A STUDY ON EFFICACY OF AEROBIC EXERCISES AS COPING STRATEGY IN PRIMARY DYSMENORRHEA

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ABSTRACT

Background
Primary dysmenorrhea is defined as a menstrual cramp that is painful without any obvious pelvic abnormality that caused it. Psychological problems such as anxiety, stress, depression increases as female experiences repeated monthly menstrual pain.

Objective: To determine the efficacy of aerobic exercises as coping self efficacy strategy in primary dysmenorrhea.

Materials and methods: A comparative controlled study was conducted on 60 female students aged 18 – 25 years with Primary dysmenorrhea. The participants were selected through convenience sampling technique and were randomly assigned to intervention group A (n=30) and control group B (n=30). Participants in intervention group participated in 45-minute per session, 4 times per week for 12 weeks aerobic exercise training program, while control group did not participate in the exercise.
program. The pain intensity and menstrual severity was assessed with Visual analogue scale (VAS) and Verbal multidimensional scoring system (VMSS); coping self-efficacy was assessed with coping self-efficacy scale (CSES); and VO2 max for exercise intensity was assessed with 3-minute step test. These scales and questionnaires were used to assess both groups at initial assessment (0-week), after first menstrual cycle (4-week), after second cycle (8-week), and after third cycle (12-week). Data collected, analyzed, and level of significance was kept at 5%.

**Result:** Pre and post-test results of both groups were analyzed by parametric tests; independent t test, and Non-parametric tests; Mann-Whitney U test to determine the study significance within between the groups. Comparison of group A and B was done at pre-test and post-tests. With independent t test, a significance difference was observed between Group A and B with changes in VO2 max from pre-test to post-test 3 (t=13.1181, p=0.0001) as p<0.05. With Mann-Whitney U test, there was a significance difference in VAS improvement in GROUP A with respect to pre-test to post-test 3 (Z=-6.6530, p=0.0001) as p<0.05, and VMSS (Z=-5.8990, p=0.0001) as p<0.05. CSES scores showed significant higher improvement from pre-test to post-test 3 in GROUP A compared to GROUP B (t=23.3884, p=0.0001) as p<0.05.

**Conclusion:** Aerobic exercise training programs are effective as it improve the coping self efficacy of females with primary dysmenorrhea in order to handle the disorder and life challenging situations.

**KEY WORDS:** Aerobic exercises, Coping self-efficacy, Primary dysmenorrhea.

**INTRODUCTION**

Within first year of menarche, painful menstruation is experienced by 88% of the adolescents with dysmenorrhea. Dysmenorrhea that occurs more than two year of menarche is secondary dysmenorrhea. Within few hours before or just after the onset of menstruation, primary dysmenorrhea begins.1 Primary dysmenorrhea is defined as painful menstrual cramps in the absence of any visible pelvic pathology that could account for it. Primary dysmenorrhea hallmarks include;

- Primary dysmenorrhea begins within a few months, mostly within 2 years of menarche.
- Cramp lasts more than 48-72 hours, whereas pain lasts only 24 hours or less. Pain starts a few hours before, or more frequently, only after the onset of the menstrual flow.
- The character of pain is described as cramping or labour-like pain.
- Pelvic examination: During examination (including rectovaginal), no abnormal findings that could account for the primary dysmenorrhea should be found.1

In women with primary dysmenorrhea, abnormal uterine activity which leads to uterine hypoxia and ischaemia occurs due to increased or abnormal production and release of endometrial prostanoids and
eicosanoids. Stress increases the sympathetic system activity, leading to increased uterine muscle contraction, and increases the symptoms of primary dysmenorrhea. Exercise can thus reduce the activity of sympathetic system, resulting in a decrease of dysmenorrhea symptom.

According to Margaret A. et al (2006), coping self-efficacy (CSE) scale is a reliable and valid tool designed to measure individual’s perceived ability to cope effectively with life challenges, as well as assess changes in CSE over time. CSE scale consists of 3 subscales (use problem-focused coping, stop unpleasant emotions and thoughts, and get support from friends and family) with 26 items. Coping self-efficacy (CSE) is one of the important psychological factors. Patients having high CSE score engage more in adaptive coping behaviors. Also, their rate of been depressed is low and high disclosure rates. CSE is created in such a way that people should truly need to believe they are capable of engaging in a coping behavior in order to participate effectively in adaptive coping behaviors. CSE is described to stress and coping theory that focuses on managing behavioral and cognitive responses to stressful situations.

Study done earlier revealed that a higher proportion of dysmenorrheic adolescents mostly ignored their menstrual pain (56.6%). The coping strategies used was mainly on self-medication (34.6%), physical exercise (14.9%), relaxation (25.7%), use of hot application (11.4), and herbs (6.7%) for reducing their menstrual pain. Only 19.4% of them seek for a physician consultation. Therefore, the present study aimed to determine the efficacy of aerobic exercises as coping strategy in primary dysmenorrhea, and also used CSE scale to determine how students with primary dysmenorrhea are able to cope with the disorder.

**Materials and methods**

60 female students of Garden City University Bengaluru, Karnataka India participated in the study. The subjects who met the inclusion criteria were selected through convenience sampling technique, and were randomly assigned to experimental and control group. The inclusion criteria of the study were: Girls between the ages of 18 to 25 years, regular menstrual cycle (cycles of 21 to 35 days), subjects with VMSS 2, 1, and 0. The study protocol was approved by Research Ethical Committee of Garden City University, Bengaluru. The research objectives was explained to the participants and written informed consent obtained.

In both groups, demographic data includes name, age, weight, height, BMI were collected in the data collection sheet. General assessment form, VAS, VMSS, 3-minute step test, and CSE scale were also used to assess the subjects at Pre-test, post-tests.
**Treatment Procedure**

Both groups were assessed before the intervention, after first cycle of intervention, after second cycle of intervention, and after third cycle of intervention. The researcher (Physiotherapist) demonstrated the exercises to the subjects using verbal and visual instructions to the intervention group and advised the participants to perform the exercises at home, when not menstruating and report when necessary.

The protocols for exercise training in the study includes,

Frequency: 4 days per week for 12 weeks.
Intensity: 40% to 60% VO2 max (moderate intensity)
Time: 45 minutes per session (10 minutes warm-up, 30 minutes aerobics, 5 minutes cool-down)
Type: Aerobic exercise program.

Exercise program consist of 3 components; warm-up period, aerobic exercise period, and cool-down period.

**WARM-UP PERIOD** enhance the adjustments that must take place before physical activity. Each session begins with 10 minutes warm-up (alternately step their legs forward, backwards and sideways 5 times in each direction).

**AEROBIC EXERCISE PERIOD**: 30 minutes aerobic training was done by the participants in Group A per session according to their tolerance at initial stage and was fun as days goes by. Subsequently, progressed gradually as adaptation took place to improve cardio respiratory fitness, aerobic capacity, improves balance, agility and motor control and in turn improve coping self efficacy as body relaxes and tension eased for positive thought.

- Alternate knee lift; Instruction; ‘Lift one knee and then the other knee in an alternating pattern’
- Hamstring curl: Instruction;
  1. Stand with feet hip-width apart, place your hands on your waist or on the chair for balance,
  2. Shift your weight onto your left leg by standing on your left leg, slowly bend your right knee, as in bringing your heel towards right buttock and keep your thigh parallel.
  3. Lower your right leg slowly and complete 10 repetitions. Repeat same with the left leg.
- Squat jump: Instructions;
  1. As you stand, remain with feet shoulder width and knees slightly bent,
2. bend your knees (knee flexion) and descend to a full squat position, engage through the 
quadiceps, glutei, and hamstring muscles and propel the body up and off floor (jump),
3. extending through legs, with full legs extension, feet few inches off the floor,
4. descend and control as you are landing by going through your foot then descend into 
the squat again for another jump, repeat the next jump upon landing immediately.

- stair running: Instruction;
  1. ‘Run up and down the stairs for 2 minutes with 60 seconds rest.
  2. End the session if felt tired or not able to perform the exercises.

**COOL-DOWN PHASE:** similar to warm-up period but last 5 minutes. It prevents pooling of blood in 
the extremity, promote relaxation, prevent fainting, enhance the recovery period, and prevent 
cardiovascular complications. This includes take a deep breath as both arms over head and breathe out 
while bringing the arms down, shake out the arms and legs.

**Group B:** Did not perform exercise.

**OUTCOME MEASURES**
The **VO2 MAX** estimated by 3minute step test. Subject’s heart rates are monitored before the step test 
and 5 seconds post test. VO2max was estimated by calculating the post-recovery heart rate using an 
equation made specifically for female; 65.81- (0.1847 × pulse rate bpm).

**Visual Analogue Scale** is a valid and reliable tool that measures pain intensity. Subjects were 
asked to rate pain intensity as no pain (0), mild pain (1-3cm) moderate pain (4-7cm), and severe 
pain (8–10 cm). Participants were subjected to visualized the 10cm scale, so that it will not be an 
auditory scale.

**Verbal Multidimensional Scoring System (VMSS):** Pain and dysmenorrhea severity was 
measured and assessed by the use of VMSS. VMSS grading system ranges from 0 to 3 grades to 
evaluate the working ability, the systemic symptoms, and the analgesics requirements. Grade 0 
indicate no pain; grade one: mild pain; grade two: moderate pain; grade three: severe pain.

**COPING SELF EFFICACY (CSE) SCALE** According to Margaret Chesney et al. With CSE 
scale, a person’s ability to cope effectively with life challenges and way to assess changes in 
coping self efficacy overtime are measured. CSE scale is a valid and reliable tool that measures
the scoping self-efficacy of an individual. In the present study, participants were instructed to tick on 11-point base with 26 items scale to determine their coping status.

Statistical Analysis and Results
Data was analyzed using SPSS software 20 version. Results showed that, a significant difference was observed between control group and experimental group regarding the mean age (p=0.0194), and BMI (p=0.0012) (Table 1).

Before intervention, there was no significant difference between control group and experimental group with VO2 MAX scores (p=0.0187). Results showed a significance difference between experimental and control groups after first, second, and third cycles of intervention (p=0.0001) (Table 2).

Before intervention, there was no significant difference observed between control group and experimental group in VAS scores (p=0.8708). However, a significant difference was observed between the two groups after the 3 cycles of interventions as VAS score decreased in experimental group (p=0.0001) (Table 3).

A non-significant difference was observed between control group and experimental group with VMSS scores at pretest (p=0.0187). VMSS scores significantly reduced in experimental group (p=0.0001) after the 3 cycles of intervention (Table 4).

A non-significant difference was observed between control group and experimental group with CSES scores at pretest (t=-0.9398, p=0.3512). However, a significant difference was observed between control group and experimental group with CSES scores increased in experimental group (p=0.0001) after the three cycles of intervention compared to control group (Table 5).

Table 1: Demographic characteristics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Control group</th>
<th>Experiment group</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age in yrs</td>
<td>20.10</td>
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<td>21.63</td>
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<tr>
<td>Weight</td>
<td>53.29</td>
<td>4.73</td>
<td>57.67</td>
<td>4.95</td>
</tr>
<tr>
<td>Height</td>
<td>1.55</td>
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<td>1.57</td>
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<tr>
<td>BMI</td>
<td>22.15</td>
<td>1.54</td>
<td>23.48</td>
<td>1.01</td>
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*p<0.05 indicates significant
Table 2: Comparison of control group and experimental group with VO2 MAX scores at different treatment time points by independent t test

<table>
<thead>
<tr>
<th>Treatment times</th>
<th>Control group</th>
<th>Experimental group</th>
<th>t-value</th>
<th>P-value</th>
</tr>
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<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
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<tr>
<td>Pretest to posttest 1</td>
<td>-0.04</td>
<td>0.11</td>
<td>-1.78</td>
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<tr>
<td>Pretest to posttest 2</td>
<td>-0.36</td>
<td>0.67</td>
<td>-3.38</td>
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<tr>
<td>Pretest to posttest 3</td>
<td>-0.46</td>
<td>0.77</td>
<td>-4.47</td>
<td>1.49</td>
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</tbody>
</table>

*p<0.05 indicates significant

Table 3: Comparison of control group and experiment group with VAS scores at different treatment time points by Mann-Whitney U test

<table>
<thead>
<tr>
<th>Treatment times</th>
<th>Control group</th>
<th>Experiment group</th>
<th>Z-value</th>
<th>P-value</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Mean</td>
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<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Pretest</td>
<td>8.23</td>
<td>1.30</td>
<td>8.17</td>
<td>1.46</td>
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<tr>
<td>Pretest to posttest 1</td>
<td>0.43</td>
<td>0.57</td>
<td>3.43</td>
<td>1.07</td>
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<tr>
<td>Pretest to posttest 2</td>
<td>0.90</td>
<td>0.71</td>
<td>6.23</td>
<td>1.63</td>
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<tr>
<td>Pretest to posttest 3</td>
<td>1.40</td>
<td>0.89</td>
<td>7.07</td>
<td>1.51</td>
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</table>

*p<0.05 indicates significant

Table 4: Comparison of control group and experiment group with VMSS scores at different treatment time points by Mann-Whitney U test

<table>
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<tr>
<th>Treatment times</th>
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<th>Experiment group</th>
<th>Z-value</th>
<th>P-value</th>
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<td>Mean</td>
<td>SD</td>
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<td>Pretest</td>
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<tr>
<td>Pretest to posttest 1</td>
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<td>0.73</td>
<td>0.45</td>
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</table>
Table 5: Comparison of control group and experiment group with CSES scores at different treatment time points by independent t test

<table>
<thead>
<tr>
<th>Treatment times</th>
<th>Control group</th>
<th>Experiment group</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Pretest</td>
<td>100.27</td>
<td>23.40</td>
<td>106.53</td>
<td>28.04</td>
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<tr>
<td>Posttest 1</td>
<td>101.00</td>
<td>23.05</td>
<td>159.43</td>
<td>26.10</td>
</tr>
<tr>
<td>Posttest 2</td>
<td>103.50</td>
<td>22.73</td>
<td>198.67</td>
<td>17.12</td>
</tr>
<tr>
<td>Posttest 3</td>
<td>105.90</td>
<td>21.99</td>
<td>223.77</td>
<td>15.27</td>
</tr>
</tbody>
</table>

*p<0.05 indicates significant
DISCUSSION
Stress threatened homeostasis, and also counteracted the adaptive processes involving affective, physiological, biochemical, and cognitive–behavioral responses in order to regain homeostasis. Several evidences supported exercise as a coping strategies for stress management and improving mental health in people with chronic disease like diabetes, coronary artery diseases, cancer, etc. Exercise is practicable treatment for coping with stress among athletes, students, and elderly and even in adults. Moreover, regular physical activity such as exercise is the simple and inexpensive strategy to use in facing stress in daily life.12,13

The present study conducted to determine the efficacy of aerobic exercises as coping strategy in primary dysmenorrhea. The study revealed that 12 weeks aerobic exercise program yielded a positive impact on dysmenorrhea symptoms.

In the present study, the improvement of VO2 MAX in the experimental group was higher compared to control group following interventions. This support the study done by Nguyen Thi et al that Step
tests produce a simple, effective and ecologically valid method of sub-maximally assessing VO2max that can be implemented in a variety of situations within the general adult population. The main indicator used for assessing cardiopulmonary capacity and determining respiratory circulation functions such as exercise intensity is the VO2 max. The magnitude of VO2max is dependent on the transport of oxygen by the cardio-respiratory system from the atmosphere to exercising muscles, followed by the utilization of oxygen by metabolically active tissue.

The present study also revealed that a significant and higher change was observed from the pre-test to post-test 3 VAS scores (7.07±1.51), and VMSS scores (1.73±0.45) in the experimental group compared to control group. This suggests the VAS and VMSS scores reduction and improvement in experimental group compared to control group. Priya Kannan et al (2018) proposed that aerobic exercise utilizes hormone (progesterone) and inflammatory cytokine-mediated mechanisms to reduce the pain associated with primary dysmenorrhea. Study done by Salvi Shah et al (2016) suggested that 8 weeks stretching exercises were effective in pain reduction in primary dysmenorrhea as VAS and VMSS scores were reduced following intervention.

In the present study, the pre-test scores of CSES are similar (poor) in control group and experimental group. Following interventions, the mean CSES in intervention group increases from 106.53 to 159.43 (after first cycle) to 198.67 (after second cycle) and to 223.77 (after third cycle). This means that, there is a significant and higher change seen in intervention group as compared to control group from pre-test to post-test 3. This support the study done by Stults et al, and Jackson that being physically active improves the way the body handles stress because of changes in the hormone responses such as endorphins is elevated in plasma level following exercise inhibiting the central nervous system (CNS) accounting sensation of calm and improved mood experienced. Physical activity increases the synaptic transmission of monoamines, including serotonin, dopamine, and adrenaline which act as anti depressant affecting mood and behaviors. With that exercise serves as a time-out or distraction from one’s stressors causing calming effect and improved retrieval of positive thoughts.

According to Margaret A. et al (2006), coping self-efficacy (CSE) scale is a reliable and valid tool designed to measure individual’s perceived ability to cope effectively with life challenges, as well as assess changes in CSE over time.
CONCLUSION

The findings of the study revealed that 45-minute, 4-session per week for 12 weeks aerobic exercise training programs are effective not only to reduce pain, but to improve coping efficacy to handle the disorder and life challenging situations in females with primary dysmenorrhea. Thereby reducing the dysmenorrheic symptoms and improve functions. The Alternate Hypothesis is accepted as there are significance effects of aerobic exercises as a coping strategy in primary dysmenorrhea.

A well structured, planned, and repetitive physical activity serves as a coping strategy in females with primary dysmenorrhea as it promotes relaxation, reduces negative thoughts, increases command over body, promotes good sleep, ease tension, promotes cardiovascular fitness. Above all, reduces symptoms associated with primary dysmenorrhea.

LIMITATIONS OF THE STUDY:

• Small sample size.
• Subjects Lack of knowledge on normal menstrual cycle.
• Subjects Lack of knowledge on dysmenorrhea.

RECOMMENDATIONS:

• The study can be further done by taking larger sample size.
• Further study will be done on different population with different age groups.

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