

RISK FACTORS FOR FETAL MACROSOMIA IN GESTATIONAL DIABETES



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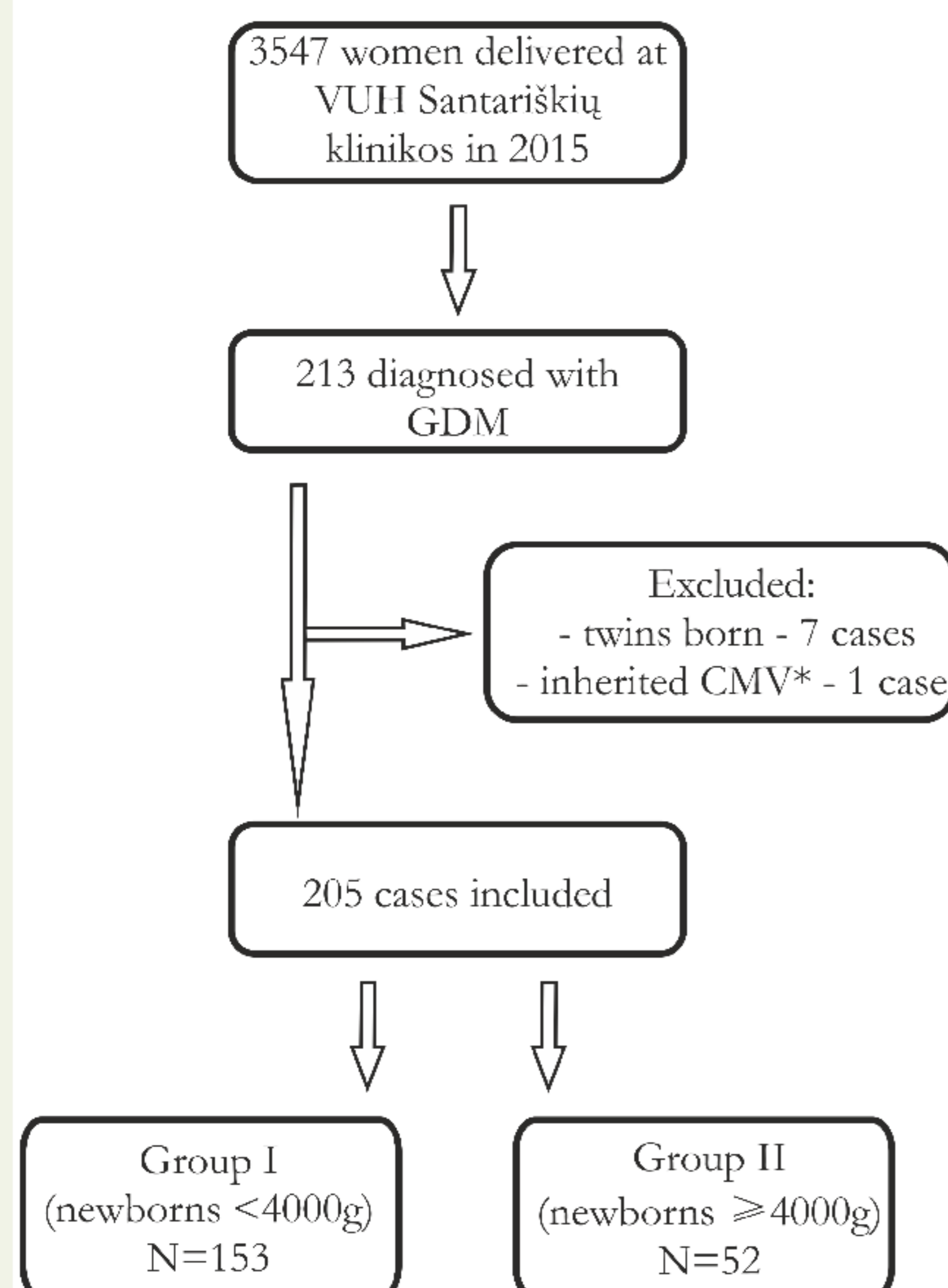
Introduction

Fetal macrosomia is one of the most important neonatal complications of gestational diabetes mellitus (GDM), which is reportedly associated with neonatal morbidity, neonatal injury, maternal injury, and increased rate of Cesarean delivery. These children have a higher risk of becoming overweight or obese at a young age and are more likely to develop type 2 diabetes later in life. The timely prediction and diagnosis of GDM would reduce the rate of complications mentioned.

The aim of our study was to assess the maternal predicting factors of fetal macrosomia in GDM.

Methods

Retrospective data analysis of 3547 women who delivered in Vilnius University Hospital Santariskiu Klinikos in 2015 was performed (Fig. 1). Documented GDM risk factors were obtained from electronic database. Newborns over 4000 g birth weight were defined as macrosomic cases. Comparisons were made between women who delivered healthy (group I) and macrosomic (group II) newborns. Multiple regression analysis was used to calculate the odds ratio (OR) and their 95% confidence intervals (CI).



* CMV - Cytomegalovirus

Fig. 1. Patient selection flow chart.

Results

There were significant differences in maternal characteristics of pregestational body weight, pregestational body mass index (BMI), gestational age at GDM diagnosis, previous fetal macrosomia and polyhydramnios among two groups (Table 1). Pregestational body weight, pregestational BMI, gestational age at GDM diagnosis, gestational age at delivery, previous fetal macrosomia and polyhydramnios were statistically significant predictors for fetal macrosomia in the univariate logistic regression model (Table 2). Multivariate regression analysis developed 2 models for prediction of fetal macrosomia: pregestational body weight and previous fetal macrosomia entered as a significant independent variables in a model 1, when pregestational body weight was used as measure of weight; previous fetal macrosomia entered as only a significant independent variable in a model 2, when pregestational BMI was used as a measure of weight (Table 3 and Table 4).

TABLE 1. Comparison of risk factors among groups

Risk factors	Women who delivered < 4000 g newborns N = 153	Women who delivered ≥ 4000 g newborns N = 52	P value
Age (years), mean ± SD	31.7 ± 4.4	32.1 ± 5.4	0.672
Pregestational body weight (kg), mean ± SD ¹	67 ± 13.5	78.3 ± 19.7	0.002
Pregestational BMI (kg/m ²), mean ± SD ²	25.7 ± 4.9	29 ± 6.4	0.004
Gestational age at GDM diagnosis, (weeks), mean ± SD	29.7 ± 3.6	31 ± 3.9	0.048
Obstetric history:			
Previous GDM, N (%) ³ (≥2 pregnancies, N=124)	8 (10.3)	3 (9.7)	0.618
Previous fetal macrosomia, N (%) ⁴ (≥2 deliveries, N=107)	13 (19.7)	19 (63.3)	< 0.001
Previous miscarriage, N (%) ⁵ (≥2 pregnancies, N=124)	27 (33.8)	9 (26.5)	0.444
Previous pre-eclampsia, N (%) ⁶ (≥2 pregnancies, N=124)	4 (5)	1 (3.1)	0.551
Previous prematurity, N (%) ⁷ (≥2 deliveries, N=107)	3 (4.7)	2 (6.9)	0.645
Comorbidities and other risk factors:			
Family history of diabetes, N (%) ⁸	64 (45.7)	24 (54.5)	0.306
Chronic hypertension, N (%) ⁹	8 (5.6)	1 (2.2)	0.689
Polycystic ovary syndrome, N (%) ¹⁰	3 (2)	0	1.00
Maternal outcomes:			
Gestational hypertension/pre-eclampsia, N (%)	18 (11.7)	4 (7.7)	0.604
Polyhydramnios, N (%)	6 (3.9)	7 (13.5)	0.015
Urinary/genital tract infection, N (%)	60 (39.2)	18 (34.6)	0.555
Gestational age at delivery (weeks), mean ± SD	38.5 ± 2.1	39.2 ± 0.86	0.108

¹missing 27; ²missing 26; ³missing 15; ⁴missing 11; ⁵missing 10; ⁶missing 13; ⁷missing 14; ⁸missing 21; ⁹missing 18; ¹⁰missing 17.

TABLE 2. Univariate predictors of macrosomia

Variables	OR (95 % CI)	P value
Age (years)	1.02 (0.95 – 1.09)	0.545
Pregestational body weight	1.05 (1.02 – 1.07)	< 0.001
Pregestational BMI	1.11 (1.04 – 1.19)	0.001
Gestational age at GDM diagnosis	1.11 (1.01 – 1.22)	0.033
Obstetric history:		
Previous GDM	1.3 (0.33 – 5.13)	0.71
Previous fetal macrosomia	8.04 (3.51 – 18.41)	< 0.001
Previous miscarriage	0.9 (0.38 – 2.15)	0.819
Previous pre-eclampsia	0.66 (0.08 – 5.82)	0.710
Previous prematurity	2.33 (0.38 – 14.45)	0.36
Comorbidities and other risk factors:		
Family history of diabetes	1.63 (0.81 – 3.26)	0.171
Chronic hypertension	0.41 (0.05 – 3.33)	0.4
Polycystic ovary syndrome	0	1.0
Maternal outcomes:		
Gestational hypertension/ pre-eclampsia	0.66 (0.21 – 2.06)	0.476
Polyhydramnios	4.04 (1.3 – 12.67)	0.017
Urinary/genital tract infection	0.79 (0.4 – 1.55)	0.498
Gestational age at delivery	1.35 (1.04 – 1.76)	0.025

TABLE 3. Multivariate prediction of macrosomia (model 1)

Variables	OR (95 % CI)	P value
Pregestational body weight	1.03 (1.00 – 1.06)	0.033
Gestational age at GDM diagnosis	1.07 (0.95 – 1.21)	0.24
Previous fetal macrosomia	4.72 (1.74 – 12.82)	0.002
Polyhydramnios	3.06 (0.76 – 12.4)	0.117
Gestational age at delivery	1.32 (0.95 – 1.82)	0.1

TABLE 4. Multivariate prediction of macrosomia (model 2)

Variables	OR (95 % CI)	P value
Pregestational BMI	1.07 (0.99 – 1.15)	0.092
Gestational age at GDM diagnosis	1.09 (0.97 – 1.22)	0.166
Previous fetal macrosomia	5.17 (1.95 – 13.74)	0.001
Polyhydramnios	2.65 (0.67 – 10.49)	0.165
Gestational age at delivery	1.36 (0.97 – 1.89)	0.074

Conclusions

Neonatal macrosomia prevention remains a challenge. According to our study pregestational body weight and previous fetal macrosomia are associated with increased risk of fetal macrosomia of current pregnancy. This finding provides insights for the prevention of macrosomia development in women with GDM.

