

## Original Article

# Attitudes toward pregnancy related changes and self-judged dieting behavior

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Adequate weight gain in pregnancy is essential for the health of the mother and developing fetus. However, a woman's self-beliefs regarding body shape and weight gain may become a driving force toward unnecessary dietary restriction during pregnancy. In order to assess the current status of self-beliefs, attitudes toward pregnancy related changes, and dieting behavior in pregnant women, a questionnaire survey was conducted at a prenatal clinic in Tokyo. A self-administered questionnaire was distributed to 500 women and 248 women responded with eligible data. Nearly all respondents (91.5%) stated that they knew their own weight gain targets. Thirty-four women (13.7%) reported dieting before being pregnant, and 88 women (35.5%) reported current dieting. Seventy-eight of the current dieters were doing so based on self-judgment, and only fifteen were following a dietician's advice. The majority of the respondents (69.0%) believed that smaller babies would help a smooth delivery. From multivariable logistic regression analysis, the odds ratio (OR) for current self-judged dieting was significant in women who had dieted before pregnancy (OR: 4.67, 95% confidence intervals (CI): 2.10-10.4), and those who desired smaller babies for a smooth delivery (OR: 2.73, 95% CI: 1.35-5.52). Obstetricians, midwives, and dieticians should be aware of previous dieting history and self-beliefs in pregnant women, in order to give professional advice about the importance of adequate weight gains.

**Key Words:** pregnancy, weight gain, diet, health knowledge, attitude to health

## INTRODUCTION

Adequate weight gain in pregnancy is essential for the health of the mother and developing fetus. Excess weight gain has received much attention as a risk factor for fetal macrosomia,<sup>1-4</sup> pregnancy complications, and operative deliveries.<sup>5-8</sup> In countries with rising obesity rates, controlling weight gain in pregnancy is considered as an important approach to prevent postpartum obesity.<sup>9,10</sup> However, too much emphasis on the unfavorable outcomes of excess weight gain may induce negative attitudes toward eating in some women. As young women tend to have high weight concerns,<sup>11-14</sup> some women may attempt unnecessary dietary restrictions to control their weight gains, in order to achieve "better" pregnancy outcomes.

The prevalence of dietary restriction for weight control in pregnant women has not been well documented in previous studies. Women's beliefs, their pre-pregnancy body size, and health provider advice are known to influence their attitudes toward weight gains.<sup>15,16</sup> In the United States, 8.1% of pregnant women were reported to be attempting to lose weight.<sup>17</sup> Insufficient weight gains are known risk factors for impaired fetal growth and shortened gestational length.<sup>18-20</sup> Furthermore, the effect of diet and weight gain on fetal health may differ according to trimester.<sup>21-25</sup> In order to deliver adequate advice to pregnant women regarding diet and weight gain, the current status of self-beliefs, attitudes toward pregnancy related changes, and dieting behavior needs to be assessed, according to the trimester of pregnancy. To clarify these

issues, we conducted a questionnaire survey on women attending a single prenatal clinic in Tokyo.

## MATERIALS AND METHODS

A self-administered questionnaire was distributed consecutively to 500 pregnant women attending a prenatal clinic in downtown Tokyo, from October to December, 2006. The clinic is located in Katsushika-ku, which is one of the 23 special cities in metropolitan Tokyo. The average annual income of taxpayers is lower in Katsushika-ku compared to the average of the Tokyo metropolitan area (4.03 million vs. 5.37 million yen), and the birthrate per 1,000 residents is higher (9.0 vs. 8.2). The proportion of children under 15 years ranks third highest (12.6%) in the Tokyo metropolitan area.<sup>26</sup> The questionnaires were recovered anonymously through mail, and 254 women responded. Of these, data on 248 women who had provided information on their current gestational age, self-reported height, pre-pregnancy weight, and current weight, were used for analyses.

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The questionnaire asked the women to describe their self-target weight gain, the source of information of the targets, the lower and upper limits of the weight gains, past dietary restriction history, current dietary restriction practice, whose advice they followed, skipping meals more than two times a week, physical activity status, their attitudes towards pregnancy change, and their attitudes toward weight change. Dieting behavior was assessed by these two questions: "Were you restricting your food intake before this pregnancy?" and "Are you currently restricting your food intake?". Women who answered "yes" to the second question were requested to identify whether they were doing so by self-judgment or by following a dietician's advice. The attitudes on pregnancy-related change consisted of five statements, and the women answered whether they agreed to the statement or not. The five statements were: 1) A smaller baby will help my delivery go smooth (desire for a smaller baby); 2) Acquiring physical strength is essential for me to go through delivery (desire for physical strength); 3) I hate stretch marks (hate stretch marks); 4) I want to resume pre-pregnant weight after delivery as soon as possible (desire to resume pre-pregnant weight); 5) I want to avoid postpartum obesity (avoidance of postpartum obesity). The body image attitudes were assessed in a five-point Likert scale, 1 (strongly disagree) to 5 (strongly agree). The first statement regarding body image was "I am concerned about what people think about me." The second was "I'm obsessed about my impressions." The third was "I sometimes become too self-conscious." The fourth was "I always check the latest fashion." The last was "I am worried about my post-delivery body shape." As preceding studies on pregnant women regarding body shape perception are scarce, the authors derived these questions from comments by pregnant women, quoted in widely read so-called "maternity magazines".

The study design and protocol was in accordance with the Ethics Guideline of the National Institute of Public Health. No private information was gathered through the questionnaire, and the survey was conducted anonymously.

Means and standard deviations were calculated for continuous variables. Student's *t*-tests were applied for the comparison between two groups, and ANOVA was applied for the comparison of three or more groups. Chi-square tests were applied to compare the categorical variables among different groups. Pearson correlation coefficients between parity, maternal age, height, pre-pregnancy weight, pre-pregnancy body mass index (BMI), current gestational age, weight, weight gain, weight gain rate, and the scores on five pregnancy weight-related attitude statements were calculated. Average weight gain rate was calculated by subtracting pre-pregnancy weight from current weight, and then dividing by full gestational age minus three weeks, based on our previous observation showing linear weight gains during pregnancy in Japanese women.<sup>27</sup> A multivariable logistic model was applied to estimate the odds ratios (ORs) for significantly related factors to self-judged dieting. A *p* value of less than 0.05 (two tailed) was considered to be significant. All statistical analyses were performed using the SPSS 15.0-J package program (SPSS Japan Inc, Tokyo).

## RESULTS

The general characteristics of the respondents are presented in Table 1. The average age of the respondents were 31.4 years, and 71% were 30 years or older. Pre-pregnancy BMI calculated by self-reported values were 20.4, and 23.0% were underweight. The prevalence of overweight/ obesity was low (5.6%). Average gestational age at survey was 28.6 weeks, and more than half of the respondents were in the third trimester. Average maternal weight gain was 0.2 kg/week. Slightly more than half of the respondents were primiparae. Thirty-four women (13.7%) reported past dietary restriction, and 88 women (35.5%) reported current dietary restriction. Seventy-eight women in the current dieters were doing so based on self-judgment, and only fifteen were following a dietician's

**Table 1.** General characteristics and pregnancy related attitudes in questionnaire respondents (n=248)

	Values	Range
General characteristics		
Age (years)	31.9±4.5	19-48
Gestational age at survey (weeks)	28.6±8.6	6-41
First trimester (<14)	10.5%	
Second trimester (14-27)	27.8%	
Third trimester (>27)	61.7%	
Height (cm)	159±4.8	148-172
Pre-pregnancy weight (kg)	51.5±7.6	37-84
Pre-pregnancy BMI	20.4±2.7	15.4-33.2
Underweight (<18.5)	23.0%	
Normal (18.5-25.0)	71.4%	
Overweight (>25.0)	4.0%	
Obese (>30.0)	1.6%	
Current weight (kg)	57.2±8.4	38.0-87.5
Weight gain (kg)	5.7±3.9	-6-17
Weight gain rate ( kg per week)	0.20±0.14	-0.50-0.63
Number of past deliveries	0.6±0.7	0-3
Primiparas	52.4%	
Skipping meals more than three times a week	9.7%	
Pre-pregnancy dieting	13.7%	
Current dieting	35.1%	
Attitudes towards pregnancy		
Knows one's own target weight gain	91.5%	
Lower limit of target weight gain (n=185)	7.0±1.3	3-10
Upper limit of target weight gain (n=226)	9.6±1.3	5-15
Desire smaller babies for a smooth delivery	69.0%	
Desire physical strength to go through delivery	65.7%	
Hate stretch marks	73.8%	
Desire to return to pre-pregnancy weight	85.9%	
Desire to avoid obesity after delivery	53.6%	
Scores on pregnancy weight-related attitudes (1-5points <sup>†</sup> )		
I'm worried about my impressions	3.6±1.0	1-5
I'm concerned about how I look	3.4±1.0	1-5
I sometimes get too self-concerned	2.8±1.1	1-5
I always follow the latest fashion	2.8±1.1	1-5
I'm worried about my post-delivery weight	4.0±0.9	1-5

Data presented as: number (%), otherwise mean±standard deviation.  
<sup>†</sup>Five-point Likert scale, 1= strongly disagree to 5= strongly agree

advice. Twenty-four women (9.7%) reported skipping meals more than three days a week.

The current status of the respondents' attitudes toward pregnancy and weight are also presented in Table 1. Nearly all respondents (91.5%) stated that they knew their own weight gain targets. One hundred eighty-five women filled their lower limit of their self-target, and 226 women filled their upper limits. The average lower limit was 7.0 kg, and the average upper limit was 9.6 kg. Eighty-two women (33.0% of total) reported their lower limit was 8 kg, followed by 7 kg (16.1%). One hundred thirty-seven women (55.2% of total) reported their ideal upper limit as 10 kg, followed by 8 kg (21.0%). Average lower limit was significantly lower (both  $p < 0.01$ ) in overweight/obese women ( $5.8 \pm 1.5$  kg), compared to underweight ( $7.1 \pm 1.2$  kg) or normal-sized women ( $7.4 \pm 1.2$  kg), but the upper limits were similar among the three groups. Major sources of their knowledge were "prenatal clinics" (53.3%), "magazines" (44.7%), and "books" (19.7%). More than half of the women (52.0%) who reported their self-target weight gains cited multiple sources, and 7.5% didn't cite any source. Concerns regarding physical changes in pregnancy were prevalent among the respondents. Nearly 70% of the women desired smaller babies for a smooth delivery. The proportion of women desiring to return to pre-pregnancy weight after delivery was high (85.9%), and the score for "worried about post-delivery weight" was  $4.0 \pm 0.9$  points.

#### Attitudes towards pregnancy and their relation to maternal characteristics

Women who desired smaller babies for a smooth delivery were significantly shorter ( $158 \pm 4.9$  cm,  $p < 0.05$ ) than women who did not ( $160 \pm 4.6$  cm). No significant differences in maternal characteristics were observed between women who desired physical strength for delivery, and those who did not, but women desiring strength were more likely to be primiparous (57.1%,  $p < 0.05$ ) compared to those who did not (43.5%). Women who hated stretchmarks had lighter pre-pregnancy weight ( $50.7 \pm 6.5$  kg vs.  $53.8 \pm 9.8$  kg,  $p < 0.01$ ), smaller pre-pregnancy BMI ( $20.1 \pm 2.2$  vs.  $21.4 \pm 3.7$ ,  $p < 0.01$ ), and lighter current weight ( $56.4 \pm 7.6$  kg vs.  $59.5 \pm 10.2$  kg,  $p < 0.05$ ), and were more likely to be primiparous (56.3% vs. 41.5%,  $p < 0.05$ ) compared to those who did not. No significant differences in maternal body size or parity were observed between women who desired to return to pre-pregnant weight and those who did not. Women who wanted to avoid obesity after delivery had a significantly higher pre-pregnancy BMI ( $20.8 \pm 2.8$  vs.  $19.9 \pm 2.6$ ,  $p < 0.05$ ) compared to women who did not, and were less likely to be primiparous (46.6% vs. 59.1%,  $p < 0.05$ ). Maternal age was not related to any of the attitudes toward pregnancy.

Pearson correlation analyses showed that younger maternal age was correlated with higher "I am worried about my body shape after childbirth" score ( $r = -0.15$ ,  $p < 0.05$ ). Taller maternal height was correlated with lower "I'm obsessed about my appearance" score ( $r = -0.14$ ,  $p < 0.05$ ). Higher pre-pregnancy weight was correlated with both lower "I'm obsessed about my appearance" score ( $r = -0.15$ ,  $p < 0.05$ ), and "I always check the latest fashion" score ( $r = -0.20$ ,  $p < 0.01$ ). Higher pre-pregnancy BMI was

correlated with lower "I always check the latest fashion" score ( $r = -0.16$ ,  $p < 0.01$ ). Higher current weight was correlated with both lower "I'm obsessed about my appearance" score ( $r = -0.12$ ,  $p < 0.05$ ), and "I always check the latest fashion" score ( $r = -0.17$ ,  $p < 0.01$ ). Gestational age, weight gain, and weight gain rate were not correlated with any of the five statements scores.

#### Self-judged dieting and related factors

The prevalence of self judged dieting according to the selected factors, together with their ORs, are presented in Table 2. The respondent's age was a significant factor for current dieting, as 69.2% of women under 25 years were dieting, which was significantly higher compared to the other age groups. Neither pre-pregnancy body size nor current trimester was a significant factor. When weight gain rate was grouped by their tertiles, the women in the second tertile (0.19-0.27 kg/week) had the highest rate of self judged dieting (39.1%, OR: 1.93; 95% CI: 1.00-3.72), compared to the women in the first tertile ( $\leq 0.18$  kg/week). Parity was not a significant factor, though multiparae were more likely to diet. Women who were past dieters were likely to be current dieters (61.8%, OR: 4.79; 95% CI: 2.21-10.41). The habit of skipping meals was not significantly different. The distribution of the lower limit

**Table 2.** Univariate logistic regression analyses for self-judged dieting

Variables	No.dieting /total (%)	OR <sup>†</sup>	95%CI <sup>‡</sup>
Age group (years)			
<25	9/13(69.2)	4.74	1.29-17.4
25-29	15/59(25.4)	1	referent
30-34	35/107(32.7)	1.21	0.62-2.37
35+	19/69(27.5)	0.92	0.44-1.95
Trimester of gestation			
First	8/26(30.8)	1	referent
Second	18/69(26.1)	0.92	0.34-2.45
Third	52/153(34.0)	1.45	0.59-3.55
Pre-pregnancy body size			
Underweight	17/57(29.8)	0.93	0.49-1.74
Normal	55/177(31.1)	1	referent
Overweight/obese	6/14(42.9)	1.85	0.62-5.53
Weight gain rate (kg/week)			
$\leq 0.18$	20/80(25.0)	1	referent
0.19 -0.27	36/92(39.1)	1.93	1.00-3.72
0.28+	22/76(28.9)	1.22	0.60-2.48
Parity			
Multipara	43/118(36.4)	1	referent
Primipara	35/130(26.9)	0.65	0.38-1.09
Pre-pregnancy dieting history			
No	57/214(26.6)	1	referent
Yes	21/34(61.8)	4.79	2.21-10.4
Skipping meals more than three times a week			
No	70/224(31.3)	1	referent
Yes	8/24(33.3)	1.45	0.59-3.55
Regular physical activity			
No	48/173(27.7)	1	referent
Yes	30/75(40.0)	1.19	0.98-1.46
Desire smaller babies			
No	15/77(19.5)	1	referent
Yes	63/171(36.8)	2.27	1.24-4.18

<sup>†</sup>odds ratio, <sup>‡</sup>confidence interval

**Table 2.** Univariate logistic regression analyses for self-judged dieting (con.)

Variables	No.dieting /total (%)	OR <sup>†</sup>	95%CI <sup>‡</sup>
Desire physical strength			
Disagree	21/85(24.7)	1	referent
Agree	57/163(35.0)	1.79	1.01-3.17
Hate stretch marks			
Disagree	20/65(30.8)	1	referent
Agree	58/183(31.7)	1.33	0.73-2.44
Desire to return to pre-pregnancy weight			
Disagree	11/35(31.4)	1	referent
Agree	67/213(31.5)	1.00	0.46-2.16
Desire to avoid obesity			
Disagree	37/115(32.2)	1	referent
Agree	41/133(30.8)	0.94	0.55-1.61
Information source of target weight gain			
Public health centers			
No	71/221(32.1)	1	referent
Yes	7/27(25.9)	0.74	0.30-1.83
Prenatal clinics			
No	33/118(28.0)	1	referent
Yes	45/130(34.6)	1.36	0.79-2.34
Magazines			
No	39/139(28.1)	1	referent
Yes	39/109(35.8)	1.43	0.83-2.45
Books			
No	62/200(31.0)	1	referent
Yes	16/48(33.3)	1.11	0.57-2.18
Internet			
No	72/227(31.7)	1	referent
Yes	6/21(28.6)	0.86	0.32-2.31
Family			
No	76/242(31.4)	1	referent
Yes	2/6(33.3)	1.09	0.2-6.09
Friends			
No	65/210(31.0)	1	referent
Yes	13/38(34.2)	1.16	0.56-2.41

<sup>†</sup>odds ratio, <sup>‡</sup> confidence interval

and upper limit (Table 3) of self-target weight gains in dieters and non-dieters were similar, and their average values were also similar. Average lower limit and upper limit were 7.0±1.3 kg and 9.5±1.1kg in dieters, and in non-dieters, the values were 7.1±1.3 kg and 9.7±1.4 kg, respectively. The sources of weight gain information were not significant factors influencing dieting.

Regarding attitudes toward pregnancy weight-related changes, those who “desired smaller babies for a smooth delivery” had a higher OR for dieting (OR: 2.27; 95% CI: 1.24-4.18) compared to those who disagreed. Those who “desired physical strength for delivery” were also likely to diet (OR: 1.79; 95% CI: 1.01-3.17). All of the scores to the five statements regarding body shape were not significantly different between dieters and non-dieters (Table 4). The proportion of high scores (4 or 5 points) were also similar.

The results of multiple logistic regression analyses to estimate the ORs of significant factors to self-judged dieting are presented in Table 5. The factors were those significant in the analyses presented in Table 2; maternal age

group, weight gain rate, primiparity, pre-pregnancy dieting history, desire for smaller babies, and desire for physical strength for delivery. In model 1, all factors were entered into the analyses after adjusting for gestational age, maternal height, and pre-pregnancy BMI, and in model 2, the factors were selected through the STEPWISE method after adjustment. As shown in Table 5, maternal age under 25years, pre-pregnancy dieting history, and desire for smaller babies were independent factors influencing self-judged dieting. Women who were younger than 25years had an odds ratio of 7.16 (95% CI: 1.79-28.6), compared to the reference age group of 25- 29 years. Women who were dieting before pregnancy had an odds ratio of 4.67 (95% CI: 2.10-10.4), compared to non-dieters. Women who desired smaller babies for a smooth delivery was more likely to diet (OR: 2.73, 95% CI: 1.35-5.52).

## DISCUSSION

Weight gain is one of the most impressive physical changes in pregnancy. The fact that higher weight gain is associated with heavier babies,<sup>1-4</sup> which consequently increases the risk of operative deliveries, seems to deeply affect the attitudes of pregnant women toward eating and gaining weight. In Japan, where 99% of deliveries are hospitalized and maternal mortality rate (3.5 per 100,000 deliveries) is one of the lowest in the world,<sup>28</sup> the fear of a large baby and a subsequent operative delivery seems extraordinarily high (69.0%, Table 1). Furthermore, this fear for a large baby is not consistent with the fact that infant birth weight has been decreasing since the 1970s, and the current proportion of macrosomic newborns (birth weight 4000 g or more) is very low, only about 1%.<sup>28</sup> The desire for women to return to their pre-pregnancy weight was also very high (85.9%), suggesting that physical changes in pregnancy is viewed as disturbing to these women. Although not significant in the STEPWISE model, a woman's weight gain rate seemed to moderately affect their attitude toward self-judged dieting (Table 5). Compared with women with low or high rates, the women with moderate weight gain rates were more likely to diet. We speculate that strict self-targets drive these women toward dieting. The weekly gain of 0.19-0.27 kg/week will end up in total weight gain of 7.0-10.0 kg at 40 weeks, which is close to the majority of the self-target weight gains in these women (Table 3). These self-target gains did not comply with the latest guidelines issued by the Ministry of Health, Labour, and Welfare in 2006,<sup>29</sup> which recommended weight gains of 9-12 kg for underweight, 7-12 kg for normal weight, and at least 5kg for slightly overweight women. They were closer to the recommendations in the 1999 guidelines for the prevention of toxemia,<sup>30</sup> which recommended weight gains of 10-12 kg for underweight (pre-pregnancy BMI<18), 7-10 kg for normal weight (BMI 18 to 24), and 5-7 kg for overweight (BMI>24) women. One reason why the women's self-targets did not reflect the national recommendation may be because this survey was undertaken soon after it was issued. In order to examine this hypothesis, we compared the self-target values according to their information sources, and also parity. Upper limits of self-targets were significantly higher in women who reported “magazines”

**Table 3.** Distribution of lower and upper limits of self-target weight gains in self-judged dieters (n=78) and non-dieters (n=170)

	Lower limit of self-target (kg)	Upper limit of self-target (kg)											N/A
		5	6	7	8	9	10	11	12	13	14	15	
Dieters	3	-	-	-	1	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	4	-	6	-	-	-	-	-	-
	6	-	-	-	8	-	2	-	1	-	-	-	-
	7	-	-	-	3	3	5	-	-	1	-	-	-
	8	-	-	-	-	-	29	-	1	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	1	-	-	-	-
	N/A	-	-	1	3	-	4	-	-	-	-	-	5
Non-dieters	3	-	-	-	1	-	-	-	-	-	-	-	-
	4	-	1	-	-	-	-	-	-	-	-	-	-
	5	-	-	2	6	-	7	-	1	-	-	-	-
	6	-	-	-	10	-	7	-	-	-	-	-	-
	7	-	-	-	6	3	16	-	3	-	-	-	-
	8	-	-	-	-	-	41	2	8	1	-	-	-
	9	-	-	-	-	-	1	-	-	-	-	-	-
	10	-	-	-	-	-	-	2	-	-	1	1	
	N/A	1	-	2	10	-	19	-	-	1	1	-	16

N/A: non-available, - : no subjects.

All figures show the number of subjects in each category.

**Table 4.** Scores on pregnancy weight-related attitudes and proportion of high scorers in self-judged dieters and non-dieters

	Dieters (n=78)		Non-dieters (n= 170)	
	Mean scores	High scorers (%)	Mean scores	High scorers (%)
I'm concerned about my impressions	3.5±1.1	65.4	3.6±1.0	67.1
I'm obsessed about my appearance	3.5±1.0	55.1	3.4±0.9	51.2
I sometimes get too self-conscious	2.8±1.2	30.8	2.8±1.1	28.8
I always follow the latest fashion	2.8±1.2	30.8	2.8±1.1	30.6
I'm worried about my post-delivery shape	4.1±0.8	88.5	4.0±1.0	80.6

High scorers: those scoring 4 or 5 points

**Table 5.** Multivariate logistic regression analysis for self-judged dietary restriction

Variables	Model 1			Model 2		
	OR †	95%CI ‡	p value	OR †	95%CI ‡	p value
Age group						
under 25yrs	8.11	1.89-34.8	<0.01	7.16	1.79-28.6	<0.01
25-29yrs	1	referent		1	referent	
30-34yrs	1.44	0.67-3.09	0.33	1.49	0.71-3.14	0.30
35yrs+	1.03	0.44-2.42	0.83	1.11	0.48-2.53	0.81
Weight gain rate (kg/week)						
≤0.18	1	referent		1	referent	
0.19-0.27	2.11	0.96-4.63	0.06	-	-	-
0.28+	1.68	0.71-3.96	0.24	-	-	-
Primiparity (vs multiparity)	0.71	0.38-1.32	0.28	-	-	-
Pre-pregnancy dieting (vs non-dieting)	4.62	2.00-10.6	<0.01	4.67	2.10-10.4	<0.01
Desire smaller babies for a smooth delivery (vs none)	2.51	1.21-5.18	0.01	2.73	1.35-5.52	<0.01
Desire physical strength for delivery (vs none)	1.81	0.92-3.56	0.09	-	-	-

Model 1: All variables were forced in the model, model 2: variables were selected through the STEPWISE method.

The analyses were adjusted for gestational age, maternal height, and pre-pregnancy BMI

†odds ratio, ‡ confidence interval

as their sources of information (9.9±1.4 vs. 9.4±1.3 kg,  $p=0.02$ , in magazine readers and non-readers, respectively), but there was no differences in average self-targets regarding other information sources. Also, there was no significant difference in self-target values between primiparae and multiparae, so the possibility that multiparae were relying on past experience was not likely. We

speculate that magazine articles were quicker than clinics to deliver the latest recommendation, leading to higher self-targets in their readers. As we failed to identify the targets used at the study prenatal clinic, we could not determine how much a woman's knowledge is influenced by the clinic's advice. Further investigation on the contents of the various information sources and their effects

on the women's self-targets should be conducted, in order to develop effective means for disseminating health information.

However, weight gain recommendations vary widely among different countries. In the United States, the Institute of Medicine recommends weight gains of 12.5-18 kg for underweight (pre-pregnancy BMI <18.5), 11.5-16 kg for normal weight (BMI 18.5 to 24.9), 7-11.5 kg for overweight (BMI 25.0 to 29.9) and 5-9 kg for obese women (BMI  $\geq$ 30).<sup>31</sup> In Chile, pregnant women are advised to achieve 120% of their "standard weight" according to their pre-pregnant weight for height.<sup>32</sup> On the other hand, the United Kingdom recommendation opposes to routine weight measurement during pregnancy, because "it may produce unnecessary anxiety with no added benefit."<sup>33</sup> The reason for these variations in weight gain recommendation may be attributed to the difficulty in determining the "optimal weight gain" for achieving good pregnancy outcomes. Health professionals should be aware of the limitations in using weight gains as a measure of pregnancy health.

Approximately one-thirds of women who were normal or underweight before pregnancy were engaged in self-judged dieting. Unnecessary dietary restriction may lead to deficiencies in essential nutrients, and may increase the risk of fetal neural tube defects.<sup>34,35</sup> Although our study was based on a cross-sectional questionnaire survey in a single clinical setting, the high prevalence of self-judged dieting in non-obese women requires attention from health professionals in prenatal clinics. All pregnant women should be advised to follow a balanced, nutritious diet.

One limitation of this study was that only half of the distributed questionnaires were recovered. However, the distribution of maternal age, height, and pre-pregnancy weight in the current study was similar to that of a previous nationwide population-based survey.<sup>36</sup> Therefore, we concluded that the study respondents were not restricted to those who were especially weight-conscious. Secondly, the smoking status of the pregnant women was not assessed in this study. Concern about weight gain after smoking cessation may influence a woman's attitude toward eating, as high weight concerns are related to lower abstinence on smoking.<sup>37</sup> Further, population-based research should be conducted in order to estimate the prevalence of dieting in pregnancy.

To date, there is no sound scientific evidence that restricting dietary intake and thus restricting weight gains can improve obstetric outcomes in non-obese women.<sup>19</sup> Obstetricians, midwives, and dieticians should check previous dieting history and pregnancy related self-beliefs at prenatal visits, and give professional advice about the importance of adequate weight gain, in order to prevent unnecessary dieting in pregnancy.

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#### AUTHOR DISCLOSURES

There are no conflicts of interest regarding this study with any of the authors.

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## Original Article

# Attitudes toward pregnancy related changes and self-judged dieting behavior

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## 對懷孕期相關變化的態度及自我判斷的節食行為

懷孕時體重適度的增加對於母親的健康和胎兒的發育是必要的。然而，女性對體型和體重的自我評價可能導致懷孕時不必要的飲食限制。為瞭解目前孕婦的自我評價、對孕期時相關變化的態度及節食行為，於東京一間產檢診所進行問卷調查。發放自填式問卷給 500 名女性，其中 248 名孕婦回覆合用的資料。幾乎所有(91.5%)的回覆者都知道自己的目標體重。有 34 位(13.7%)孕婦自述懷孕前曾節食。另有 88 位(35.5%)孕婦目前節食中，其中 78 位是根據自己的判斷而節食。只有 15 位孕婦飲食有遵照營養師的建議。大多數(69%)回覆者相信，比較小的寶寶可使分娩較順利。以多變項邏輯迴歸分析結果，懷孕前曾節食的婦女，懷孕後有 4.67 倍的機率會在孕期自行節食；而希望較小的胎兒使分娩順利的婦女，也有 2.73 倍的機率在孕期節食。因此，產科醫師、助產士和營養師應瞭解孕婦過去的節食史及健康認知，以專業告知懷孕時增加足夠體重的重要性。

**關鍵字：**懷孕、體重增加、膳食、健康知識、對健康的態度