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Weight gain during pregnancy, according to previous nutritional status and age of postpartum women assisted in the maternity department of a public hospital in Macaé, Rio de Janeiro

Ganho de peso na gestação, segundo estado nutricional prévio e idade de puérperas atendidas na maternidade de um hospital público de Macaé, Rio de Janeiro

Abstract

Introduction: Pregnancy is a physiological stage that requires adequate health monitoring, with a view to achieving a positive outcome for the mother and the baby. Among prenatal care activities, regular monitoring of weight gain is important because of the role such parameter plays in maternal and child health; moreover, inadequate weight gain may lead to health complications. *Objective:* To describe the pattern of gestational weight gain of postpartum women assisted at a public maternity hospital, according to their previous nutritional status and maternal age. *Method:* Descriptive cross-sectional epidemiological study, whose data were collected from primary (hospital record) and secondary (interview) sources, in 2014, with a sample of 113 women aged 20 to 40 years up to 48 hours after childbirth. Pregestational nutritional status was assessed using the Body Mass Index (BMI), and gestational weight gain adequacy was assessed on the basis of the recommendations of the Institute of Medicine (IOM). *Result:* 73.5% were aged 20-29 years; 69.9% made six or more prenatal visits, and 42.2% had excess weight (overweight or obese) prior to pregnancy. Age-specific data on pregestational nutritional status showed that 35.5% (n = 79) of the women between 20-29 years old and 60% (n = 30) of those between 30-40 years old had previous excess weight. There was a significant association (p <0.01) between the variables "gestational weight gain" and "previous nutritional status". Among those who had excess weight gain, 73.1% had previous excess weight. *Conclusion:* Most of the postpartum women had previous excess weight, and had excess weight gain during pregnancy - especially the older ones. Maternal age and previous nutritional status can be considered as determinants of weight gain. Also, widespread adoption and coverage of prenatal nutritional monitoring are needed in the public health system to help control excessive weight gain, which may aggravate the obesity epidemic in Brazil.

Keywords: Gestational Weight Gain. Nutritional Status. Obesity, Maternal

Resumo

Introdução: A gestação é uma etapa fisiológica que requer acompanhamento de saúde adequado, com vistas ao desfecho positivo para mãe e bebê. Dentre outros cuidados

previstos no acompanhamento pré-natal, o ganho de peso é parâmetro a ser monitorado sistematicamente, diante de sua relevância para a saúde materno-infantil e da relação entre ganho de peso inadequado e intercorrências na saúde. *Objetivo:* Descrever o perfil de ganho de peso gestacional de puérperas assistidas em uma maternidade pública, segundo estado nutricional prévio e idade materna. *Método:* Estudo epidemiológico transversal descritivo, de base primária (prontuário hospitalar) e secundária (entrevista), realizado em 2014, com amostra de 113 mulheres de 20 a 40 anos com até 48h pós-parto. O estado nutricional pré-gestacional foi avaliado por meio do Índice de Massa Corporal (IMC) e a avaliação da adequação do ganho de peso gestacional considerou as recomendações do *Institute Of Medicine (IOM)*. *Resultado:* 73,5% tinham idade entre 20-29 anos; 69,9% realizaram seis ou mais consultas de pré-natal e 42,2% tinham excesso de peso (sobrepeso ou obesidade) prévio à gestação. O estado nutricional pré-gestacional, segundo idade, revelou que 35,5%(n=79) daquelas entre 20-29 anos e 60%(n=30) das entre 30-40 anos apresentavam excesso de peso prévio. Houve associação significativa (p<0,01) entre as variáveis "ganho de peso gestacional" e "estado nutricional prévio". Dentre as que tiveram ganho de peso excessivo, 73,1% tinham excesso de peso prévio. *Conclusão:* Parte expressiva das puérperas já possuía excesso de peso e teve ganho ponderal excessivo na gestação, sobretudo as mais velhas. Sugerem-se a idade materna e o estado nutricional prévio como fatores determinantes do ganho de peso e recomendam-se maior capilaridade e cobertura do acompanhamento nutricional pré-natal no sistema público de saúde como possibilidade de enfrentamento do ganho de peso excessivo, que contribui para o agravamento da epidemia de obesidade no Brasil.

Palavras-chave: Alimentação. Ganho de Peso Gestacional. Estado Nutricional. Obesidade Materna.

INTRODUCTION

Pregnancy is a phase of a woman's life in which the body undergoes significant psychological and physiological changes and adaptations. Therefore, it requires special attention and care so that it can progress healthily.[1] During this period, women's anabolic state is dynamic as a result of increased nutritional demands, which continually changes the need for various nutrients. To meet these demands and avoid undereating or overeating, weight gain and food intake have to be monitored since the beginning of pregnancy, because previous research has reported that inadequate weight gain during the reproductive cycle may affect the epidemiology of maternal and child health problems.[2-4]

Therefore, prenatal care plays a fundamental role in nutritional monitoring during pregnancy, and knowledge of the previous and current nutritional status is crucial to provide information that can support the planning of weight gain until the end of pregnancy.[5] According to the IOM, pregestational weight is one of the main determinants of weight gain. Thus, women should remain within the weight gain guidelines, i.e., within the range planned for their individual pregnancy.[6]

Epidemiological studies in Brazil have underscored that the number of women with pregestational obesity and excess weight gain during pregnancy has been increasing in recent decades.[7-9] Notably, excess weight gain during pregnancy determines greater likelihood of complications, e.g., systemic arterial hypertension (SAH), gestational diabetes mellitus (GDM), greater postpartum weight retention, fetal macrosomia, pre-eclampsia and prematurity. For this reason, the main risk factors associated with weight gain and pregestational obesity have to be clearly understood.[10] However, maternal underweight and insufficient weight gain, although more frequent in populations under social vulnerability and food insecurity, are also associated with an increased risk of unfavorable outcomes for both the mother and the fetus, such as intrauterine growth restriction and prematurity.[11]

Gestational weight gain within the range recommended by the IOM is associated with better maternal and neonatal outcomes, when compared to greater or lesser weight gain.[12] Thus, nutrition education and counseling during prenatal care is essential to provide pregnant women with an adequate weight gain, according to their nutritional status, and also to prevent excessive or insufficient gain. Further research in this field can help increase the widespread adoption of this measure in health services that provide prenatal care,[13] thereby encouraging early diagnosis and nutritional intervention in prenatal care. They are low-cost procedures that have a great impact on reducing maternal and fetal risks, in addition to increasing the awareness of pregnant women about the impact of their nutritional status on both their health and that of their baby.[14]

The lack of epidemiological studies on nutritional status during pregnancy in the territory of Macaé represents a gap in the literature. Therefore, further research can broaden knowledge of the nutritional status of pregnant women and have a positive impact on intervention activities in the Unified Health System (SUS), for example, widespread provision and quality of nutritional care during the prenatal period. For this reason, the aim of the present study was to describe the pattern of weight gain, according to previous nutritional status and age of postpartum women assisted in the maternity department at a public hospital in Macaé.

METHODS

This is a descriptive study that used data from the research entitled *Fatores demográficos, socioeconômicos, assistência pré-natal e nutricional relacionados ao baixo-peso ao nascer: um estudo transversal realizado em um hospital municipal de Macaé-RJ (*Demographic and socioeconomic factors, prenatal and

nutritional care relative to low birth weight: a cross-sectional study conducted at a municipal hospital in Macaé-RJ). Such data were collected through secondary sources (hospital records and booklet for expecting mothers, published by Brazil's Ministry of Health) and primary sources (bedside patient interview), from August to December 2014. The study sample included 113 mothers between 20 and 40 years old, living in Macaé, whose delivery was performed at the maternity ward of the Hospital Público Municipal (Municipal Public Hospital).

Macaé is a municipality located in the state of Rio de Janeiro, north of the capital city, with a population of approximately 256,672 people. Less than half (48.9%) of the residents are formally employed, with an average income of 6.4 minimum wages; however, almost one third lives on a monthly income of up to half the minimum wage.[15]

The Municipal Public Hospital performed 2,432 deliveries in 2014. In this way, for the major research that includes the present study, sample size was calculated on the basis of a finite population of 2,500 births, estimated prevalence for low birth weight of 10%, margin of error of 5%, confidence interval of 90%, with a 10% margin for possible losses. Therefore, a sample of 103 mothers was estimated. The eligibility criteria were: to live in the city of Macaé, and to be aged between 20-40 years. The exclusion criteria were: record of complications in childbirth and high-risk pregnancies (with obstetric diseases in the current pregnancy, e.g., syphilis, HIV, SAH and GDM).

Data were collected on a regular basis by a single interviewer, who had been previously trained in completing the research questionnaire. The interviewer read the data about the pregnant women on their medical records, and also on the above-mentioned booklet for expecting mothers. The postpartum women were then interviewed within the first 48 hours after mother-baby rooming-in. The interviews were conducted three days a week, always at the most suitable times, avoiding the times of health care routines and discharge, hospital procedures and family visits.

Before approaching a particular bed, the interviewer checked the patients' eligibility criteria in their medical record. There were always more eligible postpartum women than the interviewer could possibly interview on each day of collection; thus, the ones who were awake and had no relevant effect of anesthesia/analgesia. A total of 113 postpartum women (n = 113) were invited and accepted to participate in the study, and there were no refusals.

The variables of the present study were: (a) sociodemographic variables and health care characteristics: maternal age in years (categorized into two age groups: 20-29 and 30-40); marital status (categorized as: single, married, domestic partnership and others); level of education in years (categorized into: <9 and ≥9); family income in minimum wages (categorized into: <1; 1-2; 3-4; ≥5 and unknown); gestational age at the first prenatal visit (in whole weeks); number of prenatal visits; type of delivery (categorized as: cesarean section and natural birth); and (b) nutritional variables: pregestational nutritional status (categorized as: underweight, adequate weight, overweight and obesity) and weight gain adequacy during pregnancy (categorized as: insufficient, adequate and excess).

Pregestational weight (kg) and height (m) measurements were used to calculate BMI (weight/height)^2), a measure used to classify pregestational nutritional status, following the cut-off points of the World Health Organization.[16] Excess weight was defined using a cut-off point for BMI equal to or greater than 25 kg/m2^2, which includes the ranges for overweight (O= BMI≥25 and <30Kg/m^2) and obesity (Ob = BMI≥30Kg/m^2).[17] To assess gestational weight gain adequacy, the difference in weight between the last and the first prenatal visits was compared with the recommendations of the IOM.[6]

After data collection, the questionnaires were revised and entered into a Microsoft Excel® spreadsheet (Windows 2010®) to create the database of the present research, using data organization and cleaning. Database analyses were performed in the software Statistical Package for Social Sciences (SPSS) version 19.0®. Descriptive statistics was performed using absolute and relative frequencies (%) for the categorical variables; and measures of central tendency and dispersion (mean $\pm$ standard deviation) were used for the continuous variables. The dependent variable was weight gain adequacy, and the independent variables were: pregestational nutritional status and maternal age range. Pearson's chi-square test was used to determine the strength of association between the variables "weight gain" and "pregestational nutritional status". To assess the same association in the age subgroups, Fischer's exact was used, owing to the small size of the subsamples. The level of significance adopted in the analyses was 5%.

The research project that includes the present study was approved by the Research Ethics Committee (CEP) of the Faculdade de Medicina de Campos dos Goytacazes (Campos dos Goytacazes School of Medicine) in August 2014, and it received the Certificado de Apresentação de Apreciação Ética (Certificate of Presentation of Ethical Appreciation) nº 32809614.1.0000.5244. The postpartum women were invited to participate in the research, received information about the research procedures, and signed an Informed Consent Form (ICF).

RESULTS

The main characteristics of the study sample were: 73.5% were aged 20-29 years; 61% lived with a partner (marriage or domestic partnership); 86.7% had <9 years of education; 48.7% had a family income of 1-2 minimum wages; 69.9% made six or more prenatal visits and 61.1% had a cesarean section. Regarding pregestational nutritional status, 9.2% were underweight; 48.6% had adequate weight; and 42.2% had excess weight: 16.5% were overweight, and 25.7% were obese (Table 1). Gestational age at the first prenatal visit was 13.57 ± 5.8 weeks, on average. Average gestational weight gain was approximately 12 kg (12.18 ± 5.6).

Table 1. Percentage distribution of socioeconomic and demographic variables, type of delivery and prenatal visits of postpartum women assisted at a Public Maternity Hospital in the city of Macaé. August to December/2014. (n=113).

Variables	n	(%)
Age Group (years)		
20 – 29	83	73.5
≥ 30	30	26.5
Marital status		
Single	41	36.3
Married	38	33.6
Domestic Partnership	31	27.4
Other	3	2.7
Education (years)		
< 9	98	86.7
≥ 9	13	11.5
Unknown	2	1.8
Family Income (MW[1])		
< 1	5	4.4
1 – 2	55	48.7
3 – 4	25	22.1
≥ 5	8	7.1
Unknown	20	17.7

Table 1. Percentage distribution of socioeconomic and demographic variables, type of delivery and prenatal visits of postpartum women assisted at a Public Maternity Hospital in the city of Macaé. August to December/2014. (n=113). (Continues)

Variables	n	(%)
No. prenatal visits		
<3	6	5.3
3 – 5	28	24.8
≥ 6	79	69.9
Type of delivery		
Caesarean section	69	61.1
Natural birth	44	38.9
Pregestational nutritional status[2]		
Low weight	10	9.2
Adequate weight	53	48.6
Excess weight	46	42.2
Overweight	18	16.5
Obesity	28	25.7

Notes: [2] There were 4 missing values in the height variable; therefore, the pregestational BMI value could not be calculated for the study group.
Caption: [1] MW: minimum wages

Gestational weight gain was adequate in 34.9%, insufficient in 41.3.8% and excessive in 23.8% of the sample. As shown by the analysis of weight gain adequacy, according to pregestational nutritional status, of those who had insufficient weight gain, 66.7% had adequate pregestational weight, 17.8% were underweight and 15.5% were overweight. Of those who had adequate weight gain, pregestational weight was adequate for 42.1%, insufficient for 5.3% and excessive for 52.6% of the women. Of those with excess weight gain, 26.9% had adequate weight and 73.1% had previous excess weight. There was a significant association between the variables "gestational weight gain" and "previous nutritional status" (p <0.001) (Table 2).

Table 2. Percentage distribution of gestational weight gain according to the pregestational BMI of postpartum women using a maternity department at a Public Hospital in the city of Macaé. August to December/2014. (n=109).[1]

Gestational weight gain[2]	Diagnosis of pregestational BMI[2]				
	n(%)	LW[3]	AW[3]	O[3]	Ob[3]
		n(%)	n(%)	n(%)	n(%)
Insufficient	45(41.3)	8(17.8)	30(66.7)	6(13.3)	1(2.2)
Adequate	38(34.9)	2(5.3)	16(42.1)	8(21.1)	12(31.5)
Excess	26(23.8)	0(0.0)	7(26.9)	4(15.4)	15(57.7)

Notes: [1]There were 4 missing values in the height variable; therefore, the pregestational BMI value could not be calculated for the study group; [2]Institute of Medicine (2009).
Caption: [3]LW: Low weight; AW: Adequate weight; O: Overweight; Ob: Obesity; [4]Pearson's chi-squared test.

As far as maternal age groups are concerned, the women aged 30-40 years had a higher rate of pregestational excess weight and excess weight gain during pregnancy when compared to those aged 20-29 years (60% *versus* 35.5%; and 46.7% *versus* 25.3%, respectively) (Figures 1 and 2).

Figure 1. Pregestational[1] BMI[2], according to age groups, of postpartum women assisted in a maternity department of a Public Hospital in the city of Macaé. August to December/2014. (n=109).[3]
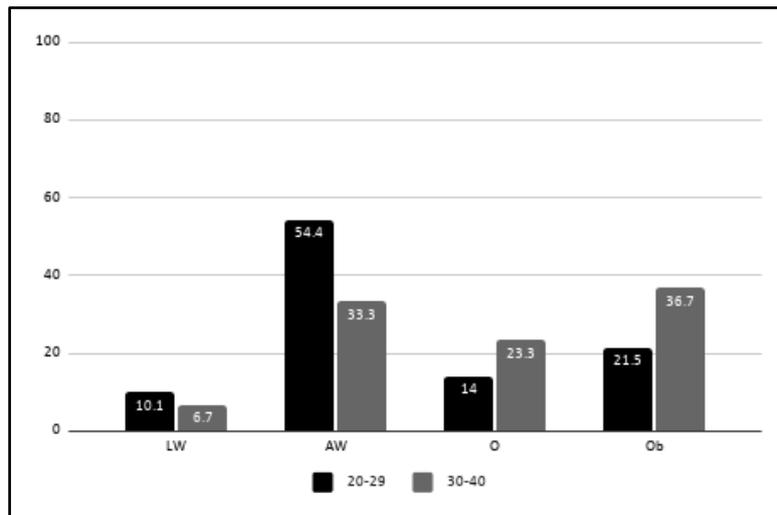
Caption: [1] Institute of Medicine (2009); [2]Body mass index.
LW: Low weight; AW: Adequate weight; O: Overweight; Ob: Obesity.
Notes: [3]There were 4 missing values in the height variable; therefore, the pregestational BMI value could not be calculated for these postpartum women.
Age groups (sample size): 20-29 (n=79); 30-40 (n=30).

Figure 2. Percentage distribution of gestational weight gain assessment[1] according to age groups (in years), of postpartum women assisted in a maternity department of a Public Hospital in the city of Macaé. August to December/2014. (n=109).[2]
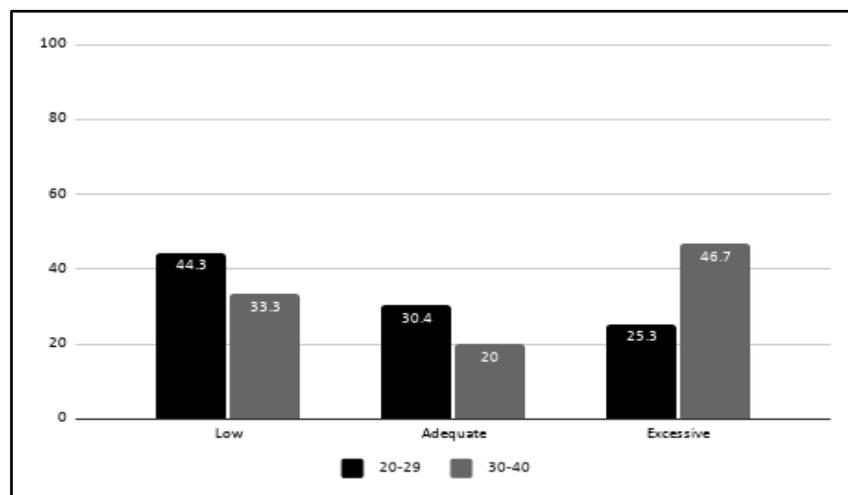
Caption: [1]Institute of Medicine (2009).
Notes: [2]There were 4 missing values in the height variable; therefore, the pregestational BMI value could not be calculated for these postpartum women.
Age groups (sample size): 20-29 (n=79); 30-40 (n=30).

When weight gain adequacy, according to previous nutritional status, was analyzed by age groups, it was found that insufficient weight gain was more frequent among the younger women, while adequacy was more frequent among the older ones. For the women aged 20-29 (n = 79) and with insufficient weight gain (n = 35), 17.1% had low pregestational BMI; 65.7% had adequate weight; 17.2% had excess weight. Of those

who had excessive weight gain in the same age group (n = 20), 35.0% had adequate weight and 65% were previously overweight. There was a significant association between the variables "gestational weight gain" and "pregestational nutritional status" in this age group (p-value = 0.001), but this outcome was not found among women aged 30-40 (p -value = 0.349) (Table 3).

Table 3 Percentage distribution of gestational weight gain, according to pregestational BMI and age groups (in years), of postpartum women assisted in a maternity department in a Public Hospital in the city of Macaé. August to December/2014. (n=109).[1]

Age group (years) Gestational weight gain[2]	Pregestational BMI[2]			
	n	LW[3]	AW[3]	O[3]
		n(%)	n(%)	n(%)
20–29 (n=79)				
Insufficient	35	6(17.1)	23(65.7)	5(14.3)
Adequate	24	2(8.3)	13(54.2)	4(16.7)
Excess	20	0(0.0)	7(35.0)	2(10.0)
≥30 (n=30)				
Insufficient	10	2(20.0)	7(70.0)	1(10.0)
Adequate	14	0(0.0)	3(21.4)	4(28.6)
Excess	6	0(0.0)	0(0.0)	2(33.3)

Notes: [1]There were 4 missing values in the height variable; therefore, the pregestational BMI value could not be calculated for the study group; [2]Institute of Medicine (2009).
Caption: [3]LW: Low weight; AW: Adequate weight; O: Overweight; [4]Fischer's exact test.

DISCUSSION

In the present study, most postpartum women made the expected number of prenatal visits and initiated prenatal follow-up in due course. However, a significant part of them had a previous nutritional status of being overweight, especially postpartum women over 30 years old. In terms of gestational weight gain, most postpartum women who had excess weight gain during pregnancy, also had pregestational excess weight. The relationship between gestational weight gain and maternal age is also relevant, and it was found that insufficient weight gain was more present in the younger postpartum women.

The socioeconomic characteristics of the present sample were similar to those found in other cross-sectional Brazilian studies. For example, in the study carried out with pregnant women in Vitória da Conquista - BA in 2015, average age was 24.0 ± 6.2 years; most participants were married or had a steady partner; average level of education was 7.9 ± 3.0 years, and monthly income was > 1 minimum wage.[18] Data from postpartum women in Rio de Janeiro, 2014, showed average age of 25 years; most of the women lived with a partner, and almost half of them had between 8-11 years of schooling.[19] In Salvador - BA, a 2011 study showed that most women were black (92%), were aged between 20-35 years (73.5%), had a family income < 2 minimum wages (79.1%) and lived with a partner (79.1%). However, most (54.8%) had a higher level of education (10-12 years of study).[20]

As regards marital status, most of the participants in the present study lived with a partner (marriage or domestic partnership). Previous studies have reported that the presence of a partner results in better sociodemographic and psychosocial conditions, and greater economic stability for the family.[21,22] Another

study carried out at a university hospital in Rio de Janeiro, in 2006, showed that most participants were aged between 19 and 25 years (39.8%), were married (38.9%) and had completed elementary school (29.6%) - which is equivalent to nine years of study.[23] The analysis of the profile of users of the Unified Health System in Brazil, later in 2016, confirmed that they were women with low income and a low level of education.[24]

The present study did not evaluate skin color, but the other characteristics, namely age group, income, level of education and presence of a partner were compatible with these nationwide studies with women assisted in public health services, even though they are from different regions of Brazil. Education plays an important role in the nutritional status of pregnant women and in weight gain during pregnancy. Previous publications have shown that little formal education and low income can increase maternal vulnerability.

Conversely, women with a high level of education are more likely to have healthy weight gain, because they can more easily access and understand the information required to make healthier food choices. In addition, they are more active and have better lifestyle habits.[25] Comparatively, a low level of education is related to a small number of prenatal visits.[26] However, in the present sample, although a low level of education was more frequent, the majority of the women made six or more prenatal visits, which started at the end of the first trimester of pregnancy. These are positive data according to the recommendations of Brazil's Ministry of Health (MS), which advocates a minimum of six visits during prenatal care: one in the first trimester of pregnancy, two in the second, and three in the third.[27]

Prenatal nutritional assistance plays a crucial role in raising women's awareness. Moreover, it helps produce a positive outcome in pregnancy, since it can promote healthy eating habits, as well as prevent, diagnose and treat not only pregestational and gestational nutritional disorders, but also nutritional deficiencies. Even so, nutritional care during pregnancy is often neglected, as pointed out in a survey carried out in seven Saúde da Família health care centers in Rio de Janeiro, in 2012. The survey showed that little attention is given to the assessment and monitoring of pregnant women's nutritional status and weight gain; moreover, these data failed to be recorded in their Cartão da Gestante (health card for pregnant women).[28] However, in the present sample, the Cartão da Gestante of most postpartum women was filled out and attached to their hospital record, and contained data of interest to the research.

As shown by the present findings, most of the postpartum women had adequate weight at the beginning of pregnancy, according to their pregestational BMI. These results are in line with those of other publications,[29-31] for example, the one of the Maternidade Escola da Universidade Federal do Rio de Janeiro (Maternity-School of the Federal University of Rio de Janeiro, UFRJ), which reported 68.2%[30] of weight gain adequacy; and the 2001 cohort with pregnant women from Rio de Janeiro, in which most participants had normal weight - according to their BMI - at the beginning of pregnancy, and had adequate weight gain.[31] In the present study, however, a significant portion of the participants had already started pregnancy with excess weight, in line with the epidemiological data found in Brazil and in many parts of the world.[32] This finding stresses the need to carefully consider the coverage and quality of prenatal care, especially in face of the greater risk of diseases associated with pregnancy, and also the possibility of weight retention and increased prevalence of overweight women.

However, in the present study, the analysis of pregestational nutritional status according to age groups, showed that most of the postpartum women aged 30-40 years started pregnancy with excess weight. This situation is worrying, as it poses risks not only to the mother, but it can also directly affect the perinatal conditions of the fetus. Therefore, prevention and management of overweight in women of childbearing age, both before and during pregnancy, have to be conducted more carefully.[33]

Analyzing women aged 20 years or older, assisted by SUS, a cohort carried out in 2001 found excess weight as the most frequent nutritional status in older women. There were about four overweight women to every underweight one. Although these prevalence rates varied slightly between categories such as age, education, skin color, parity and geographic region, significant prevalence rates of overweight were present in all study categories.[7]

As regards gestational weight gain, a relevant amount of the postpartum women (41.3%) in the present study presented insufficient weight gain. This finding is similar to that of the study carried out in 2005 with postpartum women assisted in the public health service of Viçosa (Minas Gerais state), i.e., insufficient gain of 60.0%.[34] Similar results were found in the cohort study by Kac and Velásquez-Meléndez, in 2005, carried out in the municipality of Rio de Janeiro, in which the majority of the postpartum women presented insufficient gestational weight gain.[35] However, opposite results have also been reported; for example, a study with pregnant women assisted with low-risk prenatal care in the city of São Paulo, in 2007, found excess weight gain in 40% of them.[8]

For gestational nutritional status, a cohort study with pregnant women assisted in a public prenatal service in Pernambuco, in 2006, detected 26.3% of overweight pregnant women, according to their BMI for Gestational Age.[36] Although this assessment was not the focus of the present study, the frequency rates of pregestational excess weight and excess weight gain refer to the same problem.

In view of these findings, it should be noted that inadequate gestational weight gain affects the perinatal outcome, i.e., it may have a negative impact on the newborn's birth weight, cause a delay in intrauterine growth, and increase perinatal mortality. Moreover, excessive weight gain is related to hypertension and gestational diabetes, fetal macrosomia, difficulties during delivery and hypoglycemia in the newborn. Therefore, paying attention to gestational weight gain is extremely important to prevent these complications.[37]

Finally, it is worth discussing the limitations of this research, especially because it is a cross-sectional study, in which the factor and the effect are observed in a given space and moment in time.[38] In addition, it has a sample of women assisted in the public service of a small town; therefore, the findings cannot be compared with data from the whole country and from particular regions. Secondary data, such as medical records and records from Caderneta da Gestante, may have erroneous or incomplete data; therefore, the control and rigor of research cannot be totally control when this type of source is used. However, they offer important data to be considered in research on maternal health; in addition, in the present study, all data collected from these sources were confirmed in interviews with the postpartum women. This way, these mistakes could be corrected, and missing information could be gathered.

Importantly, because the sample is small, some associations present in the reference population of the study, could not be found. However, based on the descriptive analyses and the associations that were found, advanced maternal age (30-40 years) and previous nutritional status of overweight can be considered as determinants of excessive gestational weight gain.

CONCLUSION

Gestational weight gain was associated with the sampled women's previous nutritional status. Excess weight gain was more frequent in the presence of pregestational excess weight, especially in the 30-40 age group. Greater monitoring of weight gain should be performed by means of nutritional monitoring during prenatal care.

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Contributors

Capelli JC: conception of the study, methodological design, and writing of the manuscript; Braga FANG: analysis and interpretation of data, and writing of the manuscript; Lima FF: analysis and interpretation of data, and writing of the manuscript; Freitas PS, Ribeiro YG, Sperandio N and Monteiro LS: writing of the manuscript; Carmo CN: sample calculation, statistical analysis, and writing of the manuscript. All collaborators participated in the final revision and approval of the manuscript for submission.

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