

# EXERCISE IN PREGNANCY AND THE POSTPARTUM PERIOD

*This guideline has been reviewed by the Clinical Practice Obstetrics Committee and approved by the Executive and Council of the Society of Obstetricians and Gynaecologists of Canada, and approved by the Board of Directors of the Canadian Society for Exercise Physiology.*

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## Abstract

**Objective:** To design Canadian guidelines advising obstetric care providers of the maternal, fetal, and neonatal implications of aerobic and strength-conditioning exercises in pregnancy.

**Outcomes:** Knowledge of the impact of exercise on maternal, fetal, and neonatal morbidity, and of the maternal measures of fitness.

**Evidence:** MEDLINE search from 1966 to 2002 for English-language articles related to studies of maternal aerobic and strength conditioning in a previously sedentary population, maternal aerobic and strength conditioning in a previously

active population, impact of aerobic and strength conditioning on early and late pregnancy outcomes, and impact of aerobic and strength conditioning on neonatal outcomes, as well as for review articles and meta-analyses related to exercise in pregnancy.

**Values:** The evidence collected was reviewed by the Society of Obstetricians and Gynaecologists of Canada (SOGC Clinical Practice Obstetrics Committee) with representation from the Canadian Society for Exercise Physiology, and quantified using the evaluation of evidence guidelines developed by the Canadian Task Force on the Periodic Health Exam.

## Recommendations:

1. All women without contraindications should be encouraged to participate in aerobic and strength-conditioning exercises as part of a healthy lifestyle during their pregnancy. (II-1,2B)

## Key Words

Pregnancy, exercise, fetus, neonate, outcomes, aerobic, strength

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2. Reasonable goals of aerobic conditioning in pregnancy should be to maintain a good fitness level throughout pregnancy without trying to reach peak fitness or train for an athletic competition. (II-1,2C)
3. Women should choose activities that will minimize the risk of loss of balance and fetal trauma. (III-C)
4. Women should be advised that adverse pregnancy or neonatal outcomes are not increased for exercising women. (II-1,2B)
5. Initiation of pelvic floor exercises in the immediate postpartum period may reduce the risk of future urinary incontinence. (II-1C)
6. Women should be advised that moderate exercise during lactation does not affect the quantity or composition of breast milk or impact infant growth. (I-A)

**Validation:** This guideline has been approved by the SOGC Clinical Practice Obstetrics Committee, the Executive and Council of SOGC, and the Board of Directors of the Canadian Society for Exercise Physiology.

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## INTRODUCTION

Canadians are encouraged to include exercise as part of a healthy lifestyle.<sup>1</sup> Many women enter pregnancy with regular aerobic and strength-conditioning activities already a part of their daily lives. Other women see pregnancy as an opportunity to modify their lifestyles to include more health-conscious activities.

The traditional medical advice has been for exercising women to reduce their habitual levels of exertion in pregnancy and for non-exercising women to refrain from initiating strenuous exercise programs.<sup>2,3</sup> This advice was based on concerns that exercise could affect early and late pregnancy outcomes by increasing core body temperature during embryogenesis, increasing the risk of congenital anomalies, and shifting oxygenated blood and energy substrates to maternal skeletal muscle away from the developing fetus, leading to disturbances in growth.<sup>2,3</sup>

Early studies focusing on hard physical work combined with undernutrition and on forced exercise in laboratory animals tended to support these concerns.<sup>4,5</sup> Other concerns included the risk of maternal musculoskeletal injury due to changes in posture and centre of gravity or fetoplacental injury due to blunt trauma or stress effects from sudden motions.<sup>6</sup> Recent investigations, focusing on both aerobic and strength-conditioning exercise regimens in pregnancy, have shown no increase in early pregnancy loss, late pregnancy complications, abnormal fetal growth, or adverse neonatal outcomes, suggesting that previous recommendations have been overly conservative.<sup>7-16</sup>

Women and their care providers should consider the risks of not participating in exercise activities during pregnancy, including loss of muscular and cardiovascular fitness, excessive maternal weight gain, higher risk of gestational diabetes or preg-

nancy-induced hypertension, development of varicose veins and deep vein thrombosis, a higher incidence of physical complaints such as dyspnea or low back pain, and poor psychological adjustment to the physical changes of pregnancy.<sup>17</sup>

These guidelines have been designed to aid Canadian women and their care providers as they discuss the relative merits of aerobic and strength conditioning in pregnancy and the postpartum period. The quality of evidence reported in these guidelines has been described using the Evaluation of Evidence criteria outlined in the Report of the Canadian Task Force on the Periodic Health Exam<sup>18</sup> (see boxed list next page). The guidelines have been jointly sponsored by the Society of Obstetricians and Gynaecologists of Canada (SOGC) and the Canadian Society for Exercise Physiology (CSEP).

## WHO SHOULD EXERCISE IN PREGNANCY?

In uncomplicated pregnancies, women with or without a previously sedentary lifestyle should be encouraged to participate in aerobic and strength-conditioning exercises as part of a healthy lifestyle.<sup>7,12,14,19-22</sup> (II-1,2B) Women with complicated pregnancies have been discouraged from participating in exercise activities for fear of impacting the underlying disorder or maternal or fetal outcomes.<sup>23</sup> The conditions listed in Table 1 represent exclusion criteria for subjects participating in research studies.<sup>19-22</sup> Evidence specifically detailing the risks of exercise in pregnancy for women with these conditions is not available (III-C). “Relative contraindications” refers to conditions in which risks may exceed benefits of regular physical activity. The woman’s decision to be physically active or not should be made with qualified medical advice.

The Physical Activity Readiness Medical Examination for Pregnancy (PARmed-X for Pregnancy) is a tool developed by the Canadian Society for Exercise Physiology and endorsed by the Society of Obstetricians and Gynaecologists of Canada and Health Canada (and available through CSEP’s Web site <<http://www.csep.ca/forms.asp>>) for screening women interested in participating in physical activity during pregnancy.<sup>23</sup> The PARmed-X for Pregnancy includes a questionnaire for women to complete, to supply their obstetric care providers with pertinent medical history and a recent patient activity profile. It provides women with practical prescriptions for participating in aerobic and strength-conditioning activities and includes a tear-away medical clearance form that can be completed by the obstetric provider and presented for participation in organized prenatal fitness activities.

## RECOMMENDATION

1. **All women without contraindications should be encouraged to participate in aerobic and strength-conditioning exercises as part of a healthy lifestyle during their pregnancy. (II-1,2B)**

QUALITY OF EVIDENCE ASSESSMENT <sup>18</sup>	CLASSIFICATION OF RECOMMENDATIONS <sup>18</sup>
<p>The quality of evidence reported in these guidelines has been described using the Evaluation of Evidence criteria outlined in the Report of the Canadian Task Force on the Periodic Health Exam.</p> <p>I: Evidence obtained from at least one properly randomized controlled trial.</p> <p>II-1: Evidence from well-designed controlled trials without randomization.</p> <p>II-2: Evidence from well-designed cohort (prospective or retrospective) or case-control studies, preferably from more than one centre or research group.</p> <p>II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category.</p> <p>III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.</p>	<p>Recommendations included in these guidelines have been adapted from the ranking method described in the Classification of Recommendations found in the Canadian Task Force on the Periodic Health Exam.</p> <p>A. There is good evidence to support the recommendation that the condition be specifically considered in a periodic health examination.</p> <p>B. There is fair evidence to support the recommendation that the condition be specifically considered in a periodic health examination.</p> <p>C. There is poor evidence regarding the inclusion or exclusion of the condition in a periodic health examination, but recommendations may be made on other grounds.</p> <p>D. There is fair evidence to support the recommendation that the condition not be considered in a periodic health examination.</p> <p>E. There is good evidence to support the recommendation that the condition be excluded from consideration in a periodic health examination.</p>

### **WHEN AND HOW TO START AN EXERCISE PROGRAM**

Many women find that the best time to initiate an exercise program is in the second trimester, when the nausea, vomiting, and profound fatigue of the first trimester have passed and before the physical limitations of the third trimester begin. Concerns about the teratogenic effect of high core body temperatures in the early first trimester have not been demonstrated in studies of exercis-

ing women.<sup>24-28</sup> Women who have been exercising prior to pregnancy may continue their exercise regimens throughout pregnancy using the guidelines outlined below.<sup>7,10-12,14</sup> (II-1,2B)

When starting an aerobic exercise program, previously sedentary women should begin with 15 minutes of continuous exercise three times a week, increasing gradually to 30-minute sessions four times a week.<sup>19,20,29-31</sup> Episodic maximal exercise by pregnant women in a research setting appears

TABLE I CONTRAINDICATIONS TO EXERCISE IN PREGNANCY	
Absolute Contraindications	Relative Contraindications
<ul style="list-style-type: none"> <li>• Ruptured membranes</li> <li>• Preterm labour</li> <li>• Hypertensive disorders of pregnancy</li> <li>• Incompetent cervix</li> <li>• Growth restricted fetus</li> <li>• High order multiple gestation (≥ triplets)</li> <li>• Placenta previa after 28th week</li> <li>• Persistent 2nd or 3rd trimester bleeding</li> <li>• Uncontrolled type I diabetes, thyroid disease, or other serious cardiovascular, respiratory, or systemic disorder</li> </ul>	<ul style="list-style-type: none"> <li>• Previous spontaneous abortion</li> <li>• Previous preterm birth</li> <li>• Mild/moderate cardiovascular disorder</li> <li>• Mild/moderate respiratory disorder</li> <li>• Anemia (Hb &lt;100 g/L)</li> <li>• Malnutrition or eating disorder</li> <li>• Twin pregnancy after 28th week</li> <li>• Other significant medical conditions</li> </ul>
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TABLE 2

**MODIFIED HEART RATE TARGET ZONES FOR AEROBIC EXERCISE IN PREGNANCY<sup>23,36</sup>**

Maternal Age	Heart Rate Target Zone (beats/min)	Heart Rate Target Zone (beats/10 sec)
Less than 20	140–155	23–26
20–29	135–150	22–25
30–39	130–145	21–24
40 or greater	125–140	20–23

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to be safe for mother and fetus.<sup>32,33</sup> Reasonable goals of aerobic conditioning in pregnancy would be to maintain a good fitness level throughout pregnancy without trying to reach peak fitness or train for an athletic competition (II-1,2C). Elite athletes who continue to train during pregnancy require supervision by an obstetric care provider with knowledge of the impact of strenuous exercise on maternal and fetal outcomes. Women with special needs may require a referral to a physiotherapist, exercise physiologist, or sports medicine specialist to develop an appropriate exercise program.

**RECOMMENDATION**

**2. Reasonable goals of aerobic conditioning in pregnancy should be to maintain a good fitness level throughout pregnancy without trying to reach peak fitness or train for an athletic competition. (II-1,2C)**

Women should choose activities that will minimize the risk of loss of balance and fetal trauma. Brisk walking, stationary cycling, cross-country skiing, swimming, or aquafit are aerobic exercises that cause less trauma to the joints and ligaments and less bouncing up and down of the centre of gravity than running or jogging.<sup>34</sup> It is suggested that a warm-up and cool-down period be included in any exercise regimen. (III-C)

**RECOMMENDATION**

**3. Women should choose activities that will minimize the risk of loss of balance and fetal trauma. (III-C)**

There is less evidence on strength conditioning and weight training in pregnancy.<sup>10,35</sup> Some women may experience symptomatic hypotension from compression of the vena cava by the pregnant uterus and should modify these exercises to avoid the supine position after approximately 16 weeks' gestation.<sup>36</sup> The ability to perform abdominal strengthening exercises may be impeded by the development of diastasis recti and associated abdominal muscle weakness.<sup>37-39</sup> (II-2C, III-C)

Stretching and strength training exercises such as yoga and Pilates have not been studied in a pregnant population.

**EXERCISE INTENSITY**

There is an increase of 10 to 15 beats per minute in resting heart rate in pregnancy.<sup>40,41</sup> However, at maximal exercise levels, there is a blunted heart rate response as compared to the nonpregnant state.<sup>40,41</sup> Therefore, it is suggested that the use of conventional heart rate target zones be modified to account for this reduction in maximal heart rate reserve.<sup>23,36</sup> (III-C) A modified version of the conventional age-corrected heart rate target zone can be found in Table 2.<sup>23,36</sup>

Other measures of exercise intensity include the “talk test” and a visual rating of perceived exertion (see Borg’s rating, below). As the term “talk test” implies, the woman is exercising at a comfortable intensity if she is able to maintain a conversation during exercise, and should reduce the exercise intensity if this is not possible. Exercising women can also use a visual scale to assess their exercise intensity.<sup>20</sup> A target rating of 12 to 14 on Borg’s scale of perceived exertion is suggested during pregnancy.<sup>23,36,42</sup> (III-C)

**BORG’S RATING OF PERCEIVED EXERTION<sup>42</sup>**

6	
7	very, very light
8	
9	somewhat light
10	
11	fairly light
12	
13	somewhat hard
14	
15	hard
16	
17	very hard
18	
19	very, very hard
20	

A rating of 12–14 is appropriate for most pregnant women.

## **SAFETY PRECAUTIONS**

In addition to exercise, other components of a healthy lifestyle in pregnancy include good nutrition and abstinence from smoking, alcohol, and illicit drugs.<sup>43,44</sup> Some sport activities carry significant risk in pregnancy and are considered contraindicated. Women should not scuba dive in pregnancy, as the fetus is not protected from decompression sickness and gas embolism.<sup>45</sup> Women are cautioned about the potential for loss of balance and fetal trauma if they participate in horseback riding, downhill skiing, ice hockey, gymnastics, or cycling during pregnancy. (III-C) Under normal circumstances and with appropriate hydration, moderate exercise at altitudes up to 1800–2500 m (6000–8250 ft) does not appear to significantly alter maternal or fetal well-being. However, women should be wary of hiking in a location where they might fall. For those women who do not live at higher altitudes, and who are planning on exercising at altitudes above 2500 m, appropriate acclimatization is required.<sup>46,47</sup> (II-2B) Women should discuss their specific sport activities with their obstetric care provider to clarify risk and make modifications, if necessary. Women should stop exercising and seek medical attention if they experience any of the symptoms listed below (III-C).

- Excessive shortness of breath
- Chest pain
- Presyncope
- Painful uterine contractions
- Leakage of amniotic fluid
- Vaginal bleeding

## **OUTCOMES OF EXERCISE IN PREGNANCY**

Most trials of exercising women in pregnancy lack randomization and a sample size large enough to assess differences in maternal or fetal outcomes.<sup>22,48</sup> This does not imply that there should be no limits to exercise in pregnancy, but rather that the trials to date have not demonstrated large differences in pregnancy outcomes, such as early pregnancy loss, birth weight, and preterm delivery rate.<sup>7-12,14</sup> Studies of neonatal outcomes have similar limitations in size and design and do not show any increase in risk for the offspring of exercising women.<sup>13,15</sup>

### **RECOMMENDATION**

**4. Women should be advised that adverse pregnancy or neonatal outcomes are not increased for exercising women. (II-1,2B)**

## **EXERCISE IN THE POSTPARTUM PERIOD**

Depending on the mode of delivery, most types of exercise can be continued or resumed in the postpartum period. With

the added fatigue of delivery and newborn care, some women may need to reduce the intensity or length of their exercise sessions. Women who have had Caesarean delivery may slowly increase their aerobic and strength training, depending on their level of discomfort and other complicating factors such as anemia or wound infection. The 6-week postpartum evaluation is an opportunity for women and their obstetric care providers to discuss these issues. Initiation of pelvic floor exercises in the immediate postpartum period may reduce the risk of future urinary incontinence.<sup>49,50</sup>

### **RECOMMENDATION**

**5. Initiation of pelvic floor exercises in the immediate postpartum period may reduce the risk of future urinary incontinence. (II-1C)**

## **EXERCISE AND BREASTFEEDING**

Breastfeeding is the best method of providing optimal nutrition, immunologic-based protection, and emotional nurturing for the growth and development of infants.<sup>51</sup> Therefore, exercise frequency and intensity should not interfere with a mother's ability to breastfeed. Although exercise does not negatively affect milk production or composition,<sup>52-54</sup> lactic acid has been shown to be increased in the breast milk of women exercising at maximal intensity, but not in those exercising at moderate levels.<sup>55-58</sup> Controversy exists as to whether this short-term increase in lactic acid makes the breast milk less palatable to the nursing infant.<sup>55,56,58-61</sup> Mothers who find their baby does not feed as well right after exercising may consider feeding the baby right before exercising (which may also make the breasts more comfortable during exercise), postponing feeding until 1 hour after exercising, or expressing milk prior to exercising to be used after exercising. The growth of breastfeeding babies of exercising women is normal, even for the infants whose mothers are losing weight as part of their exercise regimen.<sup>53</sup>

### **RECOMMENDATION**

**6. Women should be advised that moderate exercise during lactation does not affect the quantity or composition of breast milk or impact infant growth. (I-A)**

## **RESOURCES FOR THE PREGNANT WOMAN AND HER OBSTETRIC PROVIDER**

Pregnant women interested in participating in aerobic and strength-conditioning exercises in pregnancy can be referred to the following publications: *Active Living During Pregnancy*,<sup>36</sup> *Nutrition for a Healthy Pregnancy: National Guidelines for the Childbearing Years*,<sup>43</sup> and *Healthy Beginnings: Your Handbook for Pregnancy and Birth*.<sup>62</sup>

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