

# Exercise for dysmenorrhoea (Review)

Brown J, Brown S



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[Intervention Review]

## Exercise for dysmenorrhoea

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### ABSTRACT

#### Background

Dysmenorrhoea is characterised by cramping lower abdominal pain that may radiate to the lower back and upper thighs and is commonly associated with nausea, headache, fatigue and diarrhoea. Physical exercise has been suggested as a non-medical approach to the management of these symptoms.

#### Objectives

To assess the evidence for the effectiveness of exercise in the treatment of dysmenorrhoea.

#### Search strategy

A search was conducted using the methodology of the Menstrual Disorders and Subfertility Group (August 2009). CENTRAL (*The Cochrane Library*), MEDLINE, EMBASE, AMED and PsycINFO electronic databases were searched. Handsearching of relevant bibliographies and reference lists was also conducted.

#### Selection criteria

Randomised controlled trials comparing exercise with a control or no intervention in women with dysmenorrhoea.

#### Data collection and analysis

Trials were independently selected and data extracted by two review authors.

#### Main results

Four potential trials were identified of which one was included in the review. The available data could only be included as a narrative description. There appeared to be some evidence from the trial that exercise reduced the Moos' Menstrual Distress Questionnaire (MDQ) score during the menstrual phase ( $P < 0.05$ ) and resulted in a sustained decrease in symptoms over the three observed cycles ( $P < 0.05$ ).

## Authors' conclusions

The results of this review are limited to a single randomised trial of limited quality and with a small sample size. The data should be interpreted with caution and further research is required to investigate the hypothesis that exercise reduces the symptoms associated with dysmenorrhoea.

## PLAIN LANGUAGE SUMMARY

### Exercise for dysmenorrhoea

Painful periods are characterised by cramping lower abdominal pain that may radiate to the lower back and upper thighs. The cramps are commonly associated with nausea, headache, fatigue and diarrhoea. Women with secondary dysmenorrhoea often have chronic pelvic pain associated with a structural abnormality whereas in primary dysmenorrhoea there is no structural abnormality. Physical exercise has been suggested as a non-medical approach to the management of the symptoms of dysmenorrhoea. The objective of the review was to assess the evidence for the effectiveness of exercise in the treatment of symptoms associated with dysmenorrhoea. One trial of limited quality was identified which suggested that exercise may reduce some symptoms during the menstrual phase. The results should be viewed with caution due to the limited evidence.

## BACKGROUND

### Description of the condition

The term dysmenorrhoea comes from the Greek word for difficult monthly flow and describes painful menstruation. Dysmenorrhoea is characterised by cramping lower abdominal pain that may radiate to the lower back and upper thighs, commonly with associated nausea, headache, fatigue and diarrhoea. Dysmenorrhoea can be classified into two subtypes. Primary dysmenorrhoea occurs when there is no identifiable pelvic disease and tends to occur within 12 months of menarche. Secondary dysmenorrhoea can occur many years after menarche and is associated with identifiable pelvic pathology, for example endometriosis. Exercise can be defined as, "an activity that requires physical exertion, especially when performed to develop or maintain fitness" (Dictionary 2000).

The incidence and epidemiology of dysmenorrhoea is difficult to establish due to the variety of criteria used to diagnose dysmenorrhoea and the subjective nature of the symptoms. However, available studies demonstrate that it is a significant health problem affecting a broad range of women. A systematic review of studies in developing countries reported that 25% to 50% of adult women and 75% of adolescents experienced dysmenorrhoea and that participation in usual activities was adversely affected in 5% to 20% of these women (Harlow 2004). A systematic review, in 1998, of chronic pelvic pain in the UK concluded that the prevalence of dysmenorrhoea was between 45% to 97% (Zondervan 1998). A review of primary dysmenorrhoea in adolescents found

the prevalence to range from 20% to 90%, with 15% describing their symptoms as severe (Davis 2001).

The health burden and social and economic cost of dysmenorrhoea is high. Absenteeism has been reported as between one third to one half missing school or work at least once, and 5% to 14% absent more frequently (Tu 2007).

The first theories on the cause of dysmenorrhoea were anatomical. Hippocrates believed that cervical obstruction and subsequent stagnation of menstrual blood was the cause of painful menstruation (Ylikorkala 1978). The belief in a mechanical obstruction to the release of menstrual blood persisted for a long time. The suggested physiological causes for dysmenorrhoea include the excessive production of uterine prostaglandins (Rosenwaks 1980) and the over production of vasopressin, a hormone which stimulates uterine muscular contractions (Tu 2007).

### Description of the intervention

Physical exercise has been advocated as a non-medical intervention for the relief of dysmenorrhoea (Fernandez 1991; Metheny 1989). Billig was one of the first advocates of exercise for dysmenorrhoea, in 1943 (Billig 1943). He thought women with dysmenorrhoea had contracted ligamentous bands in the abdomen and devised a series of stretching exercises for which he claimed a high rate of symptom relief. The Billigs' exercise regime stretches the connective tissue around the pelvis, the hip flexors, and the muscles on the inside of the thighs. These exercises never became standard treatment but the belief that exercise was beneficial con-

tinued to enjoy widespread acceptance, with the evidence being mainly anecdotal (Prior 1987). Israel et al (1985) conducted an experimental study comparing dysmenorrhoeic symptoms between a physical training group of women (30 minutes continuous walk or jog programme three days a week at an intensity of 70% to 85% of the heart rate range) and a sedentary control group (no activity during the experimental period) (Israel 1985). The results showed a significant decrease in symptoms in the training group during the menstrual phase of the cycle; however, there were methodological flaws with this study. Gannon et al (1989) reported that the duration that women had been exercising for significantly correlated with reduced menstrual symptoms (Gannon 1989). A decrease in menstrual symptoms has also been reported in female runners (as a non-elite sporting activity) (Schwartz 1981). The issue is complicated by the subjective nature of the symptoms and the possible confounding factors of women's disposition, stress and mood (Metheny 1989). In a non-randomised study, Aganoff and Boyle (1994) compared regularly exercising women recruited from health and fitness clubs with non-exercisers (recruited from community sources). They reported significant effects of exercise on negative mood states and physical symptoms with significant effects on all measures across the menstrual cycle phase (Aganoff 1994). In a meta-analysis examining the predisposing factors associated with chronic pelvic pain, exercise (not defined) was associated with a small reduced risk of dysmenorrhoea (odds ratio (OR) 0.89, 95% confidence interval (CI) 0.80 to 0.99) that indicated a potential benefit of exercise (Latthe 2006).

A problem for researchers has been the subjective nature of the dysmenorrhoea symptoms experienced by women and the heterogeneity of exercise regimes. Some have tried to quantify exercise in terms of high-intensity and low-intensity exercise but the problem remains that exercise varies in quality, intensity and duration in relation to menses.

### How the intervention might work

There is evidence to suggest that aerobic exercise stimulates the release of beta endorphins (hormones) which act as an analgesic for non-specific pain (Colt 1981). Perhaps the main issue is not the mechanism of symptom relief but whether exercise has a beneficial effect or not. Unfortunately the evidence is conflicting. A prospective study found that physical activity was not associated with any changes in the dysmenorrhoea pain parameter (Harlow 1996). In contrast a 1995 study found that 'vigorous exercisers' experienced less physical symptoms during menstruation than their sedentary counterparts (Choi 1995).

### Why it is important to do this review

There is some evidence for the benefit of exercise in reducing symptoms of dysmenorrhoea. However, the quality of the evidence

needs to be examined to establish whether or not we can advocate exercise as a supplementary therapy for women with painful periods.

## OBJECTIVES

To assess the evidence for the effectiveness of exercise in the treatment of dysmenorrhoea.

## METHODS

### Criteria for considering studies for this review

#### Types of studies

Randomised controlled trials were included that used exercise as an intervention to relieve or reduce symptoms associated with dysmenorrhoea compared with no exercise.

#### Types of participants

#### Inclusion criteria

Women in the trials had to meet all the following inclusion criteria for the trial to be included in the review:

- dysmenorrhoea (pain affecting daily activity or with a high baseline score);
- dysmenorrhoea in the majority (> 50%) of menstrual cycles;
- dysmenorrhoea for at least one day of menses;
- of reproductive age;
- either primary or secondary dysmenorrhoea.

#### Exclusion criteria

If participants in the trial met any of the exclusion criteria, the trial was not included in the review:

- with irregular or infrequent menstrual cycles (usually outside of the typical range of a 21 to 35 day cycle);
- using an intra-uterine contraceptive device (IUD) or taking oral contraceptive pills (OCP).

#### Types of interventions

Any randomised controlled trials (RCTs) comparing exercise (as treatment) for dysmenorrhoea versus no exercise.

## Types of outcome measures

### Primary outcomes

- Pain relief, measured either by a visual analogue scale (VAS), other scale (menstrual disorders questionnaire), or dichotomous outcomes (i.e. pain relief yes or no)

If scales or labels other than VAS were used these were to be collapsed into dichotomous data, if possible; based on the authors' descriptions of the scales. If outcomes were presented in terms of pain intensity rather than pain relief these were to be considered and, where possible, converted into dichotomous categories. Pain measured with the VAS is preferable as it is a more objective and sensitive measure than dichotomous data (Melzack 1994).

### Secondary outcomes

- Overall physical symptom improvement scores, measured by changes in dysmenorrhoea symptoms or treatment effectiveness (either self reported or observed), or other similar measures
  - Adverse effects
  - Requirements for medication additional to assigned treatment, measured as the proportion of women requiring analgesics additional to their assigned treatment
  - Restriction of daily life activities, measured as the proportion of women who reported activity restriction
    - Absence from work or school, measured as the proportion of women reporting absences from work or school, and also as hours or days of absence as a more selective measure
    - Significant disruption to daily life for women not in the paid workforce

## Search methods for identification of studies

### Electronic searches

A search was conducted (August 2009). All reports which described (or might describe) randomised controlled trials of physical activity in the treatment of dysmenorrhoea were obtained using the search strategy developed by the Cochrane Menstrual Disorders and Subfertility Group (MDSG). The MDSG Trials Register (Appendix 1) and Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library*) were searched (Appendix 4). In addition, the MEDLINE (Appendix 2), EMBASE (Appendix 3), AMED (Appendix 5) and PsycINFO (Appendix 6) databases were searched.

The titles, abstracts, and key words of the listed articles were assessed.

### Searching other resources

The citation lists of relevant publications, review articles and any included studies were also searched.

### Data collection and analysis

Trials for inclusion in the review were selected after employing the search strategy above. One trial was identified and, therefore, analysis of data was not possible.

### Selection of studies

Trials for inclusion were identified from the search strategies by two independent researchers (JB and SB). There was no requirement for mediation from a third party.

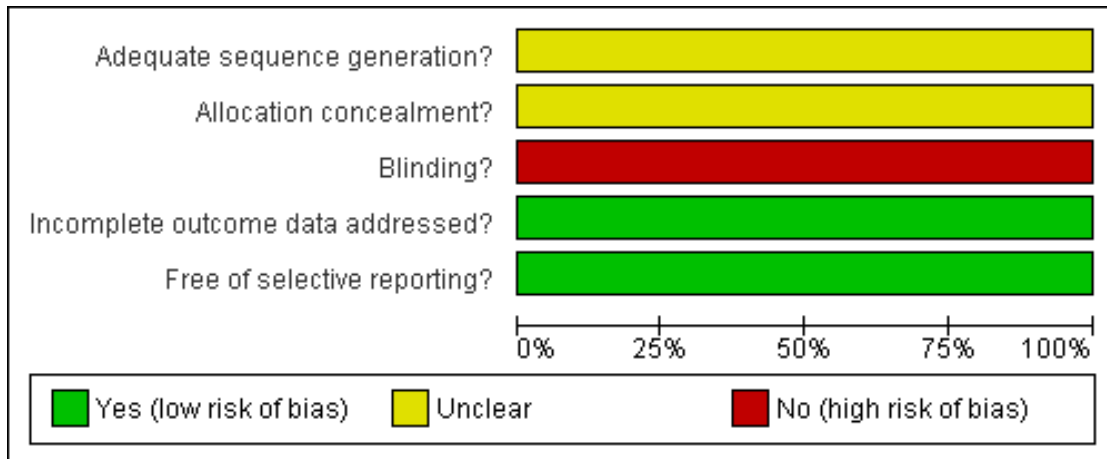
### Data extraction and management

The data identified by the authors (JB and SB) were not available in a useable format as no standard deviations, standard errors or ranges were reported. Therefore, a narrative description of the data was used. The authors would have extracted information using a standardised data extraction template to collect demographic information and dichotomous and continuous data, where available.

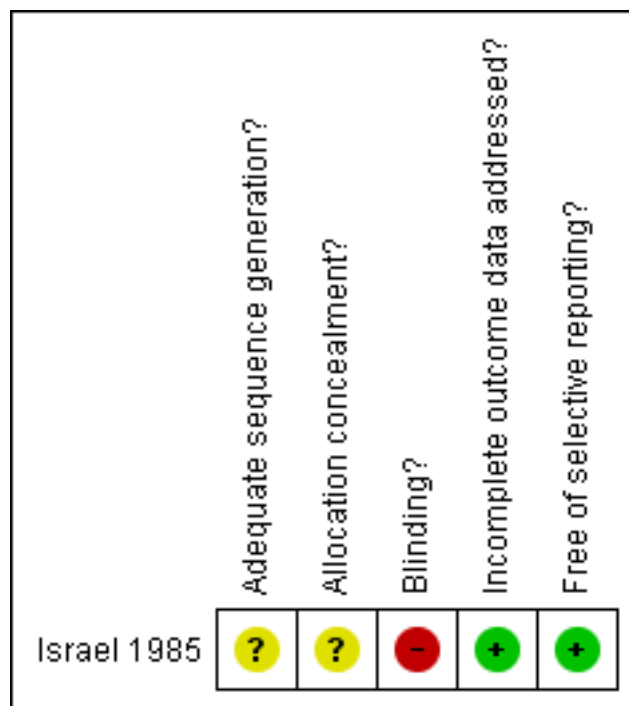
### Assessment of risk of bias in included studies

The risk of bias was evaluated by two independent researchers (JB and SB) using the following Cochrane Collaboration tool for assessment of bias. See Figure 1; and Figure 2.

**Figure 1. Methodological quality graph: review authors' judgements about each methodological quality item presented as percentages across all included studies.**



**Figure 2. Methodological quality summary: review authors' judgements about each methodological quality item for each included study.**







Domain	Description	Review authors' judgement
<b>Sequence generation</b>	Describe the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups	Was the allocation sequence adequately generated?
<b>Allocation concealment</b>	Describe the method used to conceal the allocation sequence in sufficient detail to determine whether intervention allocations could have been foreseen in advance of, or during, enrolment	Was allocation adequately concealed?
<b>Blinding of participants, personnel and outcome assessors</b> <i>Assessments should be made for each main outcome (or class of outcomes)</i>	Describe all measures used, if any, to blind study participants and personnel from knowledge of which intervention a participant received. Provide any information relating to whether the intended blinding was effective	Was knowledge of the allocated intervention adequately prevented during the study?
<b>Incomplete outcome data</b> <i>Assessments should be made for each main outcome (or class of outcomes)</i>	Describe the completeness of outcome data for each main outcome, including attrition and exclusions from the analysis. State whether attrition and exclusions were reported, the numbers in each intervention group (compared with total randomised participants), reasons for attrition and exclusions where reported, and any re-inclusions in analyses performed by the review authors	Were incomplete outcome data adequately addressed?
<b>Selective outcome reporting</b>	State how the possibility of selective outcome reporting was examined by the review authors, and what was found	Are reports of the study free of suggestion of selective outcome reporting?
<b>Other sources of bias</b>	State any important concerns about bias not addressed in the other domains of the tool If particular questions or entries were pre-specified in the review's protocol, responses should be provided for each question or entry	Was the study apparently free of other problems that could put it at a high risk of bias?

### Measures of treatment effect

No usable means with associated standard deviations or standard errors were reported and therefore the data are presented in a nar-

ative form. P values are presented where available, as an indicator of treatment effect. If sufficient data had been available, odds ratios would have been presented for dichotomous data and mean differences for continuous data. A meta-analysis was to have been

conducted when it was deemed appropriate to pool the data (that is the data were homogeneous).

### Unit of analysis issues

Data are presented as per woman randomised. No analysis was conducted due to a lack of evidence and a narrative summary is given.

### Dealing with missing data

As the paper was published more than 20 years ago, no attempt was made to contact the original authors. If more recent data were available, we would have contacted the primary authors with any queries regarding the data.

### Assessment of heterogeneity

When more than one study becomes available, heterogeneity will be evaluated using the  $I^2$  statistic.

### Assessment of reporting biases

Only one trial was identified despite an extensive search of both the published and unpublished literature.

### Data synthesis

No meta-analysis was performed as only one study was identified. Data are presented descriptively as no usable data were available. With more data, a random-effects model will be used for meta-analysis.

### Subgroup analysis and investigation of heterogeneity

If more than one study becomes available, subgroup analyses may be conducted on age and type of exercise.

### Sensitivity analysis

Not applicable.

## RESULTS

### Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

Refer to the 'Characteristics of studies' tables for further details of studies.

### Results of the search

There were 66 potential trials identified from MEDLINE, 29 from EMBASE, 53 from CENTRAL, 85 from PsycINFO and 24 from the AMED databases. After assessing the abstracts four potential trials were identified in the search conducted in August 2009.

### Included studies

One study was identified which randomised women to a control or exercise training protocol ([Israel 1985](#)).

### Excluded studies

Three studies were excluded either because the control or comparison group did not meet the selection criteria ([Carpenter 1995](#)) or they were not randomised trials ([Hubbell 1949](#); [Lundquist 1947](#)).

### Risk of bias in included studies

#### Allocation

There were no details of the randomisation process and no details of allocation concealment in the one paper identified ([Israel 1985](#)).

#### Blinding

Neither the participants nor the researchers were blinded to the assigned intervention or outcomes ([Israel 1985](#)). The lack of 'sham' exercise may exaggerate the effect of the intervention.

#### Incomplete outcome data

Three women from the control group were ill and unavailable for post-testing. Seven dropped out of the training group due to illness, injuries or stringent dietary regimens; none of these were caused by the training ([Israel 1985](#)).

#### Selective reporting

The study ([Israel 1985](#)) reported on the a priori outcomes stated.

#### Other potential sources of bias

Note that baseline measures in treadmill time, and body fat were different between the control and intervention groups ([Israel 1985](#)).

## Effects of interventions

One study was identified that compared a control group with a training intervention group and evaluated the effect on dysmenorrhoea. The authors only included women with primary dysmenorrhoea. No standard deviations or standard errors were provided in the paper and therefore the data were descriptive. The training group appeared to have significantly lower ( $P < 0.05$ ) menstrual disorder questionnaire (MDQ) scores during the menstrual phase than the control group. There was a negative linear trend in the MDQ score over the three observed cycles in the training group ( $t = 2.40$ ,  $P < 0.05$ ) and no significant linear trend in the control group.

## DISCUSSION

### Summary of main results

Only one trial ([Israel 1985](#)) was identified, which reported a decrease in the MDQ score during the menstrual phase in the trained group. The MDQ score also decreased over time in the three observed cycles. The study had major methodological flaws, however.

### Overall completeness and applicability of evidence

Caution should be taken when interpreting the results due to the limited data available. The trial was of poor quality, with a small sample size and a high drop-out rate. The MDQ only reports on symptoms (negative affect, concentration, pain, water retention, arousal, behaviour change, autonomic reactions and control) and not on quality of life issues.

### Quality of the evidence

The review was limited to a single study with a small sample size and no details of randomisation or allocation concealment in the report ([Israel 1985](#)).

## Potential biases in the review process

The review was limited by the lack of available data. The findings should be interpreted with caution due to a lack of clarity around the randomisation procedure, differences between the two groups at baseline and reported losses to follow up.

## Agreements and disagreements with other studies or reviews

The results of non-randomised trials support the use of exercise in reducing the symptoms of dysmenorrhoea ([Hubbell 1949](#); [Lundquist 1947](#)).

## AUTHORS' CONCLUSIONS

### Implications for practice

There is a lack of available evidence to support the use of exercise in the alleviation of symptoms associated with dysmenorrhoea. The limited evidence implies that there are no adverse effects associated with exercise. Further evidence is required from well controlled, randomised trials. The broader health benefits of exercise should be discussed with women experiencing dysmenorrhoea.

### Implications for research

Although there is some evidence from non-randomised studies to support the use of exercise in alleviating the symptoms associated with dysmenorrhoea, available evidence is severely limited in volume and quality. Further research is required in this area before any definitive conclusions can be made. No evidence was identified relating to exercise and secondary dysmenorrhoea.

## ACKNOWLEDGEMENTS

The authors wish to acknowledge the ongoing support of the MDSG.

## REFERENCES

### References to studies included in this review

#### Israel 1985 *{published data only}*

Israel R, Sutton M, O'Brien K. Effects of aerobic training on primary dysmenorrhoea symptomatology in college females. *Journal of the American College of Health* 1985;**33**:241–4.

### References to studies excluded from this review

#### Carpenter 1995 *{published data only}*

Carpenter S, Tjaden B, Rock J, Kimball A. The effect of regular exercise on women receiving danazol for the treatment of endometriosis. *International Journal of Gynaecology and Obstetrics* 1995;**49**:299–304.

#### Hubbell 1949 *{published data only}*

Hubbell J. Specific and non-specific exercises for the relief of dysmenorrhoea. *Research Quarterly* 1949;**20**:378–86.

#### Lundquist 1947 *{published data only}*

Lundquist C. Use of the Billig exercise for dysmenorrhoea for college women. *Research Quarterly* 1945;**18**:44–53.

### Additional references

#### Aganoff 1994

Aganoff J, Boyle G. Aerobic exercise, mood states and menstrual cycle symptoms. *Journal of Psychosomatic Research* 1994;**38**:183–92. [<http://epublications.bond.edu.au/hss/pubs/37>]

#### Billig 1943

Billig HE Jr. Dysmenorrhoea, the result of a postural defect. *Archives of Surgery* 1943;**46**:611.

#### Choi 1995

Choi PYL, Salmon P. Symptom changes across the menstrual cycle in competitive sportswomen, exercisers and sedentary women. *British Journal of Clinical Psychology* 1995;**34**:447–60.

#### Colt 1981

Colt EW, Wardlaw SL, Frantz AG. The effect of running on plasma beta endorphin. *Life Sciences* 1981;**28**:1637–40.

#### Davis 2001

Davis AR, Westhoff CL. Primary dysmenorrhoea in adolescent girls and treatment with oral contraceptives. *Journal of Pediatric and Adolescent Gynecology* 2001;**14**(1):3–8.

#### Dictionary 2000

Editors of the American Heritage Dictionaries. *The American Heritage Dictionary of the English Language*. 4th Edition. Boston: Houghton Mifflin Company, 2000.

#### Fernandez 1991

Fernandez E, Turk D. Sensory and affective components of pain: Separation and synthesis. *Psychological Bulletin* 1991;**112**:205–17.

#### Gannon 1989

Gannon L, Luchetta T, Pardie L, Rhodes K. Perimenstrual symptoms: Relationships with chronic stress and selected

lifestyle variables. *Journal of Behavioural Medicine* 1989;**12**:149–59.

#### Harlow 1996

Harlow SD, Park M. A longitudinal study of risk factors for the occurrence, duration and severity of menstrual cramps in a cohort of college women. *British Journal of Obstetrics and Gynaecology* 1996;**103**(11):1134–42.

#### Harlow 2004

Harlow S, Campbell O. Epidemiology of menstrual disorders in developing countries: A systematic review. *British Journal of Obstetrics and Gynaecology* 2004;**111**:6–16.

#### Israel 1985

Israel RG, Sutton M, O'Brien KF. Effects of aerobic training on primary dysmenorrhoea symptomatology in college females. *Journal of American College Health* 1985;**33**:241–4.

#### Latthe 2006

Latthe P, Mignini L, Gray R, et al. Factors predisposing women to chronic pelvic pain: a systematic review. *BMJ* 2006;**332**:749–55.

#### Melzack 1994

Melzack R, Katz J. Pain measurement in persons in pain. In: Wall PD, Melzack R editor(s). *Textbook of Pain*. 3rd Edition. London: Churchill Livingstone, 1994:337–51.

#### Metheny 1989

Metheny WP, Smith RP. The relationship among exercise, stress and primary dysmenorrhoea. *Journal of Behavioural Medicine* 1989;**12**(6):569–86.

#### Prior 1987

Prior JC, Vigna Y. Conditioning exercise and premenstrual symptoms. *Journal of Reproductive Medicine* 1987;**32**(6):423–8.

#### Rosenwaks 1980

Rosenwaks Z, Seegar-Jones G. Menstrual pain - its origin and pathogenesis. *Journal of Reproductive Medicine* 1980;**25**:207–13.

#### Schwartz 1981

Schwarz B, Cumming D, Riordan E, Selye M, Yen S, Rebar R. Exercise-associated amenorrhoea: A distinct entity?. *American Journal of Obstetrics and Gynecology* 1981;**141**:662–70.

#### Tu 2007

Tu F. Dysmenorrhoea: Contemporary perspectives. *Pain* 2007;**XV**(8):1–4.

#### Ylikorkala 1978

Ylikorkala O, Dawood MY. New concepts in dysmenorrhoea. *American Journal of Obstetrics and Gynecology* 1978;**30**:833–47.

#### Zondervan 1998

Zondervan K, Yudkin PL. The prevalence of chronic pelvic pain in women in the United Kingdom: a systematic review. *British Journal of Obstetrics and Gynaecology* 1998;**105**:93–9.

\* Indicates the major publication for the study

## CHARACTERISTICS OF STUDIES

### Characteristics of included studies [ordered by study ID]

#### Israel 1985

Methods	Randomised trial of training versus control in women with primary dysmenorrhoea
Participants	USA study 40 women responding positively to a pre-recruitment dysmenorrhoea questionnaire. Four were subsequently excluded for having a diagnosis of secondary dysmenorrhoea Exclusion: secondary dysmenorrhoea.
Interventions	Control (n=18): asked not to exercise during the experimental period versus Training (n=18): a 12-week walk or jog training programme at an intensity of 70-85% of the heart rate range (HRR). Training was for 3 days per week and the duration of the aerobic phase was 30 minutes with 15 minute warm up and cool down periods All participants were pre-tested two weeks prior to the start of the study to determine baseline levels of cardiorespiratory endurance using a treadmill with a steady incline until volitional fatigue was reached and body composition. ECG was recorded
Outcomes	Moos' Menstrual Distress Questionnaire administered pre-training, post-training and during the premenstrual and intermenstrual phases of the three cycles observed
Notes	Protocol adherence to training was 80%.

#### *Risk of bias*

Item	Authors' judgement	Description
Adequate sequence generation?	Unclear	'Randomly assigned'.
Allocation concealment?	Unclear	No details in paper.
Blinding? All outcomes	No	No blinding.
Incomplete outcome data addressed? All outcomes	Yes	Details and reasons for losses to follow up provided. Three women from the control group were ill and unavailable for post-testing and seven dropped out of the training group due to illness, injuries or stringent dietary regimens. None of these were caused by the training
Free of selective reporting?	Yes	Reported on main a priori outcomes.

**Characteristics of excluded studies** *[ordered by study ID]*

Study	Reason for exclusion
Carpenter 1995	Included a treatment with medical intervention, therefore wrong control group
Hubbell 1949	Controlled clinical trial, not randomised.
Lundquist 1947	Controlled clinical trial, not randomised.

## DATA AND ANALYSES

### Comparison 1. Exercise versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 MDQ score menstrual phase			Other data	No numeric data
2 MDQ score menstrual cycle			Other data	No numeric data

#### Analysis 1.1. Comparison 1 Exercise versus control, Outcome 1 MDQ score menstrual phase.

##### MDQ score menstrual phase

Study	Training	Control
Israel 1985	86	95

#### Analysis 1.2. Comparison 1 Exercise versus control, Outcome 2 MDQ score menstrual cycle.

##### MDQ score menstrual cycle

Study	Cycle 1	Cycle 2	Cycle 3
Israel 1985	Training 92 Control 93	Training 80 Control 96	Training 74 Control 87

## APPENDICES

### Appendix I. MDSG search string

Keywords CONTAINS "exercise" or "Exercise Therapy" or "activity scheduling" or "fitness" or "aerobic exercise" or "Athletic Support" or Title CONTAINS "exercise" or "Exercise Therapy" or "activity scheduling" or "fitness" or "aerobic exercise" or "Athletic Support"

AND

Keywords CONTAINS "dysmenorrh" or "pelvic pain" or "menstrual cramps" or "menstrual pain" or "pain-pelvic" or "\*Endometriosis" or "adenomyosis" or "dyspareunia" or "pain-dysmenorrh" or "pain-dyspareunia" or "pain-endometriosis" or "menstrual distress" or "Dysmenorrh" or "Dysmenorrh-Symptoms" or "dyamenorrh" or Title CONTAINS "dysmenorrh" or "pelvic pain" or "menstrual cramps" or "menstrual pain" or "pain-pelvic" or "\*Endometriosis" or "adenomyosis" or "dyspareunia" or "pain-dysmenorrh" or "pain-dyspareunia" or "pain-endometriosis" or "menstrual distress" or "Dysmenorrh" or "Dysmenorrh-Symptoms" or "dysmenorrh"

## Appendix 2. MEDLINE search strategy

Database: Ovid MEDLINE(R) <1950 to August Week 1 2009>

Search strategy:

-----  
1 exp Dysmenorrhea/ (2556)  
2 Dysmenorrh\$.tw. (2978)  
3 (pain\$ adj5 menstruat\$).tw. (209)  
4 exp Pelvic Pain/ (4793)  
5 pelv\$ pain\$.tw. (4024)  
6 period\$ pain\$.tw. (205)  
7 menstrua\$ cramp\$.tw. (78)  
8 exp Endometriosis/ (13267)  
9 Endometrio\$.tw. (14589)  
10 adenomyosis.tw. (1195)  
11 dyspareunia.tw. (1669)  
12 or/1-11 (25810)  
13 exp exercise/ or exp exercise therapy/ (66817)  
14 exercise\$.tw. (143826)  
15 aerobic\$.tw. (39903)  
16 physical training.tw. (3668)  
17 (swim\$ or jog\$ or run\$).tw. (103984)  
18 (athlet\$ or train\$).tw. (234143)  
19 conditioning.tw. (31847)  
20 (fitness or isometric\$).tw. (43833)  
21 or/13-20 (548343)  
22 12 and 21 (482)  
23 randomized controlled trial.pt. (278136)  
24 controlled clinical trial.pt. (80231)  
25 randomized.ab. (187362)  
26 placebo.tw. (117986)  
27 clinical trials as topic.sh. (145561)  
28 randomly.ab. (135743)  
29 trial.ti. (81574)  
30 (crossover or cross-over or cross over).tw. (43620)  
31 or/23-30 (658983)  
32 (animals not (humans and animals)).sh. (3335965)  
33 31 not 32 (609881)  
34 22 and 33 (66)  
35 from 34 keep 1-66 (66)

## Appendix 3. EMBASE search strategy

Database: EMBASE <1980 to 2009 Week 33>

Search strategy:

-----  
1 exp Dysmenorrhea/ (3734)  
2 Dysmenorrh\$.tw. (2247)  
3 (pain\$ adj5 menstruat\$).tw. (159)  
4 exp Pelvic Pain/ (4896)  
5 pelv\$ pain\$.tw. (3799)  
6 period\$ pain\$.tw. (179)  
7 menstrua\$ cramp\$.tw. (51)

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Exercise for dysmenorrhoea (Review)

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8 exp Endometriosis/ (11258)  
 9 Endometrio\$.tw. (12443)  
 10 adenomyosis.tw. (1044)  
 11 dyspareunia.tw. (1575)  
 12 or/1-11 (24133)  
 13 exercise\$.tw. (119657)  
 14 aerobic\$.tw. (35007)  
 15 physical training.tw. (2760)  
 16 (swim\$ or jog\$ or run\$).tw. (89371)  
 17 (athlet\$ or train\$).tw. (178395)  
 18 conditioning.tw. (24718)  
 19 (fitness or isometric\$).tw. (34312)  
 20 exercise/ or anaerobic exercise/ or aerobic exercise/ or aquatic exercise/ (79494)  
 21 or/13-20 (436393)  
 22 21 and 12 (562)  
 23 Clinical Trial/ (551760)  
 24 Randomized Controlled Trial/ (172358)  
 25 exp randomization/ (26986)  
 26 Single Blind Procedure/ (8433)  
 27 Double Blind Procedure/ (73635)  
 28 Crossover Procedure/ (21644)  
 29 Placebo/ (130050)  
 30 Randomized controlled trial\$.tw. (34498)  
 31 Rct.tw. (2873)  
 32 random allocation.tw. (643)  
 33 randomly allocated.tw. (10436)  
 34 allocated randomly.tw. (1362)  
 35 (allocated adj2 random).tw. (564)  
 36 Single blind\$.tw. (7632)  
 37 Double blind\$.tw. (86343)  
 38 ((treble or triple) adj blind\$).tw. (141)  
 39 placebo\$.tw. (112444)  
 40 prospective study/ (84538)  
 41 or/23-40 (724468)  
 42 case study/ (6277)  
 43 case report.tw. (122024)  
 44 abstract report/ or letter/ (507457)  
 45 or/42-44 (633348)  
 46 41 not 45 (699182)  
 47 22 and 46 (130)  
 48 limit 47 to yr="2008 -Current" (29)  
 49 from 48 keep 1-29 (29)

#### Appendix 4. CENTRAL search strategy

Database: EBM Reviews - Cochrane Central Register of Controlled Trials <3rd Quarter 2009>

Search strategy:

-----  
1 exp Dysmenorrhea/ (267)  
2 Dysmenorrh\$.tw. (528)  
3 (pain\$ adj5 menstruat\$).tw. (21)  
4 exp Pelvic Pain/ (421)  
5 pelv\$ pain\$.tw. (316)  
6 period\$ pain\$.tw. (144)  
7 menstrua\$ cramp\$.tw. (15)  
8 exp Endometriosis/ (370)  
9 Endometrio\$.tw. (677)  
10 adenomyosis.tw. (23)  
11 dyspareunia.tw. (152)  
12 or/1-11 (1703)  
13 exp exercise/ or exp exercise therapy/ (8581)  
14 exercise\$.tw. (21858)  
15 aerobic\$.tw. (2868)  
16 physical training.tw. (605)  
17 (swim\$ or jog\$ or run\$).tw. (6444)  
18 (athlet\$ or train\$).tw. (19000)  
19 conditioning.tw. (1301)  
20 (fitness or isometric\$).tw. (2987)  
21 or/13-20 (43746)  
22 12 and 21 (53)  
23 from 22 keep 1-53 (53)

#### Appendix 5. AMED search strategy

Database: AMED (Allied and Complementary Medicine) <1985 to August 2009>

Search strategy:

-----  
1 exp Dysmenorrhea/ (76)  
2 Dysmenorrh\$.tw. (131)  
3 (pain\$ adj5 menstruat\$).tw. (13)  
4 exp Pelvic Pain/ (0)  
5 pelv\$ pain\$.tw. (91)  
6 period\$ pain\$.tw. (22)  
7 menstrua\$ cramp\$.tw. (9)  
8 exp Endometriosis/ (26)  
9 Endometrio\$.tw. (64)  
10 adenomyosis.tw. (6)  
11 dyspareunia.tw. (18)  
12 or/1-11 (326)  
13 exp exercise/ or exp exercise therapy/ (10612)  
14 exercise\$.tw. (16451)  
15 aerobic\$.tw. (1501)  
16 physical training.tw. (258)  
17 (swim\$ or jog\$ or run\$).tw. (3025)  
18 (athlet\$ or train\$).tw. (16041)  
19 conditioning.tw. (393)

20 (fitness or isometric\$).tw. (4612)  
 21 or/13-20 (31511)  
 22 12 and 21 (24)  
 23 from 22 keep 1-24 (24)

## Appendix 6. PsycINFO search strategy

Database: PsycINFO <1806 to August Week 3 2009>

Search strategy:

-----  
 1 exp Dysmenorrhea/ (141)  
 2 Dysmenorrh\$.tw. (260)  
 3 (pain\$ adj5 menstruat\$).tw. (46)  
 4 exp Pelvic Pain/ (0)  
 5 pelv\$ pain\$.tw. (269)  
 6 period\$ pain\$.tw. (26)  
 7 menstrua\$ cramp\$.tw. (12)  
 8 exp Endometriosis/ (0)  
 9 Endometrio\$.tw. (108)  
 10 adenomyosis.tw. (4)  
 11 dyspareunia.tw. (285)  
 12 or/1-11 (926)  
 13 exp exercise/ or exp exercise therapy/ (10884)  
 14 exercise\$.tw. (31029)  
 15 aerobic\$.tw. (1792)  
 16 physical training.tw. (348)  
 17 (swim\$ or jog\$ or run\$).tw. (28997)  
 18 (athlet\$ or train\$).tw. (192543)  
 19 conditioning.tw. (30398)  
 20 (fitness or isometric\$).tw. (8054)  
 21 or/13-20 (273499)  
 22 12 and 21 (85)  
 23 from 22 keep 1-85 (85)

## WHAT'S NEW

Last assessed as up-to-date: 24 August 2009.

Date	Event	Description
31 August 2009	Amended	New authors assigned to review. Changed from protocol to review status. Search strategies run and one new trial identified

## HISTORY

Protocol first published: Issue 2, 2003

Review first published: Issue 2, 2010

Date	Event	Description
8 April 2008	Amended	Converted to new review format.
19 February 2003	New citation required and major changes	Substantive amendment

## CONTRIBUTIONS OF AUTHORS

Julie Brown: assessed the abstracts and identified potential papers, extracted information and wrote the final review.

Stephen Brown: assessed the abstracts and identified potential papers, extracted information and made comments on the final review.

The following authors developed the protocol of this review:

Paul Bolton: wrote the first draft of the protocol; entered the protocol into RevMan; responded to peer review comments;

Chris Del Mar: guidance with developing the protocol, revision of the draft protocol, developed the Methods section, final check of the protocol;

Vivienne O'Connor: development of the title, proof reading, consultant on clinical issues.

## DECLARATIONS OF INTEREST

None known

## SOURCES OF SUPPORT

### Internal sources

- none, Not specified.

### External sources

- none, Not specified.

## **DIFFERENCES BETWEEN PROTOCOL AND REVIEW**

The search string proposed and the source databases were altered as per MDSG guidance.

## **INDEX TERMS**

### **Medical Subject Headings (MeSH)**

\*Exercise; Dysmenorrhea [\*therapy]; Randomized Controlled Trials as Topic

### **MeSH check words**

Female; Humans