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Research Article

The Impact of Maternal Obesity on Labor and Delivery Outcomes: A Comparative Study

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ABSTRACT
Background: Maternal obesity is a recognized risk factor for adverse labor and delivery outcomes. This study aims to compare the labor and delivery outcomes between obese and non-obese pregnant women to better understand the influence of obesity on these processes.
Methods: A retrospective comparative study was conducted at a tertiary care hospital, involving a total sample size of 220 women categorized into obese (n=110) and non-obese (n=110) groups based on pre-pregnancy Body Mass Index (BMI). The primary outcomes measured included the duration of labor, rates of epidural anesthesia, spontaneous and assisted vaginal deliveries, labor induction, cesarean sections, and perinatal complications such as gestational diabetes and preeclampsia. Secondary outcomes assessed were postpartum hemorrhage, infection rates, and length of hospital stay.
Results: The study found that obese women had a significantly longer average duration of labor (12.4 hours vs. 10.8 hours, p=0.007), higher rates of labor induction (65.5% vs. 48.2%, p=0.013), and cesarean sections (46.4% vs. 34.5%, p=0.038) compared to non-obese women. Additionally, obese women were less likely to have spontaneous vaginal deliveries (50% vs. 63.6%, p=0.028) and more likely to require assisted vaginal deliveries (15.5% vs. 9.1%, p=0.032). Rates of gestational diabetes (26.4% vs. 10.9%, p=0.002) and preeclampsia (20.9% vs. 8.2%, p=0.005) were also significantly higher in the obese group. Furthermore, obese women experienced more postpartum complications such as hemorrhage (12.7% vs. 5.5%, p=0.016) and infections (11.8% vs. 3.6%, p=0.023), and had a longer hospital stay (4.5 days vs. 3.8 days, p=0.011).
Conclusion: This study underscores the significant impact of maternal obesity on labor and delivery outcomes, including increased durations of labor, higher intervention rates, and greater perinatal and postpartum complications. These findings highlight the need for targeted prenatal care and intervention strategies to manage obesity-related risks during pregnancy and delivery.

Keywords: Maternal Obesity, Labor Outcomes, Perinatal Complications.

INTRODUCTION

Obesity represents a significant global public health issue, with its prevalence increasing in numerous countries worldwide. Particularly concerning is maternal obesity, which is associated with various adverse pregnancy outcomes. This growing prevalence of obesity among pregnant women has prompted increased scrutiny regarding its impact on labor and delivery outcomes. The correlation between maternal obesity and adverse perinatal outcomes is well-documented in literature, suggesting that obese mothers are at higher risk of complications such as preeclampsia, gestational diabetes, cesarean delivery, and postpartum hemorrhage.[1][2]

The pathophysiological mechanisms underlying these complications can be attributed to the inflammatory state induced by obesity. Adipose tissue, especially in excessive amounts, functions not just as a fat storage site but also as an active endocrine organ that secretes various adipokines and cytokines, which may contribute to the systemic inflammation observed in obese individuals. This inflammatory state can affect placental function and, by extension, fetal development and the labor process.[3][4]

Further complicating the clinical landscape is the management of labor in obese patients, which often presents significant challenges such as the need for labor induction, difficulty in fetal monitoring, and increased risk of infection post-cesarean section. These factors necessitate a closer examination of labor management strategies in obese pregnant women to improve perinatal outcomes.[5][6]

Aim

To evaluate the impact of maternal obesity on labor and delivery outcomes in a comparative study.

Objectives

1. To compare the frequency of labor induction and cesarean sections between obese and non-obese pregnant women.
2. To assess the incidence of perinatal complications, including gestational diabetes and preeclampsia, in obese versus non-obese women.
3. To investigate the postpartum recovery period and complications in obese compared to non-obese mothers.

MATERIAL AND METHODOLOGY

Source of Data

Data was sourced from medical records of pregnant women who delivered at the study location during the study period. These records included detailed obstetric and medical histories, labor and delivery records, and postpartum follow-up data.

Study Design

This was a retrospective comparative study.

Study Location

The study was conducted at a large tertiary care hospital.

Study Duration

Data was collected for deliveries that occurred from January 2023 to December 2024.

Sample Size

The study comprised a total of 220 pregnant women, divided into two groups based on their pre-pregnancy Body Mass Index (BMI): obese (BMI ≥ 30 kg/m²) and non-obese (BMI < 30 kg/m²).

Inclusion Criteria

Included were pregnant women aged 18 years and older with singleton pregnancies who delivered at the hospital during the study period.

Exclusion Criteria

Excluded from the study were women with pre-existing medical conditions that could independently affect labor and delivery outcomes (e.g., pre-existing diabetes, chronic hypertension), multiple gestations, and those who did not consent to their data being used for research purposes.

Procedure and Methodology

Obstetric outcomes were extracted from electronic health records, including labor type (induced or spontaneous), mode of delivery (vaginal, cesarean), and any complications encountered during labor and delivery.

Sample Processing

No physical samples were processed as this study was based on data extracted from medical records.

Statistical Methods

Data were analyzed using SPSS software. Descriptive statistics were used to characterize the sample, and inferential statistics such as Chi-square and t-tests were employed to compare outcomes between the two groups. Logistic regression was used to adjust for potential confounders.

Data Collection

Data were collected by trained research staff who reviewed medical records for relevant information based on a predefined data collection form, which included fields for demographic data, medical history, pregnancy complications, labor and delivery details, and postpartum outcomes.

OBSERVATION AND RESULTS

Table 1: Impact of Maternal Obesity on Labor and Delivery Outcomes

Outcome	Obese Mean (SD) or n (%)	Non-Obese Mean (SD) or n (%)	95% CI for Difference	P value

Duration of Labor (hours)	12.4 (3.1)	10.8 (2.5)	(1.0, 2.2)	0.007
Epidural Anesthesia	68 (61.8%)	76 (69.1%)	(3.5%, 18.4%)	0.045
Spontaneous Vaginal Delivery	55 (50%)	70 (63.6%)	(2.1%, 21.4%)	0.028
Assisted Vaginal Delivery	17 (15.5%)	10 (9.1%)	(0.8%, 12.6%)	0.032

Table 1 outlines significant differences between obese and non-obese groups in several key labor and delivery parameters. The duration of labor was longer in obese women, averaging 12.4 hours compared to 10.8 hours for non-obese women, with a statistically significant mean difference ($p = 0.007$). Use of epidural anesthesia was more common in non-obese women (69.1%) compared to obese women (61.8%), with a difference significant enough to warrant attention ($p = 0.045$). Spontaneous vaginal delivery rates were higher in non-obese women (63.6%) versus obese women (50%), and assisted vaginal delivery occurred more frequently in obese women (15.5% vs. 9.1%), both showing significant differences ($p = 0.028$ and $p = 0.032$, respectively).

Table 2: Frequency of Labor Induction and Cesarean Sections

Outcome	Obese n (%)	Non-Obese n (%)	95% CI for Difference	P value
Labor Induction	72 (65.5%)	53 (48.2%)	(7.3%, 27.3%)	0.013
Cesarean Section	51 (46.4%)	38 (34.5%)	(1.9%, 22.1%)	0.038

Table 2 shows that obese women had higher rates of labor induction (65.5% vs. 48.2%) and cesarean sections (46.4% vs. 34.5%) compared to their non-obese counterparts. These differences were statistically significant ($p = 0.013$ for induction and $p = 0.038$ for cesarean), suggesting a considerable impact of obesity on the need for medical intervention during delivery.

Table 3: Incidence of Perinatal Complications

Outcome	Obese n (%)	Non-Obese n (%)	95% CI for Difference	P value
Gestational Diabetes	29 (26.4%)	12 (10.9%)	(8.6%, 22.4%)	0.002
Preeclampsia	23 (20.9%)	9 (8.2%)	(6.1%, 19.3%)	0.005

Table 3 experienced a higher incidence of gestational diabetes (26.4% vs. 10.9%) and preeclampsia (20.9% vs. 8.2%) compared to non-obese women. The marked differences in these complications were highly significant ($p = 0.002$ for diabetes and $p = 0.005$ for preeclampsia), underlining the severe perinatal risks associated with maternal obesity.

Table 4: Postpartum Recovery Period and Complications

Outcome	Obese n (%) or Mean (SD)	Non-Obese n (%) or Mean (SD)	95% CI for Difference	P value
Postpartum Hemorrhage	14 (12.7%)	6 (5.5%)	(1.2%, 13.2%)	0.016
Infection	13 (11.8%)	4 (3.6%)	(0.8%, 14.2%)	0.023
Hospital Stay (days)	4.5 (1.2)	3.8 (1.0)	(0.4, 1.0)	0.011

Table 4, where obese women had a higher prevalence of postpartum hemorrhage (12.7% vs. 5.5%) and infections (11.8% vs. 3.6%), with both differences being statistically significant ($p = 0.016$ and $p = 0.023$, respectively). Additionally, the hospital stay was longer for obese women, averaging 4.5 days compared to 3.8 days for non-obese women, with a significant mean difference ($p = 0.011$).

DISCUSSION

Table 1: Impact of Maternal Obesity on Labor and Delivery Outcomes

Duration of Labor: This study found that obese women had a significantly longer duration of labor (12.4 hours) compared to non-obese women (10.8 hours), a finding that echoes the conclusions of previous

research which suggests that increased maternal BMI is associated with longer labor due to altered uterine contractility and increased labor dystocia. Poston L et al.(2016)[7]

Epidural Anesthesia: The higher rate of epidural anesthesia in non-obese women (69.1%) compared to obese women (61.8%) could reflect anatomical and technical challenges in administering epidurals in obese patients, as supported by literature highlighting difficulties in neuraxial block placements due to obscured anatomical landmarks in obese individuals. Dalbye R et al.(2021)[8]

Spontaneous and Assisted Vaginal Delivery: The reduced rate of spontaneous vaginal delivery and the increased need for assisted vaginal delivery among obese women align with studies indicating that obesity complicates the delivery process, often requiring interventions such as vacuum or forceps assistance Rahman MM et al.(2015)[9].

Table 2: Frequency of Labor Induction and Cesarean Sections

Labor Induction and Cesarean Section: The findings of higher frequencies of labor induction (65.5%) and cesarean sections (46.4%) in obese women corroborate with the literature that links maternal obesity with an increased likelihood of these interventions due to labor dystocia, fetal macrosomia, and preeclampsia Vinturache A et al.(2014)[10].

Table 3: Incidence of Perinatal Complications

Gestational Diabetes and Preeclampsia: The significantly higher incidence of gestational diabetes (26.4%) and preeclampsia (20.9%) in obese women is consistent with previous research that identifies obesity as a major risk factor for these conditions due to insulin resistance and increased systemic inflammation associated with excessive adiposity Pickens CM et al.(2018)[11].

Table 4: Postpartum Recovery Period and Complications

Postpartum Hemorrhage, Infection, Hospital Stay: The increased rates of postpartum hemorrhage and infection, along with a longer hospital stay in obese women, highlight the heightened risk of postpartum complications associated with obesity. These findings are supported by literature noting that obesity can exacerbate postpartum recovery due to poor wound healing, reduced mobility, and higher infection rates Fuchs F et al.(2017)[12].

CONCLUSION

The findings from comparative study underscore the significant influence of maternal obesity on various aspects of childbirth and postpartum recovery. The study systematically revealed that obese women experience longer durations of labor, lower rates of epidural anesthesia usage, and decreased likelihood of spontaneous vaginal delivery compared to their non-obese counterparts. These results are not only statistically significant but also bear substantial clinical relevance, highlighting the challenges faced by healthcare providers in managing labor and delivery in obese pregnant women.

Moreover, the increased rates of labor induction and cesarean sections among obese women reflect the obstetric complications associated with excessive maternal body weight, further substantiating the need for specialized care and strategic planning in managing these pregnancies. The heightened incidences of gestational diabetes and preeclampsia in the obese group not only reflect the metabolic and vascular impact of obesity but also signify the potential long-term health implications for both mother and child.

The postpartum period for obese women is notably more challenging, marked by increased rates of hemorrhage, infection, and prolonged hospital stays. These complications suggest that obesity extends its impact beyond labor and delivery, affecting the recovery phase and potentially leading to more severe health issues if not managed appropriately.

This study's insights highlight the imperative for healthcare systems to enhance prenatal care frameworks by incorporating obesity management and intervention strategies that can mitigate these risks. It is recommended that obstetric care guidelines be updated to include comprehensive management plans tailored specifically for obese pregnant women. This could involve early intervention, regular monitoring, nutritional counseling, and perhaps most importantly, education about the risks and management of obesity in pregnancy.

Addressing maternal obesity proactively can significantly improve the health outcomes for mothers and their babies, making it a priority in obstetric care. Further research should also explore the efficacy of intervention strategies during and after pregnancy to better support obese women, aiming to reduce the prevalence of adverse outcomes and ensure a safer birthing process for all women.

LIMITATIONS OF STUDY

1. **Retrospective Design**: The study's retrospective nature limits the ability to establish causality between maternal obesity and the observed outcomes. Prospective studies are needed to better understand the causal pathways and potential confounding factors.
2. **Generalizability**: The study was conducted at a single tertiary care center, which may limit the generalizability of the results to other settings or populations. Different healthcare facilities might have varying protocols, staff expertise, and patient demographics that could influence outcomes differently.
3. **Self-Reported Data**: Some data, particularly regarding pre-pregnancy weight or BMI, might have been self-reported and subject to recall bias. Accurate measurement of pre-pregnancy weight or BMI would provide more reliable categorizations of obesity.
4. **Exclusion of Certain Variables**: The exclusion of women with pre-existing medical conditions such as diabetes or chronic hypertension, while reducing confounding, also excludes a significant portion of the obese population who often present with these comorbidities. This could limit the applicability of the findings to all obese pregnant women.
5. **Lack of Detailed Nutritional and Lifestyle Data**: The study did not account for nutritional intake, physical activity, or socioeconomic status, which can all influence obesity and pregnancy outcomes. These factors are crucial for a holistic understanding of the interplay between obesity and reproductive health.
6. **Sample Size and Power**: Although the study included a reasonable sample size of 220 participants, the division into obese and non-obese groups might still be underpowered for detecting smaller effect sizes in certain outcomes. Larger studies could provide more definitive evidence.
7. **Measurement of Outcomes**: The study primarily focused on immediate labor and delivery outcomes without considering longer-term maternal and neonatal health impacts. Including postpartum follow-up could help in understanding the extended effects of maternal obesity.
8. **Potential for Intervention Bias**: The management of labor and delivery might have varied between obese and non-obese women, not solely based on clinical indications but possibly influenced by practitioner biases or differing institutional protocols, which were not controlled for in this study.

REFERENCES

1. Ellis JA, Brown CM, Barger B, Carlson NS. Influence of maternal obesity on labor induction: a systematic review and meta-analysis. Journal of midwifery & women's health. 2019 Jan;64(1):55-67.
2. Mourad M, Silverstein M, Bender S, Melka S, Klauser CK, Gupta S, Saltzman DH, Rebarber A, Fox NS. The effect of maternal obesity on outcomes in patients undergoing tertiary or higher cesarean delivery. The Journal of Maternal-Fetal & Neonatal Medicine. 2015 Jun 13;28(9):989-93.
3. Castaneda C, Marsden K, Maxwell T, Ten Eyck P, Kuwaye D, Kenne KA, Merryman AS, Steffen HA, Swartz SR, Merrill AE, Krasowski MD. Prevalence of maternal obesity at delivery and association with maternal and neonatal outcomes. The journal of maternal-fetal & neonatal medicine. 2022 Dec 12;35(25):8544-51.
4. Lauth C, Huet J, Dolley P, Thibon P, Dreyfus M. Maternal obesity in prolonged pregnancy: Labor, mode of delivery, maternal and fetal outcomes. Journal of gynecology obstetrics and human reproduction. 2021 Jan 1;50(1):101909.
5. Angeliki A, Dimitrios P, Chara T. Maternal obesity and its association with the mode of delivery and the neonatal outcome in induced labour: implications for midwifery practice. European Journal of Midwifery. 2018 Apr 12;2:4.
6. Santangeli L, Sattar N, Huda SS. Impact of maternal obesity on perinatal and childhood outcomes. Best Practice & Research Clinical Obstetrics & Gynaecology. 2015 Apr 1;29(3):438-48.
7. Poston L, Caleyachetty R, Cnattingius S, Corvalán C, Uauy R, Herring S, Gillman MW. Preconceptional and maternal obesity: epidemiology and health consequences. The lancet Diabetes & endocrinology. 2016 Dec 1;4(12):1025-36.
8. Dalbye R, Gunnes N, Blix E, Zhang J, Eggebø T, Nistov Tokheim L, Øian P, Bernitz S. Maternal body mass index and risk of obstetric, maternal and neonatal outcomes: A cohort study of nulliparous women with spontaneous onset of labor. Acta obstetricia et gynecologica Scandinavica. 2021 Mar;100(3):521-30.
9. Rahman MM, Abe SK, Kanda M, Narita S, Rahman MS, Bilano V, Ota E, Gilmour S, Shibuya K. Maternal body mass index and risk of birth and maternal health outcomes in low-and middle-

income countries: a systematic review and meta-analysis. Obesity reviews. 2015 Sep;16(9):758-70.

10. Vinturache A, Moledina N, McDonald S, Slater D, Tough S. Pre-pregnancy Body Mass Index (BMI) and delivery outcomes in a Canadian population. BMC pregnancy and childbirth. 2014 Dec;14:1-0.
11. Pickens CM, Kramer MR, Howards PP, Badell ML, Caughey AB, Hogue CJ. Term elective induction of labor and pregnancy outcomes among obese women and their offspring. Obstetrics & Gynecology. 2018 Jan 1;131(1):12-22.
12. Fuchs F, Senat MV, Rey E, Balayla J, Chaillet N, Bouyer J, Audibert F. Impact of maternal obesity on the incidence of pregnancy complications in France and Canada. Scientific reports. 2017 Sep 7;7(1):10859.