

Introduction

Gestational Diabetes Mellitus (GDM) affects approximately 18% of pregnancies in Australia, with incidence continuing to rise. Management is primarily focused on achieving glycaemic control to reduce the risk of large-for-gestational-age (LGA) infants. However, the incidence of small-for-gestational-age (SGA) infants among women with GDM in Australia remains poorly described. A study from the US reported that approximately 7% of infants born to mothers with GDM were SGA.

Infants born SGA have increased risks of neonatal morbidity and mortality. These adverse effects may persist into adulthood, with an elevated risk of cardiovascular disease, obesity, and type 2 diabetes mellitus (T2DM).

Aim

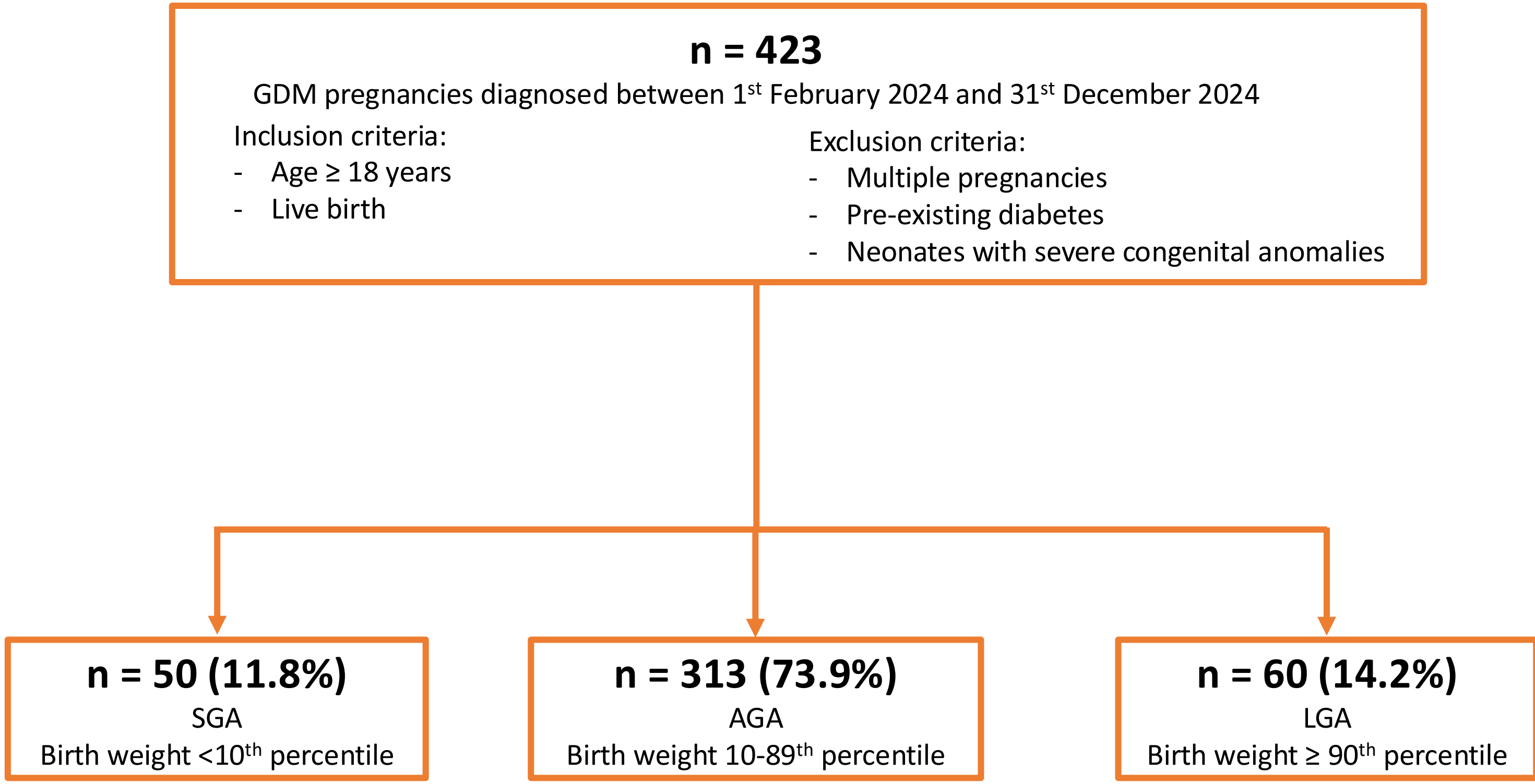
The primary aim of this study was to identify risk factors associated with having an SGA infant in GDM pregnancies.

Methods

We conducted a retrospective audit of 423 GDM pregnancies resulting in live births at a single tertiary hospital between 1 February 2024 and 31 December 2024. The cohort consisted of 60% Asian (mean BMI 27.3), 19.3% Caucasian (mean BMI 33.3) and 19% Middle Eastern (mean BMI 29.9) women. Infants were classified as SGA if their birth weight was <10th percentile for gestational age and sex according to WHO growth standards. Multivariable logistic regression analysis was performed to identify independent risk factors associated with the delivery of an SGA newborn.

Results

11.8% of women with GDM in this study delivered SGA infants. A prior history of SGA was strongly associated with a subsequent SGA baby (OR 17.09, p <0.001, 95% CI: 4.39-66.46). The first live born of a GDM pregnancy also had a higher association with SGA (OR 10.13, p 0.001, 95% CI: 2.71-37.86). Lower pre-pregnancy body mass index was associated with SGA in univariate analysis; but not after multivariable adjustment. Gestational weight gain, smoking, and oral glucose tolerance test values were not associated with SGA outcomes.



Ethnicity	Participants, n (%)	Mean Pre-pregnancy BMI (kg/m ²)
Asian	255 (60%)	27.3
Caucasian	82 (19.3%)	33.3
Middle Eastern	77 (18.1%)	29.9

References:

1. AIHW. Diabetes in Pregnancy. Australian Institute of Health and Welfare, 2024

2. Patterson et al. Am J Obstet Gynecol. 1998;179:481–485

3. Mehl et al. Health Qual Life Outcomes. 2022;20:49

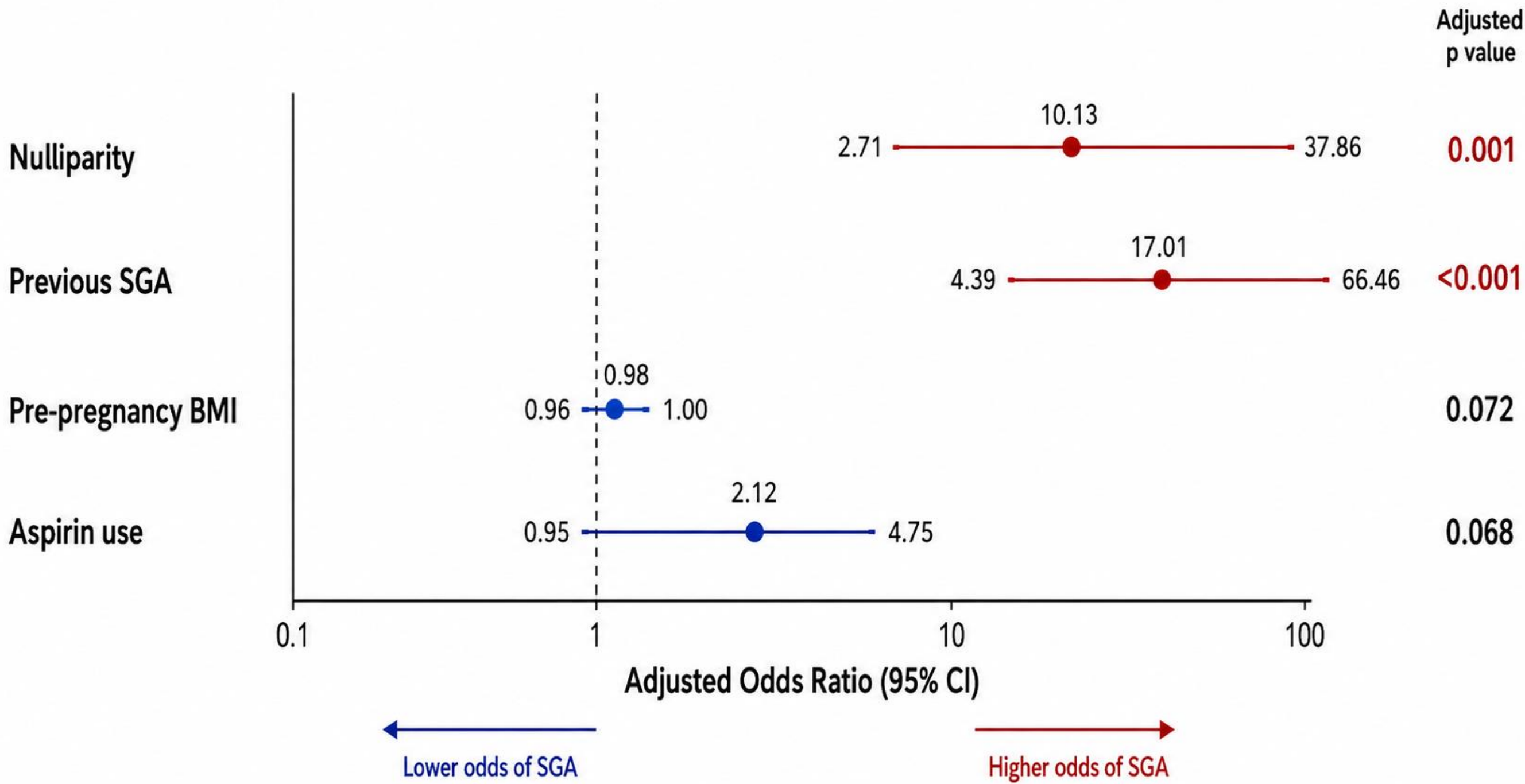
4. Ewing et al. Matern Child Health J. 2017;21:786–796

Association between maternal risk factors and delivery of an SGA infant

Risk factor	SGA	Non-SGA	p value
Maternal age (years), mean (SD)	32.0 ± 4.7	32.5 ± 4.6	0.51
Nulliparity, n (%)	36 (72)	136 (36.5)	<0.001
Previous SGA, n (%)	11 (22)	37 (9.9)	<0.001
Pre-pregnancy BMI (kg/m ²), median (IQR)	26.2 (23.4, 30.3)	27.9 (24.8, 33.1)	0.027
Total GWG (kg), median (IQR)	7.5 (5.0, 11.0)	9.0 (5.0, 13.0)	0.27
Smoking, n (%)	1 (2)	19 (5.1)	0.49
Aspirin use, n (%)	13 (26)	57 (15.3)	0.067
OGTT FBG (mmol/L), median (IQR)	5.1 (4.7, 5.3)	5.1 (4.6, 5.3)	0.89
OGTT 2H (mmol/L), median (IQR)	10.2 (8.7, 11.1)	10.3 (9.4, 11.1)	0.53
OGTT 2H (mmol/L), median (IQR)	7.9 (6.7, 8.9)	8.3 (7.0, 9.3)	0.21

Logistic regression analysis of risk factors associated with SGA

Risk factor	Unadjusted OR (95% CI)	p value	Adjusted OR (95% CI)	p value
Nulliparity	16.59 (5.01-54.98)	<0.001	10.13 (2.71-37.86)	0.001
Previous SGA	18.63 (4.96-70.05)	<0.001	17.01 (4.39-66.46)	<0.001
Pre-pregnancy BMI	0.944 (0.89-0.99)	0.046	0.98 (0.96-1.00)	0.072
Aspirin use	1.948 (0.975-3.89)	0.059	2.12 (0.95-4.75)	0.068



Discussion and Conclusion

The aim of this study was to determine the incidence of SGA infants and identify maternal risk factors associated with SGA among women with GDM at Northern Health.

We hypothesised that lower pre-pregnancy body mass index (BMI), inadequate gestational weight gain (GWG), and borderline oral glucose tolerance test (OGTT) values would be associated with an increased risk of SGA.

Evidence on risk factors for SGA in women with treated GDM is limited. A 2023 retrospective cohort study reported that lower pre-pregnancy BMI, lower fasting blood glucose, and ultrasound evidence of high SGA risk were independently associated with SGA. A 2024 case-control study identified gestational hypertension, oligohydramnios, short maternal stature, lower pre-pregnancy BMI, and inadequate GWG as significant risk factors.

In our cohort, a previous SGA birth and nulliparity were the strongest independent predictors of SGA. These findings support early identification of women at increased risk to facilitate closer fetal growth surveillance.

Our findings raise the question of whether less intensive glycaemic management may be appropriate for women with GDM who are identified as being at high risk of delivering an SGA infant. Further studies are required to determine whether individualized glycaemic targets could reduce the risk of SGA without increasing the risk of adverse maternal or neonatal outcomes.

5. Drever et al. Aust N Z J Obstet Gynaecol. 2023;63:714–720

6. Saenger et al. Endocr Rev. 2007;28:219–251

7. Li et al. BMJ Open. 2024;14:e078325