



Original Article

Efficacy of exercise on pelvic pain and posture associated with endometriosis: within subject design

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Abstract. [Purpose] This study was carried out to determine the effect of an exercise program on pelvic pain and posture associated with endometriosis. [Subjects and Methods] This study was designed as repeated measures design that compared one group of 20 patients (age range 26–32 years) diagnosed by laparoscope as having mild or moderate endometriosis before, after 4 weeks, and after 8 weeks of exercise program. The exercise program parameters were based on the American College of Obstetricians and Gynecologists guidelines for exercise suitable for sedentary women. To assess the intensity of endometriosis pain, a present pain intensity scale was used. On the other hand, a raster stereography system was used to assess the posture. [Results] After 8 weeks of performing the exercise regimen, there was a statistically significant decrease in the patients' pain intensity and thoracic kyphosis angle program in compared with pre treatment. [Conclusion] Ultimately it was proven that eight weeks of an exercise program is very effective in decreasing pain and postural abnormalities associated with endometriosis.

Key words: Endometriosis, Exercises, Pelvic pain

(This article was submitted Aug. 24, 2017, and was accepted Sep. 6, 2017)

INTRODUCTION

Endometriosis is a chronic condition in which endometrial tissue that normally lines the inside of the uterus migrates outside of the uterus and attaches to the lining of the abdominal cavity and the internal organs inside the pelvis, including the ovaries, Fallopian tubes, bladder, and bowel. The condition occurs in 6–10% of reproductive-age women. This disease is an estrogen-dependent chronic inflammatory condition that is associated with pelvic pain and infertility. Some women with endometriosis have no symptoms, but for those that do, pain can range from mild to severe¹⁾. For most of these women, pain is a consequence resulting in chronic pelvic pain (CPP). Nearly half of those affected with endometriosis have CPP, while in 70% pain occurs during menstruation²⁾. In clinical practice, postural changes are frequently observed among women with CPP. Postural assessment can lead to early detection of uneven positions, shortenings, antalgic postures and tensions. Although these changes may not be the primary cause of the clinical condition, they can contribute significantly to the worsening of pain and tension³⁾. Endometriosis can be associated with pelvic floor dysfunction (PFD). The pelvic floor consists of muscles, connective tissue and supporting ligaments, which form a sling from the pubic bone to the tailbone. The pelvic floor structures support the abdominal and pelvic organs as well as assisting with sphincter and sexual functions. PFD

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refers to problems that occur when these muscles are weak, in spasm or too tight⁴). Secondary musculoskeletal impairments may occur in the region of endometrial implantation. For instance, endometrial implants on the psoas or lumbar musculature may reproduce musculoskeletal symptoms during examination⁵). It is likely that if gone untreated, symptoms will progress and worsen over time⁶). While there is no cure for endometriosis, there are two types of interventions; treatment of pain and treatment of endometriosis-associated infertility⁷). Physical therapy techniques have been proven to reduce pain and improve quality of life in endometriosis. The overall goal of treatment is for the patient to learn how to relax the muscles, which in turn helps break the pain cycle⁸). Evidence suggested that symptoms of endometriosis result of a local inflammatory peritoneal reaction caused by the ectopic endometrial implant, which undergo cyclic bleeding⁹). On the other hand, regular physical exercise seems to have protective effects against diseases that involve inflammatory processes since it induces an increase in the systemic levels of cytokines with anti-inflammatory properties¹⁰). Regular physical exercise has been claimed to foster the reduction of menstrual flow, of ovarian stimulation, and of the action of estrogen¹¹). Analysis of available literature data shows that there are no controlled and randomized studies identifying whether, or to what extent physical exercise could be beneficial for women with endometriosis. Thus, until now researchers only have speculations about this topic¹²). This study was therefore conducted to determine the effect of an exercise program on pelvic pain and posture associated with endometriosis.

SUBJECTS AND METHODS

This study was designed as within subject design that compared one group of patients diagnosed with mild or moderate endometriosis before, after 4 weeks, and after 8 weeks performing an exercise program. The study design and sampling were carried out after obtaining approval from the hospital's ethical committee to carry out the study at the Physical Therapy Department of Bab El-Sharia University Hospital and an informed consent form was signed by each patient before participating in the study. Ethical approval was obtained from the institutional review board at Faculty of Physical Therapy, Cairo University before study commencement (No: P.T.REC/012/001488). The study was followed the Guidelines of Declaration of Helsinki on the conduct of human research.

There were twenty patients suffering from severe premenstrual pelvic pain and diagnosed by laparoscope as having mild or moderate endometriosis¹³). Patients were selected randomly from the Gynecology Outpatient Clinic at Bab El-Sharia University Hospital and recruited according to the inclusion and exclusion criteria of the study. The main exclusion criterion was the presence of diabetes mellitus, gynecological hemorrhage, impaired sensation, tubo-ovarian abscess, chest diseases, scoliosis or previous trauma or fractures in the spine, pelvis, and lower limbs. All patients participated in a supervised exercise program for 8 weeks (24 sessions) and received the same regimen of hormonal treatment (Medroxyprogesterone Acetate 100 mg once/month for 6 months) without administering any analgesic drugs all through the exercise period (8 weeks). Their age ranged from 26 to 32 years and their body mass index (BMI) did not exceed 29 kg/m². The duration of this study was 6 months from December 2015 till April 2016.

Further screening for inclusion and exclusion criterion and demographic details were recorded for each patient to confirm that the only cause of pelvic pain was endometriosis. All data and information of the patients were recorded in a recording data sheet. A detailed medical and gynecological history was taken for each patient before starting the study, according to the items of the recording data sheet. Diagnostic ultrasonography (Sonoace 3200) was used by the gynecologist before laparoscopy to locate endometriosis cysts and to exclude any pelvic pathology in each patient. Laparoscopic machine (Gemetex XL-300A) was used by the same gynecologist to confirm the diagnosis of endometriosis in patients. Before intervention, intensity of pain was measured by mean of the present pain intensity scale to help patients to determine the intensity of pain on a scale from 0 to 4 in which pain intensity was scored as follows: no pain=0, mild pain=1, moderate pain=2, severe pain=3, and unbearable pain=4. The Present Pain Intensity scale is reported to be a reliable outcome measure for pain evaluation¹⁴). Reevaluation for intensity of pain was repeated after 4 weeks (12 sessions) and 8 weeks (24 sessions) of performing the exercise program. Postural assessment revealed that patients suffered from postural kyphosis due to chronic pelvic pain and this diagnosis was confirmed by measuring the thoracic kyphosis angle by Formetric II instrument in the spinal shape analysis laboratory at the Faculty of Physical Therapy, Cairo University, before and after 4 and 8 weeks of performing the exercise program. Formetric II instrument was an optical 3D-spine, posture and measurement system, which was reliable, valid and safe to be used on patients¹⁵).

The exercise program parameters were based on the American College of Obstetricians and Gynecologists guidelines for exercise for sedentary women, according to the FITT principle (frequency, intensity, time, and type), which included frequency=minimum of three times/week, intensity=moderately hard perceived exertion, time=30–60 min/day, and type=low impact¹⁶). Class size was limited to five patients to ensure their close supervision. All classes were conducted by the same physiotherapist. Each patient was supervised carefully during the exercise program. The exercise program included posture correction exercises from crock lying, supine, and sitting and standing positions (each exercise was maintained for 5 s and then the woman relaxed for 10 s and repeated this 10 times), diaphragmatic and lateral costal breathing exercises (the woman took a deep breath for 5 s and relaxed for 10 s and repeated this five times), general relaxation and teaching muscle sense (for 10 min), Diversion drill training (for 3 min), positional education on cross-sitting and squatting positions (for 6 min), stretching exercises for lower back muscles, adductors muscles, hamstrings muscles and pelvic floor muscles each stretch

was maintained for 45 s and repeated 3 times at the start and the end of each session. Each exercise session was terminated by walking on treadmill for 20 min. Patients attended exercise sessions 3 times/week, and for the rest of the week they were instructed to perform the same exercises regularly at home throughout the study period. Compliance with home-based exercise was monitored by a self-recorded diary. The total number of sessions that were conducted during 8 weeks was 24 sessions. Attendance of at least 20 out of 24 sessions was required to be defined as completion of the intervention.

Data analysis was performed using (SPSS, Inc. Chicago, IL, USA) program version 20 for Windows. The sample size (20 patients) was calculated to yield an 90% power and $\alpha=0.05$. Prior to final analysis, data were screened for normality assumption and presence of extreme scores. This exploration was done as a pre-requisite for parametric calculation of the analysis of differences and of relationship measures. Normality test of data using Shapiro-Wilk test was used, this ensures that the data is normally distributed for kyphosis angle and not normally distributed for present pain intensity scale. Therefore, repeated measure ANOVA was used to compare the kyphosis angle at different measuring periods. Also, Friedman (nonparametric alternative to the repeated measure ANOVA) was used to compare the present pain intensity scale at different measuring periods and “Wilcoxon signed rank tests” was used as post hoc tests if Friedman test among three measuring periods is significant. As two statistical analysis tests (repeated measures ANOVA and Friedman tests) were performed on the examined sample, the alpha level was adjusted to 0.025 (0.05/2) for each of the two conducted statistical tests. Adjustment was performed to avoid alpha inflation and committing type I error.

RESULTS

As indicated by the repeated measures ANOVA, there was a statistically significant difference in kyphosis angle among the three measuring periods (pre and post 12 sessions of treatment, and post 24 sessions) ($p<0.025$). A Tukey multiple comparison tests (Post hoc tests) revealed that there was a statistically significant reduction in the kyphosis angle in the post 24 sessions of treatment compared with the pre treatment and post 12 sessions of treatment ($p<0.025$). While, there was no statistically significant difference in the pre treatment compared with the post 12 sessions of treatment ($p>0.025$) (Table 1).

The Friedman test revealed that there was a statistically significant difference in pain level among the three measuring periods (pre and post 12 sessions of treatment, and post 24 sessions) ($p<0.025$). A Wilcoxon signed rank tests (Post hoc tests) revealed that there was a statistically significant reduction in the pain level in the post 24 sessions of treatment compared with the pre treatment and post 12 sessions of treatment ($p<0.025$). In addition, there was a statistically significant reduction in the pain level in the post 12 sessions of treatment compared with the pre-treatment ($p<0.025$).

DISCUSSION

This study was conducted to determine the effect of exercise on pain and posture associated with endometriosis in 20 patients diagnosed with mild or moderate forms of the disease. The results of this study showed a statistically significant decrease in the intensity of endometriosis pain after performing the exercise program as well as, a statistically significant decrease in thoracic kyphosis angle related to postural kyphosis deformity, while, there was no significant correlation between patients’ physical characteristics and intensity of endometriosis pain. The results of this study come in agreement with the review of Bergström et al.¹⁷⁾, who found that physical exercise has beneficial effects on relaxing the muscles of patients’ suffering from endometriosis which in turn helps to break their pain cycle. In addition, the results of this study agree with those of another recent RCT which reported that progressive muscular relaxation training was more effective in improving pain, anxiety and depression in endometriosis women under hormonal therapy¹⁸⁾. Cardiovascular activity helps endometriosis patients to maintain a good level of energy. Exercise is one of the most effective strategies for boosting serotonin levels; physical activity and deep breathing exercises may increase the firing rate of serotonin neurons in the brain, which may stimulate the production of mood-elevating chemicals. Aerobic exercises such as walking and swimming may have a more significant effect on serotonin levels, toning the muscles of the entire body, and improving the general circulation¹⁹⁾. While, the results of this study were not in agreement with the literature data which proved that physical exercise plays no role in the prevention of the occurrence or progression of endometriosis in preventing the occurrence or progression of the endometriosis. These studies also draw attention to the possibility of conclusions about non-protective effect of exercise in

Table 1. Dependent variables in patients with endometriosis in pre, post four weeks and post eight weeks of exercises program

Measuring periods	Pre exercises	Post 4 weeks	Post 8 weeks
Kyphosis angle (mean \pm SD)	43.1 \pm 1.4	43.0 \pm 1.4	39.6 \pm 2.1 ^{#‡}
Pain intensity level (median (IQR))	4 (1)	1.5 (1.75) [*]	1 (1) ^{#‡}

^{*}Significant ($p<0.025$) difference between pre and post 4 weeks, [#]Significant ($p<0.025$) difference between pre and post 8 weeks, [‡]Significant ($p<0.025$) difference between post 4 weeks and post 8 weeks, IQR: Interquartile Range; SD: standard deviation.

women with endometriosis that can be due the discomfort experienced, which prevents the practice of physical exercise. There are several limitations of our study. First, the lack of an objective outcome measure of pain intensity scale. Second, the authors did not assess the long-term effect and follow up of the exercise program. A third limitation was the absence of control group of patients with endometriosis who received no treatment as the authors did not want to leave patients untreated through this period of time.

REFERENCES

- 1) : Practice Bulletin #114, "Management of Endometriosis". *Obstet Gynecol*, 2010.
- 2) Stratton P, Berkley KJ: Chronic pelvic pain and endometriosis: translational evidence of the relationship and implications. *Hum Reprod Update*, 2011, 17: 327–346. [[Medline](#)] [[CrossRef](#)]
- 3) Haugstad GK, Haugstad TS, Kirste UM, et al.: Posture, movement patterns, and body awareness in women with chronic pelvic pain. *J Psychosom Res*, 2006, 61: 637–644. [[Medline](#)] [[CrossRef](#)]
- 4) FitzGerald MP, Kotarinos R: Rehabilitation of the short pelvic floor. I: Background and patient evaluation. *Int Urogynecol J Pelvic Floor Dysfunct*, 2003, 14: 261–268. [[Medline](#)] [[CrossRef](#)]
- 5) Goodman C, Fuller K: *Pathology: Implications for the Physical Therapist*. St. Louis: Saunders Elsevier, 2009.
- 6) Endometriosis. *MayoClinic.com*. Sept. 11, 2008. <http://www.mayoclinic.com/health/endometriosis/DS00289> (Accessed Feb. 17, 2010)
- 7) "What are the treatments for endometriosis". Eunice Kennedy Shriver National Institute of Child Health and Human Development. Retrieved 20 August, 2013.
- 8) Troyer MR: Differential diagnosis of endometriosis in a young adult woman with nonspecific low back pain. *Phys Ther*, 2007, 87: 801–810. [[Medline](#)] [[Cross-Ref](#)]
- 9) Arya P, Shaw R: Endometriosis: current thinking. *Curr Obstet Gynaecol*, 2005, 15: 191–198. [[CrossRef](#)]
- 10) Febbraio MA: Exercise and inflammation. *J Appl Physiol* 1985, 2007, 103: 376–377. [[Medline](#)] [[CrossRef](#)]
- 11) Warren MP, Perlroth NE: The effects of intense exercise on the female reproductive system. *J Endocrinol*, 2001, 170: 3–11 [[CrossRef](#)]. [[Medline](#)]
- 12) Koppan A, Hamori J, Vranics I, et al.: Pelvic pain in endometriosis: painkillers or sport to alleviate symptoms? *Acta Physiol Hung*, 2010, 97: 234–239. [[Medline](#)] [[CrossRef](#)]
- 13) : American society of reproductive medicine (ASRM): "Revised classification of endometriosis: 1979. *Fertil Steril*, 1997, 67: 819.
- 14) Hartrick CT, Kovan JP, Shapiro S: The numeric rating scale for clinical pain measurement: a ratio measure? *Pain Pract*, 2003, 3: 310–316. [[Medline](#)] [[CrossRef](#)]
- 15) Drerup B, Hierholzer E: Back shape measurement using video rasterstereography and three-dimensional reconstruction of spinal shape. *Clin Biomech (Bristol, Avon)*, 1994, 9: 28–36, 28–36. [[Medline](#)] [[CrossRef](#)]
- 16) ACOG Committee Obstetric Practice: ACOG Committee opinion. Number 267, January 2002: exercise during pregnancy and the postpartum period. *Obstet Gynecol*, 2002, 99: 171–173. [[Medline](#)] [[CrossRef](#)]
- 17) Bergström I, Freyschuss B, Jacobsson H, et al.: The effect of physical training on bone mineral density in women with endometriosis treated with GnRH analogs: a pilot study. *Acta Obstet Gynecol Scand*, 2005, 84: 380–383. [[Medline](#)] [[CrossRef](#)]
- 18) Zhao L, Wu H, Zhou X, et al.: Effects of progressive muscular relaxation training on anxiety, depression and quality of life of endometriosis patients under gonadotrophin-releasing hormone agonist therapy. *Eur J Obstet Gynecol Reprod Biol*, 2012, 162: 211–215. [[Medline](#)] [[CrossRef](#)]
- 19) Carpenter SE, Tjaden B, Rock JA, et al.: The effect of regular exercise on women receiving danazol for treatment of endometriosis. *Int J Gynaecol Obstet*, 1995, 49: 299–304. [[Medline](#)] [[CrossRef](#)]