

Exercise During Pregnancy: The Role of Obstetric Providers

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Context: Obstetric providers are logical choices for conveying information about physical activity to their pregnant patients. However, research regarding obstetric providers counseling pregnant patients about physical activity is sparse.

Objectives: To investigate the association between obstetric providers discussing exercise with their pregnant patients and patients' exercise behaviors and to explore factors related to obstetric providers discussing exercise and other health behaviors (tobacco use, alcohol use, and nutrition) with their patients.

Methods: We received completed surveys from 238 pregnant women and 31 obstetric providers at 12 obstetrician offices. The offices were located throughout the United States and were heterogeneous in regards to patient insurance coverage, number of patients treated per month, and percentage of patients with complications.

Results: Women who were "more careful about eating healthy" (odds ratio [OR], 3.1; 95% confidence interval [CI], 1.2-8.0) and who discussed exercise with their obstetric provider (OR, 2.2; 95% CI, 1.1-4.3) were more likely to "maintain or increase exercise" during pregnancy than those who were not conscientious about their diets and those who did not discuss exercise with their obstetric provider, respectively. The odds of obstetric providers discussing exercise with pregnant patients increased 7-fold (OR, 7.1; 95% CI, 1.4-37.3) for each health behavior the obstetric provider discussed with the patient.

Conclusion: Patient discussions with obstetric providers about exercise and patient attention to eating habits are associated with exercising during pregnancy. A more multibehavioral approach by obstetric providers may improve the likelihood that patients exercise during pregnancy.

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Women who exercise during pregnancy benefit in multiple ways, including improved cardiovascular health, less weight gain, more appropriate blood glucose levels, and decreased risk of gestational diabetes.¹⁻⁴ In addition, exercise during pregnancy is associated with delivering closer to the estimated due date and having fewer complications at delivery.^{3,5,6} Maternal exercise also improves the functioning of the fetal and neonatal cardiac autonomic nervous system, normalizes birth weights, and reduces adiposity at birth and in early childhood.⁷⁻¹⁰

To achieve these benefits, pregnant women must exercise regularly throughout their pregnancy.¹ According to the American College of Obstetricians and Gynecologists (ACOG), in the absence of either medical or obstetric complications, pregnant women can exercise for 30 minutes on most, if not all, days of the week.¹ Further, pregnant women should know and understand the effects exercise has on pregnancy outcomes.¹¹ One study¹² reported that women received advice about exercise and pregnancy mainly from books, magazines, family, and friends. The advice received from such sources may not accurately represent the safety and benefits of exercise during pregnancy and may not be authoritatively tailored to the specific circumstances of a woman's pregnancy.^{11,12} The consequences may be the development of a negative attitude about exercise and ultimately low levels of participation in regular physical activity.^{11,13}

Obstetric providers, as defined for the purposes of this study, are practicing obstetricians, nurse practitioners, and certified nurse-midwives who offer pregnancy-related health services in a systematic way to individuals, families, and communities.¹⁴ These health care professionals are logical choices for conveying valid information about exercise to pregnant women. Most obstetric providers agree with empirical evidence supporting the benefits of exercise during normal pregnancies.^{15,16} However, obstetric providers may not possess adequate or accurate knowledge about exercise and

pregnancy. For instance, according to one study,¹⁶ approximately 94% of obstetric providers did not agree that vigorous exercise was beneficial during pregnancy. In addition, another survey-based study¹⁵ revealed that 73% of obstetric providers were not familiar with the current ACOG guidelines for exercise during pregnancy. Additional information on this topic is needed to better understand exercise behavior during pregnancy and the role played by obstetric providers. Therefore, the objective of the present study was to examine the association between obstetric providers' discussions about exercise with their pregnant patients and the pregnant patients' exercise and other health behaviors. We also explored the factors associated with whether obstetric providers discussed exercise with their pregnant patients.

Methods

Using a cross-sectional, retrospective study design, we examined characteristics and behaviors of pregnant women and of obstetric providers working in obstetrician clinics located throughout the United States. Women were included if they were aged 18 years or older, were either pregnant or had given birth in the past year, and did not have complications during their pregnancy that limited or restricted exercise. Obstetric providers who completed questionnaires were obstetricians, nurse practitioners, and certified nurse-midwives working at the clinic certified for obstetrics-gynecology clientele and whose job responsibilities required direct contact with pregnant patients. In addition, all participants were able to read and write in English.

To target obstetric providers and to maximize the response rate, we obtained the names and addresses of obstetric providers currently employed within the United States from an alumni relations office at a large midwestern university with an osteopathic medical school. In January 2011, we mailed packets to 52 obstetrics-gynecology clinics. Each packet contained instructions, 25 patient and 5 obstetric provider questionnaires (to be

completed anonymously), and 1 self-addressed return envelope for all materials. Clinics received 3 monthly follow-up letters to encourage return of completed questionnaires. The packet instructions described our research survey process, explained how the questionnaires should be completed, and included the names and contact information of the investigators in case the survey participants had any questions. The instruction letters attached to the surveys clearly stated that participation for both groups was voluntary. The study protocol was approved by the university's institutional review board.

Questionnaires

A 10-item patient questionnaire and a 10-item obstetric provider questionnaire were developed according to previous research for assessing health care behaviors of pregnant patients and obstetric providers' interactions with their pregnant patients.^{15,17} Content validity of the questionnaires was established a priori through 2-stage expert panel reviews. In stage 1, panel members reviewed each item and proposed conceptual or grammatical revisions. During stage 2, panel members reached consensus on proposed item revisions to maximize face and content validity. Preliminary versions of the questionnaires were pilot tested with pregnant women and obstetric providers to ensure that the questions were clear and concise.

Patient Questionnaire

The patient questionnaires were given to pregnant women as they waited for their appointments. Seven questions were used to assess patient demographics (ie, age, ethnicity, education level, and insurance status) and pregnancy-related information (ie, number of pregnancies, week of pregnancy or weeks postpartum, and number of times the practice was visited). In question 8, patients were asked if their obstetric provider discussed tobacco use, alcohol use, nutrition, and exercise with them, scored as either "yes" or "no" for each item. In question 9, patients responded to 3 items regarding their

health behaviors related to smoking tobacco, drinking alcohol, and eating healthy foods; these items were also scored as yes or no. Question 10 concerned current levels of exercise. Patients who reported they currently engaged in recommended levels of moderate-intensity aerobic activity (defined as 150 minutes of activities such as cycling or fast walking) or vigorous aerobic exercise (defined as 75 minutes of activities such as running or playing tennis) were classified as "exercisers." All others answering this question were considered "nonexercisers."^{1,18}

Obstetric Provider Questionnaire

In the obstetric provider questionnaire, 6 questions assessed demographic variables (ie, age and sex, ethnicity, and profession) and practice information (ie, percentage of patients with private insurance, number of pregnant patients seen per month, and percentage of patients with complications). Four questions were used to determine whether obstetric providers discussed health behaviors related to smoking, drinking alcohol, nutrition, and exercising with their pregnant patients. For each health behavior, the responses available were (1) always, (2) very frequently, (3) frequently, (4) sometimes, (5) infrequently, (6) very infrequently, and (7) never.

Data Analysis

Patient and obstetric provider data were expressed as mean (standard deviation [SD]) or as percentages where appropriate. Student *t* test for continuous variables and χ^2 analysis for categorical variables were used to compare results from the exercise group with that of the nonexercise group. The same analytical procedures were followed to contrast select variables between obstetric providers who always, very frequently, or frequently discussed exercise with their pregnant patients and obstetric providers who sometimes, infrequently, very infrequently, or never discussed exercise with their pregnant patients. Binary logistic regression analysis was conducted to determine if patients who exercised were more

likely to have discussed exercise with their obstetric provider. In this regression model, patient exercise status (exerciser vs nonexerciser) was the dependent variable, and patient demographics, the number of other health behaviors discussed with the obstetric provider, and whether exercise was discussed with the obstetric provider were the independent (ie, predictor) variables. Another binary logistic regression model was constructed to determine if self-reported characteristics of the obstetric providers were associated with obstetric providers' discussions about exercise with their pregnant patients. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for all independent variables in the models. The level for statistical significance was set at $P \leq .05$. All analyses were performed using SPSS software (release 17, SPSS Inc).

Results

Of the 52 clinics that received the materials, 12 (24.5%) returned packets. A total of 238 patients and 31 obstetric providers completed questionnaires from these 12 clinics, which were located throughout the United States. According to survey responses, the offices were heterogeneous for patient insurance coverage, number of patients seen per month, and percentage of patients with complications. Among the obstetric providers who completed surveys, 19 (61.3%) were osteopathic physicians, 6 (19.3%) were allopathic physicians, 3 (9.7%) were nurse practitioners, 2 (6.5%) were midwives, and 1 (3.2%) fit into the category "other."

Characteristics of the patients classified as exercisers (101 [43%]) and nonexercisers (137 [57%]) are given in *Table 1*. Compared with nonexercisers, exercisers reported being more conscientious about eating healthy ($\chi^2=4.7$; $P<.05$) and discussing exercise with their obstetric providers ($\chi^2=6.5$; $P<.05$). Differences between the patient groups on education level, insurance status, ethnicity, age, and week of pregnancy were not statistically significant.

The results of the regression analysis used to examine predictors of exercise in pregnant patients are presented in *Table 2*. After controlling for patient age, ethnicity, and the number of other behavior changes encouraged by the obstetric providers, obstetric provider discussion of exercise was found to be associated with patient behavior. For instance, the probability of being an exerciser was significantly greater for patients who discussed exercise with their obstetric provider than for those who did not discuss exercise with their obstetric provider (OR, 2.17; $P<.05$). We also found a statistically significant association between diet conscientiousness and exercise status during pregnancy. The probability of being an exerciser was 3-fold higher for patients who were "more careful about eating healthy" than those who were not careful about their diet (OR, 3.05; $P<.05$).

Statistically significant differences were found between obstetric providers who discussed and those who did not discuss exercise with their pregnant patients (*Table 3*). Obstetric providers who discussed exercise were older ($t=-2.77$; $P<.01$), had more pregnant patients with private insurance ($t=-3.85$; $P<.001$), and discussed a greater number of health behaviors with pregnant patients ($t=-3.69$; $P<.001$) than did obstetric providers who did not discuss exercise with their pregnant patients.

The results of the regression analysis used to examine factors associated with obstetric providers discussing exercise with their pregnant patients are given in *Table 4*. Obstetric providers were more likely to discuss exercise with pregnant patients if they discussed other health behaviors with their patients (OR, 7.14; $P<.05$). The probability of obstetric providers discussing exercise with their pregnant patients increased 7-fold for each additional health behavior discussed. Although there were statistically significant differences in demographic group comparisons, regression analysis revealed that discussing exercise with pregnant patients was not associated with obstetric provider age (OR, 3.1; $P=.08$), the percentage of pregnant patients with private insurance

Table 1.
Characteristics of Pregnant Patients Categorized as Exercisers
and Nonexercisers, No. (%)^a

Variable	Exerciser (n=101)	Nonexercisers (n=137)
Age, y, mean (SD)	24.7 (5.7)	25.4 (5.6)
Nonwhite Ethnicity	26 (25.7)	38 (27.7)
High School Education or Higher	62 (61.4)	80 (58.4)
Private Insurance	37 (36.6)	63 (46.0)
No. of Pregnancies, mean (SD)	1.8 (1.0)	2.3 (1.6)
Week of Pregnancy, mean (SD) ^b	26.9 (9.4)	27.1 (9.4)
Behavior Changes During Pregnancy		
Stopped using tobacco	22 (21.8)	29 (21.2)
Stopped drinking alcohol	43 (42.6)	49 (35.8)
More careful about eating healthy ^c	93 (92.1)	113 (82.5)
Discussed Exercise With Obstetric Provider^c	74 (73.3)	79 (57.7)
No. of Other Health Behaviors^d Discussed With Obstetric Provider, mean (SD)	3.0 (1.4)	2.8 (1.6)

^a Data presented as No. (%) except where otherwise indicated. Exercisers were defined as those who engaged in recommended levels of moderate to vigorous aerobic exercise; all others were considered nonexercisers.

^b Patients who had given birth in the past year were included in the study. Ten exercisers and 4 nonexercisers were postpartum patients.

^c Statistically significant difference ($P < .05$).

^d Other health behaviors were tobacco use, alcohol use, and nutrition.

Abbreviation: SD, standard deviation.

(OR, 5.71; $P = .07$), the number of pregnant patients seen per month (OR, 2.14; $P = .22$), or the percentage of pregnant patients with complications (OR, 0.95; $P = .93$).

Comment

The first objective of the present study was to examine the association between obstetric providers discussing exercise with their pregnant patients and the patients' exercise behavior. We found that women whose obstetric providers discussed exercise with them were more likely

to exercise during pregnancy. The second aim of the study was to explore factors related to obstetric providers discussing exercise with their pregnant patients. The results indicate that obstetric providers who discussed exercise with their pregnant patients also discussed multiple health behaviors with their pregnant patients.

Our results suggest that obstetric providers' discussion of exercise with their pregnant patients is associated with a significantly greater likelihood that the patient will engage in exercise. These findings are similar to those reported elsewhere showing the positive impact of patient education and counseling on health behaviors during pregnancy.^{17,19} Although exercise outcomes were not measured specifically in the present study, exercise during pregnancy is associated with improved pregnancy outcomes for mother and child.⁶⁻⁹ Compared with pregnant women who do not exercise, pregnant women who exercise during pregnancy have better mood and self-esteem, less fat deposition, better cardiovascular system functioning, better muscle tone, better posture, and attenuated aches of pregnancy.¹ Furthermore, regular aerobic exercise increases the likelihood of delivery close to the estimated due date, decreases labor and delivery time, and hastens recovery.⁶ There are also benefits for the baby. Regular maternal exercise, at or above ACOG minimum recommendations, leads to augmented fetal and neonatal cardiac autonomic control, similar to the lower resting heart rate seen in an adult exercise-trained response.⁷⁻⁹ Offspring who were exposed to maternal exercise in utero are leaner and have improved academic and athletic performance into adulthood compared with nonexposed counterparts.²⁰ Clearly, the benefits of exercise during pregnancy are clinically significant, and obstetric providers are in an ideal position to convey this information to pregnant women.

The results of previous studies^{15,16} suggest that obstetric providers may not be familiar with the current guidelines for exercise during pregnancy and may not possess adequate knowledge about the outcomes associated with exercising during pregnancy. With this in mind,

obstetric providers may be reluctant to discuss exercise with their pregnant patients because the providers are not sure what is appropriate or safe. The need for obstetric providers to counsel patients about exercise has been previously recognized, and numerous effective strategies have been articulated.²¹ For instance, a simple algorithm can be used by an obstetric provider within the clinical encounter to determine the most appropriate exercise information to offer a patient.²² In addition, obstetric providers can work closely with community-based prenatal programs and certified personal trainers or become familiar with pregnancy-related health materials that can be purchased or rented from the library.²³ The most efficacious approaches to educating obstetric providers about exercise during pregnancy will need to be identified and may involve the previously mentioned strategies and perhaps also placing more emphasis on behavioral counseling training during medical and other obstetric provider training.²⁴

Obstetric providers who discussed tobacco use, alcohol use, and nutrition with their pregnant patients were more likely to discuss exercise with their pregnant patients. Research suggests that osteopathic physicians are more cognizant of their own health habits than are allopathic physicians and may be more likely to encourage healthy lifestyle practices among their patients.²⁵ However, a national study²⁶ revealed that there was no difference in the frequency of exercise counseling between osteopathic physicians and allopathic physicians. Nevertheless, it seems that some obstetric providers are more aware of the holistic aspect of health and health behaviors and thus are more likely to advise patients on other health behaviors.

The present study has limitations that should be considered when interpreting the results. First, the use of questionnaires to obtain information on exercise can lead to biased data.²⁷ For example, patients asked to remember exercise behavior further in the past may have more difficulty accurately recalling the specifics of the behavior (ie, recall bias); requiring a physician to respond to

Table 2.
Predictors of Exercise in Pregnant Women (N=238)

Variable	Odds Ratio (95% Confidence Interval)
Age category (<18, 19-29, >29 years)	0.84 (0.65-1.08)
Ethnicity (nonwhite vs white)	0.89 (0.47-1.67)
Careful about diet	3.05 (1.17-7.96) ^a
Discussed exercise with obstetric provider (yes vs no)	2.17 (1.09-4.34) ^a
No. of other health behaviors discussed with obstetric provider (range, 0-3)	0.94 (0.75-1.17)

^a Statistically significant ($P < .05$).

questions that could potentially identify him or her as a practitioner who deviates from ACOG guidelines may deter some from participating in the study (ie, selection bias). We attempted to minimize the impact of these biases by using rigorous techniques for survey development and keeping the survey responses anonymous. Although these steps may not have eliminated these biases, our use of survey research is consistent with that of others who obtained information on exercise from obstetric providers and pregnant women.^{13,15-17}

Second, clinics were selected for participation in the study on the basis of alumni status from an osteopathic medical school, which may limit generalizability only to clinics employing osteopathic physicians. However, generalizations are still plausible given that the questionnaires were completed by various obstetric providers in the clinic with and without osteopathic medical training. The implications of the findings may therefore be applicable to a larger audience.

Third, although our questionnaires were the first to our knowledge to explore obstetric providers' discussions of exercise with pregnant patients and pregnant patient participation in exercise, we did not investigate whether the information conveyed by the obstetric

Table 3.
Characteristics of Obstetric Providers (N=31) Who Discussed and Did Not Discuss Exercise With Their Pregnant Patients, Mean (SD)^a

Variable	Discussed Exercise (n=20)	Did Not Discuss Exercise (n=11)
Age, y ^b	44.3 (10.8)	33.8 (8.6)
Sex, female, No. (%)	11 (55.0)	7 (63.6)
Ethnicity, No. (%)	1 (5.0)	1 (9.1)
Osteopathic physician, No. (%)	14 (70.0)	5 (45.5)
% of pregnant patients with private insurance	62.2 (26.8)	26.3 (20.6)
No. of pregnant patients seen per month	158.4 (112.9)	157.3 (120.2)
% of pregnant patients with complications	25.4 (27.0)	47.3 (35.0)
% of pregnant patients with private insurance ^c	62.2 (26.8)	26.3 (20.6)
No. of other health behaviors ^d discussed with patient (range, 0-3) ^c	3.7 (0.9)	2.3 (1.2)

^a Data presented as mean (standard deviation [SD]) except where otherwise indicated.

^b Statistically significant ($P < .01$).

^c Statistically significant ($P < .001$).

^d Other health behaviors were tobacco use, alcohol use, and nutrition.

Table 4.
Factors Associated With Obstetric Providers Discussing Exercise With Their Pregnant Patients

Variable	Adjusted Odds Ratio (95% Confidence Interval)
Age category (≤ 34 , 35-44, 45-54, > 54 years)	3.10 (0.88-10.91)
No. of pregnant patients seen per month	2.14 (0.63-7.25)
% of pregnant patients with complications	0.95 (0.28-3.19)
% of pregnant patients with private insurance	5.71 (0.84-38.62)
No. of other health behaviors ^a discussed with patient	7.14 (1.37-37.32) ^b

^a Other health behaviors were tobacco use, alcohol use, and nutrition.

^b Statistically significant ($P < .05$).

providers to their pregnant patients was consistent with the most current ACOG guidelines.

Finally, pre-pregnancy data were not obtained from the patients. Follow-up studies should consider whether exercise and other health behaviors (eg, nutritional practices) that were engaged in prior to pregnancy would alter the findings of the present study.

Conclusion

Effective interventions are needed to promote exercise among pregnant women. The results of this study suggest that such interventions should motivate obstetric providers to discuss exercise with their pregnant patients and embed this discussion in a holistic approach that considers other health behaviors. Efforts to increase exercise would benefit by also including strategies that encourage pregnant patients to engage in other health behaviors, such as healthy eating. Increasing obstetric provider training related to exercise during pregnancy may increase pregnant patient participation in exercise and ultimately lead to improved outcomes for mother and child. Further research is necessary to determine the specific forms of instruction and encouragement most successful in increasing (or maintaining) exercise in pregnant women.

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