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Original Research Article

A comparative study of the effect of body mass index on pregnancy outcomes in normal and overweight women

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ABSTRACT

Background: Maternal obesity has been reported as a risk factor for various antepartum, intrapartum, postpartum and neonatal complications. Increasing rates of overweight among pregnant women are a significant public health concern with various implications for prenatal care and supervision of delivery. Therefore, the present study is to determine the adverse materno-fetal outcome in primigravid overweight and obese women delivering singleton babies.

Methods: A prospective comparative study was conducted for a year at IMCH, Medical College, Calicut. Primigravid women with a singleton uncomplicated pregnancy with cephalic presentation at ≥ 37 weeks of gestation with accurate information regarding height and weight recorded at the booking visit were included in the study. Comparisons were made between 100 women with BMI >25 and 200 women with BMI 18.5-24.9. Statistical analysis was done using SPSS version 16.0. Data was analysed by Pearson Chi square test and Fisher's exact test.

Results: Overweight mothers are at increased risk quoted as relative risk (RR) and 95% confidence intervals (CI) of adverse materno-fetal outcomes. Gestational hypertension RR 2.39 (CI 1.65-3.47), Gestational diabetes RR 2.67 (CI 0.95-7.48), induction of labour RR 2.35 (CI 1.4-3.95), Cesarean section RR 5.73 (CI 3.76-8.73), macrosomia RR 14 (CI 1.75-112.23), NICU admissions RR 4.51 (CI 2.61-7.84), perineal lacerations RR 4.72 (CI 1.15-20.4), wound infection RR 2.97 (CI 1.06-8.41), and prolonged hospital stay.

Conclusions: It is clearly evident from the study that maternal overweight and obesity is associated with adverse materno-fetal outcome.

Keywords: Overweight, Obesity, Pregnancy

INTRODUCTION

In numerical terms, we are now in the midst of the greatest epidemic ever experienced by humans. Rates of overweight and obesity, together with a host of their related disorders, are increasing rapidly throughout much of the world. The latest reports of the World Health Organization (WHO) indicate that in 2005, approximately 1.6 billion adults were overweight and at least 400 million adults were obese - a major contributor to global burden of chronic disease and disability.¹ Overweight and obesity has also reached epidemic proportions in India in 21st century, affecting 5% of country's population. In India,

26% of pregnant women are overweight and 8% are obese. In India, the percentage of women who are overweight or obese is highest in Punjab (30%), followed by Kerala (28%) and Delhi (26%) National Family Health Survey, NFHS-3 2005-2006.²

Maternal overweight has been reported as a risk factor for various antepartum, intrapartum, postpartum and neonatal complications such as gestational diabetes mellitus, gestational hypertension, antepartum haemorrhage, induction of labour, and prolonged duration of labour, Cesarean section rates, postpartum haemorrhage, shoulder dystocia, macrosomia and neonatal

admissions.³⁻⁵ Increasing rates of overweight among pregnant women are a significant public health concern with various implications for prenatal care and supervision of delivery. Therefore, the present study is to determine the adverse materno-fetal outcome in primigravid overweight and obese women delivering singleton babies.

The aim of the study was:

- To compare the incidence of complications in the antepartum, intrapartum and postpartum period in patients with overweight and obesity with that of patients with normal body mass index.
- To compare the perinatal outcome in patients with overweight and obesity with that of patients with normal body mass index.

METHODS

We conducted a prospective comparative study for one year at Department of Obstetrics and Gynaecology, Institute of Maternal and Child Health, Government Medical College, Calicut after ethical committee approval. All primigravidas with singleton pregnancy admitted at ≥ 37 weeks of gestation with accurate weight and height recorded at 1st booking visit were included and were categorized into two groups. Study group: 100 primigravidas with BMI ≥ 25 . Control group: 200 uncomplicated primigravidas with BMI between 18.5 - 24.99. Excluded were all multigravidas, primigravidas with multiple pregnancies and malpresentations, primigravidas with history of medical illness and who were underweight and who do not have accurate weight and height recordings in the 1st trimester. A detailed written informed consent obtained from the participants before they were included in the study. During the study period, total number of deliveries were 12,580. Of these, total number of primigravidas were 6416. With exclusion criteria taken into consideration, the number reduced to 3099. Of these, 100 primigravidas with BMI ≥ 25 and 200 primigravidas with BMI between 18.5 - 24.99 were selected by systematic random sampling method. A detailed history including the demographic characteristics of the patients were taken and systemic examination done. Outcomes assessed included gestational hypertension, gestational diabetes, induction of labour, prolonged labour, Cesarean section rates, postpartum hemorrhage, wound infection, macrosomia and neonatal admissions in both the groups and results analysed.

Statistical analysis

Statistical analysis done using SPSS version 16.0. Data was analysed by Pearson Chi Square test and Fisher's exact t test. A p value < 0.05 was significant. Relative risk (RR) and Confidence Interval (CI) were used to quantify the risk.

RESULTS

Of the 100 patients in the study group, 85% were overweight and 15% were obese. All obese patients belonged to class I obese group (BMI 30-34.9).

Demographic variables

Age

Although majority of mothers in both study and control groups were between 21 -30 years of age, 9% of mothers in study group and only 0.5% of mothers in the control group were between 31-35 years of age and this difference was statistically significant with p value = 0.00001.

Occupation

85% of mothers in the study group and only 73% of mothers in control group had sedentary occupation and this difference was statistically significant with p value = 0.016.

Residence

80% of mothers in the study group and only 59% of mothers in the control group were residing in urban area and this difference was statistically significant with a p value = 0.00001.

Weight gain during pregnancy

Weight gain

≥ 13 kg during pregnancy was seen in 52% of the study group when compared to only 11% of the control group and this difference was statistically significant with a p value = 0.00001.

Infertility

29% of women in the study group and only 4.5% of women in control group were treated for infertility and the difference was statistically significant with a p value = 0.003, the main cause for infertility being polycystic ovarian disease.

Fetomaternal outcome

Antenatal complications

Hypertensive disorders and diabetes mellitus were the two most common antenatal complications encountered in the study group (Table 1 and 2).

Type of labour

60% of mothers in the study group had their labour induced when compared to only 39% in the control group

and this difference was statistically significant with a relative risk of 2.35 and 95% confidence interval 1.4-3.95 and p value = 0.0006.

Mode of delivery

63% of mothers in the study had Cesarean section when compared to only 11% in the control group with a RR-5.73, 95% CI 3.76-8.73 and a p value = 0.00006.

Mean first stage duration: Mean first stage duration is prolonged significantly in the study group (7.4 hours) when compared to the control group (5.8 hours).

Indications for cesarean section

The three most common statistically significant indications for Cesarean Section were failed induction, failure to progress and prolonged period of infertility in the study group (Table 3).

Macrosomia and NICU admission

Macrosomia and NICU admissions were also found to be statistically significant in the study group (Table 4).

Table 1: Antenatal complications - hypertensive disorders.

Antenatal complication	Study incidence	Control incidence	Relative risk [RR]	95% Confidence Interval [CI]	p Value
Gestational hypertension	43%	12%	2.39	1.65-3.47	0.00001
Pre eclampsia	15%	0.5%	30	4.02-223.9	0.0001

Table 2: Antenatal complications – diabetes mellitus.

Antenatal complication	Study Incidence	Control Incidence	Relative Risk [RR]	95% Confidence Interval [CI]	p Value
Impaired glucose tolerance	8%	2%	4	1.23-12.97	0.0168
Gestational diabetes	8%	3%	2.67	0.95-7.48	0.05
Pre-Gestational diabetes	4%	0%	-	-	0.0004

Table 3: Indications for cesarean section.

Indication for Cesarean section	Study Incidence	Control Incidence	Relative Risk [RR]	95% Confidence Interval [CI]	p Value
Failed Induction	21%	4.5%	4.67	2.22-9.81	0.00001
Failure to progress	21%	4%	5.25	2.41-11.43	0.00001
Prolonged period of Infertility	12%	0.5%	24	3.17-181.98	0.00001

Table 4: Macrosomia and NICU admission.

Parameter	Study Incidence	Control Incidence	Relative Risk [RR]	95% Confidence Interval [CI]	p Value
Birth weight > 4kg	7%	0.5%	14	1.75-112.23	0.0023
NICU admission	56%	22%	4.51	2.61-7.84	0.0001

Table 5: Postpartum complications.

Postpartum complications	Study Incidence	Control Incidence	Relative Risk [RR]	95% Confidence Interval [CI]	p Value
Wound infection	10%	4%	2.97	1.06-8.41	0.019
Perineal laceration	6%	1%	4.72	1.15-20.4	0.018
Postpartum hemorrhage	4%	0%	-	-	0.012

Postpartum complications

The three statistically significant postpartum complications in the study group were wound infection, perineal lacerations and postpartum hemorrhage (Table 5).

Prolonged hospital stay

Incidence of prolonged hospital stay was 35% in the study group when compared to only 19% in the control group with a statistically significant p value = 0.001.

DISCUSSION

The average BMI is increasing among all age categories and women are entering pregnancy at higher weights. Human pregnancy is an insulin-resistant condition by itself, potentially compounded by increased pre-gravid insulin resistance in obese women. There is a 40% to 50% increase in insulin resistance during pregnancy (from pre-gravid condition).⁶ It is now universally acknowledged that maternal overweight and obesity are linked with adverse pregnancy outcome. Maternal complications include hypertension, diabetes, respiratory complications (asthma and sleep apnea), thromboembolic disease, more frequent cesarean delivery with increased postpartum hemorrhage and wound infection.

Newborn complications include congenital malformations, large-for gestational-age (LGA) infants, stillbirths, shoulder dystocia, and long-term adolescent complications (obesity and diabetes). A discussion of these complications should be the balance between the benefit/risk ratio of fetal and maternal perspectives.

In a population based cohort study conducted by Beaten et al, to assess the pregnancy complications and outcomes in overweight and obese women, weight gain during pregnancy was above normal in 41.8% of the control group and 63.4% of the study group.⁷

In a retrospective case control study conducted by Sara Sukalich et al gestational hypertension and preeclampsia were statistically higher (p value <0.05) in the study group with an odds ratio of 1.8, 95% CI (1.4-2.3) for gestational hypertension and with an odds ratio of 1.7, 95% CI (1.2-2.4) for preeclampsia.⁸

In a study conducted to assess the prevalence of overweight and obesity in an Australian obstetric population, conducted by Callaway et al. and retrospective cohort study conducted by Sebire et al gestational diabetes was significantly higher in their study population with a p value <0.05, with an odds ratio 1.78, 95% CI (1.25-2.52) and odds ratio 1.68, 95% CI (1.53-1.84) respectively in each of the studies.^{5,9}

In a study conducted by Sebire et al and Nova Scotia et al induction of labour was significantly higher in the study group with a pvalue <0.05 with an odds ratio 2.14, 95% CI (1.86-2.04) and odds ratio 1.94, 95% CI (1.86-2.04) respectively in each of the studies.⁵ In a study conducted by Usha Kiran et al, mean duration of labour was 8.09 hours in the study group with BMI >30 and 7.7 hours in the control group with BMI-20-30.¹⁰

The Cesarean section rates were significantly higher in obese mothers in the studies conducted by Usha kiran et al. and Owens LA et al with an odds ratio 1.6 and 1.57 respectively and 95%CI 1.4-2 and 1.24-1.98 respectively. In a study conducted by Usha kiran et al, macrosomia and NICU admissions were statistically significant with an odds ratio 2.1, 95% CI 1.6-2.6 for macrosomia and odds ratio 1.5, 95% CI 1.09-2.3 for NICU admission respectively.¹⁰ Post partum complications like postpartum hemorrhage was significantly higher in the obese mothers in the study conducted by Usha kiran et al and wound infection in the study conducted by Yu et al with an odds ratio of 1.5 and 95% CI 1.2-1.8 for postpartum hemorrhage and odds ratio 1.27, 95% CI 1.09-1.48 for wound infection respectively. Prolonged hospital stay was also significantly high in a study conducted by Perlow JH et al with a p value of 0.0003.

CONCLUSION

The developing world is being seized by the epidemic, obesity. The dramatic increase in the prevalence of obesity in pregnancy is of significant public health concern. Obesity in pregnancy is associated with increased rate of antepartum, intrapartum, postpartum complications in the mother and adverse outcome in the neonate as well.

The potential of in utero therapy and prevention of fetal macrosomia, possibly through lifestyle measures before and during gestation, and achieving a desired level of glycemic control in pregnancies complicated with diabetes, should become a research focus of considerable interest relative to the short- and long-term prevention of obesity and progression into overt diabetes and metabolic syndrome.

The implications of maternal obesity far surpass intrauterine life, extending into infancy, childhood and even adulthood with severe health repercussions. Prevention rather than treatment may offer the best hope of breaking the vicious cycle of obesity during pregnancy - "THE BATTLE OF THE BULGE".

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REFERENCES

1. World Health Organization. Obesity: preventing and managing the global epidemic. Geneva (Switzerland): World Health Organization; WHO technical report series; 2000:894.
2. Third National Family Health Survey. Mumbai: International Institute for Population Sciences. 2006. Available from: http://nfhsindia.org/nfhs3_national_report.html
3. Bhattacharya S, Campbell DM, Liston WA. Effect of body mass index on pregnancy outcomes in

- nulliparous women delivering singleton babies. *BMC Public Health.* 2007;24(7):168.
4. Anna-Maria Siega-Riz, Barbaria, Laraia. The implications of maternal overweight and obesity on the course of pregnancy and birth outcomes. *Matern Child Health J.* 2006;10:S153-156.
 5. Sebire NJ, Jolly M, Harris JP. Maternal obesity and pregnancy outcome: a study of 287, 213 pregnancies in London. *Int J Obes.* 2001;25:1175-82.
 6. Catalano P. Editorial. Obesity and pregnancy-the propagation of a vicious cycle? *J Clin Endocrinol Metab.* 2003;88(8):3505-6.
 7. Baeten JM, Bukusi EA, Lambe M. Pregnancy complications and outcomes among overweight and obese nulliparous women. *Am J Public Health.* 2001;91:436-40.
 8. Sara Sukalich, Mingione MJ, Glantz JC. obstetric outcomes in overweight and obese adolescents *AJOG.* 2006;195:851-5.
 9. Callaway LK, Prins JB, Chang AM, McIntyre HD. The prevalence and impact of overweight and obesity in an Australian obstetric population. *Med J Aust.* 2006;184:56-59.
 10. Outcome of pregnancy in a woman with an increased body mass index. Usha Kiran TS; Hemmadi S; Bethel J; Evans J *BJOG.* 2005 Jun;112(6):768-72.

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