

## The obese pregnancy

A. H. Aamir

### Abstract

Weight gain in pregnancy is physiological but if a woman is overweight prior to pregnancy, this will put both women and foetus at risk of adverse complications. Obesity can affect women at all the stages of pregnancy. Obese women can be a cause of reduced fertility as compared to a normal weight woman, and a typical example is of the Polycystic ovarian syndrome (PCOS). The incidence of Gestational Diabetes Mellitus, hypertension and preeclampsia is 2-3 folds higher in obesity particularly with a BMI of  $> 30\text{kg/m}^2$ . The chances of thromboembolism, miscarriage, Caesarian - section and stillbirth are increased as well. Perinatal mortality, increased chances of genetic disorders of the foetus and macrosomia are all increased with obesity. To avoid all these complications health education regarding healthy life style and diet with regular moderate intensity exercise is the cornerstone of the management.

**Keywords:** Obesity, Pregnancy, Weight gain, Diet, Physical exercise.

### Introduction

Obesity is one of the biggest growing public health issues in both developed and developing countries of the world. According to the World Health Organization (WHO), individuals with body mass index (BMIs) of  $25.0\text{ kg/m}^2$  to  $29.9\text{ kg/m}^2$  are considered overweight and BMIs of  $30.0\text{ kg/m}^2$  and above are considered as obese. Asians tend to have higher amounts of abdominal fat at lower BMIs and these cutoffs may be insufficient in identifying Asian individuals with a high risk of obesity-related morbidity and mortality.

WHO Western pacific region proposed an alternative definition of overweight (BMI 23.0 - 24.9) and obesity (BMI  $\geq 25.0$ ) for Asian population.<sup>1</sup> Hence these cut offs need to be kept in mind when we are addressing populations in Asian population.

Pregnancy is a physiological state characterised by numerous changes which if exceeds certain limits can lead to adverse outcome. Weight gain is one of the important changes, which may affect pregnancy outcome

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Department of Diabetes, Endocrine and Metabolic Diseases, Postgraduate Medical Institute, Hayatabad Medical Complex, Peshawar, Pakistan.

**Correspondence:** Email: drahaamir@gmail.com

in many ways. According to WHO, the prevalence of obesity in pregnancy ranges from 1.8 to 25.3%.<sup>2</sup> Women who are overweight before pregnancy are likely to gain more weight and hence at risk of adverse complications.

Therefore it is imperative to assess, manage and control both pre pregnancy body weight as well as during pregnancy weight gain. It has implications for both delivery as well as maternal and neonatal health outcomes. Children of obese women are likely to become overweight during childhood and may develop metabolic syndrome in adulthood, which is also important from public health perspective.

This article will review obesity before and during pregnancy and its implications on fertility and pregnancy outcomes.

### Obesity Before Pregnancy

Obese women have reduced fertility due to irregular periods which often are a presenting complaint as compared to women with normal weight. This could partly be due to suboptimal ovulation or anovulation. Classical example of obesity and suboptimal ovulation is Polycystic ovarian syndrome (PCOS), which is characterized by obesity and oligo-or anovulation.<sup>3</sup> Common and known metabolic associations with PCOS include low concentration of serum high density lipoproteins (HDL) cholesterol, high concentration of triglycerides and low density lipoprotein (LDL) cholesterol as well as increased concentrations of plasminogen activator inhibitor -1(PAI-1).<sup>4</sup> All these metabolic abnormalities increase the risk of development of arterial hypertension, ischaemic heart disease and thrombosis. Hyperinsulinaemia as a part of pathological sequel of PCOS increases production of androgens which results in hyperandrogenaemic anovulation which may be the cause of sub fertility both natural as well as conception achieved by assisted techniques.

Obese women may have an increased risk of diabetes prior to pregnancy which may remain undiagnosed before pregnancy and only surface once pregnancy takes place. This increases the risk of pre-eclampsia, caesarian birth and macrosomia.

### Obesity During Pregnancy

#### Maternal Complications

**Gestational Diabetes Mellitus:** Obesity constitutes independent risk factors for gestational diabetes,

although other factors like family history, ethnic origin and age contribute as well. Gestational Diabetes Mellitus is prevalent two to three folds higher in obese and overweight as compared to normal weight women. Size of the foetus is also linked to obesity and Diabetes.<sup>5</sup> On a positive note, women with gestational diabetes but with normal weight and controlled blood glucose have favorable outcomes in terms of neonatal macrosomia. This is comparable to women without diabetes.

Women with Gestational Diabetes Mellitus having a normal body weight, with a good glycaemic control with life style modifications, dietary compliance and insulin, have an incidence of neonatal macrosomia comparable to that of women without Diabetes Mellitus. Moreover obese or overweight women adequately controlled on insulin treatment are protected from macrosomia

### **Hypertension and Metabolic Syndrome**

Obesity is linked to insulin resistance which consequently causes hyperinsulinaemia. This can result in hypertension, hyperlipidaemia, glucose intolerance, increased Plasminogen Activator Inhibitor 1(PAI-1) and endothelial dysfunction. This combination of disorders has been collectively called "metabolic syndrome".

During pregnancy obese women carry an increased risk of developing hypertension and pre-eclampsia especially with a BMI of  $> 30\text{kg}/\text{m}^2$  risk is two to three folds higher.<sup>6</sup>

Waist circumference, an index of visceral obesity, is directly related to hypertensive disorders and can be a part of metabolic syndrome in 46% of subjects who are at risk of developing it in the near future.<sup>7</sup>

Obesity and pre-eclampsia in a previous pregnancy constitutes a strong risk of developing pre-eclampsia in the subsequent pregnancy.

### **Thrombo Embolism**

Pregnancy itself is a prothrombotic state as the plasma concentration of coagulation factors. I, VII, VIII & X are increased. There is associated decrease protein S and inhibition of fibrinolysis.<sup>8</sup> Obesity doubles the risk of thrombosis by increasing factor VIII and IX but not fibrinogen.

### **Miscarriage**

There are some controversial and non-conclusive studies showing excess body weight and its correlation with increased risk for first trimester miscarriage.

### **Preterm Delivery**

Obesity during pregnancy may lead to induced preterm delivery but not spontaneous preterm birth.

## **Caesarean Section and Associated Anaesthetic, Surgical and Post Surgical Complications**

There is a two fold increase risk of C-Section in obese pregnant women as suggested by various studies. Also obese or overweight women undergoing C-section are more prone to post operative complications which could be excessive blood loss, deep vein thrombosis due to pro-coagulant state, increased infections of the wound and post partum uterine infections.

Local studies also support higher rate of C.sections and instrumental deliveries in obese women.<sup>9</sup>

### **Still Birth**

There is approximately two fold increased odd of still birth associated with obesity.

### **Long Term Complications**

Obese women have more chances of retaining gestational weight gain during last pregnancy than women of normal weight. Likewise obese women who develop gestational diabetes mellitus have increased chance of developing type-2 diabetes within the following 10 years. This increased chance may be up to 50% compared to normal weight pregnancy.

### **Foetal Complications**

Maternal obesity is associated with increased risk for perinatal mortality. Also there are increased chances of genetic disorders of the foetus and macrosomia.

**Foetal death:** There is up to five fold increase risk of intrauterine death and increased infant mortality rate in obese women. There is correlation between the maternal body mass index and infant mortality rate which may be increased. There is up to five fold-increased risk of intrauterine death and increased infant mortality rate in obese women.<sup>10</sup>

**Congenital abnormalities:** Ultrasound interpretation is difficult in obese women and hence chances of detecting anomalies on a compromised display is a limiting factor. This can be one explanation of increased incidence of congenital anomalies in obese women, which may be difficult to diagnose in early pregnancy. Obese women have increased risk of developing abnormalities of the neural tube like Spina bifida, cardiovascular abnormalities, abnormality of abdominal wall like omphalocele. These abnormalities are more common in offspring of women with type-2 diabetes and or folate deficiency. Further there are increased chances that maternal obesity increases intensive care unit admission of the offspring.<sup>5</sup>

## Macrosomia

Maternal weight and insulin resistance prior to pregnancy affects foetal growth. Obesity and insulin resistance alter placental functions which is more profound during the last week of pregnancy with availability of nutrients like glucose, free fatty acids and amino acids to the foetus in abundance. Maternal hyperglycaemia leads to foetal hyperglycaemia causing hypertrophy and/hyperplasia of foetal pancreas and hyperinsulinaemia which is the precursor of macrosomia. Women with DM which may not be controlled, are at higher risk of delivering macrosomic babies.<sup>5</sup> Obese women even with normal glucose tolerance and nondiabetic have two fold higher risk of having macrosomic babies. Maternal weight, gestational age, number of prior deliveries along with macrosomia are considered to be the risk of obstetrical events such as shoulder dystocia and injury of brachial plexus.<sup>6</sup>

## Long Term Complications

Complications of maternal obesity carries its legacy beyond intrauterine and neonatal life. This can be reflective in childhood and adulthood leading to serious long term complications.

Maternal obesity is a risk for childhood obesity irrespective of birth weight and future risk of developing metabolic syndrome and as a consequence cardiovascular diseases in adulthood.

With genetic factors, environment also plays an important role in the pathophysiology of obese mothers giving birth to obese babies. Moreover, the increase in caloric intake during pregnancy has a quantitative effect on the foetus, promoting the number and size of adipocytes.

Obesity before and during pregnancy leads to a vicious cycle of obese children in subsequent generations. Obesity begets obesity hence obese mothers give birth to obese daughters, who have an increased tendency of suffering from obesity and diabetes during their own pregnancies.

We are facing obesity as one of the biggest public health problems, it is important to envisage obese pregnancy as one of the causes for the rise of this condition.

## Management Before Pregnancy

Obtaining or aiming for an ideal weight and BMI is of paramount importance both for conceiving and to the outcome of the pregnancy.

Not all pregnancies are planned and even if they are

planned weight may not be on the priority list of women. Not many women would consult any specialist to treat this important metabolic disease and to get advice on how to loose weight or at least not to gain excessive weight during pregnancy. Nevertheless it is now a well established fact that weight loss attempts before pregnancy results in better outcomes of conception and increases the favourable outcomes both in women with or without PCOS.

The cornerstone of achieving this goal is information dissemination. This needs to be done as a public health approach at schools, colleges and later in the clinics. The importance of weight loss and risks involved with obesity need to be emphasized. Management includes lifestyle management with adequate physical exercise and improved and balanced diet options. Physical exercise especially aerobic exercises can achieve weight loss combined with balanced diet and would be ideal prior to pregnancy. Diet with low glycaemic load and adequate amount of nutrients including proteins reduces hyperinsulinaemia.

As with any other obesity treatment algorithm bariatric surgery provides more permanent solutions but need to be looked into in terms of pre and post op care.

## During Pregnancy

It is known that obesity or excessive weight gain during pregnancy increases the risks of adverse outcomes both to mother and foetus. Moreover women who gain excessive weight during their obese pregnancy have a three fold higher risk to become overweight during the subsequent pregnancies.<sup>11</sup> The standard of treatment to have a balanced diet and physical exercise during pregnancy remains unchanged. Unless no medical or obstetric contraindications, exercise of medium intensity has marked physical and psychological beneficial effects. Thus pregnant women need to be informed about benefits of light exercises on a daily basis including walking, aerobics for 30 or more minutes. Risks associated with strenuous exercises like falls or abdominal injuries need to be avoided.

Light exercise would benefit insulin sensitivity and hence chances of pre-eclampsia, glucose intolerance and gestational diabetes are all reduced. Dietary inputs need to be maintained as in preconception with consumption of food with nutritional value and avoidance of high glycaemic and fat content foods. Women are generally highly motivated when pregnant and this needs to be capitalized in a positive way.

## After Pregnancy

Postpartum period is another suitable period for the

mother to adopt or continue to maintain healthy lifestyle habits.

Again once invested in knowledge transfer about the ideal weight and the fact that maintaining weight to an optimum level will reduce the chances of complications related to obesity especially diabetes in the future is a positive perspective for the women.

During this time where chances of psychological alterations of puerperal period and previous any failed attempts to loose weight are often discouraging for women to make any serious effort.

At this juncture family support and dietician's advice will be crucial to combine healthy life style with adequate physical activity.

### Conclusion

The obese pregnancy poses a serious public health risk for both mother and foetus. A balanced diet and adequate exercise will not only reduce the complications related to obese pregnancy but will also reduce morbidity and mortality related to mother and foetus. A pragmatic approach is required to address this issue in order to break the chain of obesity from generation to generation.

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