The American College of Obstetricians and Gynecologists
WOMEN'S HEALTH CARE PHYSICIANS

COMMITTEE OPINION

Number 650 • December 2015 *(Replaces Committee Opinion Number 267, January 2002)*
(Reaffirmed 2019)

Committee on Obstetric Practice

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Physical Activity and Exercise During Pregnancy and the Postpartum Period

ABSTRACT: Physical activity in all stages of life maintains and improves cardiorespiratory fitness, reduces the risk of obesity and associated comorbidities, and results in greater longevity. Physical activity in pregnancy has minimal risks and has been shown to benefit most women, although some modification to exercise routines may be necessary because of normal anatomic and physiologic changes and fetal requirements. Women with uncomplicated pregnancies should be encouraged to engage in aerobic and strength-conditioning exercises before, during, and after pregnancy. Obstetrician–gynecologists and other obstetric care providers should carefully evaluate women with medical or obstetric complications before making recommendations on physical activity participation during pregnancy. Although frequently prescribed, bed rest is only rarely indicated and, in most cases, allowing ambulation should be considered. Regular physical activity during pregnancy improves or maintains physical fitness, helps with weight management, reduces the risk of gestational diabetes in obese women, and enhances psychologic well-being. An exercise program that leads to an eventual goal of moderate-intensity exercise for at least 20–30 minutes per day on most or all days of the week should be developed with the patient and adjusted as medically indicated. Additional research is needed to study the effects of exercise on pregnancy-specific outcomes and to clarify the most effective behavioral counseling methods, and the optimal intensity and frequency of exercise. Similar work is needed to create an improved evidence base concerning the effects of occupational physical activity on maternal–fetal health.

Recommendations

Regular physical activity in all phases of life, including pregnancy, promotes health benefits. Pregnancy is an ideal time for maintaining or adopting a healthy lifestyle and the American College of Obstetricians and Gynecologists makes the following recommendations:

- Physical activity in pregnancy has minimal risks and has been shown to benefit most women, although some modification to exercise routines may be necessary because of normal anatomic and physiologic changes and fetal requirements.
- A thorough clinical evaluation should be conducted before recommending an exercise program to ensure that a patient does not have a medical reason to avoid exercise.
- Women with uncomplicated pregnancies should be encouraged to engage in aerobic and strength-conditioning exercises before, during, and after pregnancy.
- Obstetrician–gynecologists and other obstetric care providers should carefully evaluate women with medical or obstetric complications before making recommendations on physical activity participation during pregnancy. Although frequently prescribed, bed rest is only rarely indicated and, in most cases, allowing ambulation should be considered.
- Regular physical activity during pregnancy improves or maintains physical fitness, helps with weight management, reduces the risk of gestational diabetes in obese women, and enhances psychologic well-being.

- Additional research is needed to study the effects of exercise on pregnancy-specific outcomes, and to clarify the most effective behavioral counseling methods and the optimal intensity and frequency of exercise. Similar work is needed to create an improved evidence base concerning the effects of occupational physical activity on maternal–fetal health.

Introduction

Physical activity, defined as any bodily movement produced by the contraction of skeletal muscles (1) in all stages of life maintains and improves cardiorespiratory fitness, reduces the risk of obesity and associated comorbidities, and results in greater longevity. Women who begin their pregnancy with a healthy lifestyle (eg, exercise, good nutrition, nonsmoking) should be encouraged to maintain those healthy habits. Those who do not have healthy lifestyles should be encouraged to view the preconception period and pregnancy as opportunities to embrace healthier routines. *Exercise*, defined as physical activity consisting of planned, structured, and repetitive bodily movements done to improve one or more components of physical fitness (1), is an essential element of a healthy lifestyle, and obstetrician–gynecologists and other obstetric care providers should encourage their patients to continue or to commence exercise as an important component of optimal health.

In 2008, the U.S. Department of Health and Human Services issued physical activity guidelines for Americans (2). For healthy pregnant and postpartum women, the guidelines recommend at least 150 minutes per week of moderate-intensity aerobic activity (ie, equivalent to brisk walking). This activity should be spread throughout the week and adjusted as medically indicated. The guidelines advise that pregnant women who habitually engage in vigorous-intensity aerobic activity (ie, the equivalent of running or jogging) or who are highly active "can continue physical activity during pregnancy and the postpartum period, provided that they remain healthy and discuss with their health care provider how and when activity should be adjusted over time" (2). The World Health Organization and the American College of Sports Medicine have issued evidence-based recommendations indicating that the beneficial effects of exercise in most adults are indisputable and that the benefits far outweigh the risks (3, 4).

Physical inactivity is the fourth-leading risk factor for early mortality worldwide (3). In pregnancy, physical inactivity and excessive weight gain have been recognized as independent risk factors for maternal obesity and related pregnancy complications, including gestational diabetes mellitus (GDM) (5–7). Some patients, obstetrician–gynecologists, and other obstetric care providers are concerned that regular physical activity during pregnancy may cause miscarriage, poor fetal growth, musculoskeletal injury, or premature delivery. For uncomplicated pregnancies, these concerns have not been substantiated (8–12). In the absence of obstetric or medical complications or contraindications (Box 1, Box 2), physical activity in pregnancy is safe and desirable, and pregnant women should be encouraged to continue or to initiate safe physical activities (Box 3). In women who have obstetric or medical comorbidities, exercise regimens should be individualized. Obstetrician–gynecologists and other obstetric care providers should carefully evaluate women with medical or obstetric complications before making recommendations on physical activity participation during pregnancy.

Anatomic and Physiologic Aspects of Exercise in Pregnancy

Pregnancy results in anatomic and physiologic changes that should be considered when prescribing exercise. The most distinct changes during pregnancy are increased weight gain and a shift in the point of gravity that results in progressive lordosis. These changes lead to an increase in the forces across joints and the spine during

Box 1. Absolute Contraindications to Aerobic Exercise During Pregnancy ⇦

- Hemodynamically significant heart disease
- Restrictive lung disease
- Incompetent cervix or cerclage
- Multiple gestation at risk of premature labor
- Persistent second- or third-trimester bleeding
- Placenta previa after 26 weeks of gestation
- Premature labor during the current pregnancy
- Ruptured membranes
- Preeclampsia or pregnancy-induced hypertension
- Severe anemia

Box 2. Relative Contraindications to Aerobic Exercise During Pregnancy ⇦

- Anemia
- Unevaluated maternal cardiac arrhythmia
- Chronic bronchitis
- Poorly controlled type 1 diabetes
- Extreme morbid obesity
- Extreme underweight (BMI less than 12)
- History of extremely sedentary lifestyle
- Intrauterine growth restriction in current pregnancy
- Poorly controlled hypertension
- Orthopedic limitations
- Poorly controlled seizure disorder
- Poorly controlled hyperthyroidism
- Heavy smoker

weight-bearing exercise. As a result, more than 60% of all pregnant women experience low back pain (13). Strengthening of abdominal and back muscles could minimize this risk. Blood volume, heart rate, stroke volume, and cardiac output normally increase during pregnancy, while systemic vascular resistance decreases. These hemodynamic changes establish the circulatory reserve necessary to sustain the pregnant woman and fetus at rest and during exercise. Motionless postures, such as certain yoga positions and the supine position, may result in decreased venous return and hypotension in 10–20% of all pregnant women and should be avoided as much as possible (14).

In pregnancy, there are also profound respiratory changes. Minute ventilation increases up to 50%, primarily as a result of the increased tidal volume. Because of a physiologic decrease in pulmonary reserve, the ability to exercise anaerobically is impaired, and oxygen availability for strenuous aerobic exercise and increased work load consistently lags. The physiologic respiratory alkalosis of pregnancy may not be sufficient to compensate for the developing metabolic acidosis of strenuous exercise. Decreases in subjective work load and maximum exercise performance in pregnant women, particularly in those who are overweight or obese, limit their ability to engage in more strenuous physical activities (15). Aerobic training in pregnancy has been shown to increase aerobic capacity in normal weight and overweight pregnant women (16–18).

Temperature regulation is highly dependent on hydration and environmental conditions. During exercise, pregnant women should stay well-hydrated, wear loose-fitting clothing, and avoid high heat and humidity to protect against heat stress, particularly during the first trimester (19). Although exposure to heat from sources like hot tubs, saunas, or fever has been associated with an increased risk of neural tube defects (20), exercise would not be expected to increase core body temperature into the range of concern. At least one study found no association between exercise and neural tube defects (21).

Despite the fact that pregnancy is associated with profound anatomic and physiologic changes, exercise has minimal risks and has been shown to benefit most women. The most common sports-related injuries in pregnancy are musculoskeletal, by and large related to lower extremities edema (80%) and joint laxity (22).

Box 3. Examples of Safe and Unsafe Physical Activities During Pregnancy* ⇦

The following activities are safe to initiate or continue*:

- Walking
- Swimming
- Stationary cycling
- Low-impact aerobics
- Yoga, modified†
- Pilates, modified
- Running or jogging‡
- Racquet sports‡§
- Strength training‡

The following activities should be avoided:

- Contact sports (eg, ice hockey, boxing, soccer, and basketball)
- Activities with a high risk of falling (eg, downhill snow skiing, water skiing, surfing, off-road cycling, gymnastics, and horseback riding)
- Scuba diving
- Sky diving
- "Hot yoga" or "hot Pilates"

*In women with uncomplicated pregnancies in consultation with an obstetric care provider.

†Yoga positions that result in decreased venous return and hypotension should be avoided as much as possible.

‡In consultation with an obstetric care provider, running or jogging, racquet sports, and strength training may be safe for pregnant women who participated in these activities regularly before pregnancy.

§Racquet sports wherein a pregnant woman's changing balance may affect rapid movements and increase the risk of falling should be avoided as much as possible.

Fetal Response to Maternal Exercise

Most of the studies addressing fetal response to maternal exercise have focused on fetal heart rate changes and birth weight. Studies have demonstrated minimum-to-moderate increases in fetal heart rate by 10–30 beats per minute over the baseline during or after exercise (23–26). Three meta-analyses concluded that the differences in birth weight were minimal to none in women who exercised during pregnancy compared with controls (27–29). However, women who continued to exercise vigorously during the third trimester were more likely to deliver infants weighing 200–400 g less than comparable controls, although there was not an increased risk of fetal growth restriction (27–29). A cohort study that assessed umbilical artery blood flow, fetal heart rates, and biophysical profiles before and after strenuous exercise in the second trimester demonstrated that 30 minutes of strenuous exercise was well tolerated by women and fetuses in active and inactive pregnant women. (26).

Benefits of Exercise During Pregnancy

Regular aerobic exercise during pregnancy has been shown to improve or maintain physical fitness (8, 9, 27). Although the evidence is limited, some benefit to pregnancy outcomes has been shown, and there is no evidence of harm when not contraindicated. Observational studies of women who exercise during pregnancy have shown benefits such as decreased GDM (6, 30–32), cesarean and operative vaginal delivery (9, 33, 34), and

postpartum recovery time (9), although evidence from randomized controlled trials is limited. In those instances where women experience low-back pain, water exercise is an excellent alternative (35). Studies have shown that exercise during pregnancy can lower glucose levels in women with GDM (36, 37), or help prevent preeclampsia (38). Exercise has shown only a modest decrease in overall weight gain (1–2 kg) in normal weight, overweight, and obese women (39, 40).

Recommending an Exercise Program

Motivational Counseling

Pregnancy is an ideal time for behavior modification and for adopting a healthy lifestyle because of increased motivation and frequent access to medical supervision. Patients are more likely to control weight, increase physical activity, and improve their diet if their physician recommends that they do so (41). Motivational counseling tools such as the Five A's (Ask, Advise, Assess, Assist, and Arrange), originally developed for smoking cessation, have been used successfully for diet and exercise counseling (42, 43). Obstetrician–gynecologists and other obstetric care providers can consider adopting the Five A's approach for women with uncomplicated pregnancies who have no contraindications to exercise.

Prescribing an Individualized Exercise Program

The principles of exercise prescription for pregnant women do not differ from those for the general population (2). A thorough clinical evaluation should be conducted before recommending an exercise program to ensure that a patient does not have medical reasons to avoid exercise. An exercise program that leads to an eventual goal of moderate-intensity exercise for at least 20–30 minutes per day on most or all days of the week should be developed with the patient and adjusted as medically indicated. Box 3 lists examples of safe and unsafe physical activities in pregnancy. Women with uncomplicated pregnancies should be encouraged to engage in physical activities before, during, and after pregnancy.

Because blunted and normal heart-rate responses to exercise have been reported in pregnant women, the use of ratings of perceived exertion may be a more effective means to monitor exercise intensity during pregnancy than heart-rate parameters (44). For moderate-intensity exercise, ratings of perceived exertion should be 13–14 (somewhat hard) on the 6–20 Borg scale of perceived exertion (Table 1). Using the "talk test" is another way to measure exertion. As long as a woman can carry on a conversation while exercising, she is likely not overexerting herself (45). Women should be advised to remain well hydrated, avoid long periods of lying flat on their backs, and stop exercising if they have any of the warning signs shown in Box 4.

Pregnant women who were sedentary before pregnancy should follow a more gradual progression of exercise. Although an upper level of safe exercise intensity has not been established, women who were regular exercisers before pregnancy and who have uncomplicated, healthy pregnancies should be able to engage in high-intensity exercise programs, such as jogging and aerobics, with no adverse effects. High-intensity or prolonged exercise in excess of 45 minutes can lead to hypoglycemia; therefore, adequate caloric intake before exercise, or limiting the exercise session, is essential to minimize this risk (46).

Prolonged exercise should be performed in a thermoneutral environment or in controlled environmental conditions (air conditioning) with close attention paid to proper hydration and caloric intake. In studies of pregnant women who exercised in which physical activity was self-paced in a temperature-controlled environment, core body temperatures rose less than 1.5°C over

Table 1. The 15-Grade Scale for Ratings of Perceived Exertion ⇦

6	
7	Very, very light
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Very, very hard
20	

Reprinted from Borg GA. Psychophysical bases of perceived exertion. Med Sci Sports Exerc 1982;14:377–81.

Box 4. Warning Signs to Discontinue Exercise While Pregnant ⇦

- Vaginal bleeding
- Regular painful contractions
- Amniotic fluid leakage
- Dyspnea before exertion
- Dizziness
- Headache
- Chest pain
- Muscle weakness affecting balance
- Calf pain or swelling

30 minutes and stayed within safe limits (46). Finally, although physical activity and dehydration in pregnancy have been associated with a small increase in uterine contractions (47), there is only anecdotal evidence that even strenuous training causes preterm labor or delivery.

Recreational Activities

Participation in a wide range of recreational activities is safe. Activities with high risk of abdominal trauma should be avoided (Box 3). Scuba diving should be avoided in pregnancy because of the inability of the fetal pulmonary circulation to filter bubble formation (48). For lowlanders, physical activity up to 6,000 feet altitude is safe in pregnancy (49).

Special Populations

Several reviews have determined that there is no credible evidence to prescribe bed rest in pregnancy, which is most commonly prescribed for the prevention of preterm labor. It is the American College of Obstetrician and Gynecologists' position that "bed rest is not effective for the prevention of preterm birth and should not be routinely recommended" (50, 51). Patients prescribed prolonged bed rest or restricted physical activity are at risk of venous thromboembolism, bone demineralization, and deconditioning. Although frequently prescribed, bed rest is only rarely indicated and, in most cases, allowing ambulation should be considered.

Obese pregnant women should be encouraged to engage in healthy lifestyle modification in pregnancy that includes physical activities and judicious diets (5). Obese women should start with low-intensity, short periods of exercise and gradually increase as able. In recent studies examining the effects of exercise among pregnant, obese women, the women have demonstrated modest reductions in weight gain and no adverse outcomes among those assigned to exercise (39, 52).

Competitive athletes require frequent and closer supervision because they tend to maintain a more strenuous training schedule throughout pregnancy and resume high-intensity postpartum training sooner as compared to others. Such athletes should pay particular attention to avoiding hyperthermia, maintaining proper hydration, and sustaining adequate caloric intake to prevent weight loss, which may adversely affect fetal growth.

Occupational Physical Activity

The evidence regarding any possible association between fetal–maternal health outcomes and occupational physical activity is mixed and limited. A meta-analysis based on 62 reports assessed the evidence relating preterm delivery, low birth weight, small for gestational age, preeclampsia, and gestational hypertension to five occupational exposures (work hours, shift work, lifting, standing, and physical work load) (53). Although the analysis was limited by the heterogeneity of exposure definitions, especially for lifting and heavy work load, most of the estimates of risk pointed to small or null effects. In contrast, a cohort study of more than 62,000 Danish women reported a dose–response relationship between total daily burden lifted and preterm birth with loads more than 1,000 kg per day (54). In this study, lifting heavy loads (greater than 20 kg) more than 10 times per day was associated with an increased risk of preterm birth.

The American Medical Association Council on Scientific Affairs 1984 guidelines on weight limits for occupational lifting during pregnancy have been used by clinicians for many years but are not specific, do not define the terms repetitive and intermittent lifting, and do not consider the type of lifting (55). A more recent proposed guideline addresses these issues and is based on the National Institute for Occupational Safety and Health equation that determines the maximum recommended weight limit. The recommended weight limit equation provides weight limits for lifting that would be acceptable to 90% of healthy women (56). A study applied the National Institute for Occupational Safety and Health's lifting equation to define recommended weight limits for a broad range of lifting patterns for pregnant women in an effort to define lifting thresholds that most pregnant workers with uncomplicated pregnancies should be able to perform without increased risk to maternal or fetal health (57). The same authors identified lifting conditions that pose higher risk of musculoskeletal injury and suggested that obstetrician–gynecologists and other obstetric care providers use their best clinical judgment to determine a recommendation plan for the patient, which might include a formal request for an occupational health professional to perform an analysis to determine maximum weight limits based on actual lifting conditions.

Exercise in the Postpartum Period

The postpartum period is an opportune time for obstetrician–gynecologists and other obstetric care providers to initiate, recommend, and reinforce a healthy behavior lifestyle. Resuming exercise activities or incorporating new exercise routines after delivery is important in supporting lifelong healthy habits. Several reports indicate that women's level of participation in exercise programs diminishes after childbirth, frequently leading to overweight and obesity (58, 59). Exercise routines may be resumed gradually after pregnancy as soon as medically safe, depending on the mode of delivery, vaginal or cesarean, and the presence or absence of medical or surgical complications. Some women are capable of resuming physical activities within days of delivery. In the absence of medical or surgical complications, rapid resumption of these activities has not been found to result in adverse effects. Pelvic floor exercises could be initiated in the immediate postpartum period.

Regular aerobic exercise in lactating women has been shown to improve maternal cardiovascular fitness without affecting milk production, composition, or infant growth. (60). Nursing women should consider

feeding their infants before exercising in order to avoid exercise discomfort of engorged breast. Nursing women also should ensure adequate hydration before commencing physical activity.

Conclusion

Despite the fact that pregnancy is associated with profound anatomic and physiologic changes, exercise has minimal risks and has been shown to benefit most women. Women with uncomplicated pregnancies should be encouraged to engage in physical activities before, during, and after pregnancy. Obstetrician–gynecologists and other obstetric care providers should carefully evaluate women with medical or obstetric complications before making recommendations on physical activity participation during pregnancy. Although the evidence is limited, some benefit to pregnancy outcomes has been shown and there is no evidence of harm when not contraindicated. Physical activity and exercise during pregnancy promotes physical fitness and may prevent excessive gestational weight gain. Exercise may reduce the risk of gestational diabetes, preeclampsia, and cesarean deliveries. Additional research is needed to study the effects of exercise on pregnancy-specific conditions and outcomes, and to further clarify effective behavioral counseling methods and optimal type, frequency, and intensity of exercise. Similar research is needed to improve evidence-based information concerning the effects of occupational physical activity on maternal–fetal health.

Resource

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ISSN 1074-861X

Physical activity and exercise during pregnancy and the postpartum period. Committee Opinion No. 650. American College of Obstetricians and Gynecologists. Obstet Gynecol 2015;126:e135–42.