

## Prospective Comparative Evaluation of Feto-Maternal Outcome in Overweight/Obese and Normal Weight Pregnancy

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Conflict of interest: Nil

### Abstract

**Aim:** Comparative study of feto maternal out come in overweight/obese and normal weight pregnancy.

**Methods:** This prospective comparative study was carried out in the Department of Obstetrics and Gynecology, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India for 13 months. All primigravidas with singleton pregnancy admitted at  $\geq 37$  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  $\geq 25$ . Control group: 100 uncomplicated primigravidas with BMI between 18.5 - 24.99.

**Results:** 28% of women in the study group and only 5% of women in control group were treated for infertility and the difference was statistically significant with a p value = 0.004, the main cause for infertility being polycystic ovarian disease. Hypertensive disorders and diabetes mellitus were the two most common antenatal complications encountered in the study group. 59% of mothers in the study group had their labour induced when compared to only 38% in the control group and this difference was statistically significant with a relative risk of 2.45 and 95% confidence interval 1.5-3.96 and p value = 0.0007. 62% of mothers in the study had Cesarean section when compared to only 10% in the control group with a RR- 5.83, 95% CI 3.86-8.83 and a p value = 0.00007. Mean first stage duration: Mean first stage duration is prolonged significantly in the study group (7.5 hours) when compared to the control group (5.9 hours). 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. Macrosomia and NICU admissions were also found to be statistically significant in the study group. Incidence of prolonged hospital stay was 34% in the study group when compared to only 18% in the control group with a statistically significant p value = 0.001.

**Conclusion:** 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.

**Keywords:** Overweight, Obesity, Pregnancy

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## Introduction:

With the rapid rate of socio-economic development and socio-cultural changes, changes in dietary pattern and changes in lifestyle, increasing BMI has become a healthcare burden to the nation. This increasing rate of BMI has affected all age groups universally. It causes major medical ailments like hypertension, Diabetes, cardiovascular, neurovascular diseases, arthritis and causes a lot of morbidity and mortality.[1] The World Health Organization and the National Institutes of Health define body mass index (BMI) less than 18.5 as underweight, 18.5-22.9 as normal weight, 23-24.9 as overweight and  $\geq 25$  BMI as obesity.[2] About 13 % of the world's adult populations are obese. According to National Family Health Survey, the percentage of married women (15-49 years) who are overweight or obese increased from 11 % (NFHS 2) to 15% (NFHS 3).[3] Maternal obesity has been reported as a risk factor for various antenatal, intrapartum, postpartum and neonatal complications such as postdates, induction of labour, macrosomia, shoulder dystocia, prolonged duration of labour, increased blood loss, caesarean section rates and neonatal admissions.[4] Many factors associated with perinatal morbidity and mortality are not amenable to intervention. Recent epidemiologic findings indicate that weight control may offer the potential for affecting gestational outcomes. A focus on the methods to prevent this trend of increasing weight gain in adolescence is essential curb the complications due to obesity.

## Material and methods

This prospective comparative study was carried out in the Department of Obstetrics and Gynecology, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India for 13 months

## Methodology

All primigravidas with singleton pregnancy admitted at  $\geq 37$  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  $\geq 25$ . Control group: 100 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. 100 primigravidas with BMI  $\geq 25$  and 100 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 25.0. 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, 84% were overweight and 16% were obese. All obese patients belonged to class I obese group (BMI 30-34.9). Although majority of mothers in both study and control groups

were between 20-30 years of age, 10% of mothers in study group and only 0.5% of mothers in the control group were between 30-35 years of age and this difference was statistically significant with p value = 0.00001. 84% of mothers in the study group and only 72% of mothers in control group had sedentary occupation and this difference was statistically significant with p value = 0.015. 79% of mothers in the study group and only 58% of mothers in the control group were residing in urban area and this difference was statistically significant with a p value = 0.00001.  $\geq 13$ kg during pregnancy was seen in 51% of the study group when compared to only 10% of the control group and this difference was statistically significant with a p value = 0.00001. 28% of women in the study group and only 5% of women in control group were treated for infertility and the difference was statistically significant with a p value = 0.004, the main cause for infertility being polycystic ovarian disease. Hypertensive disorders and diabetes

mellitus were the two most common antenatal complications encountered in the study group (Table 1 and 2). 59% of mothers in the study group had their labour induced when compared to only 38% in the control group and this difference was statistically significant with a relative risk of 2.45 and 95% confidence interval 1.5-3.96 and p value = 0.0007. 62% of mothers in the study had Cesarean section when compared to only 10% in the control group with a RR-5.83, 95% CI 3.86-8.83 and a p value = 0.00007. Mean first stage duration: Mean first stage duration is prolonged significantly in the study group (7.5 hours) when compared to the control group (5.9 hours). 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 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	42%	11%	2.49	1.75-3.57	0.00001
Pre eclampsia	14%	1%	30.1	4.12-224.9	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	7%	1%	5	1.33-12.87	0.017
Gestational diabetes	7%	2%	2.77	0.96-7.58	0.05
Pre-Gestational diabetes	3%	0%	-	-	0.0003

**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	20%	5%	4.67	2.32-9.91	0.00001
Failure to progress	20%	5%	5.25	2.51-11.53	0.00001
Prolonged period of Infertility	11%	1%	24	3.27-181.88	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	6%	1%	15	1.85-112.33	0.0021
NICU admission	55%	21%	4.61	2.71-7.94	0.0001

**Table 5: Postpartum complications**

Postpartum complications	Study Incidence	Control Incidence	Relative Risk [RR]	95% Confidence Interval [CI]	p Value
Wound infection	9%	3%	2.87	1.16-8.51	0.018
Perineal laceration	5%	1%	4.82	1.25-20.5	0.017
Postpartum hemorrhage	3%	0%	-	-	0.011

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

Incidence of prolonged hospital stay was 34% in the study group when compared to only 18% in the control group with a statistically significant p value = 0.001.

### Discussion

Obesity is a growing epidemic and its effect on the outcome of pregnancy and delivery in the healthy population has not hitherto been extensively studied. This study aims to report the effect of maternal obesity on pregnancy complications with minimal confounding bias.[5]

This study adds to the increasing body of evidence which suggests that obesity, measured by BMI, predisposes women to

complicated pregnancies and increased obstetric interventions. All pregnancies in obese women be acknowledged as high risk and managed according to strict guidelines.[6] Management should include pre-pregnancy counselling to reduce weight; shared antenatal care and appropriate management of complications. The evidence for obesity as an important complication in pregnancy is mounting; it is time to inform practice based on this evidence.[7]

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).[8] 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.[9]

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.[10]

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.[11,12 ].

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.<sup>5</sup> 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.[13]

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.[13] 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 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 glycemc 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.

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