Original Study

The Effect of Zumba Exercise on Reducing Menstrual Pain in Young Women with Primary Dysmenorrhea: A Randomized Controlled Trial

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A B S T R A C T

Study Objective: To study the effectiveness of performing Zumba exercise on the severity and duration of pain in patients with primary dysmenorrhea.
Design: Randomized controlled trial.
Setting: Cairo University gynecology Hospital and Bahgat gym and fitness center.
Participants: Ninety-eight women diagnosed with primary dysmenorrhea.
Interventions: Study participants were divided randomly into 2 equal groups: group I included women who engaged in Zumba exercise for 60 minutes twice weekly for 8 weeks, and group II was a control group with no intervention.
Main Outcome Measures: The primary outcome was the menstrual pain intensity measured using the visual analogue scale scores at 4 and 8 weeks after starting Zumba exercise. The secondary outcome was the difference in the duration of pain in both groups.
Results: Both groups were homogeneous regarding the baseline demographic characteristics. The severity of primary dysmenorrhea at the beginning of the study was not significantly different between the 2 groups. Menstrual pain intensity was significantly decreased in the Zumba group after 4 and 8 weeks of Zumba compared with the control group (mean difference, −2.94 [95% confidence interval, −3.39 to −2.48] and −3.79 [95% confidence interval, −4.16 to −3.43], respectively; $P = .001$). Also, the duration of pain was shorter in the Zumba group compared with the control group at 8 weeks (4.92 ± 1.90 vs 9.10 ± 2.92 hours, respectively; $P = .001$).
Conclusion: The Zumba intervention can reduce the severity and duration of menstrual pain thus suggesting that regularly performing Zumba might be a possible complementary treatment for primary dysmenorrhea.
Key Words: Primary dysmenorrhea, Zumba, Menstrual pain, Exercise

Introduction

Menstrual disorders are common among women of reproductive age and most commonly include menstrual pain and mood disturbances. Primary dysmenorrhea (PD) is found in at least half of menstruating women, particularly young women. PD often affects the quality of life and leads to the interruption of school and work, sleeping problems, and educational, and economic considerations.[1]

PD is defined as menstrual cramping pain that occurs immediately before or during menstruation in the absence of any organic pelvic pathology. The pain commonly starts within 3 years of menarche (the first menstrual period).[2] In addition to painful cramps, other symptoms such as back and thigh pains, headaches, diarrhea, nausea, and vomiting could be present.[3]

Although no apparent cause of PD has been clarified, an excessive release of prostaglandins in the menstrual fluid stimulating uterine contractions and lower abdominal pain is the most acceptable theory.[4] Prostaglandins, especially prostaglandin F2 alpha, stimulate uterine contractions and thus lead to a reduction in uterine blood flow, uterine hypoxia, and the painful cramping of PD.[4]

Review of the evidence suggests that nonsteroidal anti-inflammatory medications are an effective first-line treatment for PD,[5] and the combined oral contraceptive pills are a common second-line treatment for PD.[6] Approximately 25% of women are refractory or refuse to take nonsteroidal anti-inflammatory drugs and combined oral contraceptive pills.[7] Long-term drug prescription with side effects such as nausea, gastric ulcers, and kidney papillary necrosis, and lack of satisfactory pain relief precludes the use of these effective medical treatments in women with PD.[8]

However, to manage menstrual pain, the intervention (whether pharmacological or nonpharmacological

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treatment), needs to be affordable, in terms of time scheduling and cost.[9] Nonpharmacological self-care techniques or lifestyle interventions, either physical or psychological, might fulfill these criteria and include exercise (such as yoga and Pilates), heat, meditation, aromatherapy, self-massage, or acupressure. These interventions potentially reduce the menstrual pain and need for analgesics, and improve the health-related quality of life. In a recent systematic review, Matthewman et al showed moderate-quality evidence that exercise could reduce the menstrual pain intensity and low-quality evidence that it might also reduce the pain duration in women with PD.[10]

New kinds of structured physical activities such as Pilates, Spinning, Zumba, and others are all able to engage large segments of the population. These disciplines are fashionable, attractive, and the number of participants involved in these exercises is continually growing.[11]

Zumba fitness is a Latin-inspired dance exercise program that combines Latin rhythms and aerobic steps involving the entire body movements and creating a sort of choreography which is less formal, and easier and more effective than other group exercise classes.[12] The study by Baptista et al showed that belly dancing was effective in improving pain, functional capacity, quality of life, and women's body image.[13] Also, a recent systematic review has shown that Zumba dancing has beneficial effects on reducing body weight, has social and psychological benefits, and provides a slight improvement in muscular strength and flexibility, and aerobic capacity.[14] Therefore, we believe that Zumba could be more beneficial than other types of exercise for relief of PD.

This study aimed to investigate the effect of 8 weeks of regular Zumba exercise on the severity and the duration of menstrual pain in patients with PD.

Materials and Methods

This 8-week prospective, 2-arm, randomized controlled trial was conducted at Bahgat gym and fitness center from May to September 2018. The study was prospectively registered at ClinicalTrials.gov (registration ID: NCT03561493), and the study protocol was approved by the institutional review board.

The inclusion criteria were as follows: women aged 18-25 years with regular menstrual cycles (30-35 days) and menstrual bleeding of 3-10 days who had PD with menstrual pain score over 4 cm, on the 10-point visual analogue scale for pain (VAS). We excluded participants with any of the following conditions: pregnancy, known genitourinary system diseases (eg, pelvic inflammatory disease and urinary tract infections), secondary dysmenorrhea, and chronic illnesses that might contraindicate physical exercise (cardiac, respiratory, renal diseases, asthma, diabetes, epilepsy, migraine, thyroid, anemia, nervous disorders, and musculoskeletal injuries).

We also excluded participants with previous practice of Zumba fitness, irregular menstrual cycles, the usage of contraceptive methods such as intrauterine contraceptive devices, and oral contraceptive pills.

A total of 98 participants met our inclusion criteria and gave written informed consent to participate in the study. They were randomly assigned to the Zumba or the control group (49 participants in each group), using simple randomization. The randomization sequence was generated using Stata 10.0 (Stata Corp, College Station, TX). Assignments were enclosed in sequentially numbered, sealed opaque envelopes and stored by a research assistant who was independent to the trial team. The details of the sequence continued to be unknown to the trial team until participant recruitment, data collection, and data analysis were finalized.

All participants received detailed information on the purpose and usefulness of the study and were given a written consent form. After the participants signed the form, a consultant at obstetrics and gynecology hospital, Cairo University performed pelvic ultrasound examinations using Medison X6 ultrasound (Samsung Medison, Seoul, South Korea) machine equipped with a 4-7 MHz transabdominal probe to screen for pelvic or gynecologic diseases.

Participants in the intervention group practiced 16 classes of 60-minute Zumba fitness for 2 consecutive menstrual cycles (8 weeks, twice weekly). They started on the third day of the menstrual cycle of each cycle. The duration of each class was 1 hour, and a recovery period of at least 48 hours was taken between classes. The Zumba fitness scheduling of sessions was self-selected by the participants.

The Zumba sessions were conducted at Bahgat gym and fitness center and consisted of continuous dance movements to Latin music with changing intensity level all through the sessions. Low-intensity movements were initiated for the first 5 minutes of each session, followed by an increasing intensity during the workout. The intensity of the workouts gradually decreased at the end of the training session. Three certified Zumba instructors supervised the Zumba sessions.

Before each song, the instructor demonstrated the steps slowly, giving time to participants to learn them. Each session included a warm-up song, cool-down song, and the main body was on the basis of the steps from the following 6 dance styles commonly used in Zumba: merengue, cumbia, reggaeton, salsa, belly dancing, and pop. Furthermore, we provided all of the participants in the exercise group with pamphlets, including images and instructions for the exercises.

The participants in the control group did not get any intervention. Participants were also offered weekly 10-minute telephone follow-ups to provide support and for addressing dropout prevention.

Assuming a difference of 1 cm on the VAS as the minimum clinically important difference and SDs consistent with those observed in a previous study,[15] an overall 2-tailed .05 level of significance with 90% power, and ratio between the 2 groups at 1:1 and with an accommodated 20% dropout rate, a minimum sample size of 94 patients (47 patients in each group) is needed. Sample size calculation was done using the OpenEpi online calculator version 3.01 (https://www.openepi.com).

The participants filled out a demographic form. The primary treatment outcome was menstrual pain intensity,

measured using the VAS. Also, duration of pain in hours and some other menstruation characteristics (eg, length of menstruation and interval between menstrual cycles) were assessed as secondary outcomes. The study investigator contacted the participants either directly in the Zumba group or via phone calls in the control group to record pain intensity at the peak of menstrual pain (on the first day of the menstrual cycle) 4 and 8 weeks after starting Zumba sessions.

Pain intensity measured using a 10-point VAS in which a line was calibrated from 0 to 10 with 0 representing "no pain at all" and 10 representing "worst pain possible." Participants indicated their perceived pain levels by pointing to the appropriate value on a 10-cm horizontal ruler. The intensity of pain was rated to the first decimal place in centimeters. Higher scores represented higher menstrual pain intensity.

Statistical Analyses

Data were collected and then were analyzed using SPSS version 25.0 (IBM Corp). Demographic characteristics and menstrual data were summarized with descriptive statistics such as frequencies, percentages, and means. Categorical variables are described as numbers and percentage and analyzed using the χ^2 test. Continuous variables are presented as mean and SD and compared using Student *t* test (the independent sample *t* test for intergroup analysis of continuous variables, and dependent sample *t* test for intragroup analysis between the discrete time points in the same group). Besides, a 2-sided $P < .05$ was considered as statistically significant.

Table 1
Baseline Characteristics of the Study Population

Variables	Zumba Group (n = 49), Mean (SD)	Control Group (n = 49), Mean (SD)	*P*
Age, years	21.41 ± 1.49	21.53 ± 1.47	.68
Age at menarche, years	12.86 ± 1.50	12.98 ± 1.58	.69
BMI	21.06 ± 2.36	20.88 ± 2.57	.71
Interval of menstrual cycle	24.78 ± 2.44	24.92 ± 2.62	.78
Duration of bleeding	4.53 ± 0.91	4.49 ± 0.98	.83
Family history of dysmenorrhea, n (%)			
Yes	30 (61.2)	24 (49.0)	.42
No	10 (20.4)	15 (30.6)	
Unknown	9 (18.4)	10 (20.4)	

BMI, body mass index.

Results

The flow chart of the studied populations is shown in Figure 1. The mean age for the Zumba group and the control group was 21.41 and 21.53 years, respectively, with no significant difference.

No statistically significant differences were found between the 2 groups regarding body mass index (BMI), age at menarche, family history of dysmenorrhea, menstrual intervals, and the duration of bleeding ($P > .05$; Table 1).

Before the intervention, there was no significant difference among the 2 groups regarding the mean of pain intensity ($P = .93$) and duration ($P = .91$). However, a

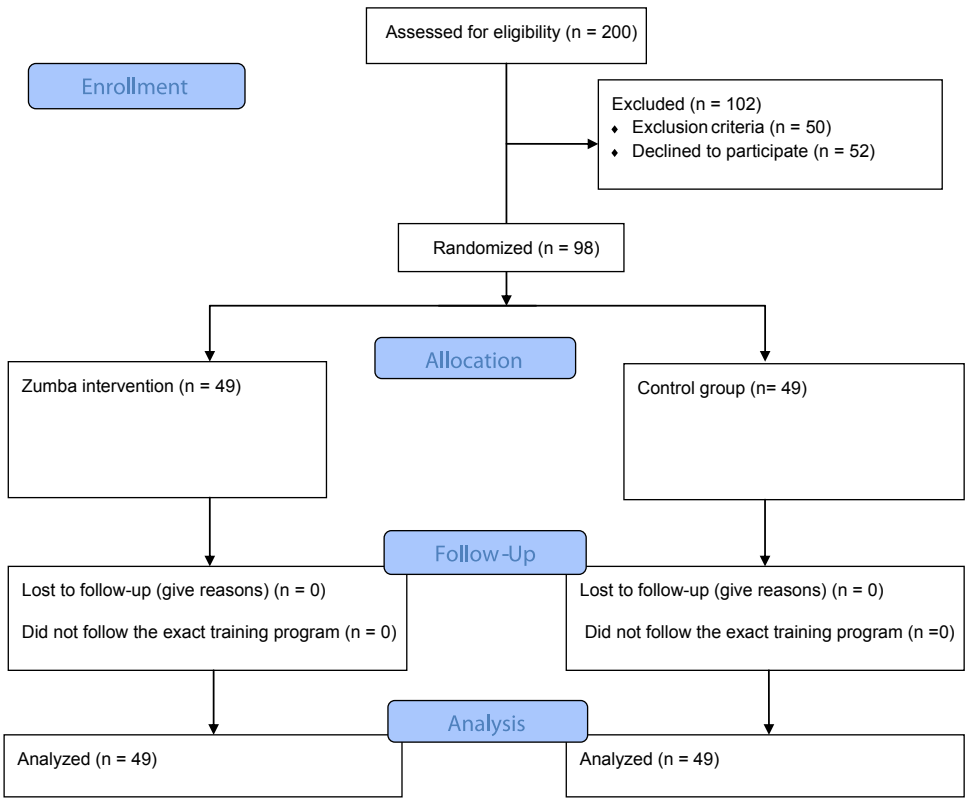

Fig. 1. Flow chart of participants' enrollment in the study.

Table 2
Comparison of Pain Intensity and Duration Between the Zumba and Control Groups

Variable	Zumba Group (n = 49)	Control Group (n = 49)	Mean Difference (95% CI)	*P*	Cohen d Effect Size
Pain intensity (VAS score)					
Baseline: before the intervention	6.49 ± 1.15	6.51 ± 1.17	−0.02 (−0.49 to 0.48)	.93	0.01724
4 weeks after intervention	4.10 ± 1.19	7.04 ± 1.07	−2.94 (−3.39 to −2.48)	.001	2.5981
8 weeks after intervention	3.10 ± 0.71	6.90 ± 1.08	−3.79 (−4.16 to −3.43)	.001	4.15791
Pain duration, hours					
Baseline: before the intervention	9.08 ± 2.77	9.14 ± 2.78	−0.06 (−1.18 to 1.05)	.91	0.00850
4 weeks after intervention	9.51 ± 2.44	9.59 ± 2.30	−0.08 (−1.03 to 0.87)	.86	0.03374
8 weeks after intervention	4.92 ± 1.90	9.10 ± 2.92	−4.18 (−5.17 to −3.19)	.001	4.69686

significant difference was observed among the 2 groups regarding pain intensity in the second and third cycles ($P = .001$). Also, a significant difference was noted among the 2 groups concerning the mean of pain duration after the third cycle ($P = .001$; Table 2).

The results of intragroup comparisons showed that there is a significant difference of pain intensity in the second and third months compared with the first month in the Zumba group ($P = .001$) and also the difference was significant when the third month was compared with the second month ($P = .001$). However, we did not find any significant difference in the Zumba group regarding the mean duration of pain between the first month and the second month ($P = .40$), but this difference was significant when the exercise continued to the third month ($P = .001$; Table 3).

Discussion

In this we study aimed to investigate the effects of Zumba exercise on PD intensity and duration. In general, dysmenorrhea is affected by many factors such as BMI, family history of dysmenorrhea, age, level of menstrual flow, and age at menarche.[16]

The results of the present study revealed no statistically significant difference among the participants regarding the means of BMI, the age of menarche, menstrual intervals, and duration of menstrual bleeding. The study findings revealed a significant difference in the intensity and duration of menstruation pain in the Zumba exercise group compared with the control group after the intervention.

Similarly, a study done by Notarnicola et al showed a beneficial effect of Zumba exercise in decreasing body pains (9.6% improvement) and improvement of physical and functional domains after 6 months of Zumba exercise.[17] Cugusi et al reported that 12 weeks of a Zumba fitness program in a group of overweight women resulted in improvement of in pain severity score (68.8%) and pain interference score (88%).[18] Dance labor, which is a complementary treatment with low risk, can reduce the intensity of pain and increase the satisfaction of mothers during the active phase of labor.[19]

It is plausible that exercise results in facilitation of prostaglandins exit from the uterus because of an increase in uterine blood flow and metabolism, which ultimately leads to a reduction in pain duration in the exercise group according to previous researchers' speculations.[20,21] Increased physical activity was identified as a small protective factor against experiencing dysmenorrhea in a systematic review published in 2006 (odds ratio, 0.89; 95% confidence interval, 0.80-0.99).[22]

The most recent systematic review showed a beneficial effect of physical activity but similarly reported that included trials contained methodological flaws limiting the strength of their conclusions.[23]

Sutar et al[24] and Siahpour et al[25] also examined the effect of aerobic dance, 3 times weekly for 8 weeks, on menstrual pain and concluded that aerobic dance reduced the pain intensity/pain duration in cases of PD. In their study, Gupta et al concluded that the effect of exercise on dysmenorrhea increases over time and regular exercise is more effective than occasional exercise, which was consistent with the results of our study.[26]

However, our results disagree with the study of Blakey et al, who studied the effects of different exercises on the participants' dysmenorrhea and did not observe any association between doing exercise and PD. This difference might be because of the retrospective reporting of menstrual symptoms, which might be inaccurate. Also, this discrepancy with our study is likely to be because of differences in the type of exercise protocol and participants in the study.[27]

We acknowledge some limitations of the present study. First, all of the participants were nonathlete students aged 18-25 years. Further studies should be conducted to determine if the same adherence to an 8-week Zumba

Table 3
Comparison of Pain Intensity and Duration Within the Zumba and Control Groups at Different Time Points

Variables	Zumba Group mean	Zumba *P*	Control Group mean	Control *P*
Pain Severity				
Within-group change between baseline and 4 weeks after Zumba	2.38	.001	0.53	.02
Within-group change between baseline and 8 weeks after Zumba	3.38	.001	0.38	.07
Within-group change between 4 and 8 weeks after Zumba	1.00	0 .001	0.14	.52
Pain duration				
Within-group change between baseline and 4 weeks after Zumba	0.42	.40	0.44	.37
Within-group change between baseline and 8 weeks after Zumba	4.16	.001	0.04	.94
Within-group change between 4 and 8 weeks after Zumba	4.59	.001	0.49	.29

intervention would lead to improvements in menstrual pain, among other populations, such as athlete women, and older adults. Second, the participants have not received any follow-up assessments after the 8 weeks of intervention. Moreover, recall bias could be a limitation of the study outcome measures. Finally, there was a small sample size, lack of blinding of participants and outcome assessors, as well as subjective outcome measures with inconsistent assessment. Further studies are needed with larger sample size, double-blinded trial methodology, and objective outcomes such as biochemical parameters; the levels of prostaglandin F2 alpha and prostaglandin E2.

Despite these limitations, our study is the first randomized controlled trial, to our knowledge, to investigate the effects of Zumba on improving pain in nonathlete women with PD. Also, confirmation of PD or pelvic diseases was on the basis of ultrasound scans rather than participant reports. There were no treatment side effects or withdrawal events. Finally, there were no dropout participants even in the control group because they were phone-called regularly and were encouraged to continue the study with free gym vouchers given after study completion to achieve a perfect retention rate.

These findings contribute to the development of knowledge on how young women with PD can manage themselves by practicing Zumba. Because Zumba exercise is easily used for women, available in many countries, a time-saving treatment, with no adverse effects and could be affordable, our results could be generalizable and applicable for many women suffering from PD.

Conclusion

On the basis of the findings of this study, we can conclude that the Zumba intervention can reduce the severity and duration of menstrual pain, thus suggesting that performing Zumba regularly might be a possible complementary treatment for PD.

CI, confidence interval; VAS, visual analogue scale.

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