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Research Article

Maternal obesity and its outcome in the fetus

D. Sai Vittal[1]*, Vemuri Usha Rani[2]

[1]Department of Medicine, Mallareddy institute of Medical Sciences, Hyderabad, India
[2]Department of Obstetrics and Gynecology, Government Maternity Hospital, Osmania Medical Coolege, Hyderabad, India

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***Correspondence:**
Dr. D. Sai Vittal,
E-mail: vitals@rediffmail.com

ABSTRACT

Background: Maternal obesity increases the risk of gestational diabetes, preeclampsia and caesarian sections. We conducted this study to find out the outcome of maternal obesity on pregnancy and neonates.
Methods: 1398 pregnant ladies who came into the Gynaecology department between the age of 18-40 were included into the study. Demographic details including age, height and weight were noted. BMI was calculated bases on the weight and height of the patients. Routine blood tests were performed. If random blod sugar was elevated, OGTT was done to identify gestational diabetes.
Results: The prevalence of overweight/ obese patients was 27.7%, of which, 72.1% were overweight, 23.1% were obese and 30 7.5% were severely obese. Most of the patients with overweight/obese over the age of 30 years. The most common complication among these women was hypertension, followed by post partum haemorrhage. Gestational diabetes was observed among 19.1% of the cases. 62.3% of them underwent caesarian sections and preeclampsia was seen in 35.9% patients. Macrosomia and higher birth weight was seen in most of the neonates.
Conclusions: Hypertension, preeclampsia and gestational diabetes are the common outcomes in the mothers leading largely to caesarian sections and higher birth weight and macrosomia is seen in neonates.

Keywords: Maternal obesity, Outcome, Overweight, Fetus

INTRODUCTION

There is a worldwide prevalence of obesity which has considerably increased over the past few years. This could be due to the increase of high - calorific food with decreased physical activity. As a result there is evidence of metabolic dysfunction among these obese individuals, due to the food and other environmental factors including contamination from industries.[1]

In 2005, 400 million obese adults were reported which is estimated to increase to 1 billion by 2030.[2] In a survey conducted in USA in 2003-2006, 32% of the women ages between 20-44 years were obese.[3] The rise in obesity during pregnancy is synonymous with the rising trend of obesity in the general population. In addition, there are reports of women gaining excessive weight during pregnancy, further leading to complications.[4,5] There are similar reports all around the world including Middle East,[6] Saudi Arabia.[7] In Denmark, 39.4% of women were found to be obese.[8]

Obesity is a risk factor for many illnesses like diabetes mellitus, hypertension, coronary heart disease and stroke.[9] Moreover, maternal obesity also increases the risk of gestational diabetes, preeclampsia and caesarian sections.[10] The excessive weight gain during the pregnancy and retention of this weight postpartum also increases the chances of the above diseases.[11]

Obesity is also associated with irregular menstrual cyles which make the detection of expected delivery date unsure and inaccurate in many cases. The ultrasound whether vaginal or abdominal is comparatively difficult, resulting in detection of structural and fetal abnormalities to be difficult. Invasive prenatal tests such as chorionic villus sampling and amniocentesis are very challenging and the chances of miscarriages is raised three fold.[12]

Gestational diabetes, which is normally identified during early pregnancy, is estimated to affect more than 7% of the women annually in US i.e more than 200,000 women per year.[13] This risk is higher in women who are obese. This not only adversely effects the pregnancy and the outcome of the fetus but also increases the risk of type 2 diabetes mellitus in future in mother and child.[14-17]

Among the children, it has been widely reported that maternal obesity has short and long term consequences of the child with chances of high birth weight, large for age neonates, macrosomia and further obesity in children due to metabolic dysfunction.[18-23] As a result there is a rise in the incidences of childhood obesity which has become a matter of clinical and public health concern.[24]

As management of obesity especially during pregnancy is a primary concern, we performed this study to identify the prevalence of obese mothers in our area, their association with gestational diabetes and observe its outcome in the fetus.

METHODS

1398 pregnant ladies between the age of 18-40 were included into the study. Demographic details of the patients like age, height, weight, Body mass index were taken, Detailed medical history including parity, previous history, familial history of diabetes, obstetric history were also taken. All the patients were subjected to regular investigations which included complete physical examination and blood tests for blood sugar levels, complete blood picture and routine urine examination. All women who had abnormal sugar levels were further asked to take up oral glucose tolerance test.

The glucose tolerance test was done after overnight fasting wherein 75g of pure glucose was mixed with 100ml of water for the patient to drink. 2 ml of blood was collected immediately and some more samples after 1, 2 and 3 hours. Plasma glucose levels were interpreted using NDDG criteria.

- Fasting blood glucose level ≥105 mg/dl
- 1 hour blood glucose level ≥190 mg/dl
- 2 hour blood glucose level ≥165 mg/dl
- 3 hour blood glucose level ≥145 mg/dl

Patients whose plasma glucose level met or exceeded any two values for glucose after the 75-g OGTT is considered positive for GDM.

RESULTS

The mean age of all the patients was 31.4 ± 4.3 years and height was about 161.2 ± 7.1. The mean BMI of them was 23.1 ± 3.9 (Table 1). Most of the women were multiparous.

Table1: Demographic details of the patients.

Details	Value ± SD
Age in yrs	31.4 ± 4.3
Height in cms	161.2 ± 7.1
Weight in kg	59.1 ± 21.3
BMI	24.1 ± 3.9
Max weight gained during pregnancy	11.7 ± 9.2
Parity among obese patients	
Primi	38
Multiparous	349

Of the 1398 patients in the study, the prevalence of overweight/ obese patients was 387 (27.7%) (Figure 1). Of them, 273 (72.1%) were overweight, 92 (23.1%) were obese and 30 (7.5%) were severely obese (Table 2).

Most of the patients with overweight/obese over the age of 30 years, though most of the pregnant women were between 24 to 30 years of age (Figure 1).

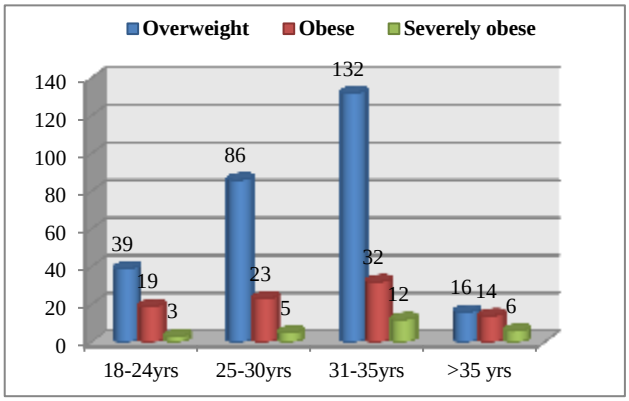

Figure 1: Age wise distribution of the obese patients.

Table 2: BMI of the patients.

BMI (range)	Number of patients (n=1398)	Percentage
Underweight (BMI <18.5)	185	13.2%
Normal (18.5-24)	816	58.4%
Overweight (25-29)	273	19.5%
Obese (30-34)	88	6.3%
Severely obese ≥ 35	26	1.9%

The most common complication among the obese women was hypertension among women with obesity, followed by post partum haemorrhage. Gestational diabetes was observed among 19.1% of the obese women (Figure 2).

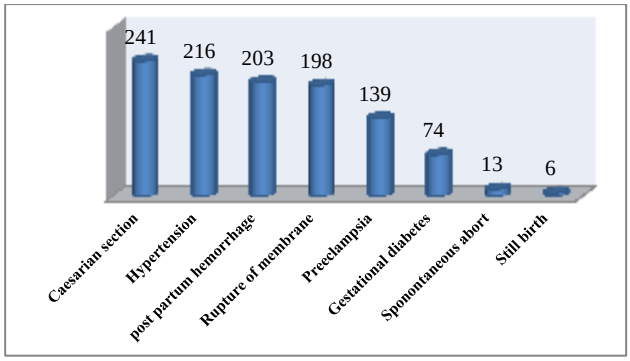

Figure 2: Complications observed in obese women.

Among the neonates, the birth weight was >4 kg in 43 (10.3%) of the cases, while they were between 3.5-4 kg in 198 cases (49.7%) of the cases (Figure 3).

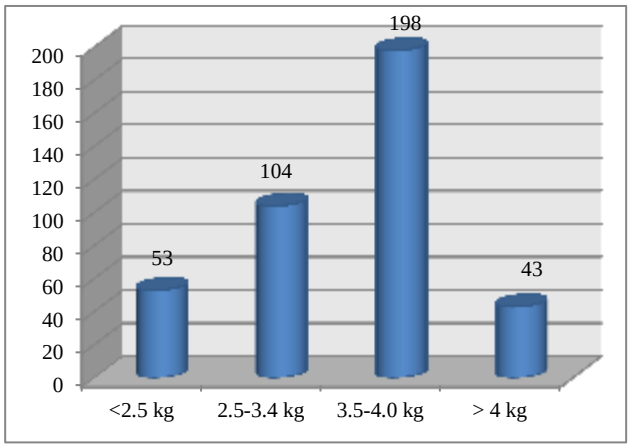

Figure 3: Birth weight of neonates.

DISCUSSION

The prevalence of obesity was found to be 27.7% among the pregnant women in our study, which was similar to a study by Ali et al in Pakistan,[25] where a prevalence of 29% was reported while in another study in Karachi, 47% females above the age of 30 years were found to be obese.[26] The increased BMI was more common among mothers older than 30 years of age, which lead to complications in both mothers and children. This was observed in other studies also.[27-30]

The increased BMI was also chiefly observed in multiparous mothers, which could imply that the mothers tend to gain weight between pregnancies.

Preeclampsia affects the placenta and mother's kidney, liver and brain. It is also the cause of many leading neonate complications such as low birth weight, premature or still birth. Maternal obesity, on the other hand, is said to be associated with increased birth weight and studies have shown that for every rise of 5-7kg/m2, there is a corresponding 2-fold increase in the risk of developing preeclampsia.[31] In our study, 139(35.9%) of the women had preeclampsia as a complication.

Gestational diabetes was observed in 74 (19.1%) of the obese individuals, but this was far less than hypertension which was the main complication in the, mothers accounting for 216 (55.8%). It has been observed that hypertension is more common, about 2.2 - 21.4 times, in even moderately obese mothers as compared to the normal mothers, leading to the higher risk of preeclampsia 1.22 – 9.7 times more.[32-34]

The rate of successful vaginal delivery decreases progressively as maternal BMI increases. Most of the obese women (62.3%) had undergone caesarian section, whether elective of otherwise. This was said to be due to reduced rate of cervical dilatation and increased deposition of soft tissues in the pelvic area of the mother leading to obstruction of labor.[35] This rate was higher than in another study where 22% of rate was observed in Denmark. Induction of labor also was found to be more prominent in the obese group than in others.[27]

Studies have shown that maternal obesity is a risk factor for spontaneous abortions and unexplained fetal still birth. The risk of still birth is twice more in obese women rather than in normal women.[36] Our study revealed that there were 6(1.6%) still births and 13(3.4%) spontaneous abortions.[25,28,37]

Macrosomic and higher birth weight were found in 241 neonates of which 43 of them were above 4 kg at the time of birth. This is in accordance to other studies. In a study, Macrosomia was found to be 13.3% and 14.6% for obese and morbidly obese women compared to the normal weight mothers.[26] Fetal macrosomia in obese women was also found to be associated not only with an increase in the absolute size of the fetus but also in the increase in the body composition of the mother, which is probably due to the weight gain during pregnancy.[38,39]

CONCLUSIONS

Our study has shown a significant portion of the expectant mothers to be obese, which only reiterates what is said in similar studies. This leads to many risks factors to the mother, fetus as well as the neonate. The gain of weight during pregnancy also leads to the longterm obesity in mothers as well as the offspring apart from the risk like gestational diabetes, peeclampsia and hypertension to the mothers and macrosomia and high birth weight of the neonate. Therefore, the weight management becomes of vital importance for prepregnancy care so that this increasein kept in check.

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Ethical approval: The study was approved by the institutional ethics committee

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