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Occurrence and Correlates of Postpartum Depression in Overweight and Obese Women: Results from the Active Mothers Postpartum (AMP) Study

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Abstract

Objective—Postpartum depression (PPD) is a significant concern for new mothers and their infants, as well as the health professionals who care for them. Obesity may be a risk factor for depression, and therefore, for PPD specifically. We examined the occurrence and risk factors for PPD in a sample of overweight and obese new mothers.

Methods—In this cross-sectional study, 491 women who were overweight or obese prior to pregnancy completed the Edinburgh Postnatal Depression Scale (EPDS) 6 weeks postpartum, along with a number of other health- and pregnancy-related measures. Occurrence of depression was investigated, as well as bivariate and multivariate relationships between depression and demographic and health-related characteristics.

Results—As determined by an EPDS score of 13 or higher, the prevalence of PPD was 9.2%. Three items on the scale stood out as drivers of the total score (“blame myself unnecessarily”, “anxious or worried,” “feel overwhelmed”). Bivariate correlates of depression included education, income, marital status, and self-reported chronic illness; income remained significant in the multivariate logistic regression model. BMI was not related to postpartum depression.

Discussion—In this group of overweight and obese women, there was no association between BMI group and postpartum depression.

Keywords

Postpartum depression; Obesity; Prevalence

Introduction

Postpartum depression (PPD) is a significant public health concern. With an overall prevalence of 10–15% [1,2], as many as one in six new mothers may be affected. Munk-

Olsen et al. [3] recently reported a significantly increased risk of new-onset depression in the first 5 months postpartum, which supports previous findings that the incidence of depression is higher for women in the first few months postpartum than at other times in the life cycle [4-6]. Furthermore, depression appears to be more severe in postpartum women [4] and has an increased risk of recurrence [7,8].

PPD has been shown to affect not only the woman herself but also her relationship with her newborn, which can lead to long-term sequelae for the child [9,10]. Depressed mothers may demonstrate more negative affect and less verbal communication with their infants [10,11], leading to impaired cognitive development and poor emotional adjustment [12-15]. Mothers with PPD may also be less likely to engage in infant safety practices, take their child to preventive health care visits, and keep up with childhood vaccination schedules [16-18].

Several studies have examined the relationship between obesity and depression, with inconsistent findings [19]. Some early studies found no significant relationship between the two conditions [20], and some found a protective effect of weight on depression [21,22]. The most rigorous investigations have found that correlations do exist but vary among different subpopulations [23,24]; for example, the relationship is more pronounced among individuals with higher socioeconomic status [25,26]. The relationship is also more consistent among women than among men [27,28]. It is unclear, however, whether obesity increases the likelihood of PPD specifically.

While depression at any point in the life cycle can have deleterious effects, the higher incidence in postpartum and the potential adverse effects on the newborn make this period particularly significant. Given that more than half of all women of childbearing age in the United States are overweight or obese [29], it is important to investigate weight as a risk factor for postpartum depression. Our objective was to examine the prevalence of self-reported PPD in a community sample of overweight and obese women. Additionally, we investigated which items on the depression scale were most highly correlated with overall depression, and determined correlates and possible predictors of PPD in these overweight and obese women.

Materials and Methods

The women in our sample were recruited for the Active Mothers Postpartum (AMP) study, a randomized controlled behavioral intervention to encourage weight loss in overweight and obese postpartum women through increased physical activity and decreased caloric intake [30]. The intervention included 10 physical activity classes, eight nutrition education classes, and six telephone counseling sessions over a 9-month period. Women were recruited for the trial from September 2004 through April 2006 from the three largest obstetric clinics in the Durham, North Carolina area, and through posters placed in public areas such as grocery stores, smaller obstetrics clinics, and libraries. Women who were at least 18 years of age, recently postpartum, and had a measured body mass index (BMI) of at least 25 were considered eligible. In accordance with Duke Institutional Review Board approval, informed consent was obtained prior to any data collection. The baseline assessments for the AMP study were utilized for the current analysis.

Women completed the baseline assessments at 6 weeks postpartum, after giving consent to participate in the trial but prior to randomization. The assessments were administered over the telephone and included a survey of demographic information, psychosocial variables (including PPD), and current diet and physical activity (conducted by a contract survey firm); and two 24-h dietary recall interviews (conducted by the Nutrition Laboratory at the University of North Carolina at Greensboro). Four hundred and fifty women completed all

baseline assessments and were randomized to the AMP study. An additional 41 women completed the baseline demographic and psychosocial questionnaire. These 41 women were not randomized to the AMP study because they did not complete the additional required assessments (the two dietary recall interviews), but are included in this analysis.

The baseline questionnaire, collected over the telephone by trained interviewers at the contract survey firm (Battelle International, Inc.) included sociodemographic measures (including age, race, education, marital status, and income) as well as health-related and pregnancy-related items (including number of live births, breastfeeding status, and self-reported chronic illness including history of depression).

PPD was assessed using the Edinburgh Postnatal Depression Scale (EPDS) [31]. This measure has been used widely and is a validated tool designed to be specific to the postpartum period [32]. The scale consists of ten items with response categories ranging from 0 to 3 (scored such that 0 is most positive and 3 most negative). Items range from positive (“I have been able to laugh and see the funny side of things”) to negative (“I have been so unhappy that I have had difficulty sleeping,” “*I have felt sad or miserable*”). One item assesses suicidal thoughts (“*The thought of harming myself has occurred to me*”); any woman answering affirmatively was followed-up by a study physician to assess the need for referral.

We calculated the mean overall depression score for the sample and dichotomized the results using a cut point of 12/13, a recommended, validated, and commonly used cutpoint for this measure [31-34]. Therefore, respondents with scores of 13 and above were categorized as depressed. We also examined the mean scores for each individual EPDS question to determine whether specific items impacted the overall score more than others. The chi-square test was used to identify associations between the sociodemographic and health-related characteristics and the occurrence of PPD. Multivariate logistic regression was then used to investigate these variables as predictors of depression. Since BMI and education were not linearly related to EPDS score, these variables were entered categorically into the multivariate model. Statistical analysis was performed using SAS 8.2 (Cary, NC).

Results

In this sample of overweight and obese postpartum women, 9.2% were categorized as having postpartum depression, with a mean EPDS score of 6.6 (SD 4.5) (Table 1). Because different published reports have used a number of different cut points on the EPDS to categorize depression, we also present an abbreviated distribution against which other populations can be compared.

Table 2 presents the mean scores on each item of the EPDS scale. Three items appear to have a much greater impact on the overall score than do others: “*I have been anxious or worried for no good reason*” (mean 1.31, SD 1.00), “I have blamed myself unnecessarily when things went wrong” (mean 1.27, SD 0.87), and “*Things have been overwhelming me*” (mean 1.11, SD 0.77). Few women reported thoughts of self-harm; there were seventeen responses of “1”, four responses of “2”, and two responses of “3” on this item (data not shown).

Table 3 presents the baseline sociodemographic and health-related characteristics of the sample. Approximately 40% of the sample was overweight and the remainder obese. Almost half the sample was black and 40% were primiparous. Participants were highly educated and 41% reported a household income of \$60,000 or more. Education was negatively correlated with depression; those with a high school education or less were more likely to be depressed than those with a college degree ($P = 0.02$). Similarly, those reporting higher income were

less likely to be depressed ($P = 0.02$). Married mothers were less likely to be depressed ($P = 0.02$), and those reporting a chronic illness were more likely to suffer from PPD ($P = 0.01$). In the multivariate analysis, only income had a significant effect on the likelihood of being categorized as depressed (OR: 0.69; CI: 0.49,0.99) (Table 4). BMI was not associated with PPD in bivariate or multivariate analyses.

Discussion

In this sample of overweight and obese women, the occurrence of PPD was 9.2%, and BMI was not associated with being categorized as depressed.

Although use of EPDS is widespread, prevalence reports often use either different measures to describe PPD or different cut points on the EPDS, which reduces the comparability among studies. A review of PPD prevalence studies by the AHRQ showed large variations in estimates based on different definitions [2]. Three prior studies that have specifically investigated the association between weight and PPD each used different measures to describe PPD. In the first, Boury et al. found no relationship between measured body weight and depressive symptoms as measured by the Beck Depression Inventory [35]. In a prospective study of 64 women, Carter et al. [36] found a relationship between self-reported BMI and depression measured by the CES-D at both 4 and 14 months postpartum. Lacoursiere et al. [37] found a relationship between self-reported BMI and self-reported “moderate or greater” depressive symptoms (“In the months after your delivery, would you say you were: not/a little/moderately/very depressed”), but it is unclear how this measure may compare to the EPDS and how reliable self-reported BMI may be. Within the overweight and obese participants in our study, there was no relationship between BMI and PPD.

Drivers of the total EPDS score appeared to be items that reflect general stress and upheaval more than sadness per se. Women seemed most stressed by feelings of anxiety and a sense of being overwhelmed, indicating the particular importance of functional as well as emotional social support in this period. Lack of social support and a negative relationship with the partner [1,38,39] have been shown to be predictors of PPD in other studies; it is important that family and partners be educated about the risks for PPD and encouraged to offer help and support. It may also be that different items are more important for women of normal weight; such a finding may indicate the need for differences in treatment across groups.

Bivariate correlates of PPD were similar to those found in the general population of postpartum women; income and marital status have been shown to be associated with PPD [1,38]. However, after controlling for other covariates in the multivariate model, only income remained as a significant predictor of PPD. Furthermore, some predictors that have been inconsistently associated with PPD in other samples—such as age, parity [40,41] and delivery type [42,43]—were not significant in our analysis. History of depression [44] and breastfeeding [45,46] have generally been found to be related to PPD; in our study, the proportion with a history of depression (7/491) and the number of breastfeeders with PPD ($n = 9$) were small, which likely contributed to the lack of statistically significant associations.

Education has not typically been found to be related to PPD in previous studies of the general population [1,38,40], although it has been shown to mediate the relationship between obesity and depression in general [25,26]. The existence of a bivariate relationship between education and PPD in this overweight and obese sample may indicate a unique correlate for PPD in these women. However, the relationship is negative and disappears after controlling for additional covariates. Two previous studies that utilized a similar analysis

approach also found a negative bivariate relationship between education and PPD in the general population that disappeared after controlling for related factors [40,41]. Therefore, it is likely that education has a similar effect in both normal and overweight populations, and that it is exerted through related factors, particularly income.

One limitation of this study was that the women in our sample were self-selected to participate in a larger intervention trial. As such, severely depressed women may have been less likely to take part in our study and our participants overall may be less likely to suffer from depression than women in the community at large. Therefore, our prevalence estimate of PPD may be conservative. Another possible limitation could be that 34 participants (7%) provided a self-reported prepregnancy BMI of less than 24.5, suggesting they may have been normal weight prior to pregnancy. Weight is more likely to be under-reported by overweight persons, however; further, these women met the criteria for overweight in postpartum, when the EPDS measure was administered. Our investigation was also affected by the lack of some potentially relevant measures such as social support [1,38,39], marital relationship [1,38,39], and depression during pregnancy [1,38,44], which have been found to be correlates of postpartum depression. The lack of an association between history of depression and PPD was likely due to the small number of cases. Furthermore, while our sample was unique in being composed of overweight and obese postpartum women, we consequently lacked a normal weight comparison group for our analysis.

Strengths of our study include utilization of a widely used, validated measure of PPD, and the broad catchment area of the sample, recruited from all major obstetrics clinics as well as call-ins from the community. The sample also consisted of a sociodemographically diverse population of women: the proportion of black participants was high, and less educated and lower income participants were well-represented, even though these groups are often difficult to recruit and retain in long-term intervention trials.

Our findings indicate that clinicians caring for postpartum women should be especially sensitive to the possibility of PPD in patients with lower income, less social support (unmarried, poor marital relationship, lack of family or friend support network) and who report suffering from anxiety or a sense of being overwhelmed by new motherhood. For such women, interventions involving cognitive-behavioral therapy, education and skills-building, and social support can have an important positive impact [2]. The presence of overweight or obesity, however, does not appear to be an important risk factor for PPD.

Conclusion

More than one in ten postpartum women in America will suffer from postpartum depression, with deleterious effects extending to their children. With obesity becoming ever more common, it is important to investigate potential associations between overweight and negative health outcomes. Obese women may be more prone to depression than the general population, and may also be more socially isolated and face more medical problems than women of normal weight. In this sample of overweight and obese women, however, BMI was not associated with postpartum depression.

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Table 1Distribution of postpartum depression scores in the sample of overweight and obese participants ($n = 491$)

Postpartum depression (EPDS ≥ 13)		9.2% ($n = 45$)
EPDS score (mean; SD)		6.6 (4.5)
EPDS score distribution		
Score	Frequency	Percent
0–7	306	62.3
8	39	7.9
9	35	7.1
10	29	5.9
11	17	3.5
12	20	4.1
13	6	1.2
14	11	2.2
15–30	28	5.7

Table 2

Mean scores for each item of Edinburgh Postnatal Depression Scale (*n* = 491)

Item	Mean (SD)
I have been able to laugh and see the funny side of things	0.29 (0.53)
I have looked forward with enjoyment to things	0.39 (0.67)
I have blamed myself unnecessarily when things went wrong	1.27 (0.87)
I have been anxious or worried for no good reason	1.31 (1.00)
I have felt scared or panicky for not very good reason	0.57 (0.85)
Things have been overwhelming me	1.11 (0.77)
I have been so unhappy that I have had difficulty sleeping	0.42 (0.77)
I have felt sad or miserable	0.63 (0.75)
I have been so unhappy that I have been crying	0.51 (0.64)
The thought of harming myself has occurred to me	0.06 (0.32)

All items are 0–3 scale scored such that 0 is most positive and 3 most negative; higher scores indicate greater depression

Table 3

Sample characteristics and bivariate relationships with depression

Variable	Total <i>n</i> = 491% (<i>n</i>)	Not depressed EPDS < 13% (<i>n</i>)	Depressed EPDS ≥ 13% (<i>n</i>)	<i>P</i> -value ^a
Body mass index				
25–29.9	40.3 (198)	89.9 (178)	10.1 (20)	0.76
30–34.9	31.2 (153)	92.2 (141)	7.8 (12)	
35–39.9	16.1 (79)	92.4 (73)	7.6 (6)	
40+	12.4 (61)	88.5 (54)	11.5 (7)	
Age				
18–24	14.1 (69)	85.5 (59)	14.5 (10)	0.18
25–34	58.0 (285)	90.9 (259)	9.1 (26)	
35+	27.9 (137)	93.4 (128)	6.6 (9)	
Race				
White	51.1 (251)	92.8 (233)	7.2 (18)	0.28
Black	46.6 (229)	88.7 (203)	11.4 (26)	
Asian	2.2 (11)	90.9 (10)	9.1 (1)	
Education				
Less than high school	6.9 (34)	85.3 (29)	14.7 (5)	0.02
High school graduate	34.4 (169)	87.0 (147)	13.0 (22)	
College degree	38.1 (187)	95.7 (179)	4.3 (8)	
Graduate degree	20.6 (101)	90.1 (91)	9.9 (10)	
Household income				
Up to \$15,000	7.5 (36)	80.6 (29)	19.4 (7)	0.02
\$15,001–\$30,000	21.1 (101)	85.2 (86)	14.9 (15)	
\$30,001–\$45,000	15.5 (74)	91.9 (68)	8.1 (6)	
\$45,001–\$60,000	14.9 (71)	90.1 (64)	9.9 (7)	
\$60,001 or more	41.0 (196)	94.9 (186)	5.1 (10)	
Marital status				
Single	21.0 (103)	85.4 (88)	14.6 (15)	0.02
Living with a partner	12.0 (59)	86.4 (51)	13.6 (8)	
Married	67.0 (329)	93.3 (307)	6.7 (22)	

Variable	Total n = 491% (n)	Not depressed EPDS < 13% (n)	Depressed EPDS ≥ 13% (n)	P-value ^a
Number of live births (incl. newborn)				
1	40.9 (201)	92.0 (185)	8.0 (16)	0.71
2	36.1 (177)	90.4 (160)	9.6 (17)	
3+	23.0 (113)	89.4 (101)	10.6 (12)	
Infant feeding				
Breastfeeding only	34.2 (168)	94.6 (159)	5.4 (9)	0.11
Combined breastfeeding and formula	27.3 (134)	88.8 (119)	11.2 (15)	
Formula feeding only	38.5 (189)	88.9 (168)	11.1 (21)	
Self-reported medical condition				
No	79.0 (388)	92.5 (359)	7.5 (29)	0.01
Yes	21.0 (103)	84.5 (87)	15.5 (16)	
Delivery type				
Vaginal	62.3 (301)	91.0 (274)	9.0 (27)	0.74
Cesarean section	37.7 (182)	90.1 (164)	9.9 (18)	
History of depression				
No	98.6 (484)	91.1 (441)	8.9 (43)	0.07
Yes	1.4 (7)	71.4 (5)	28.6 (2)	

^a Chi-square test for differences in proportions

Table 4

Predictors of depression; multivariate logistic regression

Variable	Odds ratio	95% Confidence interval
Body mass index		
25–29.9	Ref	
30–34.9	0.72	(0.32, 1.62)
35–39.9	0.49	(0.17, 1.39)
40+	0.60	(0.22, 1.68)
Age	0.96	(0.89, 1.03)
Race		
White	Ref	
Black	0.87	(0.37, 2.03)
Asian	0.63	(0.07, 6.03)
Education		
Less than high school	Ref	
High school graduate	1.21	(0.38, 3.84)
College degree	0.72	(0.17, 2.96)
Graduate degree	3.57	(0.69, 18.39)
Household income (per \$15 k)	0.68	(0.48, 0.98)
Marital status		
Single	Ref	
Living with a partner	1.30	(0.48, 3.56)
Married	0.91	(0.32, 2.54)
Number of live births (incl. newborn)	1.19	(0.75, 1.87)
Infant feeding		
Breastfeeding only	Ref	
Combined breastfeeding and formula	2.13	(0.84, 5.45)
Formula feeding only	2.00	(0.78, 5.14)
Self-reported medical condition	1.95	(0.92, 4.13)
Delivery type (Cesarean section)	1.41	(0.71, 2.81)
History of depression	5.45	(0.66, 44.93)