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Contraceptive use by obese women one year postpartum

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Abstract

Background—Obese women have higher rates of pregnancy complications, making the prevention of unintended pregnancies in this group of particular importance.

Study Design—We performed a secondary analysis of data from *Active Mothers Postpartum (AMP)*, a randomized controlled trial aimed at postpartum weight reduction. We assessed contraceptive use among 361 overweight/obese women 12 months postpartum. Logistic regression was used to model the effect of BMI categories on effective contraceptive use (intrauterine, hormonal, or sterilization methods) while adjusting for potential confounders including age, race, parity, breastfeeding, education, and chronic illness.

Results—Effective contraceptive use was reported by 45% of women. In the multivariable model, women with a BMI ≥ 35 kg/m² were less likely to use effective contraception than women with a BMI <30 kg/m² (OR 0.5, 95% CI 0.3–0.8). There was a trend towards less use of effective contraception among women with a BMI 30–34.9 kg/m² as compared to women with a BMI <30 kg/m².

Conclusion—At 12 months postpartum, obese women were less likely to use effective contraceptive methods than overweight women. Although certain contraceptive methods may be preferred over others in this population, providers should reinforce the importance of effective contraception to avoid unintended pregnancies in obese women.

1. Introduction

Obesity is epidemic in the United States, with 33% of women aged 20 years or older classified as obese (body mass index [BMI] ≥ 30 kg/m²) [1]. Paralleling this increase in obesity in the general population is an increasing level of obesity in the context of pregnancy, with the particular risks this poses to both the mother and her offspring. Obesity significantly increases the risk of pregnancy complications including gestational hypertension, preeclampsia,

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gestational diabetes, cesarean delivery, and fetal macrosomia [2–5]. Not only are obese women at higher risk of cesarean delivery, but they are more likely to have excessive blood loss, longer operative times, wound infections, and postoperative endometritis [6–8]. Therefore, it is highly important to avoid unintended pregnancies in this growing high-risk group.

It is estimated that approximately half of all pregnancies in the United States are unintended [9]. Sociodemographic characteristics consistently associated with unintended pregnancy include young maternal age, black race, unmarried status, lower income, and lower education [9–11]. However, it is unclear whether obesity per se, after controlling for these known risk factors, is associated with unintended pregnancy and whether such an association might be due to a higher level of sexual activity, less contraceptive use, more contraceptive failure, or other factors. Kaneshiro et al. [12], in a study of 6690 women, found no differences in contraceptive use patterns or in the risk of unintended pregnancies between normal weight women and overweight or obese women. In contrast, Chuang et al. [13], analyzing 7943 women, found an association between obesity and contraceptive nonuse (odds ratio [OR] 1.34, 95% confidence interval [CI] 1.16–1.55). Among women using oral contraceptives, one prospective cohort study did not find decreased adherence among obese women [14]. While it is well known that the contraceptive patch and levonorgestrel subdermal implants are less effective in obese women than those of normal weight [15–17], studies regarding oral contraceptive efficacy in obese women have shown conflicting results [18–23]. Although contraceptive nonuse or failure may not directly translate into more unintended pregnancies [24,25], it is an area that is understudied and warrants further examination, particularly in women at risk for pregnancy complications such as those who are overweight or obese. Such information would help reproductive health care providers to appropriately counsel women regarding the effects of obesity on their reproductive lives.

Using data from *Active Mothers Postpartum (AMP)*, a randomized controlled trial designed to enhance postpartum weight loss in overweight and obese women, we sought to further define the relationship between obesity and contraceptive use. We hypothesized that obese women, as compared to their overweight counterparts, would be less likely to use effective contraceptive methods one year after giving birth.

2. Materials and methods

AMP was a randomized controlled behavioral intervention trial to enhance weight loss in postpartum women who were overweight or obese prior to and during early pregnancy. The study was reviewed and approved by the Institutional Review Board of Duke University Medical Center. The design, rationale, and baseline participant characteristics have been presented in detail previously [26]. The primary objective of the overall trial was to provide a multi-component intervention that would promote and maintain a reduction in BMI via sustainable lifestyle changes. Women in the control arm received a biweekly newsletter with topics of interest to new mothers and monetary rewards for completing three follow-up surveys. In addition to the components of the control arm, women in the intervention arm were asked to participate in ten physical activity group sessions, eight healthy eating classes, and six phone counseling sessions based on motivational interviewing over a total of nine months. Women in the intervention arm also received a notebook which included healthy recipes and exercise information as well as a sport stroller and pedometer. A total of 450 women who were overweight or obese prior to and during early pregnancy were recruited from three large obstetrics clinics in Durham, North Carolina. Women who did not speak English, were less than 18 years old, or had any health conditions that prevented them from walking a mile unassisted were excluded.

Women with height and weight indicating a BMI ≥ 25 kg/m² at their six weeks postpartum visit, as measured by research staff, were considered eligible and written informed consent was obtained. These postpartum visits occurred at a mean of 45.6 days (SD 11.2) after delivery, ranging from 8–83 days after delivery. Baseline assessments included demographic characteristics, psychosocial factors, and current weight-related behaviors. At 12 months postpartum, women were asked about breastfeeding, general health status, presence and type of any chronic illness, and contraceptive use. If women reported using contraception, this was further specified as one or more of the following: progesterone-only pill, combined oral contraceptive (COC), depot-medroxyprogesterone acetate (DMPA), contraceptive patch, contraceptive vaginal ring, tubal ligation/vasectomy, intrauterine device (IUD), barrier (condoms and/or diaphragm), or other. If they indicated their contraceptive method as “other,” they were asked to specify the method.

For this secondary analysis, our primary outcome variable was use of effective contraception. Based on data showing barrier and natural family planning methods to have higher failure rates as compared to hormonal methods and IUD’s [27], “effective contraception” was defined as use of hormonal methods, IUD’s, or sterilization. “Less effective contraception” was defined as use of barrier methods, natural family planning, or none. One woman who reported she was sexually abstinent, 24 women who reported being pregnant, and 64 women who did not complete the survey at the 12-month time point were excluded from this analysis.

The main independent variable was BMI at baseline study enrollment. Women were classified as overweight (BMI 25.0–29.9 kg/m²), obesity class I (BMI 30.0–34.9 kg/m²), or obesity class II–III (class II: BMI 35.0–39.9 kg/m², class III: BMI ≥ 40.0 kg/m²) [28]. Sociodemographic, psychosocial, and health behavior characteristics with known or possible associations with contraceptive use 12 months after giving birth were evaluated as candidate predictors. Baseline characteristics included maternal age (<35 years/ ≥ 35 years), race (black/non-black), marital status (married/not married), education ($\leq$ high school/ $>$ high school), income (<15 k, 15–30 k, 30–45 k, 45–60 k, or 60 k+), smoking (yes/no), parity (one live birth/more than one live birth), delivery mode (vaginal/cesarean), and Edinburgh Postnatal Depression Scale (EPDS) score (≥ 13 / < 13). Characteristics collected at the 12-month time point were breastfeeding status (breastfeeding exclusively/some formula, in addition to solid foods), childcare arrangement (staying home with child everyday/having childcare provided), number of days worked in the last seven days (<four/ $\geq$ four), current health description (excellent/very good or good/fair/poor), and presence of a longstanding or chronic illness (yes/no with specification if yes). Assigned AMP randomization arm (intervention/control) was also evaluated as a potential covariate.

A bivariate analysis using the chi-square test was conducted to describe any associations of the potential covariates with obesity class and with effective contraceptive use. Correlation coefficients between the potential covariates were calculated. After selecting only variables that were not highly correlated with one another, those included in the model were age, race, education, parity, delivery mode, EPDS score, breastfeeding status, days worked in the last seven, current health, chronic illness, and AMP randomization arm. Multivariate logistic regression was then performed to model the effect of obesity classes on effective contraceptive use while adjusting for the described covariates. Race, age, BMI 30–34.9 kg/m², and BMI ≥ 35 kg/m² were placed into the model regardless of statistical significance. Modeling was then performed in a stepwise backwards elimination process. That is, all candidate variables were included in the preliminary model and stepwise backwards elimination was used to remove variables with p-values greater than 0.5 [29]. The final model is summarized by odds ratios with corresponding 95% confidence intervals.

For all tests, a two-sided α of 0.05 was considered statistically significant. All statistical analyses were performed using SAS, version 9.1 (SAS Institute, Cary, NC).

3. Results

The mean age of the 361 women included in this analysis was 31.2 years (SD 5.5). Forty-three percent of the women were black and 57% were non-black, all of whom were white except for nine women categorized as Asian/other. Most women were married (71%), earned more than 45 k per year (60%), had more than a high school education (83%), and had worked four or more of the last seven days (59%). The mean BMI was 32.6 kg/m² (SD 6.1) with 154 (43%) overweight, 112 (31%) obesity class I, and 95 (26%) obesity class II–III. Of the 68 women who reported having a chronic illness, 12 had hypertension and 6 had diabetes. Other illnesses reported by more than one woman were endometriosis, polycystic ovarian syndrome, asthma, hypothyroidism, depression, and back pain/problems.

There were 198 (55%) women using no or less effective contraception, with only 163 (45%) using effective methods as defined in this study. In the bivariate analysis, effective contraceptive use was significantly less likely in women who were exclusively breastfeeding (24% v. 49%, $p=0.001$), women with more than a high school education (43% v. 57%, $p=0.04$), and women in the *AMP* control arm (39% v. 50%, $p=0.05$). Among the 51 women exclusively breastfeeding, 24 were not using any contraception, 15 were using condoms, and the remaining 12 were using more effective methods. Presence of a chronic illness and effective contraceptive use were not significantly associated. There were only small numbers of women who reported diabetes or hypertension, but these specific conditions were also not associated with effective contraceptive use.

Among those subjects using any type of contraceptive method, the overall frequencies of specific methods were as follows: 37 (18%) barrier method, 1 (0.5%) natural family planning, 17 (8%) progesterone-only pill, 55 (27%) COC, 7 (3%) DMPA, 9 (4%) contraceptive patch, 4 (2%) contraceptive vaginal ring, 29 (14%) sterilization, and 42 (21%) IUD. Table 1 details the types of contraceptive use by BMI category.

Table 2 describes the results of the final logistic regression model. Using the backward stepwise regression approach as previously described, 2 covariates were eliminated from the final logistic regression analysis: current health and number of days worked. Women with obesity class II–III had significantly lower odds of effective contraceptive use as compared to overweight women (OR 0.5, 95% CI 0.3–0.8). There was a trend towards less use of effective contraception in women with obesity class I as compared to overweight women (OR 0.8, 95% CI 0.5–1.4). Women who were exclusively breastfeeding had significantly lower odds of effective contraceptive use than those who were not exclusively breastfeeding (OR 0.2, 95% CI 0.1–0.5), as did women with more than a high school education as compared to those with a high school education or less (OR 0.5, 95% CI 0.3–0.9). Women with a history of more than one live birth had significantly greater odds of effective contraceptive use than those with only one live birth (OR 1.7, 95% CI 1.1–2.7), as did women in the *AMP* intervention arm as compared to those in the control arm (OR 1.8, 95% CI 1.2–2.9).

4. Discussion

In this analysis of data from the *AMP* trial, women with obesity class II–III were significantly less likely to use effective contraception 12 months postpartum than overweight women, after adjusting for potential confounders. Although not significant, there was a trend towards less use of effective contraception among women with obesity class I as compared to overweight women, indicating that degree of obesity may be an important factor. Exclusive breastfeeding

was significantly associated with less use of effective contraception even though lactational amenorrhea as a contraceptive method is much less effective at 12 months postpartum than in the first six months [30]. Previous studies have associated lower education levels with less contraceptive use and more unintended pregnancies [10,11]. Our contrary finding of higher education levels being associated with less contraceptive use may be due to our use of data collected from women enrolled in a postpartum weight-loss trial and thus may not be representative of the general population.

Interestingly, women in the intervention arm of the *AMP* trial were more likely to use effective contraception, raising the possibility that the benefits of a weight-loss intervention may extend to other health behaviors of obese women, an area that deserves further investigation.

There are several reasons why obese women might be less likely to use effective contraceptive methods. Given that fertility has been shown to be decreased in this population [31], obese women may perceive themselves as less likely to conceive. Although Kaneshiro et al. [12] found no differences in perceived fertility when comparing women of different BMI categories, several studies have shown that women with diabetes, for example, perceive themselves to be less fertile [32,33]. A perception of decreased fertility as an explanation for less use of effective contraceptive methods in this study seems less likely given that it was conducted after all the subjects had given birth. Obese women and/or their providers may be concerned that hormonal contraceptives have more complications or are less effective in the setting of obesity and thus avoid them. These women may be less sexually active, although a recent study found similar sexual activity rates among all BMI groups [34]. Furthermore, obstetric providers may not have sufficient time to commit to contraceptive counseling for obese women during the busy prenatal and postpartum visits, particularly if the time is dominated by management of other high-risk conditions associated with obesity, such as diabetes or hypertension.

Chuang et al. [13], using a population-based sample of 7943 women, similarly found less contraceptive use among obese women than women of normal weight. While they defined contraception as not only hormonal methods and IUD's but also barrier and rhythm methods, we chose to study women using only those contraceptive methods that have the lowest documented failure rates. Despite the concern that some obese patients and their providers might have regarding the safety of hormonal contraception, the World Health Organization (WHO) gives COC's, the contraceptive patch, and ring a category 2 rating for obese women, meaning that the benefits generally outweigh the risks [35]. Certainly even a category 2 method is safer than pregnancy in obese women, a fact that obese women, their partners, and their health care providers should know. Contraceptive counseling should be tailored for the obese woman with consideration of obesity-specific factors such as the decreased effectiveness of the contraceptive patch [17], the possibly decreased effectiveness of COC's [18–22], the increased risk of venous thromboembolism [36–38], the decreased risk of endometrial cancer with COC's and the copper IUD [39,40], and co-morbid conditions such as hypertension and/or diabetes. Despite these numerous issues, an effective contraceptive method can almost always be identified.

To our knowledge, this is the first study of contraceptive use patterns among obese postpartum women. We were able to study a relatively large number of black women which is important since both obesity and unintended pregnancy occur more commonly in this population [1,9–11]. Although most women were healthy overall, we were able to include data on chronic illnesses and general health perceptions which are important factors when advising and counseling women about contraceptive use.

However, our analysis also has several limitations. Our study sample included a relatively large proportion of women of higher socioeconomic status which might limit generalizability.

Utilizing data from a clinical intervention trial, we were limited to variables that had already been collected and are therefore unable to answer why women chose or did not choose to use contraception and why they may have chosen particular methods. We used baseline BMI's for this analysis and though it's possible that weight loss over 12 months might affect the women's contraceptive use, we believe that in this case it is unlikely because the mean weight loss at 12 months for both the intervention and controls arms was small (0.9 kg and 0.4 kg, respectively). Although contraceptive use data were missing for 64 women, these women were more likely to be of a higher obesity class, indicating a likely bias towards our null hypothesis. There is also potential bias in not including the women who were pregnant at the 12 month time point as they represent a group that may have not been using contraception or may have had a contraceptive failure. However, these pregnancies were evenly distributed among the BMI categories, making it unlikely that the exclusion of these women biased the results. Similar to our finding that those women with more than a high school education were less likely to use effective contraception, the more educated women were also more likely to be pregnant at 12 months. The intendedness of these pregnancies is unknown and it's possible that some of these women planned to become pregnant approximately a year after the birth of their child.

This study provides further data regarding contraceptive use patterns in obese women. In order to improve both the reproductive and general health of overweight and obese women, it is important that a plan for postpartum weight-loss and effective contraception be made during pregnancy or early postpartum. This requires a commitment on the part of obstetric providers to address these issues, a significant challenge given the demands of prenatal care visits, particularly for women at increased risk of pregnancy complications. Prospective studies are needed to examine the reasons responsible for contraceptive choices of obese women, how to improve adherence to planned contraceptive methods, and to evaluate how to most effectively counsel these women both during and after pregnancy about their postpartum health.

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Table 1

Contraceptive type by BMI category

Contraceptive type	BMI category (kg/m ²)		
	25.0–29.9 (n=154)	30.0–34.9 (n=112)	≥35.0 (n=95)
None	64 (40)*	47 (29)	49 (31)
Progestrone-only pill	11 (65)	5 (29)	1 (6)
Combination pill	25 (46)	21 (38)	9 (16)
DMPA	4 (57)	1 (14)	2 (29)
Contraceptive patch	3 (33)	1 (11)	5 (56)
Barrier	15 (40)	11 (30)	11 (30)
Sterilization	7 (24)	14 (48)	8 (28)
Natural family planning	1 (100)	0	0
IUD	22 (52)	11 (26)	9 (21)
Contraceptive vaginal ring	2 (50)	1 (25)	1 (25)

DMPA, depot-medroxyprogesterone acetate

IUD, intrauterine device

* Frequency (percentage) of contraceptive type.

Table 2
Final multivariate logistic regression model*

Covariate	Odds ratio [†]	95% Confidence interval
BMI (kg/m ²)		
30–34.9	0.8	0.5–1.4
≥35	0.5	0.3–0.8
< 30	1.0	
Age (y)		
≥35	0.8	0.5–1.3
< 35	1.0	
Race		
Black	0.8	0.5–1.2
Non-black	1.0	
Breastfeeding		
Exclusively	0.2	0.1–0.5
Not exclusively	1.0	
Education		
> High school	0.5	0.3–0.9
≤High school	1.0	
Parity		
> 1 live birth	1.7	1.1–2.7
≤1 live birth	1.0	
Chronic illness		
Yes	1.4	0.8–2.6
No	1.0	
EPDS score		
≥13	0.8	0.3–1.7
< 13	1.0	
Delivery type		
Cesarean	0.8	0.5–1.3
Vaginal	1.0	
AMP arm		
Intervention	1.8	1.2–2.9
Control	1.0	

* Final model after backwards elimination includes 353 subjects with non-missing data for all factors.

[†] Odds ratios for association of predictors with effective contraceptive use (hormonal, intrauterine, or sterilization methods).