Published in final edited form as:

Arch Womens Ment Health. 2016 August ; 19(4): 691–694. doi:10.1007/s00737-016-0613-9.

The impact of psychosocial stressors on postpartum weight retention

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Abstract

Excessive gestational weight gain and postpartum weight retention are implicated in future morbidity in women. To understand whether psychosocial stressors contribute to weight retention, we used data collected in a cohort of postpartum women and analyzed measures of stress, depression, social support, and health-related quality of life. Depressive symptoms at delivery, and worse health related quality of life and lower stress at three-months postpartum were associated with three-month weight retention. Interventions targeting depression and improving quality of life may further reduce weight retained.

Keywords

gestational weight gain; postpartum weight retention; stress; depression; quality of life

INTRODUCTION

Women of childbearing age weigh more today than in previous generations, aligned with general U.S. population shifts. Potentially accelerating this population trend toward a higher prevalence of obesity, previous studies have demonstrated associations between prepregnancy obesity and increased postpartum weight retention (PPWR) (Mannan 2013). PPWR is influenced by gestational weight gain (GWG), and GWG outside of the recommended range has been associated with childhood obesity (Sridhar 2014), low birth weight (Frederick 2008) and infant mortality (Davis 2014). Recognizing the need to balance outcomes for mothers and their children, in 2009 the Institute of Medicine (IOM) published recommendations for GWG for mothers based on their prepregnancy BMI (IOM 2009). Adherence to the IOM GWG recommendations is associated with improved outcomes for mother, including reduced PPWR, and infant (Mannan 2013).

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ETHICAL STANDARDS

This study has been approved by the Christiana Care Health System Institutional Review Board and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

Factors affecting PPWR are varied yet few studies have examined its social and behavioral determinants and the limited body of literature has mostly focused on their relation to GWG. For example, behavioral and lifestyle interventions can reduce GWG, and potentially the incidence of gestational diabetes (Brown 2012; Oteng-Ntim 2012); they may also be of benefit for psychosocial outcomes (Hunag 2011). These strategies for reducing GWG might also be effective at reducing PPWR, and consequently future morbidity including risk of cardiovascular disease (Puhkala 2013).

The purpose of this study was to better understand the contributions of social and behavioral factors to PPWR. We examined weight trajectories for a prospective cohort of women, recruited at obstetrical delivery and explored measures of stress, depression, social support, and health-related quality of life with respect to three-month postpartum weight retention.

MATERIALS AND METHODS

Study Sample

Subjects were drawn from a prospective cohort of postpartum women systematically recruited from a large community medical center at delivery to study health services following a live birth. The cohort included women with pregnancies complicated by chronic hypertension, hypertensive disorders of pregnancy (gestational hypertension and preeclampsia), or gestational diabetes mellitus, and an uncomplicated comparison group, as described previously (Ehrenthal 2014). These particular pregnancy complications were included based on the hypothesis that these women would be at an increased risk for future cardiovascular disease. Study staff interviewed the mothers immediately following delivery on the postpartum floor of the hospital, and again at a three-month on-site follow-up visit. The study was approved by the hospital Institutional Review Board, and all subjects provided written informed consent.

Measures

To assess psychosocial stressors in the cohort that we hypothesized to be related to PPWR, we employed four well known instruments measuring factors relating to health related quality of life (QOL) (EuroQol EQ-5D-3L; EuroQol Group 1990), perceived social support (Multidimensional Scale of Perceived Social Support [MPSS]; Zimet 1988), depressive symptoms (Patient Health Questionnaire-2 [PHQ2]; Kroenke 2003), and perception of stress (Perceived Stress Scale [PSS]; Cohen 1983). All instruments were designed to be self-reported as necessitated by the original study, and therefore were completed by study participants. As clear clinical cutpoints are either not available (QOL, MPSS, PSS) or not validated in our population of pregnant and postpartum women (PHQ2), each scale was operationalized by summing the individual responses to form an aggregate score, and tested for normality. For each of the four instruments, a higher aggregate score was interpreted as follows: QOL, lower health-related quality of life; social support, higher perceived social support; depressive symptoms, increased reported depressive symptoms; stress, greater perceived stress.

The main outcome was weight retained at the three-month post-partum study visit, defined as the difference between the three-month weight (measured) and prepregnancy weight (self-reported), in kilograms. Sociodemographic characteristics, including age, race, insurance, and parity, were self-reported at study enrollment. Medical characteristics including birth outcome, pregnancy history, and delivery method were confirmed by review of the inpatient medical record. Smoking was self-reported at the three-month visit and women who reported any smoking during the last two years were considered to be smokers; breastfeeding was self-reported as any breastfeeding during infant's first three months of life. Physical activity at three months postpartum was assessed using the International Physical Activity Questionnaire.

Statistical Analysis

Descriptive statistics were used to examine the psychosocial characteristics of the cohort at delivery, three months postpartum, and the difference between the two time points. Linear regression models isolated the independent effects of the psychosocial measures (stress, depression, social support, quality of life), adjusted for potential confounding, to predict three-month weight retention. We fit three separate models corresponding to the administration of the psychosocial instruments at delivery (Model 1) and three months postpartum (Model 2), and the difference between the two time points (Model 3). These models were also used for a sensitivity analysis whereby we posited PPWR was overestimated by 20% for obese women, and 10% for non-obese (since prepregnancy weight may be underreported, PPWR may be exaggerated). All analyses were conducted using R version 3.1.0 (R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

Five hundred twenty-three postpartum women were recruited at delivery and 361 (69%) attended the three-month study visit. One participant did not have a prepregnancy weight and was excluded, yielding a final study sample of 360 mothers. The average age of the cohort was 32 years; 105 (29.2%) were African American, 145 (40.3%) were primiparous, and 244 (67.8%) were privately insured for delivery. On average 13.5 kgs were gained during pregnancy (standard deviation of 8.1) and 4.6 kgs were retained at the three month study visit (standard deviation of 7.4).

Table 1 presents the psychosocial instrument scores for the cohort at delivery, three months postpartum, and the difference between the two time points. Self reported quality of life decreased during the follow up period ($p < 0.01$), while all other measures (stress, depression, and social support) tended to remain the same.

Three linear regression models predicting three-month postpartum weight retention by psychosocial measures are shown in Table 2. At delivery (Model 1), the presence of depressive symptoms was associated with increased weight retention (0.9 kgs for each additional depressive symptom reported, 95% CI: 0.1, 1.6 kgs). At three-months postpartum (Model 2) poorer health related QOL and lower perceived stress were independently associated with greater weight retained. On average, for each unit increase in QOL score corresponding to lower quality of life, an additional kilogram of weight was retained (95%

CI: 0.2, 1.8 kgs), while for each unit increase in stress score corresponding to greater perceived stress 0.1 kgs were lost (95% CI: 0.01, 0.3 kgs). Examining the difference between measures at the two study visits, only QOL was independently associated with weight retained, suggesting that larger changes in QOL between study visits correlated with increased weight retained (0.5 kgs for each unit change in QOL, 95% CI: 0.1, 0.95). Regression results did not meaningfully differ under the sensitivity analyses (data not shown).

DISCUSSION AND CONCLUSION

We examined psychosocial risk factors associated with postpartum weight retention three months after delivery in a cohort of women. The presence of depressive symptoms at delivery and worse reported health related quality of life and lower perceived stress three-months postpartum were associated with greater PPWR. Self-reported quality of life improved during follow up.

Similar factors have been found to influence postpartum weight retention elsewhere. In a study of the Danish National Birth Cohort, a positive association between depressive symptoms and anxiety and increased weight retention was observed (Pedersen 2011). Likewise, a longitudinal analysis of postpartum depression and weight retention found depressed women had twice the risk of retaining five kg or more at one year (Herring 2008). Early pregnancy anxiety (Bogaerts 2013) may also be a contributor to PPWR as well as increased maternal stress (Whitaker 2014). Our finding of greater perceived stress predicting less weight retained contradicts the earlier study, but may reflect differences in measures used to estimate stress.

To our knowledge, health-related QOL has not been examined in relation to GWG or PPWR and may be a novel finding in this work. Wang et al. found poorer QOL to be associated with an increase in the risk of preterm birth (2013). Likewise, poorer QOL is also associated with obesity in women (Heo 2003). Self-reported worse QOL may limit ability to exercise or access foods of high nutritional value, which can further weight gain. While we noted QOL improving over study follow-up, other work has suggested an inverse relationship (Gjerdingen 2003); this may reflect recruitment of complicated pregnancies into the cohort and improved health after delivery.

This study has limitations to be considered. First, our weight retention measure was based on a self-reported prepregnancy weight. Despite being a common method of ascertaining of prepregnancy weight, it is known to be underestimated, and consequently may have resulted in an overestimate of PPWR in our cohort, although a sensitivity analysis did not detect meaningful changes in the regression estimates. Second, the absence of psychosocial measures assessed prior to pregnancy, as well as their subjective self-reported nature limits the ability to draw conclusions about possible causal relationships. For example, three-month PPWR may have caused worse QOL, as opposed to vice-versa. Last, while the cohort was originally recruited to assess high-risk pregnancy outcomes, we did not observe any relation of complicated pregnancies with the psychosocial measures or weight retention,

thereby minimizing chance of residual confounding. Nevertheless, the results should be interpreted under this qualification.

Failure to lose weight gained during pregnancy is an important cause of obesity. This study suggests that psychosocial stressors may partially contribute to weight retention, yet further investigation including multiple measures of these stressors before, during and after pregnancy will be needed to identify any causal relationship. Interventions targeting depression and QOL may further reduce weight retained.

Acknowledgments

Funding: National Institute of General Medical Sciences—NIGMS (8 P20 GM103446-13) from the National Institutes of Health to Deborah B. Ehrenthal.

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Table 1

Measures of psychosocial and behavioral characteristics of the cohort at delivery, three months postpartum, and mean difference over time.

Measure	Delivery	Three month	Difference
EQ-5D-3L QOL summary score	6.9 (1.6)	5.7 (1.1)	-1.2 (1.7) ^a
PHQ2 score	0.6 (1.1)	0.7 (1.2)	0.1 (1.1)
PSS score	12.5 (6.7)	13.1 (7.3)	0.4 (6.5)
MPSS score	74.2 (14.2)	74.1 (12.0)	0.2 (14.9)

Abbreviations: EQ-5D-3L QOL, EuroQol five dimensions quality of life; PHQ2, Patient Health Questionnaire, two questions; PSS, Perceived Stress Scale; MPSS, Multidimensional Scale of Perceived Social Support

^a p<0.01 comparing mean score between delivery and three months.

Table 2

Multivariable linear regressions of three-month postpartum weight retention by psychosocial and behavioral measures of the cohort at delivery, three months postpartum, and mean difference over time.

	Model 1: Delivery			Model 2: Three month			Model 3: Difference		
	Estimate (95% CI)	P-value		Estimate (95% CI)	P-value		Estimate (95% CI)	P-value	
EQ-5D-3L QOL summary score	-0.17 (-0.65, 0.31) ^{a,b}	0.48		1.00 (0.21, 1.78)	0.01		0.52 (0.08, 0.95)	0.02	
PHQ2 score	0.88 (0.12, 1.64)	0.02		0.48 (-0.33, 1.28)	0.25		-0.07 (-0.76, 0.62)	0.84	
PSS score	-0.04 (-0.16, 0.09)	0.57		-0.13 (-0.26, -0.01)	0.04		0.01 (-0.11, 0.13)	0.83	
MPSS score	-0.01 (-0.06, 0.04)	0.69		-0.04 (-0.10, 0.02)	0.17		-0.01 (-0.06, 0.04)	0.63	

Abbreviations: EQ-5D-3L QOL, EuroQol five dimensions quality of life; PHQ2, Patient Health Questionnaire, two questions; PSS, Perceived Stress Scale; MPSS, Multidimensional Scale of Perceived Social Support.

^aAdjusted for gestational weight gain, mother's age at delivery, parity, African American race, prepregnancy BMI, smoker prior to pregnancy, breastfeeding, and three-month physical activity score.

^bRegression estimates correspond to mean change in weight retained (relative to prepregnancy weight) at three months postpartum, in kgs, for each point increase in the instrument aggregate score.