

Exercise and Pregnancy

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Both exercise and pregnancy exert stresses on the body, and the cumulative effects must be considered when recommending a rehabilitative exercise program to pregnant women.¹ Credible human research about the topic is sparse, and animal studies provide conflicting findings. Chronic disorders such as diabetes, hypertension, and heart disease are clear reasons to discourage persons at risk from intense rehabilitative exercising while pregnant. Also, small or underweight women probably should be cautioned, since these women bear more premature and low birth weight infants than larger, normal-weight women.

Getting in Shape

Weight loss endeavors during pregnancy should be discouraged regardless of whether a decreased caloric intake or exercise is used, because neuropsychological abnormalities in infants have been associated with pregnancy. Adolescents are particularly prone to exercise during pregnancy, but a "get-in-shape" program should be deferred until after delivery if it is not undertaken before pregnancy. The existing level of aerobic fitness is an important factor in determining the eligibility of a pregnant woman for a rehabilitative exercise program. The effects of aerobic training are rapidly lost when activity ceases.

Walking is an excellent activity for the pregnant woman. Jogging should be discouraged, at least in the later stages of pregnancy, because of progressive lordosis and possible strain on the pelvic ligaments. A conservative approach to exercise seems wise because of its effects on the fetal heart rate and breathing movements. The maternal heart rate should not exceed 140 to 150 beats per minute for about 15 minutes, three to five times a week. Exercise at this level elicits an aerobic training effect in most women of childbearing age, while producing minimal fetal responses.

Gentle stretching and a warmup period before each exercise period are important measures. A cool down period of 10 to 15 minutes is also recommended. And because increased weight shifts anteriorly over the course of a pregnancy, it is also recommended that pregnant patients be fitted for custom made flexible orthotics. The ideal orthotic would be one which absorbs heel-strike shock, provides firm arch support and combats the high stress levels which commonly affect the lumbar spine of the mother-to-be.

Sedentary women should not begin vigorous rehabilitative exercise or try to get into shape during pregnancy. The time to get into good physical condition is before or after pregnancy. Once pregnant, a sedentary woman can begin a walking program or something similar. However, a woman who has been exercising can pursue a rehabilitative exercise program during pregnancy by adjusting the intensity of the program, according to how she feels, and keeping her heart rate in the 140 to 150 beats per minute range.

Fetal Heart Rates

Doppler monitoring of fetal heart rates, showing fetal bradycardia during vigorous maternal exercise, has given rise to concern for fetal safety. Because Doppler measurement of fetal heart rate during maternal exertion is difficult, two-dimensional ultrasonic imaging was used by Carpenter et al.² to record the fetal heart rate and determine the effect of submaximal and maximal maternal exertion and the incidence of fetal bradycardia.

Forty-five women with a mean gestation of 25 weeks performed exercise twice on separate days using a cycle ergometer. Resting measurements were taken with the women seated on the ergometer for 10 minutes. They underwent 85 submaximal and 79 maximal cycle ergometer tests.

Fetal cardiac activity was monitored continuously and videotaped during exercise and rest periods using a linear array two-dimensional ultrasound system. The average fetal heart rate did not change during maternal exertion, but 15 of 16 post-exercise episodes of bradycardia occurred within three minutes after maximal maternal exertion. There were 18 episodes of fetal bradycardia; one occurred during exercise.

Brief submaximal exercise up to 70% of maximal aerobic power seems to have no effect on fetal heart rate. Maximal exertion, on the other hand, is commonly followed by fetal bradycardia. The significance of this bradycardia is as yet unknown, but it seems prudent to recommend that pregnant women limit vigorous exercise to activities of no more than 150 beats per minute and conclude their exertion with a cool-down period.

Supine Exercise

Several investigators have monitored fetal heart rate (FHR) as a way to assess fetal hypoxia or distress in response to maternal exercise. An early study reported little effect on FHR, whereas later studies yielded conflicting results when using the FHR response to exercise as a screening test for uteroplacental insufficiency. Recent studies have reported a transient increase in baseline FHR. The effect of brief periods of mild, supine exercise on FHR in the late second trimester and mid-third trimester was studied by Nesler et al.³

Twenty-five healthy, regularly-exercising women were studied: 12 in the late second trimester, and 13 in mid third trimester. Although significant increases in maternal mean arterial pressure and pulse occurred, the exercise intensity was mild, with the average percent maximal pulse being 46 +/- 5% in the second trimester group and 49 +/- 5% in the third trimester group. Small increases in FHR were observed in both groups, which were insignificant statistically and physiologically. No patient experienced significant FHR abnormalities as a consequence of the exercise sequence.

These results indicate that pregnant women may continue submaximal supine exercise of short duration through the 36th week of gestation without harmful effects to the fetus. Thus, moderate exercising by pregnant women does not cause increases in the FHR. However, exercising while in a supine position instead of on a cycle ergometer may be a better choice. However, it appears from comparison of studies that the more vigorous exercise program used by Carpenter et al.² demonstrated no more danger to the fetus than did the more conservative program described by Nesler et al.³

Aerobic Exercise

The health and fitness of pregnant women at the onset of gestation affect the course and outcome of

the pregnancy. Whether pregnancy reduces physical fitness as measured by maximal oxygen consumption between the second and third trimesters, and whether maintaining a regular exercise program during the second half of pregnancy influences fitness, were determined in 23 women by South-Paul et al.⁴ at the beginning of the second trimester.

Patients were randomly assigned to either a non-exercising or an exercising group. They completed a maximal progressive exercise test on a cycle ergometer at 20 weeks and 30 weeks, during which time pulmonary parameters or aerobic capacity were assessed.

The exercising women had greater improvement in aerobic capacity than the non-exercising women, manifested by increases in tidal volume and oxygen consumption and a stable ventilatory equivalent for oxygen. Pregnancy did not decrease the maximal oxygen consumption between the second and third trimesters, during which detraining could have been substantial.

This study points out the value of exercising during pregnancy. In fact, none of the women in this study was previously trained and the average baseline oxygen consumption was in the low range for both groups. Yet, when placed in a supervised exercise program, the exercise group improved their fitness, as demonstrated by an increased maximal oxygen consumption per kilogram of body weight.

The effects of exercise on the fetus are important in view of the increasing participation by women in rehabilitative exercise clinics. Dale et al.⁵ undertook a retrospective study of 21 women who had been pregnant in the past five years and who had participated in running during the course of pregnancy. A prospective sample of 12 women who were currently pregnant and running was also done with 11 controls matched with the runners for age, race, and parity. Electronic fetal monitoring was carried out in four subjects, all with favorable obstetric outcomes.

Subjects in the retrospective sample had a mean age of 30 years and had run for an average of four years; the mean prepregnancy weekly distance was 18.7 miles. Mean distances run in the three trimesters were 14.2, 10.9, and 6.6 miles a week, respectively. Eight of the 21 subjects competed in races while pregnant. Mean maternal weight gain was 24.4 pounds. In the prospective study, the only major obstetric complication in a runner was threatened abortion. There were no neonatal complications in the running group except for jaundice in an infant. Electronic fetal monitoring during treadmill running showed transient bradycardia, with a return of fetal heart rate to normal during continued exercise.

The course of pregnancy and complications appear to be similar in women who run during pregnancy and those who do not. Women who run exhibit a trend toward failure to progress during labor, resulting in an increased rate of cesarean section delivery. There is no evidence from Dale et al.⁵ of a compromised neonatal status in cases of women who run during pregnancy. Exercise appears not to seriously compromise uteroplacental function. Whether the fetal bradycardia observed during initial exercise is a response to transient hypoxia, a result of shunting of blood to the leg muscles, or an effect of other stress remains to be determined.

In the Dale⁵ study that evaluates 33 pregnant runners and 11 pregnant nonrunners, there is a more concerned note, perhaps, about potential major obstetrical complications in runners than controls, and the possibility of a higher Cesarean section rate in this group because of failure of progression during labor. More data would be necessary to confirm this, but this would be another argument for caution in prescribing running during pregnancy. There was no significant difference between runners and

nonrunners with respect to weight gain, length of labor, and delivery, and the absolute incidence of obstetric complications. Dale⁵ did note fetal bradycardia, usually transient for a 2 1/2 to 3 1/2 minute interval, with spontaneous recovery during exercise. This is the point of concern. Again, pregnant women should limit exercise to activities requiring heart rates of no more than 150 beats per minute and conclude their exertion with a cool-down period.

References

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JULY 1997