Maternal exercise during pregnancy and neonatal outcomes in Iran

Zahra Ghodsi a, Maryam Asltoghirib

1Department of midwifery, Toyserkan Branch, Islamic Azad University, Toyserkan, Iran
2Department of midwifery, Toyserkan Branch, Islamic Azad University, Toyserkan, Iran

Abstract

Exercise during pregnancy is interested for pregnant women, but there is worry about fetal outcomes. The purpose of this study was to assess the effect of a planned aerobic exercise program on neonatal outcomes. This was a case-control study. By using a continued method, performed on pregnant women with singleton gestation were assigned to either a training or a control group. The supervised training included three days a week, with duration of 30-45 minutes, from 20-26th weeks until delivery. Neonatal outcomes include neonatal weight and first and fifth minute's apgar was recorded for two groups. According finding of this study, there were not meaningful statistical evidences for exercise training and first and fifth minute's apgar or neonatal weight in two groups. Therefore, such programs should be considered as part of routine pregnancy care for pregnant women.

Key words: Maternal exercise, pregnancy, neonatal weight, apgar

1. Introduction

The prenatal period now is recognized as a unique physiological window in which maternal and fetal adaptations can have major consequences for the long-term health and well-being of offspring (Hopkins & Cutfield, 2011). Many physiological changes and compatibility with pregnancy occurs in the mother's body which is significantly consistent with some of the same sport. Increased blood volume and thus improve efficient heat dissipation through blood flow diverted to the skin surface and release nutrients and oxygen, is one of these adaptations. In addition, physical activity by increasing plasma volume of the maternal and fetal and cardiac output which is led to increase of uterine-placenta blood flow can be effective in fetal growth (Hickman, 2007). Proper fetal development during pregnancy is of special importance. The abnormal increase or decrease is significant associated with the mortality and complications during delivery (Cunningham et al 2009). Reduced fetal growth may lead to death, choking swallowing Meconium, blood loss and, (Asphyxia) reduced the degree of heat and increased incidence of infant neural development (Scott et al 2003, Cunningham et al 2009). On the other hand, excessive fetal growth is likely to increase with maternal and neonatal complications (Such as cesarean section rates and complications of laceration, bleeding after delivery you, baby's brachial plexus injury, asphyxia and fetal death) in childbirth (Behrman et al 2004, Cunningham et al 2009).

The effects of exercise during pregnancy have been studied extensively. Despite extensive literature on the relationship between maternal physical activity and pregnancy outcomes, the evidence for a consistent and meaningful impact of regular aerobic exercise on fetal growth is lacking. It is hypothesizes that regular exercise during pregnancy elicits maternal and fetal adaptations, and that these adaptations have the potential for both

1 Zahra Ghodsi. Tel.: +98-918-3139931
E-mail address: Ghodsi2003@yahoo.com
positive and negative long-term outcomes for offspring. Based on current evidence, these adaptations seem to be dependent on the gestational period in which exercise training is initiated and maintained (Hopkins & Cutfield 2011). The American College of Obstetricians and Gynecologists (ACOG) guidelines are in fact more proactive regarding exercise recommendations during pregnancy. In the absence of either medical or obstetric complications in pregnant women, participation in a wide range of recreational activities appears to be safe (Abby, 2010). The ACOG recommends exercise for pregnant women at least 30 minutes of moderate-intensity physical activity on most, if not all, days of the week (ACOG 2003).

Several studies have concluded that exercise in pregnancy leads to a slight reduced birth-weight and BMI of the infant (Gunningham et al 2009). In a study in New Zealand reported a modest reduction in offspring birth size in response to regular non weight-bearing aerobic exercise in the second half of pregnancy. This is actually good news since higher birth-weight is correlated with increased risk of obesity later on. Thus, exercise in pregnancy may have long-term health benefits for one’s children. Benefits again were seen when pregnant women engaged in exercise during the second-half of pregnancy (Hopkins et al 2010). As a result of these methodological limitations, randomized controlled studies examining the effects of regular aerobic exercise during pregnancy have reported contrasting effects on offspring birth weights (Kagan et al 2004, Khaledan et al 2010, Motahari et al 2010). Our findings do further strengthen the notion that moderate, carefully supervised exercise can be safely performed by pregnant women until the end of pregnancy even if they were previously sedentary. The aim of this study was to determine the effects of aerobic exercise training during pregnancy on neonatal outcomes. We hypothesized that regular non-weight-bearing aerobic exercise during the second half of pregnancy would lead to a reduction in offspring birth size and percentage body fat.

2. Methods

This study was a field random trial type along with comparison group. The study performed from February to June 2011 during 5 months in prenatal care clinics and hospitals. The samples under study were include 250 healthy pregnant women, nulli and prime Para, without any regular exercise at the past, which were divided into two groups: intervention (exercise training) and comparison group (non exercise training). Samples were in the range of normal body mass index (19.8-26 kg/m²), and were similar of age, height, number of pregnancies, gestational age when study entry. The selection of samples was conducted using continuous sampling method. If mothers tended to receive exercise training, they were included in intervention group and otherwise, they were included in comparison group. The criteria for the acceptance of units under study were: lack of a specific disease during pregnancy, willingness to participate in research, having the correct address for follow-up, and at least read and write ability. Excluding criteria were included: fetal growth retardation, fetal distress, heavy smokers, double or multiple pregnancy, known physical or mental disease, recent uterine bleeding, such as placenta previa, detachment, premature labor history (more than once), infertility, elective caesarean, obese and lean women (BMI of less than 19.8 and more than 26), professional athletes, experience life fully immobilized, failure to observe discipline in the sport.

Data collection tools include information about the consequences of pregnancy, exercise Sheet, exercise booklets, newborn weighting scale, and Apgar form. Weighing the validity was determined by a standard weight. Also a set of tools to compare the reliability of each measured on a seven samples done by the researcher and colleague and the correlation coefficient for all cases was 90%. Registration information through interview, referring to the mother’s health during pregnancy and delivery records was completed. The questionnaire included two parts of questions: the first part was including some social and demographic characteristics (age of sample, number of pregnancies and deliveries, employment, education, etc.) and the second section was including information about neonatal outcomes: gestational age at birth, newborn weight, and first and fifth minutes Apgar. Sheet in relation to exercise duration and frequency and type of exercise training was conducted, which samples ticked the types of training exercises, and exercise duration.

Training program in the study was based on American College of Sports Medicine (ACSM) and U.S. Centers for Disease Control and Prevention (CDC) guidelines for exercise in adults (ACOG, 2006). The mixed exercise regimen included three days a week, with duration about 30 minutes, from 20-26th weeks until delivery. The
samples were free in choice of exercise’s type during pregnancy. However at the first visit were trained aerobic exercises, because it was a home-based non weight-bearing exercise programs. Exercises were Includes stretching and flexibility, especially the large muscle groups for about 15 minutes. Aerobic exercises were including walking; followed by the continuation of the term of 5 to 15 minute. Other exercises were including swimming, cycling, and walking. After each practice session, all samples used of liquids such as water or fruit juice. Neonatal outcomes include neonatal weight, first and fifth minute's apgar were recorded for two groups. The samples were asked to stop the practice immediately in case of any problem, and notify the researcher. In this study, the researcher visited a total of 4 times every month in the intervention group, and 2 times, at the beginning and end of the study, in the comparison group. The control group did not recommend a specific exercise program and was emphasized they reported if they did exercise regularly during the study. The pregnancy outcomes recorded in both groups were then compared. The data analysis was done using SPSS software using descriptive and inferential statistics were analyzed.

3. Results:

The independent variable in this study was exercise training and dependent variable was consisted of neonatal weight and first and fifth’s Apgar score. From 250 participating in the study, 90.4% in intervention group, and 92.2% in comparison group had not any occupation, most people educational level in two groups was diploma degree (41.2% in intervention group and 35.7% of comparison group). Other maternal demographic factors were included: Initiation time to study in two groups between 20-26 weeks of pregnancy with a mean and standard division of 22.1±2.62 for intervention and 22.5±2.57 for comparison group, mean of mother age was 25.43±4.52 for intervention and 25.86±4.90 for comparison group, number and percent of nulli and primi parity were following 66(57.9) and 48(42.1) for intervention and 66(57.4) and 49(42.6) for comparison group. Mean of BMI was 23.4(1.9) for training and 23.3(2.1) for control group. P value was more than 5 for all above characteristics. However, gestational age at inclusion in the majority of people in the intervention group (50.9%) and comparison group (39.1%) was 20 weeks. Table 1 shows gestational age, neonatal weight and first and fifth’s Apgar score in interventional and comparison groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Mean(SD)</th>
<th>Comparison Mean(SD)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal weight (gram)</td>
<td>3204.3±368.8</td>
<td>3216.5±381.3</td>
<td>P&gt;0/05</td>
</tr>
<tr>
<td>First Minute Apgar</td>
<td>8.85±0.46</td>
<td>8.75±0.95</td>
<td>P&gt;0/05</td>
</tr>
<tr>
<td>Fifth Minute Apgar</td>
<td>10±0</td>
<td>9.99±0.09</td>
<td>P&gt;0/05</td>
</tr>
</tbody>
</table>

As table 1 reveals the result of Man Whitney test concerning the gestational age, there is no meaningful relationship between pregnancy exercise and gestational age in two groups. Most people in two groups (53.3% of intervention group and 52.2% of comparison group delivered a neonate between 3001-3500 gram. 99.1% of neonates in training group and 98.8% in comparison group had Apgar score between 7-10, whereas none of two groups had fifth Apcar score less than 7-10. Most of participates (92.1% of intervention and 97% of comparison group) had a term delivery. The results did not show any statistical meaningful relationship about gestational age, first and fifth minute Apgar score, and neonatal weight between two groups (P>0/05).
4. Discussion

In this randomized, controlled study, 14-20 weeks of mixed exercise regimen during the second half of pregnancy was not associated with birth weight changes after correction for gestational age at delivery. To reinforce our findings showing that regular exercise during the second part of pregnancy does not impact on neonatal weight, several maternal potentially confounding variables that might affect neonatal outcome (for example age, height, and weight study entry, previous parity history, heavy smoking, and BMI) were controlled for, as we found no significant differences between the intervention and the control group. Further, the overall health status of the baby is unaffected, as reflected by the results of the worldwide-used Apgar score. An additional novelty of our study was that exercise training consisted most non weight bearing (swimming, walking, cycling, moderate intensity aerobics, and pelvic muscles reinforces) whereas most previous studies have solely analyzed the effect of some or especial aerobic exercise. However, there are many studies examining the effects of regular aerobic exercise on fetal growth that have focused primarily on birth size and have reported contrasting effects on birth weight (Kramer & McDonald 2006, Marquez-Sterling et al 2000). Contradictory findings may be explained by variations in exercise prescription (e.g. timing and volume) and by differences in study populations. Other studies have been performed in this field show that exercise during pregnancy have no effect on neonatal weight (Orr et al 2006, Motaharitarabari et al 2010, Memari et al 2006). In research on the effect of regular leisure physical activity on Labour, rate of low birth weight was not more, but the activities were increased very low birth weight rate. The reason for this is the type of exercise and physical activity (Liferman & Evenson, 2003). Desirable weight gain in pregnancy and the role of adequate oxygen which is resulted due to exercise are effective in prevent of neonatal weight decrease.

Our findings are consistent with a small reduction in birth weight (12 g). A study by Marquez-Sterling et al (2000), using a mixed exercise regimen, reported a more reduction in birth weight (207 g) but had inadequate statistical power (n = 9) to detect modest effects on offspring birth weight. In contrast, our data differ from those of Clapp et al (2000) who reported a non significant increase in birth weight (260 g) in previously sedentary women, beginning a program of moderate weight-bearing exercise in early pregnancy corrected for gestational age, gender, and race. The increase in birth weight was caused by a proportional increase in lean body mass and fat mass. The differential effects seen in sedentary compared with previously active women may be caused by the ability of physically fit women to maintain a more intense exercise regimen during pregnancy. Therefore our data suggest that mixed exercise regimen also has a small impact but not significant on fetal growth. Indeed, our exercise program was achievable and acceptable for the participants involved, with good compliance. Our observations suggest that, during a healthy pregnancy, maternal exercise does not impact on Apcar score which is an important characteristic for neonate health. The hand with the study, research conducted by Kardl and Kase (2009), and Barekat et al (2009) exercise during pregnancy was non-impact on the first and fifth minute apgar score. Sedaghati et al did not find statistical significant difference in the first and fifth minute apgar score between groups that had started exercise in the second trimester, but the first minute apgar score in the was higher among the group that had started exercises from second trimester (2006). In another study in Iran, first and fifth minute apgar score was more in the training group that had started exercise from 8 to 12 weeks of pregnancy (Zand & Zamani, 2009). To explain the differences found in studies to be noted to non-uniform nature, type, severity, and frequency of exercise in pregnancy.

One aspects of our study design should be considered when interpreting the results of this study. Due to a home-based non weight-bearing exercise programs and so unsupervised, this study was underpowered to detect differential effects of exercise training on the results. The results of this study showed that healthy and non-athlete mothers can safely engage in specific aerobic exercise program delivered at present study, from 20th week of pregnancy, continue until delivery, and take advantage of its potential benefits. Increased size at birth is associated with greater risk for the development of overweight and obesity in childhood (Whitaker, 2004). Future studies should investigate the impact of exercise in overweight and obese mothers during pregnancy to determine whether exercise-related alterations in fetal growth occur in a population with increased risk of macrosomia. Because exercise throughout pregnancy can cause babies to be a positive behavior change (Cunningham et al, 2009), it is recommended that further study conduct to demonstrate impact of early exercise training (start at first trimester) on neonatal outcome, on multiparous pregnant women, and an especial exercise on pregnancy outcome. Most of studies have provided little or no information on nutritional status and caloric intake during pregnancy nor have they controlled for gestational age at birth, socioeconomic status, or environmental factors likely to have confounding effects on offspring size,
whereas these factors have a large moderating effect on the exercise-induced change in offspring birth size and may provide one explanation for the large variability demonstrated in the previous literature (Clapp, 2002). Therefore it is recommended that studies are conducted with consideration of above factors. However, the mechanisms underlying the effects of exercise on fetal growth remain unclear, and so more studies are need for detailed long-term follow-up of these children.

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References