

## “Effect of aerobic exercises on primary dysmenorrhoea in college students”

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**Abstract:** Background: Dysmenorrhea, a common problem in women of reproductive age, is a very serious problem that can often directly affect the quality of life and cause periodic college absenteeism. Exercise is commonly cited as a probable remedy for menstrual symptoms with limited research available. The purpose of this study was to observe the effect of aerobic exercises on Primary dysmenorrhoea. Methods: Study was a randomized clinical trial. Participants were 100 female college students who were divided in “exercise” and “control” groups. The “exercise group” was given Aerobic exercises and results of three cycles were registered. Outcome measures were VAS for Pain and SF36 for Quality of life. Data was analyzed using paired t test, chi square test and z test for statistical significance. Results: The results showed that pain (VAS scores) in the exercise group declined significantly. The VAS scores started to decrease just after the beginning of the exercise intervention and continued to decrease in the subsequent three visits and was statistically significant ( $p < 0.05$ ). The Physical Domain of Quality of life showed significant difference in the exercise group. Conclusion: Aerobic exercises can help to reduce pain and improve physical symptoms which has a positive impact on quality of life in primary dysmenorrheal girls.

**Keywords:** Aerobic Exercise, Dysmenorrhea, Primary Dysmenorrhea,

### I. Introduction

The period of adolescence is transition from childhood to adult life along with pubertal development and sexual maturation. During puberty, hormonal, psychological, cognitive and physical changes occur simultaneously.<sup>1</sup> One of the major physiological changes that take place in adolescent girls is the onset of menarche. The problems of irregular menstruation, excessive bleeding, and dysmenorrhoea are commonly seen of which dysmenorrhoea is the commonest problem experienced by most of the adolescent girls<sup>1</sup>. In primary dysmenorrhoea, pain is spasmodic in character and felt mainly in the lower abdomen, but it may radiate to the back and along the thighs. There may be associated systemic symptoms like nausea, vomiting, diarrhoea, headache, fatigue, and dizziness, and in severe cases, syncope<sup>(1, 2)</sup>. The onset is usually 6 to 12 months after menarche, which coincides with the occurrence of regular ovulatory cycles. Symptoms are frequently associated with absenteeism from school, work, or other activities.<sup>2</sup> In spite of the frequency and severity of dysmenorrhoea, most women do not seek medical treatment for this condition.<sup>3,4</sup> Prevalence of dysmenorrhoea was found to be 72.7% and was significantly higher in coffee consumers, females with menstrual bleeding duration  $\pm 7$  days, and those who had a positive family history of dysmenorrhoea. However, dysmenorrhoea seems to be the most common gynaecological condition, regardless of age and ethnicity.<sup>3</sup>

Dysmenorrhoea is classified into a) Primary Dysmenorrhoea b) Secondary Dysmenorrhoea Primary dysmenorrhoea (PD) is defined as painful menses in women with normal pelvic anatomy, usually begins during adolescence<sup>(4,5)</sup>. It is unusual for symptoms to start within first six months after menarche. Affected women experience sharp, intermittent spasm of pain usually concentrated in the suprapubic area. Pain may radiate to the back of the legs or the lower back. Systemic symptoms are Nausea, Vomiting, Diarrhoea, Fatigue, mild fever and Headache or light-headedness are fairly common. Cramps and pelvic pain beginning shortly before or at the onset of menses and lasting 1–3 days, pain usually develops within hours of the start of the menstruation and peaks as the flow becomes heaviest during the first day or two of the cycle.<sup>2,6</sup>

### II. Patho physiology

The etiology of primary dysmenorrheal is not precisely understood, but most symptoms can be explained by the action of uterine prostaglandins, particularly  $\text{PGF}_2^-$  alfa, the disintegrating endometrial cells release  $\text{PGF}_2^-$  alfa as menstruation begins.  $\text{PGF}_2^-$  alfa stimulates myometrial contractions, ischemia and sensitization of nerve endings. Falling progesterone level during the luteal phase brings about these elevations, specifically of  $\text{PGF}_2^-$  alfa. The role of prostaglandin synthesis inhibitors is in reducing painful symptoms accompanying menstrual discharge<sup>(6)</sup>. The intensity of the menstrual cramps and associated symptoms of dysmenorrhea are directly proportional to the amount of  $\text{PGF}_2^-$  alfa released<sup>4,5</sup>. The levels of prostaglandin F2 $\alpha$  are especially high during the first two days of menstruation in women with severe primary dysmenorrhoea.<sup>3</sup> Vasopressin and leuko-triene concentrations have also been found to be higher in women with severe menstrual pains than in

women who experience mild or no menstrual pain<sup>1,2,4,5</sup>. The posterior pituitary hormone vasopressin may be involved in myometrial hyper sensitivity, reduced uterine blood flow, and pain in primary dysmenorrhea. Vasopressin role in the endometrium may be related to prostaglandin synthesis and release.<sup>5</sup>

### **III. Effect Of Exercises**

The idea that exercise might help to relieve menstrual pain is not new; in 1943 Billing proposed that women with dysmenorrhea had contracted ligamentous bands in the abdomen and subsequently developed a series of stretching exercises for which he claimed a high rate of symptom relief<sup>7,8,15</sup>. The belief that exercise was effective seems to have prevailed and led to anecdotal beliefs among health agencies, clinicians, and women that exercise is beneficial. However, a combination of organic, psychological, and sociocultural factors may be responsible<sup>15</sup>. Evidence suggests that aerobic exercise reduces negative effect on women who exercise regularly exhibit lower levels of negative effect and physical symptoms across the menstrual cycle<sup>10, 11, 14</sup>. This study tests the hypothesis that women who participate in regular, aerobic exercise will report less negative effect and lower levels of physical symptoms, throughout the menstrual cycle, than non-exercisers.<sup>5,7</sup> Emotional and behavioral problems may exacerbate menstrual cycle problems and dysmenorrhea. Due to the negative effects of dysmenorrhea on an individual's psychological status, health-related quality of life (HRQoL) may be disrupted among adolescent women<sup>8,15</sup>. Exercise today is an integral part of normal life for many women. It is clear that there are many health benefits for women who exercise regularly and in moderation. Exercise improves cardiovascular status, increased bone mineral content; improve dysmenorrhea and premenstrual syndrome symptoms<sup>5,9,15</sup>. Considering the side effects of drug treatments and surgery, non-drug treatments, particularly physical activity, has attracted the attention of professionals and women<sup>8</sup>.<sup>6</sup> Also, it helps in reducing pain, relieving stress, elevating mood and improving health. Women who exercise show less severe dysmenorrhea and greater positive effects than women who are sedentary. Health care providers suggest some form of aerobic exercise such as pelvic tilting, walking, bicycling and swimming, may improve blood flow, relax abdominal muscles, reduce pelvic pain and relieve pressure on nerve centers, pelvic organs and the alimentary canal.<sup>1,7</sup> Exercise increases the release of several neurotransmitters including natural endorphins (the brain natural painkillers), estrogen, dopamine and endogenous opiate peptides, as well as altering the reproduction of hormone secretion, suppressing prostaglandin from being released and raising the estrone-estradiol ratio which acts to decrease endometrial proliferation and shunts blood flow away from the uterus<sup>8,9</sup>. Exercise may act as a distraction from intrusive thoughts and promote positive thoughts, decreasing short-term depression. Exercise may increase concentration and improve mood and behavior<sup>10</sup>. *Primary dysmenorrhea (PD)* is a very common and serious problem that can often directly affect the quality of life for women, interfering in activities such as working or studying<sup>3</sup>. In this study, we investigated how menstrual discomfort affects the student's quality of life and how it improves with exercises.

#### **Short Form-36 (SF-36) Health Survey Questionnaire to determine to HRQoL**

The SF-36 scale is the most widely used generic instrument for rating HRQoL. The validity and reliability of this instrument has been established for measuring HRQoL in large populations of both healthy and diseased individuals. The original questionnaire was developed by Ware and Sherbourne<sup>(1,6)</sup>. It is a self-evaluation instrument consisting of 36 items which provide assessment in eight domains: physical functioning, social functioning, role limitations due to emotional problems (role-emotional), role limitations due to physical problems (role-physical), bodily pain, vitality, mental health, and general health perception. For each variable item scores are coded, summed, and transformed on to a scale from 0 (worst possible health state measured by the questionnaire) to 100 (best possible health state). It yields scale scores for each of these eight health domains. In our study, we used the Turkish version of SF-36 which showed good reliability and validity in the Turkish validation study<sup>1,6,9</sup>.

### **IV. Methodology**

Requisite permission and approval was obtained from the head of the institution and institutional ethical committee. Young, undergraduate medical students (age 17 to 23 years, n=100) having no known pelvic pathology, regular menstrual cycle and diagnosed by gynaecologist were included in this study. A baseline questionnaire was taken to evaluate medical h/o of menstruation. Female student who were regularly exercising, taking any hormonal medication and suspected of having pelvic pathology were excluded from this study. The individual grade of dysmenorrhea was assessed by the MSS system in which grades are decided as mild, moderate and severe based on pain and limited activities. Pain was assessed by a visual analogue scale (VAS) to determine the intensity of the pain at the beginning of the study and the subsequent three cycles. Short Form-36 (SF-36) Health Survey Questionnaire (HRQoL) was given to determine quality of life. It is a self-evaluation instrument consisting of 36 items which provide assessment in eight domains. A Purposive sampling with randomized allocation was used to divide the subjects equally into experimental and control group as per

inclusion and exclusion criteria .Subjects were explained regarding the Questionnaire and asked to fill the same for pre and three consecutive menstrual cycles (24 – 36 hours before the start of menstruation) and were recorded pre intervention, in between (4<sup>th</sup> week) and post intervention (8<sup>th</sup> week).This was followed by documentation of the data and evaluation.A structured 8 weeks of aerobic training program (3days/week, 45 min/day) were given<sup>7</sup> (Days of menstruation was excluded from the exercise programme)This exercise was performed between the three menstrual cycles.The Exercise programme included warm upexercises for 10 min. The warm-up period allows for a gradual increase in the heart rate and may reduce the risk of injuries Free Active movements of UL, LL and trunk,Cross toe touch,Dynamic stretches such as lunges, hamstring and TA, Stretching trunk flexors<sup>34</sup>.Aerobic exercises in the form of aerobic dance, as it is easier simple, effective tool, which doesn't require any equipment and many efforts to learn and can be done in the groupwas selected<sup>13</sup>Duration was 25 minutes at an intensity of 70-80% of maximum heart rate, by Borg's Scale (RPE)<sup>7</sup>Every week, the intensity was increased gradually from 60% to 80% of maximum heart rate (HRmax)<sup>13</sup>.Aerobic dance consisted of the following steps: marching, single step touch, step touches front and back, double step touch, grapevine ,“V” step,knee lift, leg curl ,forward walk, reach outs, lunge side and back,“L” Step, jumping jacks.Cool down exercises for 10 min. which included slow marching, slow “V” step and “L” step, hamstring, quadriceps, TA stretching etc. This allows the body to clear acid that has built up in the muscles and allows more blood back into the circulation which in turn helps to prevent muscle cramps and sudden drop in blood pressure. Control group: Control group was observed without exercises; with no life-style modification.

### V. Result

It was found that after the exercise intervention, at each menstrual cycle VAS scores decreased significantly . Paired t-test was used for pre and post intervention values of VAS and HRQOL within the group.The VAS scores started to decrease just after the beginning of the exercise intervention and continued to decrease in the subsequent three visits and is statistically significant ( $p < 0.05$ ) as in fig 1

Figure 1

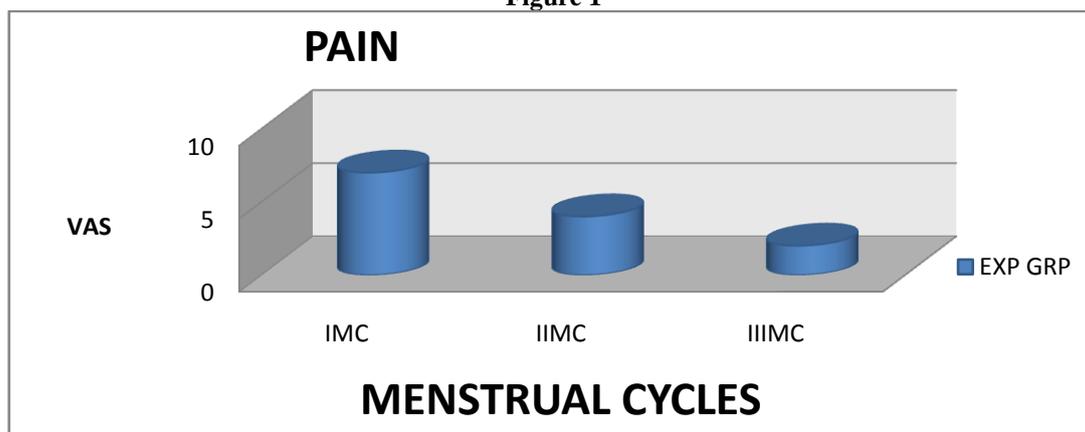
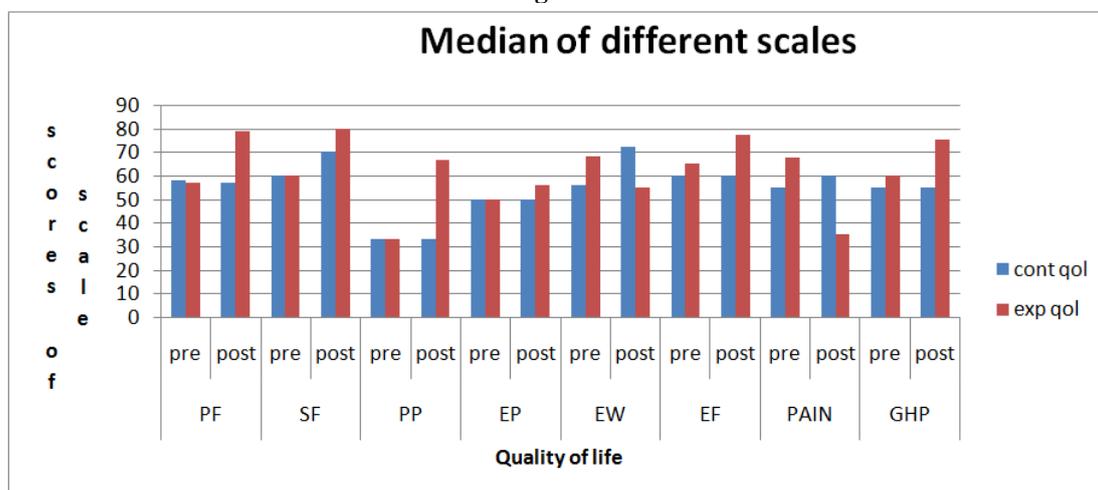


Figure 2



When the eight domains of the SF-36 were compared between the first and third visits, all domains showed highly significant improvement within the group. (pre and post intervention).(Fig 2)

## **VI. Discussion**

The present clinical trial was conducted to study the effectiveness of aerobic exercises of on symptoms of PD for 8 weeks in terms of reduction of pain using VAS, improvement in quality of life by HRQOL SF-36, which indicates that aerobic exercises are beneficial in primary dysmenorrhoea and improves quality of life. Aerobic exercise is found to be effective in reducing pain and symptoms of dysmenorrhoea. It is considered that the pain during menstrual cycle is due to prostaglandins which are present in high quantities in menstrual fluid. They are potent vasoconstrictor and thus cause ischemia to the uterus and even reduced progesterone may also cause increased production of prostaglandin, the mediator of pain. Reduced titer of progesterone causes increased myometrial contraction, that gives more strain to ischemic myometrium and intensify pain resulting dysmenorrhoea<sup>2,12</sup>. Exercises act on the lining of the uterus and increases level of circulating endorphins which in turn raise the pain threshold<sup>12</sup>. The result of the present study are consistent with the findings of Abbaspour Z concluded that women who exercised at least once per week show a significant improvements in reduction of pain and quality of life<sup>10</sup>

An interesting element of the relationship between the PD and exercises is the involvement of stress. Stress is considered as a main factor related to physical training and dysmenorrhea<sup>15</sup>. Stress, inhibits the pulsatile release of follicle stimulating hormone (FSH) and luteinizing hormone (LH) leading to impaired follicular development. As synthesis of progesterone is increased in the luteinized follicle following ovulation, stress induced impairment of follicular development could potentially reduce progesterone synthesis and release.<sup>11,15</sup> Even Menstrual pain probably stems from increased contraction of the uterine muscle, which is innervated by the sympathetic nervous system. Stress tends to enhance sympathetic activity, and may therefore increase menstrual pain by exacerbating uterine contraction. By relieving stress, exercise may decrease this sympathetic activity, thereby alleviating symptoms. Physical activities act as a specialized anti-pain and can cause decreasing primary dysmenorrhea by decreasing anxiety and mental stress<sup>14</sup>. Similar result was also found by Israel, R.; Sutton, M. that aerobic exercise reduces the physical and psychological symptoms effectively<sup>13</sup>. As regular aerobic exercise has many benefits, including increased power for women's heart vascular activity, increasing the bone density, and reducing the stress<sup>3,9</sup>.

As the Pain is the main contributor for reduction in physical functioning, Reduction in pain plays a crucial role in improvement of all the domains of HRQOL SF-36.viz social functioning, emotional well-being and general health perception etc. The study done by Ozlem Onural's (2012) also supports our hypothesis, that there was a significant improvement in health-related quality of life measured by the SF-36. All eight domains of the SF-36 (physical functioning, role – physical, bodily pain, general health perception, vitality, social functioning, role –emotional, mental health) showed significant improvements in every subsequent visit<sup>9</sup>.

The effect of regular physical activity is the reduction of nor epinephrine hormone levels at rest, which in turn can cause reduced heart rate and blood pressure at resting time<sup>2,14</sup>. Another possible mechanism is the effect of exercise on blood leptin levels in women with PMS.<sup>12</sup> Leptin is a hormone secreted from fat cells and regulates the metabolism of the hypothalamus–pituitary–gonadal and has an important role in human reproduction. This hormone exerts its metabolic and neuro-endocrinologic effects through its receptors in the hypothalamus area of emotional control. Some researchers showed that physical activity reduces the amount of leptin in blood to 30-34%.<sup>12</sup> Hood and Dincher<sup>14</sup> who suggested a program of exercise for Dysmenorrhoea patient 2-3 times a day before the period, They reported that exercise reducing pain during menstruation by relaxing abdominal muscles and relieves pressure on the nerve centres, pelvic organs and decrease pelvic congestion<sup>14</sup>.

## **VII. Conclusion**

Results of the study confirmed that the treatment with Aerobic exercises may be the preferred treatment for dysmenorrhea as it is also cost effective. We conclude that in this study there is the positive effect of aerobic exercise, on dysmenorrhea. The inter group for VAS score showed statistically significant pain reduction in intervention group. It is found that VAS is, decreased after the exercise intervention and also quality of life, of all eight domains of the SF-36 scale showed improvement in exercising girls. Our finding show that exercises can help to reduce pain and improve physical symptoms which overall improves quality of life of primary dysmenorrheal girls. Dysmenorrhea, as a significant problem for girls, that causes absence from school, college and work, we recommend regular exercise as a helpful means in this age group. On the other hand we can do exercise in every place that do not need to any cost. We recommend that these young adolescent girls should be educated regarding healthy life-style, exercises and consultation with physiotherapist for effective relief of pain. Aerobic exercise training to patients suffering from PD can reduce symptoms, resulting in better job and social performance. It can be recommended as an effective treatment method. Since this syndrome can have a

negative impact on the employment and the performance of girls and can cause economic damage, this method is recommended to improve other aspects of women’s health as well.

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