

Complications during pregnancy, labor and puerperium in women with increased BMI at pregnancy term

Research Article

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Abstract: The aim of this study was to analyse perinatal complications in woman with increased BMI at pregnancy term. Study included 23190 women who gave singleton birth during a 10-year period in our institution. Maternal databases were reviewed for pregnancy, labor and delivery complications and early maternal postpartum morbidity. Women with increased BMI at pregnancy term had a significantly higher incidence of postterm pregnancy, gestational diabetes, pregnancy-induced hypertension and third trimester hemorrhage, compared to normal weight women (p 0.000). Women with increased BMI had significantly more labor induction with prostaglandins (p 0.001 and 0.000) and elective caesarean (p 0.025 and 0.000). Also, overweight and obese women had higher incidence of operative delivery: caesarean section (p 0.000) and vacuum extraction (p 0.000). The incidences of postpartum febrility (p 0.057, 0.000, 0.002) and trombophlebits (p 0.013) were also significantly higher. We can conclude that prepregnancy normal weight women with increased BMI during pregnancy need special follow-up and counseling in pregnancy and delivery.

Keywords: Obesity • Pregnancy • Labor • Complication

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1. Introduction

Obesity, a common condition in well-developed and emerging countries, is recognized as a threat to health. Maternal obesity carries significant risks for both mother and fetus, is considered an obstetrical risk factor leading to high frequency of complications during prenatal period, and increases the risk of several adverse outcomes of pregnancy. Therefore, there is a substantial need for the development of preventive actions [1,2]. There are many criteria for definition of obesity in pregnancy and body mass index is one of mostly commonly used [1-13]. Many recent publications used prepregnancy BMI as a risk factor for pregnancy and labor complications [9,14]. Obese pregnant women experience more gestational diabetes, preeclampsia,

induction, primary cesarean, and postpartum infection than pregnant women who are not obese [3-10,15]. Maternal obesity is associated with a higher rate of venous thromboembolic disease and respiratory complications, and may be an independent risk factor for preterm delivery [11]. Obese pregnant women are at high risk for complications during delivery and therefore need careful pre-conception and prenatal counseling, as well as perinatal management [3].

The aim of this study was to analyse pregnancy, labor and postpartum complications in woman with normal prepregnancy BMI and normal or increased BMI at pregnancy term. Using medical records of all term singleton child births during a period of 10 years at the Department of Gynecology and Obstetrics, Clinical Hospital Rijeka, Croatia, we studied the effects of

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Table 1. Stratification of women according to term BMI (N = 23190).

BMI at term (kg/m ²)	N	(%)
18 – 24.9	8157	(35.17)
25 – 29.9	13450	(58.01)
30 – 35.9	1571	(6.77)
≥ 36	12	(0.05)
Total	23 190	(100.0)

increased pregnancy BMI on the following: pregnancy and labor complications; mode of delivery; and maternal complications in the early postpartum period.

2. Material and Methods

The study population included 23190 women with term singleton pregnancies (37-42 gestational weeks) who gave birth within a 10-year period at the Department of Gynecology and Obstetrics, University of Rijeka, Croatia. The women selected were normal weight according to the prepregnancy BMI of 18-24.9 kg/m², defined as weight in kilograms divided by the square of height in meters [14,15]. At pregnancy term, all women were stratified according to term BMI into four groups: normal weight (BMI 18-24.9), overweight (BMI 25-29.9), obese (BMI 30-35.9) and extremely obese (BMI ≥ 36). Maternal records were reviewed for pregnancy and

labor complications, mode of delivery and maternal early postpartum morbidity (during the first three days after delivery). The analysis was performed to assess the effect of increased BMI on maternal morbidity, presumed to increase the risk of adverse outcome of pregnancy. Body mass index (BMI) at term was calculated as weight in kilograms divided by the square of height in meters. The chi-square analysis and Student T-tests were used to establish differences in the four populations' outcomes. Each population with increased BMI (overweight, obese and extremely obese) is compared separately to the normal BMI population (normal weight control). Table 1 shows stratification of women according to term BMI.

3. Results

A control group of 8157 (35.17%) normal weight pregnant women at term (BMI 18-24.9) was compared to the three populations with increased BMI at term for maternal demographic and obstetric variables. Overweight and obese women were significantly older (5.42% vs. 8.11% and 7.7%, p 0.000), pluriparous (46.35% vs. 50.97%, p 0.000), and high school graduated (65.83% vs. 74.01%, p 0.006), compared to normal weight women. Also, overweight and obese women had higher incidence of postterm pregnancy (41-42 weeks, 22.11% vs. 26.52%

Table 2. The demographic characteristics of women delivering singleton infants during a 10-year period at the Department of Gynecology and Obstetrics, Clinical Hospital Center Rijeka.

BMI at term (kg/m ²)	18 – 24.9 (N = 8157)	25 – 29.9 (N = 13450)	30 – 35.9 (N = 1571)	≥ 36 (N = 12)	p
Age (years)§	27.49±4.89	28.2±4.93	27.71±4.98	26.25±2.62	NS
≤ 18	117 (1.43)	127 (0.94)*	15 (0.95)	0	0.001
≥ 36	442 (5.42)	1091 (8.11)*	121 (7.7)*	0	0.000
Parity					
Nulliparous	4345 (53.27)	6563 (48.79)*	871 (55.44)	8 (66.66)	0.000
Pluriparous	3781 (46.35)	6855 (50.97)*	698 (44.43)	4 (33.34)	0.000
Multiparous	31 (0.38)	32 (0.24)	2 (0.12)	0*	0.032
Education					
Not educated	112 (1.37)	117 (0.87)*	19 (1.21)	1 (8.33)	0.000
Elementary school	810 (9.93)	1254 (9.32)	162 (10.31)	1 (8.33)	NS
High school	5370 (65.83)	9221 (68.56)	1162 (74.01)*	8 (66.67)	0.006
University	1865 (22.86)	2858 (21.25)*	228 (14.51)*	2 (16.67)	0.026
Gestation (weeks) §	39.62±(1.16)	39.79±(1.12)	39.86±(1.12)	39.42±(1.32)	NS
37 – 40	6340 (77.72)	9868 (73.37)*	1121 (71.35)*	9 (75.0)	0.000
41 - 42	1804 (22.11)	3567 (26.52)*	447 (28.45)*	3 (25.0)	0.000
> 42	13 (0.16)	15 (0.11)	3 (0.19)	0*	0.000

§ - Student - t test. * - Chi square

Table 3. Complications during pregnancy.

BMI at term (kg/m ²)	18 – 24.9 (N = 8157)	25 – 29.9 (N = 13450)	30 – 35.9 (N = 1571)	≥ 36 (N = 12)	p
No. of prenatal visits					
Without	1368 (16.78)	1921 (14.28)*	177 (11.27)*	3 (25.0)	0.000
≤ 4	455 (5.58)	478 (3.55)*	59 (3.76)*	0	0.000
5-9	3493 (42.82)	5600 (41.63)	668 (42.52)	4 (33.33)	NS
≥ 10	2841 (34.83)	5451 (40.53)*	667 (42.45)*	5 (41.67)	0.000
Hemorrhage – 3/3	27 (0.33)	50 (0.37)	48 (3.06)*	0	0.000
PIH	267 (3.27)	1156 (8.59)*	340 (21.64)*	6 (50.0)*	0.000
Gestational diabetes	43 (0.52)	107 (0.79)*	30 (1.91)*	0	0.022
Uroinfection	27 (0.33)	28 (0.21)	3 (0.06)*	0	0.000
Imminent preterm labor	528 (6.47)	690 (5.1)*	70 (4.45)*	0	0.000
Anemia	204 (2.5)	93 (0.69)*	10 (0.63)*	0	0.003

* *Chi-square*

and 28.45%, *p* 0.000) (Table 2). Significantly more overweight and obese women had 10 and more prenatal visits (34.83% vs. 40.53% and 42.45%, *p* 0.000). In relation to pregnancy complications, overweight and obese women had a higher incidence of gestational diabetes (0.79% and 1.91% vs. 0.52%, *p* 0.022 and 0.000), pregnancy-induced hypertension (8.59%, 21.64% and 50% vs. 3.27%, *p* 0.000) and third trimester hemorrhage (3.06% vs. 0.33% , *p* 0.000), compared to normal weight women. Incidence of uroinfections (0.33% vs. 0.06%, *p* 0.000), imminent preterm labor (6.47% vs. 5.1% and 4.45%, *p* 0.000 and 0.003) and anemia in pregnancy (2.5% vs. 0.69% and 0.63%, *p* 0.000) was significantly lower in overweight and obese women (Table 3).

In populations of women with increased BMI labor started significantly often with spontaneous rupture of membrane (23.36% and 24.31% vs. 21.5%, *p* 0.011 and 0.049). Women with increased BMI had significantly more labor induction with prostaglandins (5.22% and 7.51% vs. 4.2%, *p* 0.001 and 0.000) and elective caesarean (2.08% and 2, 81% vs. 1.46%, *p* 0.025 and 0.000). Also, overweight and obese women had higher incidence of operative delivery: caesarean section (8.51%, 14.26% and 50% vs. 6.35%, *p* 0.000) and vacuum extraction (4.71% vs. 2.62%, *p* 0.000) (Table 4).

Women with increased BMI had significantly higher incidence of postpartal febrility (increased temperature of 38.0°C during three days) (1.725%, 3.12% and 16.67% vs. 1.385%, *p* 0.057, 0.000, 0.002). Incidence of thrombophlebitis was significantly higher in overweight women (0.186% vs. 0.049%, *p* 0.013). Other postpartum complications as incidence of uterine atonia and blood

loss (> 500 ml), birth trauma (mother), incidence of eclampsia, puerperal anemia and blood transfusions, episiotomia or wound dehiscence did not significantly differ in women with increased BMI.

4. Discussion

Since obesity is a major risk factor in the development of many chronic diseases, it represents an important individual and public health issue. This study focuses on the pregnancy and labor complications associated with maternal obesity defined as pregnancy-increased body mass index (≥ 25 kg/m²). Very different criteria were used to define obesity in pregnancy [10,12,13,15,16], and here we showed that prepregnancy normal weight women may become overweight or obese, even morbidly obese at term. Many studies focused on prepregnancy increased BMI as a risk factor for adverse pregnancy outcomes [1,3-6,8-11,17,18]. It is a fact that obesity before pregnancy, defined as increased prepregnancy BMI, was connected with increased frequency of pregnancy, labor and puerperal complications. Increases in prepregnancy BMI between the first two pregnancies from normal to obese are associated with increased risk of indications for primary cesarean [19].

Some authors showed different observations. Jensen *et al.* [14] showed that prepregnancy increased BMI was not related to more caesareans or vacuum extractions. Edwards *et al.* [20] showed that gestational weight change was not associated with pregnancy complications in obese or normal-weight women. Wolfe *et al.* [21] indicated that calculation of maternal

Table 4. Labor and early postpartum complications.

BMI at term (kg/m ²)	18 – 24.9 N = 8157	25 – 29.9 N = 13450	30 – 35.9 N = 1571	≥ 36 N = 12	p
Labor beginning					
Spontaneous contractions	5722 (70.14)	8973 (66.71)*	991 (63.08)*	4 (33.33)	0.022
Amniorrhexis	1753 (21.5)	3143 (23.36)*	382 (24.31)*	6 (50.0)	0.011
Prostaglandin inductions	342 (4.2)	702 (5.22)*	118 (7.51)*	2 (16.67)	0.001
Amniotomy/oxytocin	221 (2.70)	354 (2.63)	36 (2.29)	0	NS
Elective caesarean	119 (1.46)	252 (2.08)*	44 (2.81)*	0	0.025
Operative delivery					
Caesarean section (total)	518 (6.35)	1145 (8.51)*	224 (14.26)*	6 (50.0*)	0.000
Vacuum extraction	214 (2.62)	388 (2.88)	74 (4.71)*	0	0.000
Thrombophlebitis	4 (0.049)	25 (0.186)*	3 (0.191)	0	0.013
Postpartum febrility	113 (1.385)	232 (1.725)*	49 (3.119)*	2 (16.667)*	0.057
Uroinfection	31 (0.380)	70 (0.520)	11 (0.700)	0*	0.002

* *Chi-square*

body mass index offered no advantage over simply weighing the patient. We showed that increased BMI at pregnancy term, in prepregnancy normal weight women, had been highly associated with an increased frequency of gestational diabetes, pregnancy-induced hypertension, hemorrhage in the third trimester, and medical interventions in labor such as prostaglandin induction, vacuum extraction and caesarean section. We can accept that prepregnancy increased BMI is a risk factor for perinatal complications in the mother, according to observations by many authors, even though maternal obesity defined as pregnancy-increased body mass index (≥ 25 kg/m²) is also a risk factor. A recent study showed that elevated prepregnancy BMI was associated with increased risk of hypertensive disease of pregnancy (HDP), which in turn was associated with increased long-term maternal mortality rates. This association between HDP and mortality rates increased with elevated prepregnancy BMI [22].

We believe that intensive education of pregnant woman and information about nutritional needs during pregnancy had positive effects on their nutritional habits and may be helpful in prevention of perinatal complications. We provide an educational course in our institution for all pregnant women or contact with primary health care workers. Maternal weight measurements need to be recorded during antenatal care and used consistently because pregnancy-increased BMI is obviously a risk factor for maternal complications during pregnancy, labor and postpartum. We can conclude that prepregnancy normal weight women with increased BMI during pregnancy need special follow-up and counseling in pregnancy and delivery. Recommendations regarding the counseling of overweight and obese pregnant women and specific guidelines are of particular interest for the obstetrician.

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