

Protocols for Exercise during Pregnancy

S.A. Fazlani

4th year Medical Student, Ziauddin Medical University, Karachi.

Background

Most pregnant women restrict their mobility and their participation in routine activities, but studies have proved that daily exercises program can reduce chances of miscarriage by 40%.^{1,2} US researcher, James Clapp and co-workers have observed that moderate exercises such as walking or cycling can prevent pregnancy induced hypertension. Women who started exercise early in pregnancy, their placenta grew almost a third faster in mid-pregnancy and had about 15% more blood vessels and surface area at term.^{3,4} An observational study in Punjab has shown the incidence of Pre-term premature rupture of membrane of about 5.4% which is higher than the incidence in United Kingdom, America and France etc, where it is around 1-2%.⁵ Exercise can also prevent early onset of labor, premature rupture of membrane, and can even help to shorten the duration of labor.⁶

Maternal Benefits

A study has shown that women who exercised during pregnancy felt better during the first trimester than those who did not exercise in pregnancy.⁷ Exercise acts in concert with pregnancy to increase the heart rate, stroke volume and cardiac output.⁸ It has also been observed that exercise help mothers to loose pregnancy weight faster; it decreases aches and pains associated with pregnancy; reduces likelihood of severe trauma from episiotomies and also reduces the number of caesarean sections.⁹⁻¹² A study of changes in lung

function tests during pregnancy have shown that women who were engaged in daily exercise program developed adaptive changes in lung functions in the antenatal period.¹³ Lesser weight gain and fat retention; improved attitude and mental state; easier and less complicated labor and quick recovery are among the other advantages of exercise during pregnancy.⁸

Fetal Benefits

Fetal benefits include improved stress tolerance and advanced neurobehavioral maturation.^{14,15} The offspring of the exercising women were significantly heavier (corrected birth weight: 3.75 ± 0.08 kg vs. 3.49 ± 0.07 kg) and longer (51.8 ± 0.3 cm vs. 50.6 ± 0.3 cm) than those born to women in control group but there were no significant differences in neonatal percentage body fat, head circumference, ponderal index, or maternal weight gain.^{9,16} Consequently the offspring of those mothers who started exercise early in their gestation are leaner at 5 years of age and have a slightly better neurodevelopmental outcome.^{8,17} One review concluded that "current evidence appears to indicate participation in moderate to vigorous activity throughout pregnancy may enhance birth weight", with a caution that vigorous exercises could result in lighter offspring.¹⁸ A prospective study of more than 800 pregnant women found that the babies of those who expended a mean of 2,000 kcal/wk in leisure time physical activity (a level that does not necessarily reflect intense activity) were significantly heavier at birth than those of non-exercisers.²

Recommendations

A few exercises recommended during pregnancy are explained briefly as follows:

For beginners: For women who have previously been sedentary, non-weight-bearing activities such as swimming, stationary cycling pose the least risk of injury and moderate walking is also safe for most. A schedule of 20 to 30 minute exercise sessions daily at a comfortable pace is a reasonable goal. Because of the increased risk of injury to joints, a jogging program should not be initiated at this time.¹⁹

For previously active women: In the absence of obstetric or medical complications, most active women can continue to exercise in accustomed ways. Studies have proved that exercises involving strenuous, prolonged physical activity such as aerobics, circuit training, stair climbing, swimming, biking, and running remains a way of life for at least 25% of all women planning pregnancy.²⁰

Activities that can be started during pregnancy, even by those not currently participating in an exercise program are:^{21,22}

Low impact aerobics
Cycling/stationary biking
golf
Rowing machine Stairmaster
/stair climbing Swimming
Walking
Water aerobics
Tennis/racquetball (only if you are in good physical condition)
Weight training

Activities that can be continued during pregnancy by those currently participating are:^{21,22}

Backpacking (only if in good physical condition)
Ballet
Basketball
Body building (only for experienced)
Cross country skiing (only if in good physical condition)
Running (only if in good physical condition)
Softball
Volleyball.

Kegels maneuver: In this maneuver alternate contraction and relaxation of the muscles of pelvic outlet and birth canal is done.²³ Strengthening of these muscles supports the contents of the abdomen preventing uterus or bladder from falling through these muscles, especially after having children. Relaxing these muscles teaches her how to let go so the baby can pass through the birth canal.

Running: It is recommended that most habitual runners can continue to participate until late pregnancy; those who are simply trying to maintain fitness (as opposed to competing) are well advised to reduce their running time to lesser than 45 minutes.²⁰

Squatting: Squatting during pregnancy helps increase the mobility of the pelvic joints and strengthens the legs. A squatting position during birth can increase the pelvic outlet

by as much as 25% percent and allows for the greatest degree of pelvic adaptation as the baby descends.^{20,24} Squatting should be avoided after 32 weeks of gestation if the baby is a breech or the mother has a cervical stitch (cerclage), hemorrhoids, vulvar varicosities, or painful varicosities in the legs; however, a supported squat can be practiced safely as long as it does not cause any discomfort.²⁵

Pelvic floor muscle training: Stress incontinence is a disturbing problem during pregnancy. The protocol has been published previously²⁶ and recommendations for general training to increase strength of skeletal muscle were made.^{27,28} Participants were asked to conduct 8-12 contractions of pelvic floor muscles three times a day at home with additional training in groups once a week for 45 minutes with a physical therapist. The prevalence of urinary incontinence was significantly lower in the training group than in the control group at 36 weeks of pregnancy, (32% versus 48%) and at three months after delivery (20% versus 32%).^{7,22,27-29}

Relaxation in the side lying position: Relaxation provides important benefits to a women's body and mind. Taking time each day to relieve stress can renew energy as well as enhance experience of pregnancy and the growing life with in her. Relaxing on a side not only produces physical and mental benefits for mother, but also maximizes blood flow to the uterus, providing benefits for the baby.

Some Easy Exercises

There are quite few ways to get some easy exercise into pregnant mother's daily schedule:

- Take the stair whenever possible.
- Park the car further away from stores.
- Walk to do short errands.
- Use a video if she can't get to the gym.
- Walk around the house or up and down stairs while commercials are on television.
- Schedule her workout like any other appointment.
- Get up to change the television channels.
- Use a push mower.

Exercise under Supervision

- A specialist can modify activities of women who happen to be involved in the aerobic activities.
- Lifting of weights should be avoided, except under proper prescription and supervision.
- Mothers with multiple gestations are at risk for premature labor, and if they have additional risk factors, the aggregate risk is even higher so exercise program for these women should therefore be individualized and medically supervised.

- Women who are excessively obese or significantly underweight should exercise under supervision and with extreme caution if at all, as should those who have type 1 diabetes, pregnancy-induced hypertension, seizure disorder or anemia.¹⁹

General Precautions

It is recommended that all pregnant women, regardless of their activity or fitness level, should take precautions against dehydration and hyperthermia. They should avoid exertion in hot, humid environments and should drink adequate fluids before, during, and after exercise. Appropriate clothing and other strategies (e.g. using a small fan while using an exercise cycle) will facilitate heat dissipation. This is especially important in the first trimester. To avoid compromising fetal growth, caloric intake must be adequate to meet the combined demands of pregnancy (an additional 300kcal/day) and exercise, except in the case of competitive athletes who are determined to maintain high performance for as long as possible. Studies reveal that there are no known added benefits, and more potential complications, with vigorous exertion.²⁰ Oxygen consumption during pregnancy is higher, limiting the ability to perform high-intensity tasks. Regular exercises need to be advised to heed signs of fatigue and curtail workouts short of exhaustions to reduce the potential risk of hypoglycemia.

Contraindications

According to American College of Gynecology guidelines, careful evaluation should be done to determine if exercise is appropriate for pregnant women who have cardiac disease or restrictive lung disease. Second or third trimester bleeding, pregnancy induced hypertension, preterm labor with present or previous pregnancies, intrauterine growth retardation, incompetent cervix, placenta previa and premature rupture of membrane are absolute contraindications to exercise.²⁴ Participation in a full range of sports such as volleyball and tennis, as well as any activity with the potential for causing abdominal trauma should be avoided. Exercise during the first few days of exposure to high altitude is also not recommended because of the reduced oxygen availability.

Warning Signs

Pregnant women should be alerted to signs that should prompt them to stop exercising and seek medical attention. In addition to excessive fatigue, these include pain (particularly in the back or pubic area), dizziness, shortness of breath, palpitation, decreased fetal movement, persistent contractions, rupture of membranes, and vaginal bleeding.³¹

Discussion

Continuing much higher levels of exercise are not associated with an increased incidence of infertility, abortion, congenital malformation, premature labor, premature rupture of membranes, cord entanglement, fetal distress, abnormal labor, significant growth restriction or maternal injury.^{1-4,7,18,32-34} Like wise follow up studies for the first 5 years after delivery have revealed no evidence of abnormalities in postnatal growth or neurodevelopment in these offspring and no evidence of structural defects, injury or other health abnormalities in women.⁴ These observational results led to a series of three prospective, randomized studies on weight-bearing (treadmill, aerobics, and stair-stepping) exercise training during pregnancy.^{3,27,35} High volume of moderate-intensity, weight-bearing exercise in mid and late pregnancy symmetrically reduces fetoplacental growth with a proportionally greater increase in fat mass than that in lean body mass.⁹ Investigators have cited some theoretic reasons for concern about premature labor in women who exercise in late pregnancy. Exercise is known to increase circulating levels of nor epinephrine and epinephrine. Nor epinephrine has been shown to increase both strength and frequency of uterine contractions.³⁵ In contrast; epinephrine has an inhibiting effect on uterine activity. Runners often complain of contractions during exercise, but actual measurement with tokodynamometry has not demonstrated consistent changes in uterine contractility. Tokodynamometry is, of course, logistically difficult in this situation and may not be reliable. The study did not find any evidence of an increase in preterm labor, premature rupture of the membranes or fetal distress.³ Weight loss of approximately 0.5 kg per week between 4 and 14 weeks post partum in overweight women who are exclusively breast-feeding does not affect the growth of their infants.¹¹ There is no data that suggest exercise is related to abortions.

Acknowledgements

I am grateful to my fellow students, Ali S. M. Akhtar and Sadaf Shaheen for their continuous support and cooperation in writing this review article.

References

1. Clapp JF 3rd. The effects of maternal exercise on early pregnancy outcome. *Am J Obstet Gynecol* 1989;161:14.
2. Hatch MC, Stein ZA. Work and exercise during pregnancy: epidemiological studies, in Artal R, Wiswell RA, Drinkwater BL (eds). *Exercise in pregnancy*, ed 2. Baltimore: Williams & Wilkins 1991, pp. 279-86.
3. Clapp JF 3rd. The course of labor after endurance exercise during pregnancy. *Am J Obstet Gynecol* 1990;163:1799-805.
4. Clapp JF 3rd. *Exercising Through Your Pregnancy*. Champaign, Ill: Human Kinetics Publishers Inc; 1998, pp. 145-51.
5. Tahir S, Aleem M, Aziz R. Incidence and outcome of preterm-premature rupture of membranes. *Pak J Med Sci* 2002;18:26-32.
6. Beckmann CR, Beckmann CA. Effect of a structured antepartum exercise program on pregnancy and labor outcome in primiparas. *J Reprod Med*

- 1990;35:704-9.
7. Sternfeld B, Quesenberry CP Jr, Eskenazi B, et al. Exercise during pregnancy and pregnancy outcome. *Med Sci Sports Exerc* 1995;27:634-40.
 8. Pivarnik JM, Lee W, Clark SL, et al. Cardiac output responses of primigravid women during exercise determined by the direct Fick technique. *Obstet Gynecol* 1990;75:954-9.
 9. Clapp JF 3rd. Exercise during pregnancy. A clinical update. *Clin Sports Med* 2000;19:273-86.
 10. Clapp JF 3rd, Little KD, Appleby-Wineberg SK, et al. The effect of regular maternal exercise on erythropoietin in cord blood and amniotic fluid. *Am J Obstet Gynecol* 1995;172:1445-51.
 11. Clapp JF 3rd. Guiding the athlete during pregnancy and lactation. *Contemporary. Obstet Gynaecol* 1996;41(sports medicine suppl):20-26.
 12. Crane SS, Wojtowycz MA, Dye TD, et al. Association between pre-pregnancy obesity and risk of cesarean delivery. *Obstet Gynecol* 1997;89:213-6.
 13. Phatak MS, Kurhade GA. A longitudinal study of antenatal changes in lung function tests and importance of postpartum exercises in their recovery. *Indian J Physiol Pharmacol.* 2003;47:352-6.
 14. Clapp JF 3rd, Lopez B, Harcar-Sevcik R. Neonatal behavioral profile of the offspring of women who continued to exercise regularly throughout pregnancy. *Am J Obstet Gynecol.* 1999;180:91-4.
 15. Clapp JF 3d. Exercise in pregnancy: a brief clinical review. *Fetal Med Rev* 1990;2:89-101.
 16. Clapp JF 3rd, Kim H, Burciu B, et al. Beginning regular exercise in early pregnancy: effect on fetoplacental growth. *Am J Obstet Gynecol* 2000;183:1484-8.
 17. Clapp JF 3rd. Morphometric and neuro-developmental outcome at age five years of the offspring of women who continued to exercise regularly throughout pregnancy. *J Pediatr* 1996;129:856-63.
 18. Pivarnik J. Potential effects of maternal physical activity on birth weight: brief review. *Med Sci Sports Exerc* 1998;30:400-6.
 19. Clap JF 3rd. Cover story: recommending exercise during pregnancy. *Contemporary Obstet Gynaecol* 2001;1:30-49.
 20. Clapp JF 3rd, Kim H, Burciu B, et al. Continuing regular exercise during pregnancy: effect of exercise volume on fetoplacental growth. *Am J Obstet Gynecol* 2002;186:142-7.
 21. Thomas W, Wang Y, MacNeal KE, et al. Exercise during pregnancy. *Am Acad Fam Physician* 1999;48:2165-74.
 22. Clapp JF 3rd, Simonian S, Lopez B, et al. The one year morphometric and neurodevelopmental outcome of the offspring of women who continued to exercise regularly throughout pregnancy. *Am J Gynecol* 1998;178:594-99.
 23. Cowlin A, Shelley S. Exercises to ease pregnancy, birth and recovery. Washington: parent articles 1994; 352:9707-10.
 24. Davies GA, Wolfe LA, Mottola MF, et al. Exercise during pregnancy and the postpartum period. ACOG Technical Bulletin number 189- February 1994. *Int J Gynaecol Obstet* 1994;45:65-70.
 25. Teasdill W. Step-by-step yoga for pregnancy: essential exercises for the childbearing year. Chicago: Contemporary Books, 1999, pp.178-85.
 26. Clapp JF 3rd. The effect of maternal exercise on early pregnancy outcome. *Am J Obstet Gynecol* 1989;161:14.
 27. Veille JC, Hohimer AR, Burry K, et al. The effect of exercise on uterine activity in the last eight weeks of pregnancy. *Am J Obstet Gynecol* 1985;151:727-30.
 28. Bø K, Hagen RH, Kvarstein B, et al. Pelvic floor muscle exercise for the treatment of female stress urinary incontinence. III: Effects of two different degrees of pelvic floor muscle exercise. *Neurourolog Urodyn* 1990;9:489-502.
 29. Bø K, Talseth T, Holme I. Single blind, randomised controlled trial of pelvic floor exercises, electrical stimulation, vaginal cones, and treatment in management of genuine stress incontinence in women. *BMJ* 1999;318:487-93.
 30. American College of Sports Medicine. Position stand. The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. *Med Sci Sports Exerc* 1990;22:265-74.
 31. Stevenson L. Exercise in pregnancy: part 2: recommendations for individuals. *Can Fam Physician* 1997;43:107-111.
 32. Hatoum N, Clapp JF 3rd, Newman MR, et al. Effects of maternal exercise on fetal activity late in gestation. *J Matern Fetal Med* 1997;6:134-139.
 33. Clapp, JF 3rd. Exercise and fetal health. *J Dev Physiol* 1991;15:9-14.
 34. Clapp JF 3rd, Capeless EL. Neonatal morphometrics after endurance exercise during pregnancy. *Am J Obstet Gynecol* 1990;163:1805-11.
 35. Artal R, Platt LD, Sperling M, et al. Maternal cardiovascular and metabolic responses in normal pregnancy. *Am J Obstet Gynecol* 1981;140:123-7.
-