



## Early Pregnancy (≤ 12 Months) After Bariatric Surgery: Does It Really Influence Maternal and Perinatal Outcomes?

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## Disclosure None



## **Backgrounds**

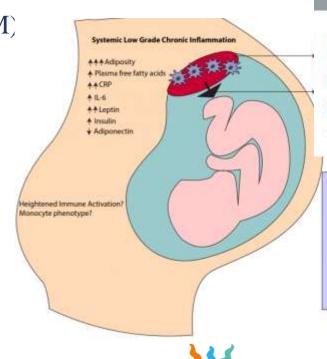
Obesity during pregnancy elevates the risk of health complications for both the mother and the baby (Marchi J 2015)

#### **Maternal risks**

- Gestational diabetes mellitus (GDM)
- Gestational hypertension (GH)
- Preeclampsia
- Spontaneous miscarriage
- Postpartum hemorrhage
- Cesarean section

#### **Neonate risks**

- Macrosomia
- Premature birth
- Large for gestational age
- Birth defect
- Meconium aspiration



#### Systematic Reviews

Maternal and neonatal outcomes after bariatric surgery; a systematic review and meta-analysis: do the benefits outweigh the risks?

Wilson Kwong, MD; George Tomlinson, PhD; Denice S. Feig, MD

Gestational Diabetes
Gestational Hypertension
Presclampsia
Thromboembolism

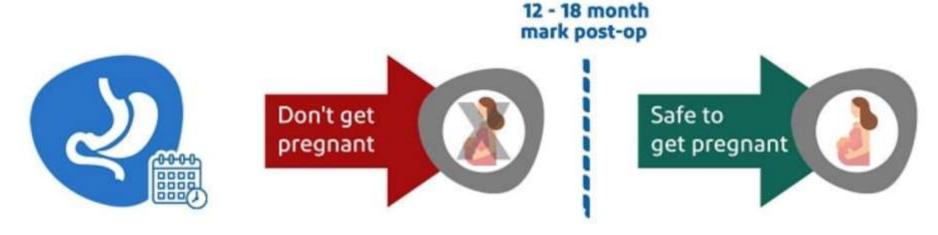
Macrosomia
Fetal Anomalies
Infertility
Instauterine Growth Restriction
C-section
Wound Infections

Bariatric surgery can reduce the risk of adverse obstetric outcomes



## **Backgrounds**

When is the optimum time for pregnancy after bariatric surgery?



• BOMSS, ASMBS recommend that patients avoid pregnancy for 12 - 18 months after surgery

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- ACOG --12 24 months
- Lack of consensus and evidences

## **Objectives**



• To evaluates the influence of early pregnancy (≤ 12 months) after bariatric surgery on maternal and perinatal outcomes.

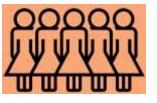


## **Methods**

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Systematic Reviews and Meta-Analysis



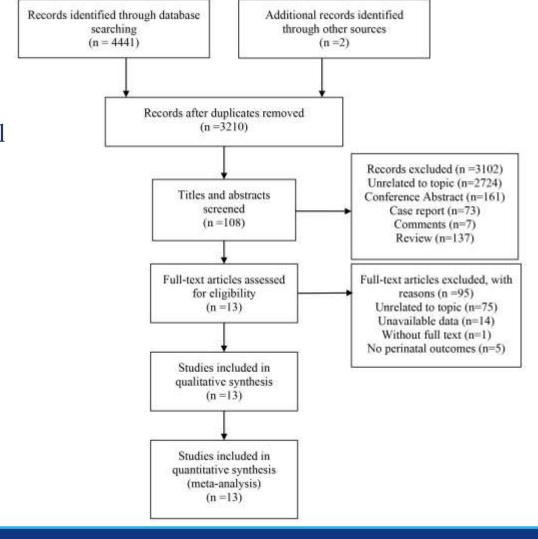
Patients underwent bariatric surgery having maternal and perinatal outcomes



Literature search from Jan 1 2000 to Aug15 2021



13 studies were included



## Results: Meta-analysis of Maternal Outcomes

#### 2.1 Weight gain



#### 2.2 Gestational diabetes mellitus

	<12 n	no .	> 12	mo		Odds Ratio	Odd	s Ratio
Study or Subgroup	Events	Total	Eventa	Total	Weight	M-H. Fixed, 95% C	3 M-H, Fix	ed. 95% CI
Dolin 2019	2	28	. 0	48	0.0%	9.15 [0.42, 197.73]		
Ducame 2015	2	12	. 6	52	3.5%	1.53 [0.27, 8.74]	-	
Heusschen (1) 2021	4	46	3	43	5.3%	1,27 [0.27, 6.03]		+
Heusschen (2) 2021	4	46	12	107	12.4%	0.75 [0.23, 2.47]		
Karadag 2019	2	38	4	42	6.8%	0.53 (0.09, 3.06)	7,1	
Kjaer 2013	13	158	14	128	26.7%	0.73 [0.33, 1.61]		
Mahmoudieh 2021	2	12	. 7	37	5.4%	0.86 (0.15, 4.82)	-	
Malakauskiene 2020	- 1	30	3	100	2.5%	1.11 (0.11, 11.13)		*
Resteiro 2018	3	19	14	67	9.8%	0.71 (0.18, 2.78)		
Sheiner 2011	11	104	28	385	20.0%	1.51 [0.72, 3.14]	. 3	
Walter(1) 2021		22	. 5	72	4.2%	0.64 [0.07, 5.77]		
Water(2) 2021	- 5	22	2	38	2.6%	0.86 (0.07, 10.03)	100	
Total (95% CI)		537		1119	100.0%	1.06 [0.68, 1.46]		•
Total events	46		98					1
Heterogeneity: Chi <sup>2</sup> =	5.30, df =	11(P=	0.921; 12	- 0%			0.05 0.2	5 20
Test for overall effect:	Z = 0.00 (	P = 1.0	0)				0.05 0.2 © 12 mg	

#### 2.3 Gestational hypertension

	<12 ±	na .	> 12:	TIO		Odds Ratio	Odd	s Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% C	M-H, Fig	eed, 95% CI
Dolin 2019	1	28	. 8	48	13.6%	0.19 (0.02, 1.57)	-	-
Ducarme 2015	1	12	2	- 52	1,6%	2.27 (0.19, 27.35)	_	-
leusschen (1) 2021	2	46	3	43	7.1%	0.61 [0.10, 3.82]		
leusschen (2) 2021	2	46	. 6	107	8.3%	0.77 (0.15, 3.94)		
Karadag 2019	2 6	38	- 4	42	7.7%	1.78 [0.46, 6.87]		
Malakauskiene 2020	3	30	15	100	14.9%	0.63 (0.17, 2.34)	•	
Rasteiro 2018	0	19	4	67	4.5%	0.36 [0.02, 7.02]	-	
Sheiner 2011	16	104	43	385	37.1%	1.45 [0.78, 2.69]		-
Walter(1) 2021	1	22	3	72	3.2%	1,10 (0.11, 11.09)		
Water(2) 2021	1	22	4	38	1.7%	1.76 [0.10, 29.65]	-	1.
Total (95% CI)		367		954	100.0%	1.02 (0.66, 1.56)	- 19	•
Total events	33		89					
Heterogeneity: Chif = i	6.29, df = 8	9 (P = 0	71); F=	0%			400 04	1 1
Test for overall effect:	Z = 0.08 (4	0.90	3)				0.02 0.1 -0.12 mo	1 10 >12 mo

Early pregnancy was associated with a reduction in weight gain during pregnancy

#### Maternal outcomes

Weight gain

Gestational diabetes

Gestational hypertension

Preeclampsia

Caesarean section

Postpartum hemorrhage

#### 2.4 Preeclampsia

	<12 n	no	>12 r	no		Odds Ratio		Odd	Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H. Fixed, 95% C	1	M-H, Fix	ed. 95% CI
Ducarme 2015	0	12	1	52	3.5%	1.37 [0.05, 35.76]			
Karadag 2019	4	38	4	42	21.2%	1.12 (0.26, 4.82)		9	- T-
Kjaer 2013	5	158	3	128	20.0%	1.36 [0.32, 5.81]			•
Mahmoudieh 2021	1	12	4	37	11.2%	0.75 [0.08, 7.44]		_	
Malakauskiene 2020	0.	30	6	100	18.8%	0.24 (0.01, 4.35)	_	-	
Rasteiro 2018	0	19	4	67	12.5%	0.36 (0.02, 7.02)	-	•	
Walter(1) 2021	1	22	3	72	8.4%	1.10 [0.11, 11.09]			
Walter(2) 2021	1	22	1	38	4.4%	1.76 [0.10, 29.65]			
Total (95% CI)		313		536	100.0%	0.90 [0.44, 1.84]		•	-
Total events	12		26						
Heterogeneity: Chi <sup>2</sup> =	1.90, df = 1	(P=0	1.97); (*=	D%			200		1 1
Test for overall effect:	Z = 0.28 (F	P = 0.71	8)				0.02	0.1 ≤12 mo	1 10 >12 mo

#### 2.5 Caesarean section

	≤12 r	no	>12 0	mo		Odds Ratio	Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H. Random, 95% CI	M-H. Random, 95% CI
Dolin 2019	13	28	18	48	8.1%	1.44 [0.56, 3.72]	
Ducarme 2015	3	12	17	52	4.9%	0.69 (0.16, 2.87)	
González 2015	5	20	21	114	6.7%	1.48 [0.48, 4.51]	-
Heusechen (1) 2021	6	46	- 4	43	5.4%	1.46 (0.38, 5.58)	-
Heusschen (2) 2021	6	46	25	107	7.9%	0.49 [0.19, 1.30]	-
Karadag 2019	24	38	20	42	8.6%	1.89 [0.77, 4.62]	-
Kjaer 2013	53	158	39	128	12.9%	1.15 [0.70, 1.90]	
Mahmoudieh 2021	8	12	27	37	5.0%	0.74 (0.18, 3.01)	-
Malakauskiene 2020	11	30	46	100	9.1%	0.68 (0.29, 1.57)	
Rasteiro 2018	5	19	18	67	6.5%	0.97 [0.31, 3.09]	
Sheiner 2011	38	104	117	385	13.4%	1.32 [0.84, 2.08]	-
Walter(1) 2021	8	17	53	67	6.7%	0.23 [0.08, 0.72]	
Walter(2) 2021	3	17	23	33	4.8%	0.09 (0.02, 0.40)	-
Total (95% CI)		547		1223	100.0%	0.86 [0.59, 1.25]	•
Total events	183		428			. Principle of Assessment	
Heterogeneity: Tau* =	0.22; Chř	= 25.0	7, df = 12	P = 0	01); (*= 5	2%	<del></del>
Test for overall effect:				400	100		0.2 0.5 1 2
			15/00				≤12 mo > 12 mo

#### 2.6 Postpartum hemorrhage

	≤12 c	no.	>12 r	no		Odds Ratio	Odds	Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H. Fixed, 95% CI	M-H. Fixe	d, 95% CI
Ducarme 2015	1	12	3	52	7.5%	1.48 [0.14, 15.66]		
Kjaer 2013	10	158	-8	128	60,4%	1.01 [0.39, 2.65]	1	
Mahmoudieh 2021	1	12	3	37	9.8%	1.03 [0.10, 10.95]		-
Malakauskiene 2020	1	30	4	100	13.0%	0.83 [0.09, 7.70]	-	_
Sheiner 2011	1	104	3	385	9.2%	1.24 [0.13, 12.01]	-	•
Total (95% CI)		316		702	100.0%	1.05 [0.50, 2.19]	-	-
Total events	14		21					
Heterogeneity: Chi² = I	0.15. df = 4	(P = 1	.00); I* =	0%			01.02.05	2 5 10
Test for overall effect:	Z = 0.12 (6	= 0.9	0)				0.1 0.2 0.5 ≤12 mg	2 5 10



## Results: Meta-analysis of Neonatal Outcomes





#### 3.2 Small gestational age

	≤12 #	90	>12.6	no		Odds Ratio		Odds	Ratio	
Study or Subgroup	Events	Total.	Events.	Total.	Weight	M-H. Fixed, 95% C		M.H. Fist	pd, 95% Ct.	
Cniz (1) 2019		10	. 0	20	1.0%	6.47 (0.24, 174.08)		-		_
Cruz (2) 2019	1.1	12	. 0	. 12	2.4%	3.26 (0.12, 88.35)		-	-	
Dokn 2019	. 1	20	4.	46	15.0%	0.41 (0.04, 3.84)	3.0		-	
Ducame 2015	. 0	12	- 2	52	5.2%	0.81 (0.04, 17.92)	-			
Heusschen (1) 2021	1	46	1	43	5.0%	0.93 (0.06, 15.40)				
Heusschen (2) 2021	. 1	46		107	16.2%	0.45 (0.05, 3.99)				
Karadag 2019	. 2	38	- 2	42	9.9%	1,11 (0.15, 8.30)			-	
IQser 2013	2	158	2	126	12.0%	0.81 (0.11, 5.81)		-		
Mahmoudieh 2021	. 0	12		37	4.0%	0.97 [0.04, 25.47]				
Melekauskiene 2020	3	30	12	100	27.4%	0.81 (0.21, 3.10)		-		
Total (95% CI)		392		189	100.0%	0.89 [0.45, 1.74]		•		
Total events	12		29							
Heterogeneity: Chi* = 2	2.51. <del>cf</del> + 1	00-00	197512 -	0%			1			+
Test for oversit effect.							0.05	0.t : ≤12 mo	5 10 10 5 12 min	50

#### 3.3 Large gestational age

	<12 n	no -	>121	ma:		Odde Ratio		Odd	ts Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H. Fixed, 95% CI		M-H, FI	sed, 95% CI	
Cruz (1) 2019	0	10	1	20	1.8%	0.62 (0.02, 16.57)		-	-	-
Cruz (2) 2019	0	10	. 0	12		Not estimable				
Dolin 2019	4	28	3	48	3.5%	2.50 (0.52, 12.10)			-	-
Ducarme 2013	6	43	3	51	4.3%	2.59 (0.61, 11.07)		-	1 1	•
Docarmo 2015		12	12	52	7.8%	0.30 (0.04, 2.59)	_	-		
González 2015	2	20	13	114	6.4%	0.86 (0.18, 4.15)		-	•	
Heusschen (1) 2021	. 7	46	2	43	3.2%	3.68 [0.72, 18.81]			1	-
Heusschen (2) 2021	7	46	9	107	8.4%	1,95 (0.68, 5,61)			-	
Karadag 2019	10	38	0	42	7.7%	2.14 [0.69, 6.61]			+	
Qaer 2013	15	158	10	128	18.3%	1,24 (0.64, 2.86)		-	•	
Mahmoudieh 2021	3	12	10	37	6.7%	0.90 (0.20, 4.01)		_	-	
Malokauskiene 2020	2	30		100	3.1%	1.71 (0.30, 9.85)		7.7	1	
Rasteiro 2018	4	19	10	67	6.4%	1,52 (0.42, 5.53)		_		
Sheiner 2011	- 3	104	14	385	10.0%	0.79 (0.22, 2.79)		_		
Welter(1) 2021	2	1.7	- 5	66	3.3%	1,00 (0.29, 9.22)			1	
Weller(2) 2021	3	17		35	8.9%	0.40 (0.07, 2.14)				
Total (95% Cf)		610		1304	100.0%	1.34 [0.96, 1.89]			•	
Total events	:60		110						P-W	
Heterogeneity: Chif = 1	9.52. df =	14 (P =	0.80); 11	- 0%			2.05	0.2		-
Test for overall effect:	Z = 1.88 (	0.0	9)				0.05	≤12 mc	>12 mg	

The result showed no significant difference between the two groups regarding preterm birth, small gestational age, large gestational age, birth defects, neonatal intensive care unit admission and Apgar score  $\leq 7$  within 5 min

#### Neonatal outcomes

Preterm birth

SGA

LGA

Macrosomia

Birth defect

NICU admission

Apgar ≤ 7 within 5 min

#### 3.4 Macrosomia

	C12+	no:	>12 1	no .		Orlda Ratio		Odds	Ratio	
Study or Subgroup	Exects.	Total	Exents.	Total	Weight	M-H. Fixed, 95%, C.		M.H. Fin	pd. 95% CL	_
Dolin 2019	12	28	32	48	36.7%	0.38 (0.14, 0.98)				
Ducarme 2013	2	43		61	11.9%	0.45 (0.08, 2.44)	7	•		
Ducarme 2015	0	12	- 2	52	2.6%	0.81 [0.04, 17.92]	_			_
Mahmoudieh 2021	0	12	1	37	2.0%	0.97 [0.04, 25.47]	-			
Malakauskiene 2020	4	30	13	100	14.1%	1,03 (0.31, 3.43)				
Sheiner 2011	12	104	32	385	32.8%	1.44 [0.71, 2.90]				
Total (95% CI)		229		673	100.0%	0.85 [0.52, 1.37]		4		
Total events	30		85							
Heterogeneity: Chi <sup>2</sup> = 3	5.61, df = 5	5 (P = 0	351:1"=	11%			0.06	0.2		- 1
Test for overall effect:	Z = 0.07  fs	P = 0.56	0)				0.00	1512 mg	>12 mg	21
								14 100	10.1100	

#### 3.5 Birth defect

	<12 €	99	>12 n	no		Odds Ratio		Odd	is Ratio	
Study or Subgroup	Exents	Total	Events	Total	Weight	M.H. Fixed, 95% C	-	M-H, FI	кра. 95%. С	
Karadag 2019	0	38	0	42		Not estimable		1000	(ACS0/10)U	
Quer 2013	9	158	13	128	71.6%	0.53 (0.22, 1.29)				
Mahmoudieh 2021	0	12	1	37	3.9%	0.97 [0.04, 25.47]	_		-	_
Malakauskiene 2020	0	30	0	100		Not estimable				
Sheiner 2011	2	104	5	385	11.0%	1.49 (0.28, 7.79)			30	
Welter(1) 2021	1	21	1	68	2.4%	3.35 (B.20, 58.00)			1	
Walter(2) 2021	1	21	3	36	11.1%	0.55 (0.05, 5.85)				
Total (95% CI)		384		796	100.0%	0.73 (0.36, 1.46)		-		
Total events	13		23						100	
Hotorogeneity: Ch# = 1	2.41. dt = 4	(P=0	(66): F =	0%				4.2	1 1	- 4
Test for overall effect:	Z = 0.00 (8	= 0.3	7)				0.09	0,2 <17 mm	1 B	20

#### 3.6 NICU admission

	≪12.n	no:	>12:	no:		Odds Ratio		Odd	s Ratio	
Study of Subgroup	Events.	Total.	Events	Total	Weight	M-H. Fixed, 95% C	_	M-H, Fo	ed. 95% Ct.	
Ducarme 2013	5	43	2	51	7.5%	3.22 (0.59, 17.53)				
Ducerme 2015	. 3	12	- 3	52	3.9%	5.44 (0.95, 31.36)				_
Kjaer 2013	18	158	12	128	54.4%	1.24 [0.58, 2.69]		_		
Mehmoudish 2021	3	12	8	37	13.6%	1.21 [0.26, 5.54]		-		
Rastero 2018	3	19	12	67	20.7%	0.86 (0.22, 3.42)				
Total (95% CI)		244		315	100.0%	1.47 [0.86, 2.52]			•	
Total events	32		37							
Heterogeneity: Chr2 =	3.80, # =	4 (P+1	0.43); P =	0%			0.05	0.2	: :	-
Test for overall effect:	Z = 1.40 f	P = 0.1	6)				0.00	C12 mg	-12 ma	- 80

#### 3.7 Apgar ≤ 7 within 5 min

	5121	00	>121	no:		Odds Ratio	Odds Ratio
Study or Subgroup	Events.	Total	Exents.	Total	Weight	M-H. Fixed, 95% C	M.H. Fixed, 96% CI
Ducarme 2013	2	43	-0	51	7.4%	8.20 (0.29, 132.83)	
Ducame 2015	0	12	- 0	52		Not estimable	
Heusschen (1) 2021	2	40	2	43	33.9%	0.93 (0.13, 6.92)	_
Heusschen (2) 2021	2	46	- 1	107	9.9%	4.82 [0.43, 54.51]	1 1
Mahmoudieh 2021	0	12	1	37	12.6%	0.97 [0.04, 25.47]	
Malakauskiene 2020	1	30	1	100	7.6%	3.41 (0.21, 58.28)	
Sheiner 2011	5	904	4	385	28.6%	1.87 [0.34, 10.34]	
Total (95% CI)		293		775	100.0%	2.17 [0.86, 5.45]	•
Total events			9				2
Heterogeneity: Chi? = 1	1.91. et = 1	5 (P = 0	.861:17 =	0%			001 01 1 10 10
Test for overall effect.	Z = 1.65 (	P = 0.10	0)				0.01 0.1 1 10 10 ≤12 mo ≥12 mo

### **Discussions**

- Early unintended pregnancy ( $\leq 12 \text{ mo or } \leq 6 \text{ mo}$ ), extremely  $\leq 3 \text{mo}$ , abortion or close prenatal monitoring?
- Women with fertility issues or those nearing the end of their reproductive age after surgery: fixed intervals or personalized approach?
- Growth and development of the infant for the long-term

Extremely early pregnancy (<6 mo) after sleeve gastrectomy: maternal and perinatal outcomes

Amihai Rottenstreich, M.D.<sup>a,\*</sup>, Gabriel Levin, M.D.<sup>a</sup>, Tair Ben Porat, R.D., M.P.H.<sup>b</sup>, Misgav Rottenstreich, M.D.<sup>c</sup>, Raanan Meyer, M.D.<sup>d</sup>, Ram Elazary, M.D.<sup>e</sup>

Conclusions: Pregnancy occurring in the first 6 months after LSG was independently associated with a higher rate of SGA infants. Delaying conception during the very early postoperative period is recommended. Providing adequate contraception and excluding the presence of early pregnancy at the time of surgery are of utmost importance. (Surg Obes Relat Dis 2021;17:356–362.) © 2020 American Society for Bariatric Surgery. Published by Elsevier Inc. All rights reserved.

## **Conclusions**

- ◆Early pregnancy (within 12 months) has been linked to insufficient gestational weight gain, but there appear to be no significant adverse effects on maternal and perinatal outcomes.
- ◆ Avoid getting pregnant within 12 to 18 months following surgery.
- ◆The potential impact on the future growth and development of the infant remains uncertain and requires further studies.
- ◆In the event of a pregnancy, thorough monitoring and management are crucial. If any abnormalities are detected, termination of the pregnancy might be necessary.
- ◆The approach to pregnancy after bariatric surgery should be tailored to each individual patient's situation.

### **IFSO-APC Meeting 2023**





# SAVE THE DATE WELCOME TO CHINA!



# Thank you!!!

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