

Nutritional status and dietary intake of pregnant women

Estado nutricional e ingesta dietaria de mujeres embarazadas

Fernanda Scherer-Adami, Michele Dutra-Rosolen, Francieli Schedler,
Ioná Carreno and Mabel N. Alves

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ABSTRACT

Objective To evaluate weight gain during pregnancy according to the pregestational state in women who underwent prenatal care in Primary Health Care.

Methods A cross-sectional study with the participation of 255 pregnant women. Socioeconomic and demographic variables were collected using a structured questionnaire. Women were evaluated for nutritional status and dietary intake. Data related to the age of the pregnant woman, gestational week, current weight, pregestational weight, and height were obtained from the prenatal follow-up form. The Statistical Package for the Social Sciences (SPSS) was used for statistical analysis.

Results Pregestational nutritional status assessment showed that 43.2% (n=110) of the women started gestation with overweight and 4.3% (n=11) started with low weight. 51% percent (n=130) gained gestational weight above the recommended level. The mean age of women with pregestational BMI ≥ 25 kg/m² was significantly higher than that of those with BMI <25 kg/m² (p<0.001). Total energy (p=0.037) and calcium (p=0.004) intake were higher in women with weight gain above the recommended.

Discussion The results presented highlight the importance of strategies in public health to avoid excess weight gain during pregnancy.

Conclusion Pregnant women presented a gestational weight gain above the recommended maximum value according to pregestational BMI, which may contribute to adverse maternal and infant outcomes.

Key Words: Pregnancy; weight gain; food intake; prenatal (source: MeSH, NLM).

RESUMEN

Objetivo Evaluar la ganancia de peso durante el embarazo según el estado pregestacional en mujeres que se sometieron a atención prenatal en Atención Primaria de Salud.

Métodos Se hizo un estudio transversal con la participación de las mujeres embarazadas. Las variables socioeconómicas y las variables demográficas se utilizaron a un cuestionario cuestionable. Las mujeres fueron evaluadas para el estado nutricional y la dieta. La relación con la edad de la mujer embarazada, la semana de gestación, obesidad, peso actual, peso previo a la gestación se obtuvieron de la forma prenatal. El Statistical Package para las Ciencias Sociales (SPSS) fue utilizado para el análisis estadístico.

Resultados La evaluación del estado nutricional previo a la gestación reveló que el 43,2% (n=110) de las mujeres comenzaron su gestación con sobrepeso y el 4,3%, con un peso muy bajo. El 51% (n=130) obtuvo un peso gestacional por encima del recomendado. La edad media de las mujeres con un IMC previo a la gestación mayor o igual a 25 kg/m² fue significativamente más alto que la de las mujeres con un BMI inferior a 25 km/m². La ingesta de energía total (p=0,037) y el calcio (p=0,004) fue mayor en las mujeres que subieron peso por encima del recomendado.

Discusión Los resultados obtenidos resaltan la importancia de las estrategias de salud pública para evitar la ganancia de peso durante el embarazo.

FS: Nutritionist. Ph. D. Environment and Development, Universidade do Vale do Taquari, Rio Grande do Sul, Lajeado, Brazil.

fernandascherer@univates.br

MD: Nutritionist. Ph. D. Food Science and Technology, Universidade Federal de Pelotas, Pelotas, Brazil. *michele.dutra@gmail.com*

FS: Nutritionist. University Graduate in Nutrition, Universidade do Vale do Taquari, Lajeado, Brazil. *francieli_lays@hotmail.com*

IC: Nurse. Ph. D. Nursing, Universidade do Vale do Taquari, Lajeado, Brazil. *icarreno@univates.br*

MN: Nutritionist. M. Sc. Nutrition. Universidade Federal de Pelotas, Pelotas, Brazil.

mabelnalves@yahoo.com.br

Conclusión Las mujeres embarazadas aumentan de peso por encima del valor máximo recomendados, acorde con el IMC previo a la gestación. Este hecho provoca consecuencias negativas en materia de maternidad e infancia.

Palabras Clave: Gestación; aumento de peso; ingestión de alimentos; prenatal (*fuentes: DeCS, BIREME*).

Gestation comprises a period of susceptibility to physiological, metabolic, and endocrine changes that interfere with the nutritional and dietary needs of women. The balance of these aspects is directly related to the health condition of the mother and fetus (1), increasing the nutrient requirement of the pregnant woman (2). Maternal malnutrition is directly associated with child malnutrition (3). Pregestational low weight and low pregnancy weight gain, among other factors, are determinants of fetal growth restriction, prematurity, and low birth weight, which, in turn, are related to psychiatric diseases and to the loss of human capital in adulthood (4-5). Considering gestational weight gain, the risk of preterm birth was evidenced in a group of pregnant women with weight gain ≤ 8 kg (6).

On the other hand, overweight and obese women are more likely to enter a gestation at risk, and may present preeclampsia, gestational diabetes, cesarean deliveries, and abnormal fetal growth. Other long-term metabolic consequences of excessive gestational weight gain for women include type 2 diabetes, cardiovascular disease, metabolic syndrome, and increased postpartum weight retention, which contribute to the prevalence of female overweight and obesity (7-9). The risks of surgical delivery and fetal macrosomia are greater the higher the BMI at the beginning of pregnancy and the higher the weight gain during pregnancy (6). A cohort study showed that mothers who exceeded the recommendations for weight gain during pregnancy were more likely to have overweight children at 40 years of age (10).

Given the importance of maternal and childcare, arose the concept of the first thousand days, a period that begins after conception and goes until the end of the second year of life. This period is crucial to pursuing a balanced and healthy development of the child, also considering his or her life in adulthood. To this end, a set of highly effective interventions to reduce maternal and infant malnutrition, as well as to prevent childhood overweight and obesity, should be planned and implemented (3).

The health status of pregnant women is verified through prenatal monitoring, constituting an important tool for tracking risk situations (11). The anthropometric profile integrates the evaluated aspects, being directly influenced by food intake, sociodemographic aspects such as age over 35 years, indefinite marital status, and reduced level of schooling of pregnant women. These variables may also be related to low adherence to prenatal

consultations and numerous risk factors (12-13). As for food intake, pregnant women should pay attention to the quality of food choices, providing the nutritional needs of the period regarding the energy contribution of macro- and micronutrients. Detailed guidelines are described in the Ten Steps to Healthy Eating for Pregnant Women (*“Dez Passos para uma Alimentação Saudável para Gestantes”*) made available by the Brazilian Ministry of Health (14).

In this context, Primary Health Care (PHC), through the Basic Health Unit (BHU), represents the pregnant women's preferential entry point into the health system, especially for those with low socioeconomic status. This is because the single health system (SUS) is available for free, and universal access to health services at all levels of care must be equal (15). PHC contemplates attention to prenatal care in order to observe any sign of alteration throughout pregnancy, preventing maternal-infant morbidity and mortality (11,14).

In view of the above, the objective of this study was to evaluate weight gain during gestation according to the pregestational state, observing the food intake, in women who underwent prenatal care in the PHC of a city in the central region of Rio Grande do Sul.

METHODS

This is a cross-sectional study with a quantitative approach on the nutritional status and dietary intake of pregnant women attended at PHC. All pregnant women attended at PHC in 2012, regardless of maternal and gestational age, were invited to participate. Pregnant women who did not had continuous prenatal care were excluded, totaling 255 pregnant women evaluated. Participants were informed about the study procedures and those who agreed to participate signed the free and informed consent form. The study was approved by the Research Ethics Committee of the University Center - Univates, under the number 41575.

Data were collected in a reserved room in the Basic Health Unit (BHU), and a structured questionnaire was applied containing the socioeconomic and demographic variables of the participants: number of pregnancies, family income, number of people living in the household, schooling, current occupation, and marital status. Data related to the age of the pregnant woman, gestational week, current weight, pregestational weight, and height were obtained from the prenatal follow-up form.

The women were evaluated according to the Body Mass Index (BMI), considering pregestational weight and current weight; for the classification of the nutritional status, the parameters of the World Health Organization were adopted¹⁶. Gestational weight gain was assessed according to pregestational BMI and considering the recommendations adopted by the Institute of Medicine (17).

Data on dietary intake were obtained by means of two 24-hour recalls, carried out on alternate days, in which the quantities and types of preparations of all foods consumed on the day prior to data collection were recorded. The nutritional calculation of food intake was performed using the software Avanutri®, version 4.0. For the analyses of the present study, pregnant women (n=3) with energy intake of less than 600 kcal or greater than 6,000 kcal were excluded in order to remove biologically implausible data.

The analyses were performed in the statistical program Statistical Package for the Social Sciences (SPSS), v. 16. Frequency analyses were performed to describe categorical variables, and the mean and standard deviation for continuous variables. The Kolmogorov-Smirnov normality test was performed and the Student's t-test or the Mann Whitney U test were used to compare the means of the quantitative variables; the Pearson chi-square test was used for the qualitative variables. The comparison of gestational food intake was performed using the generalized linear model adjusted for maternal age. A significance level of 5% (p<0.05) was adopted for a 95% confidence interval (95% CI).

RESULTS

The mean age of the 255 pregnant women evaluated was 26.1 ± 6.6 years, and the mean gestational age was 22.8 ± 10.6 weeks, with 26.7% (n=68), 32.9% (n=84), and 40.4 (n=103) of the women in the first, second, and third trimester of gestation, respectively. Pregestational nutritional status assessment showed that 43.2% (n=110) of the women started gestation with overweight, and 4.3% (n=11) started with low weight. Gestational weight gain up to the time of the assessment, considering the recommendations for gestational age and nutritional status, was below the recommended in 11.8% (n=30) of the women, in agreement with the recommendations in 37.3% (n=95), and above the recommended values in 51% (n=130).

The socioeconomic and demographic characteristics according to pregestational state are shown in Table 1. Among the variables studied, it was observed that the mean age of women with pregestational BMI ≥ 25 kg/m² was significantly higher than that of those with BMI < 25 kg/m² (p<0.001). There were no significant differences in the other variables. In general, the majority of women had completed elementary school (56.9%), had paid work (52.5%), reported living with their partner (83.1%), and were multiparous (55.7%). The monthly family income was, on average, R\$ 1053.7 \pm 475.0.

The prevalence of women with gestational weight gain higher than the recommended maximum value according to pregestational BMI was 56.5% (n=39) among those overweight, 53.7% (n=22) among those with obesity, and 48.5% (n=65) among the eutrophic (Table 2).

Table 1. Demographic, socioeconomic, and obstetric characteristics of pregnant women according to their pregestational nutritional status (n=255)

Variables	Pregestational nutritional status		P
	BMI <25	BMI \geq 25	
Maternal schooling <8 years, n (%) ^a	63 (43.4)	47 (42.7)	0.90
Maternal age (years), mean (SD) ^b	24.4 \pm 6.4	28.1 \pm 6.1	0.00 ^c
Maternal civil status (with partner), n (%) ^a	117 (80.7)	95 (86.4)	0.23
Mother's occupation (unpaid), n (%) ^a	73 (50.3)	48 (43.6)	0.28
Family income, mean (SD) ^c	1068.1 \pm 467.6	1034.7 \pm 486.0	0.47
Parity (multiparous), n (%) ^a	74 (51.0)	68 (61.8)	0.08
Gestational weight gain (kg), mean (SD) ^c	6.8 \pm 5.1	5.8 \pm 5.0	0.05

SD = standard deviation; BMI = body mass index; ^aPearson's chi-square test; ^bStudent's t-test; ^cMann-Whitney test *p \leq 0.05.

Table 2. Gestational weight gain according to the Pregestational Nutritional Status (n=255)

Pregestational Nutritional Status	Gestational weight gain*		
	Below n (%)	Recommended n (%)	Above n (%)
Low weight	1 (9.1)	6 (54.5)	4 (36.4)
Eutrophy	16 (11.9)	53 (39.6)	65 (48.5)
Overweight	7 (10.1)	23 (33.3)	39 (56.5)
Obesity	6 (14.6)	13 (31.7)	22 (53.7)

* Gestational weight gain according to IOM recommendations.

The comparative analyses of energy, macro- and micronutrient intake during gestation according to the pregestational nutritional status are presented in Table 3. It was observed that women who were not overweight (BMI < 25 kg/m²) had significantly higher mean differences in the intake of total energy (p=0.038), carbohydrates (p=0.012), and calcium (p=0.036) during gestation in relation to women who were overweight (BMI ≥ 25 kg/m²) prior to the period of pregnancy.

Regarding the evaluation of dietary intake during gestation according to gestational weight gain, the total energy intake (p=0.037) and calcium intake (p=0.004) were higher in women with a weight gain above the recommended value compared to women who presented weight gain up to the recommended value (Table 4).

Table 3. Comparison of gestational dietary intake according to the Pregestational Nutritional Status (n=252)

Nutrients	Pregestational Nutritional Status			P
	BMI <25 Mean	BMI ≥25 Mean	MD (95% CI) ^a	
Total energy (kcal)	2276.4	2060.0	216.4 (12.4 – 420.3)	0.03*
Macronutrients				
Proteins (g)	88.1	86.8	1.2 (-6.4 – 9.0)	0.74
Carbohydrates (g)	321.2	276.8	44.4 (9.8 – 79.0)	0.01*
Total fat (g)	71.3	67.1	4.2 (-2.7 – 11.2)	0.23
Micronutrients				
Vitamin A (mcg)	710.3	583.9	126.4 (-45.0 – 297.8)	0.14
Vitamin C (mg)	133.6	129.6	4.0 (-35.6 – 43.7)	0.84
Folic acid (mcg)	146.7	134.3	12.4 (-12.8 – 37.8)	0.33
Iron (mg)	14.9	14.7	0.2 (-1.5 – 1.8)	0.89
Calcium (mg)	626.2	529.6	96.5 (6.2 – 186.8)	0.03*
Zinc (mg)	9.1	10.1	-1.0 (-2.3 – 0.2)	0.12

DM: mean difference; CI: confidence interval; ageneralized linear model adjusted for maternal age *p≤0.05.

Table 4. Comparison of gestational dietary intake according to gestational weight gain (n=252)

Nutrients	Gestational weight gain			p
	Up to the recommended Mean	Above the recommended Mean	MD (95% CI) ^a	
Total energy (kcal)	2079.0	2285.1	-206.1 (-400.2 – -12.0)	0.03*
Macronutrients				
Proteins (g)	84.4	90.7	-6.3 (-13.6 – 0.9)	0.09
Carbohydrates (g)	286.9	316.9	-29.9 (-63.1 – 3.1)	0.07
Total fat (g)	66.3	72.6	-6.3 (-12.9 – 0.2)	0.06
Micronutrients				
Vitamin A (mcg)	600.0	710.5	-110.5 (-273.7 – 52.8)	0.18
Vitamin C (mg)	117.1	146.2	-29.0 (-66.7 – 8.5)	0.13
Folic acid (mcg)	140.7	142.1	-1.4 (-25.5 – 22.7)	0.91
Iron (mg)	14.2	15.4	-1.2 (-2.7 – 0.4)	0.16
Calcium (mg)	520.4	647.2	-126.7 (-212.0 – -41.4)	0.00*
Zinc (mg)	9.4	9.5	0.1 (-1.2 – 1.2)	0.96

MD: mean difference; CI: confidence interval; ageneralized linear model adjusted for maternal age *p≤0.05

DISCUSSION

The present study analyzed the socioeconomic, demographic, and obstetric characteristics of pregnant women, as well as the gestational weight gain and the association with the food intake of these pregnant women according to the pregestational nutritional status. The results showed that more than half of them presented a gestational weight gain higher than that recommended by the Institute of Medicine. In Brazil, a cross-sectional population-based study analyzed 1 117 pregnant women and verified that 29.1% of the women interviewed presented an excessive weight gain during pregnancy (6). Other

population studies have verified the prevalence of excessive weight gain in gestation in up to 52% of women (9,18). These data point to a worrying scenario in Brazil, since excess weight gain is directly related to obstetric and perinatal consequences (19,20), impacting the health conditions of the mother and child in the long term (21). Some factors are associated with excess weight gain during pregnancy, such as: negative body image, attitude towards weight gain, inaccurate perceptions, and less knowledge about weight gain, perceived barriers to healthy eating, psychosocial stress, absence of planning of weight gain, uncontrolled food intake (“eating for two”), and sedentary lifestyle (22-24).

The mean age of pregnant women with pregestational nutritional status ≥ 25 kg/m² was significantly higher when compared to pregnant women with lower BMI, demonstrating a trend of increased risk of overweight among older pregnant women (18,25-26). This relationship was observed in a national survey that showed the prevalence of overweight and obesity in the adult population, increasing as a function of age. The survey also showed that the prevalence of obesity doubles from 25 years (27).

Pontes (2) (2007) reported that maternal schooling may be considered an obstetric risk marker for the pregnant woman and the newborn, since it is associated with low birth weight, neonatal mortality, perinatal mortality, infant mortality, and parity. A positive relationship of healthy weight gain occurs among pregnant women with 12 or more years of schooling (29). In the present study, pregnant women who were eutrophic in the pregestational period had the highest prevalence of schooling <8 years (43.4%) and no paid work (50.3%). Pregnant women who were overweight prior to pregnancy had higher prevalence of partner presence and were multiparous. It is important to emphasize that family support, including the support from both the partner and social or health professionals promote integral care to the pregnant woman, giving her greater security and better counseling to experience this period (30). Pregnant women with partners and primiparous women had lower postpartum weight retention, and parity was directly associated with overweight (31-33). It should be noted that socioeconomic issues have a strong impact on weight gain among overweight and obese pregnant women (34,35).

The prevalence of women with gestational weight gain higher than the recommended maximum, according to pregestational BMI, was higher among overweight pregnant women, followed by those with obesity and those eutrophic at birth. Marmitt (29) et al. (2016), observed that women with overweight or obesity at birth are likely to gain more weight during pregnancy. Probably, previous weight gain contributes in some way to a greater gestational weight gain, since it is reported in the literature that genetic variables related to obesity are also associated with weight gain during pregnancy (36,37). In addition, they could have carried the habits that have kept them overweight to the gestational period. It should be noted that a high prevalence (48.5%) of eutrophic pregnant women gained weight above the recommended levels and presented higher energy and nutrient intakes, underscoring the challenge of maintaining adequate nutritional status in this group during gestation. In this context, an intervention study with a dietary guidance for pregnant women found that the reduction in the weekly

weight gain rate was not effective for eutrophic pregnant women, being effective only for those overweight (38). One hypothesis for this relationship is the fact that pregnant women eutrophic at birth do not belong to the risk group at the beginning of pregnancy such as malnourished or overweight women, being required a more efficient intervention strategy.

Total energy, carbohydrate and calcium intake were significantly lower among women with pregestational overweight than among those with previous normal weight. This relationship may reflect the fact that they were being guided in their health services considering that they initially had this risk factor. However, inverse results were found in a study carried out at the Clinical Hospital of the University of São Paulo/SP, Brazil, with pregnant women receiving nutritional counseling during prenatal care, which showed significantly higher intakes of energy, carbohydrates, and calcium in pregnant women with overweight when compared to those with normal weight (39). Another study with pregnant women from the State of Goiás found higher energy and calcium intake among pregnant women with a weight gain above the recommended level when compared to those with adequate weight gain (40).

Weight gain higher than recommended during gestation was associated with higher energy and nutrient intakes among pregnant women, being thus a plausible result that highlights the importance of public health strategies in order to avoid excess weight gain during pregnancy (25,41), as well as measures of weight control of women of childbearing age, considering an expected weight change in the case of pregnancy. Weight control during pregnancy should be carried out through healthy eating, which can be complemented by structured programs of mild to moderate physical activity according to the trimester of gestation, in the absence of gestational risk, and after medical release (14).

Regarding the limitations of this study, the use of the 24-hour recall survey is cited, since when performed only once, it does not estimate the usual diet. However, in this study, two 24-hour recalls were performed. Its use has several advantages, as it is fast, relatively inexpensive, easy to apply and does not alter food intake (40). Another aspect that deserves attention is the prevalence of 48% of pregnant women eutrophic in the preconception period who had the highest energy intake during gestation, which, however, did not represent the group with a higher prevalence of weight gain above the recommended. It is considered a limitation because this relationship may have been influenced by the fact that in this group there were adolescents, whose caloric needs are higher, thus supporting this higher intake. Moreover, pregnant

women with a good level of physical activity could be part of the group of those who were eutrophic before pregnancy; notwithstanding, the present study did not verify this variable.

Therefore, data from this study showed that gestational weight gain was above the recommended level, according to pregestational BMI, for most pregnant women, especially those who were previously overweight, being associated with a higher dietary energy intake. In view of this, more attention should be given to women's health, especially regarding the attainment and maintenance of a healthy weight throughout their reproductive life, as well as during pregnancy ♣

Conflict of Interest: None.

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