Exercise in Pregnancy

Karen Antell, MD, MPH, FAAFP
Christiana Care Family Medicine Residency
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Objectives

- Benefits of exercise – to mom and baby
- Physiologic changes during pregnancy that affect and are affected by pregnancy
- Cautions and contraindications to exercise during pregnancy
ACOG Recommendations, 2009

In the absence of either medical or obstetric complications, pregnant women should perform 30 minutes of moderate exercise most days of the week.
• Thorough clinical evaluation should be conducted before recommending an exercise program
• In the absence of contraindications, women should be encouraged to engage in regular, moderate intensity physical activity
• May prevent GDM, especially in morbidly obese patients (BMI>33)
Obesity in pregnancy
Trends of Maternal Obesity

Medical complications of obesity in pregnancy - maternal

- Cardiac disease
- VTE
- Gestational hypertension
- Gestational diabetes
- Obstructive sleep apnea
- Increased rate of cesarean delivery and less chance of successful VBAC
- Increased risk of complications during cesarean – hemorrhage, endometritis, wound infection

Davies GA et al, JOG Canada, 2010
Medical complications of obesity in pregnancy - fetal

- Increased risk of stillbirth
- Increased risk of congenital anomalies
  - Double the risk of neural tube defects
- Defects harder to detect by ultrasound
- ....and obese babies grow up to be obese adults
Obesity leads to increased health care costs

- Increased length of stay at delivery – mostly due to higher rates of cesarean delivery

- More prenatal fetal testing

- More obstetrical ultrasounds

- More medications dispensed

- More prenatal visits, more of them by physicians (fewer NP/PA providers)

Chu SY et al, NEJM, 2008
Data from the literature:

- Cochrane review, 2010:
  - “Regular aerobic exercise during pregnancy appears to improve (or maintain) physical fitness. Available data are insufficient to infer important risks or benefits for the mother or infant”.
  - “Larger and better trials are needed before confident recommendations can be made about the benefits and risk of aerobic exercise in pregnancy”.
  - 14 trials, 1014 women, small trials, fair-poor methodology
Data from the literature: Bias

- Voluntary participation (healthier, motivated patients), selection bias
- Self-reported exercise, recall bias
- Study demographics – largely white, and upper SES population, generalizable
- Bad outcomes are rare, small studies underpowered to detect effect
Data from the literature: Pregnancy outcomes

- Some data that women who exercised vigorously into 3rd trimester had infants with 200-400 g lower mean birth weight (may preserve head circumference and fetal length, lower fetal fat mass)

- No significant difference in incidence or preterm labor or age at delivery in exercisers vs. controls

- No relationship determined between exercise and cesarean vs. vaginal delivery in one study

- Prospective study of 800 women showed cesarean 28% in control vs. 6.7% women who exercised vigorously (1987)

Gavard and Artal, Clinical Obstetrics and Gynecology, 2008
Data from the literature: Obesity

- LIMIT study in Australia, 2008-2011
- 2200 women with BMI >25
- Healthy diet and regular exercise advice in the intervention group
- No changes in maternal weight gain or percentage of LGA babies, but percentage of babies born at > 4000 gm (about 8 lbs 12 oz) decreased (15% vs 19% in patients with standard care).
Data from the literature: GDM

- Case control (155 GDM vs 386 non-GDM) showed OR of 0.29 for developing GDM in women who exercised before pregnancy, similar for women who exercised in first 20 weeks of pregnancy.
- Preventive effect strongest over all studies in women who exercised vigorously before and during pregnancy.
- GDM – small (41 pt) study showed diet/exercise equivalent to insulin in obtaining euglycemia within one week.

Gavard and Artal, Clinical Obstetrics and Gynecology, 2008
Data from the Literature: GDM

- Spanish study 2007-2011
- Sedentary women, exercised 3x/week through weeks 38-39
- 55 min sessions including resistance/weights and aerobics, HR < 70% max, RPE 10-12
- Risk of developing GDM did not decrease, but in women with GDM:
  - Reduced fetal macrosomia (OR 1.76 vs 4.22)
  - Reduced maternal weight gain (12% lower)
  - Reduced cesarean rate (OR 1.30 vs 1.99)

Barakat, Br J Sports Med 2013
Data from the literature: Preeclampsia

- Women who exercised in first 20 weeks of pregnancy had significantly lower risk of developing preeclampsia (adjusted OR = 0.65, CI = 0.43-0.99)

- Data weaker than for GDM but overall favorable

Gavard and Artal, Clinical Obstetrics and Gynecology, 2008
Data from the literature: Maternal outcomes

- Improved maternal fitness, aerobic capacity and exercise performance, in women who continue and in women who start an exercise program during pregnancy.

- Exercisers experience fewer somatic complaints and less insomnia, anxiety, as well as fewer pregnancy symptoms of heartburn, leg cramps, round ligament pain and low back pain.

- Conflicting evidence on maternal weight gain.

- Exercisers may have improved self-image.
Changes in physiology

- Increase in blood volume (40-45%), plasma volume and red cell mass (33%) begins in first trimester
- Cardiac output increases by 35% above pre-pregnancy level by 12 weeks gestation
- Women who exercise before pregnancy have an additional 40% increase in cardiac output over sedentary women, and blood volume expands by 20% more in exercisers
- Decreased uterine blood flow is demonstrated during strenuous exercise, but there appears to be compensation by shunting blood from myometrium to placenta, and the blood flow effect is minimized with conditioning.

Morris and Johnson, J Repro Med, 2005
More changes in physiology

- Increased relaxin – more mobility in joints, increased risk of injury
- Change in center of gravity with gravid uterus
  - Decreased stability
  - Increased risk of falls
  - Stress on pelvis and lower back
- Pulmonary/diaphragm – diaphragm displaced upwards, but diameters increase due to relaxin. TLC decreases by 4-5%. TV increases by 40%, RR by 10%, minute ventilation by 50%
A few more.....

- Increased progesterone leads to capillary dilatation, nasal congestion, may lead to nasopharyngeal/tracheal/bronchial congestion

- Increased reflux due to decrease in peristalsis, slower gastric emptying, relaxation of LES

- Abdominal stretch can lead to diastasis recti

- Estrogen exposure in animals leads to ACL and other ligament laxity, little data in humans

We can also see more:

- Low back pain
- Carpal tunnel syndrome (2-25%)
- DeQuervain’s tenosynovitis
- Meralgia paresthetica

- These conditions generally resolve after delivery – may benefit from treatment with abdominal binders, night splints, positional changes and activity modification.
Absolute Contraindications to Exercise During Pregnancy

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

ACOG, 2009
Relative Contraindications of Exercise During Pregnancy

- Severe anemia (hemoglobin < 9 mg/dL)
- Unevaluated maternal cardiac arrhythmia
- Chronic bronchitis
- Poorly controlled type 1 diabetes
- Extremely morbid obesity
- Extreme underweight (BMI < 12)
Relative Contraindications of Exercise During Pregnancy

- 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
Warning Signs to Terminate Exercise While Pregnant

- Vaginal bleeding
- Dyspnea prior to exertion
- Dizziness
- Headache
- Chest pain
- Muscle weakness
- Calf pain or swelling (r/o VTE)
- Preterm labor
- Decreased fetal movement
- Amniotic fluid leakage
Cautions

- Supine position diminished venous return, decreased cardiac output and orthostatic hypertension, especially in 2\textsuperscript{nd} and 3\textsuperscript{rd} trimester – only an issue in symptomatic patients

- Motionless standing decreased cardiac output

- Undetermined if occupations requiring standing or repetitive, strenuous physical work lead to growth restriction or preterm delivery

- Scarce information is available on strenuous activity in competitive athletes
Safety in Particular Activities

- High potential for contact in hockey, soccer, basketball, etc – recommended to avoid
- High risk of falling in gymnastics, horseback riding, downhill skiing, water skiing, some racquet sports – recommended to avoid
- Scuba diving – fetus is at increased risk for decompression sickness (pulmonary circulation cannot filter bubbles) – avoid throughout pregnancy –
  - snorkeling is OK
- Avoid exertion above 6000 feet
- No documented risk to hyperthermia
- Competitive athletes may require close obstetric supervision
Recommended activities

- Walking
- Swimming
- Cycling (stationary)
- Aerobics
- Prenatal exercise, including yoga
- Running for runners, may need to modify routine
Newborn growth

- 1992 – case-control, 52 per group– all exercised before pregnancy, half continued during pregnancy
  - Running, aerobics, stair machines
- Newborns weighed 3.38 vs 3.58 kg at birth, lower percent body fat
- At one year, growth and neurodevelopmental parameters were equivalent

Clapp, JF. Am J Ob Gyn 1998
Danish National Birth Cohort

- > 79,000 babies, 1996-2002
- Self-reported exercise, interviewed at 16 and 31 weeks
- Birth weight data from birth records
- Patients with GDM or preexisting DM excluded
- Differences in birth weight were small and disappeared when other variables (smoking, SES) added to the analysis
- Slightly lower risk of SGA and LGA babies in exercising women.

Juhl M. Am J Ob Gyn, 2010
Postpartum and Lactation

- Lactation –
  - no effect found on milk supply or analysis of breast milk composition
  - no changes noted in rate of breastfeeding success or discontinuation
  - no differences found in need for supplementation
  - no differences in growth parameters of breastfeeding infants (cohort of > 500 from 2007)
Postpartum

- Decreased incidence of PP depression in exercising women
- Improved return to pre-pregnancy weight in exercising moms
- There are no specific guidelines on when to restart exercise after birth
- Patients may be deconditioned if sedentary during pregnancy, gradual resumption of activities is advisable
Remember that post-partum may also be inter-pregnancy

- Continuing an exercise program that facilitates weight loss may decrease obesity in a subsequent pregnancy.

- Women with hypertensive disorders in pregnancy have an increased risk of recurrence.

- This is also true for patients with GDM.

- And—
  - Hypertensive disorders and GDM are risk factors for hypertension and Type II diabetes after pregnancy.
Summary

- Exercise safe in otherwise healthy, low-risk women
- May be preventive of preeclampsia, GDM and fetal macrosomia, even in obese women
- Exercise should be non-contact, low injury-risk activities
- Women can continue or start an exercise program during pregnancy
References

4. Cochrane Review:
5. Morris and Johnson, J Repro Med, 2005
8. Dodd, JM et al. BMJ 2014;348:g1285