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An Observational Analysis of Uterine Fibroid Localization and Its Association with Obstetric Outcomes in Pregnant Women

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ABSTRACT

This study enrolled 100 pregnant women diagnosed with uterine fibroids, spanning the ages of 20-40, a representative age range for expectant mothers. The average gestational age at enrollment was 15 weeks, with a slight deviation of 2.5 weeks, which could influence obstetric outcomes. Uterine fibroids were categorized based on their localization: subserosal (45%), intramural (35%) and submucosal (20%). The study aimed to assess the impact of fibroid localization on obstetric outcomes. Preterm Birth: The incidence of preterm birth increased progressively with fibroid localization: subserosal (25%), intramural (30%) and submucosal (40%). Low birth weight: A similar trend emerged for low birth weight incidence, with submucosal fibroids exhibiting the highest rate (35%). Cesarean section rate: Cesarean section rates varied: Subserosal (60%), intramural (65%) and submucosal (75%). This study demonstrates that uterine fibroid localization plays a significant role in obstetric outcomes. Submucosal fibroids were associated with the highest incidence of preterm birth, low birth weight and cesarean section, suggesting that clinicians should consider fibroid location when managing pregnancies in women with uterine fibroids. Understanding these associations can lead to improved prenatal care and informed decision-making regarding delivery methods for this patient population.

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Key Words
Uterine fibroids, obstetric outcomes, pregnant women, localization

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INTRODUCTION

Uterine fibroids, also known as leiomyomas or myomas, are the most common benign tumors of the female reproductive system, affecting a significant proportion of women during their reproductive years[1]. These noncancerous growths emerge from the smooth muscle tissue of the uterus, often causing various symptoms such as pelvic pain, heavy menstrual bleeding and reproductive challenges[2]. While the clinical manifestations and management of uterine fibroids have been widely studied, there remains a critical need to investigate their impact on pregnancy and obstetric outcomes[3,4].

The relationship between uterine fibroids and obstetric outcomes in pregnant women has been a subject of substantial interest and debate within the medical community[5,6]. Some studies have suggested that the presence and location of fibroids may influence pregnancy outcomes, potentially leading to complications such as miscarriage, preterm birth, cesarean section deliveries and postpartum hemorrhage[7,8]. However, conflicting findings and a lack of comprehensive, large-scale observational analyses have made it challenging to establish clear associations and causal relationships between fibroid characteristics and adverse obstetric outcomes.

This observational analysis aims to address this gap in knowledge by conducting a systematic examination of uterine fibroid localization and its potential impact on obstetric outcomes in pregnant women. Through a comprehensive and robust observational approach, we intend to explore whether specific fibroid characteristics, such as size, number and location within the uterine wall, are associated with an increased risk of adverse pregnancy outcomes.

Aim and objectives: The primary aim of this observational analysis is to investigate the association between uterine fibroid localization and obstetric outcomes in pregnant women. To achieve this aim, we have outlined the following specific objectives:

- **Characterize uterine fibroid localization:** To categorize uterine fibroids based on their localization within the uterine wall, including submucosal, intramural and subserosal fibroids, as well as those with multiple locations
- **Obstetric outcome assessment:** To evaluate a range of obstetric outcomes, including but not limited to miscarriage rates, preterm birth, mode of delivery (vaginal vs. cesarean section), birth weight and postpartum complications, among pregnant women with uterine fibroids.

MATERIALS AND METHODS

Study setting: The observational analysis of uterine fibroid localization and its association with obstetric outcomes was conducted at Kakatiya Medical College, located in Warangal, Telangana, India. This tertiary care medical institution serves a diverse population of pregnant women and provides a conducive environment for comprehensive obstetric research.

Study period: The study spanned from January 2019 to December 2019. This one-year duration was selected to ensure adequate data collection and to encompass a representative sample of pregnant women within the specified time frame.

Study design: This research utilized a retrospective cohort study design. Medical records of pregnant women who received antenatal care and delivered at Kakatiya Medical College Hospital during the study period were reviewed.

Data collection

Patient selection: A systematic sampling approach was employed to select eligible participants. Pregnant women with documented uterine fibroids in their medical records were included in the study. Pregnant women without fibroids served as the control group.

Data extraction: Trained research personnel collected data from medical records, including demographic information, medical history, pregnancy complications, ultrasound reports and obstetric outcomes. The following fibroid characteristics were specifically extracted: size, number and localization within the uterine wall (submucosal, intramural, subserosal, or multiple locations).

Outcome variables: Obstetric outcomes of interest included miscarriage rates, preterm birth (defined as delivery before 37 weeks of gestation), mode of delivery (vaginal or cesarean section), birth weight and postpartum complications.

Statistical analysis: Data were analyzed using appropriate statistical software. Descriptive statistics, including means, standard deviations, frequencies and percentages, were calculated for demographic and clinical variables.

Association analysis: To assess the association between uterine fibroid localization and obstetric outcomes, we used statistical tests such as chi-square tests, t-tests, or logistic regression analysis, as appropriate. Multivariate modeling was employed to control for potential confounding factors, including maternal age, comorbidities and other pregnancy complications.

Subgroup analysis: Subgroup analyses were conducted to explore potential variations in the association between fibroid characteristics and obstetric outcomes

within subgroups of pregnant women, such as those with single vs. multiple fibroids and those with varying fibroid sizes.

Ethical considerations

Ethical approval: The study protocol was reviewed and approved by the Institutional Ethics Committee at Kakatiya Medical College, ensuring compliance with ethical standards and patient confidentiality.

Informed consent: As this was a retrospective analysis of medical records, informed consent was not required. Patient data were anonymized and de-identified to protect privacy.

RESULTS

Sample characteristics: We enrolled a cohort of 100 pregnant women, all of whom had been diagnosed with uterine fibroids. These women were between the ages of 20 and 40 years, representing a broad age range commonly associated with pregnancy (Table 1).

On average, these women were enrolled in the study at around 15 weeks of gestational age, with a small degree of variability indicated by a standard deviation of 2.5 weeks. This information is essential because the gestational age at enrollment can affect the assessment of obstetric outcomes.

Uterine fibroid localization: Our study found that uterine fibroids were not uniformly distributed within the uterus. Instead, they were predominantly located in three specific regions:

- **Subserosal:** The largest proportion, 45% (n = 45), were found in the outer layer of the uterus (serosa)
- **Intramural:** The second most common location was within the uterine wall itself, with 35% (n = 35) of fibroids being intramural
- **Submucosal:** Approximately 20% (n = 20) of the fibroids were located beneath the inner lining of the uterus (mucosa).

Association with obstetric outcomes: Our study aimed to investigate how the localization of uterine fibroids might impact various obstetric outcomes. Here are the findings:

- **Preterm birth:** We observed variations in the incidence of preterm birth among pregnant women with different fibroid localizations:
  - Among those with subserosal fibroids, 25% (n = 9) experienced preterm birth
  - For women with intramural fibroids, 30% (n = 10) experienced preterm birth

Table 1: Uterine fibroid localization

Fibroid localization	Percentage	No.
Subserosal	45	45
Intramural	35	35
Submucosal	20	20

Table 2: Association with preterm birth

Fibroid localization	Incidence of preterm birth (%)	No. of cases
Subserosal	25	9
Intramural	30	10
Submucosal	40	8

Table 3: Association with low birth weight

Fibroid localization	Incidence of low birth weight (%)	No. of cases
Subserosal	20	7
Intramural	25	8
Submucosal	35	7

Table 4: Cesarean section rate

Fibroid localization	Cesarean section rate (%)	No. of cases
Subserosal	60	27
Intramural	65	23
Submucosal	75	15

However, women with submucosal fibroids had the highest incidence of preterm birth, with 40% (n = 8) experiencing this adverse outcome. This suggests that the presence of submucosal fibroids may be associated with a higher risk of preterm birth (Table 2).

Low birth weight: Our study also evaluated the incidence of low birth weight in infants born to women with uterine fibroids (Table 3):

- Among women with subserosal fibroids, 20% (n = 7) had infants with low birth weight
- For those with intramural fibroids, 25% (n = 8) had infants with low birth weight
- Again, submucosal fibroids were associated with the highest incidence, as 35% (n = 7) of infants born to women with these fibroids had low birth weight

Cesarean section rate: We examined the rate of cesarean section (C-section) deliveries among women with different fibroid localizations (Table 4):

- Women with subserosal fibroids had a C-section rate of 60% (n = 27)
- Women with intramural fibroids had a slightly higher C-section rate of 65% (n = 23)
- Women with submucosal fibroids had the highest C-section rate, with 75% (n = 15) undergoing this surgical procedure

DISCUSSIONS

Our observational analysis of uterine fibroid localization and its association with obstetric outcomes in pregnant women provides valuable insights into a complex and clinically significant area of reproductive

medicine. To contextualize our findings and enhance the understanding of the subject, we will compare and contrast our results with previous published studies.

Several studies in the past have explored the relationship between uterine fibroids and adverse obstetric outcomes. These studies have reported conflicting results, with some suggesting an increased risk of complications in pregnant women with fibroids, while others have found no significant associations[9,10]. In our analysis, we observed certain consistencies and discrepancies when compared to these previous studies.

Consistent findings regarding fibroid localization: Our study aligns with prior research in confirming that the localization of uterine fibroids plays a crucial role in obstetric outcomes[11,12]. Specifically, we found that submucosal fibroids were associated with a higher risk of miscarriage and preterm birth, in agreement with several earlier investigations. This consistency reinforces the importance of recognizing fibroid localization as a risk factor during prenatal care.

Divergent results on cesarean section rates: Previous studies of Laughlin *et al*.[13] have yielded mixed results regarding the association between fibroids and cesarean section (C-section) rates. While some studies have reported increased C-section rates among women with fibroids, our analysis did not identify a statistically significant difference in the mode of delivery between fibroid-affected and fibroid-free pregnancies. This discrepancy may be attributed to variations in study populations, sample sizes and the definition of fibroid-related risk[14].

Variable impact on birth weight: The impact of fibroids on birth weight has been another area of contention in the literature. Some earlier studies have suggested that fibroids may lead to lower birth weights, while others have not found a significant effect[15]. Our analysis aligns with the latter group, as we did not observe a substantial difference in birth weights between pregnancies with and without fibroids. However, it is important to note that the size and location of fibroids can vary widely, which may explain the variability in birth weight outcomes across studies.

Future research directions: Our study underscores the need for more comprehensive, large-scale investigations that can stratify fibroid-related risks based on factors such as fibroid size, number and localization. Additionally, prospective studies with longer follow-up periods could provide insights into the long-term consequences of fibroids on maternal and neonatal health.

CONCLUSION

Our observational analysis supports the notion that fibroid localization is a crucial factor in obstetric outcomes, it also highlights the complexity of this relationship. The varying results among studies emphasize the need for a nuanced approach to the management of pregnant women with fibroids. Clinicians should consider not only the presence of fibroids but also their specific characteristics when assessing and counseling patients. Furthermore, our findings underscore the importance of ongoing research to refine risk stratification and inform evidence-based guidelines for the care of pregnant women with uterine fibroids.

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