The influence of maternal BMI and weight gain in gestational diabetes: results of the Portuguese population in 2011

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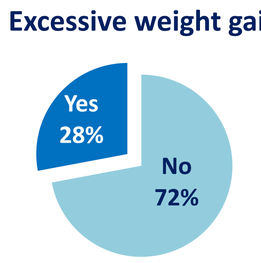
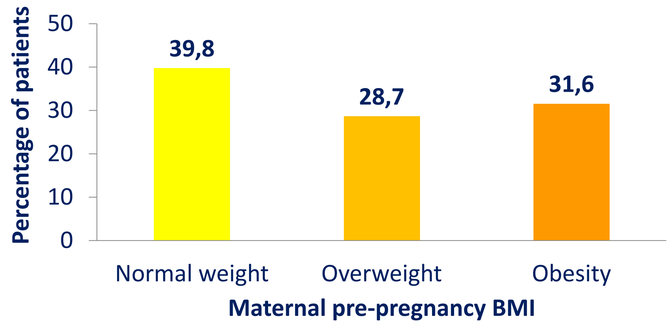
Background and aims: Maternal BMI and weight gain are associated with maternal and fetal complications in gestational diabetes (GD), but their relative contribution is not clearly defined. The aims of this study are, in women with GD, to analyse: 1) the relationship between maternal pre-pregnancy BMI and previous maternal factors; 2) the absolute weight gain and excessive weight gain in pregnancy according maternal BMI ; 3) the influence of maternal pre-pregnancy BMI and maternal excessive weight gain in the evolution of pregnancy and in fetal overgrowth.

Material and Methods: Multicentric cross-sectional study of women with GD included in the records of the Portuguese Group for the Study of Diabetes and Pregnancy in 2011. We included women with GD according to the new criteria of the IADPSG and excluded multiple pregnancies and cases with lack of information about maternal BMI. The Chi-square, Mann-Whitney, Kruskall-wallis and One-way ANOVA tests were used for statistical analysis. We considered a level of significance of 0,05.

Results

- N = 1577 women
- Age: 33,1±5,3 years [17-48]
- Pre-pregnancy maternal BMI: 27,5±6,0Kg/m^2 [14,3-51,8]
- Weight gain in pregnancy: 9,9±5,5Kg [-8;33]
- Gestational age at delivery: 38,3±1,7 weeks [22-41]
- 9,8% of the newborns classified as LGA.





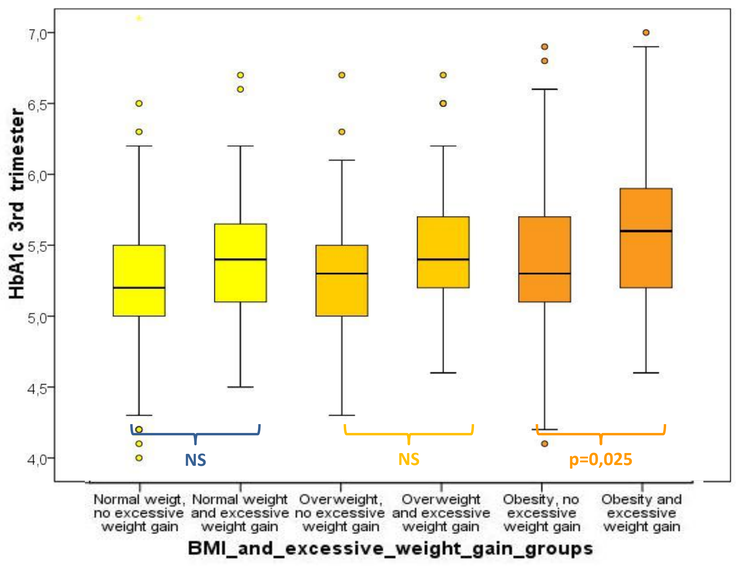
Relationship between maternal pre-pregnancy BMI and previous maternal factors

Previous maternal factors	Initial maternal BMI			
	Normal Weight	Overweight	Obesity	p
Maternal age	32,9±5,5 [17-48]	33,4±5,2 [19-46]	33,1±5,2 [17-46]	NS
Family history of diabetes	38,4%	43,7%	48,8%	0,002
Multiparity	49,8%	57,7%	62,8%	<0,001
Previous GD	9,9%	16,2%	15,0%	0,005
Previous LGA	3,2%	5,3%	10,1%	<0,001

Absolute weight gain and excessive weight gain in pregnancy according maternal BMI

In pregnancy	Initial maternal BMI						
	Normal weight (NW)	Overweight (OW)	Obesity (Ob)	p	NW vs OW	NW vs Ob	OW vs Ob
Weight gain (Kg)	11,5±4,7 [-2; 29]	10,0±5,5 [-6;31]	7,9±5,8 [-8;33]	<0,001	<0,001	<0,001	<0,001
Women with excessive weight gain (%)	17,3%	34,3%	35,5%	<0,001			

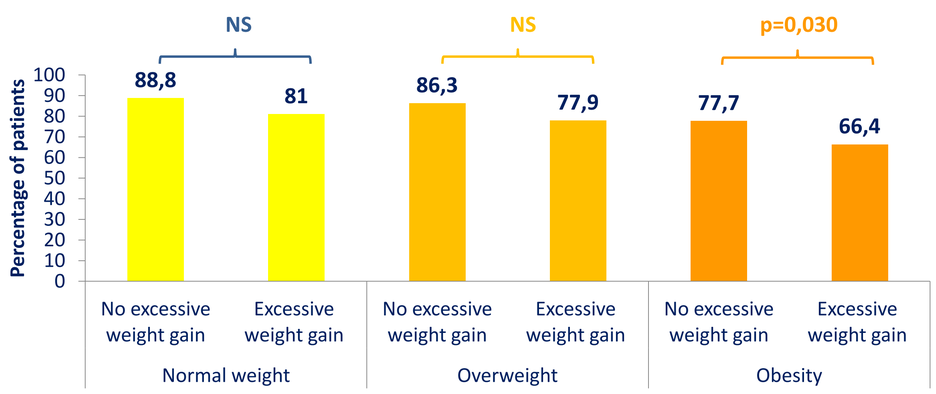
Influence of maternal pre-pregnancy BMI and maternal excessive weight gain in the evolution of pregnancy and in fetal overgrowth.



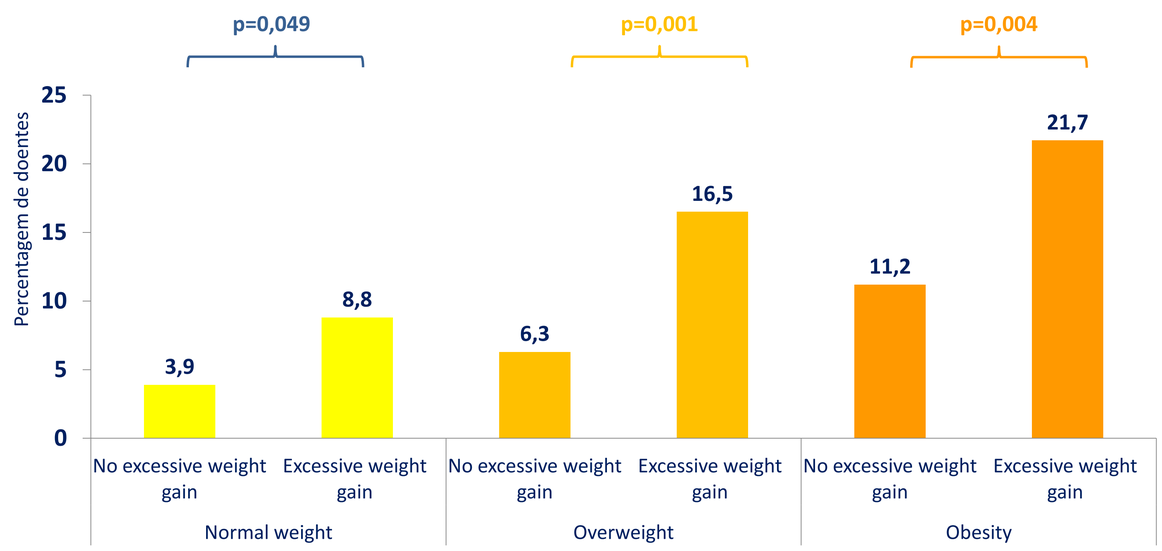
Maternal BMI	Normal weight			Overweight			Obesity		
Excessive weight gain	No	Yes	p	No	Yes	p	No	Yes	p
GD week of diagnosis*	25,0 (5,0) [4-38]	26,0 (8,0) [5-37]	NS	25,0 (13,0) [4-38]	26,0 (10) [6-38]	NS	23,0 (15,0) [5-37]	26,0 (15,0) [4-37]	<0,001
Insulinotherapy (%)	29,3%	30,2%	NS	40,3%	37,1%	NS	50,0%	52,3%	NS
Week of beginning of insulinotherapy*	30,0 (6,0) [10-38]	28,0 (9,0) [13-37]	NS	29,5 (9,0) [9-37]	30,5 (5,0) [10-39]	NS	27,0 (13,0) [8-37]	30,0 (13,0) [8-37]	NS
Insulin TDD*	11,5 (14,0) [2-69]	20,0 (22,0) [4-106]	NS	18,0 (25,0) [2-88]	15,0 (22,0) [4-62]	NS	20,0 (23,0) [4-96]	24,0 (27,0) [4-128]	NS
Infant weight (g)	2995,3±507,4 [860-4565]	3273,8±434,8 [2258-4700]	<0,001	3128,4±508,8 [562-4715]	3348,7±500,1 [1540-4520]	0,007	3190,7±510,5 [1050-4645]	3378,7±592,2 [1515-5040]	0,043

* Md (IQR) [range]; TTD – Total daily dose

HbA1c < 5,8%



Large for Gestational Age



Conclusion: Women with higher pre-pregnancy BMI and women with excessive weight gain in pregnancy had higher rates of inadequate glycaemic control in the 3rd trimester and of LGA newborns. In all BMI groups, excessive weight gain in pregnancy led to an increased occurrence of LGA. Although maternal prepregnancy BMI is important for the occurrence of LGA, weight gain in pregnancy is also an important factor that can significantly influence fetal overgrowth. This highlights the need, not only to control women's weight before pregnancy, but also during its course, to reduce the risk of fetal overgrowth.

Bibliography: 1. Black, M. H.; Sacks, D. A.; Xiang, A. H.; Lawrence, J. M. The relative contribution of prepregnancy overweight and obesity, gestational weight gain and IADPSG-defined gestational diabetes mellitus to fetal overgrowth. Diabetes Care 36:56-62, 2013; 2. Ricart W. Et al. Body mass index has a greater impact on pregnancy outcomes than gestational hyperglycaemia. Diabetologia (2005) 48:1736-1742; 3. International Association of Diabetes and Pregnancy Study Groups Consensus Panel. International Association of Diabetes and Pregnancy Study Groups Recommendations on the Diagnosis and Classification of Hyperglycemia in Pregnancy. Diabetes Care, volume 33, Number 3, March 2010 676-682; 4. Catalano P. M. et al. The Hyperglycemia and Adverse Pregnancy Outcome Study: Associations of GDM and obesity with pregnancy outcomes. Diabetes Care 35:780-786, 2012, 5. Ouzounian JG et al. Pre-pregnancy weight and excess weight gain are risk factors for macrossomia in women with gestational diabetes. Journal of Perinatology (2011) 31, 717-721; 6. HAPO Study Cooperative Research Group. Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) Study: associations with maternal body mass index. BJOG 2010;117:575-584