

The impact of abnormal maternal body mass index during pregnancy on perinatal outcomes: A retrospective cohort study

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Introduction

- According to the World Health Organization (WHO), obesity is one of the most significant global health issues of the 21st century due to the alarming rise in prevalence¹.
- **Abnormal Body mass index** (BMI) during pregnancy is a growing public health concern as it has been associated with an increased risk of maternal and neonatal complications.
- Maternal risks associated with obesity include **gestational diabetes mellitus** (GDM), **gestational hypertension** (GHT), **intrapartum complications**, and **postpartum complications**².
- Fetal risks associated with obesity include **birth abnormalities**, **macrosomia**, unexplained **stillbirths**, admission to the neonatal intensive care unit (**NICU**), and neonatal **fatalities**².
- Less research has been targeted at the effect of maternal underweight, which is associated with adverse neonatal outcomes.

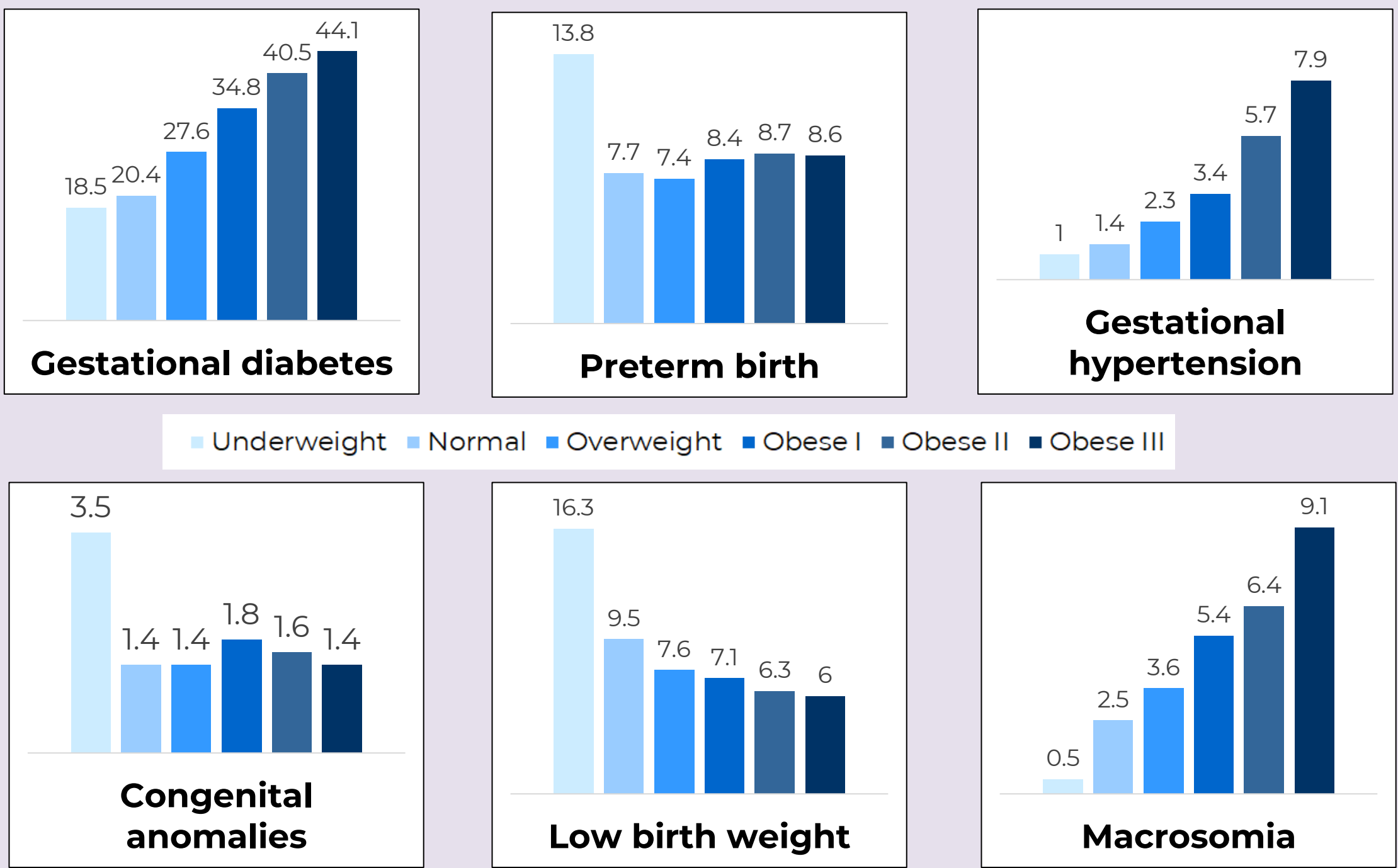
Aim

- This study aimed to investigate the impact of abnormal (**low & high**) BMI on **maternal** and **neonatal** outcomes compared to normal BMI.

Methodology

- This is a **retrospective cohort** study that included 14,624 singleton births in a tertiary maternity hospital in Qatar over a 12-month period.
- Women were categorized based on WHO BMI classification as **underweight** (BMI <18.5 kg/m²), **overweight** (25.0-29.9 kg/m²), **obesity class I** (30.0– 34.9 kg/m²), **obesity class II** (35.0– 39.9 kg/m²), and **obesity class III** (≥40.0 kg/m²) and compared to women with **normal BMI** (18.5-24.9 kg/m²)
- Outcomes included **GDM**, **GHT**, postpartum hemorrhage (**PPH**), cesarean delivery (**CD**), preterm birth (**PTB**), low birth weight (**LBW**), congenital anomalies, and **NICU** admission.

Results



Results

- Women with increasing BMI had increasingly higher odds of developing adverse outcomes, the highest being in the class III obesity group (**GDM**- aOR 2.71, 95% CI 2.25-3.27, p<0.001, **GHT**- aOR 5.32 95% CI 3.49-8.11, p<0.001, **CD**- aOR 2.33 95% CI 1.85-2.94, p<0.001, **PPH**- aOR 1.77 95% CI 1.35-2.33, p<0.001).
- Being underweight during pregnancy was associated with an increased risk of **PTB** (aOR 2.09, 95% CI 1.37-3.20, p=0.001), **LBW** (OR 1.88, 95% CI 1.27-2.79, p=0.002) and **congenital anomalies** (aOR 2.52 95% CI 1.12-5.64, p=0.025).

Maternal outcomes		Normal BMI	Underweight	Overweight	Obesity I	Obesity II	Obesity III
Gestational diabetes (N= 14,255)	a OR (95% CI)	1	0.99 (0.68-1.42)	1.40 (1.26-1.55)	1.90 (1.70-2.12)	2.35 (2.05-2.70)	2.71 (2.25-3.27)
	p value	-	0.937	<0.001*	<0.001*	<0.001*	<0.001*
Gestational hypertension (N=14,624)	a OR (95% CI)	1	0.79 (0.19-3.29)	1.60 (1.14-2.24)	2.38 (1.69-3.34)	3.89 (2.69-5.62)	5.32 (3.49-8.11)
	p value	-	0.747	0.007*	<0.001	<0.001	<0.001
Caesarean delivery (N=14,624)	a OR (95% CI)	1	0.93 (0.61-1.42)	1.31 (1.16-1.48)	1.55 (1.36-1.77)	1.96 (1.66-2.31)	2.33 (1.85-2.94)
	p value	-	0.746	<0.001*	<0.001*	<0.001*	<0.001*
Postpartum haemorrhage (N= 14,517)	a OR (95% CI)	1	0.62 (0.33-1.15)	1.25 (1.07-1.46)	1.29 (1.09-1.52)	1.48 (1.20-1.82)	1.77 (1.35-2.33)
	p value	-	0.131	0.004*	0.003*	<0.001*	<0.001*

- Nearly 67% in the underweight group had less than average expected weight gain, compared to the 56% in the normal BMI group and 45-46% in the obesity II & III groups.

Results

Neonatal outcomes		Normal BMI	Underweight	Overweight	Obesity I	Obesity II	Obesity III
Preterm birth N= 14,624	a OR (95% CI)	1	2.09 (1.37-3.20)	0.90 (0.76-1.06)	0.94 (0.79-1.13)	0.94 (0.75-1.18)	0.84 (0.61-1.15)
	p value	-	0.001*	0.213	0.519	0.572	0.273
Low birth weight N= 14,618	a OR (95% CI)	1	1.88 (1.27-2.79)	0.77 (0.66-0.91)	0.70 (0.58-0.83)	0.61 (0.48-0.78)	0.53 (0.37-0.76)
	p value	-	0.002*	0.001*	<0.001*	<0.001*	0.001*
Macrosomia N= 14,618	a OR (95% CI)	1	0.20 (0.03-1.46)	1.44 (1.68-2.83)	2.18 (1.68-2.83)	2.62 (1.94-3.55)	3.88 (2.73-5.53)
	p value	-	0.114	0.006*	<0.001*	<0.001*	<0.001*
Admission to NICU N= 14,624	a OR (95% CI)	1	1.49 (0.99-2.24)	1.04 (0.91-1.21)	1.22 (1.05-1.42)	1.30 (1.07-1.58)	1.36 (1.04-1.77)
	p value	-	0.055	0.519	0.011*	0.007*	0.022*
Congenital anomalies N= 14624	a OR (95% CI)	1	2.52 (1.12-5.64)	1.01 (0.70-1.46)	1.21 (0.82-1.78)	1.08 (0.66-1.79)	0.92 (0.44-1.90)
	p value	-	0.025*	0.970	0.337	0.757	0.814

Conclusion

- Healthcare providers need to be aware of potential risks associated with abnormal BMI.
- **Increasing BMI** was associated with an **increased chance** of developing adverse maternal & neonatal outcomes.

References:

- Sirimi N, Goulis DG. Obesity in pregnancy. Hormones. 2010(4):299-306.
- Sunder, A., Varghese, B., Darwish, B., Shaikho, N. M., AlSada, A., Albuainain, H., et al. Maternal Obesity: An Obstetric Risk. Cureus. 2022;14(9). doi:10.7759/CUREUS.29345