

Original research article

A prospective observational research to investigate the effect of increasing maternal BMI on foetal outcome

Dr. Vidya Paul¹, Dr. Seema²

¹Senior Resident, Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

²Associate Professor, Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

Corresponding Author: Dr.Seema

Abstract

Aim: to study the effect of increased maternal BMI on fetal outcome.

Materials and methods: The present descriptive cross-sectional study entitled was conducted in the Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India. The study includes 120 subjects who have taken antenatal care at the hospital. Descriptive statistics included computation of percentages, means and standard deviations were calculated using SPSS version 20.

Results: mean age was 28.21 years, mean BMI (kg/m²) was 28.49 and mean weight gain (Kgs.) was 8.01. Most common neonatal complication was Low Birth Weight (6.7%) followed by Meconium Aspiration Syndrome (5.8%), Sepsis (5.0%), VLBW (4.2%), Hypoglycemia (1.7%), Respiratory Distress Syndrome (2.5%), Congenital Heart Defect (0.8%) and cleft palate (1.7%) respectively. Neonatal death was observed among 6.7% subjects and still birth was reported among 10%.

Conclusion: The current study found a link between maternal obesity and newborn problems such as low birth weight, meconium aspiration syndrome, and sepsis.

Keywords: BMI, LBW, Outcome, Obesity

Introduction

During the last 20-40 years, the prevalence of obesity has increased at a rate that gives cause for concern. Several chronic diseases, such as hypertension, cardiovascular disease and type-2 diabetesⁱ and also increased mortality are associated with obesity.ⁱⁱ

In India the epidemic of obesity is seen alongside continuing problem of under nutrition, creating a double burden.ⁱⁱⁱ According to NFHS (2005-06) surveys more than 30 million people of India are obese, which is approximately 6% of the obese people worldwide.^{iv} Currently third in the chart next only to US & China; India is racing ahead to top the chart. There is also a steady rise in obesity among children in Asian population with it rising up to 25% in some developing countries.^v

In 2009, the Institute of Medicine (IOM) put forth new guidelines regarding how much weight women should gain during pregnancy.^{vi} The impetus for the update was partly due to the increasing availability of data on the effect of gestational weight gain (GWG) on perinatal outcomes as well as the changing obstetric population over time since its last recommendation in 1990.^{vii}

The studies of feto-maternal adverse outcomes have been primarily based on retrospective studies, reviews, and large birth registries, have used weights rather than BMI, and have been limited in the outcomes evaluated. Hence the present study was undertaken to study the effect of increased BMI on fetal outcome.

Materials and methods

The present descriptive cross-sectional study entitled “to study the effect of increased BMI on fetal outcome” was conducted in the Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India. for 1 year. study includes 120 subjects who have taken antenatal care at the hospital.

Inclusion Criteria

1. Pregnant woman who give informed consent for study
2. Pregnant woman with gestation <12 weeks
3. Pregnant woman with comorbid conditions like thyroid disease, diabetes mellitus, PCOS.

Exclusion Criteria

1. Pregnant woman presenting beyond 12 weeks of gestation.
2. Pregnant woman with previous LSCS.
3. Pregnant woman with multiple gestations.

Methodology

Pregnant woman were followed up in each antenatal visit as well as in ward in case of any complication before or after delivery. Detailed history was taken including complaints during present pregnancy, past history, menstrual history, obstetrical history. Detailed general physical examination and obstetrical examination was done. Neonatal status was followed up in the ward or NICU.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics included computation of percentages, means and standard deviations were calculated. For all tests, confidence interval and p-value were set at 95% and ≤ 0.05 respectively

Results

Table 1: clinical profile of the study population

Variables	Mean	Std. Deviation
Age (Years)	28.21	3.08
BMI (Kg/m ²)	28.49	1.34
Weight Gain (Kgs)	8.01	1.13

Table 1: mean age was 28.21 years, mean BMI (kg/m²) was 28.49 and mean weight gain (Kgs.) was 8.01.

Table 2: distribution neonatal complications

Neonatal complications	N %
Low Birth Weight	8 (6.7%)
Meconium Aspiration Syndrome	7 (5.8%)
Sepsis	6 (5.0%)
VLBW	5 (4.2%)
Hypoglycemia	2 (1.7%)
Respiratory Distress Syndrome	3 (2.5%)
Congenital Heart Defect	1 (0.8%)
Cleft Palate	2 (1.7%)

Table 2: The most common neonatal complication was Low Birth Weight (6.7%) followed by Meconium Aspiration Syndrome (5.8%), Sepsis (5.0%), VLBW (4.2%), Hypoglycemia (1.7%), Respiratory Distress Syndrome (2.5%), Congenital Heart Defect (0.8%) and cleft palate (1.7%) respectively.

Table 3: Fetal outcome

Outcome	N (%)
Survived	101 (84.2%)
Stillbirth	12 (10.0%)
Neonatal Death	8 (6.7%)

Table 3: Neonatal death was observed among 6.7% subjects and still birth was reported among 10.0% respectively.

Discussion

The maternal body mass index (BMI) is one of the most significant indicators of a pregnant woman's nutritional state. Nutritional consumption and maternal weight are both controllable factors that can affect the outcome of a pregnancy.^{viii} Both being underweight and being overweight can have a substantial influence on the pregnancy's outcome. Obesity and overweight have been more common over the world, especially in the last two to three decades. According to the WHO's most recent data, around 1.6 billion persons are overweight, with roughly 400 million being obese. As a result, obesity is a significant contribution to the worldwide burden of chronic illnesses and impairments.^{ix}

The mean age was 28.21 years, mean BMI (kg/m²) was 28.49 and mean weight gain (Kgs.) was 8.01. In their study, Kumar HAS et al.^x found that the age group of 21 to 30 years had the highest number of patients across all BMI levels. According to Shuchi L et al.^{xi}, the BMI>30 group had a mean age of 25.92, whereas the BMI30 group had a mean age of 24.2. This might be owing to these individuals' age-related weight increase.

In the present study, maternal obesity is associated with an increased risk of Low Birth Weight (6.7%) followed by Meconium Aspiration Syndrome (5.8%), Sepsis (5.0%), VLBW (4.2%), Hypoglycemia (1.7%), Respiratory Distress Syndrome (2.5%), Congenital Heart Defect (0.8%) and cleft palate (1.7%) respectively. This depicts that increased neonatal complication with

increased BMI. The cause of the increased risk of abnormalities is unclear. Potential mechanisms may include deficiencies in folic acid, chronic hypoxia, as well as metabolic changes including maternal hyperglycemia, increased insulin resistance, and incremented circulating levels of triglycerides and uric acid as described above. Another possible contributor to this apparent increase in congenital abnormalities may relate to the relative difficulties with antenatal detection. Ultrasound scanning of obese pregnant women may lead to suboptimal visualization of fetal anatomy, lower detection rates of structural abnormalities, and therefore an increased prevalence at birth.^{xii}

In the present study, neonatal deaths reported were 6.7% and still birth was reported among 10%. John J et al.^{xiii} in her investigation found that the incidence of still birth was 10%. A meta-analysis was conducted by Chu et al.^{xiv} the findings suggested that maternal obesity increased the risk of stillbirth, the explanation for the association is uncertain. It may be directly related to obesity, or could be due to associated co-morbidities such as GDM or hypertensive disorders. It can be said that the increased risk of preterm delivery in the obese may be iatrogenic, as increased prevalence of medical conditions in the mother or fetal macrosomia and intrauterine growth restrictions of the baby may warrant early interception by attending physicians. Increased low birth weight, stillbirth, and spontaneous preterm delivery might also be due to dysregulation of pro-inflammatory cytokines as well as increased risk of infection in obese and overweight individuals as they will lead to reduced placental surface area and also their vasculature with consequent uteroplacental insufficiency.^{xv}

Conclusion

The current study found a link between maternal obesity and newborn problems such as Low Birth Weight, Meconium Aspiration Syndrome, and Sepsis. Obesity in the mother is currently one of the most prevalent risk factors in pregnancy, leading to issues that affect the woman's and her child's health.

References

- ⁱ Gregg EW, Cheng YJ, Cadwell BL, Imperatore G, Williams DE, Flegal KM et al. Secular trends in cardiovascular disease risk factors according to body mass index in US adults. *JAMA* 2005; 293:1868-74.
- ⁱⁱ Flegal KM, Graubard BI, Williamson DF, Gail MH. Excess deaths associated with underweight, overweight, and obesity. *JAMA* 2005; 293:1861-67
- ⁱⁱⁱ Vaidya, ADB. (2014). The formidable of underweight, overweight and obese children in India (Editorial). *Journal of Obesity & Metabolic Research*, 1:4-5.
- ^{iv} International Institute for Population Sciences (IIPS) and ORC Macro. National Family Health Survey (NFHS-3), India, Mumbai: IIPS. 2005-06; pp. 01
- ^v Kelishadi, R. Childhood overweight, obesity, and the metabolic syndrome in developing countries. *Epidemiology Reviews*. 2007;29: 62–76.
- ^{vi} Institute of Medicine: National Research Council Committee to Reexamine IOM Pregnancy Weight Guidelines. *Weight gain during pregnancy: reexamining the guidelines*. Washington, DC: National Academies Press, National Academy of Sciences; 2009.
- ^{vii} Institute of Medicine Committee on Nutritional Status During Pregnancy and Lactation. *Nutrition during pregnancy, part I, weight gain: part II, nutrient supplements*. Washington, DC: National Academies Press, National Academy of Sciences; 1990
- ^{viii} *Nutrition During Pregnancy and Lactation. Implementation Guide*. 1992. p. 125. Available from: http://www.nap.edu/openbook.php?record_id=1984.

-
9. ^{ix} WHO. Obesity: Preventing and managing the global epidemic. Report of a WHO consultation. World Health Organ Tech Rep Ser 2000; 894:1-253.
 10. ^x Kumar HSA, Chellamma VK. Effect of Maternal Body Mass Index on Pregnancy Outcome. Int J Sci Stud 2017;4(10):81-84
 11. ^{xi} Lakhanpal S, Aggarwal A, Kaur G. To Assess the Effect of Maternal BMI on Obstetrical Outcome. IntJAdvancRes Tech 2012;1(1):32-70.
 12. ^{xii} Stirrat LI, Reynolds RM. Effects of maternal obesity on early and long-term outcomes for offspring. Research and Reports in Neonatology. 2014;4:43-53.
 13. ^{xiii} John J, Mahendran M. Maternal and fetal outcomes of obese pregnant women: a prospective cohort study. Int J ReprodContraceptObstetGynecol 2017;6:725-9.
 14. ^{xiv} Chu SY, Kim SY, Lau J, Schmid CH, Dietz PM, Callaghan WM, et al. Maternal obesity and risk of stillbirth: a metaanalysis. Am J ObstetGynecol 2007;197:223-8.
 15. ^{xv} Tsai IH, Chen CP, Sun FJ, Wu CH, Yeh SL. Associations of the pre-pregnancy body mass index and gestational weight gain with pregnancy outcomes in Taiwanese women. AsiaPac J ClinNutr 2012;21:82-7.

Received: 10-08-2020 // Revised: 30-08-2020 // Accepted: 15-09-2020