SHORT COMMUNICATION

Effects of high intensity aerobic training on symptomatology of primary dysmenorrhoea

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Abstract

This study was conducted to determine the effects of high-intensity aerobic training on the symptomatology of primary dysmenorrhoea. The study was conducted at Shifa Tameer-e-Millat University, Islamabad, Pakistan, from February 2021 to July 2021. The participants were randomly allocated to two groups - experimental and control - with 21 participants in each group, using the sealed envelope method. Experimental group underwent a structured eight-week high-intensity aerobic training regimen on a treadmill (Intensity 80-90% of target heart rate). The participants in the control group were given low-intensity aerobic training (Intensity 40-60% of target heart rate). The severity of dysmenorrhoea symptoms was assessed using Menstrual Symptom Questionnaire. The study concluded that high-intensity aerobic training is effective in reducing the symptoms of primary dysmenorrhoea.

Keywords: Dysmenorrhoea, Heart rate, Pakistan, Primary, Participant, University.

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Introduction

Primary dysmenorrhoea is a debilitating condition that affects 45% to 95% of females worldwide in the age group from 17 to 24 years.[1] In Pakistan, a cross-sectional survey of young adolescents reported 78% positive symptoms associated with dysmenorrhoea.[2] Despite common occurrence, only a few affected women seek treatment as many of them consider pain as a usual part of the cycle rather than a health problem.[3] Commonly reported symptoms include lower abdominal pain with radiation towards the back, cramps and systemic symptoms such as nausea, vomiting, diarrhoea, fatigue, and insomnia.[4] Females also reported poor pain tolerance, daytime fatigue, and drowsiness.[4]

Dysmenorrhoea is considered one of the commonest reasons for absenteeism among university students.[4] Females who continue to work and do not miss school have reduced focus and productivity leading to poor performance.[3] Multiple treatment options have been reported in the literature such as hormonal, non-hormonal, non-pharmacologic, and physical therapy based on the age.[5] Over the years Aerobic exercise programmes have been used in various studies for managing symptoms of dysmenorrhoea.[6] Recent studies reported that moderate to high-intensity aerobic training is effective in reducing the physical and psychological symptoms through effects on inflammatory mediators associated with this condition.[7] Exercising at vigorous intensities is believed to be more effective in stimulating the release of natural opiates such as beta-endorphins.[7]

Previous studies have suggested that a combination of low to moderate and moderate to high-intensity aerobic training is effective in managing the symptoms of dysmenorrhoea but the evidence is emerging and this study particularly focuses on structured "High-Intensity Protocol" which has not been done previously. A lack of high-quality studies was the driver to design this experimental study, which aims to evaluate the effectiveness of an exercise intervention to reduce the associated symptoms of menstruation in women with primary dysmenorrhoea.

Patients/Methods and Results

This randomised control trial study was conducted on 42 young female students studying at Shifa Tameer-e-Millat University, Islamabad, Pakistan, from February 2021 to July 2021 following approval from the ethical review board. The study was registered with the United States (US) National Library of Medicine (ClinicalTrials.gov Identifier: NCT04687722). Sample size was calculated through online software Open Epitool (CI=95% Power=80%) using means of interventional group as 2.53 (±1.66) and control group as 4.67 (±2.07).[8] Non-probability convenient sampling was used and grouping was done using sealed envelope method. Informed consent was taken from each participant before participation. Unmarried, healthy female students between the ages of 18 and 25 years, who experienced moderate to severe pain during their last three menstrual cycles, screened by Numeric Pain Rating Scale (Horizontal bar line in which a respondent selects the whole number

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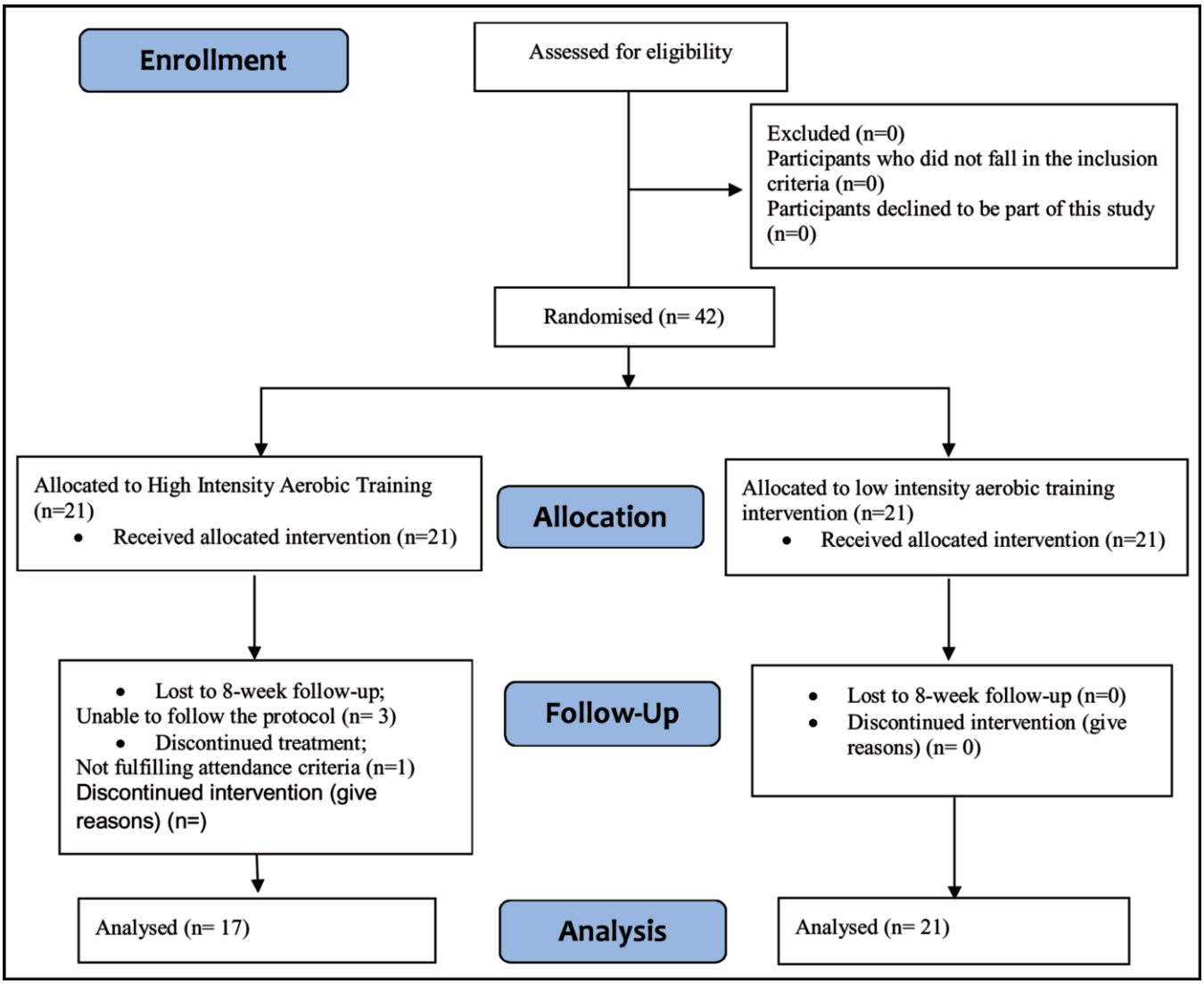

Figure: Consort flow diagram.

(0-10). '0' indicates no pain whereas '10' indicates extreme pain), participated in the study. Participants with diagnosed clinical conditions, irregular monthly cycles or using any particular medications that affect dysmenorrhoea three months before or during the study were excluded. Severity of dysmenorrhoea symptoms (abdominal pain, somatic complaints and back pain) were assessed using Menstrual Symptom Questionnaire at baseline and after eight weeks.

Group A (Control Group) underwent low-intensity aerobic training and Group B (Experimental Group) underwent high-intensity aerobic training on a treadmill under supervision of a trained physical therapist. The principal portions of the exercise session consisted of five minutes of warm-up exercises including stretching exercises for the abdominal, pelvic and groin regions, Experimental and control groups underwent high and low-intensity aerobic training at an intensity of 80 to 90% and 40 to 60% of target heart rate, respectively, calculated through Karvonen formula[8]. In the end, participants of both the groups performed five minutes of cool-down exercises including breathing, stretching, and active exercises. The intensity of exercise was gradually increased and tailored according to each individual's calculated heart rate by adjusting the speed and inclination of the treadmill. The supervised training protocol was followed for 30 minutes on alternate days, three times a week for eight weeks.

CONSORT flow diagram was given to share further details of the study (Figure). Shapiro-Wilk test of normality was applied on baseline menstrual symptoms. P-value was >0.05 for abdominal and somatic complaints, so for between-group analysis independent t-test was applied,

Table: Comparison of pre-and post-exercise menstrual symptoms between the two groups.

Variables	Level	Groups	Mean±SD	Median (IQ)	Mean Rank	Effect Size (d)	P-value
Abdominal pain	Pre	Control	31.19±5.24	-	-	0.31	0.34
		Experimental	29.64 ±4.45	-	-		
	Post	Control	24.14 (±9.01)	-	-	0.48	0.139
		Experimental	20.47 (±5.83)	-	-		
Somatic complaints	Pre	Control	36.68 (±8.60)	-	-	0.33	0.373
		Experimental	33.94 (±7.86)	-	-		
	Post	Control	29.38 (±9.63)	-	-	0.47	0.164
		Experimental	25.35 (±7.35)	-	-		
Back pain	Pre	Control	-	13 (2.5)	0.00	-0.10	0.510
		Experimental	-	11 (3)	9.00		
	Post	Control	-	10 (5)	0.00	-0.17	0.281
		Experimental	-	8 (4)	9.00		

Abdominal pain and somatic complaints p-values were calculated using Independent t-test.
P-value for back pain was calculated using Mann Whitney U test.

while Mann Whitney U test was applied for back pain as p-value was <0.05. Quantitative variables like age, BMI, and age at menarche were expressed as mean ± standard deviation (SD); whereas, qualitative variables like absenteeism from university and use of painkillers during the cycle were expressed as frequency and percentages. The effect size was calculated using the formulas [Cohen's d = (M2 - M1) / SD pooled (Parametric Test) and Z/√n (Non-Parametric Test)]. Data was analysed using SPSSv-26.

A total of 42 females were included in the study. In the control group, the mean age, BMI, and age at menarche was 20.33±1.35 years, 21.99±3.43 kg/m^2, and 13.14±1.23 years, respectively. The mean age, BMI, and age at menarche in the experimental group was 21.17±1.13 years, 21.28±3.54kg/m^2,13.47±1.23 years, respectively. The majority of participants-12 (57.1%) in the control and 10 (58.8%) in experimental group — reported occasional absenteeism from university and a similar trend was observed in the use of painkillers — 9 (42.8%) in control and 10 (58.8%) experimental group — during the cycle. Baseline characteristics were the same for both the groups (p> 0.05).

The study results did not report a statistically significant difference (p>0.05) between the groups, although a small to medium effect was noted for abdominal and somatic complaints after the intervention (d= 0.48 and 0.47) (Table).

Discussion

The current study findings suggest that both low and high intensity exercise intervention has positively affected menstrual symptoms after eight weeks of training; although there was no significant statistical difference between the two groups, high intensity aerobic training group was clinically superior. Supporting the results of the present study, Akbb E, Erdem reported positive effects of aerobic exercise on the intensity of abdominal and low back pain and other somatic complaints.[9] Another interventional study by Roghayeh Moradpour reported that eight weeks of aerobic training is effective in managing the physical symptoms of primary dysmenorrhoea.[10] One of the possible explanations for the reduction in the symptoms of dysmenorrhoea after both low and high intensity interventions might be that aerobic exercise induces analgesia using a progesterone-based mechanism, as it increases the level of progesterone in the late luteal phase resulting in decreased production of prostaglandins which results in reduced uterine ischaemia, pain relief and subsequent reduction in symptoms of dysmenorrhoea. Subjective outcome measure was used in this clinical trial because of lack of funding.

Conclusion

This study concludes that high-intensity aerobic training is clinically superior in terms of reduction of symptoms of dysmenorrhoea to conventionally used low-intensity aerobic training, so it can be used in clinical settings for the management protocol of primary dysmenorrhoea.

It is recommended that in future, studies should be conducted using objective outcome measures such as hormone "Progesterone" testing with extended weeks of training to see whether they provide greater benefits in improving the symptoms of dysmenorrhoea.

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