

Gestational diabetes mellitus - one disease with many questions

Berović M, Frangen D, Pažur J, Potkonjak AM, Košec V, Gall V
University hospital centre Sestre milosrdnice, Zagreb, Croatia

Objective

Gestational diabetes mellitus (GDM) is a condition which reflects different patterns of glucose metabolism of pregnant woman, with various short- and long-term effects on the foetus and the newborn. The treatment is predominantly based on well-established algorithms which do not consider female metabolic type as well as a lifestyle. The body mass index (BMI) might play an important role, as it presents/indicates maternal metabolism, when targeting therapy in the context of gestational diabetes. The aim of this study was to investigate the impact of maternal pre-pregnancy BMI on the oral glucose tolerance test (OGTT), weight gain during pregnancy and birth weight, suggesting different patterns of glucose metabolism.

Methods

This is a retrospective cohort study which included 108 pregnant women who developed gestational diabetes. The patient data were collected from the archive of University Hospital Centre Sestre milosrdnice. The Institutional Ethics Committee approved the study. Information collected for the analysis were: the OGTT levels, weight gained during the pregnancy and the birth weight of their babies. The participants were divided according to their pregestational BMI in 3 groups: obese (BMI >30; group 1), overweight (BMI 25-29; group 2) and low weight (BMI 18,4-20; group 3) pregnant women. None of them had multiple pregnancy. The first group had 47 participants, the second group 37 and the third group had 24. The calculation of the pre-pregnancy BMI was performed by dividing the weight in kilograms with the square of height in meters. The diagnosis of gestational diabetes was performed with 75 g of glucose measuring 2-hour glucose levels proposed by International Association of Diabetes and Pregnancy Study Group. The OGTT was done between 24 and 28 gestational weeks. The criteria include fasting glucose levels (FGL) above 5.1 mmol/L (92 mg/dL), glucose level after 1 hour above 10.0 mmol/L (180 mg/dL) and after 2 hours above 8.5 mmol/L (153 mg/dL). Results of the OGTT were given in milligrams per decilitre (mg/dL) or millimoles per litre (mmol/L). Gained weight was given in kilograms (kg) and birth weight in grams (g). Weight gain regarding BMI was calculated according to Institute of Medicine (IOM) recommendations. The recommended weight gain for low weight women is 11.3-15.8kg, for overweight 6.8-11.3kg and for obese 5-9,1kg. Statistical analysis was performed using the χ^2 -test. Statistical Package for Social Sciences (SPSS v. 19) was used for statistical analysis.

Results

The average weight gain during pregnancy in low weight women was 9.5 ± 3.4 kg, $M \pm SD$. Significantly higher weight gain during pregnancy was observed in overweight pregnant women (18.5 ± 4.65 kg, $M \pm SD$). The weight gain in obese women was slightly above the recommended 11.2 ± 5.9 kg ($M \pm SD$). A statistically significant difference in weight gain during pregnancy between the first and the second group ($p=0.00000003$, DF 82) as well as the second and the third group ($p=0.0000000003$, DF 59) was found. The obese and overweight pregnant women showed almost similar FGL: 5.4 mmol/L ± 0.47 ($M \pm SD$) and 5.3 mmol/L ± 0.7 , ($M \pm SD$) respectively. The pregnant women with low pre-pregnancy BMI had significantly lower FGL (4.7 mmol/L ± 0.4 , $M \pm SD$) in comparison to other 2 groups ($p = 0.000000001$, DF 71, $p = 0.001$, DF 59). The mean glucose level 60 minutes after glucose load in the first group was 9.9 mmol/L ± 2.05 ($M \pm SD$), in the second group 8.7 mmol/L ± 1.6 ($M \pm SD$) and 10.3 mmol/L ± 1.5 ($M \pm SD$) in the third group. A statistically significant difference was found between the second and the third group ($p=0.004$, DF 35) but not between the first and the second group ($p=0.07$, DF 33) and between the first and the third group ($p= 0.46$, DF 38). The first group showed glucose levels of 7.2 mmol/L ± 1.9 ($M \pm SD$) 120 minutes after glucose load, the second group 8.2 mmol/L ± 1.4 ($M + SD$) and the third group 9.1 ± 1.2 ($M \pm SD$). The glucose levels measured 120 minutes after glucose load differed significantly between the first and the third group ($p=0.00003$, DF 71) as well as between the first and the second group ($p= 0.01$, DF 84), but did not between the second and the third group ($p=0.4$, DF 71). The average birth weight of newborns in the first group was significantly higher comparing to the third group (3521 grams ± 489 g ($M \pm SD$) and 3177 ± 344 g ($M \pm SD$), $p=0.03$, df 69). The second group had significantly heavier babies comparing to the third group (3659 ± 471 g ($M \pm SD$): 3177 ± 344 g ($M \pm SD$), $p= 0.00006$, df 59). Between the first two groups there were no statistically significant difference.

Conclusion

Overweight and obese women showed fasting glucose level higher than low weight women which suggests different metabolic patterns of glucose. The reasonable explanation may be an insuline resistance of peripheral tissues for the first two groups, whereas it may be the lack of pancreas response to glucose overload in low weight women which rather results in glucose intolerance. The latter could be supported by higher glucose levels afterload in the third group. Should we observe and treat gestational diabetes regarding BMI? A diagnosis of gestational diabetes does not always mean the same condition and/or circumstances. Different metabolic patterns of glucose seem to be a reasonable explanation. Should diabetic diet remain the golden standard of care or should it be individualised based on BMI? Dietary treatment options should be revised due to different metabolic patterns of glucose. According to the IOM guidelines, low weight women did not gain suggested weight during pregnancy and their children were smaller. The overweight women gained weight which was extremely above the recommendations what is very concerning. We should pay attention especially to them because they are under the risk of developing more obstetrical complications.