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Relationship between the dimensions of eating behavior and weight gain in high-risk pregnant women followed up at a university hospital

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ABSTRACT

During the gestational period, several physiological adaptations occur in the woman's body to meet the demands of the maternal-fetal binomial and childbirth. These alterations include anatomical, hormonal, metabolic, and immunological aspects, varying according to gestational age. After pregnancy is confirmed, it is essential that the woman starts prenatal care at Basic Health Units (UBS), although cases of risk factors may require follow-up in high-complexity hospitals. Several factors, such as individual characteristics, preconditions, and obstetrics, can make a pregnancy high-risk, requiring lifestyle changes and professional support to avoid adverse outcomes. Inadequate weight gain during pregnancy is one of these factors, associated with complications such as gestational diabetes, hypertension and childhood obesity. The prevalence of overweight and obesity among pregnant women has increased, highlighting the importance of adequate monitoring during pregnancy for maternal and fetal health.

Keywords: Pregnancy, Gestational complications, Obesity during pregnancy.

INTRODUCTION

The gestational period is marked by several changes in the maternal body, with the aim of meeting the needs arising from the maternal-fetal binomial and childbirth (SOMA-PILLAY et al., 2016). These physiological adjustments can be characterized as anatomical, hormonal, metabolic, and immunological, varying according to gestational age (PARRETTINI; CAROLLI; TORLONE, 2020).

After the discovery of pregnancy, it is important for women to seek Basic Health Units (BHUs) to start prenatal care (CORREA et al., 2017). However, if the woman has any risk factor, there is a greater

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chance of developing complications during pregnancy, so follow-up can be performed in high-complexity hospitals (RAJBANSHI; NORHAYATI; HAZLINA, 2020).

In this sense, there are several factors or conditions that can lead to a high-risk pregnancy, including individual characteristics, sociodemographic conditions, clinical conditions prior to pregnancy, previous reproductive history, and current obstetric conditions. They are associated with actual or potential danger to the pregnancy, often requiring lifestyle changes, family and professional support. Therefore, it is essential for health professionals to detect these high-risk pregnancies early to avoid unfavorable outcomes (RAJBANSHI; NORHAYATI; HAZLINA, 2020; BRAZIL, 2022).

Inadequate weight gain during pregnancy is also considered one of these factors and is directly associated with negative outcomes for both mother and baby. Excessively, weight gain is associated with gestational diabetes, hypertension, and childhood obesity (FERREIRA et al., 2022). The prevalence of overweight and obesity in pregnant women increases every year in the state of Goiás and in Brazil as a whole (PEIXOTO et al., 2021). In 2010, the percentage of pregnant women with obesity in Goiás was 11.6%, and in 2020 this number rose to 21.6%, which represents a large portion of the population (PEIXOTO et al., 2021).

Pre-gestational nutritional status is classified using the Body Mass Index (BMI) according to the criteria adopted by the World Health Organization (WHO). Thus, individuals with BMI < 18.5 kg/m² are classified as underweight, BMI between 18.5 - 24.9 kg/m² are eutrophic, 25 - 29.9 kg/m² are considered overweight, and for obesity BMI ≥ 30 kg/m² (⁶). In pregnant women, the calculation of recommended weight gain varies according to the classification of pre-gestational BMI. Therefore, weight gain will be inversely proportional to pre-gestational BMI, and in the underweight classification, the total weight gain should be between 9.7 and 12.2 kg, in the normal weight classification between 8 and 12 kg, in overweight between 7 and 9 kg, and in obesity, 5 to 7.2 kg (KAC et al., 2021).

One of the aspects that influence weight gain is food consumption, which may change during this period (MOREIRA et al., 2019). These originate from the increase in energy demand and hormonal levels of leptin, ghrelin and adiponectin, leading to an intensification of physiological hunger signals (PARRETTINI; CAROLLI; TORLONE, 2020).

The dietary pattern of pregnant women is commonly evaluated as insufficient in relation to the intake of food sources of essential micronutrients, marked by an excessive consumption of foods with high energy density and low nutritional value (ARAÚJO et al., 2016), thus favoring the development of nutritional disorders (TANG et al., 2020). However, the choice of foods ingested goes far beyond their nutritional composition. Factors such as personal and family history, cultural involvement, taste, price, appearance, ease of preparation and advertising are considered (GLANZ et al., 1998). Thus, the variation of these aspects can be related to an individual's eating behavior, in a positive or negative way.

Eating behavior comprises several aspects, from food consumption, way of eating, relationship with food, how and where to eat (ALVARENGA et al.; 2019). In this context, during the gestational period it is important to maintain an adequate diet and healthy behaviors for the recommended weight gain (GILA-DÍAZ et al.; 2021). The act of eating is complex, as it involves social and cultural issues (MOREIRA et al.; 2019). As a result, the absence of family support, low access to food products and health, unemployment, low schooling and income in the place where they are inserted can influence the eating behavior of these pregnant women (GRAHAM; UESUGI; OLSON, 2016).

In pregnant women, the factors that make up eating behavior are intensified as a result of the physiological changes and social context that occur during pregnancy, which impact on a series of factors such as increased appetite, body change, consequent alteration of body image and mood changes (HAMILTON et al., 2000). Cultural and emotional experiences related to eating behavior can intensify during pregnancy, leading to a possible influence on gestational weight gain (MOREIRA et al., 2019).

Thus, the hypothesis of a possible relationship between gestational weight gain and the dimensions of eating behavior in this population is considered, since there are few studies in this area with at-risk pregnant women, facilitating the adoption of strategies in care with this approach.

OBJECTIVE

OBJECTIVE: To investigate the relationship between the dimensions of eating behavior and weight gain in high-risk pregnant women.

METHODOLOGY

This is an analytical cross-sectional study conducted with pregnant women treated by the Unified Health System (SUS) at the Hospital das Clínicas of the Federal University of Goiás (HC-UFG), Goiânia, Goiás, Goiás. It uses a sample of data from a base project entitled "Evaluation of the nutritional status of pregnant women followed up in primary health care and at the Hospital das Clínicas (HC-UFG/EBSERH) and its associated factors" (opinion no. 6.115.506).

The target population of the study was composed of pregnant women followed at the Maternal and Child Unit of the HC, aged 20 years or older, regardless of gestational age. Women with tubal pregnancies, multiple pregnancies, hydatidiform moles, fetal deaths, and pregnancies of malformed fetuses were excluded.

The sample was obtained by convenience, and all pregnant women who received care between February 2022 and December 2023 were invited to participate in the study. Data were collected after the pregnant women were accepted, by nutritionists and nutrition students, previously trained, through the application of a structured and standardized questionnaire based on face-to-face interviews conducted

during the follow-up of the pregnant women at the HC/UFG. The variables of the questionnaires were grouped into four sets.

1. **Sociodemographic:** Age (in complete years), race defined according to the volunteer's perception (white, brown or yellow/black/indigenous), marital status (lives with or without a partner), education (illiterate, elementary school, high school, higher education, postgraduate), whether they have a paid occupation (no or yes), whether they receive government aid Bolsa Família/Auxílio Brasil (no or yes) and monthly per capita income (in Reais).
2. **Gestational and lifestyle:** Gestational age in weeks (estimated from the date of the last menstruation: LMP and/or the first ultrasound available in the medical record, in which the embryo is recorded), number of pregnancies (primiparous, two pregnancies, three or more pregnancies), number of deliveries and number of miscarriages.
3. **Anthropometrics:** Pre-gestational weight (PPG), gestational weight (PG), height, gestational weight gain, pre-gestational BMI.
4. **Eating behavior - TFEQ-R21 Questionnaire:** evaluation performed by applying the reduced version of the TFEQ-R21 (The Three Factor Eating Questionnaire - short version), translated and validated for the Portuguese (NATACCI; FERREIRA JÚNIOR, 2011).

The measurement of anthropometric measurements followed the techniques recommended by Lohman et al. (1988). Gestational weight (PG) was measured on a digital scale, with a precision of 0.1 kg and a capacity of 150 kg at the time of the interview. Height (m) was measured with a stadiometer with a precision of 0.1 cm. For anthropometric classification, the pre-gestational weight (PPG) self-reported by the pregnant women was obtained at the time of the interview and, subsequently, their pre-gestational Body Mass Index (BMI) was calculated. Next, the pregnant women were classified according to their pre-pregnancy BMI, according to the recommendations of the Institute of Medicine (IOM, 2009) (Table 1).

For the evaluation of gestational weight gain (GPG), the PG measured at the time of the interview was considered, subtracted by the self-reported PPG. Soon after, using the Pregnant Woman's Handbook (BRASIL, 2022), gestational weight gain was classified according to gestational age, in percentile intervals (KAC et al., 2021), taking into account the curves for pre-gestational BMI classifications. Finally, using this classification, the participants were classified according to the range of adequacy of weight gain: below adequate weight gain, adequate weight gain, and above adequate weight gain.

Table 1. Ranges of adequacy of gestational weight gain according to pre-gestational BMI.

Pre-gestational BMI (kg/m²)	Classification of pre-gestational BMI	Adequacy range of weight gain by gestational age (percentiles)
< 18.5	Low weight	P18 – P34

≥ 18.5 and < 25	Eutrophy	P10 – P34
≥ 25 and < 30	Overweight	P18 – P27
≥ 30	Obesity	P27 – P38

Source: Adapted from WHO, 1995; Kac et al., 2021 apud Caderneta da Gestante

The questionnaire used to assess eating behavior evaluates three dimensions, namely: Cognitive Restriction (CR), which is the conscious tendency to restrict food intake, Emotional Eating (EA), which is characterized by excessive consumption of food in response to negative emotions experienced, and Eating Lack of Control (AD), in which there is a loss of self-control and, consequent overconsumption of food (STUNKARD; MESSICK, 1985; NATACCI; FERREIRA JÚNIOR, 2011). The CR scale is composed of six items and measures food prohibition to influence weight or body shape. The SE scale has six items and measures the propensity to consume exaggerated food in response to negative emotional states, such as loneliness, anxiety or depression. The AD scale has nine items and verifies the tendency to lose control over eating when feeling hungry or when exposed to external stimuli (THOLIN et al., 2005).

A four-point response format is used for items one to 20, and an eight-point numerical rating scale for question 21. The calculation of the mean of the scores (ranging from 1 to 4) will be used for the general items, as well as the items within the subdomain of each item, i.e., OR, AE and DA. Higher scores indicated higher levels of food restriction, uninhibited eating, and predisposition to hunger, respectively.

Data analysis was performed by constructing a database with the variables of interest in Excel for Windows 10, in double entry. The analysis was performed using SPSS version 21.0. In the statistical analysis, descriptive statistics were used, where categorical variables were expressed as absolute and relative frequencies and continuous variables as mean and standard deviation or median and interquartile range.

To evaluate the differences between the classifications of nutritional status by pre-gestational BMI and the adequacy of weight gain by gestational age and the dimensions of feeding behavior, a General Linear Model (GLM) and a Bonferroni test were performed. For data that do not have a normal distribution, they were transformed into z-score prior to GLM. Spearman's correlation analyses were performed to verify the relationships between the dimensions of eating behavior ($p<0.05$). A significance level of 5.0% was considered.

DEVELOPMENT

The pregnant women evaluated had a mean age of 30.1 + 6.5 years, 55.0% declared themselves to be brown, the majority (79.5%) had a partner, 56.1% had completed high school, 51% did not have paid activities, 66.3% did not receive government assistance and, finally, it was found that 55.1% of the families received up to R$2,200.00 per month (Table 2). The results reveal that the pregnant women

investigated have a sociodemographic profile similar to those investigated in other studies carried out with those in prenatal care in the SUS, with a predominance of brown women, with schooling equal to or higher than complete high school, who have a partner and are economically inactive (SAMPAIO *et al*, 2018; DOMINGUES *et al*, 2015; VIELLAS *et al*, 2014).

Table 2. Socioeconomic and demographic characteristics of high-risk pregnant women followed at Hospital das Clínicas/ UFG 2022 (n=98).

Variable	Average+SD	Median (IQ)
Age	30,1 Plus 6,5	29 (24,75 - 36)
Colour		
White	25	25,5
Black	10	10,2
Brown	54	55,1
Yellow	7	7,1
Indigenous	1	1
Don't know	1	1
Marital status		
With companion	78	79,6
No companion	19	19,4
I didn't want to answer	1	1
Schooling		
Incomplete elementary school	7	7,1
Complete elementary school	6	6,1
Incomplete high school	11	11,2
Completed high school	55	56,1
Incomplete tertiary education	7	7,1
Completed higher education	11	11,2
Completed post-graduation	1	1
Gainful activity		
No	50	51
Yes	48	49
Government Aid		
No	65	66,3
Yes	33	33,7
Income		
Up to R$ 1100,00	14	14,3

R$ 1100,00 to R$ 2200,00	40	40,8
R$ 2200,00 to R$ 5500,00	37	37,8
R$ 5500,00 to R$ 11000,00	6	6,1
Don't know	1	1

Values presented as mean and standard deviation (SD) or median and percentile ranges (p25 – p75) (IQR).

Half of the sample had been pregnant three or more times, 63.3% had never had an abortion. Regarding the number of deliveries, it was found that 38.8% of the pregnant women had one delivery and another 38.8% had two or more deliveries. Domingues et al. (2015) obtained similar results in which 52.5% of the sample was multiparous (more than one delivery).

The mean gestational age of the participants was 29.76 ± 8.6 weeks (third trimester). The mean pre-gestational BMI was 28.51 ± 7.5 kg/m², with a prevalence of overweight of 61.2% and underweight of only 1% of the total. The analysis implied that the majority (57.1%) of the women had weight gain above adequate (Table 3).

Monteschio et al. (2021) also found a prevalence of higher gestational overweight (38.3%) and an association between pre-gestational overweight with increased food intake and higher weekly frequency in the consumption of industrialized products. In this sense, Pires and Gonçalves (2021) and Carvalhães et al. (2013) also found a predominance of pregnant women with excessive weight gain, contributing to greater overweight at the end of pregnancy, as the results obtained in the present study. The authors also highlight that this problem is the main nutritional challenge to be faced in prenatal care, since it is associated with higher gestational risk, and is a problem identified in pregnant women of different socioeconomic levels.

Table 3. Anthropometric data of high-risk pregnant women followed at Hospital das Clínicas/ UFG 2022 (n=98).

Variable	**Media+DP**	**Median (IQ)**
Gestational age		
0 - 40 weeks	29,76 Plus 8,6	33 (26,75 - 36)
Pre-pregnancy BMI	28,51+ 7,5	26,5 (23,4 - 33)
Classification of pre-gestational BMI		
Low weight	1	1
Eutrophic	37	37,8
Overweight	26	26,5
Obesity	34	34,7
Classification of weight gain		

Less than adequate	22	22,4
Adequate	20	20,4
Above Adequate	56	57,1

Values presented as mean and standard deviation (SD) or median and percentile ranges (p25 – p75) (IQR).

Gestational weight gain was not related to the dimensions of eating behavior in the population studied, but the domains of emotional eating and eating uncontrol were directly correlated (0.532, $p<0.001$). No significant associations were found between the dimensions of the TFEQ-R21 and pre-gestational BMI classification, nor in relation to the adequacy of weight gain by gestational age (Tables 4 and 5).

Tang et al. (2020) pointed out a statistically significant relationship between weight and BMI with the dimensions of eating behavior and concluded that a higher score of uncontrolled eating was associated with a higher probability of excessive weight gain during the gestational period, however, this relationship was not sustained when socioeconomic variables and pre-gestational BMI were inserted and correlated.

However, the studies by French et al. (2014), Hays et al. (2002), Lindroos et al. (1997), Tepper & Ullrich (2002), who studied the non-pregnant adult population, concluded that the dimensions of eating behavior have a significant relationship with weight and BMI values. In particular, a high score of uncontrolled eating by itself, or in conjunction with a low score of cognitive restriction, is significantly correlated with higher body weight and obesity in this population. In addition, it was found that a higher emotional eating score is significantly associated with higher BMI values.

Table 4. Characterization of the dimensions of the eating behavior of high-risk pregnant women followed at Hospital das Clínicas/ UFG 2022 (n=98).

Variables	**Mean ± SD**	**Median (IQ)**
RC	37.2 ± 20.6	33,3 (22,2 – 50)
AE	28.9 ± 29.7	22,2 (0 – 38,8)
OF	37.5 ± 24.0	37,03 (18,5 – 55,5)

CR: cognitive restriction; AE: emotional feeding; AD: lack of eating control. Values presented as mean and standard deviation (SD) or median and percentile ranges (p25 – p75) (IQR).

With regard to the characteristics of the public studied, especially the lower socioeconomic level, there is greater difficulty related to the understanding and perception of feelings and emotions related to food. Baião and Deslandes (2008) discuss that the act of gestation has several meanings that must be embraced and interpreted by a multidisciplinary team, so that the purpose of eating is not distorted through

dysfunctional behaviors, which may be related to guilt and weight gain in this period. Factors that, in the study, were related to the "fear" of providing negative consequences for the mother-baby binomial.

Table 5. Dimensions of eating behavior according to the classifications of nutritional status by pre-gestational body mass index and adequacy of weight gain by gestational age of pregnant women at HC-UFG (n=98).

Variables	**Total n(%)**	**RC**		**OF**		**AE**	
		n	P	Media+DP	p	Media+DP	p
EN classification by IMCPG Low weight Eutrophy Overweight Obesity	1(1) 37(37,8) 26(26,5) 34(34,7)	50 30,78+17,05 38,67+23,01 42,81+21,25	0,084	11,11 38,74+22,72 36,32+20,42 38,01+28,21	0,716	27,77 28,98+31,16 22,43+25,84 33,99+31,39	0,535
Classification of the adequacy of weight gain for GI Less than adequate Adequate Above Adequate	22(22,4) 20(20,4) 56(57,1)			34,59+19,91 38,33+18,37 37,89+21,94			

CR: cognitive restriction; AE: emotional feeding; AD: lack of dietary control; IMCPG: pre-gestational body mass index; GA: gestational age. Values presented as absolute (n) and relative (%) frequencies or mean and standard deviation (SD). *General Linear Model* (GLM).

When comparing the present study with existing studies, it was possible to notice that the sample size was restricted, as it was still under development and with continuity in the collection. In addition, the surveyed public is located in a very specific portion of the population, which may not correlate with the domains of eating behavior. Finally, it is important to emphasize the need for further studies with this population, in order to deeply identify eating behavior and its impacts on weight gain, with a view to making nutritional therapy more effective for each profile.

FINAL THOUGHTS

Although the study did not show an association between the domains of eating behavior and gestational weight gain, the results obtained contribute to a better understanding of the nutritional and behavioral aspects of pregnancy. Thus, it was noticed that the domains of eating behavior are not addressed during nutritional follow-up, since the pregnant women were reflexive and confused when choosing their answers.

Finally, the present study highlights the importance of nutritional monitoring through a behavioral approach that is welcoming, so that it is not restricted to the adequacy of weight gain and considers all other biopsychosocial factors that are related to the act of eating and food choices.

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