

Chapter 15 – Pregnancy

By the end of this chapter you will understand:

- Benefits of exercise before, during, and after pregnancy
- Weight gain recommendations
- Response to exercise
 - Musculoskeletal
 - Physiological
- Preeclampsia
- Gestational diabetes
- Diastasis recti
- Precautions and considerations for exercise
- Activity recommendations
 - While pregnant
 - Postpartum

Benefits of Exercise

Over the past decade, there has been mounting evidence supporting the benefits of exercise during and after pregnancy. Healthy pregnant women are encouraged to exercise to maintain a healthy weight, reduce the chance for gestational diabetes, and improve psychological well-being. Pregnant women who exercise, regardless if they exercised prior to becoming pregnant or started after, experience fewer delivery and postpartum complications, have a lower incidence of edema, and are more likely to deliver a normal size baby (American College of Sports Medicine [ACSM], 2018). To encourage prescriptive exercise during

pregnancy, The American College of Obstetricians and Gynecologists (ACOG), as well as a joint Canadian task force, comprised of the Society of Obstetricians and Gynaecologists of Canada and the Canadian Society for Exercise Physiology, developed guidelines for exercise during pregnancy (ACOG, 2015; Davies, Wolfe, Mottola, & MacKinnon, 2003). They are summarized below:

- Exercise during pregnancy has minimal risks and multiple benefits.
- Exercise may need to be modified.
- A clinical evaluation should be performed prior to beginning an exercise program.
- All women without contraindications should be encouraged to participate in aerobic and strength-conditioning exercises as part of a healthy lifestyle during pregnancy.
- 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.
- Women should choose activities that minimize the risk of loss of balance and fetal trauma.
- Women should be advised that adverse pregnancy or neonatal outcomes are not higher for women who exercise.
- Initiation of pelvic floor exercises in the immediate postpartum period may reduce the risk of future urinary incontinence.
- Women should be advised that moderate exercise during lactation does not affect the quantity or composition of breast milk or effect infant growth.

Weight Gain Recommendations

The most apparent physiological change during pregnancy is weight gain, averaging 25-40 pounds, or 15-25% of pre-pregnancy weight (ACSM, 2018; Bush, 2018; Merrill, 2015). The Institute of Medicine recommends underweight women (<18 BMI) gain 28-40 pounds, normal weight women (18.8-24.9 BMI) should gain 25-35 pounds, overweight women (25-29.9BMI) should gain 15-25 pounds, and obese women (>30 BMI) should gain 11-20 pounds. Weight gains below these recommendations can result in low infant birth weight, and above these recommendations can result in fetal macrosomia (birth weight above 8lbs,13oz.), difficulty with natural birth, and trauma to the mother and baby (ACSM, 2018; Bush, 2018; Merrill, 2015). Additional weight gain can also lead to musculoskeletal problems, hypertension or preeclampsia, and gestational diabetes.

Musculoskeletal Response

During pregnancy, the musculoskeletal response includes a shifting center of gravity, increased joint forces, and pelvic girdle pain. Over 60% of pregnant women will suffer low back pain during and following pregnancy due to lordosis from weight gain, and a change in the center of gravity (COG) (ACOG, 2015). Additionally, pelvic girdle pain is experienced by 25% of pregnant women (Sarıkaya, Yılmaz, & Okumuş, 2016). The pain often radiates from the tailbone or sacroiliac to the posterior thigh. The combination of weight gain, the COG moving forward, and excessive joint mobility caused by the release of the hormones relaxin and progesterone, often leads to joint pain and altered gait mechanics that need to be considered during activity, and for program design. Accordingly, heavy weights and activities that increase the risk of falling should be avoided (ACOG, 2015; Davies et al., 2003).

Physiological Response

In addition to changes in the musculoskeletal system, there are also changes to a woman's cardiovascular, respiratory, and thermoregulatory systems. While blood volume, heart rate, and stroke volume increase, vascular resistance decreases, resulting in lightheadedness, dizziness, and fatigue. Additionally, the change in hemodynamics can cause hypotension while in static positions such as those found in yoga, or supine positions (ACOG, 2015; ACSM, 2018). Changes in tidal volume in pressure gradients designed to increase oxygen uptake and carbon dioxide emission can cause a sense of breathlessness. Also, a decrease in pulmonary reserve may hinder anaerobic and aerobic exercise and limit the overall workload. Interestingly, women who perform aerobic exercise regularly during pregnancy often experience a training effect that increases aerobic capacity after birth (ACOG, 2015; Merrill, 2015). The increase in tidal volume and decrease in vascular resistance also permits greater blood flow to the skin and lungs, allowing better heat dissipation. To maintain positive heat balance, blood volume needs to remain high, suggesting proper hydration is critical. Furthermore, it is recommended pregnant women avoid exercising in high heat or humid conditions and wear loose fitting clothing for better air circulation (ACOG, 2015; Merrill, 2015).

Preeclampsia

Preeclampsia is persistent hypertension, and affects up to 4% of pregnant women (Merrill, 2015). Although preeclampsia can present at any time during pregnancy, it usually occurs later and sometimes even up to 6 weeks after pregnancy. Women who suffer from preeclampsia have high levels of protein in their urine and may experience edema in the extremities. Although the cause is unknown, it is thought to affect women who are overweight

and have poor nutritional habits. The only cure for preeclampsia is birth. Preeclampsia risk factors, signs, and complications can be found in Table 15.1.

It is beyond the scope of a CXS to work with a client who suffers from preeclampsia.

Table 15.1

Preeclampsia risk factors, signs, and complications

Risk factors	Signs	Complications
First pregnancy	Rapid weight gain	Stroke
History of preeclampsia	Edema	Seizures
An immediate relative who suffered from preeclampsia,	Headache	Heart failure in the mother
Multiple gestations	Nausea	Impaired mental abilities in the baby
A history of diabetes, kidney disease, or some autoimmune diseases	Abdominal pain	Stunted growth for a baby
	High blood pressure	Fetal death

Merrill, 2015

Gestational Diabetes

Gestational diabetes mellitus (GDM) can affect 1 in 7 births and is characterized by exacerbated insulin resistance in pregnant women (International Diabetes Federation, 2019; Merrill, 2015). This period of hyperglycemia, or carbohydrate intolerance, usually resolves following birth (Padayachee & Coombes, 2015). Non-modifiable risk factors include ethnic minority (African American, Native American, Hispanic, and some Asians cultures), maternal age (>35), polycystic ovarian syndrome, family history of diabetes, and preeclampsia. Modifiable risk factors include obesity and poor nutrition (Padayachee & Coombes, 2015). The effects of GDM can be larger than normal birthweight, jaundice, nervous system disorders, and pulmonary distress. Babies may also suffer from hypoglycemia immediately following birth and have a greater chance for obesity or metabolic disorders. Exercise and proper nutrition prior to pregnancy can reduce the likelihood GDM by almost 25%. Additionally, although there is no cure for GDM, the primary mode of treatment is activity and nutrition counselling. A CXS can

only work with a client with GDM after a woman has received medical clearance to exercise, and often requires little to no exercise modifications as compared to healthy pregnant women.

Diastasis Recti

Another topic of concern for pregnant women is abdominal diastasis recti (ADR) (ACOG, 2015; Merrill, 2015). ADR is characterized by a separation of the right and left sides of the rectus abdominals, and is caused by mechanical stress, weak abdominal muscles, and an increase of hormones. Women with multiple gestation, who are petite, have had multiple pregnancies, or who have poor muscle tone are at risk. Symptoms include a protruding stomach, low back pain, poor posture, and constipation. There are no readily available statistics on diastasis recti, but it is thought it may affect 60-100% of pregnant women at some point during or after pregnancy. To avoid exacerbating ADR, caution should be used when performing core, abdominal, and trunk movements such as flexion, extension, or rotation. Accordingly, static abdominal exercises should be considered.

Precautions and Considerations for Exercise

Each condition, including a healthy pregnancy, should be considered when designing an exercise program for pregnant women, women who are trying to get pregnant, or women who have already given birth. The PARmed-X (physical activity readiness questionnaire for pregnant women developed by the Canadian Society for Exercise Physiologists), or a similar tool should be filled out by potentially pregnant clients. The following are precautions and recommendations for exercise during pregnancy (ACSM, 2018; Merrill, 2015):

- Women not previously active should begin slowly and progress.
- Pregnancy alters the heart rate response, so the RPE scale or talk test should be used to gauge intensity.

- Exercise programs should include aerobic and resistance training, stretching, and a 15-minute warm up and cool down period.
- An additional 300 calories/day may be needed to account for the caloric needs of the baby.
- Exercise should be performed in a cool, dry environment.
- Maintain hydration by consuming a pint of water prior to exercise, and a cup of water every 20 minutes during exercise.
- Avoid static positions and exercises performed in a supine position.
- Due to joint laxity, joints may be prone to injury.
- Avoid the Valsalva maneuver.
- Avoid high risk activities that may result in fetal damage due to contact, falling, or oxygen deprivation:
 - Snow and water skiing
 - Rock climbing
 - Scuba diving
 - High altitude adventures
 - Horseback riding
 - Contact sports

Table 15.2 lists contraindications to exercise while pregnant, and warning signs when to immediately stop exercise and seek medical attention. A relative contraindication suggests the benefits of exercise may not outweigh the risks of exercise and each risk needs to be individually considered, while an absolute contraindication could cause injury, harm, or death (Davies, et al., 2003). Women who were active prior to pregnancy, and have no complications,

should follow the exercise guidelines for apparently healthy adults during pregnancy, and postpartum. Women who were not active prior to pregnancy should avoid high intensity exercise. Regardless, pregnant women should engage in at least 30 minutes of light to moderate intensity exercise most days of the week for a total of 150 minutes per week. Guidelines for intensity have been developed based on BMI and age; moderate intensity is recommended for women with a BMI of <25, and light intensity for women with a BMI of >25 (Merrill, 2015). Table 15.3 provides exercise guidelines for pregnant women.

Table 15.2

Contraindications and warning signs for exercise during pregnancy

Relative contraindications	Absolute contraindications	Warning signs to stop exercise
Anemia	Hemodynamically significant heart disease	Vaginal bleeding
Maternal cardiac arrhythmia	Restrictive lung disease	Painful contractions
Chronic bronchitis	Incompetent cervix	Amniotic fluid leakage
Morbid obesity or extreme underweight	Multiple gestations	Dyspnea before exertion
Eating disorder	Persistent bleeding	Dizziness
Orthopedic limitations	Placenta previa after week 26	Headache
Heavy smoker	Premature labor	Angina
Previous spontaneous abortion	Ruptured membranes	Poor balance
Previous preterm birth	Uncontrolled type I diabetes	Calf pain or swelling
Poorly controlled type 1 diabetes	Uncontrolled thyroid disease	Decreased fetal movement
Poorly controlled hypertension	Uncontrolled CVD	
Comorbidities	Preeclampsia	
	Severe anemia	

ACOG, 2015; Bush, 2018; Davies et al., 2003

Table 15.3

Exercise recommendations for pregnant women

	Frequency	Intensity	Time	Type
Aerobic	3-5days/week	RPE 12-14, or somewhat difficult BMI <25: 40-60% HRR BMI>25: <40%HRR	At least 150 min/week 120 min. Active 15 min. warm up 15 min. cool down	Lower skill level balance activities: <ul style="list-style-type: none"> • Walking • Swimming • Stationary cycle • Low impact aerobics
Resistance	2-3 days/week	Relatively low weights: 40-60% 1RM	12 reps/set 12-15 reps/set after week 28	All modalities <ul style="list-style-type: none"> • Controlled ROM

		or 60-80% of 10 rep max		<ul style="list-style-type: none"> • Focus on postural muscles, particularly in the later stages of pregnancy • Nothing supine (after 1st trimester) • No isometrics • Avoid Valsalva maneuver •
Flexibility	Daily	Below discomfort level	Static stretch hold for 10-30 sec.	Be aware of joint and ligament laxity Avoid ballistic stretching
Kegels-prenatal	Daily		10 reps Hold for 3 seconds	
Kegels-postpartum	3x/day		10 reps Contract for 10 sec Relax for 10 sec	

ACOG, 2015; ACSM, 2018, Bush, 2018; Davies et al., 2018

Postpartum Exercise Recommendations

There is no timeline defining the postpartum period; however, most physiological and morphological changes continue for 4-6 weeks after birth (Evenson, Mottola, Owe, Rousham, & Brown, 2014). The ACOG suggests pre-pregnancy levels of activity can resume as soon as it is medically safe, based on physician approval. The benefits of postpartum activity are similar to benefits from prenatal activity; improved cardiorespiratory and muscular fitness, improved mood, and weight management. The goal of exercise following birth is to have some personal time and regain a sense of control. Unfortunately, women who do not resume activity postpartum often stay inactive for years (Evenson et al., 2014). Assuming no complications immediately following birth, mild exercise to include walking, pelvic floor exercises, and light stretching can be performed. Kegels can help with postpartum recovery, decrease urinary incontinence, and pelvic floor muscle function. Postpartum posture also needs to be considered. Added body weight, carrying a newborn, and carrying and moving equipment designed for an infant, can lead to an anterior posture indicated by rounded shoulders, upper

cross syndrome, and kyphosis. Stretching the pectorals and the shoulder girdle, and strengthening the scapula and neck may be appropriate to improve posture and relieve low back pain. The following suggestions can reacclimate a client to activity (Merrill, 2015):

- Begin slowly.
- Avoid excessive fatigue.
- Support and compress the abdomen and breasts.
- Stop activity when it hurts.

Discussion and application

1. Describe the physiological changes that takes place in females during pregnancy and how those changes will effect exercise program design.
2. What elements should be considered in an exercise program for post-partum women and why?

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