Assessment of the maternal and neonatal risk in obese women at Ain shams University Maternity Hospital

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Dedication

*To my **family** who taught me the principles and patience and gave me the smile during hard times.*

Ahmed Mostafa

Abstract

Objective: to assess the effect of maternal obesity as a risk factor on maternal and neonatal outcomes among pregnant patients with spontaneous onset of labor.

Methods: This prospective cohort study involved a total no. of 250 women with singleton pregnancies delivered in the period between December 2014 and June 2015 and were categorized into two groups according to their BMI; normal weight (18-24.9 kg/m2) and obese (≥30 kg/m2).

Main outcome measures: mode of delivery, risk of delivery and neonatal complications in obese women versus normal weight women.

Results: Obese women had a significantly increased risk of caesarean section (P=0.001) and higher rate of induction ending in caesarean section compared with women of normal weight (P=0.01). Again there was a significantly longer median length of first stage, increased incidence of second-degree tear (P=0.001) and significantly increased risk of low Apgar score (P=0.019). However, the incidence of postpartum haemorrhage, admission to NICU and third-degree tear were similar in the two body mass index categories. As regard shoulder dystocia, there was a trend towards increased incidence with increasing BMI (P=0.003). There was a trend towards increased incidence of macrosomia with increasing BMI category (P=0.001).

Conclusions: Increasing BMI is associated with increased incidence of CS delivery, failed progress of labour, labour induction, perineal tears, low Apgar score, macrosomic babies and admission to NICU.

Keywords:

BMI, obesity complications, macrosomia.

Contents

Introduction

Obesity has been recognized by WHO as "a pandemic nutritional disorder which represents a rapidly growing threat to the health of populations of an increasing number of countries world- wide" ***(Khashan and Kenny, 2009).***

Obesity in women of childbearing age is a growing global problem. In Sweden, information on maternal height and weight on registration for antenatal care has been recorded since 1992, and onwards Body Mass Index **(**BMI, calculated as weight in kilograms divided by height in meters squared (kg/m2)**)** has increased among both primiparas as well as multiparas. In 2008, almost 25% of all pregnant women in Sweden were shown to be overweight (BMI 25-29.9) on presentation at the antenatal clinic and almost 12% of them were considered as obese (BMI≥30) ***(Kaplan-Sturk et al., 2013).***

It is well known that obesity is associated with increased maternal and fetal morbidity during pregnancy and labour ***(Baron et al., 2010).***

Obesity is associated with irregular menstruation with longer cycles, often making the expected date of delivery unsure: the vaginal examination to assess uterine size is notoriously inaccurate in overweight individuals ***(Johnson et al., 1999).*** Furthermore they reported that ultrasound examination of the fetus, both in terms of vaginal and especially abdominal ultrasound is more difficult in obese women and it might be more difficult to detect structural fetal abnormalities. In addition, it is technically more challenging to perform invasive prenatal diagnostic tests such as chorionic

villus sampling and amniocentesis, and the risks of miscarriage are increased three-fold in the obese. In terms of amniocentesis, post-amniocentesis amniotic fluid leak and fetal loss were significantly higher in women with an increased BMI than in a control group.

Catalano and Ehrenberg., 2006 reported that in pregnancy there is the continued production of counterregulatory (anti-insulin) hormones by the growing placenta, and insulin resistance increases progressively throughout pregnancy. But obese women have higher insulin resistance (lower insulin sensitivity) than women of normal weight, which results in increased availability of lipids for fetal growth and development. The development of GDM has a number of adverse maternal and fetal implications. For women, these include a high risk of hyperglycemia, cesarean delivery, and diabetes in later life.

Hedderson et al., 2008 reported that obesity is associated with an increased risk of diabetes, both pregestational diabetes and GDM.

Maternal obesity is associated with an increased risk of hypertensive disorders of pregnancy, including preeclampsia and the risk increases linearly with obesity. For each increase in BMI of 5 to 7 kg/m2, there is a corresponding 2-fold increase in the risk of developing preeclampsia ***(Weiss et al., 2004).***

Maternal obesity is a risk factor for spontaneous abortion (for both spontaneous conceptions and conception achieved through assisted reproductive technology), as well as for unexplained stillbirth (intrauterine fetal demise). A meta-analysis revealed that obese pregnant women have an estimated risk of stillbirth that is twice that of normal weight pregnant women ***(Chu et al., 2007).*** Furthermore they reported that the rate of successful vaginal delivery decreases progressively as maternal BMI increases. As the rate of cesarean delivery were 1.46 (95% CI, 1.34-1.60), 2.05 (95% CI, 1.86-2.27), and 2.89 (95% CI, 2.28-3.79) among overweight, obese, and severely obese women, respectively, compared with normal weight pregnant women.

The 2- to 3-fold increase in cesarean delivery rate is true for both primigravid and multigravid women ***(Lynch et al., 2008).***

Maternal obesity is associated with abnormal fetal growth. Therefore in obese pregnant women is fetal macrosomia (defined as an estimated fetal weight of greater than or equal to 4500 g), which appears to be increased 2- to 3-fold in obese parturient with a dose-dependent relationship between maternal obesity and fetal macrosomia ***(Ehrenberg et al., 2004).***

There is an increased incidence of fetal macrosomia in obese women and, if delivered vaginally, there is an increased risk to the woman of a third-degree tear. With regard to the fetus, trauma is more common, especially brachial plexus injuries, due in part to a higher incidence of shoulder dystocia. Therefore a higher maternal BMI in the first trimester and a greater increase in BMI throughout pregnancy were associated with a reduced likelihood of spontaneous labor at term, an increased risk of post-term pregnancy, and rate of intrapartum complication ***(Denison et al., 2008).***

In addition to an increased rate of operative delivery, obese women are also a high incidence of intraoperative complications, including increased infectious morbidity and thromboembolic events. There is also an increased risk of anesthetic complications, such as failed intubation at the time of general endotracheal anesthesia ***(Soens et al., 2008).***

In these patients there is also an increased risk of neural tube defect (NTD) in the offspring. A Meta analysis by Rasmussen and colleagues reported that the risk for delivering an infant with NTD was 1.22 (95% CI, 0.99-1.49), 1.70 (95% CI, 1.34-2.15), and 3.11 (95% CI, 1.75-5.46) among overweight, obese, and morbidly obese women, respectively, compared with normal weight women ***(Rasmussen et al., 2008).***

Pregnancies complicated by GDM have a 4-fold increased risk of prenatal mortality, of shoulder dystocia and resultant birth injury and Low APGAR scores, more admissions to neonatal intensive care units; and higher rates of prenatal death ***(Watkins et al., 2003).***

Moreover, offspring born of GDM pregnancies are more likely to develop childhood and adult obesity (OR 1.4 [95% CI, 1.2-1.6] for every 1-kg increment in birth weight) as well as type 2 diabetes mellitus ***(Gillman et al., 2003).***

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Aim OF Work

The aim of this work is to assess the effect of maternal obesity as a risk factor on maternal and neonatal outcomes among pregnant patients with spontaneous onset of labor.

Research hypothesis

In obese women with spontaneous onset of labor, there is no or increased risk of maternal and neonatal complications.

Research question

In obese women with spontaneous onset of labor, does the obesity increase the risk of maternal and neonatal complications?

Obesity

Obesity is defined as an increase in body fat while overweight is an increase in weight relative to a standard **(Gallagher et al., 2000).** Obesity is a global health problem that is increasing in prevalence. The world health organization characterizes obesity as a pandemic issue with a higher prevalence in females than in males **(Beckles and Thompson Reid, 2001)** thus; many pregnant patients are seen with high body mass index. Obesity during pregnancy is considered a high- risk state because it is associated with many complications **(Galtier Dereure et al., 2000).**

Prevalence of obesity

Current prevalence rates of obesity range from 5% in China, Japan and some African countries to 75% in the Eastern Mediterranean region and Samoa Island **(Puska et al., 2004).** Changes in prevalence rate over time vary between countries and regions. In USA, the obesity prevalence rates doubled in adults between 1980 and 2002.An estimate from the National Health and Nutrition Examination Survey (NHANES) revealed that obesity prevalence conducted in 2003-2004 showed that the prevalence rates of obesity among men increased significantly between 1999 and 2004.No Increase of overall obesity prevalence among women was observed over this 6 year period **(Ogden et al., 2006).** One third of adult women in the USA are currently obese **(Headly et al., 2004).**

The proportion of adults classified as obese in Australia increased significantly from 8.7 % in 1991 to 14.1 % in 2003, and morbid obesity increased from 2.6 % to 5.3 % in the same period **(Dal Grande et al., 2005).** In Portugal, the prevalence of obesity in men increased from 10.3 % in 1995-1996 to 11.5 % in 1998-1999 and in women, the prevalence of

obesity increased from 10.3 % in 1995- 1996 to 14.2 % in 1998-1999 **(Marquez-Vidal and Dias. 2005).**

Obesity occurred in 9.8 % of the Swedish population aged between16 and 84 years in 2004, compared with 4.8 % in 1980. There are also reports from developing countries of increasing obesity rates **(Prentice, 2006).**

In USA the prevalence of overweight and obesity has steadily increased over the years among genders, all ages, all racial and ethnic groups, all educational levels, and all smoking levels **(Mokdak et al., 2003).** In the period between 1960 and 2004, the prevalence of overweight increased from 44.8% to 66 % in those aged between 20 and 74 years **(NCHS, 2006).**

Among women, the age adjusted prevalence of overweight or obesity in racial and ethnic minorities is higher among black and Mexican American women than among white women. Among men, there is a little difference in the prevalence among these three groups **(NCHS, 2006).**

While there is no generally accepted definition for obesity as distinct from overweight in children and adolescents, the prevalence of overweight is increasing for children and adolescent in the United States. Approximately 17.5 % of children aged from 6 to 11 years, and 17 % of adolescents aged from 12 to 19 years were overweight in the period between 2001 and 2004 **(NCHS, 2006).**