

## [ Primary Care ]

# Exercise in Pregnancy: A Clinical Review

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**Context:** Health professionals who care for pregnant women should discuss potential health benefits and harms of exercise. Although most pregnant women do not meet minimal exercise recommendations, there are a growing number of physically active women who wish to continue training throughout pregnancy.

**Evidence Acquisition:** A search of the Web of Science database of articles and reviews available in English through 2014. The search terms *exercise pregnancy*, *strenuous exercise pregnancy*, and *vigorous exercise pregnancy* were used.

**Study Design:** Clinical review.

**Level of Evidence:** Level 3.

**Results:** With proper attention to risk stratification and surveillance, exercise is safe for the mother and fetus. Benefits of exercise in pregnancy include reduction in Cesarean section rates, appropriate maternal and fetal weight gain, and managing gestational diabetes. Exercise as a means of preventing gestational diabetes, preeclampsia, or perinatal depression cannot be reliably supported. Overall, the current evidence suffers from a lack of rigorous study design and compliance with physical activity interventions.

**Conclusion:** Research thus far has been unable to consistently demonstrate proposed benefits of exercise in pregnancy, such as preventing gestational diabetes, preeclampsia, or perinatal depression. However, moderate- and high-intensity exercise in normal pregnancies is safe for the developing fetus and clearly has several important benefits. Thus, exercise should be encouraged according to the woman's preconception physical activity level.

**Keywords:** pregnancy; exercise; strenuous; review

Historically, pregnant women were considered vulnerable and were advised to reduce their level of activity.<sup>28</sup> In 2002, the American College of Obstetricians and Gynecologists (ACOG) updated their recommendations for exercise during pregnancy to be less restrictive<sup>1</sup>; these recommendations were reaffirmed by the ACOG in 2009. However, a survey of physicians found that more than 60% of physicians were not familiar with the current ACOG guidelines for exercise during pregnancy.<sup>9</sup> Although limited by a small sample size that included physicians in both obstetrics and gynecology and family medicine in 1 geographic region, this study highlights the deficiency in knowledge regarding this subject.<sup>9</sup>

In general, exercise reduces the morbidity and mortality associated with cardiovascular disease, hypertension, and type 2 diabetes mellitus among other chronic diseases.<sup>39</sup> Nevertheless, only 20.3% of American adults meet weekly exercise

recommendations.<sup>40</sup> Similarly, compliance with physical activity guidelines is low both prior to and during pregnancy.<sup>3</sup> Additionally, studies have consistently shown that women tend to decrease their physical activity during pregnancy.<sup>3,24,30</sup> Since pregnancy itself is a life-changing event for many women, it is also a time when other lifestyle changes may be enacted, such as smoking cessation, adopting a healthy diet, or beginning routine exercise. Additionally, as female participation in sports increases,<sup>45</sup> the safety of training during pregnancy has become an important issue.

## EFFECTS OF EXERCISE ON MATERNAL AND FETAL HEALTH IN PREGNANCY

Exercise offers potential benefits to both maternal and fetal health.<sup>5,6,17,18,21,25-27,32,35,36,38,42,52,54</sup>

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## Gestational Diabetes Mellitus

In parallel to its effect on the incidence of type 2 diabetes mellitus, regular exercise should also decrease the risk of gestational diabetes mellitus.<sup>21</sup> However, several review articles have concluded that there is insufficient evidence to support physical activity as an effective intervention to decrease the risk of developing gestational diabetes.<sup>29,48,53</sup> Poor compliance to exercise regimens may have contributed to the lack of significance.<sup>48</sup> Nevertheless, multiple studies have shown significantly lower glucose levels on the 24- to 28-week oral glucose tolerance test in physically active women.<sup>5,18</sup> Although physical activity may not prevent the development of gestational diabetes, it may help manage it. The majority of studies using exercise as an intervention to treat gestational diabetes mellitus were successful.<sup>48</sup> Women diagnosed with gestational diabetes at 24 to 34 weeks of pregnancy who performed resistance exercise were less likely to require insulin during the remainder of their pregnancy as compared with women with gestational diabetes in the control group.<sup>17</sup> Additionally, exercise modulates maternal weight gain in pregnancy<sup>27</sup> and reduces the risk of large-for-gestational age newborns,<sup>32,42,52</sup> which are concerns with gestational diabetes.

## Hypertension and Preeclampsia

Hypertension and preeclampsia are significant sources of morbidity and mortality in pregnancy.<sup>46</sup> Although physical activity is known to be helpful in preventing cardiovascular disease, a similar association between physical activity in pregnancy and hypertension or preeclampsia has not been definitively shown. Data reported from the North Carolina Pregnancy Risk Assessment Monitoring System indicate that gestational hypertensive complications are less likely in women who are physically active before and during pregnancy.<sup>38</sup> Conversely, an increased risk of developing preeclampsia was shown with greater than 270 minutes of exercise per week in a prospective cohort study of 85,139 pregnant Danish women.<sup>41</sup> A 2012 review of randomized control, cohort, and case-control studies suggests that there is a trend toward a preventive effect of physical activity on the development of preeclampsia.<sup>36</sup> However, there were a dearth of studies, and the evaluation of the few studies was complicated by differing methodologies, including the quantification of physical activity and the diagnosis of preeclampsia.

## Maternal-Fetal Circulation and Fetal Growth

There is theoretical concern that exercise may negatively impact the developing fetus in terms of hemodynamics and growth.<sup>7,20,27</sup> However, this is unsubstantiated in the current literature. Multiple studies have shown that blood flow to the fetus is not significantly altered by moderate-intensity physical activity.<sup>7,20,23,50</sup> Interestingly, an increase in total vascular volume, capillary surface area, and parenchymal density was demonstrated in the placentas of women delivering at term who had exercised during the first half or all of their pregnancy.<sup>31</sup>

Overall, birth weight was not significantly different between physically active women and inactive women.<sup>20,32,50,52</sup>

Additionally, several studies have demonstrated that women who were physically active had a decreased risk of having babies that were large for gestational age.<sup>32,42,52</sup> Although additional studies would be beneficial, research thus far indicates that physical activity is safe for the developing fetus.

## Labor and Delivery

Regular exercise may shorten the duration of labor and reduce the risk of Cesarean section and operative-assisted vaginal delivery.<sup>6,35</sup> Improved tone of abdominal and pelvic floor musculature and aerobic fitness may be important factors. Evidence-based support for this is limited,<sup>6,35</sup> as there are few contradictory results.<sup>8</sup> Women who participated in an exercise program throughout their pregnancies had a lower percentage of Cesarean section and instrumental vaginal deliveries compared with a control group.<sup>6</sup> This was in contrast to an earlier randomized controlled trial showing that there was no significant difference in Cesarean section and instrumental vaginal deliveries for women participating in an exercise program compared with a control group.<sup>8</sup> However, the exercise program was only from weeks 20 to 36 of gestation compared with weeks 6 to 39 in the later study. In another study, aerobic fitness was tested only in nulliparous women, which can affect labor duration, and a higher maximal oxygen consumption ( $\text{VO}_2$  max) as a measure of aerobic fitness was associated with an approximately 30-minute shorter labor duration.<sup>35</sup>

## Perinatal Depression

Since exercise is associated with fewer depressive symptoms in adults with clinical depression,<sup>37</sup> it has also been hypothesized that exercise would alleviate symptoms of depression during pregnancy<sup>19,25,26,47</sup> and postpartum.<sup>16</sup> Although several studies report a decrease in depressive symptoms on questionnaires in women who are physically active,<sup>19,25,26,47</sup> the findings are not consistent. One study showed that pregnant women who were exercising 1 to 2 times per week, but not 3 times or more per week, were less likely to report depression,<sup>26</sup> while another study reported decreased depression in pregnant women who exercised 4 times or more per week but not less than 4 times per week.<sup>25</sup> Additionally, it is not clear whether the lower depression scores reported are clinically significant.<sup>47</sup> A meta-analysis of 5 randomized controlled trials concluded that there is insufficient evidence to determine whether exercise reduces symptoms of postpartum depression.<sup>16</sup>

## GUIDELINES FOR WEIGHT GAIN IN PREGNANCY

Weight gain is tracked throughout pregnancy as it has important ramifications on both maternal and fetal health. Excessive weight gain is associated with gestational diabetes, preeclampsia, and postpartum weight retention.<sup>27</sup> In 2013, the ACOG endorsed the Institute of Medicine's weight gain goals

Table 1. Summary of guidelines for exercise during pregnancy<sup>a</sup>

A pregnant woman with no absolute or relative contraindications to exercise should be advised to	
1.	Perform at least 30 minutes of moderate-intensity exercise on most days of the week <sup>1</sup>
2.	Avoid exercise involving the following conditions:
a.	Supine position after the first trimester <sup>15</sup>
b.	Prolonged standing <sup>15</sup>
c.	High risk of contact, falling, or abdominal trauma <sup>4</sup>
d.	Altitudes greater than 5250 feet <sup>22</sup>
e.	Scuba diving <sup>12</sup>
3.	Stop exercise for any of the following signs or symptoms <sup>1,39</sup> :
a.	Vaginal bleeding
b.	Dizziness
c.	Calf pain or swelling
d.	Chest pain
e.	Preterm labor
f.	Decreased fetal movement
g.	Leakage of amniotic fluid
h.	Dyspnea prior to physical activity

<sup>a</sup>These guidelines apply to uncomplicated pregnancies. Please see text for the absolute and relative contraindications to exercise in pregnancy.

during pregnancy based on a woman's body mass index (BMI) at her first prenatal visit.<sup>2</sup> According to these recommendations, women with a normal BMI (18.5-24.9 kg/m<sup>2</sup>) should gain 25 to 35 pounds whereas overweight (BMI 25-29.9 kg/m<sup>2</sup>) and obese (BMI >30 kg/m<sup>2</sup>) women should aim to gain 15 to 25 pounds and 11 to 20 pounds, respectively.<sup>2</sup> In 1 study, approximately 40% of normal-weight women and 60% of overweight women gained more weight than the upper limit of the respective range recommended by the Institute of Medicine.<sup>14</sup> Exercise can help manage weight gain during pregnancy. Women who attended all 24 supervised exercise sessions during a 12-week program stayed within the Institute of Medicine's weight gain guidelines compared with 62% of the control group.<sup>27</sup> Overall, the compliant members of the exercise group had significantly less weight gain and postpartum weight retention compared with the control group.<sup>27</sup>

## GUIDELINES FOR EXERCISE IN PREGNANCY

The ACOG reaffirmed their 2002 committee opinion on exercise in pregnancy in 2009.<sup>1</sup> Based on these recommendations, women who are currently physically active can continue

exercising while those who are physically inactive are encouraged to start exercising.<sup>1</sup> The American College of Sports Medicine's (ACSM) physical activity guidelines calling for "30 minutes or more of moderate exercise . . . on most, if not all, days of the week" is advised for normal pregnancies.<sup>1</sup> Sixteen percent of pregnant women meet these recommendations; for comparison, only 26% of nonpregnant women comply with the ACSM physical activity recommendations.<sup>44</sup> Additionally, pregnant women should be cautioned to avoid exercise in the supine position after the first trimester and exercise involving prolonged standing due to significant decreases in cardiac output<sup>15</sup>; exercise with a high risk of contact, falling, or abdominal trauma due to the risk of injury to the mother or the fetus<sup>4</sup>; exercise at altitudes greater than 5250 feet due to concerns for fetal hypoxemia<sup>22</sup>; and scuba diving due to the risk of the fetus developing decompression sickness.<sup>1,12</sup> Table 1 provides a summary of the exercise guidelines.

## EXERCISE PRESCRIPTION

Before advising the initiation or continuation of physical activity during pregnancy, a physician must assess the woman's risk level. Healthy women without contraindications to exercise are



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