Self-Perception of Weight Gain Among Multiethnic Reproductive-Age Women

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Abstract

Objective: To examine the accuracy of self-perception of weight gain and its correlates in a multiethnic reproductive-age population of women.

Methods: A total of 608 women (balanced by contraceptive methods and race/ethnicity) self-reported their perceptions of weight gain at baseline and every 6 months thereafter for 36 months. Data regarding body weight, height, and other covariates were also obtained. Women with at least two follow-up visits were included in the final analysis. Generalized estimating equations (GEE) models were used to examine correlates of the accuracy of self-perception of weight gain over time.

Results: Overall, 466 women had at least two follow-up visits with 1744 total observations over 36 months. In total, 44%, 30%, 19%, 12%, and 8% observations had at least 1, 2, 3, 4, and 5 kg weight gain in 6 months while 59%, 67%, 73%, 78%, and 85% of women accurately recognized it, respectively. Depot medroxyprogesterone (DMPA) users were more likely than nonhormonal method users (69%/51%, 76%/59%, 81%/63%, 85%/59%, and 93%/71%), and blacks more likely than whites (70%/51%, 76%/59%, 83%/65%, 90%/68%, and 95%/78%) ($p < 0.05$ for all) to recognize weight gains of 1, 2, 3, 4, and 5 kg. The differences remained significant after adjusting for covariates using GEE. A significant difference was also observed between DMPA and oral contraceptive users.

Conclusions: Inability to recognize weight gain is common among young women. Both race/ethnicity and contraceptive methods influence the accurate perception of weight gain. Clinicians should provide patient-specific counseling to address the frequent inaccuracies to recognize weight gain.

Introduction

THE PREVALENCE OF OBESITY has more than doubled in the United States over last three decades. Currently more than two thirds of adults are overweight or obese.^{1,2} Over the years, public health campaigns have focused on raising awareness of the health implications of obesity and suggested necessary steps to decrease the risk of becoming overweight.^{3,4} However, population level data show that, by and large, people have not changed their lifestyles,^{5,6} which means that there is one or more missing links somewhere in the chain of actions necessary for behavior modification.

The Health Belief Model (HBM) offers some explanation for the mechanisms underlying behavior change. This model is based on six components: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. The first component is related to accurate self-perception of weight and weight gain. For example, if individ-

uals who are overweight do not perceive that they are overweight and are not able to recognize weight gain, other components of the HBM would not work for them. Thus, behavioral intervention programs of any kind will be unsuccessful unless a person recognizes that he or she is overweight and can recognize recent weight gain. Earlier studies have shown that weight misperception is very common and a barrier to weight loss behaviors.⁷⁻¹¹ However, the extent of accurately recognizing recent weight gain has not been investigated. Moreover, correlates of an individual's accurate perception of weight gain have not been identified. For example, race may be an important correlate because it is a major determinant of obesity prevalence, recognition, and awareness.^{2,11,12} Hormonal contraceptives, especially depot medroxyprogesterone acetate (DMPA), are also associated with weight gain¹³⁻¹⁵ and thus may affect an individual's ability to recognize weight gain.

Determining the extent of one's ability to accurately recognize weight gain is especially important in reproductive-age women

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FIG. 1. Flow of recruitment across the study. obs, observation; #, number. *Removed by Data Safety Monitoring Board (DSMB) because of abnormal bone scan.

because they are more likely to be obese than similarly aged men.¹⁶ Over one half of reproductive-age women in the United States currently have a body mass index (BMI) $>25 \text{ kg/m}^2$, placing them at increased risk of developing type 2 diabetes mellitus or cardiovascular disease at a young age.¹⁷ Minority women are at even higher risk, with an alarming 82% of black and 75% of Mexican American women now meeting the criteria for being overweight or obese.² Moreover, reproductive-age women are prone to gain excess body weight during pregnancy and the postpartum period.^{18–21} Failure to recognize weight gain in this high risk group means fewer weight loss behaviors will be adopted, making the women more vulnerable to cardiovascular disease risk factors and other obesity-related diseases. The purpose of this study was to fill these gaps in the literature by examining the accuracy of perception of weight gain and its correlates in a multiethnic sample of reproductive-age women.

Methods

This secondary analysis evaluated data from a cohort study whose details were published elsewhere.^{22–24} Briefly, as part of a larger study, 805 non-Hispanic black, non-Hispanic white, and Hispanic women between 16 and 33 years of age were recruited between October 9, 2001, and September 14, 2004, to examine the effect of hormonal contraceptives on bone mineral density. Women were recruited from those who responded to advertisements and mailed announcements. Women who were pregnant or breastfeeding were not eligible to participate.

To determine the effects of contraceptive methods on various outcomes, the sample was balanced by age group (16–24 years and 25–33 years), race (black, white, Hispanic) and three different contraceptive methods: nonhormonal (NH), oral contraceptives (OCs), and DMPA injection. Based on the larger study's exclusion criteria, from among 805 women who signed a consent form, 197 women were excluded because the baseline symptom checklist was not completed ($n=95$), screening tests were abnormal ($n=92$), or the bone density scan result was abnormal ($n=5$) (Fig. 1). Women who were excluded ($n=197$) did not differ from women included in the analyses ($n=608$;

TABLE 1. SAMPLE CHARACTERISTICS OF STUDY PARTICIPANTS AT BASELINE ($N=466$)

	No. of study subjects (%)
Age, years	
16–24	241 (51.7)
25–33	225 (48.3)
Contraceptive method ^a	
NH	118 (25.3)
DMPA	180 (38.6)
OC	168 (36.1)
Race/ethnicity	
White	162 (34.8)
Black	134 (28.8)
Hispanic	170 (36.5)
Education	
High school or less	213 (45.7)
Some college, no degree	202 (43.4)
≥ 4 year, college degree	51 (10.9)
Income (annual household)	
$< \$15,000$	57 (12.5)
$\$15,000$ – $\$29,999$	183 (40.2)
$\geq \$30,000$	215 (47.3)
Marital status	
Not married	339 (72.8)
Currently married	127 (27.2)
Current smoker	
Yes	126 (27.0)
No	340 (73.0)
Weight status, BMI ^b	
Normal weight, < 25	194 (41.6)
Overweight, 25–29.9	132 (28.3)
Obese, ≥ 30	140 (30.0)
Ever been pregnant	
Yes	311 (66.7)
No	155 (33.3)
Weight gain perceived at baseline	
Yes	138 (29.6)
No	328 (70.4)
<i>Mean $\pm$ SD^c</i>	
Age, years	24.8 (5.0)
Weight, kg	71.6 (17.8)
BMI, kg/m^2	27.3 (6.5)
Parity	1.2 (1.2)
Physical activity (min/week)	105.1 (109.7)

^aNH, nonhormonal; DMPA, depot medroxyprogesterone acetate; OC, oral contraceptives.

^bBMI, body mass index (kg/m^2).

^cSD, standard deviation.

NH, 171; DMPA, 219; OC, 218) on age, marital status, parity, education, or income (all $p > 0.05$). Written, informed consent was obtained from all participants; parental consent was obtained for participants <18 years of age. All procedures were approved by the Institutional Review Board at the University of Texas Medical Branch at Galveston.

Participants completed a symptom checklist including questions on perceived weight gain every 6 months, from baseline to 36 months. Women responded "yes" or "no" to indicate if they felt they had gained weight in the past 6 months. Our analysis was limited to women who had at least two successive follow-ups with body weight data; thus we excluded 142 with only one observation and based our final analyses on 466 women. The analyses for the current study included data on age, height, weight, BMI, education, race/ethnicity, contraceptive methods used, marital status, smoking, physical activity, parity, and perceived weight gain.

Data were available on standing height and weight, which was obtained with women wearing light indoor clothing and no shoes. Standing height was measured to the nearest 0.1 cm using a stadiometer. Body weight was measured using a digital scale accurate to the nearest 0.1 kg. BMI was calculated as weight (kg) divided by the square of the height (m).

Statistical analyses

We used chi-square tests to examine the relationship between categorical variables. Generalized estimating equation (GEE) procedure was also used to identify correlates of the accurate perception of weight gain, accounting for the fact that observations within one person are dependent.²⁵ These models allowed us to obtain odds ratios (OR) for the various

predictors while adjusting for the estimated errors for the repeated measurements. Those who gained at least 1 kg weight during the last 6 months were included in the longitudinal analysis. The primary outcome was perceived weight gain (yes or no) measured every 6 months over 36 months among these women. Our models included age, race/ethnicity, and contraceptive method (OC, DMPA, NH) as main effects. Other variables such as income, education, marital status, parity, baseline BMI, smoking, and physical activity were included in the model if $p \leq 0.20$ was found in the bivariate analysis with the outcomes of interest. Separate models (one model for each of the following: ≥ 1 kg, ≥ 2 kg, ≥ 3 kg, ≥ 4 kg, ≥ 5 kg) were built for different cut-off points of weight gain to examine the consistency of influence of correlates on the accuracy of recognizing weight gain. All analyses were performed using STATA 11 (Stata Corporation).

Results

In total, 466 women had at least two follow-up observations. The mean age of the entire sample was 24.8 years (SD 5.0, range 16–33 years). The sample was balanced across contraceptive methods, race/ethnicity, and age group. Overall, 25.3% were NH method users, 38.6% were DMPA users, and 36.1% were OC users, while 34.8% were non-Hispanic whites, 28.8% were non-Hispanic blacks, and 36.5% were Hispanics (predominantly Mexican Americans; Table 1). Household incomes were low, with 52.7% earning below \$30,000 per year. The majority (54.3%) of the participants had at least some college education; were single (72.8%), nonsmokers (73.0%), and overweight or obese (58.3%); had been pregnant (66.7%); and did not perceive recent weight gain when asked at the baseline visit (70.4%). Mean duration of physical

TABLE 2. ACCURACY OF SELF-PERCEPTION OF WEIGHT GAIN OF DIFFERENT INTENSITY BY CONTRACEPTIVE METHODS AND RACE/ETHNICITY

Amount of actual weight gain	NH		DMPA		OC		p value		
	Perceived weight gain		Perceived weight gain		Perceived weight gain		NH vs. DMPA	NH vs. OC	DMPA vs. OC
	Yes	No	Yes	No	Yes	No			
≥ 1 kg	91 (51.1)	87 (48.9)	221 (69.3)	98 (30.7)	138 (51.3)	131 (48.7)	<0.001	0.971	<0.001
≥ 2 kg	64 (58.7)	45 (41.3)	182 (75.8)	58 (24.2)	103 (60.2)	68 (39.8)	0.001	0.801	0.001
≥ 3 kg	40 (62.5)	24 (37.5)	133 (81.1)	31 (18.9)	70 (67.3)	34 (32.7)	0.003	0.524	0.010
≥ 4 kg	19 (59.4)	13 (40.6)	92 (85.2)	16 (14.8)	50 (74.6)	17 (25.4)	0.002	0.122	0.083
≥ 5 kg	12 (70.6)	5 (29.4)	65 (92.9)	5 (7.1)	35 (77.8)	10 (22.2)	0.022	0.389	0.025
Amount of actual weight gain	White		Black		Hispanic		p value ^a		
	Perceived weight gain		Perceived weight gain		Perceived weight gain		W vs. B	B vs. H	W vs. H
	Yes	No	Yes	No	Yes	No			
≥ 1 kg	141 (50.7)	137 (49.3)	150 (69.8)	65 (30.2)	158 (58.1)	114 (41.9)	<0.001	0.008	0.083
≥ 2 kg	110 (58.5)	78 (41.5)	115 (75.7)	37 (24.3)	123 (68.7)	56 (31.3)	0.001	0.161	0.042
≥ 3 kg	82 (64.6)	45 (35.4)	84 (83.2)	17 (16.8)	77 (74.0)	27 (26.0)	0.002	0.111	0.112
≥ 4 kg	55 (67.9)	26 (32.1)	56 (90.3)	6 (9.7)	50 (78.1)	14 (21.9)	0.001	0.061	0.171
≥ 5 kg	40 (78.4)	11 (21.6)	41 (95.4)	2 (4.7)	31 (81.6)	7 (18.4)	0.018	0.049	0.715

^aW, white; B, black; H, Hispanic.

FIG. 2. Proportion of women recognized weight gain accurately by (a) contraceptive methods, (b) race/ethnicity, and (c) BMI status. NH, non-hormonal; DMPA, Depot medroxyprogesterone acetate; OC, oral contraceptives; BMI, Body Mass Index.

activity was slightly over 1.5 hours per week. Overall, the 466 women had 1744 observations during the 36 months of follow-up. Among them, 766 (43.9%), 520 (29.8%), 332 (19.0%), 207 (11.9%), and 132 (7.6%) observations had weight gains of at least 1, 2, 3, 4, and 5 kg in 6-month intervals while 450 (58.8%), 349 (67.1%), 243 (73.2%), 161 (77.8%), and 112 (84.9%) women were capable of identifying the weight gain, respectively.

Bivariate analyses showed that race/ethnicity and contraceptives were significantly associated with weight gain of different amounts. DMPA users were significantly more likely than NH method users to recognize weight gains of at least 1, 2, 3, 4, and 5 kg ($p < 0.05$ for all) (Table 2; Fig. 2a). Significant differences were also observed between DMPA and OC users for respective categories. Blacks were more likely than whites to accurately recognize weight gain of the respective amounts ($p < 0.05$ for all) (Table 2; Fig. 2b). Similarly, significant differences were observed between blacks and Hispanics for the ≥ 1 kg and ≥ 5 kg categories. No significant differences were observed between white and Hispanic women, except in the ≥ 2 kg category, in which Hispanics were more likely than whites to recognize weight gain accurately. Ability to accurately recognize weight gain of different amounts was not different among women of different BMI categories (Fig. 2c).

Variables that met the screening criteria for inclusion in the GEE model were race/ethnicity and contraceptive method, while age was forced into the model. Relative to those using NH contraception, women using DMPA were more accurate in recognizing weight gain of different amounts after adjusting for follow-up duration and race/ethnicity (Table 3). They were more than twice as likely to recognize weight gain of at least 1, 2, and 3 kg, and around four times as likely to recognize 4 and 5 kg when compared with NH contraception users. They were also more likely to recognize weight gain of at least 1 kg (odds ratio [OR] 2.09, 95% confidence intervals [CI]: 1.43–3.09), 2 kg (OR 2.05, 95% CI: 1.27–3.29), and 3 kg (OR 1.99, 95% CI 1.10–3.60) when compared with OC users. No significant differences were observed between NH method and OC users with regard to weight gain recognition.

Racial differences were also observed with regard to the ability to recognize weight gain accurately. GEE analysis showed that blacks were more likely to recognize weight gain of at least 1, 2, 3, and 4 kg but not 5 kg when compared with

whites (Table 3). On the other hand, they were more likely than Hispanic women to recognize ≥ 1 kg weight gain (OR 1.60, 95% CI: 1.06–2.44), but were similar for the ≥ 2 kg, ≥ 3 kg, ≥ 4 kg, and ≥ 5 kg categories. No significant differences were observed between white and Hispanic women with regard to any categories of weight gain.

Discussion

To our knowledge, this is the first study to examine the accuracy of self-perception of recent weight gain and its predictors. Overall, we observed that nearly one third and one fourth of women did not recognize a 2- and 3-kg weight gain during a 6-month interval, respectively. Furthermore, black women and DMPA users were more likely to recognize weight gain than their counterparts. This report adds to the body of weight control and management literature by demonstrating that inaccurate recognition of weight gain is commonplace in women and it is influenced by race/ethnicity and contraceptive use.

Our previous study reported that one fourth of reproductive-age women who were overweight or obese consider themselves normal weight.¹¹ Misperception of weight coupled with inaccuracies in self-perception of weight gain is a real threat to the success of obesity prevention programs. The first of the six steps (according to HBM) required to change health behavior is perceived susceptibility, which is dependent on an accurate perception of body weight and weight gain. If individuals do not perceive that they are overweight and are continuing to gain even more extra weight over time, other components of the HBM will not work for them. Thus, a priority for obesity prevention programs should be helping the target group to recognize when they are overweight and to identify recent weight gain. Moreover, our findings may give clinicians a point of discussion when counseling reproductive-age women about obesity and weight loss. A recent study reported that regular self-weighing is an important tool for weight management,²⁶ thus clinicians could also suggest this activity to their patients.

The reason for the higher likelihood of DMPA users to recognize weight gain is unknown because existing literature does not provide any clue on the mechanism. However, recent reports on this side effect of DMPA in the press

TABLE 3. ODDS RATIOS (95% CONFIDENCE INTERVALS) OF ACCURATELY PERCEIVING WEIGHT GAIN BY CONTRACEPTIVE METHODS AND RACE/ETHNICITY: GENERALIZED ESTIMATED EQUATIONS MODEL RESULTS

Characteristics	Weight gain ^a				
	≥ 1 kg	≥ 2 kg	≥ 3 kg	≥ 4 kg	≥ 5 kg
Contraceptive methods					
NH ^b	1	1	1	1	1
DMPA	2.10 (1.38–3.21)	2.15 (1.23–3.76)	2.51 (1.17–5.38)	3.95 (1.60–9.76)	4.33 (1.06–17.73)
OC	1.00 (0.66–1.54)	1.05 (0.61–1.80)	1.26 (0.59–2.68)	2.17 (0.87–5.39)	1.56 (0.44–5.49)
Race/ethnicity					
White ^b	1	1	1	1	1
Black	2.17 (1.45–3.26)	2.06 (1.21–3.49)	2.55 (1.27–5.13)	4.50 (1.70–11.94)	4.63 (0.93–23.16)
Hispanics	1.35 (0.92–1.99)	1.58 (0.98–2.57)	1.56 (0.83–2.93)	1.76 (0.81–3.81)	1.37 (0.43–4.38)

^aAdjusted by age (16–24 vs. 25–33 years) and visit (6, 12, 18, 24, 30, 36 months).

^bReference group.

might explain the underlying mechanism. Because DMPA has been reported to be associated with a significant amount of weight gain,^{13,14,27–30} users who are aware of this might engage in continuous weight monitoring, resulting in greater weight gain recognition. This could provide an opportunity for clinicians to counsel DMPA users on weight management, since they are more likely to recognize weight gain when it occurs.

Our finding that race/ethnicity is a determinant of accurate recognition of weight gain has not been previously reported. It is known, however, that there are racial disparities in the prevalence and recognition of obesity and its consequences.^{2,11,12} Black and Hispanic women are more likely to be overweight or obese but less likely to recognize health risks associated with obesity compared to whites.^{2,12} Thus, our finding that black women were more likely to recognize recent weight gain was unexpected. Future studies are needed to explore this relationship and should use detailed measures that would include cultural, psychological, and perceptual aspects of weight change in women.

The strength of our study includes the use of longitudinal data and a fairly large sample size. However, this study has several limitations. First, we examined self-perception of weight gain in only 16- to 33-year-old women, so we do not know whether similar findings would be observed in other age groups. Second, our study is not based on a random sample and thus, our sample may not be representative of all women. Third, the Hispanic women in our study were predominantly of Mexican descent, so extension of these data to Hispanic women of other origins should be done with caution.

In conclusion, we observed that inability to recognize weight gain is common in women of reproductive age. Clinicians can assist with this problem by providing information on weight gain when it occurs and pointing out that many women fail to recognize their weight gain. The media could also play an important role to address racial disparities and to raise awareness in this regard.

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Disclosure Statement

No competing financial interests exist.

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