



Exercise and Pregnancy

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During my tenure as a sports medicine specialist, I have been approached by many women who would either like to continue exercising during their pregnancy or begin an exercise programme at this juncture in their lives. There are many physiological changes during pregnancy that need to be understood to ensure a safe exercise prescription. Once these changes and appropriate recommendations are instituted, then the risks to the developing fetus and the pregnant mother are ameliorated. We will review the physiologic changes during pregnancy and their impact on the foetus, the contraindications to exercise, the benefits of exercise to pregnancy and labour, and the recommendations for exercise prescription by the American College of Obstetricians and Gynecologists (ACOG)⁽¹⁾.

Physiologic Changes of Pregnancy

Hemodynamic

Exercise acts in concert with pregnancy to increase both heart rate and stroke volume, therefore increasing cardiac output⁽²⁾. Stroke volume is the more important factor and it is caused by an increase in plasma volume. However, during exercise, blood is diverted from abdominal viscera, including the uterus, to supply exercising muscle. This decrease in splanchnic blood flow can reach 50 percent and raises theoretic concerns about fetal hypoxemia^(3,4).

Maternal body position also affects cardiac output during pregnancy. After the first trimester, the supine position and prolonged standing is associated with a decrease in cardiac output⁽⁵⁾. The reduction in venous return in the supine position is secondary to uterine compression and can be ameliorated by assuming a right or left sided lying position. Prolonged standing leads to increased peripheral pooling. Certain recommendations will be made below.

Oxygen Needs

Pregnancy causes a decrease in functional reserve capacity; while tidal volume and oxygen consumption are increased ⁽⁶⁾. With mild exertion, pregnant women have a greater increase than their non-pregnant counterparts in respiratory frequency and oxygen consumption to meet their greater oxygen demand. As exercise increases to moderate and maximal levels, however, pregnant women demonstrate decreased respiratory frequency and maximal oxygen consumption. The oxygen demand at high levels of activity appears to overwhelm the system. This may be partially due to the obstructive effect of an enlarged uterus on diaphragmatic movement ⁽⁷⁾. The issue of theoretical fetal hypoxemia is again raised.

Energy Needs

Pregnancy and exercise are associated with a higher need for energy. In the first two trimesters, an increased intake of 150 calories per day is recommended; an increase of 300 calories per day is required in the third trimester ⁽⁸⁾. Caloric needs with exercise are even higher. The competing energy needs of the exercising mother and the growing fetus raise the theoretical concern that excessive exercise might adversely affect fetal development.

Maternal and Foetal Temperature Issues

The metabolic rate increases during both exercise and pregnancy, resulting in greater heat production. Theoretically, when exercise and pregnancy are combined, a rise in maternal core temperature could decrease fetal heat dissipation to the mother. Animal studies have demonstrated that an increase in core temperature can lead to midline fusion defects of the central nervous system ⁽⁹⁾.

Hormonal Changes

Artal et al have brought up the theoretical concerns about premature labour in women who exercise in late pregnancy ⁽¹⁰⁾. Exercise is known to increase circulating levels of norepinephrine and epinephrine ⁽¹⁰⁾. Norepinephrine has been shown to increase both the strength and the frequency of uterine contractions. In contrast, epinephrine has an inhibiting effect on uterine activity. Runners often complain of contractions during exercise. The cited study did not find any evidence of an increase in preterm labor, premature rupture of the membranes or fetal distress ⁽¹¹⁾.

Musculoskeletal Changes

Pregnancy leads to some obvious alterations of the woman's body. These changes often make exercise and other activities requiring balance more difficult. Changes include enlarging breasts, uterus, and fetus, an increase in lumbar lordosis and anterior tilt to the pelvis. In addition, weight-bearing exercise becomes a greater concern. Sudden

movements may exacerbate these mechanical difficulties and increase the potential for injury. Increases in joint laxity may lead to a higher risk of strains or sprains.

Contraindications to Exercise

Contraindications to exercise during pregnancy, as listed in the most recent ACOG technical bulletin, are given in the table below ⁽¹⁾.

Contraindications

Pregnancy-induced hypertension

Preterm rupture of membranes

Preterm labor during the previous or current pregnancy or both

Incompetent cervix or cerclage placement

Persistent second- or third-trimester bleeding

Placenta previa

Intrauterine growth retardation

Relative contraindications

Chronic hypertension

Thyroid function abnormality

Cardiac disease

Vascular disease

Pulmonary disease

Benefits of Exercise to Pregnancy and Labor

In a study comparing degree of physical conditioning and obstetrical outcome, the well-conditioned subjects were found to have shorter labor, less need for obstetrical intervention and fewer signs of fetal compromise ⁽¹²⁾. Exercise may also have a favorable effect on the subjective experience of discomfort during pregnancy. In a study tracking exercise throughout pregnancy ⁽¹³⁾, women who exercised in the three months before pregnancy felt better during the first trimester than those who did not exercise. Exercise in the first and second trimesters was correlated with feeling better in the third trimester. Another study of maternal exercise ⁽¹⁴⁾ showed a decrease in perceived exertion during

labor. No difference was found in gestational length, maternal weight or duration of the first stage of labor^(14,15).

Recommendations for Exercise Prescription

A controlled analysis of exercise prescription is lacking, because studies in humans are limited. Any exercise regimen should be individually structured to the patient; her goals, physical conditioning and general health should be considered. The physician should offer an explanation of the theoretic causes of concern, balanced with a reminder that clinical studies to date have shown no adverse effects from moderate exercise^(15,22).

The intensity, duration and frequency of exercise should start at a level that does not result in pain, shortness of breath or excessive fatigue. Regular exercise at least three times per week for at least thirty minutes per outing is preferable to intermittent activity. Exercise may then progress at a rate that avoids significant discomfort or exhaustion. Patients should be counseled to perform frequent self-assessments of physical conditioning and well-being, including hydration, caloric intake, quality of rest and presence of muscle or joint pain. It should be stressed that decreases in exercise performance are common, especially later in pregnancy. The goal is to allow the pregnant patient to obtain the maximal benefits derived from exercise, while ensuring that no detrimental effects occur in the mother or the fetus^(1,15-17,22).

The patient can minimize thermal stress by performing exercise in the early morning or late evening to improve heat dissipation when it is hot outside. Fans may be used during stationary cycling or other indoor exercise, and swimming is the best option. It is prudent to avoid exercise when the weather is very hot or humid, since heat dissipation is impaired at these times. Wearing appropriate loose clothing that allows adequate ventilation is also advisable^(1,15,16,18).

The importance of maintaining adequate hydration should be emphasized. Drinking up to 500 mL of liquid before exercising and 250 mL of liquid every 30 minutes during exercise should be sufficient to maintain adequate hydration. Even if the patient is not thirsty after exercise, she should drink enough liquid to replenish lost fluids. It is common to lose 1 to 2 litres of fluid per hour in sweat^(1,15,16). Exercises performed in the supine position are inadvisable after the first trimester, as are prolonged periods of motionless standing. Both of these body positions have been associated with decreased cardiac output. Prolonged Valsalva maneuvers with isometric exercise such as weight lifting should be avoided because they may result in decreases in splanchnic blood flow and uterine perfusion^(1,15,16).

At each respective appointment, fundal height, hydration status, urine dipstick for ketones, sugar, and protein, blood pressure, adequate caloric intake between 150 to 300 kcal per day, and maternal weight should be routinely followed. The patient should show a normal weight gain throughout the pregnancy, independent of exercise. Some experts have recommended a baseline ultrasound examination at 16 to 18 weeks. Subsequent ultrasound evaluation would be indicated only if a size/date discrepancy were noted

(1,15,19,20)

Some women may experience a subjective increase in contractions during exercise in the late trimester, but these will generally resolve spontaneously without adverse sequelae. If contractions are still felt 30 minutes after exercise, the physician should be notified. Cervical checks or monitoring for contractions should be based on the patient's history and physical examination ^(21,22).

Activities that require exceptional balance or extreme range of motion should be avoided in late pregnancy. The patient should also be discouraged from performing exercises that involve sudden changes in body position, chances of abdominal trauma, and increased potential of falls. A summary of recommendations regarding sports activities is provided in the table following ⁽¹⁾.

Activities to encourage

Walking

Stationary cycling

Low-impact aerobics

Swimming

Activities to discourage

Contact sports (increased risk of abdominal trauma)

Hockey (field and ice)

Football

Soccer

High-risk sports (increased potential for falls/trauma)

Gymnastics

Skating

Skiing (snow and water)

Vigorous racquet sports

Weight lifting

Scuba diving

Conclusion

The multifactorial physiological changes in pregnancy and exercise are still largely misunderstood. There is a long list of theoretical concerns. Given the appropriate guidelines and some helpful advice, there appears to be no reason that most women cannot continue with exercise during pregnancy and reap the possible benefits of improvement in well-being.

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