysmenorrhea in adolescent girls. *Biomed Hum Kinetics* 2012;4:127-32.
30. Daley A. The role of exercise in the treatment of menstrual disorders: the evidence. *Br J Gen Pract* 2009;59:241-2.
31. Bartley CA, Hay M, Bloch MH. Meta-analysis: aerobic exercise for the treatment of anxiety disorders. *Prog Neuropsychopharmacol Biol Psychiatry* 2013;45:34-9.
32. Iacovides S, Avidon I, Bentley A, Baker FC. Reduced quality of life when experiencing menstrual pain in women with primary dysmenorrhea. *Acta Obstet Gynecol Scand* 2014;93:213-7.
33. Kannan P, Chapple CM, Miller D, Claydon LS, Baxter GD. Menstrual pain and quality of life in women with primary dysmenorrhea: Rationale, design, and interventions of a randomized controlled trial of effects of a treadmill-based exercise intervention. *Contemp Clin Trials* 2015;42:81-9.

Appendix

VISUAL ANALOG SCALE FORM FOR MENSTRUAL SYMPTOMS

Please mark the time before going through the following evaluations

- a) Onset the bleeding
- b) After 2 hours
- c) After 6 hours
- d) After 12 hours
- e) After 24 hours
- f) After 48 hours
- g) After 72 hours

Please mark a single point on each ruler according to the amount of your complaint

1. Abdominal Pain

No Pain Unbearable Pain

◆-----◆

2. Low Back Pain

No Pain Unbearable Pain

◆-----◆

3. Thigh Pain

No Pain Unbearable Pain

◆-----◆

4. Headache

No Pain Unbearable Pain

◆-----◆

5. Nausea

No Nausea Unbearable Nausea

◆-----◆

6. Dizziness

No Dizziness Unbearable

No Fatigue Fatigue

◆-----◆

7. Fatigue