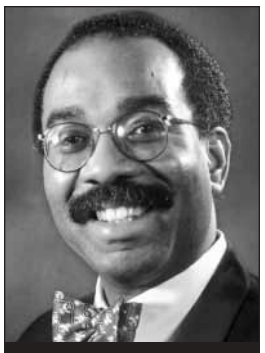
E. ALBERT REECE, M.D., PH.D., M.B.A.

MASTER CLASS

Exercise in Pregnancy

The extraordinary increase in obesity in the United States is giving rise not only to direct complications, such as hypertension and cardiovascular disease, but also to indirect problems such as diabetes. Hence, we have one problem leading into many others, ultimately resulting in a significant increase in morbidity and mortality.

Unfortunately, exercise—which can counter obesity—is not increasing at a concomitant rate. As a result, an emphasis on healthy lifestyles, with exercise as a central theme, has become the focus of national and international efforts undertaken by such groups as the World Health Organization, many of our medical societies, and even certain governmental agencies.

Just as exercise outside of pregnancy has clear benefits, exercise during pregnancy is also very important. For example, we know that a woman with gestational diabetes can certainly improve glucose control with exercise. However, there are clearly guidelines that must be followed when engaging in exercise during pregnancy.

In this month's Master Class, my guest professor is Raul Artal, M.D., who is an internationally recognized expert in the area of exercise physiology and exercise in pregnancy. He will lead us through specific recommendations concerning exercise during pregnancy, with references to gestational diabetes, weight control, and postpartum exercise.

Dr. Artal is professor and chair of the department of ob.gyn. at St. Louis University. He received his medical degree in Israel and his residency and fellowship training in the United States. He served as a faculty member at University of Southern California in Los Angeles and as chairman of ob.gyn. at the State University of New York, Syracuse, before attaining his current position. Dr. Artal is the lead author of the American College of Obstetricians and Gynecologists' Committee Opinion #267, "Exercise During Pregnancy and the Postpartum Period." ■

DR. REECE, who specializes in maternal-fetal medicine, is the vice chancellor and dean of the college of medicine at the University of Arkansas in Little Rock.

Make Exercise Recommendations a Priority

Although exercise is promoted to the general population for its well-recognized benefits, it is still not adequately accepted or recommended during pregnancy.

The hesitance of obstetricians to recommend exercise to pregnant women is rooted in old-fashioned notions of pregnancy as a time of confinement. In the absence of reassuring data regarding the effects of exercise on the mother and fetus, most obstetricians adhered to the principle of doing no harm—advising women to eat for two and not to move.


BY RAUL ARTAL, M.D.

With ample evidence to show that regular, moderate exercise in women with healthy pregnancies results in no adverse maternal or fetal effects, it could be argued that, in the spirit of "primum non nocere," obstetricians should make exercise recommendations a top priority.

Indeed, because it is recognized that habits adopted during pregnancy can result in persistent lifestyle improvements, the promotion of exercise during pregnancy is an important public health issue that could significantly reduce the lifetime risks of obesity, chronic hypertension, and diabetes—not only for our patients, but for their families as well.

Recently, exercise has been recognized as an effective alternative to insulin therapy for treating gestational diabetes and as a means of preventing this disorder, which is frequently the first manifestation of what can become a lifelong condition.

Healthy Pregnancy? Few Restrictions

Despite the profound anatomical and physiologic changes of pregnancy, women with healthy pregnancies and no contraindications can exercise just as their nonpregnant counterparts do, combining both aerobic and resistive elements in their workouts. (See box on opposite page.)

A clinical evaluation of each patient is recommended before prescribing exercise, and physicians must consider the type and intensity of exercise—as well as the duration and frequency of exercise sessions—for each patient, based on her level of fitness and familiarity with various activities.

Contact sports and exercises with a high risk of falling or abdominal trauma should be avoided. Scuba diving should be avoided throughout pregnancy because this activity puts the fetus at increased risk for decompression sickness secondary to the inability of the fetal pulmonary circulation to filter bubbles.

Exercise Intensity

Moderate exercise is defined as a level of intensity that still allows normal conversation—equivalent, for example, to brisk walking at 3-4 miles per hour. For women who have been sedentary and are taking up exercise for the first time, a gradual progression to this intensity for up to 30 minutes per day is recommended. Those who are already fit when they become pregnant should be advised that pregnancy is not a time for greatly improving physical fitness and that, in general, overall activity and fitness levels tend to decline during pregnancy.

Pregnant women should exercise caution in increasing the intensity of their workouts, especially when they are extending exercise sessions beyond 45 minutes, because body core temperatures can rise above safe limits after that time. Strenuous exercise has not been proved to increase overall benefit and could actually be harmful, so this level of exercise intensity should be avoided.

Fetal Effects

Maternal cardiovascular, respiratory, and thermoregulatory adaptation occurs as a result of pregnancy and is further challenged by the addition of exercise. There is decreased availability of maternal oxygen during exercise because of increased maternal oxygen requirements at rest and the increased difficulty in breathing caused by the pressure of the enlarged uterus on the diaphragm. In addition, pregnancy raises basal metabolic rate and heat production, which are then further raised by exercise.

The hesitance of many obstetricians to prescribe exercise for pregnant women centers on the hypothetical fetal risks of impaired transplacental blood flow of oxygen, carbon dioxide, and nutrients during maternal exercise, as well as the potentially teratogenic effects of raising fetal temperature.

Most studies show a minimal to moderate increase in fetal heart rate during maternal exercise, and there is also evidence of fetal heart rate decelerations and bradycardia; however, no lasting fetal effects have been reported.

Data on the effects of increased maternal core temperatures are limited. Hyperthermia during embryogenesis (the first 45-60 days following the last menstrual period) has been shown to cause major congenital malformations (JAMA 1992;268:882-5).

The temperature threshold for human teratogenesis is 39.2° C (103° F). Moderate exercise performed in conditions allowing adequate heat dissipation has been shown to raise core temperatures no higher than 1.5° C during 30 minutes of exercise in nonpregnant women—and this temperature plateaus during as much as 1 hour of exercise.

Loss of fluid through sweat may compromise heat dissipation, so maintenance of euhydration—and thus blood volume—is essential to controlling core temperature.

Extra Nutritional Requirements

Although the published data on a link between low birth weight and maternal exercise are conflicting, it appears that adequate energy intake can offset any exercise-induced decreases in birth weight.

By the second trimester of pregnancy, an extra 1.3 MJ (300 kcal) per day are required to meet general metabolic needs in pregnancy, and this energy requirement is increased with exercise. Pregnant women use carbohydrates at a greater rate than do nonpregnant women—both at rest and during exercise—and there is preferential use of this form of energy during non–weight-bearing exercise, making adequate carbohydrate intake of particular importance.

Elite Athletes

Although routine prenatal care is sufficient for monitoring women in average exercise programs, closer obstetric observation is required for women who are elite athletes.

Most elite athletes choose to continue training during pregnancy, but they must be told that they probably will not achieve the same level of performance as they did before pregnancy, and the physiologic changes they experience—such as weight gain and joint or ligament laxity—will also make them more prone to injury. Women engaging in endurance sports can be prone to anemia that results from increased blood volume during pregnancy. High intensity, prolonged, and frequent exercise can put women at greater risk of thermoregulatory complications as well, and will usually result in less maternal and fetal weight gain than occurs in less active women.


LYNDA BANZI

Maintenance of euhydration is essential to controlling core temperature while exercising in pregnancy.

Gestational Diabetes

The American Diabetes Association has endorsed exercise as a helpful adjunctive therapy for gestational diabetes mellitus (GDM) when glycemic control cannot be achieved through diet alone. Approximately 39% of patients with GDM require

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insulin therapy, but in my experience, exercise is a safe and effective alternative for most of these women.

The key to achieving euglycemia through exercise is ensuring the adequate duration and intensity of the activity. Exercise improves the impaired insulin sensitivity of women with GDM, which in turn increases glucose uptake by muscles and splanchnic organs, but this effect is achieved only through the activation of large muscles, such as the quadriceps, at adequate intensity, which explains why some studies in the literature fail to show normalization of glucose levels after exercise. At least half an hour of brisk walking per day is sufficient to upregulate insulin sensitivity in patients with GDM, obviating the need for insulin therapy.

Additionally, epidemiologic data suggest that exercise may act as primary prevention for GDM in morbidly obese women, but not in women of normal weight.

Weight Control

Although exercise should never be used for weight control during pregnancy, excessive weight gain should be avoided.

The current Institute of Medicine (IOM) guidelines on weight gain—which recommend a gain of 25-35 pounds for normal-weight women with a singleton pregnancy—are too high and are based on historical concerns about the effects of famine on fetal growth retardation.

The effect of gestational weight gain on pregnancy outcomes in obese women is not well studied. It is my opinion that the IOM guidelines are outdated, and that weight gain recommendations should be individualized. Compared with IOM recommendations for adequate gestational weight gain in obese women (at least 15 pounds), it is well recognized that a gain of less than 15 pounds in this population significantly reduces the risks of preeclampsia, C-section, and large-for-gestational-age infants.

The risk for small-for-gestational-age infants varies significantly, particularly among morbidly obese women in whom no weight gain—or even weight loss—may not have any adverse effect on birth weight.

Postpartum Exercise

Because failure to lose weight gained in pregnancy is a significant contributor to the obesity epidemic, the promotion of good exercise habits during pregnancy can also sow the seeds for postpartum exercise and weight loss.

One study showed that the amount of postpartum weight retention increases with each subsequent pregnancy (Acta. Obstet. Gynecol. Scand. 1979;58:45-7). Another study found that women who gained excessive weight during pregnancy and failed to lose it within 6 months post partum were 8.3 kg heavier 10 years later (Obstet. Gynecol. 2002;100:245-52).

Our study found that a weekly structured exercise program plus diet in postpartum overweight women were much more effective in achieving weight loss after 12 weeks compared with a single 1-hour education session about diet and exercise (J. Women's Health [Larchmt] 2003;12:991-8).

Therefore, women whose exercise habits have become firmly entrenched during pregnancy stand a much better chance of maintaining them post partum—and perhaps even into their next pregnancy. ■

Contraindications To Exercise In Pregnancy

Absolute Contraindications

- 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 that occurs after 26 weeks' gestation
- Premature labor during the current pregnancy
- Ruptured membranes
- Preeclampsia/pregnancy-induced hypertension

Relative Contraindications

- Severe anemia
- Unevaluated maternal cardiac arrhythmia
- Chronic bronchitis
- Poorly controlled type 1 diabetes
- Extreme morbid obesity
- Extreme underweight
- 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

Source: Obstet. Gynecol. 2002;99:171-3