

Maternal nutritional profile and neonatal nutritional status in the city of Pará de Minas – MG

Perfil nutricional materno e estado nutricional neonatal, na cidade de Pará de Minas – MG

Bianca Machado Eleutério¹, Gabrielli Lennore de Oliveira Araújo¹, Lauana Palhares da Silveira¹, Lucilene Rezende Anastácio²

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ABSTRACT

This retrospective study analyzing cross-references of medical records of pregnant women followed at the Woman and Child Healthcare Center at the Hospital Nossa Senhora da Conceição, in Pará de Minas – MG between 2009/2010 assesses the influence of maternal nutritional status on neonate weight at birth. Gestational data considered included prenatal visits, gestation weeks, type of delivery, parity, pre-pregnancy body mass index (PPBMI) and gestational weight gain (according to the IOM, 2009), as well as the neonates' weight at birth. Data analysis was carried out with Excel and Statistical Package for Social Sciences (SPSS) version 17.0 and statistic tests by chi-square, Student T and Pearson tests. 64 pregnant women (mean age 25.5±6.9 years) were evaluated. Regarding PPBMI, 73.4% (n=47) of pregnant women were classified as eutrophic, 3.1% (n=2) as underweight, 17.2% (n=11) as overweight and 6.3% (n=4) were obese. There was a high prevalence of underweight neonates (<3.0 kg; 21.9%; n=14), when compared to macrosomic (>4.0 kg; 6.3%; n=4). Women with insufficient weight gain had babies with weight significantly lower (p<0.05) than others. There was a directly proportional correlation between the neonate weight and gestational weight gain (p<0.05) as well as gestational weight at the last appointment with the doctor (p<0.05). The relation between gestational weight gain and neonate weight at birth was analyzed. No significant differences have been found between the data assessed and weight at birth, which shows the importance of weight control during gestation.

Key words: Pregnancy; Nutritional Status; Birth Weight; Fetal Macrosomia.

RESUMO

Este estudo retrospectivo com análise de dados remissivos em prontuários médicos de gestantes atendidas nos anos de 2009/2010 no Centro de Atenção à Saúde da Mulher e da Criança e de seus neonatos, nascidos no Hospital Nossa Senhora da Conceição, Pará de Minas-MG., avalia a influência do estado nutricional materno no peso ao nascer de neonatos. Os dados gestacionais avaliados compreenderam consultas pré-natais, semanas gestacionais, tipo de parto, paridade, índice de massa corporal pré-gestacional (IMCPG) e ganho de peso gestacional (e sua classificação de acordo com o IOM, 2009), bem como o peso ao nascer do neonato. Os dados foram analisados por meio dos softwares Excel e Statistical Package for Social Sciences (SPSS) versão 17.0 e os testes estatísticos com os testes de qui-quadrado, T de Student e correlação de Pearson. Foram avaliadas 64 gestantes (idade média 25,5±6,9 anos). Em relação ao IMPG, 73,4% (n=47) das gestantes foram classificadas como eutróficas, 3,1% (n=2) como baixo peso, 17,2% (n=11) como portadoras de sobrepeso e 6,3% (n=4) de obesidade. Foi observada alta prevalência de neonatos com peso insuficiente (<3,0 kg; 21,9%; n=14), comparados aos macrossômicos (>4,0 kg; 6,3%; n=4). Mulheres com ganho de peso insuficiente tiveram bebês com peso significan-

¹ Nutrition undergraduate student at Universidade de Itaúna. Itaúna, MG – Brasil.

² Nutritionist. Master in Food Sciences. Professor at Universidade de Itaúna. Itaúna, MG – Brasil.

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Institution:
Universidade de Itaúna
Itaúna, MG – Brazil

Corresponding Author:
Luana Palhares da Silveira
E-mail: luanapalhares@yahoo.com.br

temente menor ($p < 0,05$) comparadas às demais. Houve correlação diretamente proporcional entre peso dos neonatos e ganho de peso gestacional ($p < 0,05$) e peso gestacional na última consulta ($p < 0,05$). Apurou-se associação entre o ganho de peso gestacional e o peso dos recém-nascidos, embora não tenham sido registradas diferenças significativas entre os outros dados avaliados e o peso ao nascer, evidenciando a importância do controle de peso durante a gestação.

Palavras-chave: Gravidez; Estado Nutricional; Peso ao Nascer; Macrosomia Fetal.

INTRODUCTION

Gestation is a moment of crucial nutritional importance, both for the mother and for the child, since it is from the nutrients supplied by the mother that the child begins to develop within the conditions that are right and favorable to its intrauterine growth. Several studies show the relation between maternal nutritional state and its perinatal repercussion, and associate dietary errors and malnutrition with increased chances of complications in childbirth and inadequate nutritional status in the newborn.^{1,3} Birth weight correlates with the likelihood of neonatal survival – since inadequate weight at birth determines high risk of morbidity and mortality in the first year of life⁴ – and with pre-pregnancy weight and weight gain during pregnancy.⁵

Fetal macrosomia, defined as birth weight above 4,000 grams, is considered a nutritional problem that entails complications for the mother, such as postpartum bleeding and considerable number of Cesarean sections, and also increased newborn and intrauterine mortality rates.⁶ A relationship can be established between increased incidence of fetal macrosomia and the increase of maternal age and, consequently, of the risk of complications in childbirth. There is also a relation between obesity in pregnancy and neonatal overweight, harmful for both mother and child.⁷ Another nutritional complication found in neonates is low birth weight, established when the newborn weighs less than 2,500 grams, which is more prevalent among children of pregnant women below their appropriate weight and a decisive factor in neonatal morbidity and mortality.^{3,8}

Low birth weight and macrosomia are associated, respectively, with the mother's low weight or insufficient weight gain, short stature, smoking, alcoholism, and maternal obesity, excessive gestational weight gain and diabetes mellitus.^{1,6,8,9} Health assistance also appears to be influenced in determining the nutritional development of the fetus during pregnancy, since

prenatal care helps to reduce premature births and the risk of infant mortality.^{3,10}

Despite recognition of the impact of various risk factors for changes in neonatal nutritional status, little is known about maternal nutritional status and its impact on neonates weight in Pará de Minas – MG, which is the aim of this study.

METHODOLOGY

This is a retrospective study developed in Pará de Minas-MG, with data collected from files and prenatal medical records of pregnant women in the years 2009 and 2010 at the Women and Children's Healthcare Center (CASMUC), and those who gave birth at Hospital Nossa Senhora da Conceição (HNSC). The medical records of pregnant women who received care at CASMUC were included in this research, with prenatal monitoring data from the first quarter until the 14th week of gestation, to the last gestational month, from the 36th gestational week, with at least three appointments at the health unit. Out of these records a selection was made of those whose information was legible and included the following data: name, gestational age, pre-pregnancy weight and, in the last session, height, date of first and last appointment, date of the last menstruation period (LMP) and parity.

The following records were deleted: those whose information was insufficient or dubious for the analysis of nutritional status; illegible; with less than three prenatal appointments at CASMUC; no data until the 36th gestational week; with insufficient data to calculate weight gain in pregnancy; gestation interrupted or resulting in miscarriage.

Mothers were included depending on characteristics of their newborns, and were excluded those whose pregnancies resulted in stillbirths, were multiple or whose children had malformations. Thus, only pregnant women with live neonates were included. Data on the pregnant women, the gestations, and the newborns were collected. The data on the pregnant women were: name, age, LMP, pre-pregnancy body mass index (BMI), weight gain in pregnancy, number of prenatal appointments, use of nutritional supplements in pregnancy, parity, and interval between pregnancies. Delivery data included: delivery date, gestational week at delivery, and mode of delivery. The data on the neonates were: weight and length.

The pregnant women were classified by pre-pregnancy BMI, which was obtained by dividing the weight of the pregnant women prior to conception by her squared height, classifying it by means of the cut-off points proposed by the Institute of Medicine (IOM).¹¹ Based on this classification, pregnant women were considered eutrophic or of adequate weight, underweight, overweight, and obese, with BMI between 18.5 and 24.9, below 18.5, between 25 and 29.9, and above 30 kg/m², respectively. Gestational weight gain was evaluated by subtracting the weight in kilograms in the last prenatal appointment from the pre-pregnancy weight and classified as advised by the IOM.¹¹ Women were sorted according to their pre-pregnancy IBM as underweight, overweight, obese, and eutrophic when they had ponderal gain of 12.5 to 18, 11.5 to 16, 70.0 to 11.15, and 5.0 to 9.0 kg during their entire gestations, respectively.

As recommended by the Ministry of Health,¹² maternal age and the number of appointments in the prenatal period were also evaluated as gestational risk factors. Pregnant women considered at risk were those under the age of 15 years and above 35 and who had less than six appointments during the prenatal period. Pregnant women below 150 cm were classified as having short stature according to the Pan American Health Organization (PAHO).¹³ The classification of pregnant women's lifestyles was based on data found in medical records. It considered as pregnant women consuming alcoholic beverages those who consumed any quantity of alcohol during pregnancy, and as smokers those who consumed tobacco and nicotine with any quantity or frequency. Neonate weight at birth was classified according to the cut-off points proposed by the World Health Organization.¹⁴ They were classified as of low weight, insufficient, suitable, and macrosomic when they were born weighing less than 2,500, between 2,501 and 2,999 and between 3,000 and 3,999, and above 4,000 grams.

The data was analyzed with the aid of Microsoft Excel and Statistical Package for Social Sciences (SPSS, version 17.0). The numerical data were presented as average and standard deviation; and the categorical data as percentages. The association between the neonate's nutritional status and other variables was made through univariate analysis. The statistical tests used were the Pearson correlation test, Student's T-test and Chi-square test. The significance level adopted was 5%.

RESULTS

Two hundred and fifty medical records of pregnant women seen at CASMUC between 2009 and 2010 were analyzed. The inclusion and exclusion criteria were met in 64 charts. Average maternal age was 25.5 ± 6.9 years, with 20.3% (n = 13) of teenagers, and 14.1% (n = 9) older than 35 years (Table 1). A high prevalence of parity was found for first pregnancies (55.7%; n = 34); and among single women compared to married and divorced women.

Table 1 - Sociodemographic characteristics of the pregnant women surveyed, Pará de Minas – MG, 2011

Characteristic	N	%
Age		
15-19 years	13	20,3
20-34 years	42	65,6
≥35 years	09	14,1
Marital Status		
Single	34	53,1
Married	29	45,3
Divorced	01	1,6
Parity		
First pregnancy	34	55,7
Second pregnancy	16	26,2
Third pregnancy	03	6,6
Fourth pregnancy		8,2

Consumption of alcohol and tobacco, hypertensive disorders not related to pregnancy, and non-gestational diabetes mellitus were found in nine (14.1%), six (9.4%), two (3.1%), and one (1.6%) pregnant women, respectively. A higher prevalence of BMI eutrophic pregnant women was detected compared with those with low weight, overweight, and obese (Figure 1). The average pre-pregnancy weight was of 58.8 ± 10.8 kg, average maternal stature 159 ± 5.0 cm and BMI, 23.3 ± 4.2 kg/m². We also observed that the average length of gestation was 39.6 ± 1.8 weeks. 14.1% (n = 9) and 7.8% (n = 5) gave birth before the 37th week and after the 42nd gestational week, respectively. Of the total number of pregnant women, 3.1% (n = 2) displayed low stature, i.e. less than 150 cm.

Based on delivery and neonatal characteristics, despite the high incidence of cesarean sections, 33 pregnant women delivered vaginally (51.6%). Cesarean deliveries were undertaken by 46.9% (n = 30)

of the pregnant women, and there was one case in which forceps was used (1.6%). From the neonatal data obtained, it was found that 57.8% (n = 37) of the neonates were male, with an average birth weight of $3,293 \pm 405.0$ g; 6.3% (n = 4) of them considered macrosomic (> 4,000 g), 21.9% (n = 14) had insufficient weight at birth (< 3,000 g), and one neonate (1.6%) was classified as having low birth weight (< 2,500 g). The average length at birth was 48.3 ± 2.2 cm.

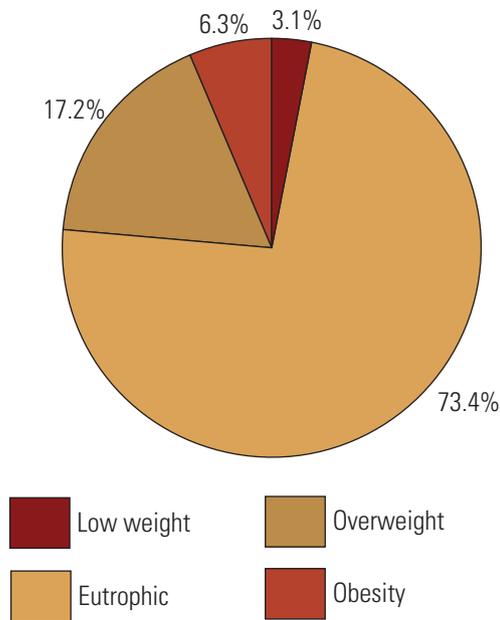


Figure 1 - Classification of the initial nutritional status of the pregnant women surveyed, Pará de Minas – MG, 2011.

A predominance of adequate ponderal gain was found in pregnant women with eutrophic BMI, excessive in pregnant women with overweight BMI, inadequate in pregnant women with BMI indicative of obesity and underweight, but only two subjects fit the latter group (Figure 2).

The average weight gain among the pregnant women was 13.0 ± 5.8 kg, with great variability of their initial weights and in the last prenatal consultation. The average of the last weight was 71.8 ± 10.4 kg. The characterization of the weight gain in the whole sample showed a higher number of pregnant women with weight gain above the ideal when compared to the appropriate and insufficient gain, of 37.5% (n = 24), 29.7% (n = 19) and 32.8% (n = 21), respectively. There was a significant and directly proportional correlation between the neonates' weight and gestational weight gain ($p < 0.05$) and gestational weight in the last appointment ($p < 0.05$) since the women with greater weight gain had children with more weight at birth. We also noted that women who gained less weight than the minimum recommended by the IOM, according to the pre-pregnancy nutritional status, had children weighing significantly less ($p < 0.05$) than the others, on average $3,108.0 \pm 388.8$ g versus average $3,398.0 \pm 373.0$ g, respectively.

As regards maternal stature height and the neonates' weight, a directly proportional correlation between these variables ($p < 0.05$) was found. However, women below 150 cm had neonates with weight similar to the others ($p > 0.05$).

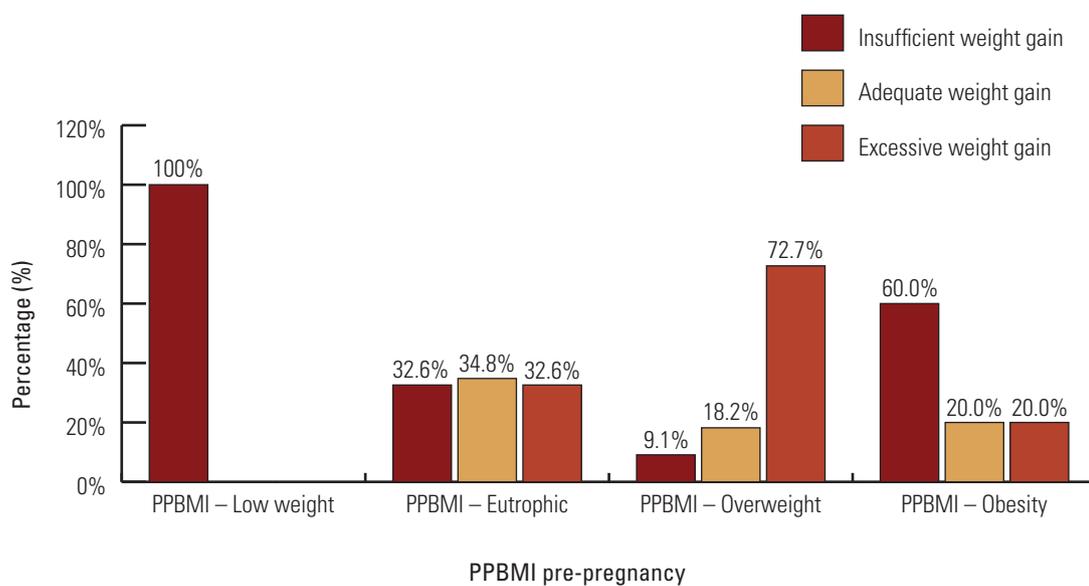


Figure 2 - Percentage of pregnant women with insufficient, excessive, and appropriate weight gain according to the pre-pregnancy nutritional status classification, Pará de Minas – MG, 2011.

DISCUSSION

From the total of records evaluated ($n = 250$), there was a 74% sample loss due to incompatibility and absence of information needed for completing the study accurately. Incomplete medical records have also been found by other authors, who identified the problem in 97% of patient records in a teaching hospital in the north-west of Paraná.¹⁵ It is certainly possible that this sample loss may have interfered in the analyses, making the data of this study unrepresentative of the total population.

Among the pregnant women evaluated, the average age of 24 ± 5 years is consistent with other studies conducted with pregnant women in the Brazilian Unified Health System (SUS).^{16,17} Among the pregnant women who were patients at CASMUC and whose medical records were evaluated, 20.3% and 14.1% were below 20 and above 35 years old, respectively. This reality was also described in other works,¹⁷ such as in a sample of 115 pregnant women who received care by the SUS in Campina Grande - PB, in which the average age was the same as in this study, and 24% were teenagers. Another study, which evaluated the morbidity and mortality of neonates according to maternal age, found a high incidence of newborns with low birth weight and premature newborns in pregnant women older than 35 years.¹⁸ The same association was also found for pregnant teenagers, according to a cross-sectional study in Rio Branco - AC.¹⁹ This study found no associations between maternal age and birth weight. This could, however, be a bias from the small population size in this study.

Teenage pregnancy is related to a high risk of prematurity and low birth weight since their reproductive system is not yet fully developed for a pregnancy. Pregnancies among women older than 35 years are more likely to be associated with neonatal weight changes, especially low birth weight, prematurity, and high risk of neonatal death.¹⁸

This study found a high percentage of unmarried pregnant women (53.1%; $n = 34$), similar to the numbers obtained by Minamisava et al.,²² in which 51% of the pregnant women evaluated also were unmarried. It should be noted, however, that as the data was obtained from medical records, marital status can not be interpreted as a condition that rules out a structured family network since these pregnant women could be co-inhabiting, even though they remain legally unmarried.

Regarding lifestyle, 9.4% of the pregnant women were smokers. Similar data for smoking during preg-

nancy were found by other authors, ranging between 9 and 12%.^{16,17}

The average gestational age was 39.6 ± 1.8 weeks, a number similar to those reported by other authors, on average 38.6 ± 2.4 weeks.⁶ Several studies report that about 44.53% of births are caesareans deliveries²², a result close to the one found in this study, in which 46.9% of pregnant women had a surgical delivery. It should be stressed that the average gestational age reported in this work may have been influenced by the high number of caesarean sections, whose population is low-risk, and it is assumed that the rate of cesarean deliveries cannot be explained by obstetric indication.

As regards the number of pre-natal visits, other authors emphasized an average of 7 ± 1.8 appointments,¹⁷ which is fewer than the numbers presented in this research, which found an average of 9.4 ± 2.1 appointments. We would call attention to the fact that two pregnant women in this study had less than six appointments during their pregnancies.

Based on initial nutritional status, the descriptive and transversal study conducted by Amorim et al.⁶ showed that 26.1% of pregnant women evaluated were overweight and obese and 73.9% were eutrophic as per their BMI, in agreement with this work (23.5% and 73.4, respectively). For initial nutritional status and prenatal consultations, Padilha et al.²³, aiming at associating pre-pregnancy nutritional status and predictions of gestational complication, found a higher prevalence of pregnant women with a BMI indicative of eutrophy (68.2%) and average number of appointments of 8.2 ± 2.9 , similar to our results regarding predominance of eutrophic pregnant women (73.4%) and average number of appointments (9.4 ± 2.1). However, regarding gestational weight gain, Amorim et al.⁶ showed higher incidence of pregnant women with insufficient weight gain, differently from what is reported in here, with predominance of excessive weight gain.

In this study, 37.5% of the pregnant women showed excessive weight gain, as found by Stulbach et al.²⁴, who assessed determinants on weight gain in 141 pregnant women and their newborns in the municipality of São Paulo. These authors showed that 37% of pregnant women had weight gain above the standards recommended by the IOM/WHO, based on initial nutritional status. Although excessive or inappropriate weight gain in pregnancy is related the neonate's nutritional status, maternal height is also a risk factor in gestation and may predict low birth weight.⁵ Pregnant women with stature below 150 cm

have more chances of having children with birth weight below the recommended and predict nutritional risk for the neonate, which was found here, with a significant and directly proportional relationship between the variables maternal height and neonate's birth weight ($p < 0.05$).

Based on the neonatal data, Padilha et al.²³ reported average weight and length at birth were similar to the ones obtained in this study, respectively, $3,285.2 \pm 479.6$ g and 49.1 ± 2.8 cm. Regarding birth weight, this study found a 6.3% incidence of macrosomic neonates, similar to Amorim et al. (2009), in which 5.4% of the neonates had fetal macrosomia.⁵ Such figures have been related to pregnant women with pre-pregnancy overweight/obesity and excessive weight gain during pregnancy, which was not detected in this work.

Evaluating the nutritional profile of 2,775 newborns in the city of São Paulo in order to investigate the influence of gestational weight gain on birth weight, Lizo et al.¹ reported that 149 (5.4%) of neonates had low weight, 477 (17.2%) had insufficient weight, and 1,649 (59.4%) neonates had appropriate weight. Although we have not found an association between excessive gestational weight gain and lower weight among newborns, in this work weight gain in pregnancy correlated directly with the neonatal weight, as was also reported by Minagawa et al.⁸

Maternal weight gain was the variable most related to birth weight.⁸ For many years, there have been many controversies concerning weight gain in pregnancy, causing changes in nutritional patterns during pregnancy.⁸

In 1920, for example, a 4 to 6 kg weight gain in the gestational period was considered ideal. From that time onwards, this recommendation has become progressively higher, always having as a base the best results for the fetus. This substantial increase led to a re-evaluation of nutritional recommendations during pregnancy, as the Institute of Medicine (IOM) did in 1990 by classifying the weight gain in pregnancy according to pre-pregnancy nutritional status.^{11,25,26}

Due to concerns regarding maternal and perinatal morbidity and mortality, and for the purpose of correcting low birth weight, fetal macrosomia and excessive weight gain, in 2009 the IOM revised its recommendations and indicated new parameters for gestational weight gain, considering them according to the pre-pregnancy nutritional status, ranking as eutrophic, underweight, overweight and obese pregnant women with a BMI between 18.5 and 24.9; below 18.5, between 25 and 29.9, and above 30 kg/m², respec-

tively.^{2,11} In pregnancy, meeting the pregnant women's nutritional needs influences gestational weight gain and birth weight. Failure to meet these requirements may result in inadequate intrauterine development, with changes in the fetus' normal growth.²⁷

CONCLUSION

This work, in spite of not finding significant differences regarding most gestational variables related to neonatal data (parity, smoking, alcohol consumption, marital status, occupation, pre-pregnancy nutritional status, and birth weight), has shown a significant relationship between weight gain in pregnancy, maternal height and weight in the last appointment, and the birth weight of neonates. Thus, it confirms the existence of a direct relationship between maternal nutritional status and newborns' proper nutritional development. It also highlights the importance of controlling the mother's weight gain control and diet to ensure the necessary nutritional supply for perfect development of the fetus and newborn. It reinforces the need for public health policies for pregnant women that enhance strategies focused on nutrition and diet in this phase of life and which direct attention to control of weight gain in pregnancy, helping ensure good obstetric outcomes.

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