

OBSTETRICS

Leisure time physical activity is associated with a reduced risk of preterm delivery

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OBJECTIVE: This study was undertaken to study the association between the times spent on sports activities and leisure time physical activity in the first and early second trimester of pregnancy and the risk of preterm delivery.

STUDY DESIGN: Population-based follow-up study of 5749 healthy pregnant women who delivered in Aarhus University Hospital, Denmark.

RESULTS: Women who practiced more than 1 type of sports had a significantly reduced adjusted risk (odds ratio = 0.09 95% CI, 0.01-0.66) of preterm delivery compared with women with no sports activity.

Compared with sedentary pregnant women, women engaged in light leisure time physical activity had a 24% nonsignificantly reduced adjusted risk (odds ratio = 0.76, 95% CI, 0.60-1.02) of preterm delivery and those engaged in moderate-to-heavy leisure time activity had a 66% reduced adjusted risk (odds ratio = 0.34, 95% CI, 0.14-0.85).

CONCLUSION: Moderate-to-heavy leisure time physical activity during pregnancy is associated with a significantly reduced risk of preterm delivery.

Key words: leisure time physical activity, preterm delivery, sports activities

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The rate of preterm delivery, a major determinant of neonatal mortality and morbidity, has increased in recent years.^{1,2} From a public health perspective it is important to know whether factors such as those related to lifestyle influence preterm delivery.^{3,4} Whereas physical activity lessens the risk of some diseases, its association with preterm delivery is unclear.⁵ Leisure time physical activity is common among pregnant women, but the levels vary, with walking the favorite and more vigorous sports much less common.⁶

Earlier studies have focused on vigorous sports training several times a

week during pregnancy and this is associated with a decreased or unchanged risk of preterm delivery.⁷⁻¹² However, the results of these studies are difficult to apply in the general population of pregnant women, owing to the potential self-selection of very healthy pregnancies to vigorous activities. Only 1 smaller study included gardening and cycling in the activities.⁸ Hence, knowledge about the association between preterm delivery and less vigorous sports training and other kinds of leisure time exercises such as gardening, physical activities at home, and walking is sparse.

In our study, physical activity is defined as sports training (hours spent weekly, the type of sport) and the total amount of leisure time spent on physical activities, including sports and other forms of exercise. Our purpose was to study the association between the times spent on sports activities/leisure time physical activity during pregnancy and the risk of preterm delivery.

MATERIALS AND METHODS

All pregnant women attending the routine antenatal program at the Department of Obstetrics, Aarhus University Hospital, Denmark, from August 1989 to September 1991 were invited to participate in the study. When the women who were unable to speak Danish, experienced fetal death before 28 weeks of gestation, or had twin pregnancies were excluded, 8719 women were left. This study is described in detail elsewhere.^{13,14}

The obstetric department was the only maternity unit in the city and served a well-defined geographic area with a population of 250,000. Antenatal care is free of charge in Denmark and almost all (>99%) women complied with the program.

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On 2 self-administered questionnaires, the women gave details of lifestyle factors (physical activity, smoking, alcohol, and caffeine intake), sociodemographic characteristics, medical and obstetric history, and psychosocial factors.

The questionnaires were returned at about 16 weeks of gestation and 6917 women had completed both. After excluding the women with cardiovascular disease, pulmonary or kidney disease, diabetes, other metabolic diseases, psychiatric illness, hypertension, or epilepsy before pregnancy ($n = 308$), women with no valid information on gestational age ($n = 9$), and women with incomplete information on sports and leisure time activities, the final study population comprised 5749 women. More than 99% of the women in the study population were non-Hispanic whites. Each woman was asked whether she was at present taking part in sports ("yes/no"), what kind of sport, and how much time she spent on sports a week.

She was also asked which of the following 4 categories most correctly described her level of leisure time activity: mostly sitting (reading, watching television, going to the movies); light physical activity (>3 hours weekly of light gardening, playing table tennis); sports or heavy gardening (>3 hours weekly running, swimming, playing tennis, playing badminton); or participating in competitive sports several times weekly.¹⁵ Women who walked as part of their leisure time activity were expected to indicate light physical activity. Those taking part in competitive sports were few ($n = 18$), and the 2 categories with the highest level of activity were analyzed as 1. Leisure time activity was thus categorized as sedentary, light, or moderate to heavy.

In 4713 women (82%), gestational age was estimated by ultrasound measures before 21 completed weeks of gestation. In 547 women (9.5%), gestational age was estimated from the date of a valid last menstrual period (LMP) corrected to a cycle length of 28 days. In 490 (8.5%) women, the gestational age was estimated by the midwife from a less reliable LMP (mostly a LMP without information on a specific cycle length) or an ultrasound measure after 21 weeks. Pre-

term delivery was defined as delivery before 37 completed weeks.¹⁶

Maternal age, prepregnancy body mass index (BMI), marital status, years in school, parity, smoking during pregnancy, employment status in pregnancy, and psychologic distress were all considered potential confounders, owing to previously shown associations with preterm delivery. Psychologic distress was measured on the 30-item version of the General Health Questionnaire.¹⁷ The score from the General Health Questionnaire was trichotomized as described elsewhere.¹³

Statistical Methods

Initial analyses were based on the χ^2 test for independence within contingency tables. The test for trend was carried out where appropriate. All potential confounding factors were categorized, as shown in Table 1, and entered in a multiple logistic regression analysis as a number of dummy variables equal to the number of categories minus 1. A priori we chose to include the following variables as potential confounding factors in the multivariate logistic regression analyses; maternal age, years in school, maternal prepregnancy BMI, and smoking.

Adjusted odds ratios are given with 95% CIs. Statistical significance was defined as a 2-sided P value less than .05.

The research protocol was approved by the regional committee for ethics and science (no. 1991/2060) and by the Danish Data Protection Agency.

RESULTS

Table 1 shows maternal characteristics, lifestyle, and sociodemographic factors by preterm delivery. A total of 210 women (3.7%) had a preterm delivery, and of these 24 women delivered before 32 completed weeks of gestation.

Sports and preterm delivery

Pregnant women who participated in sports had a nonsignificant, 23% reduced adjusted risk of preterm delivery (odds ratio [OR] = 0.77, 95% CI 0.53-1.11) (Table 2). Accordingly, a nonsignificant tendency toward a reduced risk of preterm delivery was found in

pregnant women engaged in sports 1-2 hours or 3 or more hours weekly compared with women with no sports activity. However, women who trained in more than 1 type of sport experienced a significantly reduced adjusted risk of 91% (OR = 0.09, 95% CI 0.01-0.66) compared with women with no sports activity (Table 2).

Leisure time physical activity and preterm delivery

Compared with sedentary women, pregnant women with light leisure time physical activity had a 24% nonsignificantly reduced adjusted risk (OR = 0.76, 95% CI, 0.60-1.02) and those with moderate-to-heavy activity, a 66% significantly reduced adjusted risk (OR = 0.34, 95% CI, 0.14-0.85) for preterm delivery (Table 2). The results remained unchanged when the subjects participating in competitive sports were excluded from the analyses.

COMMENT

This study shows that women with moderate-to-heavy leisure time physical activity in the early second trimester had a significantly reduced risk of preterm delivery compared with sedentary women. Women with light leisure time also had a reduced risk; however, this was not statistically significant. Participation in 1 or more types of sports was associated with a reduced risk of preterm delivery as compared with no sports activities. Women who practiced sports 1-2 hours or 3 hours or more weekly had a tendency toward a reduced risk compared with women with no sports activity. Thus, we found an overall inverse relationship between the level of leisure time activity and the risk of preterm delivery within the range of light-to-moderate physical activities during pregnancy. Our study population comprised non-Hispanic white women. The results therefore are not generally applicable to other or mixed populations of pregnant women.

Women who exercise or are physically active are likely to be healthier than other women. In our selection of the participants and in the statistical analyses, we

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