Artigo Original/Original Article

Influência do índice de massa corporal na evolução da diabetes gestacional

Implications of body mass index in the evolution of gestational diabetes

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ABSTRACT

Objective: To evaluate the implications of body mass index (BMI) in pregnancies complicated with gestational diabetes (GD).
Study Design: Retrospective assessment of pregnancies complicated with GD managed at our institution from January 2000 to December 2004.
Results: Obstetrical complications beyond GD occurred in: group A (BMI 20-24,9) - 23%; group B (BMI 25-29,9) - 18.8% and group C (BMI>30) - 35.3%, including hypertensive disorders in A-1.65%, B-3.76% and C-9.6%. Mean value of HbA1c at third trimester was A-5.05, B-5.25 e C-5.41%. Insulin treatment was needed in A 26.1%, B-41% and C-50.6%, and was started on average at A-32.8, B-30.5 and C-29.3 gestational weeks. Delivery occurred on average at 38 weeks in the three groups, with caesarean rates of A-26.7%, B-33.1% and C-38.5%. Mean birthweight of the newborns was A-3189g, B-3307g and C-3469g. There were 5 perinatal deaths (A-1, B-2 and C-2). Maternal and neonatal morbidity were not significantly different in the three groups.
Conclusions: Obese pregnant women with GD had a higher mean maternal age, higher rates of obstetrical complications (hypertensive in particular), higher levels of HbA1c in the third trimester, needed insulin treatment more frequently and at earlier gestational ages, and their newborns were heavier.
Key-words: body mass index; pregnancy; gestational diabetes

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INTRODUCTION

Obesity became a public health problem with growing rates in industrialized countries, and affecting anyone from women to men at all ages and social conditions. The negative impact on the health of the affected individuals is well known, as it elevates the risk for the

development of cardiovascular diseases and diabetes, among others.

In pregnant women (non diabetic), obesity is known to increase the risk of obstetrical complications and adverse perinatal results, such as a higher risk for gestational diabetes, hypertensive complications, infections, macrossomy, fetal death and distocic deliveries.[1,2]

From clinical practice, there is the idea that obese pregnant women, whose pregnancy is complicated with gestational diabetes, have more difficulties in controlling glycemic levels, with implications on the outcome of the gestation.

With the present work, we aim to evaluate the implications of body mass index (BMI) in pregnancies complicated with Gestational Diabetes (GD).

POPULATION AND METHODS

A retrospective assessment was made of all singleton pregnancies complicated with GD managed at our institution from January 2000 to December 2004.

Gestational Diabetes was defined by criteria of our National Screening. In women with no risk factors for development of diabetes, the O'Sullivan test is done by the 24th and 32nd weeks of gestation. If the test is positive (glycaemia ≥140 mg/dl one hour after ingestion of 50 g of glucose in 200 ml of water), an oral glucose tolerance test (OGTT – glycaemia at 0, 60, 120 and 180 minutes after ingestion of 100 g of glucose in 400 ml of water) is undertaken. GD diagnose is made if two or more of these glycaemia measures are greater than the values of 95, 180, 155 and 140, respectively. When pregnant women have risk factors for development of GD, the O'Sullivan test is also made at the first visit.

Those pregnant women were divided in 3 groups according to the Body Mass Index (BMI): A- normal weight (BMI 20-24.9 Kg/m2), B – overweight (BMI 25-29.9 Kg/m2) and C – obese (BMI e"30 Kg/m2).

The BMI was calculated upon the prepregnant weight at the first prenatal visit.

Women with multiple pregnancies and with a BMI <20 Kg/m2 or unknown were excluded from this study.

In each group were analysed the following variables: maternal age, weight gain, family history of diabetes, previous GD, stillbirth and macrossomy, obstetrical complications, gestational age at GD diagnose, glicosilated haemoglobin (HbA1c), insulin need and gestational age of introduction, gestational age at delivery, type of delivery, birthweight, newborn malformations, perinatal mortality, perinatal and maternal morbidity and admission to Newborn Intensive Care Unit (NICU).

The statistical analysis was made by ANOVA test for quantitative variables and by the Mann-Whitney test for qualitative variables.

A *p* value <0.05 was considered significant.

RESULTS

Of the 698 pregnancies included, 303 (43.4%) were integrated in group A (BMI 20-24,9 Kg/m2), 239 (34.2%) in group B (BMI 25-29,9 Kg/m2) and 156 (22.3%) in group C (BMI ≥30 Kg/m2). Tables I, II and III summarize the results.

The obese group (C) had a significantly higher (p=01) mean maternal age - 32,8 years, when compared to group A - 31,4 years, as well as to group B – 32.4 years, (p=0.03).

Weight gain was significantly lower (p<.001) in group C - 6,9 Kg, in relation to group A - 10,4 Kg.

Regarding family history of diabetes - 49,5% vs 53,9% vs 54,5% -, previous gestational diabetes - 5,9% vs 10,1% vs 12,2% - and stillbirth - 2,6% vs 4,6% vs 2,5% -, there were no significantly differences between the 3 groups. Previous macrossomy was higher, (p<.001), in group C - 13,9% - comparatively to group A - 4,1%.

Obstetrical complications (including preterm birth, preterm rupture of membranes and infections) occurred in higher rates (p=.006) in group C (35.3%) when compared to group A (23,1%), and also when compared (p=.0001) to group B (18,8%). Hypertensive disorders, in particular, were more frequent in group C (9,6%) and in group B (3,8%) comparatively to group A (1,6%), although statistic significance only occurred between groups A and C (p=.0001).

Gestational diabetes diagnosis was made significantly earlier in group C – 27,2 weeks - (p <.0001) and in group B – 28,5 weeks - (p =.04) when compared to group A – 29,8 weeks.

Table I Results from the study and statistic evaluation between Groups A – normal weight women, and B – overweight pregnant women

	Group A	Group B	p value
N (n)	303	239	-
Mean Maternal Age (years)	31.4	32.4	0.03
Mean GA at diagnose (weeks)	29.8	28.5	0.04
Hypertensive disorders (%)	1.6	3.8	n.s.
Insulin need (%)	26	41.1	0.000
Mean GA at insulin start (weeks)	32.8	30.5	0.03
HbA1c 3rd trimester (%)	5.0	5.2	0.00
Mean GA at delivery (weeks)	38.4	38.5	n.s.
Caesarean rate (%)	26.7	33.1	n.s.
Mean birthweight (g)	3189	3307	0.03
Macrossomy (%)	9.2	19.7	0.001
Neonatal morbidity (%)	7.6	8.4	n.s.
NICU admission (%)	4	3.8	n.s.
Perinatal mortality (%)	0.1	0.3	n.s.

*a p value <.05 was considered significant

Table II **Results from the study and statistic evaluation between Groups A – normal weight women, and C – obese pregnant women**

	Group A	Group C	p value
N (n)	303	156	-
Mean Maternal Age (years)	31.4	32.8	0.01
Mean GA at diagnose (weeks)	29.8	27.2	0.000
Hypertensive disorders (%)	1.6	9.6	0.000
Insulin need (%)	26	50.6	0.000
Mean GA at insulin start (weeks)	32.8	29.3	0.001
HbA1c 3rd trimester (%)	5.0	5.4	0.000
Mean GA at delivery (weeks)	38.4	38.4	n.s.
Caesarean rate (%)	26.7	38.5	0.008
Mean birthweight (g)	3189	3469	0.000
Macrossomy (%)	9.2	30.2	0.000
Neonatal morbidity (%)	7.6	12.2	n.s.
NICU admission (%)	4	7.1	n.s.
Perinatal mortality (%)	0.1	0.3	n.s.

* a p value < .05 was considered significant

Mean value of HbA1c at third trimester was significantly (p<.0001) higher in group C (5,4%) and in group B (5,2%), when compared to group A (5,0%).

Insulin treatment was needed in 50.6% of group C and in 41.1% of group B, while in just 26% of group A, these differences being statistically significant (p=.0001). It was started on average at 29,3 gestational weeks in group C, at 30.5 in group B and at 32,8 in group A, this differences being statistically significant with p=.001 and p=.03, respectively.

Delivery occurred on average at 38 weeks in the 3 groups, with caesarean rates higher in group C - 38,5%, in relation to group A - 26,7%, (p =.008).

Table III Results from the study and statistic evaluation between Groups B – overweight women, and C – obese pregnant women

	Group B	Group C	p value
N (n)	239	156	-
Mean Maternal Age (years)	32.4	32.8	n.s.
Mean GA at diagnose (weeks)	28.5	27.2	n.s.
Hypertensive disorders (%)	3.8	9.6	0.000
Insulin need (%)	41.1	50.6	n.s.
Mean GA at insulin start (weeks)	30.5	29.3	n.s.
HbA1c 3rd trimester (%)	5.2	5.4	0.01
Mean GA at delivery (weeks)	38.5	38.4	n.s.
Caesarean rate (%)	33.1	38.5	n.s.
Mean birthweight (g)	3307	3469	0.009
Macrossomy (%)	19.7	30.2	0.02
Neonatal morbidity (%)	8.4	12.2	n.s.
NICU admission (%)	3.8	7.1	n.s.
Perinatal mortality (%)	0.3	0.3	n.s.

* a p value < .05 was considered significant

The newborns of group A were lighter (3189g) when compared to those of group C (3469g, p<.0001), but also when compared to group B (3307g, p=.009).

Admissions to NICU and perinatal deaths were not different in the studied groups, as well as the neonatal malformation rates and maternal and neonatal morbidity.

In relation to pregnant women with normal weight, obese pregnant women with GD had a higher mean maternal age, higher rates of obstetrical complications (hypertensive in particular), earlier diagnose of GD, higher levels of HbA1c at the 3rd trimester, needed insulin treatment more frequently and at earlier gestational ages. They also had higher rates of caesarean deliveries and their newborns were heavier, with higher rates of macrossomy.

Overweight pregnant women with gestational diabetes (when compared to the normal weight group), had a higher maternal age, lower mean gestational age at diagnosis and at insulin start, needed insulin more frequently and had higher values of HbA1c in the 3rd trimester. Their newborns were heavier and also with higher rates of macrossomy.

Regarding the differences between overweight and obese pregnant women, we found that the last group had higher levels of hypertensive disorders, higher levels of HbA1c in the 3rd trimester and their newborns were heavier (also with higher rates of macrossomy).

DISCUSSION

Although there are a large number of studies regarding pregnancy outcomes according to pre-pregnancy weight in non-diabetic women, there are only a few studies regarding pregnancy outcomes and glycemic level controls in those complicated with gestational diabetes[1]. Nevertheless, in these studies an association between overweight and obesity with bad metabolic control and higher rates of pregnancy complications is reported.

Since obesity itself is a risk factor for adverse pregnancy outcomes, one of the purposes of prenatal visits, once the diagnosis of gestational diabetes is made, is to obtain the best glycemic control possible[1-3].

We found that obese women had more difficulties in achieving the ideal glycemic control, needing more frequently insulin treatment than other women, and at earlier gestational ages. A favourable evolution in a GD patient is dependent on the glycemic levels and on the need to control them with insulin. In those pregnant women that maintain euglycemic levels until delivery, the risk of complications is not increased when

compared to non-diabetic women[2]] But this euglycemic state is more difficult to obtain when GD women are overweight or obese.

Pregnancy complications, including infections, preterm rupture of membranes and preterm birth, were also more frequent in the obese group, probably reflecting the influence of obesity associated with a deficient metabolic control. Hypertensive disorders, which were also more frequent in this group, probably reflect the 'metabolic syndrome'. It is known that obesity and gestational diabetes course frequently with insulin resistance and hiperinsulinemia, which are also common findings along with dyslipidemia and hypertension[1,2].

These difficulties in glycemic control did not affect gestational age at delivery, but could be responsible for the higher rates of caesarean and heavier newborns in the obese women group.

These results reinforce the importance of health education at the primary care level regarding the benefits of losing weight, practicing exercise and following an adequate diet, to minimise the adverse complications that overweight can bring, especially in those women who still are in a fertile age. And once pregnant, they should be alerted for the crucial importance of adequate weight gain control.

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