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Postpartum Physical Activity in Overweight and Obese Women

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Abstract

Background—Low physical activity (PA) during the postpartum period is associated with weight retention. While patterns of PA have been examined in normal weight women during this period, little is known about PA among overweight and obese women. The aim of this cross-sectional study was to investigate PA and determine the proportion of women meeting recommendations for PA.

Methods—Women ($n = 491$), with a body mass index (BMI) ≥ 25 kg/m² were enrolled in a behavioral intervention. PA was assessed at six weeks postpartum using the Seven-Day PA Recall.

Results—Women averaged 923 ± 100 minutes/day of sedentary/light and 33 ± 56 minutes/day of combined moderate, hard, and very hard daily activity. Women with a BMI ≥ 40 kg/m² reported more time in sedentary/light activities and less hours of sleep than those with a lower BMI. Only 34% met national PA guidelines; this proportion was significantly lower among blacks (OR 0.5, CI 0.3–0.9).

Conclusions—These overweight and obese postpartum women reported a large percentage of time spent in sedentary/light activity, and a high proportion failed to meet minimal guidelines for PA. Promotion of PA in the postpartum period should focus on reducing sedentary behaviors and increasing moderate PA.

Keywords

physical activity assessment; obesity; epidemiology

Pregnancy-related weight retention contributes to overweight and obesity among women.¹ Physical activity is a modifiable factor associated with weight retention and health outcomes in the perinatal period.^{2,3} While physical activity is safe, promotes weight loss, and provides positive health benefits during postpartum,^{3–5} women often reduce activity because of physiological, behavioral, and psychosocial changes.^{6–10} Factors such as limited childcare, more children in the home and working full-time significantly contribute to inactivity during the postpartum period.⁹

Several studies have assessed physical activity during the postpartum period, but primarily among women of normal weight.^{2,7,9,11,12} The purpose of this cross-sectional study was to 1) assess amounts of self-reported physical activity, 2) examine the proportion of women meeting physical activity recommendations, and 3) identify possible sociodemographic differences in these measures in a large and diverse sample of overweight and obese postpartum women.

Study Design

We investigated physical activity among women enrolled in Active Mothers Postpartum (AMP), a behavioral intervention trial.¹³ The overall aim of AMP was to evaluate the effect of the intervention on increased physical activity, decreased caloric intake, and weight loss among overweight and obese postpartum women.¹³

Participants were recruited from the 3 largest obstetric clinics in the Durham, North Carolina area and through community posters. Women with a measured body mass index (BMI) ≥ 25 kg/meters² (kg/m²), 18 or older, English speaking, and without contraindications to exercise were eligible to participate. After baseline measurements were completed, women were randomized equally into either the control or intervention group. Details of the overall study have been reported previously.¹³ The study followed participants up to 24 months postpartum; this report is limited to baseline measurements. The institutional review boards at Duke University and the University of North Carolina at Greensboro approved the protocol. All women gave written, informed consent.

Measures

Prepregnancy height and weight were obtained by self-report during the initial screening procedure. Prescreened women attended their six week obstetric visit where BMI was measured directly. Participants were measured with light clothing and without shoes by a trained research assistant who measured height with a stadiometer (Seca, Columbia, MD) and weight on a digital scale (Tanita, Arlington Heights, IL). BMI measures were categorized based on clinical guidelines.¹⁴ Within 3 weeks, sociodemographic information including education, marital status, parity and intent to work at 6 months postpartum was obtained by trained interviewer via telephone survey, during which women also completed the Seven-Day Physical Activity Recall (PAR) described by Sallis and colleagues.¹⁵ All interviewers were trained using a standard PAR telephone protocol and had knowledge of physical activity levels to question and clarify responses.

The PAR captures a detailed recollection of duration, intensity, and volume of physical activity in the last 7 days. Questions ask the duration (minutes) of moderate, hard, and very hard activity in the morning, afternoon, and evening of each of the 7 days in the previous week. (Example: “Did you do any physical activity Monday in the morning? For how long? Was that moderate, hard, very hard activity?”). The PAR describes activity intensity as follows: “The moderate category is similar to how you feel when walking at a normal pace. The very hard category is similar to how you feel when running. The hard category falls between the two.” Sleep time is defined as the time women got into bed “for good” at night until they got out of bed in the morning. No adjustment was made for night-time care of infants. Estimates of time spent sleeping and time engaged in moderate, hard, and very hard activity were totaled and the remaining minutes in the day were designated as sedentary/light activity.¹⁵

Participants were classified as meeting national physical activity guidelines¹⁶ if at least 1 of the following criteria was met over a 7-day period (as determined from the PAR): a) 5 or more 30-minute bouts of moderate activity; b) 3 or more 20-minute bouts of vigorous

activity; c) 4 moderate bouts plus 1 vigorous bout of activity, or d) 3 moderate bouts and 2 vigorous bouts of activity. An additional, more rigorous criteria was also used, because the PAR definition for moderate activity may not have reached the level of intensity defined for moderate physical activity in the guidelines ("Moderate-intensity aerobic activity, is generally equivalent to a brisk walk and noticeably accelerates the heart rate.").¹⁶ Using this second criterion, hard physical activity among these participants was considered moderate and very hard was considered vigorous. Therefore, participants were classified as meeting national guidelines¹⁶ if at least 1 of the following criteria was met over a 7-day period (as determined from the PAR): a) 5 or more 30-minute bouts of hard activity; b) 3 or more 20-minute bouts of very hard activity; c) 4 hard bouts plus 1 very hard bout of activity or d) 3 hard bouts and 2 very hard bouts of activity.

Statistical Analysis

Data were analyzed using SAS version 9.1 (SAS Institute, Cary, NC). Descriptive variables were summarized as frequencies and percentages. Minutes of physical activity were reported as means and standard deviations (SD) for the entire group and within each category of the sociodemographic variables. Multivariate linear regression analysis was used to investigate baseline BMI, race, age, education, marital status, parity, and intended work status as predictors of daily sleep, sedentary/light activity, and moderate physical activity. Predictor variables were those participant demographic and anthropometric characteristics commonly associated with physical activity among postpartum women (prepregnancy BMI, race, age, education, income, marital status baseline BMI, race, age, education, marital status, parity, and intended work status).^{2,7,9,11,12} Logistic regression was used to investigate if these variables also predicted whether women met national physical activity guidelines.

Results

Baseline data were collected from 491 women who were eligible and consented to participate in the AMP study. On average women attended their first study visit at 8 ± 2 weeks postpartum. A small number of outliers (± 3 SD above the mean) reporting very high moderate ($n = 9$) (227 to 497 minutes/day), hard ($n = 7$) (50 to 150 minutes/day) or very hard ($n = 6$) (31 to 137 minutes/day) activity. However, these participants were not excluded because when called a second time to verify activity levels, it was determined they represented normal, daily occupational activity (eg, waitressing). The intent of this study was to report all real daily activities of postpartum women. As reflected by our results, some postpartum women have jobs which require significant amounts of physical activity and this should be acknowledged and reported.

The mean BMI at six weeks postpartum was 33 kg/m^2 ; 59% of the sample had a BMI $> 30 \text{ kg/m}^2$ (Table 1). Fifty-seven percent of the women were 30 or older (mean age 31 years old) and 47% were black. Twenty-one percent had a high school degree or less education; 53% were college graduates. Most women were married and intended to work full-time at six months postpartum.

Bivariate relationships between each predictor variable and physical activity levels are also shown in Table 1. Women in this study averaged 476 ± 81 minutes (~ 8 hours) of nightly sleep. Nightly sleep ranged from a low of 439 ± 93 minutes among women with the highest BMI to a high of 486 ± 78 minutes among women who were primiparous. Women averaged 33 ± 56 minutes per day of moderate physical activity and very low amounts of hard and very hard activity (6 ± 13 minutes and 2 ± 9 minutes, respectively). Women averaged 923 ± 100 minutes (~ 15.4 hours) of sedentary/light activity per day. Women with the highest BMI spent the most time in this category. Women under 30 years of age, with lower education

and not intending to work at 6 months postpartum reported less sedentary/light activity and more moderate or more intense physical activity.

In multivariate analysis (Table 2), those with a BMI ≥ 40 kg/m² ($P = .001$), 30 years or older ($P = .006$) with a college ($P = .02$) or postgraduate ($P = .05$) education and planning to work full-time ($P = .04$) or part-time ($P = .02$) by 6 months postpartum spent significantly more time in sedentary/light activity. Those over 30 and with the highest BMI slept significantly less ($P = .03$ for age; $P = .001$ for BMI), while those with more education spent less time in moderate activity ($P = .003$ for postgrad). Hard and very hard physical activities were not analyzed in the multivariate analysis because women reported very low amounts of both (6 ± 13 minutes/day and 2 ± 9 minutes/day, respectively). Furthermore, while moderate physical activity was normally distributed, there was little variability in the hard and very hard physical activity data, thus causing the distribution to be right-skewed. Sixty-five percent of women reported not doing any hard physical activity, while 88% reported not doing any very hard activity.

As shown in Table 1, only 34% of women met or exceeded the national physical activity recommendations using the PAR criteria for moderate and vigorous activity (hard + very hard activities). Blacks were significantly less likely to meet the physical activity guidelines (OR 0.5, CI 0.3–0.9) than nonblacks. When using the more rigorous PAR criteria using only hard and very hard activity, only 24% of participants met or exceeded guidelines. While blacks were still less likely to meet guidelines (OR 0.5, CI 0.3–1.0), women planning to go back to work full or part time by six months postpartum were also less likely to meet the physical activity guidelines (full-time, OR 0.5, CI 0.3–0.9, part-time OR 0.49, CI 0.2–1.0) than women not intending to go back to work by this time.

When excluding the outliers in the multivariate analysis, those with a BMI ≥ 40 kg/m² ($P = .001$) and 30 years or older ($P = .02$) remained significant predictors of spending more time in sedentary/light activity; however, education and intent to go back to work by 6 months postpartum were no longer significant. While those over 30 and with the highest BMI still slept significantly less ($P = .02$ for age; $P = .001$ for BMI), women with more education were no longer predictors of moderate physical activity. The exclusion of the outliers did not affect the proportion meeting guidelines using the PAR criteria for moderate and vigorous activities (hard + very hard activities). However, when excluding the outliers for the more rigorous PAR criteria using only hard and very hard activities, 22% rather than 24% met or exceeded the guidelines. While blacks were significantly less likely to meet guidelines for both criteria, intent to work full or part time by six months postpartum were no longer significant predictors of meeting guidelines when outliers were removed (full time $P = .08$ and part time, $P = .07$).

Discussion

In this sociodemographically diverse sample of overweight and obese postpartum women, only 34% met recommended physical activity guidelines as defined by the current PAR guidelines. When a more rigorous criteria was used, only 24% met recommendations. This is well below the national average of 47.9% for women meeting the Center for Disease Control and American College of Sports Medicine guidelines.¹⁷ Significantly fewer blacks than nonblacks met recommendations in this study. This is similar to national data which states blacks are less likely to fulfill physical activity recommendations when compared with non-Hispanic and Hispanic ethnic groups.^{16,17} Boardley et al¹² showed lower activity levels of physical activity among black postpartum women compared with whites, possibly contributing to the high incidence of overweight among this population. Engagement in sedentary/light activities was highest among the most overweight women in this study.

Olson et al² showed while exercising often helped minimize postpartum weight retention among normal weight women, this was even less among obese women who exercised regularly. Sleep duration was also lowest among the most overweight, an association observed in other populations.^{18,19} Older, more educated, working women were less active; this may be due to their higher likelihood of having sedentary (office-based) occupations. Employment during pregnancy and the postpartum period appears to be directly associated with sedentary behaviors. Pereira et al⁹ showed women who worked the most during the second trimester of pregnancy and did not begin to decrease their level of employment by 6 months postpartum were more likely to be sedentary. Others have reported lack of child care and television watching as contributing factors associated with a less active lifestyle, while age and education were not.^{9,11}

Our results are similar to those reported by Wilkinson et al, who used the PAR to assess physical activity in a sample of 44 low income postpartum women.²⁰ These women (mean BMI = 27 kg/m²) wore a pedometer for 3 days to correlate self-reported physical activity with step counts. They found that 537 of 921 minutes (58%) of daily light activity was spent sitting.²⁰ It is likely that women in our study spent a large amount of their sedentary/light activity time sitting. While some sitting cannot be avoided because of infant feeding, voluntary sedentary behaviors such as watching television may contribute to physical inactivity during the postpartum period.¹¹ Evidence shows women's total physical activity significantly decreases from prepregnancy to six months postpartum.⁹ Such sedentary behaviors have been associated with retaining at least 5 kg by six months postpartum.¹¹ Women in this study were more likely to participate in moderate activity as defined as walking at a normal pace rather than vigorous activity. Other studies have also shown women are more likely to walk for exercise during the postpartum period⁹ and in fact walking for at least 30 minutes per day may prevent postpartum weight retention at 1 year postpartum.¹¹ Therefore, sedentary women should be encouraged to walk at least 30 minutes each day.

There were several limitations of this study. One limitation was that activities specific to the postpartum period, such as night-time awakenings and infant care, are difficult to assess and quantify and often are not captured well in surveys.²¹ It is also possible that moderate activities were over-reported based on the PAR definition of moderate activity as equivalent to "how you feel when walking at a normal pace." Overweight women may walk below the intensity threshold qualifying as moderate activity; yet perceive it as being moderate activity. Finally, some predictors that may impact the amount of postpartum physical activity; such as, prepregnancy activity⁹ or availability of childcare upon going back to work⁹ were not recorded.

Conclusion

One-third or less of overweight and obese postpartum women reported achieving sufficient amount of physical activity to accrue health benefits. Race, age, education, and intent to work were factors significantly associated with more time spent in sedentary/light activity. Current physical activity guidelines emphasize engagement in at least moderate physical activity for health benefits. To promote postpartum health, special emphasis should be placed on reducing sedentary time and on increasing moderate intensity physical activity, such as brisk walking.

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Table 1

Participant Characteristics, Average Minutes Spent in Sleep and Physical Activity, and Proportion Meeting National Physical Activity Recommendations

Demographic	N	Sleep		Light activity		Moderate activity		Hard activity		Very hard activity		Proportion meeting weekly guidelines	
		Mean mins. (± SD)		Mean mins. (± SD)		Mean mins. (± SD)		Mean mins. (± SD)		Mean mins. (± SD)		Unadjusted proportion	
Total sample	491	476 (81)		923 (100)		33 (56)		6 (13)		2 (9)		34%	
BMI (kg/m ²)													
25–30 (overweight)	198 (40%)	485 (74)		918 (92)		31 (46)		5 (8)		1 (8)		35%	
30–34.9	153 (31%)	477 (78)		919 (106)		35 (70)		7 (17)		2 (8)		33%	
35–39.9	79 (16%)	482 (87)		914 (102)		37 (63)		6 (14)		1 (5)		37%	
40 and greater	61 (12%)	439 (93)		961 (102)		31 (35)		6 (12)		3 (18)		31%	
Race													
White	251 (51%)	481 (73)		919 (92)		32 (52)		5 (11)		2 (9)		40%	
Black	229 (47%)	472 (90)		926 (109)		35 (62)		6 (15)		2 (10)		28%	
Asian	11 (2%)	451 (68)		969 (64)		15 (12)		4 (10)		1 (3)		27%	
Age (years)													
<30	211 (43%)	484 (81)		906 (109)		42 (68)		6 (16)		2 (10)		34%	
30 and older	280 (57%)	470 (81)		937 (91)		27 (44)		5 (10)		1 (9)		34%	
Education													
High school or less	102 (20%)	475 (90)		905 (127)		49 (86)		8 (20)		3 (14)		34%	
Some post-high school/college	127 (26%)	467 (80)		927 (104)		39 (61)		5 (11)		2 (10)		35%	
College graduate or greater	262 (53%)	481 (78)		928 (85)		24 (33)		5 (10)		1 (6)		34%	
Marital status													
Single/divorced/separated	103 (21%)	470 (94)		929 (105)		35 (50)		5 (11)		2 (10)		27%	
Living with partner	59 (12%)	474 (87)		909 (115)		44 (84)		8 (20)		6 (21)		39%	
Married	329 (67%)	479 (76)		924 (96)		31 (52)		5 (12)		1 (4)		36%	
Parity													
First child	201 (41%)	486 (78)		912 (102)		36 (62)		5 (10)		2 (8)		37%	
Second child	177 (36%)	473 (70)		933 (82)		27 (42)		5 (11)		1 (7)		32%	
Third child	113 (23%)	465 (100)		927 (120)		38 (64)		8 (19)		3 (14)		34%	
Expected employment (at 6 months)													
Not work for pay	91 (19%)	481 (85)		911 (106)		39 (63)		6 (11)		2 (11)		43%	

Demographic	N	Sleep		Light activity		Moderate activity		Hard activity		Very hard activity		Proportion meeting weekly guidelines	
		Mean mins. (± SD)		Mean mins. (± SD)		Mean mins. (± SD)		Mean mins. (± SD)		Mean mins. (± SD)		Unadjusted proportion	
Full-time	310 (64%)	476 (79)		925 (99)		31 (55)		6 (14)		2 (10)		32%	
Part-time	86 (18%)	469 (84)		931 (96)		33 (54)		5 (10)		2 (6)		32%	

Table 2
Predictors of Daily Sleep and Physical Activity in Overweight and Obese Postpartum Women

Demographic	N	Sleep (daily minutes)		Sedentary/light activity (daily minutes)		Moderate activity (daily minutes)		Meeting weekly guidelines	
		Adjusted β -coeff (st err)	855 (20)	Adjusted β -coeff (st err)	64 (12)	Adjusted β -coeff (st err)	reference	Adjusted β -coeff (st err)	Odds ratio (95% CI)
Total sample/intercept	491	510 (17)							
BMI (kg/m ²)									
25–30 (overweight)	198 (40%)	reference		reference		reference		reference	
30–34.9 (mildly obese)	153 (31%)	–5 (9)		2 (11)		2 (6)		1.0 (0.6, 1.6)	
35–39.9 (moderately obese)	79 (16%)	–3 (11)		4 (14)		–1 (8)		1.2 (0.6, 2.1)	
>40 (extremely obese)	61 (12%)	–44 (13)**		55 (15)**		–13 (9)		0.8 (0.4, 1.7)	
Race									
White	251 (51%)	reference		reference		reference		reference	
Black	229 (47%)	1 (10)		2 (12)		0 (7)		0.5 (0.3, 0.9)	
Asian	11 (2%)	–37 (25)		52 (30)		–14 (17)		0.5 (0.1, 2.2)	
Age (years)									
<30	211 (43%)	reference		reference		reference		reference	
30 and older	280 (57%)	–17 (8)*		27 (10)**		–8 (6)		1.0 (0.6, 1.5)	
Education									
High school or less	102 (21%)	reference		reference		reference		reference	
Some post-high school/college	127 (26%)	–14 (11)		32 (14)**		–13 (8)		0.9 (0.5, 1.6)	
College graduate or greater	262 (53%)	0 (11)		27 (14)*		–24 (8)**		0.7 (0.4, 1.4)	
Marital status									
Single/divorced/separated	103 (21%)	reference		reference		reference		reference	
Living with partner	59 (12%)	10 (13)		–30 (16)		12 (9)		1.7 (0.8, 3.4)	
Married	329 (67%)	9 (11)		–15 (14)		6 (8)		1.0 (0.6, 1.9)	
Parity									
First child	201 (41%)	reference		reference		reference		reference	
Second child	177 (36%)	–12 (9)		21 (11)		–10 (6)		0.8 (0.5, 1.2)	
Third child	113 (23%)	–15 (11)		15 (13)		–4 (7)		0.9 (0.5, 1.5)	
Expected employment (at 6 months)									
Not work for pay	91 (19%)	reference		reference		reference		reference	

Demographic	N	Sleep (daily minutes)		Sedentary/light activity (daily minutes)		Moderate activity (daily minutes)		Meeting weekly guidelines	
		Adjusted β -coeff (st err)		Adjusted β -coeff (st err)		Adjusted β -coeff (st err)		Odds ratio (95% CI)	
Full-time	310 (64%)	-14 (10)		27 (13) *		-12 (7)		0.7 (0.4, 1.2)	
Part-time	86 (17%)	-20 (12)		33 (15) *		-11 (9)		0.6 (0.3, 1.1)	

* $P < .05$;

** $P < .01$.

Abbreviations: SD, standard deviation; β -coeff (st err), Beta-coefficient (standard error).