

School of doctoral studies

-summary of PhD thesis-

Title: The impact of maternal diet on anthropometric, biological and proinflammatory status in mother and newborn

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Introduction: Overweight and obesity are some of the most important public health problems in recent times, due to the ever-increasing incidence worldwide, with high rates of morbidity and mortality, regardless of age. The changes suffered by the body during pregnancy have a major systemic impact and can lead to maternal complications in the short and long term, but also to a negative impact on the fetus. A balanced maternal diet during pregnancy plays a crucial role in avoiding the impairment of nutritional status, being well known that both malnutrition and excessive weight gain during this period will have a negative impact. Many recent data reported in the literature have highlighted a systemic inflammatory status associated with excessive weight gain during pregnancy in these women with negative implications that can lead to many complications such as abortion, preeclampsia / eclampsia, premature rupture of membranes and implicit premature birth, or even the risk of cancer. Proinflammatory cytokines have been associated with gestational complications, thus, pregnancy-induced hypertension, one of the leading causes of maternal and neonatal morbidity and mortality, has been associated with elevated levels of TNF- α , IL-6 and IL-10. Also, the level of cytokines in maternal blood may be a predictive factor for the weight of the fetus at birth.

Objectives

The 1st study aimed at assessing women's weight gain during pregnancy based on energy intake and macronutrients. This study was performed on 115 pregnant women and also followed the diet types of pregnant women during pregnancy and the assessment of the link between the type of diet and the weight of newborns at birth. Anthropometric parameters such as MUAC and TST were also evaluated.

The 2nd study included 170 pregnant women and tracked the correlation between women's weight gain during pregnancy and inflammatory status by evaluating IL-6, IL-8 and hepcidin. The evaluation of some laboratory parameters as well as the values of IL-6, IL-8 and hepcidin at the end of the first trimester of pregnancy and at birth as well as their values in newborns were also followed. The correlation between gestational weight gain and cytokines at the end of the first trimester of pregnancy and at birth was performed.

The 3rd study aimed to assess the correlation between excessive weight gain in pregnant women and laboratory parameters in the peripheral blood suggestive of systemic inflammation. This study was performed on 176 pregnant women. Lipid metabolism parameters as well as NLR and PLR were also evaluated.

General methodology

All studies described in this thesis are prospective and have been performed on pregnant women over the age of 18 and followed throughout pregnancy and at birth. The pregnant women in the study underwent anthropometric measurements, but laboratory tests were also taken, both usual tests and special tests such as cytokines or hepcidin. The division of pregnant women into the two groups was performed based on weight gain in pregnancy, which was defined as the difference between the weight at the end of pregnancy and the weight before conception, considering this as the weight of the pregnant woman at inclusion in the study, ie in the first trimester.

Results

1st study: We noticed that the number of pregnant women who had an increased gestational weight gain was higher than the one with adequate weight gain. Most pregnant women who were overweight were primiparous. Pre-gestational BMI was higher in pregnant women with excessive gestational weight gain. Also, MUAC and TST values were higher in pregnant women who had an increased gestational weight gain. We identified a higher birth weight of newborns in mothers with excessive weight gain, and these pregnant women had a higher caloric intake in all trimesters compared to those with adequate weight gain. Regarding diet, we observed that a lipid-based diet is a risk factor for excessive weight gain (relative risk 1.488 with 95% CI 1.112-1.991), while protein-based diet is a protective factor (relative risk 0.6723 and 95% CI 0.4431-1.020).

Conclusions of the 1st study: predominantly lipid-based diet is a risk factor for gestational overweight, while a dietary protein pattern is a protective factor. In pregnant women with excessive weight gain, pregestational BMI was higher than in those with adequate weight gain.

2nd study: We concluded that both cholesterol and triglyceride levels increase during pregnancy, and PCR values were 7 times higher at birth than at the end of the first trimester; likewise, ESR values were double at the end of pregnancy compared to the first trimester. Regarding cytokines, IL-8 values doubled at birth compared to the first trimester (36.34 ± 33.70 pg / ml at the end of the first trimester compared to 82.05 ± 71.85 pg / ml at the end). The value of IL-6 tripled at the end of pregnancy compared to the first trimester (2.77 ± 1.74 pg / ml in the first trimester compared to 10.59 ± 11.80 pg / ml at the end of pregnancy). Hepcidin values were also increased at the end of pregnancy compared to the first trimester (8.11 ± 10.04 ng / ml in the first trimester compared to 12.03 ± 20.76 ng / ml at the end of pregnancy).

Conclusions of the 2nd study: inflammatory status during pregnancy is strongly correlated with neonatal one. Excessive gestational weight gain at the end of gestation will cause a higher level of IL-8 in the mother. There is a significant positive correlation between inflammatory biomarkers and IL-6 and hepcidin.

3rd study: We identified that the value of pregestational BMI was higher in pregnant women with high weight gain in pregnancy. Regarding laboratory parameters, pregnant women in the group with high weight gain in pregnancy had a higher level of platelets and triglycerides than pregnant women with adequate weight gain ($p = 0.0165$, respectively $p = 0.0247$). We observed a significantly positive correlation

between gestational weight gain and fetal birth weight ($r = 0.2049$ with 95% CI: 0.0588-0.3425, $p = 0.0064$) and a significantly negative correlation between weight gain in pregnancy and mean hemoglobin concentration in erythrocyte ($r = 0.1659$ with 95% CI: 0.3063 - 0.0184, $p = 0.0278$).

Conclusions of the 3rd study: excessive gestational weight gain in pregnancy will cause a gestational inflammatory status, which has an effect on pregnancy and childbirth. Following the significantly positive correlations between leukocytes and PLR in both mother and newborn, we concluded the presence of the transfer of inflammation from mother to fetus.