Effects of antenatal exercise on length of gestation among women attending antenatal clinic of the Federal Medical Centre Owerri, Southeast Nigeria

Jovita Ada Daniel, Edith Ifeyinwa Nwaogu, Clifford Chika Ezeugwu

Abstract

Background: literature relating physical activity to risk of preterm birth or growth restriction is growing. No study has been carried out on the effect of physical exercise on gestation in Nigerian women.

Objectives: To determine whether antenatal exercise predisposes to preterm delivery.

Methods and Materials: A randomized controlled trial with one test group and one control group involving pregnant women in their 2nd trimester (not less than 20 weeks gestation) recruited from among women attending antenatal clinic at Federal Medical Centre Owerri, South East Nigeria. 105 subjects were initially screened and 95 met the inclusion criteria for the study and were randomized into exercise and control groups. The exercise group participated in a twice weekly exercise programme, each session lasting 45 to 60 minutes at moderate intensity of 12 to 14 on a scale of 20 of Borge Scale. Control group did not participate in any exercise programme within the period of study. 70 out of the 95 participants completed the exercise programme and only their data were analyzed.

Results: The result showed no increase in the risk of preterm labour and delivery. Duration of Gestation was rather significantly longer in the exercise group compared to the control t (68) = 2.315, p = .026) but there was no post-datism. No significant difference was observed with regards to the wellbeing of babies born to mothers in either group as determined by the Apgar scores at 1min and 5 minutes.

Conclusion: No evidence that moderate intensity exercise started from the 2nd trimester of gestation was associated with adverse changes in the length of gestation. On the contrary, we found that exercise in pregnancy significantly lengthens period of gestation.

Keywords: Antenatal Exercise, Preterm Labour, Exercise Participation.
INTRODUCTION:
The length of gestation also known as gestational age refers to how long the fetus grows in utero. The general idea is that the longer the fetus spends in utero, the more development will occur and the higher the survival and improved health at birth. There is general fear that stressful activities during pregnancy could predispose to preterm delivery as physical activity is one of the hypothesized risk factor for preterm birth or growth restriction. Previous studies investigating the effect of exercise during pregnancy and risk of preterm birth report inconsistent findings. The epidemiologic literature relating physical activity to risk of preterm birth or growth restriction is growing, but inconclusive. Recent results from studies from the Danish National Birth Cohort have found increased risk of spontaneous abortion among women who engaged in physical exercises. This was blamed on the increased level of adrenaline and nor-adrenaline following exercise which causes increase in uterine contraction and so could induce labour. A recent Cochrane review of eleven randomized trials with 472 total participants suggested that the risk of preterm birth may be higher in women who perform recreational physical activity during pregnancy; although no association was detected with gestational age, they concluded that the data are insufficient to draw firm conclusions.

Other studies have however given health benefits of physical activities for the mother which include prevention of obesity, gestational diabetes and preeclampsia with the effects on the fetus not clear. Another study within the Danish National Birth Cohort found no negative effect of physical exercise on the risk of preterm birth but rather found minor protective association. This study was based on self reported data on physical exercise participation during pregnancy without any organized exercise programme for the women. Intervention studies and observational studies show conflicting results as to whether physical exercise actually causes uterine contractility. A recent Cochrane review concluded that trials on physical exercise and preterm birth were few and too small to provide scientifically based documentation. No study has been carried out on the effect of physical exercise on gestation in Nigerian women.

Our study aimed at examining the effect of participation in a planned exercise programme during pregnancy on the length of gestation in women from the Southeastern Nigeria.

MATERIALS AND METHODS
Study Design: This was a randomized controlled trial aimed at examining the effect of exercise on the length of gestation of pregnant women. Participants: Approval was sought and gotten from the ethical committee of the Federal Medical Centre, Owerri for this study. Participants were recruited through the antenatal health talks given every Friday in the hospital. Women in their 2nd trimester attending antenatal clinic of Federal Medical Centre Owerri were eligible for the study. Inclusion criteria for the study were; resident in Owerri and environ, not less than 16weeks gestation and not presenting with any of the conditions contraindicating exercising in pregnancy as stipulated by American Congress of Obstetricians and Gynaecologists (ACOG). Exclusion criteria for the study were; inability to attend the twice weekly exercise classes or inability to complete a minimum of 20 exercise sessions.
Effects of antenatal exercise on length of gestation

Subjects
A total of 105 pregnant women indicated interest following the adverts at the health talks. After screening using the Physical Activity Readiness Questionnaire for pregnancy designed by Canadian Physiotherapy Association, 95 women were certified fit by their attending Physicians to participate in the study. The participants signed informed consent form after being informed properly on what the study entailed and giving their consents willingly without persuasion. A simple random procedure was used to assign participants into exercise and control groups.

Interventions: Participants in the exercise group (EG) attended an organized exercise programme held twice weekly in the gymnasium of the Physiotherapy Department of the FMC Owerri. The exercise classes held on Mondays and Wednesdays at 9am and lasted 45 to 60mins per session. The exercises began with 5 to 10 mins warm-up, 35 to 40mins main exercise workout including aerobic dance, breathing exercise, abdominal contraction exercise, pelvic floor muscle exercise and stabilization exercises and then 5 to 10 mins stretches/cool-down exercises. All rules guiding exercising in pregnancy as stated by ACOG were observed. All activities were maintained at moderate intensity using Borge Rating of Perceived Exertion (RPE)\(^{15}\). The intensity was maintained at level 12 – 14 on the scale of 6 to 20. The exercise classes were led by two Women’s Health Physiotherapists one of which is also experts in Exercise Physiology. The participants in the control group (CG) were encouraged to continue with their normal activities of daily living. They were not discouraged from any physical activity that has been part of their routine lives but were not encouraged to join any organized exercise classes. The study covered a period of 12 months from April 2012 to March 2013.

Outcome measure: Gestational age at time of delivery, Apgar Scores at 1 and 5 minutes after birth were obtained from the birth records in the labour ward. The main outcome measure was gestational age at the time of delivery which was recorded in weeks. Secondary outcome measures were the Apgar Scores at 1 and 5 minutes and infant birth weight

Statistical Analysis:
Mean gestational age was compared between the 2 groups using independent t test with significance level set at probability of 0.05. All statistical analysis was done on SPSS 15.

Table 1 Mean and SD for background variables of Subjects

| Variables     | N  | EG         | CG         |
|---------------|----|------------|------------|
| Maternal Age  | 35 | 28.97(3.3) | 29.49(5.9) |
| Parity        | 35 | 1.46(1.1)  | 2.03(1.3)  |

EG= exercise group average age   CG = Control group average age
RESULTS

A total of 95 pregnant women who met the inclusion criteria were randomly assigned into EG and CG. Only 70 (EG = 35 and CG = 35) participants completed the study and had their data analysed. Information regarding their background variables is shown in Table 1. Mean maternal age of participants was 28.97 years for the EG and 29.49 yrs for the CG. Participants in the EG showed significantly (p<0.05) longer gestational age (39.92 \pm 0.84 weeks) than those in the control group (38.76 \pm 2.84 weeks) (Table 2).

No adverse effect or health problems resulting from the exercise programme was reported. No preterm delivery was recorded in the exercise group but 3 preterm deliveries were recorded in the control group (gestational ages: 25 weeks, 33 weeks and 36 weeks. The baby born at 25 weeks did not survive).

Table 2 Mean (Standard Deviation) and P-value of the tested variables for both the EG and CG.

| Variables   | N  | EG         | CG          | P-Value |
|-------------|----|------------|-------------|---------|
| G.Age       | 35 | 39.92(0.84)| 38.76(2.84) | .026    |
| B.wt        | 35 | 3.37(0.62) | 3.31(0.71)  | .72     |
| Apgar at 1min | 35 | 7.94(1.08) | 7.37(2.05)  | .15     |
| Apgar at 5min | 35 | 9.74(0.62) | 9.37(2.52)  | .40     |
| OFC         | 35 | 34.83(1.99)| 34.74(4.90) | .92     |

DISCUSSION

We found no evidence that moderate intensity exercise started from the 2nd trimester of gestation was associated with adverse changes in the length of gestation. On the contrary, we found that exercise in pregnancy significantly lengthens period of gestation. This finding is in good agreement with previous studies suggesting that recreational physical activity is either not associated or associated with lower risk of preterm birth. One study\(^1\) found no difference in the length of gestation between women who participated in aerobic dance and those that did not. Another recent prospective study\(^2\) found no evidence that first trimester vigorous recreational physical activity was associated with adverse changes in length of gestation.

The study of the Danish population that associated exercising early in pregnancy with preterm birth, found no association between exercise and risk of miscarriage after 18 weeks of gestation. Though the study concluded that exercise early in
pregnancy is associated with an increased risk of miscarriage, the study involved retrospective data collection which could be biased.

This study found that women that exercised are more likely to carry their pregnancies to full term than those that did not exercise. Antenatal Exercise participation did not induce preterm labour or delivery in any of the participants rather, participants were found to be delivering at full term. The result of this study did not suggest any negative effects of pregnancy duration or any risk of preterm delivery in exercised women, rather it suggests that exercise could be used as a means of preventing preterm birth.

Some studies found increased risk of preterm delivery in physically active women. Some physical activities could be hazardous and pose dangers to the woman and her unborn baby. Because these studies were based on self-reported data, the researchers could not control the type and intensity of the physical activities of these women. Our study restricted the exercises to moderate intensity and all rules guiding exercising in pregnancy were strictly adhered to. Based on the result of this study, we conclude that structured exercise performed at moderate intensity will not cause preterm delivery if all the guidelines for exercising in pregnancy are observed.

CONCLUSION

No evidence that moderate intensity exercise started from the 2nd trimester of gestation was associated with adverse changes in the length of gestation. On the contrary, we found that exercise in pregnancy significantly lengthens period of gestation.

References

1. May LE. Effect of Maternal Exercise on Labour and Delivery: in Physiology of Prenatal and Fetal Development. . Spring Briefs in Physiology. 2012
2. Jukic AMZ, Evenson, KR, Daniels JL, Herring AH, Wilcox AJ, Hartman KE. A prospective study of the association between vigorous physical activity and length of gestation and birth weight. . Maternal and Child Health .2012;16(5):1031-1044
3. Madsen M, Jørgensen T, Jensen ML, et al. Leisure time physical exercise during pregnancy and the risk of miscarriage: a study within the Danish National Birth Cohort. BJOG.2007;114:1419-26
4. Juhl M., Andersen PK., Olesen J., Madsen M., Jørgensen T., Nohr EA., Andersen AMN. . Physical Exercise during pregnancy and risk of preterm birth: a study within the Danish National Birth Cohort. Am. J. Epidemiol. .2008;167 (7): 859-866.
5. Kramer, M. S., & McDonald, S. W. . Aerobic exercise for women during pregnancy. The Cochrane Database of Systematic Reviews.2006;CD000180(3):
6. Magnusson P, Torp-Pedersen CT, Backer V, et al. Physical activity and chronic disease I. Heart disease and hypertension. (In Danish). Ugeskr Laeger .2004;166():1543-7
Effects of antenatal exercise on length of gestation

7. Dye TD, Knox KL, Artal R, et al. Physical activity, obesity, and diabetes in pregnancy. *Am J Epidemiol*. 1997;146():961-5.
8. Solomon CG, Willett WC, Carey VJ, et al. A prospective study of pregravid determinants of gestational diabetes mellitus. *JAMA*. 1997;278():1078-83.
9. Sorensen TK, Williams MA, Lee IM, et al. Recreational physical activity during pregnancy and risk of preeclampsia. *Hypertension*. 2003;41():1273-80.
10. Kramer, M.S. Aerobic exercise for women during pregnancy. *Cochrane Database Syst Rev* 2001; CD000180(2):
11. Spinnewijn, WE, Lotgering, FK, Struijk, PC, et al. Fetal heart rate and uterine contractility during maternal exercise at term. *Am J Obstet Gynecol* 1996; 174(): 43-8.
12. Durak, EP, Jovanovic-Peterson, L, Peterson, CM. Comparative evaluation of uterine response to exercise on five aerobic machines. *Am J Obstet Gynecol* 1990; 162(): 752-6.
13. Grisso JA, Main DM, Chiu G, et al. Effects of physical activity and lifestyle factors on uterine contraction frequency. *Am J Perinatol* 1992; 9(): 489-92.
14. American College of Obstetricians and Gynecologists. ACOG Committee Opinion: Exercising during pregnancy and postpartum period. *Obstet Gynecol* 2002; 99(267): 171-173.
15. Borg G. ‘Borg’s perceived exertion and pain scales. Human Kinetics publications. 1998; (): 51.
16. Haakstard, LAH, BOK. Exercise in pregnant women and birthweight: A randomized controlled trial. *BMC pregnancy and childbirth* 2011; 11(16): .