

Low BMI and Pregnancy/Neonatal Outcomes

Date of Search: 30/06/2016

Sources Searched: Medline, Embase, Cinahl, NHS Evidence, Trip database

Search History:

1. EMBASE; exp UNDERWEIGHT/; 7376 results.
2. EMBASE; underweight.ti; 781 results.
3. EMBASE; (low adj2 BMI).ti,ab; 3370 results.
4. EMBASE; (low adj2 "body mass index").ti,ab; 2029 results.
5. EMBASE; "under weight".ti; 29 results.
6. EMBASE; 1 OR 2 OR 3 OR 4 OR 5; 12487 results.
7. EMBASE; (maternal OR pregn*).ti; 284246 results.
8. EMBASE; exp PREGNANCY/; 620412 results.
9. EMBASE; 7 OR 8; 698977 results.
10. EMBASE; 6 AND 9; 1089 results.
11. EMBASE; *UNDERWEIGHT/; 600 results.
12. EMBASE; 9 AND 11; 48 results.
13. EMBASE; "under nutrition".ti; 127 results.
14. EMBASE; 9 AND 13; 21 results.
15. EMBASE; 12 OR 14; 68 results.
16. EMBASE; exp PRENATAL DIAGNOSIS/; 86148 results.
17. EMBASE; exp FETUS ECHOGRAPHY/; 19493 results.
18. EMBASE; 16 OR 17; 86148 results.
19. EMBASE; 10 AND 18; 21 results.
20. EMBASE; maternal.ti; 70178 results.
21. EMBASE; 6 AND 20; 375 results.
22. EMBASE; (thin OR thinness).ti; 22571 results.
23. EMBASE; 9 AND 22; 213 results.
24. EMBASE; 6 AND 23; 1 results.
25. Medline; exp THINNESS/; 4360 results.
26. Medline; (underweight OR "under weight").ti; 700 results.
27. Medline; (low adj2 BMI).ti,ab; 2294 results.
28. Medline; (low adj2 "body mass index").ti,ab; 1811 results.
29. Medline; 25 OR 26 OR 27 OR 28; 8236 results.
30. Medline; (maternal OR pregn*).ti; 245622 results.
31. Medline; exp PREGNANCY/; 788063 results.
32. Medline; 30 OR 31; 824159 results.
33. Medline; 29 AND 32; 634 results.
34. Medline; exp ULTRASONOGRAPHY, PRENATAL/; 0 results.
36. Medline; ((fetal OR foetal OR prenatal) adj2 (ultras* OR sonogra* OR echogr*)).ti,ab; 9464 results.
38. Medline; "ULTRASONOGRAPHY PRENATAL".af; 26593 results.
39. Medline; 36 OR 38; 30798 results.
40. Medline; 33 AND 39; 15 results.

41. Medline; 33 [Limit to: (Language English)]; 564 results.
42. Medline; "under nutrition".ti [Limit to: (Language English)]; 91 results.
43. Medline; undernutrition.ti [Limit to: (Language English)]; 1779 results.
44. Medline; 42 OR 43 [Limit to: (Language English)]; 1874 results.
45. Medline; 32 AND 44 [Limit to: (Language English)]; 572 results.
46. Medline; exp PREGNANCY OUTCOME/ [Limit to: (Language English)]; 40623 results.
47. Medline; 45 AND 46 [Limit to: (Language English)]; 10 results.
48. EMBASE; (low adj2 "gestational weight").ti,ab; 48 results.
49. EMBASE; *LOW GESTATIONAL WEIGHT GAIN/; 1 results.
50. EMBASE; (low adj2 "body mass index").ti,ab; 2029 results.
51. EMBASE; 7 AND 50; 69 results.
52. Medline; (low adj2 "gestational weight").ti,ab; 46 results.
53. CINAHL; *THINNESS/; 359 results.
54. CINAHL; underweight.ti; 152 results.
55. CINAHL; (low adj2 BMI).ti,ab; 376 results.
56. CINAHL; (low adj2 "body mass index").ti,ab; 297 results.
57. CINAHL; "under weight".ti; 5 results.
58. CINAHL; 53 OR 54 OR 55 OR 56 OR 57; 1053 results.
59. CINAHL; (maternal OR pregn*).ti; 38097 results.
60. CINAHL; exp PREGNANCY/; 106541 results.
61. CINAHL; 59 OR 60; 113801 results.
62. CINAHL; 58 AND 61; 91 results.
63. CINAHL; 58 AND 61; 91 results.

Title: Maternal pre-pregnancy weight and perinatal outcomes

Citation: Journal of Perinatal Medicine, October 2015, vol./is. 43/(no pagination), 0300-5577 (October 2015)

Author(s): Ruiz Duran S., Maroto Martin M.T., Sanchez Gila M.D.M., Manzanares Galan S., Montoya Ventoso F., Puertas Prieto A.

Language: English

Abstract: Introduction: Obesity is one of the most important health problems, also seems to have influence on pregnant women. Obesity has severe consequences on the health since diabetes mellitus, hypertension, and venous thrombosis among others. The aim of the study was to determine the effect of early pregnancy body mass index (BMI) on obstetric and neonatal outcomes. Materials and methods: A period 2003-2014 cohort study was carried in Granada (Spain). Maternal BMI was classified as underweight (<18.5), normal weight (18.5 to 24.99), overweight (25 to 29.99) and obese (> 30). Logistic regression analysis adjusted for age, parity, diabetes and hypertension using reference BMI was used. Results: Of a total of 10428 pregnant underweight 330 (3.2%), normal weight 6204 (59.5%), overweight 2565 (24.6%), obese 1329 (12.7%). As compared to normal weight women, underweight women were significantly younger (underweight 28.07; normal weight 30.71; overweight 30.90 and obese 30.58, $p < 0.001$). Overweight and obese showed significantly higher parity, hypertension and Diabetes Mellitus. Underweight women seem to be protective against birth post-term, if compared to normal weight women and after controlling for maternal age, multiparity, hypertension, and diabetes as confounding factors. However, underweight women present a higher risk of instrumental delivery. Obese women seem to be protective against term pregnancy and instrumental delivery. However, they present a higher risk of: induced labor (1.7 times higher compared to normal BMI group); cesarean (2.1 times higher); low birth weight (1.2 times higher);

macrosomas (3.3 times higher); low Apgar test at the first minute (3.6 times higher) and at 5 minutes (3.7 times higher); although, they do not present worse results in the pH of umbilical artery. Obese women has a higher risk of rectovaginal Streptococcus group B colonization (OR 1.38; 95% CI 1.14-1.66). Overweight women also seem to present a higher risk of induced labor; cesarean; low birth weight; and macrosomas; although, they do not present worse results in the Apgar score. Conclusions: Maternal obesity is associated with an increased risk of adverse obstetric and neonatal outcomes.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Maternal body mass index and risk of birth and maternal health outcomes in low- and middle-income countries: A systematic review and meta-analysis

Citation: Obesity Reviews, September 2015, vol./is. 16/9(758-770), 1467-7881;1467-789X (01 Sep 2015)

Author(s): Rahman M.M., Abe S.K., Kanda M., Narita S., Rahman M.S., Bilano V., Ota E., Gilmour S., Shibuya K.

Language: English

Abstract: We conducted a systematic review and meta-analysis of population-based cohort studies of maternal body mass index (BMI) and risk of adverse birth and health outcomes in low- and middle-income countries. PubMed, Embase, CINAHL and the British Nursing Index were searched from inception to February 2014. Forty-two studies were included. Our study found that maternal underweight was significantly associated with higher risk of preterm birth (odds ratio [OR], 1.13; 95% confidence interval [CI], 1.01-1.27), low birthweight (OR, 1.66; 95% CI, 1.50-1.84) and small for gestational age (OR, 1.85; 95% CI, 1.69-2.02). Compared with mothers with normal BMI, overweight or obese mothers were at increased odds of gestational diabetes, pregnancy-induced hypertension, pre-eclampsia, caesarean delivery and post-partum haemorrhage. The population-attributable risk (PAR) indicated that if women were entirely unexposed to overweight or obesity during the pre-pregnancy or early pregnancy period, 14% to 35% fewer women would develop gestational diabetes, pre-eclampsia or pregnancy-induced hypertension in Brazil, China, India, Iran or Thailand. The highest PAR of low birthweight attributable to maternal underweight was found in Iran (20%), followed by India (18%), Thailand (10%) and China (8%). Treatment and prevention of maternal underweight, overweight or obesity may help reduce the burden on maternal and child health in developing countries.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *John Wiley and Sons* in [Obesity Reviews](#)

Title: Associations of Gestational Weight Gain with Preterm Birth among Underweight and Normal Weight Women.

Citation: Maternal and child health journal, Sep 2015, vol. 19, no. 9, p. 2066-2073, 1573-6628 (September 2015)

Author(s): Sharma, Andrea J, Vesco, Kimberly K, Bulkley, Joanna, Callaghan, William M, Bruce, F Carol, Staab, Jenny, Hornbrook, Mark C, Berg, Cynthia J

Abstract: Studies report increased risk of preterm birth (PTB) among underweight and normal weight women with low gestational weight gain (GWG). However, most studies examined GWG over gestational periods that differ by term and preterm which may have biased associations because GWG rate changes over the course of pregnancy. Furthermore, few studies have specifically examined the amount and pattern of GWG early in pregnancy as a predictor of PTB. Within one integrated health care delivery system, we examined 12,526 singleton pregnancies between 2000 and 2008 among women with a body mass index $<25 \text{ kg/m}^2$, who began prenatal care in the first trimester and delivered a live-birth >28 weeks gestation. Using self-reported pregravid weight and serial measured antenatal weights, we estimated GWG and the area under the GWG curve (AUC; an index of pattern of GWG) during the first and second trimesters of pregnancy (≤ 28 weeks). Using logistic regression adjusted for covariates, we examined associations between each GWG measure, categorized into quartiles, and PTB (<37 weeks gestation). We additionally examined associations according to the reason for PTB by developing a novel algorithm using diagnoses and procedure codes. Low GWG in the first and second trimesters was not associated with PTB [aOR 1.11, (95% CI 0.90, 1.38) with GWG $<8.2 \text{ kg}$ by 28 weeks compared to pregnancies with GWG >12.9]. Similarly, pattern of GWG was not associated with PTB. Our findings do not support an association between GWG in the first and second trimester and PTB among underweight and normal weight women.

Source: Medline

Full Text:

Available from *Springer Link Journals* in [Maternal and Child Health Journal](#)

Title: Relationship between pre-pregnancy maternal BMI with spontaneous preterm delivery and birth weight.

Citation: Journal of obstetrics and gynaecology : the journal of the Institute of Obstetrics and Gynaecology, May 2015, vol. 35, no. 4, p. 354-357, 1364-6893 (May 2015)

Author(s): Sharifzadeh, F, Kashanian, M, Jouhari, S, Sheikhsari, N

Abstract: The aim of the present study was to find the relationship between pre-pregnancy maternal body mass index (BMI) with spontaneous preterm delivery and birth weight. A prospective cohort study was performed on 576 pregnant women. Maternal BMI was determined at the first prenatal visit between 8-12 weeks' gestation and considered as the pre-pregnancy maternal weight. The women were then monitored up to delivery. Out of 576 women, 396 completed the study. The demographics of the women in all BMI groups did not differ with regard to age, height, history of abortion and employment. A total of 21 women (5.3%) were underweight; 198 women (50%) were normal weight; 117 women (29.5%) were overweight and 60 (15.2%) were obese. There were no cases of morbidly obese ($\text{BMI} > 40 \text{ kg/m}^2$) women. Obesity in women had a positive correlation with higher gestational age at the time of delivery ($r = 0.213$, $p = 0.015$) and a heavier birth weight ($r = 0.361$, $p = 0.008$). Low birth weight had a correlation with low maternal BMI ($r = 0.157$, $p = 0.041$). Macrosomia was greater in obese women ($p = 0.022$) and BMI had a positive correlation with macrosomia ($r = 0.224$, $p = 0.034$). Preterm delivery showed a negative correlation with maternal

BMI ($r = -0.124$, $p = 0.004$) and the women with a lower BMI had a greater number of preterm deliveries ($p = 0.035$).

Source: Medline

Full Text:

Available from *Taylor & Francis* in [Journal of Obstetrics and Gynaecology](#)

Title: Factors associated with recurrent preterm birth among underweight women

Citation: *Reproductive Sciences*, March 2015, vol./is. 22/(150A), 1933-7191 (March 2015)

Author(s): Girsan A.I., Mayo J., Matthew W.B., Gould J.B., Carmichael S.L., Lyell D.J., Shaw G.M.

Language: English

Abstract: INTRODUCTION: Maternal underweight is related to increased risk of recurrent preterm birth (PTB;<37 weeks).We aimed to identify factors associated with recurrent PTB among underweight women. METHODS: Hospital and birth certificate records of deliveries in California between 2007-10 were used.Consecutive singleton births of women with underweight body mass index ($BMI < 18.5 \text{ kg/m}^2$) in the first pregnancy were analyzed.Pregnancies were categorized based on the outcome:term-term;term-PTB;PTB-term;PTB-PTB (recurrent).Logistic regression modeling compared PTB-PTB to term-term (³37 wks) group. RESULTS: Of 4,971 underweight women, 86 (1.7%) had recurrent PTB. Women with recurrent PTB were more often of Hispanic race-ethnicity, younger, and had inter-pregnancy-interval (IPI) of <6 months. In multivariable analyses, IPI<6 months (adjusted OR=2.23, 95%CI:1.33- 3.75) was associated with increased odds of recurrent PTB whereas an increase in maternal age (aOR=0.94 per year,CI: 0.89-0.99) and an increase in inter-pregnancy weight (aOR=0.98 per lb,CI:0.96-0.99) decreased the odds of recurrent PTB. CONCLUSIONS: Factors related to recurrent PTB among underweight women were young age, IPI<6 months and small inter-pregnancy weight gain.These results may offer etiologic clues about recurrent PTB among underweight women. (Table Presented).

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: The recommendations of the American Institute of Medicine (IOM) for normal and underweight women to reduce the risk of low birth weight.

Citation: *Taiwanese journal of obstetrics & gynecology*, Feb 2015, vol. 54, no. 1, p. 1-7, 1875-6263 (February 2015)

Author(s): Tsai, Yieh-Loong, Chen, Li-Ching, Seow, Kok-Min, Chong, Kian-Mei

Abstract: The recommendations of the American Institute of Medicine (IOM) were revised recently in order to enhance maternal and neonatal health. The aim of our study was to investigate the risk of low birth weight (LBW) among women who follow the IOM recommendations. Gestational weight gain (GWG) and rate of weight gain (RWG) across the different periods of pregnancy among women who delivered LBW fetuses were analyzed retrospectively. The logistic regression was used to analyze the risk of LBW and to identify recommendations. From January 2008 to December 2009,

117 out of 4924 (2.4%) women delivered term LBW fetuses. After exclusions, 88 LBW and 91 control subjects were enrolled into the study. There was increased risk of cesarean delivery [odds ratio (OR) with 95% confidence interval (CI): 2.53 (1.33-4.83)] and neonatal asphyxia within 7 days of birth [OR 95% CI: 5.71 (1.21-26.83)] for the LBW group compared with the control group. Normal weight women [body mass index (BMI): 18.5-24.9 kg/m²] who followed the GWG and RWG recommendations of the IOM had no increased risk of LBW. However, there was a two-to three-fold increased LBW risk among normal weight women who followed the IOM guidelines when, during the 2(nd) trimester, their GWG was ≤7 kg [OR 95% CI: 2.21 (1.28-6.49)] or their RWG was ≤0.45 kg/week [OR 95% CI: 3.14 (1.32-7.47)]. Among underweight women (BMI < 18.5 kg/m²), if, during the 2(nd) and 3(rd) trimesters, they followed the lower range of the GWG and RWG recommendations of the IOM there was a five-fold increased risk of LBW if the GWG was ≤13 kg [OR 95% CI: 5.29 (1.61-25.51)]; or the RWG was ≤0.45 kg/week [OR 95% CI: 5.35 (1.61-24.66)]. For underweight women, it is suggested that they follow the upper range of the IOM recommendation in order to avoid LBW. For normal weight women, although the IOM guidelines provide a good basis, it is suggested that they carefully follow the recommended GWG and the RWG values during the 2(nd) trimester, which is a very important period for fetal growth. Copyright © 2014. Published by Elsevier B.V.

Source: Medline

Full Text:

Available from *Free Access Content* in [Taiwanese Journal of Obstetrics and Gynecology](#)

Title: Impact of maternal under nutrition on obstetric outcomes.

Citation: Journal of endocrinological investigation, Jan 2015, vol. 38, no. 1, p. 31-38, 1720-8386 (January 2015)

Author(s): Triunfo, S, Lanzone, A

Abstract: Maternal malnutrition, ranging from under nutrition to over dietary intake before and in the pregnant state, is worldwide problem with significant consequences, not only for survival and increased risk for acute and chronic diseases both in mother and child, but also for economic productivity of individuals in the societies and additional costs on health system. Inter alia, pre-pregnancy underweight and insufficient gestational weight gain are considered as individual risk factors for the occurrence of spontaneous interruption, preterm birth, fetal growth restriction, and hypertensive disorders, strongly associated with poorer perinatal outcome. In a portion of this population, major eating disorders (anorexia and bulimia nervosa), once thought to be rare, but nowadays enlarged due to cultural pressure on the drive for thinness, have been identified as the etiology of an abnormal nutritional condition in developed countries, in contrast to long standing food deprivation in developing countries. Actually, even if without a complete weight management guidance for these selected pregnant women, an appropriate weight gain is recommended during pregnancy. Mainly, therapeutic approach is prevention using specific programs of improving weight before pregnant status. In this article, a review of the literature on selected obstetrical risks associated with maternal underweight has been performed and both the target prevention and management strategies have been described.

Source: Medline

Title: Does maternal underweight prior to conception influence pregnancy risks and outcome?

Citation: In Vivo, November 2014, vol./is. 28/6(1165-1170), 0258-851X;1791-7549 (01 Nov 2014)

Author(s): Hoellen F., Hornemann A., Haertel C., Reh A., Rody A., Schneider S., Tuschy B., Bohlmann M.K.

Language: English

Abstract: Aim: Data analyzing risks during pregnancy and neonatal outcome in Caucasian women with pre-conceptional underweight are scarce. Patients and Methods: We conducted a retrospective cohort study in Northern Germany comparing pregnancy risks and neonatal outcomes in nulliparous women with either pre-conceptional underweight or normal weight. Results: The data of 3,854 nulliparous women with either underweight (n=243; BMI <math><18.5 \text{ kg/m}^2</math>) or normal weight (n=3611; BMI 18.5-24.9 kg/m²) were screened. The risks for preterm birth (23.3 vs. 18.6%; p=0.004) and neonatal underweight were significantly higher in women with underweight prior to conception (p<0.0001). The risk for secondary caesarean sections was significantly lower in underweight patients. Conclusion: To our knowledge, the present retrospective cohort study constitutes the largest subgroup analysis on delivery and maternal and neonatal outcome in pre-conceptionally underweight mothers. There are significantly more preterm deliveries in underweight mothers, while maternal outcome and birth-associated trauma (lacerations, caesarean section) is not disadvantageously influenced by maternal underweight. Further investigations are required in order to specify nutritional deficits in underweight pregnant women and to optimize medication in cases where nutritional balance cannot be achieved in order to improve the neonatal status at birth.

Publication Type: Journal: Article

Source: EMBASE

Title: Maternal pre-pregnancy underweight and fetal growth in relation to institute of medicine recommendations for gestational weight gain

Citation: Journal of Maternal-Fetal and Neonatal Medicine, June 2014, vol./is. 27/(334), 1476-7058 (June 2014)

Author(s): Roje D., Jeric M., Medic N., Vulic M., Mestrovic Z.

Language: English

Abstract: Brief Introduction: Maternal nutritional status is one of the most important factors of fetal growth and development. Consequently, the currently increasing prevalence of underweight women worldwide has come in the focus of interest of perinatal medicine. The aim of the study was to assess the effect of low pre-pregnancy body mass index (BMI) on fetal growth. Materials & Methods: Data on 4678 pregnant women and their neonates were retrospectively analyzed. Pre-pregnancy BMI of study women was categorized according to the WHO standards. Fetal growth was assessed by birth weight and birth length, birth weight for gestational age, and ponderal index. Clinical Cases or Summary Results: Study group included 351 (7.6%) women with pregestational BMI <math><18.5 \text{ kg/m}^2</math>, while all women with pregestational BMI 18.5-25 kg/m² (N = 3688; 78.8%) served as a control group. The mean birth weight and birth length of neonates born to underweight mothers were by 167 g and 0.8 cm lower in comparison with the neonates born to mothers of normal nutritional status, respectively (p<0.001 both). The prevalence of small for gestational age (SGA) births was twofold that found in the control group of mothers of normal nutritional status (9.7% vs. 4.9%; p<0.001). The

inappropriately low gestational weight gain additionally increased the rate of SGA infants in the group of mothers with low pre-pregnancy BMI (21.4% vs. 10.4%; $p = 0.02$). Pre-pregnancy BMI category did not influence neonatal growth symmetry. Conclusions: Low maternal pregestational BMI is associated with fetal growth assessment. Improvement of the maternal nutritional status before pregnancy can increase the likelihood of perinatal outcome.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Full Text:

Available from *Taylor & Francis* in [Journal of Maternal-Fetal and Neonatal Medicine, The](#)

Title: Associations of maternal pre-pregnancy underweight with small-for-gestational-age and spontaneous preterm birth, and optimal gestational weight gain in Japanese women

Citation: Journal of Obstetrics and Gynaecology Research, April 2014, vol./is. 40/4(988-994), 1341-8076;1447-0756 (April 2014)

Author(s): Fujiwara K., Aoki S., Kurasawa K., Okuda M., Takahashi T., Hirahara F.

Language: English

Abstract: Aim: To determine associations of maternal pre-pregnancy underweight with poor outcomes and evaluate how gestational weight gain affects risks for such outcomes in pre-pregnancy underweight Japanese women. Methods: By analyzing the January 2001-December 2012 hospital database, we retrospectively identified 6954 women with pre-pregnancy normal weights (body mass index, 18.5-24.9 kg/m²) and 1057 pre-pregnancy underweight women (body mass index, <18.5 kg/m²) who delivered at the Perinatal Maternity and Neonatal Center of Yokohama City University. These women were stratified by weekly weight gain during the second/ third trimesters to investigate associations of gestational weight gain with spontaneous preterm birth and small for gestational age (SGA). Spontaneous preterm birth and SGA incidences were compared with those of women meeting Institute of Medicine (IOM) guidelines to determine optimal weight gain in Japanese women. Results: Preterm birth and SGA incidences were significantly higher in pre-pregnancy underweight than in pre-pregnancy normal weight women (4.6% vs 2.4% [$P = 0.005$] and 13.9% vs 9.7% [$P = 0.003$], respectively). For pre-pregnancy normal weight women, preterm birth incidence was significantly higher in those with weight gain of less than 0.2 kg/week than in those IOM guidelines. For pre-pregnancy underweight women, preterm birth and SGA incidences were significantly higher in those with weight gain of less than 0.3 kg/week than in those meeting IOM guidelines. Conclusion: Preterm birth and SGA incidences did not differ significantly between pre-pregnancy normal weight women with weight gain of 0.2 kg/week or more and pre-pregnancy underweight women with weight gain of 0.3 kg/week or more, as compared to women meeting IOM guidelines. These results suggest that IOM guidelines for gestational weight gain may lack external validity in Japanese women. © 2014 Japan Society of Obstetrics and Gynecology.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Title: Increased risk of very low birth weight, rapid postnatal growth, and autism in underweight and obese mothers.

Citation: American journal of health promotion : AJHP, Jan 2014, vol. 28, no. 3, p. 181-188, 2168-6602 (2014 Jan-Feb)

Author(s): Moss, Brian G, Chugani, Diane C

Abstract: To determine whether prepregnancy weight was associated with children's birth weight, early physical growth, and autism diagnosis. Early Childhood Longitudinal Study-Birth Cohort data. United States. Representative sample of U.S. children followed from birth through kindergarten (n = 4800). Also, a subpopulation of the very low birth weight children was examined (n = 500). Maternal variables included age and prepregnancy body mass index. Changes in children's height, weight, and head circumference between 9 months and 2 years were used as growth metrics. Children's sex, age, birth weight, and reported autism were also considered. Logistic and multinomial logistic models assessed the impact of prepregnancy weight on birth weight and children's subsequent rate of physical growth and autism. Children born to underweight or obese mothers had increased odds of very low birth weight. Very low birth weight was related to rapid height and weight growth and more than twice the likelihood to subsequently be diagnosed with autism. For the subgroup of very low birth weight children, rapid head growth was related to a fivefold increase in the odds of autism. After accounting for the impact birth weight and growth rates, we found prepregnancy weight indirectly impacted autism risk. Being underweight or obese during prepregnancy indirectly increased risk for autism from increased odds of low birth weight and accelerated postnatal growth.

Source: Medline

Title: Association between maternal body mass index during pregnancy, short-term morbidity, and increased health service costs: a population-based study.

Citation: BJOG : an international journal of obstetrics and gynaecology, Jan 2014, vol. 121, no. 1, p. 72, 1471-0528 (January 2014)

Author(s): Denison, F C, Norwood, P, Bhattacharya, S, Duffy, A, Mahmood, T, Morris, C, Raja, E A, Norman, J E, Lee, A J, Scotland, G

Abstract: To investigate the impact of maternal body mass index (BMI, kg/m²) on clinical complications, inpatient admissions, and additional short-term costs to the National Health Service (NHS) in Scotland. Retrospective cohort study using an unselected population database. Obstetric units in Scotland, 2003-2010. A total of 124,280 singleton deliveries in 109,592 women with a maternal BMI recorded prior to 16 weeks of gestation. Population-based retrospective cohort study of singleton deliveries, with multivariable analysis used to assess short-term morbidity and health service costs. Maternal and offspring outcomes, number and duration of hospital admissions, and healthcare costs. Using multivariable analysis, in comparison with women of normal weight, women who were overweight, obese, or severely obese had an increased risk of essential hypertension [1.87 (1.18-2.96), 11.90 (7.18-19.72), and 36.10 (18.33-71.10)], pregnancy-induced hypertension [1.76 (1.60-1.95), 2.98 (2.65-3.36), and 4.48 (3.57-5.63)], gestational diabetes [3.39 (2.30-4.99), 11.90 (7.54-18.79), and 67.40 (37.84-120.03)], emergency caesarean section [1.94 (1.71-2.21), 3.40 (2.91-3.96), and 14.34 (9.38-21.94)], and elective caesarean section [2.06 (1.84-2.30), 4.61 (4.06-5.24), and

17.92 (13.20-24.34)]. Compared with women of normal weight, women who were underweight, overweight, obese, or severely obese were associated with an 8, 16, 45, and 88% increase in the number of admissions, respectively, and women who were overweight, obese, or severely obese were associated with a 4, 9, and 12% increase in the duration of stay (all $P < 0.001$). The additional maternity costs [mean (95% CI), adjusted analyses] for women who were underweight, overweight, obese, or severely obese were £102.27 (£48.49-156.06), £59.89 (£41.61-78.17), £202.46 (£178.61-226.31), and £350.75 (£284.82-416.69), respectively. Maternal BMI influences maternal and neonatal morbidity, the number and duration of maternal and neonatal admissions, and health service costs. © 2013 Royal College of Obstetricians and Gynaecologists.

Source: Medline

Full Text:

Available from *John Wiley and Sons* in [BJOG: An International Journal of Obstetrics and Gynaecology](#)

Title: Effects of Pre-Pregnancy Body Mass Index and Gestational Weight Gain on Low Birth Weight in Omani Infants: A case-control study.

Citation: Sultan Qaboos University medical journal, Aug 2013, vol. 13, no. 3, p. 386-391, 2075-051X (August 2013)

Author(s): Al-Hinai, Mustafa, Al-Muqbal, Majid, Al-Muqbal, Aisha, Gowri, Vaidyanathan, Al-Maniri, Abdullah

Abstract: This study aimed to investigate the association between pre-pregnancy maternal body mass index (BMI), gestational weight gain and low birth weight (LBW) in babies born to a sample population of Omani women. A case-control study was carried out among deliveries registered between 1(st) May 2010 and 30(th) April 2011 at Sultan Qaboos University Hospital, Muscat, Oman. A case was defined as a woman who delivered a low birth weight baby (<2,500 g); a control was a woman delivering a baby weighing between 2,500 and 4,000 g. A random selection of 150 cases and 300 controls was carried out using the hospital information system. Maternal, pre-natal, and delivery data were extracted from the mothers' follow-up cards. Bivariate and multivariate logistic regression analyses were executed to examine the association between pre-pregnancy maternal BMI and LBW. The percentage of underweight mothers (BMI <18.5) was higher among the cases compared to the controls (17.3% versus 6%; $P < 0.001$). The proportion of mothers with less-than-recommended weight gain was also higher among the cases compared to the controls (57.7% versus 33%; $P < 0.001$). After adjustment for potential confounders, infants of underweight mothers had more than twice the risk of LBW compared to those of mothers with normal weight (odds ratio = 2.27; 95% confidence interval 1.09-4.71). Underweight Omani women as well as women with less-than-recommended gestational weight gain were at higher risk of delivering LBW babies. Maternal health promotion programmes should be directed towards improving mothers' nutrition before and during pregnancies.

Source: Medline

Full Text:

Available from *National Library of Medicine* in [Sultan Qaboos University Medical Journal](#)

Title: How does low maternal BMI affect obstetric and neonatal outcome?

Citation: BJOG: An International Journal of Obstetrics and Gynaecology, June 2013, vol./is. 120/(168), 1470-0328 (June 2013)

Author(s): Mittal S., Hall S.

Language: English

Abstract: Objectives This study aimed to look at various obstetric and neonatal outcomes in underweight women (BMI <18.5) and compare them with those in women with normal BMI (18.5-25) and obese (BMI >30) group. Methods This was a retrospective observational study in a tertiary teaching hospital in the North East of England looking at 10 614 consecutive deliveries in a period between January 2009 and March 2011. Women were divided in different BMI groups to compare the outcomes. Results There were 345 women (3.2%) in BMI <18.5 group, 5512 (51.9%) in BMI 18.5-25, 2801 (26.3%) in BMI 25-30 and 1947 (18.3%) in BMI >30 group. Spontaneous vaginal delivery was highest at 61.7% in low BMI compared to 60.7% in normal BMI and 57.4% in BMI >30 with 49.2% in sub-group of BMI >45. Assisted vaginal delivery rates were also inversely proportional to BMI with a peak of 16.8% in BMI <18.5 falling to 10.4% in BMI >30 and lowest at 4.3% in BMI >45. Elective lower segment caesarean section was also lowest in low BMI at 5.2% compared to 9.8% in normal BMI and 13.28% in BMI >30. Underweight women were slightly more likely to have emergency caesarean section at 14.5% compared to 12.39% in normal BMI group with 18.45% in BMI >30. Preterm delivery rates (<37 weeks) were significantly different between underweight and normal BMI group (14.5% versus 9.4%, P = 0.002, RR 1.536, CI 1.155-2.017). Surprisingly they were also less likely to have postpartum haemorrhage (PPH) >500 mL at delivery (13.9% versus 19.6%, P = 0.009, RR 0.709, CI 0.533-0.929). There were more babies with birth weight <2.5 kg in underweight group compared to normal BMI (15.7% versus 9.1%, P = 0.0001, RR 0.301, CI 0.147- 0.590) and less babies >4 kg at 2.6% compared to 8.7% in normal BMI (P = 0.0001). Other obstetric outcomes such as third degree tear, shoulder dystocia, stillbirth and late miscarriage were not different among groups. Neonatal outcomes such as abnormal cord pH, SCBU admissions were also not different in underweight group compared to other groups. Conclusion Low BMI increases vaginal delivery rates either spontaneous or assisted and they are less likely to need caesarean section. They are also more likely to have preterm delivery and babies with low birthweight. This study does not reveal any differences in other obstetric outcomes apart from PPH and neonatal outcomes are also similar.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Full Text:

Available from *John Wiley and Sons* in [BJOG: An International Journal of Obstetrics and Gynaecology](#)
Available from *John Wiley and Sons* in [BJOG: An International Journal of Obstetrics and Gynaecology](#)

Title: Maternal pre-pregnancy underweight and fetal growth in relation to institute of medicine recommendations for gestational weight gain

Citation: Early Human Development, May 2013, vol./is. 89/5(277-281), 0378-3782;1872-6232 (May 2013)

Author(s): Jeric M., Roje D., Medic N., Strinic T., Mestrovic Z., Vulic M.

Language: English

Abstract: Purpose: Maternal nutritional status is one of the most important factors of fetal growth and development. Consequently, the currently increasing prevalence of underweight women worldwide has come in the focus of interest of perinatal medicine. The aim of the study was to assess the effect of low pre-pregnancy body mass index (BMI) on fetal growth. Materials and methods: Data on 4678 pregnant women and their neonates were retrospectively analyzed. Pre-pregnancy BMI of study women was categorized according to the WHO standards. Fetal growth was assessed by birth weight and birth length, birth weight for gestational age, and ponderal index. Results: Study group included 351 (7.6%) women with pregestational BMI <math><18.5\text{kg/m}^2</math>, while all women with pregestational BMI 18.5-25kg/m² (n=3688; 78.8%) served as a control group. The mean birth weight and birth length of neonates born to underweight mothers were by 167g and 0.8cm lower in comparison with the neonates born to mothers of normal nutritional status, respectively (P<0.001 both). The prevalence of small for gestational age (SGA) births was twofold that found in the control group of mothers of normal nutritional status (9.7% vs. 4.9%; P<0.001). The inappropriately low gestational weight gain additionally increased the rate of SGA infants in the group of mothers with low pre-pregnancy BMI (21.4% vs. 10.4%; P=0.02). Pre-pregnancy BMI category did not influence neonatal growth symmetry. Conclusion: Low maternal pregestational BMI is associated with fetal growth assessment. Improvement of the maternal nutritional status before pregnancy can increase the likelihood of perinatal outcome. © 2012 Elsevier Ltd.

Publication Type: Journal: Article

Source: EMBASE

Title: Maternal underweight and child growth and development.

Citation: Lancet (London, England), Feb 2013, vol. 381, no. 9867, p. 626-627, 1474-547X (February 23, 2013)

Author(s): Razak, Fahad, Finlay, Jocelyn E, Subramanian, S V

Source: Medline

Full Text:

Available from *Lancet* in [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#)

Available from *ProQuest* in [Lancet, The](#)

Title: Maternal pregnancy weight gain and the risk of placental abruption: A retrospective cohort study

Citation: American Journal of Obstetrics and Gynecology, January 2013, vol./is. 208/1 SUPPL.1(S297), 0002-9378 (January 2013)

Author(s): Salihu H., Diamond E., Wilson R., August E., Mbah A., Whiteman V.

Language: English

Abstract: OBJECTIVE: Weight gain during pregnancy has recently been identified as a risk factor for placental abruption but the association remains relatively understudied. The purpose of this study

was to assess the relationship between gestational weight gain and the incidence of placental abruption utilizing a highly reliable and tested population-based, maternally-linked, longitudinal dataset. **STUDY DESIGN:** This retrospective cohort was restricted to Missouri women who had a singleton, live birth between the years 1989 to 2005 (N= 1,146,935). Weight gain during pregnancy was categorized as below optimal, optimal, and above optimal according to the most recent guidelines established by the Institute of Medicine (IOM). Multivariate logistic regression was used to generate independent measures of association between pregnancy weight gain and placental abruption. Sub-group analyses were conducted utilizing pre-pregnancy body mass index (BMI) categories: underweight, normal, overweight, and obese. Regression models were adjusted for level of prenatal care, maternal race, age, smoking habits, and the occurrence of other pregnancy complications. **RESULTS:** Overall, women who gained more than the optimal weight recommended during pregnancy had a 30% reduced odds of placental abruption [adjusted odds ratio (AOR) =0.695, 95% confidence interval (CI): 0.660-0.731], as compared to those with optimal weight gain. By contrast, women who gained less than the optimal weight during pregnancy had a 67% increased likelihood of experiencing placental abruption (AOR = 1.673, 95% CI: 1.588-1.762). The results remained statistically significant even after controlling for the confounding effects of maternal BMI status. **CONCLUSION:** Pregnant women that gain weight below the recommended IOM guidelines are at elevated risk for placental abruption regardless of their BMI status. These findings underscore the importance of weight gain management during pregnancy to improve maternal/fetal outcomes. (Table Presented).

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Association between maternal nutrition status and birth outcome

Citation: Annals of Nutrition and Metabolism, 2013, vol./is. 63/(671), 0250-6807 (2013)

Author(s): Przybylowicz K., Przybylowicz M., Grzybiak M., Janiszewska K.

Language: English

Abstract: Background and objectives: Various maternal anthropometric criteria (pre-pregnancy weight, height, weight gain during pregnancy period) has been significantly associated with intrauterine growth. Birth weight plays an important role in infant mortality and morbidity, development, and future health of the child. Maternal nutritional status both before and during pregnancy is a well-recognized determinant of birth outcomes. The aim of the study was to examine maternal nutritional status and its relationship to infant birth weight and birth length. **Methods:** The study was conducted on 510 women between the ages of 18-47 (28.1+/-4.8 years) who were patients of hospitals in the province of Warmia and Mazury. The course of pregnancy was uncomplicated, finished with natural labor, in biological time limits. The impact of mother's nutritional status before pregnancy and weight gain on newborns weight, length, Ponderal Index was estimated by multivariate linear regression. **Results:** The infant birth weight depended on mothers BMI before pregnancy and was lower in the group of underweight subjects (2988.8 g vs 3380.6 g, p<0.05). Women with low increase in body mass during pregnancy delivered newborns with lower anthropometrics parameters. The increase in gestational weight gain of one kg resulted in statistically significant increase of birth weight by 40.1 g, increase of Ponderal Index 0.22 kg/m³. **Conclusions:** Maternal BMI and gestational weight gain of pregnant women could be considered as predictive factors of birth weight of neonates.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Full Text:

Available from *ProQuest* in [Annals of Nutrition and Metabolism](#)

Title: Effects of low pre-pregnancy body mass index and gestational weight gain on neonatal outcomes

Citation: American Journal of Obstetrics and Gynecology, January 2013, vol./is. 208/1 SUPPL.1(S71-S72), 0002-9378 (January 2013)

Author(s): Berguig M., Timofeev J., Landy H.

Language: English

Abstract: OBJECTIVE: To evaluate the effect of low pre-pregnancy body mass index (BMI) and low gestational weight gain on neonatal outcomes as compared to parturients with normal BMI and normal or excessive weight gain. STUDY DESIGN: A retrospective review of a multicenter cohort of de-identified data in the Consortium on Safe Labor (NICHD). This database includes information on 233,844 births from 228,668 deliveries from 2002-2008. Maternal factors and neonatal outcomes were analyzed by BMI (low BMI <math><18.5 \text{ kg/m}^2</math>, normal 18.5-24.9 \alpha=0.05. RESULTS: Low pre-pregnancy BMI showed statistically significant increases in the risk of small for gestational age (SGA) infants (OR = 1.96, CI = 1.93 - 2.00), NICU admission (OR = 1.24, CI = 1.21 - 1.26), and neonatal death (OR = 1.62, CI = 1.47 - 1.79). No statistically significant differences were seen in gestational age at delivery or need for newborn resuscitation. When considering recommended weight gain, women who gained less weight (<28 lbs for low BMI, and <25 lbs for normal BMI) had higher risks of poor pregnancy outcomes (SGA, 5-minute Apgar score < 7, NICU admission, antepartum and intrapartum stillbirth (Table). CONCLUSION: Pregnancy outcomes are influenced by both pre-pregnancy BMI and weight gain during pregnancy. These findings suggest that women can minimize their risk of neonatal morbidity and mortality by optimizing their weight prior to conception and gaining the recommended weight amount throughout the pregnancy. (Table Presented).

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Can maternal body mass index predict offspring birthweight?

Citation: International Journal of Gynecology and Obstetrics, October 2012, vol./is. 119/(S366), 0020-7292 (October 2012)

Author(s): Hardock V., Bhattacharya S.

Language: English

Abstract: Objectives: To assess the strength of association between maternal pre-pregnancy Body Mass Index (BMI) and offspring birthweight. Materials: The Aberdeen Maternity and Neonatal Databank records and stores information on all pregnancy related events occurring in a geographically defined population. For this analysis we extracted data on all deliveries occurring between 1967 and 2010. This dataset contained 95554 deliveries. Methods: Birthweight and maternal BMI are recorded as continuous variables in the AMND. These were categorised as follows: Birthweight: low - <2500g, normal - 2500-3999g, high ->4000g. BMI: underweight - <20 kg/m², normal - 20-24.9, overweight - 25-29.9, obese - 30-34.9, morbidly obese - >35. Chisquare tests were performed to identify any association between the two variables using the normal categories as reference groups. Other risk factors for low and high birthweight were assessed at first by univariate analysis and if found to be significant at 5% level, were entered into the logistic regression models to calculate adjusted odds ratios with 95% confidence intervals. Results: The adjusted odds of delivering a high birthweight baby increased linearly as follows: 0.55 (0.59, 0.77) in underweight; 1.53 (1.44, 1.62) in overweight, 2.03 (1.87, 2.21) in obese and 2.61 (2.34, 2.90) in morbidly obese mothers. Similarly, the adjusted odds of a low birthweight baby decreased with increasing maternal BMI: underweight 1.44 (1.27, 1.62); overweight 0.76 (0.69, 0.85); obese 0.69 (0.59, 0.82); morbidly obese 0.47 (0.37, 0.60). However, this linear relationship was only evident after adjustment for gestational age, signifying that higher maternal BMI is also associated with preterm deliveries. Conclusions: Increasing maternal BMI is associated linearly with birthweight adjusted for gestational age. (Table presented).

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Gestational bodyweight gain among underweight Japanese women related to small-for-gestational-age birth.

Citation: The journal of obstetrics and gynaecology research, Sep 2012, vol. 38, no. 9, p. 1137-1144, 1447-0756 (September 2012)

Author(s): Harita, Nobuko, Kariya, Masatoshi, Hayashi, Tomoshige, Sato, Kyoko Kogawa, Aoki, Takuya, Nakamura, Kimihiko, Endo, Ginji, Narimoto, Katsuhiko

Abstract: The prevalence of underweight women, who have an increased risk for small-for-gestational-age (SGA) birth, is increasing in Japan. We examined the associations of pre-pregnancy body mass index and gestational weight gain (GWG) with SGA birth among Japanese women. We conducted a prospective cohort study of 1391 women who delivered full-term singleton babies. SGA was defined as below the 10th percentile of birthweight at each gestational age, baby sex, and parity. We calculated the 5th percentile of birthweight in the same way for another threshold for SGA. According to pre-pregnancy body mass index, we divided the participants into three groups: underweight (<18.5 kg/m²), normal weight (18.5-24.9 kg/m²), and overweight and obese (≥25.0 kg/m²). SGA birth was observed most frequently among the underweight group (13.8%). Underweight was associated with an increased risk of SGA birth. The multiple-adjusted odds ratio for underweight was 1.96 (95% confidence interval, 1.23-3.11) compared with normal weight. Sufficient GWG reduced the incidence and the multiple-adjusted odds ratio for 1-kg increase of GWG was 0.86 (0.81-0.92). The same tendency was observed for the delivery of infants below the 5th birthweight percentile. Women with underweight and normal weight who had 9.0 kg or less of GWG had a

significantly higher risk of SGA birth than women with normal weight who had 9.1-11.0 kg of GWG. Underweight and poor GWG were associated with a higher incidence of SGA birth. However, the incidence of SGA birth among underweight women was not increased significantly if they had sufficient GWG. © 2012 The Authors. Journal of Obstetrics and Gynaecology Research © 2012 Japan Society of Obstetrics and Gynecology.

Source: Medline

Full Text:

Available from *John Wiley and Sons* in [Journal of Obstetrics and Gynaecology Research](#)

Available from *John Wiley and Sons* in [Journal of Obstetrics and Gynaecology Research](#)

Title: Maternal underweight status and association with preterm contractions.

Citation: Archives of gynecology and obstetrics, Jul 2012, vol. 286, no. 1, p. 35-36, 1432-0711 (July 2012)

Author(s): Tam, Teresa, Muresan, Michael, Ipema, Neal

Abstract: The purpose of the study is to investigate whether underweight pregnant women are more likely to be admitted for preterm contractions compared to normal or overweight women. This is a retrospective, cohort study of patients who presented for preterm contractions from January 1, 2000, through January 1, 2008. Body mass index(BMI) categories include index rating of <19 as underweight, 20–25 as normal, and >25 as overweight, based on the National Institutes of Health standards. Preterm contractions were documented using an external tocodynamometer. Exclusion criteria included multiple gestations, gestational age under 24 weeks or over 37 weeks, neonatal anomalies, and premature rupture of membrane. Data was analyzed using SPSS 14.0. Statistical data was analyzed using a probability model. 2 testing compared the probability of admission as a function of weight groups as well as age and race variables. Of the 840 patients identified with preterm contractions, 7% were admitted while 93% were discharged. Of the total patients, 15% were underweight, 43% normal weight, and 42% overweight. Admission for preterm contractions was highest in underweight pregnant women (95%), followed by normal weight (5%). None were overweight. Both basic and augmented probability models showed that normal weight patients were less likely to be admitted for preterm contractions compared to underweight patients even after controlling for age and race. These results suggest that underweight patients are more likely to be admitted for preterm contractions compared to normal weight patients. No overweight patients were admitted for preterm contractions.

Source: Medline

Full Text:

Available from *Springer Link Journals* in [Archives of Gynecology and Obstetrics](#)

Title: Effect of women's nutrition before and during early pregnancy on maternal and infant outcomes: A systematic review

Citation: Paediatric and Perinatal Epidemiology, July 2012, vol./is. 26/SUPPL. 1(285-301), 0269-5022;1365-3016 (July 2012)

Author(s): Ramakrishnan U., Grant F., Goldenberg T., Zongrone A., Martorell R.

Language: English

Abstract: Current understanding of biologic processes indicates that women's nutritional status before and during early pregnancy may play an important role in determining early developmental processes and ensuring successful pregnancy outcomes. We conducted a systematic review of the evidence for the impact of maternal nutrition before and during early pregnancy (<12 weeks gestation) on maternal, neonatal and child health outcomes and included 45 articles (nine intervention trials and 32 observational studies) that were identified through PubMed and EMBASE database searches and examining review articles. Intervention trials and observational studies show that periconceptional (<12 weeks gestation) folic acid supplementation significantly reduced the risk of neural tube defects. Observational studies suggest that preconceptional and periconceptional intake of vitamin and mineral supplements is associated with a reduced risk of delivering offspring who are low birthweight and/or small-for-gestational age (SGA) and preterm deliveries (PTD). Some studies report that indicators of maternal prepregnancy size, low stature, underweight and overweight are associated with increased risks of PTD and SGA. The available data indicate the importance of women's nutrition prior to and during the first trimester of pregnancy, but there is a need for well-designed prospective studies and controlled trials in developing country settings that examine relationships with low birthweight, SGA, PTD, stillbirth and maternal and neonatal mortality. The knowledge gaps that need to be addressed include the evaluation of periconceptional interventions such as food supplements, multivitamin-mineral supplements and/or specific micronutrients (iron, zinc, iodine, vitamin B-6 and B-12) as well as the relationship between measures of prepregnancy body size and composition and maternal, neonatal and child health outcomes. © 2012 Blackwell Publishing Ltd.

Publication Type: Journal: Review

Source: EMBASE

Full Text:

Available from *John Wiley and Sons* in [Paediatric and Perinatal Epidemiology](#)

Available from *John Wiley and Sons* in [Paediatric and Perinatal Epidemiology](#)

Title: Abnormal maternal body mass index and obstetric and neonatal outcome

Citation: Journal of Maternal-Fetal and Neonatal Medicine, March 2012, vol./is. 25/3(308-312), 1476-7058;1476-4954 (March 2012)

Author(s): Galan S.M., Hernandez A.S., Zuniga I.V., Lopez Criado M.S., Llorens A.P., Jose Luis Gallo V.

Language: English

Abstract: Objective. The objective of this study is to examine the effects of abnormal maternal body mass index (BMI), either underweight or severe or morbid obesity (BMI >35), on obstetrical and neonatal outcomes. Methods. A three-year period (2007-2009) observational retrospective study was carried out in Granada (Spain). Women were categorized by first ten weeks of pregnancy BMI, according to World Health Organization (WHO) into three groups: underweight (<18.5), normal (18.5-24.9), and severe or morbid obese (>35). Obstetrical and neonatal outcomes were evaluated using normal group as reference after suitable adjustments for confounding factors. Results. 3016 patients out of 12,781 single births were included. Maternal BMI classified 168 women (5.5 %) as underweight, 2,597 (86.1%) as normal, and 251 (8.3%) as severe or morbidly obese. As compared to normal women, underweight women were younger, and class II or III obese showed higher parity

and higher incidence of hypertension disorders and Diabetes Mellitus. After controlling for these confounders, underweight women showed increased adjusted risk of oligohydramnios and low birth weight babies, and severe or morbidly obese women had an increased adjusted risk of Streptococcus Group B colonization, induction of labour, elective and emergency cesarean section, fetal macrosomia, fetal acidosis at birth, and perinatal mortality. Conclusions. Severe or morbid obesity were associated with an increased risk of adverse perinatal outcome and mortality and should be managed as high-risk pregnancies. © 2012 Informa UK, Ltd.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *Taylor & Francis* in [Journal of Maternal-Fetal and Neonatal Medicine, The](#)

Title: Low gestational weight gain and the risk of preterm birth and low birthweight: a systematic review and meta-analyses.

Citation: Acta obstetrica et gynecologica Scandinavica, Sep 2011, vol. 90, no. 9, p. 935-954, 1600-0412 (September 2011)

Author(s): Han, Zhen, Lutsiv, Olha, Mulla, Sohail, Rosen, Allison, Beyene, Joseph, McDonald, Sarah D, Knowledge Synthesis Group

Abstract: Low gestational weight gain is common, with potential adverse perinatal outcomes. To determine the relation between low gestational weight gain and preterm birth and low birthweight in singletons in developing and developed countries. Medline, EMBASE and reference lists were searched, identifying 6,283 titles and abstracts. Following the MOOSE consensus statement, two assessors independently reviewed titles, abstracts, full articles, extracted data and assessed quality. Fifty-five studies, 37 cohort and 18 case-control, were included, involving 3,467,638 women. In the cohort studies (crude data, generally supported where available by adjusted data and case-control studies), women with low total gestational weight gain had increases in preterm birth <37 weeks [RR 1.64 (95%CI 1.62-1.65)], 32-36 weeks [RR 1.39 (95%CI 1.38-1.40)] and ≤ 32 weeks [RR 3.80 (95%CI 3.72-3.88)]. Low total gestational weight gain was associated with increased risks of low birthweight <2,500 g [RR 1.85 (95%CI 1.72-2.00)], in developing and developed countries [RR 1.84 (95%CI 1.71-1.99) and RR 3.02 (95%CI 1.37-6.63), respectively], 1,500-2,500 g [RR 2.02 (95%CI 1.88-2.17)] and <1,500 g (RR 2.00 (95%CI 1.67-2.40)). Women with low weekly gestational weight gain were at increased risk of preterm birth [RR 1.56 (95%CI 1.26-1.94)], 32-36 weeks [RR 2.43 (95%CI 2.37-2.50)] and ≤ 32 weeks [RR 2.31 (95%CI 2.20-2.42)] but not low birthweight [RR 1.64 (95%CI 0.89-3.02)]. In this systematic review, we determined that singletons born to women with low total gestational weight gain have higher risks of preterm birth and low birthweight, with the lower the gain, the higher the risks. © 2011 The Authors Acta Obstetrica et Gynecologica Scandinavica © 2011 Nordic Federation of Societies of Obstetrics and Gynecology.

Source: Medline

Full Text:

Available from *John Wiley and Sons* in [Acta Obstetrica et Gynecologica Scandinavica](#)

Available from *John Wiley and Sons* in [Acta Obstetrica Et Gynecologica Scandinavica](#)

Title: Maternal underweight and the risk of preterm birth and low birth weight: a systematic review and meta-analyses.

Citation: International journal of epidemiology, Feb 2011, vol. 40, no. 1, p. 65-101, 1464-3685 (February 2011)

Author(s): Han, Zhen, Mulla, Sohail, Beyene, Joseph, Liao, Grace, McDonald, Sarah D, Knowledge Synthesis Group

Abstract: Despite the current obesity epidemic, maternal underweight remains a common occurrence with potential adverse perinatal outcomes. Our objective was to determine the relationship between maternal underweight and preterm birth (PTB) and low birth weight (LBW) in singleton pregnancies in developing and developed countries. We followed the MOOSE consensus statement. We searched MEDLINE and EMBASE from their inception. We included studies that assessed the effect of maternal underweight compared with normal weight according to body mass index in singleton gestations on our two primary outcomes: PTB (<37 weeks) and LBW (<2500 g). Two assessors independently reviewed citations, extracted data and assessed quality. A total of 78 studies were included involving 1 025 794 women. The overall risk of PTB was increased in the cohort studies of underweight women [adjusted relative risk (RR) 1.29, 95% confidence interval (CI) 1.15-1.46], as were the risks of spontaneous PTB (adjusted RR 1.32, 95% CI 1.10-1.57) and induced PTB (adjusted RR 1.21, 95% CI 1.07-1.36). Underweight women had an increased risk of an LBW infant (adjusted RR 1.64, 95% CI 1.38-1.94). In developed countries, underweight women had an increased risk of PTB (RR 1.22, 95% CI 1.15-1.30) but not in developing countries (RR 0.99, 95% CI 0.67-1.45). In both developed and developing countries, underweight women were at increased risk of having an LBW infant (RR 1.48, 95% CI 1.29-1.68, and RR 1.52, 95% CI 1.25-1.85, respectively). In this systematic review and meta-analyses, we determined that singletons born to underweight women have higher risks of PTB (overall, spontaneous and induced) and LBW than those born to women with normal weight.

Source: Medline

Full Text:

Available from *Oxford University Press* in [International Journal of Epidemiology](#); Note: ; Collection notes: To access please select Login with Athens and search and select NHS England as your institution before entering your NHS OpenAthens account details.

Available from *Highwire Press* in [International Journal of Epidemiology](#)

Title: Maternal under-nutrition results in increased apoptosis in near-term and term offspring kidneys

Citation: American Journal of Obstetrics and Gynecology, January 2011, vol./is. 204/1 SUPPL.(S177), 0002-9378 (January 2011)

Author(s): Nast C.C., Magee T.R., Tafti S.A., Desai M., Ross M.G.

Language: English

Abstract: OBJECTIVE: Maternal undernutrition (MUN) results in growth restricted newborns with reduced renal glomerular numbers resulting in an increased risk of adult hypertension and renal disease. A possible cause of reduced glomeruli may be increased apoptosis (programmed cell death) and we investigated whether apoptotic signaling and cell death were increased in MUN rat kidneys.

STUDY DESIGN: Pregnant rat dams were fed either ad libitum diet (control) or were 50% food restricted (MUN) from embryonic day (E10) to induce growth restricted fetuses. At E20 and postnatal day 1 (P1), male offspring kidneys (n=5 each MUN and control) were prepared for mRNA analysis by qPCR and protein expression analysis by Western blotting and immunohistochemistry. Apoptosis was measured by the TUNEL assay. Data were considered statistically significant by t-test ($p < 0.05$). **RESULTS:** MUN kidney showed a trend of increased apoptosis at E20 that was markedly increased at P1. Up-regulation of pro-apoptotic genes was detected at E20 (Fas, Fas Ligand, Caspase 9) with further gene induction at P1 (Caspase 3, Bax). The anti-apoptotic factor Bcl2 was decreased in P1 kidneys. Kidney TUNEL showed significantly increased apoptotic nuclei in the P1 nephrogenic zone (MUN 2.2 +/- 0.3 vs C 1.6 +/- 0.5, $p < 0.05$). The majority of apoptotic nuclei colocalized to undifferentiated mesenchyme and pretubular aggregates in the nephrogenic zone. E20 TUNEL trended upward but was not significant ($p = 0.07$). **CONCLUSIONS:** Pro-apoptotic mRNA and proteins were increased at E20 and to a greater extent at P1 suggesting differential regulation following parturition. Apoptosis is up-regulated in P1 term MUN offspring kidneys in the mesenchyme and pretubular aggregates, thus suggesting a mechanism for impairing postpartum nephron formation. Therefore, upregulated apoptosis likely is an important mechanism for the induction of nephropenia in gestational programming of the kidney.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Low gestational weight gain and the risk of preterm birth and low birth weight: A systematic review and meta-analyses

Citation: American Journal of Obstetrics and Gynecology, January 2011, vol./is. 204/1 SUPPL.(S208), 0002-9378 (January 2011)

Author(s): Han Z., Mulla S., Lutsiv O., Rosen A., Beyene J., McDonald S.D.

Language: English

Abstract: **OBJECTIVE:** Low gestational weight gain remains common with potential adverse perinatal outcomes. To determine the magnitude and direction of the relationship between low gestational weight gain and both preterm birth (PTB) and low birth weight (LBW) in singleton pregnancies. **STUDY DESIGN:** We followed the MOOSE consensus statement on the meta-analysis of observational studies. We searched Medline and EMBASE from their inceptions to 2009 with an experienced librarian and checked reference lists of identified articles. We included studies that assessed the effect of low total gestational weight gain in singleton pregnancies on our two primary outcomes: PTB (< 37 weeks) and LBW (< 2500 grams). Two assessors independently reviewed titles, abstracts and full articles, extracted data and assessed quality. **RESULTS:** Fifty-five studies, 37 cohort and 18 case-control, were included involving 3,467,638 women. In the crude data from cohort studies (whose findings in Table 1 below were generally supported where available, by adjusted data and by the case-control studies), women with low GWG had an increased risk of PTB and a LBW infant. **CONCLUSIONS:** In this systematic review and meta-analyses, we determined that singletons born to women with low total GWG have higher risks of PTB (<37 weeks, 32-36 weeks, and <32 weeks) and LBW (<2500 g, 1500-2500 g, and <1500 g). We found a graded relationship, with the lower the GWG, the higher the risks of PTB and LBW. (Table presented).

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Maternal body mass index: Effect on pregnancy outcomes over a 10 year period

Citation: American Journal of Obstetrics and Gynecology, January 2011, vol./is. 204/1 SUPPL.(S80), 0002-9378 (January 2011)

Author(s): Patterson T.M., Tita A.T., Cliver S.P., Neely C.L., Biggio J.

Language: English

Abstract: OBJECTIVE: Quantify the relationship of maternal body mass index (BMI) and maternal and neonatal outcomes over a recent 10 year period. STUDY DESIGN: Retrospective cohort study of women delivering singletons > 20 weeks gestational age (GA) with recorded height and weight between 2000-2009 was conducted. Women were stratified by maternal BMI: underweight (< 18.5), normal (18.5-24.9), overweight (25-29.9), obese (30-39.9) and morbidly obese (> 40). Selected maternal and neonatal morbidities were analyzed and compared using Mantel Haenszel test for trend. Logistic regression was used to adjust for confounders when comparing underweight, overweight, obese and morbidly obese BMI categories to normal weight women. RESULTS: Of the 18,057 eligible women, 3% were underweight, 34% normal, 26% overweight, 27% obese and 9% morbidly obese. With increasing BMI, spontaneous preterm birth (PTB) and delivery of a SGA infant decreased significantly (trend $p < 0.0001$ for both), while other pregnancy outcomes including gestational diabetes, hypertensive disorders, gestational hypertension, preeclampsia, chorioamnionitis, cesarean delivery, indicated PTB, birthweight > 4000 grams, and LGA significantly increased (all trend $p < 0.0001$ except chorioamnionitis $p = 0.04$). Adjusted risk ratios for selected outcomes according to maternal BMI when compared to normal BMI are presented (Table). CONCLUSIONS: Our data from the past 10 years quantify the dose response of maternal BMI on specific pregnancy outcomes. Underweight women are at increased risk for spontaneous preterm birth, while women with BMI > 25 are at increased risk for gestational diabetes, hypertensive disorders, cesarean delivery and LGA infants. Thus, interventions are warranted to promote a normal BMI to decrease adverse consequences for pregnant women and their infants.(Table presented).

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Maternal body mass index and congenital anomaly risk: a cohort study.

Citation: International journal of obesity (2005), Sep 2010, vol. 34, no. 9, p. 1371-1380, 1476-5497 (September 2010)

Author(s): Rankin, J, Tennant, P W G, Stothard, K J, Bythell, M, Summerbell, C D, Bell, R

Abstract: To investigate the association between maternal body mass index (BMI) and major, structural congenital anomalies. Cohort study using prospectively collected data. Data on all singleton pregnancies booked at five maternity units in the north of England between 01 January 2003 and 31 December 2005 and data on congenital anomalies notified to the Northern Congenital

Abnormality Survey were linked using key variables. Maternal pre-gestational diabetic status was derived from the Northern Diabetes in Pregnancy Survey. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were estimated by maximum-likelihood logistic regression models, with missing values modelled as explicit categories. There was a total of 41,013 singleton pregnancies during the study period, of which 682 were affected by a structural congenital anomaly, a total prevalence of 166 (95% CI: 154, 179) per 10,000 registered births. Overall, the risk of a congenital anomaly was significantly increased among the maternal underweight (BMI \leq 18.5 kg m⁻²); aOR = 1.60, 95% CI: 1.09, 2.36; P = 0.02) and maternal obese groups (BMI \geq 30 kg m⁻²); aOR = 1.30, 95% CI: 1.03, 1.63; P = 0.03), but not for maternal overweight (BMI = 25-29.9 kg m⁻²); aOR = 0.85, 95% CI: 0.68, 1.06; P=0.15), compared with mothers of recommended BMI. Maternal obesity was associated with significantly increased risk of ventricular septal defect (aOR=1.56, 95% CI: 1.01, 2.40; P = 0.04), cleft lip (aOR = 3.71, 95% CI: 1.05, 13.10; P = 0.04) and eye anomalies (aOR = 11.36, 95% CI: 2.25, 57.28; P=0.003). Maternal underweight was associated with significantly increased risks of atrial septal defect (aOR = 2.86, 95% CI: 1.18, 6.96; P=0.02), genital anomalies (aOR = 6.30, 95% CI: 1.58, 25.08; P = 0.009) and hypospadias (aOR = 8.77, 95% CI: 1.42, 54.29; P = 0.02). We found an overall increased risk of congenital anomalies in women who are obese and women who are underweight compared with women of recommended weight. Women should be made aware of these risks and supported to optimize their weight before pregnancy.

Source: Medline

Full Text:

Available from *Nature Publishing Group* in [International Journal of Obesity](#)

Available from *ProQuest* in [International Journal of Obesity](#)

Title: The association of maternal BMI with fetal echogenic intracardiac foci and echogenic bowel

Citation: The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians, August 2010, vol./is. 23/8(781-784), 1476-4954 (01 Aug 2010)

Author(s): Bornstein E., Sheiner E., Barnhard Y., McKeanna C., Binder D., Divon M.Y., Hackmon R.

Language: English

Abstract: OBJECTIVES: To evaluate the impact of maternal body mass index (BMI) as well as maternal ethnicity on the detection of either echogenic intra-cardiac focus (EIF) or echogenic bowel (EB).METHODS: This prospective study identified 74 uncomplicated singleton fetuses in which EIF and/or EB were detected between 18 and 21 weeks of gestation (i.e. study group). Seventy four consecutively scanned fetuses without EIF or EB, at the same gestational age, were selected as controls. The differences in maternal BMI and maternal ethnicity were compared between the two groups using the chi(2) test, Fisher's exact test, and the Student t-test. A multivariable logistic regression model was constructed to control for confounders. Odds ratios (OR) and their 95% confidence interval (CI) were computed.RESULTS: The mean maternal BMI was significantly lower in the study group as compared to controls (22.9 +/- 3.1 vs. 28.0 +/- 7.5 kg/m(2), respectively; p < 0.0001). Patients with fetal EIF and/or EB were significantly more likely to be Asians (20.3% vs. 5.4%, OR = 4.5; 95% CI 1.3-16.9). Using a multivariable analysis, controlling for ethnicity, the association between maternal BMI and fetal EIF or EB remained significant (OR = 0.83; 95% CI 0.76-0.91). However, based on this model Asian ethnicity was not an independent risk factor for the detection of EIF and/or EB (OR = 2.6; 95% CI 0.8-8.9).CONCLUSIONS: Our data suggests an inverse relationship

between the maternal BMI and the detection of fetal EIF and/or EB. Moreover, it appears that low maternal BMI, and not Asian ethnicity, is an independent risk factor for the detection of these echogenic fetal findings.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *Taylor & Francis* in [Journal of Maternal-Fetal and Neonatal Medicine, The](#)

Title: Risk factors for term small for gestational age infants in women with low prepregnancy body mass index

Citation: Journal of Obstetrics and Gynaecology Research, June 2010, vol./is. 36/3(506-512), 1341-8076;1447-0756 (June 2010)

Author(s): Watanabe H., Inoue K., Doi M., Matsumoto M., Ogasawara K., Fukuoka H., Nagai Y.

Language: English

Abstract: Aim: The purpose of our study was to investigate the association between low maternal prepregnancy body mass index (BMI) less than 18.5 kg/m² and the incidence of small for gestational age (SGA) infants. Material & Methods: This was a cross-sectional study. The women with BMI of less than 25.0 kg/m² who gave birth to single term infants (37-42 weeks) at clinics and hospitals in the Tokyo metropolitan area between 2003 and 2004 were analyzed for risk factors for SGA. Results: Five hundred and seventy-two women were underweight (BMI < 18.5 kg/m²) and 2708 (75.1%) were normal (18.5 < BMI < 25.0 kg/m²). Birthweight, analyzed by multiple regression analysis, was highly related (P < 0.05) to gestational age, maternal age, parity, prepregnancy BMI, maternal weight gain and maternal smoking status. Women with a less than 9 kg weight during pregnancy were 1.8 times (confidence interval [CI], 1.6-2.2) more likely to give birth to an SGA infant compared with women who gained 9-12 kg. Maternal smoking more than 10 cigarettes per day was associated with an increased risk of having an SGA infant (odds ratio [OR], 2.5; CI, 1.8-3.5). Women with prepregnancy BMI less than 21.0 kg/m² were associated with an increased risk of having an SGA infant (OR, 1.6; CI, 1.3-2.2 for BMI < 18.5 kg/m², and OR, 1.4; CI, 1.2-1.7 for 18.5 < BMI < 21.0 kg/m²). Conclusion: We conclude that the detrimental effect of low prepregnancy BMI in Japanese women on birthweight and incidence of SGA infants. Our findings suggest that appropriate maternal BMI at conception followed by adequate weight gain during pregnancy may have a substantial influence on reducing the SGA infants and increasing the birthweight. © 2010 Japan Society of Obstetrics and Gynecology.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *John Wiley and Sons* in [Journal of Obstetrics and Gynaecology Research](#)

Available from *John Wiley and Sons* in [Journal of Obstetrics and Gynaecology Research](#)

Title: The relationship between fetal gastroschisis and maternal BMI in a UK population

Citation: Archives of Disease in Childhood: Fetal and Neonatal Edition, June 2010, vol./is. 95/(Fa16-Fa17), 1359-2998 (June 2010)

Author(s): Derbyshire A., Taylor A., Howe D.

Language: English

Abstract: Gastroschisis is a congenital defect of the abdominal wall through which the intestines protrude. American studies suggest that a low maternal body mass index increases the risk of gastroschisis^{1,2} but this has not been investigated in a UK population so the authors examined the relationship in women seen in our unit. The authors identified 55 cases of gastroschisis from the Wessex Fetal Medicine Database from 2005 to 2009 and compared these with two control groups from the birth register at the Princess Ann Hospital Southampton. The first group consisted of the next mother in the register to deliver an infant without gastroschisis. The second consisted of the next age-matched mother to deliver an unaffected infant. The authors noted the body mass index (weight in kg/height in m²) at booking for all 165 mothers. Compared with the general population of pregnant women, mothers of affected infants were younger and had lower body mass index (BMI). However, compared with age-matched controls, there was no difference in body mass.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Full Text:

Available from *Highwire Press* in [Fetal and Neonatal](#)

Title: Evaluation of maternal underweight as risk factor for negative neonatal outcomes

Citation: Journal of Maternal-Fetal and Neonatal Medicine, May 2010, vol./is. 23/(263), 1476-7058 (May 2010)

Author(s): Santalla A., Lopez Criado M.S., Gomez-Fernandez J., Vico I., Gonzalez I., Manzanares S.

Language: English

Abstract: Brief Introduction: Obesity is a well-known risk factor for pregnancy and delivery, but less is known about influence of maternal underweight (BMI < 18.5) in pregnancy and neonatal outcomes. Materials and Methods: An observational retrospective study involving pregnant women was conducted to compare pregnancy and delivery records and neonatal outcomes in a group of maternal underweight pregnancies (n = 169) and normal weight (BMI = 18.5-25) mothers (n = 2759) among deliveries that took place in our hospital between 2003 and 2009. Clinical Cases or Summary Results: Low BMI is significantly more frequent in young pregnant (mean age = 25.8 vs. 29.5 years). Maternal underweight group significant had a lower mean birthweight (2930 g vs. 3030 g) and more cases of intrauterine growth restriction (10% vs. 7.6%) than control group. Case group had less elective and non elective cesarean sections and operative deliveries probably due to lower mean maternal age and parity. No differences in neonatal outcomes were found between groups (APGAR test score and venous pH values). Conclusions: Maternal underweight (BMI < 18.5) seems to have an increased risk of fetal intrauterine growth restriction so close follow-up scans could be recommended in this pregnancies.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Full Text:

Available from *Taylor & Francis* in [Journal of Maternal-Fetal and Neonatal Medicine, The](#)

Title: Increased risk of placental abruption in underweight women.

Citation: American Journal of Perinatology, 2010, vol./is. 27/3(235-240), 07351631

Author(s): Beutsch AB, Lynch O, Alio AP, Salihu HM, Spellacy WN

Language: English

Abstract: We sought to determine if there is a relationship between prepregnancy underweight status and placental abruption. We utilized the Missouri maternally linked cohort data files covering the period 1989 through 1997. We estimated the association between prepregnancy underweight subtypes and placental abruption using adjusted odds ratios. Subanalyses were performed to determine whether the amount of weight gained during pregnancy could modify the association. A total of 439,235 singleton pregnancies with 3696 abruptions were analyzed. Underweight mothers had a 40% greater likelihood for placental abruption (odds ratio 1.4; 95% confidence interval 1.3 to 1.5). The risk increased with ascending severity of underweight status (P for trend <0.01). There was a trend toward decreased risk for placental abruption among underweight women with adequate weight gain in pregnancy. Prepregnancy maternal underweight status is associated with placental abruption. This risk may be reduced with adequate weight gain during pregnancy.

Publication Type: Academic Journal

Source: CINAHL

Title: Antenatal detection of fetal growth restriction and stillbirth risk in mothers with high and low body mass index

Citation: American Journal of Obstetrics and Gynecology, December 2009, vol./is. 201/6 SUPPL. 1(S158-S159), 0002-9378 (December 2009)

Author(s): Williams M., Francis A., Gardosi J.

Language: English

Abstract: OBJECTIVE: Maternal obesity is associated with an increased risk of stillbirth. We wanted to study the relationship between stillbirth risk and the antenatal detection of intrauterine growth restriction (IUGR) in mothers with high and low BMI. STUDY DESIGN: The cohort consisted of 48,357 consecutive pregnancies during 2006/7, delivered in one of 6 participating maternity units. Maternal BMI was grouped as <20, 20-24.9, 25-29.9, 30-34.9 and 35 + . Growth restriction was defined as birthweight below the 10th customised centile. Antenatal diagnosis of growth restriction by clinical assessment was based on EFW <10th centile, slowed growth and/or abnormal Doppler, with detection rates determined through individual case note review. RESULTS: Stillbirth risk rose incrementally with larger BMI categories, from 2.8 (BMI <20), 6.2, 7.6, 8.5 and up to 9.8 for mothers

with BMI of 35 or more. Antenatal detection of IUGR was highest for mothers with BMK20: 33.3%, and dropped stepwise with increasing BMI: 20-24.9: 22.2%; 25-29.9: 22%; 30-34.9: 20.7%; 35 + : 17.2%. The reverse rates (% missed) are plotted in the Figure. CONCLUSION: The increased risk of stillbirth in pregnancies with high maternal BMI is associated with an elevated rate of fetal growth restriction. The lowest stillbirth risk is in low BMI mothers, where antenatal detection rates of IUGR are highest. The correlation between increasing stillbirth risk and undetected IUGR warrants further investigation, and suggests that at least some of these deaths could be avoided by improved antenatal surveillance. [Figure presented].

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Low maternal pre-pregnancy body mass index and mid-trimester weight gain: Risk of preterm birth

Citation: American Journal of Obstetrics and Gynecology, December 2009, vol./is. 201/6 SUPPL. 1(S240), 0002-9378 (December 2009)

Author(s): Hur H., Lee M., Kwon J., Park Y.-W., Kim Y.H.

Language: English

Abstract: OBJECTIVE: The objective of this study was to evaluate if low pre-pregnancy body mass index (BMI) and mid-trimester weight gain increase preterm birth risk. STUDY DESIGN: we retrospectively reviewed the medical records of 1452 patients who delivered singleton live births between 25 and 42 gestational weeks at Severance Hospital from October 2005 to March 2009. Pre-pregnancy BMI (kg/m²) was categorized as underweight (under 18.5), normal (18.5-24.9), overweight (25-29.9), and obese (above 30). Gestational weight gains (kg/week) were measured between 14 and 28 weeks of gestation, and categorized as <0.15, 0.16-0.25, 0.26-0.35, 0.36-0.45, 0.46-0.55, and >0.55kg/week. Delivery before 37 weeks of gestation was considered preterm birth and delivery before 33 weeks of gestation was considered as early preterm birth. RESULTS: Women with low pre-pregnancy BMI were at increased risk of preterm delivery. Odds ratio of underweight mothers for preterm birth was 1.91 (1.52-1.98), and for early preterm birth was 2.3 (1.6-3.5). The risks for spontaneous preterm birth increased in women with very low weight gain (<0.15kg/week) during pregnancy with odds ratios of 3.4 (1.8-3.8) for underweight women, 2.0 (1.1-3.0) for normal weight women, and 1.4 (0.7-2.8) for overweight women compared to normal weight women with normal weight gain during pregnancy. In contrast, odds ratios of underweight women with normal weight gain was 1.3 (0.8-1.8) for preterm birth and 1.1 (0.6-1.5) for early preterm birth. CONCLUSION: Low pre-pregnancy maternal BMI and failure to gain adequate weight during mid-trimester are risk factors for preterm delivery. These suggest normal pre-pregnancy BMI and adequate level of gestational weight gain are important in order to reduce the risk of preterm birth, especially in pre-conceptual counseling with underweight women.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Maternal body mass index and preterm birth: Impact of subtype of preterm delivery

Citation: International Journal of Gynecology and Obstetrics, October 2009, vol./is. 107/(S292-S293), 0020-7292 (October 2009)

Author(s): Odibo A., Zhong Y., Cahill A., Macones G.

Language: English

Abstract: Objective: Maternal obesity is reaching epidemic proportions in the U.S. and worldwide. While maternal weight has been associated with preterm birth, the few studies on the subtype of preterm delivery have reported conflicting results. Our objective is to evaluate the impact of the type of preterm delivery on the association between maternal BMI and preterm birth. Materials and Methods: This is a retrospective cohort study to investigate the association between maternal body mass index (BMI) and subtypes of preterm delivery. The study included 42,840 American women presenting for care in Saint Louis, United States between 1990 and 2006. We examined the associations between categories BMI with subtypes of preterm delivery (PTD) <37 and <34 weeks, respectively. Only singleton gestations were included. The subtypes of PTD evaluated include spontaneous PTD, preterm premature rupture of membranes (PPROM), and indicated PTD. Univariate and multivariate analyses were used to estimate the association between maternal BMI categories and the subtypes of preterm delivery. Among women meeting the inclusion criteria. Results: PTD <37 occurred in 3402 (8.0%) while PTD < 34 in 1279 (3.0%). The risk for indicated delivery is highest in women with morbid obesity (adjusted odd ratios (OR) = 1.8, 95% confidence interval (CI): 1.5, 2.2); while being underweight increased the risk of spontaneous PTD (adjusted OR = 1.6, 95% CI: 1.2, 2.0). Women <20 years' old and are underweight have a higher adjusted OR for spontaneous PTD of 3.1 (95% CI: 1.8, 5.5). Conclusion: The impact of maternal BMI on preterm birth varies by the subtype of preterm delivery. The information will be useful in preconception counseling and towards efforts at preterm birth prevention.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Pre-pregnancy underweight and the risk of spontaneous abortion

Citation: International Journal of Gynecology and Obstetrics, October 2009, vol./is. 107/(S526), 0020-7292 (October 2009)

Author(s): Sekhavat L., KarimiZarchi M.

Language: English

Abstract: Objective: The aim of the present study was to study the effect of underweight on spontaneous abortion rate. Methods: This was a retrospective cohort study, performed during the years 2005-2008. The participants were a total of 1000 nulliparous, singleton women recruited consecutively to the Shahid Sedughi Hospital due to spontaneous abortion at the first half of pregnancy. Information on maternal pre-pregnancy weight, height, lifestyle factors and obstetric risk factors were obtained from self-administered questionnaires and hospital files. Pre-pregnancy body mass index (BMI) was used to compare the risk of spontaneous abortion in underweight women (BMI < 18.5) and women with normal BMI (between 18.5 and 24.9). Crude and adjusted odds ratios were calculated using multiple logistic regression analysis. Results: The population consisted of

underweight 226 (22.6%), normal weight 576 (57.6%), and others were overweight and obese. As compared to women with normal BMI, the ratio for spontaneous abortion in underweight women was 2.31 (95% confidence limits 1.85-2.57) compared to women with normal pre-pregnancy BMI. Women with a BMI of 25 or more had a smaller increase in risk of spontaneous abortion. Conclusion: Our study indicated that pre-pregnant underweight may increase the risk of spontaneous abortion.

Publication Type: Journal: Conference Abstract

Source: EMBASE

Title: Maternal pre-gravid body weight and risk for placental abruption among twin pregnancies

Citation: Journal of Maternal-Fetal and Neonatal Medicine, September 2009, vol./is. 22/9(745-750), 1476-7058;1476-4954 (September 2009)

Author(s): Aliyu M.H., Alio A.P., Lynch O., Mbah A., Salihu H.M.

Language: English

Abstract: Objectives. Placental abruption is a major cause of fetal and neonatal death and has been reported more frequently in twin pregnancies than among singleton gestations. The purpose of this article is to investigate the role of maternal pre-gravid body mass index (BMI) on the risk for placental abruption among twin pregnancies. Methods. We used the Missouri maternally linked cohort files (years 1989-1997) consisting of twin live births (gestational age 20-44 weeks). Maternal pre-gravid weight was classified based on the following BMI-based categories: normal (18.5-24.9), underweight (<18.5), overweight (25-29.9), and obese (>30). We used logistic regression for generated adjusted odds ratios with correction for the presence of intra-cluster correlation using generalized estimating equations. Results. Overall, 261 cases of placental abruption were registered over the entire study period, yielding a placental abruption rate of 14.9/1000. The frequency of placental abruption correlated negatively with maternal BMI in a dose-effect pattern: underweight (19.3/1000); normal weight (16.1/1000); overweight (13.9/1000); and obese (9.5/1000) mothers (p for trend < 0.01). After adjusting for confounders, the likelihood of placental abruption was still lower in obese women (OR 0.58; 95% CI 0.38-0.87). By contrast, women who were underweight had a 2030 greater likelihood for placental abruption when compared with normal weight mothers, although these findings were statistically not significant. Conclusions. There is an inverse relationship between pre-gravid maternal BMI and placental abruption. The mechanism by which obesity impacts the likelihood of placental abruption in twin pregnancies requires further study.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from Taylor & Francis in [Journal of Maternal-Fetal and Neonatal Medicine, The](#)

Title: Low pre-pregnancy body mass index and risk of medically indicated versus spontaneous preterm singleton birth

Citation: European Journal of Obstetrics Gynecology and Reproductive Biology, June 2009, vol./is. 144/2(119-123), 0301-2115 (June 2009)

Author(s): Salihu H.M., Mbah A.K., Alio A.P., Clayton H.B., Lynch O.

Language: English

Abstract: Objective(s): There were three primary objectives of this study: (1) to estimate the risk of preterm and very preterm birth by severity of low pre-pregnancy body mass index (BMI), (2) to determine if the risk in preterm and very preterm birth by severity of low pre-pregnancy BMI differs for spontaneous versus medically indicated preterm delivery, and finally (3) to determine if there is a difference in the risk for preterm and very preterm birth by severity of low pre-pregnancy BMI across gradations of gestational weight gain. Study design: This study utilized the Missouri maternally linked cohort files from 1989 to 1997. After restricting analyses to singleton live births (gestational age 20-44 weeks) and women with either a low or normal BMI, the final study population consisted of 437,403 births. Pre-pregnancy BMI was categorized as normal (19.5-24.9), mild thinness (17.0-18.5), moderate thinness (16.0-16.9) and severe thinness (<15.9). Statistical analyses included chi-square tests and logistic regression with generalized estimating equations (GEE). Results: Underweight mothers were more likely to experience a preterm delivery. For all preterm births, the risk among underweight mothers increased with ascending underweight severity ($p < 0.01$). Higher risk estimates were observed for spontaneous than for medically indicated preterm birth. For each BMI category, extreme risk values for spontaneous preterm births were observed among women with very low gestational weight gain (<0.12 kg/week). Severely thin mothers with very low and very high pregnancy weight gain were at the greatest risk for spontaneous preterm birth. By contrast, underweight women with moderate gestational weight gain (0.23-0.68 kg/week) had the lowest risk for spontaneous preterm birth with the sole exception of moderately underweight gravidas. Conclusions: These findings suggest that women with low or normal pre-pregnancy BMI should be counseled to maintain a moderate level of gestational weight gain (0.23-0.68 kg/week) in order to reduce their risk for preterm birth. Further, our observation that severity of low pre-pregnancy BMI was associated directly (in a dose-response pattern) with preterm birth highlights the importance of preconceptional counseling for women-specifically the importance of women achieving or maintaining a normal weight status prior to pregnancy. © 2009 Elsevier Ireland Ltd. All rights reserved.

Publication Type: Journal: Article

Source: EMBASE

Title: Maternal prepregnancy underweight and risk of early and late stillbirth in black and white gravidas

Citation: Journal of the National Medical Association, June 2009, vol./is. 101/6(582-587), 0027-9684 (June 2009)

Author(s): Salihu H.M., Mbah A.K., Alio A.P., Lynch O'N., Wathington D., Kornosky J.L.

Language: English

Abstract: Objective: The association between underweight and stillbirth remains poorly defined, especially across racial/ethnic sub-populations. We investigate the association of pre-pregnancy underweight on the risk for early and late stillbirth among black and white mothers. Methods: We conducted analysis on the Missouri maternally linked data files covering the period 1989-1997

inclusive. Using body mass index (BMI), we categorized mothers as underweight (BMI <18.5) and normal weight (BMI = 18.5-24.9). By applying logistic regression modeling with adjustment for intracluster correlation, we estimated the risk for total, early (<28 weeks of gestation), and late stillbirth (>28 weeks of gestation) among black and white mothers. Results: A total of 1808 cases of stillbirth were registered. The rate of stillbirth among white mothers was 3.7 per 1000, while the rate among blacks was 7.1 per 1000. Underweight black mothers had comparable risk for total (OR, 0.9; 95% CI, 0.7-1.2), early (OR, 1.1; 95% CI, 0.8-1.5), and late stillbirth (OR, 0.8; 95% CI, 0.5-1.2) as compared to their normal-weight counterparts. By contrast, underweight white gravidas had a 30% reduced likelihood (OR, 0.7; 95% CI, 0.6-0.9) for late stillbirth as compared to normal-weight white mothers. However, the risks for total and early stillbirth among underweight white mothers were similar to those of normal-weight white mothers. J Conclusion: Low prepregnancy BMI has similar effects on fetal survival in both blacks and whites except for late stillbirth. The underweight white survival advantage over blacks in late pregnancy could probably be due to greater access for identified white at-risk groups to effective obstetrical interventions as previously reported.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *ProQuest* in [Journal of the National Medical Association](#)

Title: Impact of maternal body mass index on neonatal outcome.

Citation: European journal of medical research, May 2009, vol. 14, no. 5, p. 216-222, 0949-2321 (May 14, 2009)

Author(s): Kalk, P, Guthmann, F, Krause, K, Relle, K, Godes, M, Gossing, G, Halle, H, Wauer, R, Hocher, B

Abstract: Maternal body mass index has an impact on maternal and fetal pregnancy outcome. An increased maternal BMI is known to be associated with admission of the newborn to a neonatal care unit. The reasons and impact of this admission on fetal outcome, however, are unknown so far. The aim of our study was to investigate the impact of maternal BMI on maternal and fetal pregnancy outcome with special focus on the children admitted to a neonatal care unit. A cohort of 2049 non-diabetic mothers giving birth in the Charite university hospital was prospectively studied. The impact of maternal BMI on maternal and fetal outcome parameters was tested using multivariate regression analysis. Outcome of children admitted to a neonatal ward (n = 505) was analysed. Increased maternal BMI was associated with an increased risk for hypertensive complications, peripheral edema, caesarean section, fetal macrosomia and admission of the newborn to a neonatal care unit, whereas decreased BMI was associated with preterm birth and lower birthweight. In the neonatal ward children from obese mothers are characterized by hypoglycaemia. They need less oxygen, and exhibit a shorter stay on the neonatal ward compared to children from normal weight mothers, whereas children from underweight mothers are characterized by lower umbilical blood pH and increased incidence of death corresponding to increased prevalence of preterm birth. Pregnancy outcome is worst in babies from mothers with low body mass index as compared to healthy weight mothers with respect to increased incidence of preterm birth, lower birth weight and increased neonate mortality on the neonatal ward. We demonstrate that the increased risk for neonatal admission in children from obese mothers does not necessarily indicate severe fetal impairment.

Source: Medline

Full Text:

Available from *Free Access Content* in [European Journal of Medical Research](#)

Available from *National Library of Medicine* in [European Journal of Medical Research](#)

Title: Extreme maternal underweight and feto-infant morbidity outcomes: a population-based study.

Citation: The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians, May 2009, vol. 22, no. 5, p. 428-434, 1476-4954 (May 2009)

Author(s): Salihu, Hamisu M, Lynch, O'Neil, Alio, Amina P, Mbah, Alfred K, Kornosky, Jennifer L, Marty, Phillip J

Abstract: We sought to estimate the association between severity of maternal pre-pregnancy underweight and feto-infant morbidity outcomes. Missouri maternally linked cohort records from 1989 to 1997 inclusive were analysed. Using pre-pregnancy maternal body mass index (BMI), we classified study participants into: Normal (18.5-24.9) [referent group], mild thinness (17.0-18.5), moderate thinness (16.0-16.9) and severe thinness (<16.0). We estimated the association between pre-pregnancy underweight, underweight subtypes and feto-infant morbidity outcomes using adjusted odds ratios to approximate relative risks with correction for intra-cluster correlations. Fetal growth curve trajectories for the two groups became divergent as from 30 gestational weeks. Underweight mothers were at increased risk for low birthweight (OR = 1.82; 95% CI = 1.77-1.88), very low birthweight (OR = 1.41; 95% CI = 1.31-1.51), small for gestational age (OR = 1.80; 95% CI = 1.76-1.84), preterm (OR = 1.37; 95% CI = 1.33-1.40) and very preterm (OR = 1.42; 95% CI = 1.34-1.50). These risk estimates increased in a dose-effect fashion with increasing severity of underweight status except for very preterm (p for trend < 0.01). Pre-pregnancy underweight is a risk factor for a spectrum of feto-infant morbidity outcomes, with risk estimates being most pronounced among extremely underweight mothers.

Source: Medline

Full Text:

Available from *Taylor & Francis* in [Journal of Maternal-Fetal and Neonatal Medicine, The](#)

Title: Prepregnancy weight status and the risk of adverse pregnancy outcome.

Citation: Acta obstetrica et gynecologica Scandinavica, Jan 2008, vol. 87, no. 9, p. 953-959, 1600-0412 (2008)

Author(s): Hauger, Marit S, Gibbons, Luz, Vik, Torstein, Belizán, José M

Abstract: To examine the association between maternal pre-pregnancy weight status and the risk of stillbirth, pre-eclampsia and preterm delivery. Hospital-based cohort study using prospectively recorded data. Ten public hospitals in Buenos Aires, Argentina. 46,964 pregnant women who had a delivery during 2003-2006. Prepregnancy body mass index (BMI) was used to categorize women in four weight categories from underweight to obese. The reference group were women with BMI between 18.5 and 24.9. Crude and adjusted odds ratios were calculated using multiple logistic regression analysis. Preterm birth, pre-eclampsia and stillbirth. The risk of preterm delivery decreased with increasing BMI, with the highest risk among underweight women (OR: 1.45; 95% CI:

1.26-1.67), and the lowest risk among the overweight. The risk of pre-eclampsia was highest among overweight (OR: 1.55; 95%CI: 1.30-1.86) and obese women (OR: 3.10; 95%CI: 2.54-3.78). Obese or overweight women did not have an increased risk of stillbirth in this study. Overweight and obese women have an increased risk for pre-eclampsia, while underweight women have an increased risk for preterm delivery. There is a high prevalence of overweight women in the obstetric population in Buenos Aires.

Source: Medline

Full Text:

Available from *John Wiley and Sons* in [Acta Obstetricia et Gynecologica Scandinavica](#)

Available from *John Wiley and Sons* in [Acta Obstetricia Et Gynecologica Scandinavica](#)

Title: Undernutrition and growth restriction in pregnancy.

Citation: Nestlé Nutrition workshop series. Paediatric programme, Jan 2008, vol. 61, p. 103-121, 1661-6677 (2008)

Author(s): Bergmann, Renate L, Bergmann, Karl E, Dudenhausen, J W

Abstract: Newborn size is the result of intrauterine growth. Premature, low birthweight of <2,500 g, small for gestational age (SGA, <10th percentile), or intrauterine growth-restricted (IUGR) newborns may have similar weights. Serial fetal biometry (ultrasound), required for the diagnosis, timing and severity of intrauterine growth restriction in the individual infant, is still not common in epidemiological studies. SGA newborns have less lean body mass, but they particularly lack fat mass. The most important etiological determinants of intrauterine growth restriction in developed countries is cigarette smoking, while in developing countries it is usually longstanding food deprivation. Follow-up studies of SGA newborns consistently showed a positive association between birthweight and later lean body mass, whereas associations with adiposity were more variable. Most SGA infants had catch-up in length/height. Signs of the metabolic syndrome accompanied the catch-up in bodyweight and central adiposity. So far, no overarching model is available to explain how the epigenetic and hormonal tunings, which accompany intrauterine malnutrition from preconception through pregnancy, can program the regulatory systems of fundamental life processes. The theoretical concepts of a thrifty phenotype (Hales and Barker) and of a predictive adaptive response (Gluckman and Hanson) offer a comprehensive approach to understanding the empirical and experimental findings.

Source: Medline

Title: Risk factors for small for gestational age.

Citation: Pediatrics international : official journal of the Japan Pediatric Society, Dec 2007, vol. 49, no. 6, p. 985-990, 1328-8067 (December 2007)

Author(s): Tsukamoto, Hiroko, Fukuoka, Hideoki, Koyasu, Mieko, Nagai, Yasushi, Takimoto, Hidemi

Abstract: The purpose of the paper was to determine the risk factors for small-for-gestational-age (SGA) infants at full term, in Japan. The study was conducted at four hospitals and clinics in the Tokyo metropolitan area. A retrospective review of 2972 mothers and their infants born from singleton pregnancies at any time during the years 2002 and 2003 was conducted. Of these women,

8.4% gave birth to SGA infants. The proportion of SGA infants was significantly higher among heavy smokers (>10 cigarettes/day; 13.7%, $P < 0.01$). The odds ratio (OR) for SGA decreased significantly in proportion to the pregnancy body mass index (OR, 0.89; 95% confidence interval [CI]: 0.84-0.94, $P < 0.001$). The OR of SGA for stratified maternal weight gain was 1.79 (95%CI: 1.24-2.58, $P \leq 0.01$) for weight gain < 8.0 kg; 1.16 (95%CI: 0.79-1.71, $P = 0.45$) for weight gain 8.0-10.0 kg; and 0.49 (95%CI: 0.3-0.78, $P < 0.01$) for weight gain >12 kg. The present study clearly confirms the detrimental effect of a low prepregnancy body mass index, low maternal weight gain and maternal smoking during pregnancy on the incidence of SGA infants.

Source: Medline

Full Text:

Available from *John Wiley and Sons* in [Pediatrics International](#)

Available from *John Wiley and Sons* in [Pediatrics International](#)

Title: The effect of low body mass index on the development of gestational hypertension and preeclampsia.

Citation: The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians, Jul 2007, vol. 20, no. 7, p. 509-513, 1476-7058 (July 2007)

Author(s): Belogolovkin, Victoria, Eddleman, Keith A, Malone, Fergal D, Sullivan, Lisa, Ball, Robert H, Nyberg, David A, Comstock, Christine H, Hankins, Gary D V, Carter, Suzanne, Dugoff, Lorraine, Craigo, Sabrina D, Timor-Tritsch, Ilan E, Carr, Stephen R, Wolfe, Honor M, D'Alton, Mary E

Abstract: To evaluate the relationship between low maternal body mass index (BMI) as calculated in the first trimester and the risk of preeclampsia and gestational hypertension. Patients enrolled in the First And Second Trimester Evaluation of Risk for aneuploidy (FASTER) trial were grouped into three weight categories: low BMI (BMI <19.8 kg/m²), normal BMI (BMI 19.8 - 26 kg/m²), and overweight BMI (26.1 - 29 kg/m²). The incidences of gestational hypertension and preeclampsia were ascertained for each group. Tests for differences in crude incidence proportions were performed using Chi-square tests. Multiple logistic regression was used to adjust for maternal age, race, parity, obesity, use of assisted reproductive technology (ART), in vitro fertilization (IVF), gestational diabetes, pre-gestational diabetes, cocaine use, and smoking. The proportion of patients having gestational hypertension in the low BMI group was 2.0% compared to 3.2% for normal BMI and 6.0% for overweight BMI ($p < 0.0001$). Women with low BMI were also less likely to develop preeclampsia, 1.1% vs. 1.9% for normal BMI and 2.8% for overweight BMI ($p < 0.0001$). We found that women with low BMI in the first trimester were significantly less likely to develop gestational hypertension or preeclampsia than women with a normal BMI.

Source: Medline

Full Text:

Available from *Taylor & Francis* in [Journal of Maternal-Fetal and Neonatal Medicine, The](#)

Available from *ProQuest* in [Journal of Maternal - Fetal and Neonatal Medicine](#)

Title: Low birth weight at term: relationship with maternal anthropometry.

Citation: JNMA; journal of the Nepal Medical Association, Apr 2007, vol. 46, no. 166, p. 52-56, 0028-2715 (2007 Apr-Jun)

Author(s): Ojha, N, Malla, D S

Abstract: The objective of this study was to determine the relationship of maternal anthropometry with low birth weight at term. This study was conducted at the Maternity Hospital, Thapathali, from 6th December 2004 to 30th January 2005. It was a prospective, hospital based, comparative study, carried out in 308 women who had delivered singleton live babies at term. The study population was divided into two groups based on baby's weight. During the study period, 154 women, who had delivered term low birth weight (LBW) babies (<2500gm), were taken as cases. For each case, a comparative case (matching in age and parity) who had delivered normal birth weight (NBW) baby (2500gm) was selected and served as control. Maternal anthropometric measurements were compared between the two groups. The variables studied were post-delivery maternal weight, height, body mass index (BMI) and mid upper arm circumference (MUAC). The incidence of low birth weight during the study period was 12.76% (329 of 2577 total births). The incidence of term low birth weight was 8.15% among the 2283 term births. In mothers with low weight (<45.0kg), low birth weight babies were three times more common than in mothers with normal weight (OR 3.5 95% CI 1.82-6.77) and with low MUAC (<22.0cm), it was twice as common (OR 2.04 95% CI 1.14-3.63). In mothers with low height (<145.0cm), LBW babies were higher but could not reach significant level (OR 1.87 95% CI 0.98-3.75). Similarly, in mothers with low BMI (<18.5kg/m²), the difference was not significant (OR 1.9 95%CI 0.61-5.65). On multiple logistic regression analysis, only low maternal weight was powerful enough to remain significant (OR 2.84 95% CI 1.34-5.99). From these results, it can be concluded that low maternal anthropometric measurements have a definite role in causing LBW babies at term. Among the studied variables, maternal weight showed the strongest influence on low birth weight.

Source: Medline

Title: Pre-pregnancy body mass index and pregnancy outcomes.

Citation: International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics, Dec 2006, vol. 95, no. 3, p. 242-247, 0020-7292 (December 2006)

Author(s): Doherty, D A, Magann, E F, Francis, J, Morrison, J C, Newnham, J P

Abstract: To determine the effect of maternal pre-pregnancy BMI on pregnancy outcomes. Pregnancy cohort recruited pregnancies between 16 and 18 weeks. BMI evaluated underweight, BMI<18.5, normal, BMI 18.5-25, overweight BMI 25-30, and obese BMI>30 women. Pre-pregnancy BMI classified 331 women as underweight (11.7%), 1982 normal (69.9%), 326 overweight (11.5%), and 188 as obese (6.6%). Obese women were more likely to develop gestational diabetes (p<0.001), hypertension (p<0.001), preeclampsia (p<0.001), need labor induction (p<0.001), cesarean delivery for fetal distress (p<0.001), postpartum hemorrhage (p=0.003), need neonatal resuscitation (p=0.001) and deliver hypoglycemic infants (p=0.007). Being underweight is correlated with fetal growth restriction (p=0.001). Pre-pregnancy obesity is a risk factor for gestational diabetes, preeclampsia, labor induction, cesarean for fetal distress, postpartum hemorrhage and neonatal hypoglycemic and need for resuscitation. Being underweight is risk factor for fetal growth restriction.

Source: Medline

Title: Weight gain and spontaneous preterm birth: the role of race or ethnicity and previous preterm birth.

Citation: *Obstetrics and gynecology*, Dec 2006, vol. 108, no. 6, p. 1448-1455, 0029-7844 (December 2006)

Author(s): Stotland, Naomi E, Caughey, Aaron B, Lahiff, Maureen, Abrams, Barbara

Abstract: To study how the relationship between gestational weight gain and spontaneous preterm birth interacts with maternal race or ethnicity and previous preterm birth status. This was a retrospective cohort study of singleton births to women of normal or low prepregnancy body mass index. Gestational weight gain was measured as total weight gain divided by weeks of gestation at delivery, and weight gain was categorized as low (less than 0.27 kg/wk), normal (0.27-0.52 kg/wk), or high (more than 0.52 kg/wk). Univariable and multivariable analyses were performed on the relationship between weight gain categories and spontaneous preterm birth, stratified by maternal race or ethnicity and history of previous preterm birth. Overall, low weight gain was associated with spontaneous preterm birth (adjusted odds ratio [AOR] 2.5, 95% confidence interval [CI] 2.0-3.1). Although low gain was consistently associated with increased spontaneous preterm birth, some differences were found in subgroup analysis. Among African Americans with a previous preterm birth, both low and high weight gain were associated with increased odds of spontaneous preterm birth (AOR for low weight gain 4.3, 95% CI 1.2-15.5; AOR for high weight gain 6.1, 95% CI 1.8-20.2). For all other groups, high weight gain was not associated with spontaneous preterm birth. Among Asians with a previous preterm birth, low weight gain was not statistically significantly associated with spontaneous preterm birth (AOR 1.9, 95% CI 0.5-7.7). Among Asians there was also a non-statistically significant inverse relationship between high weight gain and spontaneous preterm birth (AOR 0.5, 95% CI 0.3-1.1). These results confirm an association between low maternal weight gain and spontaneous preterm birth. The effect modification of maternal race or ethnicity and history of previous preterm birth on this association deserves further study. II-2.

Source: Medline

Full Text:

Available from *Obstetrics and Gynecology* in [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#)

Available from *Ovid* in [Obstetrics and Gynecology](#)

Title: Gestational weight gain and adverse neonatal outcome among term infants.

Citation: *Obstetrics and gynecology*, Sep 2006, vol. 108, no. 3 Pt 1, p. 635-643, 0029-7844 (September 2006)

Author(s): Stotland, Naomi E, Cheng, Yvonne W, Hopkins, Linda M, Caughey, Aaron B

Abstract: To examine the relationship between gestational weight gain and adverse neonatal outcomes among infants born at term (37 weeks or more). This was a retrospective cohort study of 20,465 nondiabetic, term, singleton births. We performed univariable and multivariable analyses of the associations between gestational weight gain and neonatal outcomes. We categorized gestational weight gain by the Institute of Medicine guidelines as well as extremes of gestational

weight gain (less than 7 kg and more than 18 kg). Gestational weight gain above the Institute of Medicine guidelines was more common than gestational weight gain below (43.3% compared with 20.1%). In multivariable analyses, gestational weight gain above guidelines was associated with a low 5-minute Apgar score (adjusted odds ratio [AOR] 1.33, 95% confidence interval [CI] 1.01-1.76), seizure (AOR 6.50, 95% CI 1.43-29.65), hypoglycemia (AOR 1.52, 95% CI 1.06-2.16), polycythemia (AOR 1.44, 95% CI 1.06-1.94), meconium aspiration syndrome (AOR 1.79, 95% CI 1.12-2.86), and large for gestational age (AOR 1.98, 95% CI 1.74-2.25) compared with women within weight gain guidelines. Gestational weight gain below guidelines was associated with decreased odds of neonatal intensive care unit admission (AOR 0.66, 95% CI 0.46-0.96) and increased odds of small for gestational age (SGA; AOR 1.66, 95% CI 1.44-1.92). Gestational weight gain less than 7 kg was associated with increased risk of seizure, hospital stay more than 5 days, and SGA. Gestational weight gain more than 18 kg was associated with assisted ventilation, seizure, hypoglycemia, polycythemia, meconium aspiration syndrome, and large for gestational age. Gestational weight gain above guidelines was common and associated with multiple adverse neonatal outcomes, whereas gestational weight gain below guidelines was only associated with SGA status. Public health efforts among similar populations should emphasize prevention of excessive gestational weight gain.

Source: Medline

Full Text:

Available from *Obstetrics and Gynecology* in [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#)

Available from *Ovid* in [Obstetrics and Gynecology](#)

Title: Maternal underweight and the risk of spontaneous abortion.

Citation: Acta obstetrica et gynecologica Scandinavica, Dec 2005, vol. 84, no. 12, p. 1197-1201, 0001-6349 (December 2005)

Author(s): Helgstrand, Stine, Andersen, Anne-Marie Nybo

Abstract: To evaluate the risk of spontaneous abortion in relation to maternal pre-pregnant underweight. The study was designed as a cohort study within the framework of the Danish National Birth Cohort (DNBC). The participants were a total of 23 821 women recruited consecutively to the DNBC from October 1, 1997 to March 31, 1999 and interviewed subsequently. The pregnant women were recruited in first half of pregnancy and interviewed about pre-pregnant body size, obstetric history, exposures in pregnancy, and socio-demographic factors. Pregnancies were followed-up regarding spontaneous abortion. Relative risk of spontaneous abortion was calculated as Hazard Ratios using Cox regression with delayed entry. The outcome measure was spontaneous abortion. The hazard ratio for spontaneous abortion in women with a pre-pregnant body mass index (BMI) below 18.5 was 1.24 (95% confidence limits 0.95-1.63) compared to women with pre-pregnant BMI 18.5-24.9. Women with a BMI of 25 or more had a smaller increase in risk of spontaneous abortion. Adjustment for maternal age, parity, previous miscarriages, and lifestyle factors did not affect the estimates substantially, neither did exclusion of women with metabolic or eating disorders. These results indicate that pre-pregnant underweight may affect the risk of spontaneous abortion negatively.

Source: Medline

Full Text:

Available from *John Wiley and Sons* in [Acta Obstetrica et Gynecologica Scandinavica](#)

Available from *John Wiley and Sons* in [Acta Obstetricia Et Gynecologica Scandinavica](#)

Title: The preferred timing of second-trimester obstetric sonography based on maternal body mass index

Citation: Journal of Ultrasound in Medicine, August 2004, vol./is. 23/8(1019-1022), 0278-4297 (August 2004)

Author(s): Lantz M.E., Chisholm C.A.

Language: English

Abstract: Objective. To determine the preferred timing of sonographic screening of fetal anatomy based on the maternal body mass index (BMI). Methods. We abstracted the sonographic reports of 2303 gravidas undergoing routine fetal anatomic screening between 15 and 24 weeks' gestation to determine the completeness of the study. Height and weight information was available on 1444 patients. The maternal BMI (weight [kilograms]/height [square meters]) was categorized as underweight (<19.8), normal weight (19.8-26.0), overweight (26.1-29.0), and obese (>29.0). Completion rates were compared by chi² analysis. Multiple logistic regression was used to evaluate for independent predictors of a completed study. Results. Except for underweight women, completion rates for all BMI categories were significantly higher when the sonographic examinations were performed between 18 weeks and 19 weeks 6 days compared with those performed between 15 weeks and 17 weeks 6 days. Body mass index, estimated gestational age, and black race were independent predictors of a completed study. Conclusions. Except in underweight women, the 18- to 20-week interval appears to be superior to the 15- to 18-week interval when performing sonographic screening of the fetal anatomy.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *Highwire Press* in [Journal of Ultrasound in Medicine](#)

Title: Low maternal weight, failure to thrive in pregnancy, and adverse pregnancy outcomes

Citation: American Journal of Obstetrics and Gynecology, December 2003, vol./is. 189/6(1726-1730), 0002-9378 (December 2003)

Author(s): Ehrenberg H.M., Dierker L., Milluzzi C., Mercer B.M.

Language: English

Abstract: OBJECTIVE: The purpose of this study was to correlate low maternal pregravid weight, delivery weight, and poor gestational weight gain with perinatal outcomes. STUDY DESIGN: Maternal and perinatal data from January 1997 to June 2001 were obtained from a perinatal database at MetroHealth Medical Center. Low maternal weight (LMW) was defined as pregravid or delivery weight <100 pounds or body mass index (BMI) <19.8 kg/m²>. Low maternal weight gain was defined as <0.27 kg per week. Perinatal complication rates in these subjects were compared with those with weights of 100 to 200 pounds, normal BMI (>19.8, <26 kg/m²>), and normal gestational weight gain (0.27-0.52 kg/wk). Chi-square and t tests were used where

appropriate. $P < .05$ was significant. RESULTS: A percentage (2.6%) of 15,196 subjects began pregnancy weighing <100 pounds; 0.15% weighed <100 pounds at delivery and 13.2% had a pregravid BMI $<19.8 \text{ kg/m}^2$. Pregravid LMW was highly correlated with ethnicity (Asians, 8.6%; Hispanics, 4.3%; Caucasians, 2.5%; African Americans, 1.9%; $P < .001$). Subjects with pregravid LMW were at increased risk for intrauterine growth restriction (IUGR) (relative risk [RR], 2.3, 95% CI, 1.3-4.05), and perineal tears (3rd-degree lacerations; RR, 1.8, 95% CI, 1.1-2.9), and low birth weight ([LBW] $<2500 \text{ g}$; RR, 1.8, 95% CI, 1.1-2.9). They had a lower risk of cesarean section (RR, 0.72, 95% CI, 0.56-0.92) and preterm delivery (PTD) (RR, 1.1, 95% CI, 0.97-1.06). Pregravid BMI $<19.8 \text{ kg/m}^2$ was associated with preterm labor (PTL) (RR, 1.22, 95% CI, 1.02-1.46), IUGR (RR, 1.67, 95% CI, 1.2-2.39), and LBW ($<2500 \text{ g}$; RR, 1.13, 95% CI, 1.0-1.27) and was protective against cesarean delivery (RR, 0.8, 95% CI, 0.71-0.91). Delivery LMW was associated with LBW ($<2500 \text{ g}$; RR, 2.81, 95% CI, 1.62-4.84), active-phase arrest (RR, 5.07, 95% CI, 1.85-13.9), PTL and PTD (RR, 2.5, 95% CI, 1.02-6.33, and RR, 2.45, 95% CI, 1.4-4.4, respectively), a lower gestational age at delivery (36.8 vs 38.3 wks, $P < .05$), and mediolateral episiotomy (RR, 9.6, 95% CI, 1.9-48.0). A percentage (0.8%) of subjects had BMI $<19.8 \text{ kg/m}^2$ at delivery. Low delivery BMI was associated with birth weight $<2500 \text{ g}$ (RR, 1.74, 95% CI, 1.3-2.32), PTL (RR, 2.16, 95% CI, 1.45-3.19), and PTD (RR, 1.57, 95% CI, 1.18-2.11). Failure to thrive in pregnancy (weight gain $<0.27 \text{ kg/wk}$) was associated with LBW ($<1500 \text{ g}$; RR, 1.23, 95% CI, 1.03-1.45), $<2500 \text{ g}$; RR, 1.22, 95% CI, 1.13-1.33), and PTL and PTD (RR, 1.2, 95% CI, 1.05-1.37, and RR, 1.11, 95% CI, 1.02-1.2, respectively). CONCLUSION: Low weight and BMI at conception or delivery, as well as poor weight gain during pregnancy, are associated with LBW, prematurity, and maternal delivery complications.

Publication Type: Journal: Article

Source: EMBASE

Title: Low preconception body mass index is associated with birth outcome in a prospective cohort of Chinese women.

Citation: The Journal of nutrition, Nov 2003, vol. 133, no. 11, p. 3449-3455, 0022-3166 (November 2003)

Author(s): Ronnenberg, Alayne G, Wang, Xiaobin, Xing, Houxun, Chen, Chanzhong, Chen, Dafang, Guang, Wenwei, Guang, Aiqun, Wang, Lihua, Ryan, Louise, Xu, Xiping

Abstract: Low maternal prepregnancy BMI is associated with adverse birth outcomes, but the BMI at which risk increases is not well defined. We assessed whether the relationship between prepregnancy BMI and birth outcomes is influenced by the extent to which mothers were underweight in a prospective study in Anhui, China. The women ($n = 575$) were 20-34 y old, married, nulliparous and nonsmokers. All measures of infant growth increased with increasing maternal BMI until a plateau was reached at a BMI of 22-23 kg/m^2 . Infants born to the 27% of women who were severely underweight before pregnancy (BMI $\leq 18.5 \text{ kg/m}^2$) were at increased risk for fetal growth deficits associated with infant morbidity. Compared with a normal BMI, being severely underweight was associated with mean (\pm SEM) reductions of 219 \pm 40 g in infant birthweight and 6.7 \pm 1.3% in the birthweight ratio and an 80% increase in risk of intrauterine growth restriction [odds ratio (OR) 1.8; 95% CI: 1.0, 3.3; $P = 0.05$]. Being severely underweight was also associated with smaller infant head circumference and lower ponderal index. Being moderately underweight ($18.5 < \text{BMI} < 19.8 \text{ kg/m}^2$) was not significantly associated with adverse pregnancy outcomes. Gestational age and risk of preterm birth were not associated with maternal BMI. More than half of the women in this study were underweight before pregnancy. Although being

moderately underweight was not associated with increased risk of adverse pregnancy outcomes, being severely underweight was an important risk factor for reduced fetal growth.

Source: Medline

Full Text:

Available from *Highwire Press* in [Journal of Nutrition, The](#)

Available from *ProQuest* in [Journal of Nutrition, The](#)

Available from *Free Access Content* in [Journal of Nutrition](#)

Title: Association between prepregnancy maternal body mass index and the risk of having an infant with a congenital diaphragmatic hernia

Citation: Birth Defects Research Part A - Clinical and Molecular Teratology, January 2003, vol./is. 67/1(73-76), 1542-0752 (01 Jan 2003)

Author(s): Waller D.K., Tita A.T.N., Werler M.M., Mitchell A.A.

Language: English

Abstract: BACKGROUND: A previous study observed that women who are underweight prior to conception were significantly more likely to have infants affected by congenital diaphragmatic hernia (CDH). The objective of the current study was to examine the association between maternal body mass index and the risk of a CDH-affected offspring based on a larger number of cases of CDH. METHODS: A case control study was conducted using data collected by the Boston University Slone Epidemiology Center Birth Defects Study, which identifies infants with major malformations who are born in the metropolitan area surrounding Boston, Massachusetts; Philadelphia, Pennsylvania; and Toronto, Ontario, Canada. Control infants were selected from infants without malformations who were born in the same areas. The study included 85 cases of CDH and 655 controls delivered between 1993 and 1997. RESULTS: After adjustment for maternal education and maternal age, we observed that women who were thin or underweight for their height (body mass index <math>< 19.0 \text{ kg/m}^2</math>) had an increased risk of having an infant with isolated CDH (OR = 1.9; 95% CI = 0.92-4.1), but no increase in the risk of having a CDH infant with multiple defects (OR = 0.86; 95% CI = 0.29-2.6) compared with all other women. CONCLUSIONS: Although our finding for isolated CDH was not statistically significant ($P = 0.08$), it suggests that the offspring of thin or underweight women may have an increased risk of isolated CDH. This finding requires confirmation. If it is confirmed, further research on factors associated with being underweight should be explored such as diet, exercise, and use of drugs. © 2003 Wiley-Liss, Inc.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *John Wiley and Sons* in [Birth Defects Research Part A: Clinical and Molecular Teratology](#)

Title: Is maternal underweight really a risk factor for adverse pregnancy outcome? A population-based study in London

Citation: British Journal of Obstetrics and Gynaecology, 2001, vol./is. 108/1(61-66), 0306-5456 (2001)

Author(s): Sebire N.J, Jolly M., Harris J., Regan L., Robinson S.

Language: English

Abstract: Objective: To determine the maternal and fetal risk of adverse outcome during pregnancy in relation to low maternal body mass index in an unselected population. Design: Retrospective analysis. Methods: Information for the years between 1988 and 1997 was extracted from a validated maternity database, including all but one of the maternity units in the North West Thames Region; 215,105 completed singleton pregnancies were studied. Comparison of pregnancy outcome was made on the basis of maternal body mass index at booking. There were 176,923 with a normal weight body mass index ($= 20 < 25$). There were 38,182 with an underweight body mass index (< 20). Comparisons included antenatal complications (e.g. gestational diabetes, pre-eclampsia); intervention in labour, maternal morbidities (e.g. infection, postpartum haemorrhage, pulmonary thromboembolism); and neonatal outcome (admitted to special care baby unit at 24 hour of age, gestation at delivery, birthweight, stillbirth). Data are presented as percentages of outcomes in the normal and underweight groups with adjusted odds ratios and confidence intervals according to body mass index group. Results: In the underweight group only antenatal anaemia, preterm delivery and birthweight below the 5th centile were more frequent than in women of normal body mass index. The prevalence of certain complications, including development of gestational diabetes mellitus, pre-eclampsia, obstetric intervention and postpartum haemorrhage, were significantly lower in those with low body mass index. Conclusion: Low maternal body mass index is associated with increased prevalence of some pregnancy complications, notably preterm delivery and low birthweight, but overall the outcome is favourable and several adverse outcomes are less common in this group of women.

Publication Type: Journal: Article

Source: EMBASE

Full Text:

Available from *British Journal of Obstetrics and Gynaecology* in [Patricia Bowen Library and Knowledge Service West Middlesex university Hospital](#)

Title: A low pregnancy body mass index is a risk factor for an offspring with gastroschisis.

Citation: Epidemiology (Cambridge, Mass.), Nov 1999, vol. 10, no. 6, p. 717-721, 1044-3983 (November 1999)

Author(s): Lam, P K, Torfs, C P, Brand, R J

Abstract: A mother's prepregnancy obesity has been suggested as a risk factor for having offspring with an abdominal wall defect. We evaluated this hypothesis among 104 cases of gastroschisis--a severe birth defect of the abdominal wall most prevalent in infants of young women--and 220 controls with no defect. Using Quetelet's index ($QI = \text{weight in kg}/\text{height in m}^2$) as a measure of body mass, we found a higher risk of gastroschisis (odds ratio (OR) = 3.2; 95% confidence interval (CI) = 1.4-7.3) for underweight mothers ($QI < 18.1 \text{ kg/m}^2$) and a lower risk (OR = 0.2; 0.05-0.9) for overweight mothers ($QI > 28.3 \text{ kg/m}^2$) as compared with mothers of normal weight. As QI was correlated to height, with the correlation varying according to mother's ethnicity and age, we

adjusted for these factors in the analysis; the adjusted values approximated the unadjusted values. Evaluation of QI as a continuous variable showed that, for every unit increase in QI, the risk for gastroschisis decreased by about 11%. Sociodemographic, pregnancy, and nutrient factors did not confound the association. These results suggest that low prepregnancy body mass rather than obesity is a risk factor for gastroschisis.

Source: Medline

Title: Low pregravid body mass index as a risk factor for preterm birth: variation by ethnic group.

Citation: *Obstetrics and gynecology*, Feb 1997, vol. 89, no. 2, p. 206-212, 0029-7844 (February 1997)

Author(s): Hickey, C A, Cliver, S P, McNeal, S F, Goldenberg, R L

Abstract: To examine the association between pregravid body mass index (BMI) and preterm delivery among black, white, and Hispanic women. Preterm deliveries among 12,459 women (43.2% black, 39.3% white, and 17.5% Hispanic) enrolled in a large multicenter trial of preterm birth prevention were examined by pregravid BMI category (very low, less than 16.5; low, 16.5-19.7; normal, 19.8-26.0; high, greater than 26) and by pathway (all, early, late, spontaneous preterm labor, and premature rupture of membranes [PROM]). More than one-fifth of both black (20.1%) and white (28.6%) women had low pregravid BMIs (less than 19.8), whereas only 11.7% of Hispanic women were under-weight. The overall prevalence of preterm delivery (gestational age less than 37 completed weeks) was 8.1% (10.3% in black, 7.3% in white, and 4.8% in Hispanic women). Among black and white women, bivariate analysis revealed an inverse linear association between pregravid BMI and the prevalence of all preterm deliveries ($P < \text{or} = .001$) and between pregravid BMI and the prevalence of late (33-36 weeks' gestation) preterm deliveries ($P < .001$). No such associations were observed for early (20-32 weeks' gestation) preterm delivery or among Hispanic women. Pregravid BMI was also associated inversely with spontaneous preterm labor among both black ($P < \text{or} = .01$) and white ($P < .001$) women, but not among Hispanic women. Logistic regression analysis (adjusting for the effects of maternal age, education, smoking, parity, previous preterm delivery, birth interval, and height) revealed that among black and white women, very low and low pregravid BMIs were associated with increased adjusted odds ratios for late (but not early) preterm delivery and for spontaneous preterm labor (but not PROM). These observations suggest that low pregravid BMI is associated with an increase in the prevalence of late preterm delivery and of spontaneous preterm labor among black and white, but not Hispanic, women.

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Title: Maternal underweight status and inadequate rate of weight gain during the third trimester of pregnancy increases the risk of preterm delivery.

Citation: *The Journal of nutrition*, Jan 1996, vol. 126, no. 1, p. 146-153, 0022-3166 (January 1996)

Author(s): Siega-Riz, A M, Adair, L S, Hobel, C J

Abstract: This study examines the differences in the pattern of weight gain according to trimesters of pregnancy for women who delivered term vs. preterm and analyzes the independent effect of prepregnancy weight status and rate of weight gain on delivering preterm. The differential effects of these variables on the etiological pathways of prematurity (preterm labor and preterm rupture of the amniotic membranes) were also examined. Data were collected prospectively from 7589 pregnant women receiving care in public health clinics in the West Los Angeles area. Eighty percent of women identified themselves as being of Hispanic origin. Multivariate logistic regression techniques were used to isolate the role of each nutritional variable from other factors that may influence birth outcome. Women who delivered preterm had patterns of weight gain similar to women delivering term infants. Underweight status (body mass index < 19.8 kg/m²) before pregnancy nearly doubled the likelihood of delivering preterm [adjusted odds ratio (AOR) 1.98, 95% confidence interval (CI) = 1.33, 2.98]. Inadequate weight gain in the third trimester defined as < 0.34, 0.35, 0.30 and 0.30 kg/wk for underweight, normal weight, overweight and obese women, respectively, increased the risk by a similar magnitude (AOR 1.91, 95% CI = 1.40, 2.61). Slight differentiation of these risk factors occurred when analyzing the etiological pathways of preterm birth. Preconceptional nutrition counseling and promotion of adequate weight gain during the third trimester of pregnancy should be components of public health programs designed to decrease the prevalence of preterm birth.

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Title: Maternal anthropometry and idiopathic preterm labor.

Citation: Obstetrics and gynecology, Nov 1995, vol. 86, no. 5, p. 744-748, 0029-7844 (November 1995)

Author(s): Kramer, M S, Coates, A L, Michoud, M C, Dagenais, S, Hamilton, E F, Papageorgiou, A

Abstract: To assess the etiologic role of maternal short stature, low pre-pregnancy body mass index (BMI), and low rate of gestational weight gain in idiopathic preterm labor. We carried out a three-center case-control study of 555 women with idiopathic onset of preterm labor (before 37 completed weeks), including two overlapping (ie, nonmutually exclusive) subsamples: cases with early preterm labor (before 34 completed weeks) and cases with recurrent preterm labor (before 37 completed weeks plus a history of prior preterm delivery or second-trimester miscarriage). Controls were matched to cases by race and smoking history. All subjects responded in person to questions about height, pre-pregnancy weight, gestational weight gain, and obstetric and sociodemographic histories. Maternal height, pre-pregnancy weight, and gestational weight gain demonstrated excellent test-retest reliability, with intra-class correlation coefficients of 0.97, 0.99, and 0.91, respectively. Based on matched analyses, women with a height of 157.5 cm or less had an increased risk of idiopathic preterm labor (odds ratio [OR] 1.85, 95% confidence interval [CI] 1.25-2.74), as did those with a pre-pregnancy BMI less than 19.8 kg/m² (OR 1.63, 95% CI 1.09-2.44) or a gestational weight gain rate less than 0.27 kg/week (OR 1.74, 95% CI 1.16-2.62). Conditional logistic regression models containing all three anthropometric variables and controlling for parity, marital status, language, age, and education yielded virtually identical point estimates and CIs. Maternal short stature, low pre-pregnancy BMI, and low rate of gestational weight gain may lead to shortened gestation by increasing the risk of idiopathic preterm labor.

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Title: Outcome of pregnancy in underweight women after spontaneous and induced ovulation.

Citation: British medical journal (Clinical research ed.), Apr 1988, vol. 296, no. 6627, p. 962-965, 0267-0623 (April 2, 1988)

Author(s): van der Spuy, Z M, Steer, P J, McCusker, M, Steele, S J, Jacobs, H S

Abstract: Low maternal weight before pregnancy and poor weight gain during pregnancy are known to result in an increased prevalence of low birthweight infants. Low body weight is also an important cause of amenorrhoea. The hypothesis that amenorrhoeic underweight women who become pregnant after induction of ovulation are more at risk of delivering low birthweight infants than underweight women who ovulate spontaneously was investigated. Forty one pregnant women in whom ovulation had been induced and 1212 in whom ovulation was spontaneous were studied. Women ovulating spontaneously whose weight was normal and who showed good weight gain during pregnancy (greater than 450 g a week) had the lowest incidence (6%) of babies who were small for gestational age. Underweight women (body mass index less than 19.1) who ovulated spontaneously had a threefold increased risk of delivering babies who were small for gestational age (18%). Overall, the women in whom ovulation had been induced had an even higher risk of babies who were small for dates (25%), and the risk was greatest (54%) in those who were underweight. The outcome of pregnancy is related to weight before conception, which in many cases reflects nutritional state; lack of spontaneous ovulation indicates an increased risk of producing a small for dates infant. The most suitable treatment for infertility secondary to weight related amenorrhoea is therefore dietary rather than induction of ovulation.

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