



IMPACT OF MATERNAL OBESITY ON OBSTETRIC OUTCOMES

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ABSTRACT

Weight gain and obesity are public health problems in pregnant women and is associated with increased risk of maternal and neonatal complications. Objective was to determine maternal, fetal and neonatal complications in obese women. A Prospective study was conducted at Gynecology ward, Razi medical and educational center, Ahvaz, Iran during year 2011. A total of 850 subjects were participated in this study for 18 weeks follow-up. The subjects were divided into two groups. Overweight/ obese (n= 300) and normal (n=550) groups. The outcomes measurement was gestational diabetes, pregnancy induced-hypertension, cesarean section, and intrauterine death and anesthesia complications. Data was analysed using SPSS, version 16. There was significant association between obesity and gestational diabetes 95% CI, 8.45-19.7, P < 0.0001). Hypertension pregnancy-induced was higher 4.3% in obese pregnant compared to normal weight pregnant women (95% CI, 2.1- 4.9, p < 0.0001). Postpartum infection and bleeding among obese women was 10 and 11.3 times higher than normal weight pregnant women (95% CI, 85-370, p < 0.0001) (p < 0.0001) respectively. Obesity in reproductive age has been known effect on pregnancy outcomes, labor and infants and even children in their later life. Therefore, at risk people should be identified. Pre-pregnancy weight should be closed to normal range with strict nutritional and health care.

Key words: Obesity, Pregnancy, Body mass index, Hypertension, Fetal macrosomia, Cesarean section.

INTRODUCTION

Overweight in all communities is one of the major health problems and its prevalence among adults has risen in the past decade to an alarming.¹ In some developed countries only 2% of pregnant women have body mass index less than 18.5 kg/m² whereas 50% of pregnant mother have body mass index greater than 25 kg/m².² In a study of obesity in America has been shown that in year 2030 rate of obesity among women is more than men and prevalence of obesity among adult is higher than children. It's estimated that overweight and obesity among adult increasing to 86.5% and 51.1% respectively.³ In a study conducted by Pleis et al., in year 2000 revealed that 34% of American adult were overweight and 27% were obese. This result was comparable with other study in year 1980 which showed 75% increasing in rate of overweight and obesity.⁴ Obesity among Hispanic American women and black women aged 20-39 years old is very high and it's incomparable and holds true even in the poor people.⁵

Weight gain and obesity are public health problems in pregnant women and is associated with increased risk of maternal and neonatal complications.⁶ Maternal complications associated with obesity are hypertension, diabetes, infections, thromboembolism, increased cesarean section, neonatal complications such as macrosomia ones and so on, most infants hospitalized in intensive care, birth defects, prematurity, and increased problems with dead baby.^{7,8} Unwanted pregnancy with obesity may lead to complication in mother as well as newborn.⁹ Except for the pregnancy problems in non-pregnant obese adults, other disease such as heart disease, liver and gallbladder disease, osteoarthritis and cancers such as colon cancer and other chronic diseases will increase.¹⁰ Obesity due to increasing morbidity and mortality needs to spend more health care costs and health and cause enormous costs to society and the health system is imposed. In the United State, 9.5% of annual health care expenditures are directly spent for obesity.¹¹ The

association between obesity and type II diabetes mellitus is well known. In most of reports, 90% of patients with type II diabetes mellitus are obese. Heart diseases due to obesity are hypertension, hypervolemia and dyslipidemia which cause impaired left ventricular function, heart failure and myocardial infarction.¹² Weight gain is associated with increased premature mortality, mainly due to cardiovascular disease, diabetes and cancer that related to an increased BMI. Obesity is one of the risk factors for preeclampsia. For each 5-7 kg/m² increased in BMI before pregnancy, risk of preeclampsia increase two times.¹³ Obesity in pregnancy is also associated with risks for mother and fetus.¹⁴ Major complications are preeclampsia, gestational diabetes, thrombosis, infection, cesarean, increased hospital staying and inability to breast-feeding.¹⁵ Increase incidences of fetal congenital anomalies such as neural tube defects, cardiovascular, gastrointestinal and central nervous system abnormalities have been reported in newborns in obese mothers.^{16,17} In a review has been shown that rate of emergency and elective cesarean both can be increase substantially.¹⁸ Cesarean section and gestational diabetes are higher in obese adolescents pregnant. Failed induction, labor and normal vaginal delivery and cesarean section, both are increased in obese women.¹⁹

In obese women, major problems are happened during general anesthesia especially during intubation and also difficulty during epidural and spinal analgesia.²⁰ In obese women success breast-feeding and lose weight after delivery both are less successful.²¹ Amador and colleagues were reported that postpartum depressions in obese women increase obviously.²² Given the numerous obesity complications in pregnancy and childbirth based on its complications can effort to develop prevention methods and treatment. Therefore, we aimed to evaluate maternal, fetal and neonatal complications in obese women during year 2011 at Razi medical and educational center.

METHODOLOGY

Study design and location: A Prospective study was conducted at Gynecology ward, Razi medical and educational center, Ahwaz, Iran, 2011. The study was approved by Ahwaz Jundishapur University of Medical Sciences, and Ethics Committee (ع/4-291 -2011).

Subjects: A total of 850 subjects were participated in this study. Three hundred overweight and obese pregnant women who were in third trimester were enrolled. They were followed until delivery and 6 weeks after postpartum. The follow-up duration was 18 weeks. They were comparison with a control group (n= 550) who had normal body weight. The inclusion criteria were those with no chronic diseases (heart failure, renal failure and connective tissue disease) regardless to age, number of pregnancy, singular or twin fetus, type of previous delivery, and agree to participate. The exclusion criteria were chronic diseases and incomplete subjects' profiles. Cases with absent data regarding height, pre-pregnancy weight also were excluded from the study. The subjects were matched with respect to personal characteristics, nutritional status, life style and medical care. The consent form was obtained from each subject.

Measurements: The outcomes measurement was Sociodemographic, economic status and medical history which included gestational diabetes, pregnancy induced-hypertension, cesarean section, and intrauterine death and anesthesia complications. A questionnaire was prepared which included personal information (Sociodemographic and economic), medical history (e.g., chronic diseases, number of fertility, number of live child, number of still birth, number of intrauterine death, type of previous delivery [normal vaginal delivery, cesarean section]), nutritional status pre pregnancy (such as BMI, nutritional disorders). The questionnaire was completed by face to face interview. All subjects have been completed 18 weeks follow- up (n=850).

Obesity was defined based on body mass index (BMI) classification (BMI <18.5 kg/m² = under weight, BMI 18.5-24.9 kg/m² = normal weight, BMI 25-29.9 kg/m² = overweight, BMI ≥ 30 kg/m² = obese) (WHO 1995). The subjects were classified as obese or normal based on their BMI before pregnancy.

Gestational diabetes (GDM) usually develops after 20 weeks of gestation. It is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. Women with known diabetes mellitus before pregnancy are not classified as having GDM. GDM is usually diagnosed during the second or third trimester of pregnancy. It is classified as shown in Table 1.

Random blood glucose level was measured by using digital Glucometer (HC 09 LP, India) at the same time of enrollment, if the blood sugar was not normal according to Table 1, fasting blood glucose level was measured to confirmed diabetes.

Pregnancy induced- hypertension includes gestational hypertension and preeclampsia or eclampsia. Gestational hypertension which develops after mid pregnancy, is a maternal blood pressure of 140/90 mmHg or higher with no proteinuria (Table 2). Females with hypertension induced -pregnancy may develop preeclampsia, which is defined as a systolic blood pressure of 140/90 mm Hg or higher or diastolic blood pressure of 90 mm Hg and/ or a urinary protein level of 300 mg or more in a 24- hr urine sample. The blood pressure was measure at the time of interview using by Sphygmomanometer (1002/Presameter, Riester, Germany). If the blood pressure was not in normal range based on Table 2, to confirm pregnancy induced- hypertension, the subject was followed to control her blood pressure within three consecutive days.

Postpartum bleeding (hemorrhage) defined as excessive bleeding following the birth of a baby. About 4 percent of women have postpartum hemorrhage and it is more likely with a cesarean birth. Hemorrhage may occur before or after the placenta is delivered. The average amount of blood loss after the birth of a single baby in vaginal delivery is about 500 ml (or about a half of a quart). The average amount of blood loss for a cesarean birth is approximately 1,000 ml (or one quart). Most postpartum hemorrhage occurs right after delivery, but it can occur later as well (<http://www.chw.org/display/PPF/DocID/23228/router.asp>).

For the first two days probably needed to wear a hospital-grade pad. If the bleeding slowed the subjects could be able to wear a commercial pad. For measuring postpartum bleeding if the pad was soaked front to back, side to side in an hour, while subject was bed rested and bleeding continues at the same rate after rested or passed clots larger than golf balls, the patient considered to have postpartum bleeding.

Statistical Analysis: Data was analysed using SPSS, version 16. The entire test was 2 sided significant at the level of 0.05 by estimating power of 95%. Normality test was preformed and all variables were normally distributed. The Chi- square (χ^2) test with considering odds ratio (OR) was performed.

RESULTS

Mean age of study and control groups was 25.91± 6.32 and 26.17 ± 5.24 years old respectively (p= 0.45). Minimum and maximum age was 14 and 46 years old respectively. The mean of body mass index (BMI) was 25.49 ± 4.9. The mean of number of pregnancy was 2.28 ± 1.28. In 90% of subjects the number of fertility was 4 and less and in the control group was 2.11 ± 1.31 (p= 0.18). The results showed that the pregnancy complications were followed as hypertension (23.5%), shortness of breath (12%), gestational diabetes (38%), macrosomia (8.9%), and cesarean section (49.2%), intrauterine death (3.4%), length of hospital staying more than 2 days (56%), postpartum infection (15%), postpartum bleeding (26.8%), urinary tract infection during pregnancy (19%), oxytocin induction (45%) and lower back pain (37%).

Table 1 Diagnosis of Diabetes Mellitus and Impaired Glucose Homeostasis

Diagnosis	Criteria
Diabetes	Fasting plasma glucose (FPG) ≥126 mg/dl (≥ 7.0 mmol/L) Casual plasma glucose (CPG) ≥200 mg/dl (≥11.1 mmol/L) plus symptoms 2- hour plasma glucose level (2hPG) (≥200 mg/dl) (≥ 11.1 mmol/L)
Impaired glucose homeostasis (Impaired fasting glucose)	FPG ≥ 110 and < 126 mg/dl (≥6.1 and < 7.0 mmol/L)
Impaired glucose tolerance	2hPG ≥ 140 and < 200 mg/dl (≥7.8 and < 11.1 mmol/L)
Normal	FPG < 110 mg/dl (< 6.1 mmol/L) 2hPG <140 mg/dl (<7.8 mmol/L)

Source: Modified from Expert Committee on the diagnosis and classification of Diabetes mellitus: Report from the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, Diabetes care 20:1183, 1997

Table 2 Classification of Blood Pressure in Adults Age 18 years and Older

Category	Blood Pressure (mm Hg)		
	Systolic		Diastolic
Optimal	< 120	and	< 80
Normal	< 130	and	< 85
High-normal	130-139	or	85-89
Hypertension			
Stage 1	140-159	or	90-99
Stage 2	160-179	or	100-109
Stage 3	≥ 180	or	≥ 110

Source: From the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: Sixth Report (JNC VI), Arch Intern Med 157:2413, 1997.

Table 3 Pregnancy complications in obese pregnant women (data presented as number and percentage) (n=850)

Variables	BMI (kg/m ²)		p
	BMI > 25 (Overweight and obese) (n= 300)	BMI (18.5- 24.9) Normal (n= 550)	
	No: (%)	No: (%)	
Pregnancy induced- hypertension	71 (23.5)	34 (6.1)	0.0001*
Gestational diabetes	115 (38.1)	23 (4.2)	0.0001*
Cesarean section	149 (49.2)	153 (28)	0.001*
Lower back pain	112 (37)	110 (20)	0.0001*
Postpartum bleeding	82 (26.9)	37 (6.7)	0.0001*
Postpartum infection	46 (15)	18 (3.5)	0.0001*
Urinary tract infection (UTI) during pregnancy	59 (19.5)	45 (8.5)	0.0001*
Intrauterine death	10 (3.4)	3 (0.5)	0.0001*
Macrosomia	27 (8.9)	20 (3.9)	0.20
Delayed delivery	22 (7.2)	38 (6.9)	0.53
Anesthesia complications	87 (28.9)	6 (1.1)	0.0001*
Hospital staying > 2 days	168 (56)	116 (21)	0.001*

* p < 0.05 is significant using Chi- square test

The effect of abnormal weight gain during pregnancy showed that gestational diabetes in obese subjects was 13.9% higher than normal weight pregnant mothers (95% CI, 8.45-19.7, P < 0.0001). Hypertension 4.3% was higher in obese pregnant compared to normal weight pregnant women (95% CI, 2.1-4.9, p < 0.0001). Therefore, hypertension and gestational diabetes are associated with obesity. Postpartum infection among obese women was 10% higher than normal weight pregnant women (95% CI, 85-370, p < 0.0001). Postpartum bleeding in obese mothers was 11.3% more than normal weight mothers (p < 0.0001). There was no significant association between macrosomia and pregnancy obesity (p = 0.2) (Table 3).

DISCUSSION

This study was evaluated the pregnancy complications due to obesity for 18 weeks follow- up. Today, obesity among pregnant mothers is one of the most important factors associated with mother's mortality rate in developed countries.²³ The current study showed that gestational diabetes was 38% and about 13.9% was higher in obese mother compare to normal weight mother. The study was supported by a Meta Analysis study conducted by Chu et al in year 2007 that revealed the highest prevalence of gestational diabetes in obese mother was 19.9% in France (1995) and 18.6% in Canada (2005) respectively.²⁴ The prevalence of GDM among obese pregnant women in United Arab which is neighbor to Iran was 9.8% (2001).²⁵

In the current study the prevalence of pregnancy induced-hypertension (PIH) was 23.5% which was 4.3% higher in the obese group rather than normal weight group. The study was comparable with another study involved by Asim and Naeem showed that overall PIH was 33.5% which was present in 41% of obese women and in 26% of non-obese women.²⁶ Other study also showed that relative risk of gestational hypertension in obese women was 12.²⁷ Similar observation was made in another study that showed pregnancy induced-

hypertension was significantly associated with maternal obesity.²⁸

Result of this study showed that prevalence of postpartum infection was 15% which was 10% higher than non obese mothers also postpartum hemorrhage was 26.8% that was 11.3% higher in obese group compare to normal group. This finding was comparable with the Longitudinal prospective study conducted in India which showed that postpartum infection morbidities was 9.95% in obese group vs. 3.79% in normal group.²⁹ Other study also supported our result that there was an increased prevalence of postpartum hemorrhage primarily with changes in maternal characteristics. The risk of atonic uterine hemorrhage increased rapidly with increasing BMI. There was a twofold increased risk in obesity class III (1.8%). There was an increased risk for postpartum hemorrhage for women with a BMI of 40 or higher (5.2%) after normal delivery (odds ratio [OR] 1.23, 95% CI 1.04-1.45) compared with normal-weight women (4.4%).³⁰

The current study revealed that percentage of cesarean section was 49.2% among obese group which was comparable with the study investigated in Australia with the relative risk (RR) of cesarean section – (RR 1.42 [95%CI 1.18, 1.70], p = 0.0002) and (1.63 [95%CI 1.34, 1.99], p < 0.0001) in obese and normal weight groups respectively (29). This study found that prevalence of macrosomia was 8.9% that was comparison with (RR 4.54 [95%CI 2.01, 10.24], p = 0.0003) compared with those of women with a normal BMI in the Australian study.³¹

The current study also was shown that the prevalence of intrauterine death was 3.4% in maternal obesity that was comparable with 2.35 (95% CI 1.28 to 4.32) in a study investigated in Finland.³² A recent meta-analysis of 9 studies revealed that obese pregnant women have an estimated risk of stillbirth that is twice that of normal weight pregnant women.³³ Oxytocin induction among maternal obesity of this

study population was rated 45% while in a 15- year, population –based cohort study in Canada showed that induction of labor was 2.77 adjusted OR, (95% CI, 2.39-3.21).³⁴ Urinary tract infection among obese pregnant mother was 19% which was supported by another study conducted in UK (OR 1.39 (1.18--1.63), 95% CI).³⁵ Low back pain during the current pregnancy was 37% in this study population while in another study it was predicted by age [younger women were more likely to develop, (p= .004)] and during a previous pregnancy (p=.002).³⁶

CONCLUSION

Obesity in reproductive age in both developed and developing countries has been known effect on pregnancy outcomes, labor and infants and even children in their later life. Therefore, at risk people should be identified. Pre-pregnancy weight should be closed to normal range with strict nutritional and health care. Early symptoms of gestational diabetes and hypertension- induced pregnancy in obese pregnant women should be identified and treated. Fetal growth should be accurately monitored, therefore, serial Ultrasonography is recommended. To reduce risk of maternal and fetal mortality, qualified and professional staffs during surgery and anesthesia should be worked in a team.

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