

THE IMPACT OF BODY MASS INDEX ON MATERNAL AND NEONATAL OUTCOMES

By

Wael Saleh Yossef, Taher Mohammed Moustafa and Ibrahim Ramadan El-Sawy

Obstetrics and Gynecology Department, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Corresponding author: Wael Saleh Yossef;

Mobile: 01142862615; **E-mail:** swael0318@gmail.com

ABSTRACT

Background: The problems relating to the management of obesity in pregnancy are many. There are both short-and long-term complications and implications for both mother and fetus.

Objectives: To examine pregnancy outcomes in overweight and obese women.

Patients and Methods: In this study, one hundred twenty (120) pregnant women were included. They were divided into 3 equal groups: Group A: Pregnant women with normal weight (BMI =18.5 – 24.9 kg /m²), group B: Pregnant overweight women (BMI = 25 – 29.9 kg /m²), and group C: Pregnant obese women (BMI = \geq 30 kg /m²) to evaluate the impact of body mass index on maternal and neonatal outcomes regarding the incidence of gestational diabetes mellitus, gestational hypertension, deep venous thrombosis, birth weight, route and time of delivery, Apgar score at 1, 5 minutes, neonatal admission to NICU, post-partum haemorrhage, wound sepsis and puerperal sepsis.

Results: Correlation between BMI in various groups as regards postpartum hemorrhage, puerperal sepsis and parity showed no statistical significant difference. There were statistical differences between BMI and occurrence of gestational DM, gestational hypertension, DVT, macrosomia, Apgar score at 1min & 5min, wound sepsis, mode and time of delivery.

Conclusion: There were strong associations with antenatal complications including increased incidence of gestational hypertension, gestational diabetes and delivery complications, while underweight women appeared to have better pregnancy outcomes than even women with BMI within the normal range. Moderate overweight has a significant deleterious effect on the outcome of pregnancy, and obesity leading to major maternal and fetal complications.

Keywords: Body Mass Index, Maternal and Neonatal Outcomes.

INTRODUCTION

Obesity is clinically defined as body mass index (BMI) \geq 30 Kg/m on the other hand; BMI is limited as a solitary clinical diagnostic criterion for obesity. It is usually caused by excessive food intake, reduced physical activity, and genetic predisposition. Obese individuals have a higher energy outflow than normal individuals due to the energy needed to

uphold a raised body mass (*Yazdi et al., 2015*).

Rising rates of obesity additionally are due to easily access to a palatable nutritious diet, augmented dependence on vehicle. Excessive food consumption is a cornerstone factor for obesity. Mean food energy per person per day has increased all over the world except Eastern Europe. The largest part of this extra energy from

food consumption is due to a raised carbohydrate intake rather than fat intake. Particularly sweetened beverages, representing 25 percent of daily food energy in the states particularly young adult population, and potato chips. Contributing in a serious and hazardous manner to increasing obesity rates and metabolic syndrome and type two DM. The pandemic of Vitamin D deficiency is correlated to diseases coupled with obesity (*Bojanowska and Ciosek, 2016*).

The aim of the present study was to evaluate the impact of BMI on maternal and neonatal outcomes.

PATIENTS AND METHODS

This was a prospective randomized controlled research trial in which 120 patients were recruited from the outpatient antenatal care clinics of the maternity hospital at West Aswan central Hospital.

The study participants were categorized into 3 main groups:

- **Group A:** control (BMI = 18.5–24.9kg/m²).
- **Group B:** overweight patients (BMI = 25 – 29.9kg/m²).
- **Group C:** obese patients (BMI ≥ 30 kg/m²).

The impact of body mass index on maternal and neonatal outcomes was compared between the 3 groups regarding the incidence of gestational hypertension, gestational diabetes mellitus, IUGR, macrosomia, cesarean delivery, normal vaginal delivery, wound infection, Apgar score at 1,5 minutes and Neonatal admission to ICU.

Inclusion criteria:

1. Maternal age from 20-35 years.
2. Gestational age > 28 weeks confirmed by the first day of the last menstrual period or first trimester ultrasound.
3. Single living fetus.
4. Spontaneous pregnancy without history of infertility.

Exclusion criteria:

1. Women with multiple pregnancies.
2. Women with pre-gestational diabetes or hypertension.
3. Women with associated medical complications (endocrinal, cardiac, renal, and others).
4. Grand multipara patients.
5. History of infertility specially cases of ivf.
6. Obstetric causes as previous cesarean section, congenital anomalies, past history of embolic disorders and premature rupture of membrane.

All patients in the three groups were subjected to the following:

• **Antenatal:** Estimation of gestational age, full obstetric sheet showing complications of current pregnancy or previous pregnancies, full medical and surgical history, ultrasound examination to confirm viability, gestational age, amniotic fluid index (AFI), placental site and lab investigations (glucose and HbA1c).

• **Natal and postnatal:** Mode of delivery (normal vaginal, operative vaginal, or cesarean delivery), timing of delivery (Preterm delivery < 37 weeks), mean birth weight – macrosomia, neonatal

intensive care unit (NICU) admission and apgar score at 1 and 5 minutes after delivery.

Primary outcomes (Most important outcomes to be assessed)

The impact of body mass index on maternal and neonatal outcomes included:

1. Gestational Diabetes Mellitus.
2. Pregnancy-induced hypertension.
3. Birth weight.
4. Mode of delivery (Normal vaginal deliveries, operative vaginal deliveries and cesarean delivery).
5. Timing of delivery.
6. Admission to neonatal intensive care unit.

Secondary outcome parameters (other outcomes to be assessed):

1. Post-partum hemorrhage.
2. Puerperal sepsis.
3. Venous thromboembolism.

Patients included in this study were subjected to: Informed consent was obtained from the pregnant women who were included in the study, Full history, Clinical Examination, Laboratory investigations (CBC, kidney and liver function, coagulation profile, FBS, PPBS, HBA1C and urine analysis) and Ultrasound to assess Biophysical Profile (BPP), which include: Amniotic Fluid Index (AFI), fetal movement, fetal tone, fetal breathing, number of fetuses (exclusion of multiple pregnancies), position of the placenta, biometry, gestational age, presentation (at term), estimated Fetal weight using Hadlock

formula depending on BPD, AC, FL for assessment of normal growth, macrosomia, and IUGR and umbilical artery Doppler flowmetry for assessment of fetal condition.

Termination of Pregnancy occurred by either vaginal delivery or cesarean section.

Neonatal assessment was followed up for Apgar score at 1 & at 5 min by trained pediatrician, the neonatal weight and neonatal admission to ICU.

Statistical analysis:

Data were tabulated, coded then analyzed using the computer program SPSS (Statistical package for the social sciences) version 23.0 to obtain. A P value <0.05 was considered statistically significant.

Descriptive statistics were calculated in the form of:

1. Mean \pm Standard deviation (SD) for parametric quantitative data.
2. Median & interquartile range for non-parametric quantitative data.
3. Frequency (Number-percent) for qualitative data.

Analytical statistics:

In the statistical comparison between the different groups, the significance of difference was tested using one of the following tests:

1. **ANOVA (analysis of variance):** Used to compare between more than two groups of numerical (parametric) data followed by post-hoc tukey.
2. **Kruskal wallis test:** Used to compare between more than two groups of

numerical (non-parametric) data followed by pairwise comparisons.

Spearman's correlation coefficient test was used correlating different parameters.

3. **Inter-group comparison** of categorical data was performed by using chi square test (X²-value).

A P value <0.05 was considered statistically significant.

RESULTS

Concerning the correlation between BMI groups and age, DVT and birth weight there was a statistical difference as

p value =0.001, 0.009 and <0.001 respectively. No statistical difference in correlation to parity (**Table 1**).

Table (1): The correlation between BMI groups and age, parity, DVT and birth weight

Parameters		Groups	Normal weight (n = 40)	Overweight (n = 40)	Obese (n = 40)	P
AGE	Mean		29.6	30.1	33.5	0.001
	±SD		4.5	5.3	4.4	
Parity	P1		26 (65%)	22 (55%)	26 (65%)	0.095
	P2		8 (20%)	10 (25%)	6 (15%)	
	P3		6 (15%)	8 (20%)	4 (10%)	
	P4		0 (0%)	0 (0%)	4 (10%)	
Deep venous thrombosis	Negative		40 (100%)	39 (97.5%)	34 (85%)	0.009
	positive		0 (0%)	1 (2.5%)	6 (15%)	
Birth weight	Mean		2.82	3.31	3.92	<0.001
	±SD		.65	.81	.51	

Concerning the correlation between BMI groups and development of gestational DM, gestational HTN and

neonatal outcome, there were statistical differences as p value =0.044, 0.014 and 0.023 respectively (**Table 2**).

Table (2): The correlation between BMI groups and development of gestational DM, gestational HTN and neonatal outcome.

Parameters		Groups	Normal weight (n = 40)	Overweight (n = 40)	Obese (n = 40)	P
Development of gestational DM	Negative		37 (92.5%)	33 (82.5%)	36 (90%)	0.044
	positive		3 (7.5%)	7 (17.5%)	14 (10%)	
Development of HTN	Negative		36 (90%)	31 (77.5%)	25 (62.5%)	0.014
	positive		4 (10)	9 (22.5%)	15(37.5%)	
Neonatal outcome	Alive and well		38 (95%)	36 (90%)	30 (75%)	0.023
	NICU		2 (5%)	4 (10%)	10 (25%)	

Concerning the correlation between BMI groups and mode of delivery, apgar score, PPH, wound sepsis of episiotomy and wound sepsis of cesarean section,

there were statistical differences as p value =0.0002, <0.001, 0.0118 and 0.01 respectively (**Table 3**).

Table (3): The correlation between BMI groups and mode of delivery, apgar score, PPH, wound sepsis of episiotomy and wound sepsis of cesarean section

Parameters		Groups	Normal weight (n = 40)	Overweight (n = 40)	Obese (n = 40)	P
Mode of delivery	Vaginal		35 (87.5%)	28 (70%)	18 (45%)	0.0002
	Cesarean		5 (12.5%)	12 (30%)	22 (55%)	
Apgar score 1min	Mean		8.6	7.8	7.1	< 0.001
	±SD		1.9	1.5	1.2	
Apgar score 5min	Mean		9.2	8.5	7.4	< 0.001
	±SD		1.3	1.6	1.1	
Postpartum hemorrhage	Negative		34 (85%)	26 (65%)	30 (75%)	0.0118
	Positive		6 (15%)	14 (35%)	10 (25%)	
Wound sepsis of episiotomy	Negative		33 (94.3%)	23 (82.1%)	11 (61.1%)	0.01
	Positive		2 (5.7%)	5 (17.9%)	7 (38.9%)	
Wound sepsis of CS	Negative		4 (80%)	10 (83.3%)	9 (40.9%)	0.032
	Positive		1 (20%)	2 (16.7%)	13 (59.1%)	
Puerperal sepsis	Negative		38 (95%)	34 (85%)	35 (87.5%)	0.325
	Positive		2 (5%)	6 (15%)	5 (12.5%)	

Concerning the correlation between BMI groups and macrosomia and time of delivery, there were statistical differences

as p value =0.01 and 0.002 respectively (**Table 4**).

Table (4): The correlation between BMI groups and macrosomia and time of delivery

Parameters		Groups	Normal weight (n = 40)	Overweight (n = 40)	Obese (n = 40)	P
MACROSOMIA	No		38 (95%)	34 (85%)	28 (70%)	0.01
	Yes		2 (5%)	6 (15%)	12 (30%)	
Time to delivery	< 37 wks		4 (10%)	10 (25%)	20 (50%)	0.002
	37-41 wks		34 (85%)	26 (65%)	18 (45%)	
	> 41 wks		2 (5%)	4 (10%)	2 (45%)	

DISCUSSION

Obesity is a global health problem. Among adults of all ages, women generally have higher rates of obesity than men. Rates of obesity in pregnancy are increasing, particularly in developed countries (*Livingston, 2018*).

Obesity has become an epidemic throughout the world. Worldwide, obesity rates have doubled in the last 30 years, with rates also increasing among pregnant women. Maternal obesity has significant health implications, contributing to increased morbidity and mortality for both mother and baby. A higher proportion of

women who die in pregnancy/postpartum are obese (Centre for Maternal and Child Enquiries *CMACE, 2011*).

All patients in the three groups of the present work have been subjected antenatally to estimation of gestational age, full obstetric sheet, full medical and surgical history, ultrasound examination and laboratory investigations (glucose and HbA1c), mode of delivery, timing of delivery, mean birth weight, macrosomia, neonatal intensive care unit (NICU) admission and Apgar score at 1 and 5 minutes after delivery. The impact of body mass index on maternal and neonatal outcomes were compared between 3 groups regarding the incidence of gestational hypertension, gestational diabetes mellitus, route of delivery, Apgar score at 1 and 5 minutes, birth weight, blood glucose, HbA1c and neonatal admission to NICU.

Comparing age among different BMI study groups has shown statistically significant difference between normal, overweight and obese group. *Scott-Pillai et al. (2013)* assessed the prevalence of overweight and obesity, and investigated the impact of rising BMI on maternal and neonatal outcomes. Singleton pregnancies over an 8-year period were categorized as underweight (2.8%), normal weight (52.5%), overweight (27.8%), obese class I (11.0%), obese class II (3.9%), and obese class III (1.9%). Compared with women of normal weight, a higher proportion of underweight women were younger, nulliparous, unmarried, smokers, and socially deprived. By contrast, as BMI increased, so did maternal age and parity.

Dodd et al. (2011) determined pregnancy outcomes according to

maternal BMI. Overweight and obese women had an increased risk of gestational diabetes, hypertension and iatrogenic preterm birth. Labor was more likely to be induced, and the risk of caesarean birth was increased. Infants were more likely to require resuscitation at birth and to have birth weight in excess of 4 kg. The risk increased with increasing maternal body mass index. So this study is in agreement with our study in relation to fetal weights, increased risk of gestational diabetes, hypertension and preterm labor.

Antenatally, obesity increases the risk of miscarriage, gestational diabetes mellitus (GDM), gestational hypertension, thromboembolism, and pre-eclampsia. Obesity is associated with poor labour outcomes, with obese women less likely to go into labour spontaneously, more likely to have prolonged pregnancies and have their labour induced, and less likely to achieve a normal delivery, being at increased risk of caesarean section (*Dodd et al., 2011*). In addition, there are long-term consequences of obesity in pregnancy. Obese women tend to be heavier with each subsequent pregnancy. These women are more likely to remain obese adults, with all the associated increased risks of obesity. Furthermore, long-term studies demonstrate that having an obese mother increases the risk of a child growing up to be obese themselves. The impact that obesity in pregnancy has on the long-term health of society as a whole, is therefore immeasurable (*Deierlein et al., 2011*).

Correlation between BMI in various groups and postpartum hemorrhage, puerperal sepsis and parity, there was no statistical significant difference. However,

we found a statistical difference between BMI in control, overweight and obese groups and occurrence of deep venous thrombosis. *Scott-Pillai et al. (2013)*, contrary to our study, found that the risk of postpartum hemorrhage (PPH) increased as BMI increased may be due to higher numbers of patients than our study.

We found a statistical difference between BMI in control, overweight and obese groups and birth weight. *Scott-Pillai et al. (2013)* found that the underweight group was at increased risk of delivering a baby of low birth weight, with borderline significance. However, all three obese groups were less likely to have a baby of low birth weight, and this risk decreased as BMI increased.

Regarding the correlation between BMI groups and admission to the neonatal intensive care unit, there was a statistical significant difference observed. *Scott-Pillai et al. (2013)* found that the risk for admission to the neonatal unit was still statistically significant for the three obese groups: obese class I, obese class II, and obese class III. *Saini et al. (2018)* determined association between maternal BMI and neonates requiring NICU admission and showed an increased risk of wide variety of pregnancy and perinatal complications and higher neonatal admissions in overweight and obese women.

The study of *Eliasdottir et al. (2010)* showed that obese women have a significantly increased risk of essential hypertension prior to pregnancy, developing gestational hypertension, pre-eclampsia, gestational diabetes, musculoskeletal symptoms, requiring induction of labor and being delivered by

cesarean section, both emergent and elective compared to mothers of normal weight and overweight. Neonates of obese mothers have significantly higher birth weight, larger head circumference and are more likely to require admission to neonatal ICU compared with neonates of normal weight and overweight mothers.

El-Gilany and Hammad (2011) showed that women were at increased risk for pregnancy-induced hypertension, gestational diabetes, preeclamptic toxemia, urinary tract infections, and cesarean delivery. Neonates born to obese women had an increased risk for postdate pregnancy, macrosomia, and admission to neonatal care units. So, there were significant association between BMI and gestational diabetes, gestational hypertension, preeclampsia, fetal outcome and neonatal outcome.

Scott-Pillai et al. (2013) outlined antenatal outcomes were categorized as underweight (2.8%), normal weight (52.5%), overweight (27.8%), obese class I (11.0%), obese class II (3.9%), and obese class III (1.9%). Compared with women of normal weight, a higher proportion of underweight women were younger, nulliparous, unmarried, smokers, and socially deprived. By contrast, as BMI increased, so did maternal age and parity. Likewise, the risk of hypertensive disorders of pregnancy also increased in relation to an increase in BMI classification.

We found statistically significant correlations between BMI and APGAR scores at 1 and 5 minutes. *Scott-Pillai et al. (2013)* found that women in obese class III had a statistically significant

association with low Apgar score at 5 minutes.

In our study, there was a statistical significant correlation between BMI and mode of delivery. *Martin et al. (2010)* found no significant associations between maternal weight and parameters of HELLP syndrome severity, race, delivery mode, gestational age, or perinatal outcome. Significantly associated with increasing maternal weight were maternal age, parity, admission mean arterial pressure, peak peripartum systolic blood pressures, concurrent essential hypertension, and the interval between admission and delivery. *Scott-Pillai et al. (2013)* found that women who were overweight were at increased risk of cesarean section, and this risk increased with an increase in BMI for women in obese class III. This increased risk exists for both emergency cesarean section and elective caesarean section. Conversely, overweight and obese women were less likely to have a normal delivery or an instrumental delivery. They found a statistical significant association between macrosomia and BMI categories. The underweight group was least likely to deliver a macrosomic baby, whereas women in obese class III were most likely to deliver a macrosomic baby. They demonstrated an increasing risk of adverse outcomes across BMI categories, with women who are overweight also at significant risk.

CONCLUSION

Obesity showed strong associations with antenatal complications including increased incidence of gestational hypertension, gestational diabetes and delivery complications including

macrosomia and postnatal complications including postpartum hemorrhage, while underweight women appear to have better pregnancy outcomes than even women with BMI within the normal range. Even moderate overweight has a significant deleterious effect on the outcome of pregnancy, and obesity leads to major maternal and fetal complications.

REFERENCES

1. **Bojanowska E and Ciosek J. (2016):** Can we selectively reduce appetite for energy-dense foods? An overview of pharmacological strategies for modification of food preference behavior. *Current Neuropharmacology*, 14 (2):118-42.
2. **Centre for Maternal and Child Enquiries (CMACE) (2011):** Saving Mothers' Lives: reviewing maternal deaths to make motherhood safer: 2006–2008. The Eighth Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. *BJOG*, 118 (1): 1–203.
3. **Deierlein A, Siega-Riz AM, Adair LS and Herring AH. (2011):** Effects of prepregnancy body mass index and gestational weight gain on infant anthropometric outcomes. *The Journal of Pediatrics*, 158: 221–6.
4. **Dodd JM, Grivell RM, Nguyen A, Chan A and Robinson JS. (2011):** Maternal and perinatal health outcomes by body mass index category. *Aust N Z J Obstet Gynaecol*, 51: 136–40.

5. **El-Gilany AH and Hammad S. (2011):** Obstetric outcomes of teenagers and older mothers: experience from Saudi Arabia. *International Journal of Collaborative Research on Internal Medicine & Public Health*, 4(6):901.
6. **Eliasdottir OJ, Harðardóttir H and Þórkelsson Þ. (2010):** The effect of maternal weight on pregnancy outcome. *Laeknabladid*, 96(11):691-6.
7. **Livingston EH. (2018):** Reimagining obesity in 2018: a JAMA theme issue on obesity. *JAMA*, 319 (3): 238–40.
8. **Martin JN, May WL and Rinehart BK. (2010):** Increasing maternal weight: a risk factor for preeclampsia /eclampsia but apparently not for HELLP syndrome. *South Med J*, 93 (7): 686-91.
9. **Saini A, Rizvi SM and Gupta A. (2018):** Hostile turf: Higher maternal body mass index and neonatal Intensive Care Unit admission risk. *J Clin Neonatol*, 7: 213-6.
10. **Scott-Pillai R, Spence D, Cardwell C, Hunter A and Holmes V. (2013):** The impact of body mass index on maternal and neonatal outcomes: a retrospective study in a UK obstetric population, 2004_2011. *BJOG*, 120: 932–939.
11. **Yazdi FT, Clee SM and Meyre D. (2015):** Obesity genetics in mouse and human: back and forth, and back again. *Peer J*, 3:856.

تأثير مؤشر كتله الجسم على الأم والجنين

وائل صالح يوسف، طاهر محمد مصطفى، ابراهيم رمضان الصاوى

قسم أمراض النساء والتوليد، كلية الطب، جامعة الأزهر

E-mail: swael0318@gmail.com

خلفية البحث: يتم تعريف السمنة عندما يزيد مؤشر كتله الجسم عن 30 كجم لكل متر، وتعتبر السمنة من الأمراض المعقدة والمزمنة، والتي تسبب الكثير من أمراض القلب والنوع الثانى من داء السكري، وأمراض إرتفاع ضغط الدم والعديد من المشاكل المرضية الأخرى. تعرف السمنة عادة بأنها الوزن الزائد للجسم بالنسبة للطول، ومؤشر كتلة الجسم هو إنعكاس دقيق لنسبة الدهون في جسم الإنسان ويمكن تقدير نسبة الدهون في الجسم بالجمع بين مؤشر كتلة الجسم والعمر والجنس. التعريف القائم على مؤشر كتلة الجسم هو عملي للاستخدام الإحصائي، لأنه يعتمد فقط على إثنين من المؤشرات التي تم قياسها بشكل عام، لكنه لا يعتبر التغير في كميات كتلة الجسم، وخاصة الكتلة العضلية. حيث يمكن للبالغين الذين يقومون بجهد بدني كثيف أن يرفعوا مؤشرات مؤشر كتلة الجسم على الرغم من وجود القليل من الدهون. عادة ما تحدث السمنة بسبب الإفراط في تناول الطعام، إنخفاض النشاط البدني، الإستعداد الوراثي حيث يعاني الأفراد البدينون من تدفق طاقة أعلى من الأفراد العاديين بسبب الطاقة اللازمة لدعم كتلة الجسم المرتفعة، بعض من الأمراض الطبيه والنفسيه.

الهدف من البحث: تقييم تأثير مؤشر كتله الجسم على الأم والجنين.

المریضات وطرق البحث: سوف تتم هذه الدراسة فى قسم النساء والتوليد مستشفی أسوان العام على عدد 120 سيده حامل وتقسم على ثلاث مجموعات معدل طبيعى (مؤشر كتله الجسم = 18.5 الى 24.9 كجم /متر مربع)، وزن زائد (مؤشر كتله الجسم من 25 الى 29.9 كجم/متر مربع)، سمنة (مؤشر كتله الجسم < 30 كجم/متر مربع). طبقا لحدوث سكر الحمل، ضغط الحمل، جنين حجمه صغير بالنسبة لعمره، جنين حجمه كبير بالنسبة لعمره، ولاده قيصريه، ولاده طبيعیه، إتهاب الجرح، وإحتياج الطفل لمحضن.

نتائج البحث: تم تسجيل النتائج ومعالجتها إحصائياً باستخدام المعادلات الإحصائية المختلفة. كان الهدف الرئيسي من هذه الدراسة هو فحص نتائج الحمل لدى النساء البدنيات والسمنة. وجدت دراستنا زيادة خطر العديد من المضاعفات في النساء البدنيات. مثل ارتفاع ضغط الدم أثناء الحمل، وداء السكري، وزيادة معدلات العمليات القيصرية والمضاعفات المصاحبة للتخدير والتهاب الجرح والعدوى وتجلط الأوردة العميقة. وبالنسبة للجنين، هناك مخاطر مثل زياده وزن الجنين، وزياده احتماليه ولاده مبكره واحتياجه لمحضن او لوحده العناية المركزه بحديثي الولاده.

تعاني هذه الدراسة مثل أي دراسة رصدية أخرى من نوعها، من عدة قيود. أولاً، إن الوقت المثالي لتسجيل الطول والوزن الأساسيين للمرأة الحامل هو قبل أن تبدأ في إكتساب الوزن بسبب الحمل مع الأخذ في الاعتبار أن الوزن قبل الحمل كان معروفاً من خلال كلمات المريض الخاصة وأخذ التاريخ. ثانياً، استخدمت دراستنا البيانات التي تم جمعها على مدى 6 أشهر؛ فترة قصيرة يجب تمديدها في الدراسات والبحوث اللاحقة لإظهار الأثر الطويل الأمد للسمنة على المريض.

الإستنتاج: فقدان الوزن عند النساء البدنيات مع تغيير نمط الحياة وتحقيق مؤشر كتلة الجسم الطبيعي قبل الحمل هو الهدف الأساسي في علاج السمنة أثناء الحمل.

الكلمات الدالة: مؤشر كتله الجسم، التأثير على الأم والجنين.