SciVerse ScienceDirect

Procedia - Social and Behavioral Sciences 31 (2012) 418 – 422

Procedia
Social and Behavioral Sciences

WCLTA 2011

Does exercise training during pregnancy affect gestational age and gestational weight gain?

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Abstract

Some controversies exist over the possibility that exercise during pregnancy might increase the risk of preterm delivery. At the same time excessive gestational weight gain is increasing in prevalence and associated with a number of adverse pregnancy outcomes for both mother and child. This study aimed to determine the possible relationship between regular exercise of pregnancy and gestational weight gain and gestational age at the moment of delivery. This was a case-control survey. By using a continued method, performed on 250 women with one or two gestation were assigned to either a training (n = 125) or a comparison (n = 125) group. The supervised training was included three days a week, 30-45 min, from 20-26th weeks to 38–39th weeks of pregnancy. Pregnancy outcomes include of gestational weight gain and gestational age was recorded for two groups. Statistical analysis was performed using Students` t-test, man-Whitney, and chi-squared test where appropriate. According finding of this study, No significant differences were found ($p>0.05$) between 2 groups for gestational age and exercise. The mean gestational age did not differ between the training (39 weeks ±1 day) and the comparison group (39 weeks, 4 days ±1.23 day). There were meaningful statistical evidences for exercise training and gestational weight gain at the time of delivery. According the findings of the present study, healthy gravid with one or two gestation can safely engage in moderate, supervised exercise programmed until the end of gestation as this would not affect gestational age. Also the program proved effective in reducing gestational weight gain at the time of delivery. Such programs should be considered as part of routine pregnancy care for pregnant women especially obese ones.

Keywords: exercise training, pregnancy, gestational age, gestational weight gain

1. Introduction

Pregnancy causes many changes in the mother's body which may alter the effects of exercise on the body or the body's ability to perform certain types of exercise is limited. Many pregnant women would like to exercise in pregnancy to continue, but the consequences of maternal or fetal safety, such as weight loss, premature labor, and neonatal outcome are concerned (Scott James, & et al 2007).

Today's knowledge about the importance of exercising regularly in controlling weight gain in pregnancy is mainly based on results from observational studies (Gunninghom & et al, 2010, Evenson & et al, 2009. Duncomb et al, 2006). Several studies suggest that exercise has positive effects on pregnancy outcome, has proved to be such: exercise reduces the risk of the mother and the mother's weight gain can be adjusted (Gunninghom & et al, 2010. Lochmuller & Friese 2005). Maternal obesity is associated with a number of adverse outcomes during and after

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 doi:10.1016/j.sbspro.2011.12.077

pregnancy, such as gestational diabetes, preeclampsia, caesarean delivery, and children born large for gestational age (Baeten, 2001).

Relevant data from training studies suggest no *association* between physical activity during pregnancy and risk of preterm delivery in previously physically active (and thus fit) and usually middle–high-socioeconomic class women or even black women (Barakat & et al, 2008. Giroux et al, 2006. Evenson et al, 2009. Orr et al, 2006). Preterm labor causes health problem (Orr & et al, 2006). Given current concerns about the consequences of exercise during pregnancy and a lack of good quality randomized controlled trials, assessing short and long term effects of physical activity in pregnancy on mothers and neonates, this study aimed to determine effect of exercise training in pregnancy on gestational age and gestational weight gain.

2. Method

This study which is a part of larger survey, was a field random trial type along with control group. The samples under study include 250 nonathletic healthy pregnant women, nulli and prime Para, without any regular exercise at the past, which were divided into two groups: intervention group (exercise training) and comparison group (non exercise training). Samples were in the range of normal body mass index (19.8-26 kg/m^2), and were similar of age, height, number of pregnancies, gestational age and weight 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: having the correct address for follow-up, lack of a specific disease during pregnancy, willingness to participate in research, and at least read and write ability. Excluding criteria were included: known physical or mental disease, recent uterine bleeding, such as placenta previa, detachment, fetal growth retardation, fetal distress, double or multiple pregnancy, abortion or premature labor (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, heavy smokers, failure to observe discipline in the sport.

Data collection tools include information about the consequences of pregnancy, exercise Sheet, exercise booklets, and some forms. 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 pregnancy outcomes: gestational age at birth, and mother weight at the time of delivery. 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: at least 30 minutes of moderate exercise on most, 3 days of the week (AGOC, 2002). 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 control group, and 2 times, at the beginning and end of the study, in the comparison group. 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 consisted of gestational age, and gestational weight gain. Table1 has been arranged to describe the samples. 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). Initiation time to study entry in two groups was between 20-26 weeks of pregnancy. 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. Parturient demographic details and labour characteristics in two groups

Maternal demographic factors	intervention	comparison	P Value
Maternal age(years)	25.43±4.52	25.86±4.90	P>0/05
Weight(kg)	61.79±7.62	61.92±7.26	P>0/05
Height(cm)	162.42±6.32	162.60±5.97	P>0/05
Parity(number)			
1(n (%))	66(57.9)	66(57.4)	P>0/05
2(n (%))	48(42.1)	49(42.6)	P>0/05
BMI	23.4(1.9)	23.3(2.1)	P>0/05

Table 2 shows gestational age and maternal gestational weight gain in interventional and comparison groups.

Table 2. Maternal gestational weight gain and gestational age

Gestational Age and Maternal gestational weight gain	intervention	comparison	P Value
Preterm	7(6.1)	4(3.5)	
Term	105(92.1)	107(97)	
Post term	2(1.8)	4(3.5)	
Mean(SD)	38.99(1.05)	39.43(1.23)	P>0/05
gestational weight gain	9.4±2.06	10.72±3.28	P<0/05

As table 2 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. 7 participants (6.1%) of intervention group and 4 participants (3.5%) of comparison group showed preterm labor, whereas none had previous history of preterm labor. 2 participants (1.8%) of intervention group and 4 participants (3.5%) of comparison group showed post term delivery, however, most of them had a term delivery.

In contrast, the results showed a meaningful relationship for gestational weight gain between two groups. The majority of people in intervention group (50%) and comparison group (37.4%) get gestational weight around 8 to 10 kilogram. To obtain intensity of correlation index between exercise and weight gain during pregnancy used Kendall correlation and was an inverse relationship between pregnancy weight gain and exercise.

4. Discussion

The main finding of our study was that supervised, moderate exercise training performed on second and over third trimesters of pregnancy (~60 training sessions in total) does not negatively affect one of the main pregnancy outcomes, gestational age at the moment of delivery. To reinforce our findings showing that regular exercise during the second part of pregnancy does not alter the risk for preterm delivery, several maternal, potentially confounding variables that might affect pregnancy outcome (for example age, heavy smoking, and previous parity history) were controlled for, as we found no significant differences between the intervention and the comparison groups. Preterm birth remains the leading cause of neonatal morbidity and mortality in the world today (accounting for 75% of neonatal deaths) and a cause of long-term handicap in surviving infants. On the other hand, the etiology of preterm delivery is far from being clearly elucidated and strategies for prevention of prematurity have not proved very successful to date (López Bernal & et al, 2007).

The results of most studies show exercise during pregnancy to be beneficial overall to the maternal–fetal unit (Pivarnik & et al, 2006) and data from pilot reports and prospective studies suggest no significant *association* between exercise during pregnancy and pregnancy outcome such as gestational age and risk of preterm delivery (Motahari & et al 2010, Dun comb & et al 2006, Orr & et al 2006, Barekat & et al 2008). Particular caution should theoretically be placed on exercise performed during the last trimester of pregnancy, which is necessary for the maturation of the fetal lungs and other organs in preparation for extra-uterine life.

Exercise participation was not associated with preterm and post term birth. A study on 922 pregnant in Baltimore City, Maryland led to similar results, Despite the, they did not exclude women with chronic diseases such as hypertension or diabetes or those with previous preterm or low birth weight births (Orr et al, 2006). None of the women in the sample did participate in strenuous exercise (alone or in combination with no strenuous exercise). Our results were applicable to women who participate in non strenuous exercise during all the period.

Exercis activity during pregnancy decrease risk of mother abuse and regulate weight increase process (Guningham & et al 2010, Luchmuller & Frisese 2005). Result of our study showed a positive relative between gestational weight gain and exercise during pregnancy. The bulk of knowledge supports set of weight increase process in women who engage in regular exercise during pregnancy (Motahari & et al 2010, Sedaghati & et al 2008, Luchmuller & Frisese 2005). In Motahari study mother weight gain was less in intervention group but there was not statistical meaningful difference between two groups that can be because of sample low numbers. In contrast, a study in Iran on 132 pregnant women showed no meaningful relation between gestational weight gain and exercise during pregnancy. Perhaps it be due to kind of exercise (only simple exercise, non training). Moreover, in mentioned study also surveyed effect of correct position for daily tasks doing which it may be explain no deference. Maternal obesity is regarded a high-risk obstetric condition and is associated with pregnancy complications and adverse outcomes (Artal & Toole, 2003). In addition, there is increasing evidence that gestational weight gain may be an important predictor of the women's risk of subsequent obesity and diabetes and as gestational weight gain associates with weight retained during the postpartum period (Clapp 2000). Further, maternal obesity is associated with a number of adverse outcomes during and after pregnancy, such as preeclampsia, caesarean delivery and children large for gestational age (Artal & Toole, 2003).

Regarded as strength of the study, it was the composition of the exercise training program, comprising endurance training, general strength training, and specific pelvic floor exercises. We think that women who like to participate in this kind of study are motivated for exercise and thereby that some of the women in the comparison group will do regular exercise training on their own. Such cross-over from comparison group would potentially lead to smaller between-group differences. If women randomized to training manage to reduce their gestational weight gain compared to controls, such programs should be considered as part of the regular pregnancy care for this high-risk obstetric group. In addition to effects on weight gain, we hope to see a reduction in other pregnancy outcome.

In summary, previously sedentary women with one and tow gestation can safely engage in moderate, supervised exercise programmed until the end of gestation as this would not affect gestational age. Based on previous and present findings, exercise mode could include both aerobic and very light weight training/toning-oriented types of activities. Future research would be enhanced by inclusion of assessment of both fitness-related and other sources of physical activity among pregnant women. The associations between exercise and pregnancy outcomes might differ for women who engage in an alone or special exercise such as walking, treadmill, or swimming. Therefore, a next step in studies of exercise training during pregnancy might be to separate exercises type as well as intensity. Furthermore, it is recommended that to do studies about physical activity alone or by its purpose and even physical activity for fun and fitness and pregnancy outcome. However, research should be performed in women at high risk for preterm delivery. It would also be interesting to assess the maximum recommendable exercise intensity and the maximum tolerable resistance loads, based, for example, on hormonal (particularly catecholamine's) determination.

Acknowledgment

We would like to thank Social Security Hospital of Hamedan and, the personnel of the Obstetric and Gynecology Departments, and private clinics for their invaluable help in this study. In addition, I would like to thank Dr Parisa Jalaly Miss Mina Hajiloomohajerani an active my student due to their contributions in this study.

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