[Primary Care]

Running Habits of Competitive Runners During Pregnancy and Breastfeeding

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Background: Running is a popular sport that may be performed safely during pregnancy. Few studies have characterized running behavior of competitive female runners during pregnancy and breastfeeding.

Hypothesis: Women modify their running behavior during pregnancy and breastfeeding.

Study Design: Observational, cross-sectional study.

Level of evidence: Level 2.

Methods: One hundred ten female long-distance runners who ran competitively prior to pregnancy completed an online survey characterizing training attitudes and behaviors during pregnancy and postpartum.

Results: Seventy percent of runners ran some time during their pregnancy (or pregnancies), but only 31% ran during their third trimester. On average, women reduced training during pregnancy, including cutting their intensity to about half of their nonpregnant running effort. Only 3.9% reported sustaining a running injury while pregnant. Fewer than one third (29.9%) selected fetal health as a reason to continue running during pregnancy. Of the women who breastfed, 84.1% reported running during breastfeeding. Most felt that running had no effect on their ability to breastfeed. Women who ran during breastfeeding were less likely to report postpartum depression than those who did not run (6.7% vs 23.5%, $P = 0.051$), but we did not detect the same association of running during pregnancy (6.5% vs 15.2%, $P = 0.16$).

Conclusion: Women runners reported a reduction in total training while pregnant, and few sustained running injuries during pregnancy. The effect of running on postpartum depression was not clear from our findings.

Clinical Relevance: We characterized running behaviors during pregnancy and breastfeeding in competitive runners. Most continue to run during pregnancy but reduce total training effort. Top reasons for running during pregnancy were fitness, health, and maintaining routine; the most common reason for not running was not feeling well. Most competitive runners run during breastfeeding with little perceived impact.

Keywords: behavior; running; pregnancy; health; postpartum depression

The American College of Obstetrics and Gynecology recommended in 2002, "In the absence of either medical or obstetric complications, 30 minutes or more of moderate exercise a day on most, if not all, days of the week is recommended for pregnant women."[1] Recent reviews have consistently concluded exercise is safe and beneficial during pregnancy for both mother and fetus without known medical or obstetric contraindications.[11,17,19,20] However, performing exercise at high levels of intensity may pose health risks for the fetus. For example, running above 90% maximal effort may

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compromise fetal well-being,[21] and others have cited concerns that some athletes may exercise in excess of what is safe for the fetus.[23]

In the United States, 42% of women report exercising during pregnancy, and 21% continue for more than two thirds of their pregnancy.[24] Studies of exercise behavior have reported both athletes and the general population reduce physical activity while pregnant.[4,6,22] However, few studies have evaluated how female runners modify their exercise behavior while pregnant. Running—an intense, weightbearing activity—may have unique effects on the female body prenatally and postpartum. Case reports on runners who continued intense training throughout pregnancy did not report adverse outcomes for the women or their newborns.[2,10]

This study aimed to describe the running habits of competitive female runners during pregnancy and breastfeeding. We also describe motivations and perceived barriers to running during these periods.

MATERIALS AND METHODS

Study Design

The Institutional Review Board of Stanford University approved this research protocol. This was a cross-sectional survey study. A self-administered online questionnaire was used to obtain information about multiple parameters related to long-distance running, including anthropometric variables, training and competition history, running-related injuries, and health issues related to reproductive health and pregnancy. We are unaware of a standardized questionnaire to evaluate exercise behaviors in runners while pregnant or breastfeeding. We developed a series of questions designed to explore behaviors and attitudes about running during pregnancy and breastfeeding. Participants were recruited through the Pacific Association of USA Track and Field organization (PAUSATF). They were contacted by e-mailing club team coaches, handing out flyers at races, and posting on the Web site and e-mailing the distribution list. The online survey was completed by 406 female participants during the time of study enrollment from January 2010 to March 2011. We included women aged 18 years and older who participated in running prior to becoming pregnant. Details of the study and survey procedures were provided, and electronic informed consent was obtained from each subject.

The pregnancy and breastfeeding portion of the survey focused on running history during pregnancy and breastfeeding. Each woman was asked whether she ran during pregnancy as well as the timing and duration (which trimester[s] they ran), average mileage, and relative intensity (compared with baseline intensity when not pregnant). She was asked her reasons for running or not running during pregnancy and how soon she resumed running postpartum. She also reported any health issues during pregnancy and identified whether she sustained a running-related injury and common medical problems associated with pregnancy (gestational diabetes, preeclampsia, and postpartum depression). She was asked whether she ran while breastfeeding, whether she experienced any running-related injuries while breastfeeding, and attitudes about the effects of running on breastfeeding.

Statistical Analyses

Data analysis was primarily descriptive. We summarized the data as means and standard deviations or numbers and percentage of total. To compare women who ran during pregnancy or breastfeeding with those who did not, we evaluated for differences in continuous variables using *t* tests and categorical variables using chi-square tests or Fisher exact tests. Data were analyzed using SAS 9.2.

RESULTS

Of 406 female respondents, 170 women reported having ever been pregnant. Pregnancy was defined on the survey as having a positive pregnancy test and the pregnancy confirmed by a physician. If a woman answered yes to being pregnant, additional questions detailed whether she had experienced a term delivery, preterm delivery, or miscarriage. We excluded 23 women who had never had a live birth (including 3 who were currently pregnant with their first child) and 37 women who began their running careers after having their children. This left a sample size of 110 (Table 1).

The women in our study population were on average multiparous, lean, predominantly white, and highly educated. Their competitive levels ranged from recreational to elite; about one third had been nationally ranked at some point in their careers.

Seventy percent of runners ran sometime during their pregnancy (or pregnancies), and about one third ran through their third trimester (Table 2). On average, women greatly curtailed their training during pregnancy—reducing their running volume and cutting their intensity to about half of their nonpregnant running effort. Few reported sustaining a running injury while pregnant.

Women who ran during pregnancy were leaner at time of survey completion (body mass index [BMI], 20.7 ± 1.6 vs 21.4 ± 1.6 kg/m^2; $P < 0.05$) and trained more when not pregnant (current weekly miles, 36.6 ± 13.8 vs 27.4 ± 15.9; $P < 0.005$) than women who did not run during pregnancy (data not shown). They also tended to be more competitive (77.1% of nationally ranked runners ran during pregnancy vs 60.8% of recreational/club team runners), but this difference was not statistically significant. They were similar in all other characteristics (data not shown).

In the postpartum period, nearly one quarter of women waited 2 or fewer weeks to resume running; most resumed running within 2 months. Almost all women breastfed and, of these, most reported running during breastfeeding. The majority felt that running had no effect on their ability to breastfeed. Ten percent sustained a running injury while breastfeeding.

The prevalence of gestational diabetes (n = 2, 1.8%), preeclampsia (n = 7, 6.4%), and postpartum depression

Table 1. Demographic characteristics, pregnancy history, and running history of the study population (N = 110)

Variables	Mean ± SD or n (%)	Range
Age, y	44.3 ± 7.8	28-63
Body mass index, kg/m^2	20.9 ± 1.6	17.0-25.3
Education		
2-year college degree or less	6 (5.5)	
4-year college degree	41 (37.3)	
Postgraduate degree	63 (57.3)	
Ethnicity		
African-American	2 (1.8)	
Asian or Pacific Islander	11 (10.0)	
Latino	6 (5.5)	
White	90 (81.8)	
Other	1 (0.9)	
Gravidity	2.5 ± 1.3	1-7
Ever miscarried	32 (29.1)	
Ever had a preterm birth	15 (13.6)	
Average weekly miles (past year)	33.9 ± 15.0	0-75
Highest running level ever attained		
Recreational/club team	46 (41.8)	
Varsity competitor in high school or college	29 (26.4)	
Nationally ranked (as a junior, college, open, or master's runner)	35 (31.8)	

(n = 10, 9.2%) were relatively low. Women who ran during breastfeeding were less likely to report postpartum depression than women who did not run during breastfeeding (6.7% vs 23.5%, $P = 0.051$ [Fisher exact test]). Women who ran during pregnancy tended to be less likely to report postpartum depression than those who did not run during pregnancy, although this did not reach statistical significance (6.5% vs 15.2%, $P = 0.16$).

Among those who ran during pregnancy, the most common reasons cited for running were to stay in shape (89.6%), maternal health (80.5%), and maintaining a routine (71.4%). Only 37.7% of respondents selected weight control, and less than one third (29.9%) selected fetal health as reasons to continue running during pregnancy. Among those who did not run during pregnancy, the majority (54.6%) did not feel well enough; 27.3% stopped running on doctor's advice (doctor advised not to run or doctor advised nonweightbearing activities); and 21.2% did so for concern of miscarriage.

DISCUSSION

Most women ran during the first trimester, and fewer continued to run during the second and third trimesters, consistent with reported physical activity behaviors in the general population[6,14,24] and in competitive athletes.[4] Women cut back substantially on their mileage and intensity, and few sustained injuries while pregnant. Nearly half of runners resumed running within 1 month postpartum, and most resumed running at 2 months. The physiologic and morphologic effects of pregnancy on a woman's body may persist for 4 to 6 weeks postpartum,[1] suggesting that some women may have returned to running earlier than what would be commonly recommended.

Table 2. Summary of running behavior during pregnancy and breastfeeding

Running During Pregnancy and Breastfeeding	Mean ± SD or n (%)
Ran ever during pregnancy	77 (70.0)
Ran during the first trimester	69 (62.7)
Ran during the second trimester	57 (51.8)
Ran during the third trimester	34 (30.9)
Ran while breastfeeding[a]	90 (84.1)
Time to resume running postpartum[b]	
<1 week	6 (5.7)
1-2 weeks	18 (17.2)
3-4 weeks	23 (21.9)
5-7 weeks	26 (24.8)
2-6 months	20 (19.1)
>6 months	12 (11.4)
Running during pregnancy (n = 77)	
Average weekly mileage	20.3 ± 9.3
Average running intensity (percentage of normal)	47.9 ± 21.0
Sustained a running injury	3 (3.9)
Running during breastfeeding (n = 90)	
Perceived effect of running on breastfeeding	
No effect	76 (84.4)
Positive effect	7 (7.8)
Negative effect	7 (7.8)
Sustained a running injury	9 (10.0)

[a]Three women did not breastfeed and thus were excluded from this question.
[b]Missing data on this question for 5 women.

The most common reasons cited by women who continued to run during pregnancy include fitness, health, and maintaining a routine. Women perceive health benefits for moderate exercise during pregnancy,[3] consistent with improved health, fitness, and cardiovascular benefits for mothers who voluntarily maintain exercise during pregnancy.[7] Of note, fetal health was the least cited reason to continue running during pregnancy. In women without known medical or obstetric complications, there are numerous benefits for both maternal and fetal health in women who exercise during pregnancy.[11,17,19,20]

Women who stopped running during pregnancy reported their behaviors were influenced by feeling poorly or uncomfortable, doctor advice, concern for miscarriage, and to gain/maintain weight. Physical changes associated with pregnancy including musculoskeletal disorders, ligamentous laxity, and weight gain can all negatively influence the comfort level and ability of pregnant women to participate in exercise.[5] Prior reports have identified both discomfort and safety concerns as being barriers for women to continue exercising during pregnancy.[12,16] Certainly, physician advice to stop running during pregnancy is a valid reason to modify exercise behavior. However, other women identified concern of miscarriage and the goal to gain/maintain weight as reasons to stop running, and it is unclear whether physician advice or

personal belief system informed these beliefs. We caution readers that interpretation of the miscarriage data is limited because of study design. Continued efforts may be required to educate women and their support networks of the potential health benefits of exercise during pregnancy, as many women receive information from non–health care providers.[8] For women who are too uncomfortable to run, promoting lower impact and nonimpact exercises for women without medical or obstetric contraindications may be prudent to maintain exercise benefits during pregnancy.

Nearly all women reported breastfeeding their infants, and many women chose to run while breastfeeding. Most women who reported running did not have a perceived effect on ability to breastfeed, consistent with beliefs of postpartum women that exercise is appropriate while breastfeeding.[13] The high rate of breastfeeding in our sample is consistent with the influence of education level on breastfeeding.[15] We note that 10% of women report sustaining an injury while breastfeeding. Overuse running injuries commonly occur in nulliparous females, so the association of injuries sustained during the postpartum period and breastfeeding is unclear. Of note, no stress fractures or long bone injuries were reported. Exercise has been shown to be beneficial in slowing bone loss associated with lactation.[18]

We observed lower rates of postpartum depression in women who ran while breastfeeding compared with those who did not run. Similar findings were seen in women who ran during pregnancy, although differences did not reach statistical significance. Daley et al[9] performed a meta-analysis on the role of exercise in postnatal depression and stated further research is necessary. Prescribed exercise may be a valuable substitute or addition for the depressed woman, especially one who ran regularly prior to pregnancy.

The study uses an unvalidated survey design to self-report behaviors and is prone to recall and selection bias and variable timing from time of birth to survey completion. We asked questions about generalized running behaviors and attitudes during pregnancy and postpartum, so we cannot detect changes in behavior for multiparous women during each pregnancy. To minimize bias, we targeted a large population of female runners with a goal to have more generalized information on running patterns and underlying reasons for behavior in an understudied population of athletes.

CONCLUSION

Most women run during pregnancy at decreased intensity and volume of training by nearly one half. Women who run during pregnancy reported their behavior was influenced to stay in shape, maintain health, and keep a routine. Feeling poorly or uncomfortable was the most commonly cited reason for stopping running while pregnant. Most women reported breastfeeding, and few perceived running had any influence. Reported postpartum depression may be lower in runners who run during breastfeeding.

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