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)
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.

Sponsors: This guideline has been jointly sponsored by the Society of Obstetricians and Gynaecologists of Canada and the Canadian Society for Exercise Physiology.

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.7,12,14,19-22 (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.5,6 The conditions listed in Table 1 represent exclusion criteria for subjects participating in research studies.19-22 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.23 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)
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 exercising women. Women who have been exercising prior to pregnancy may continue their exercise regimens throughout pregnancy using the guidelines outlined below.

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. Episodic maximal exercise by pregnant women in a research setting appears

<table>
<thead>
<tr>
<th>Absolute Contraindications</th>
<th>Relative Contraindications</th>
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<tbody>
<tr>
<td>• Ruptured membranes</td>
<td>• Previous spontaneous abortion</td>
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<tr>
<td>• Preterm labour</td>
<td>• Previous preterm birth</td>
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<tr>
<td>• Hypertensive disorders of pregnancy</td>
<td>• Mild/moderate cardiovascular disorder</td>
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<tr>
<td>• Incompetent cervix</td>
<td>• Mild/moderate respiratory disorder</td>
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<tr>
<td>• Growth restricted fetus</td>
<td>• Anemia (Hb &lt;100 g/L)</td>
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<tr>
<td>• High order multiple gestation (≥ triplets)</td>
<td>• Malnutrition or eating disorder</td>
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<tr>
<td>• Placenta previa after 28th week</td>
<td>• Twin pregnancy after 28th week</td>
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<tr>
<td>• Persistent 2nd or 3rd trimester bleeding</td>
<td>• Other significant medical conditions</td>
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<tr>
<td>• Uncontrolled type 1 diabetes, thyroid disease, or other serious cardiovascular, respiratory, or systemic disorder</td>
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to be safe for mother and fetus.32,33 Reasonable goals of aero-
bic 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 ath-
etles who continue to train during pregnancy require supervi-
sion 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 aero-
bic 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.34 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.10,35 Some women may experience symp-
tomatic 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.36 The
ability to perform abdominal strengthening exercises may be
impeded by the development of diastasis recti and associated
abdominal muscle weakness.37-39 (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.40,41 However, at maximal exercise levels, there
is a blunted heart rate response as compared to the nonpreg-
nant state.40,41 Therefore, it is suggested that the use of con-
ventional heart rate target zones be modified to account for this
reduction in maximal heart rate reserve.23,36 (III-C) A modified
version of the conventional age-corrected heart rate target zone
can be found in Table 2.23,36

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 conversa-
tion 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.20 A target rating of 12 to 14 on
Borg’s scale of perceived exertion is suggested during preg-
nancy.23,36,42 (III-C)

<table>
<thead>
<tr>
<th>BORG’S RATING OF PERCEIVED EXERTION42</th>
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<td>7</td>
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A rating of 12–14 is appropriate for most pregnant women.

<p>| TABLE 2 |</p>
<table>
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<tr>
<th>MODIFIED HEART RATE TARGET ZONES FOR AEROBIC EXERCISE IN PREGNANCY23,36</th>
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<tbody>
<tr>
<td>Maternal Age</td>
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<td>---------------</td>
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<td>Less than 20</td>
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<td>20–29</td>
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<td>30–39</td>
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<td>40 or greater</td>
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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. 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. 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. 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. 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. 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. 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.

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. 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, 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. Controversy exists as to whether this short-term increase in lactic acid makes the breast milk less palatable to the nursing infant. 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.

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," "Nutrition for a Healthy Pregnancy: National Guidelines for the Childbearing Years," and "Healthy Beginnings: Your Handbook for Pregnancy and Birth."
REFERENCES


