Original Research Article

Frequency of Uterine Rupture in Multigravida Women With Different BMI

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Abstract: *Uterine rupture remains a life-threatening obstetric complication, particularly among multigravida women. Maternal nutritional status, as reflected by body mass index, may influence the risk, yet local evidence remains limited.* **Objective:** *To determine the frequency of uterine rupture in multigravida women with different BMI groups presenting at Khyber Teaching Hospital, Peshawar.* **Methods:** *Eighty multigravida women aged 18 to 40 years with singleton pregnancies>36 weeks' gestation were included in this study. Body mass index was calculated for every patient and was categorized as underweight, normal weight, and overweight/obese. Data was analysed using SPSS 26. Uterine rupture was assessed in all patients and across BMI groups using the chi-square test, with a P-value set at ≤0.05.* **Results:** *The cohort had a mean age of 29.29 ± 6.43 years, a mean gestational age of 39.18 ± 1.49 weeks, a mean parity of 3.38 ± 1.15, and a mean BMI of 24.15 ± 4.44 kg/m2. The overall frequency of uterine rupture was 33.8%. The majority of rupture cases (18, 66.7%) occurred in the overweight/obese groups, followed by 7 (25.9%) in the normal weight group and 2 (7.4%) in the underweight group. Higher parity (>3) (P = 0.006), lower economic background (P = 0.004), and rural residence (P = 0.02) were significantly associated with uterine rupture.* **Conclusion:** *The frequency of uterine rupture in multigravida women was considerably higher in the overweight/obese BMI category than in the underweight and overweight categories.*

Keywords: uterine rupture, multigravida, body mass index, obesity, parity, cross-sectional study

Introduction

Uterine rupture is one of the life-threatening obstetric complications that often results in adverse fetomaternal outcomes. While advances in obstetric care have minimized the occurrence within the high-income countries, uterine rupture remains a considerable public health unease within the low-income settings due to the limited access to timely antenatal care. (1) Studies reported that this condition is inexplicably higher within the multigravida women, predominantly among those with a history of prior uterine surgery, which predisposes the uterus to structural weakening. (2) Multigravidity is an established risk for uterine rupture because of the cumulative stretching and thinning of uterine musculature in women with consecutive pregnancies. With increasing parity, the uterus typically becomes less able to tolerate the mechanical stress of labor if obstructed labor or unsuitable use of uterotonic agents were considered. (3) Multigravida women commonly present late in labor in low-income countries or get limited antenatal monitoring, which eventually elevates the risk for uterine rupture. (4)

Body mass index (BMI) is an essential maternal feature influencing pregnancy outcomes. Maternal obesity is often associated with prolonged labor and elevated risk of C-section rates, which indirectly affects the risk of uterine rupture. The relationship between BMI and multigravidity is noteworthy. Obese multigravida women typically experience extended labor that often requires augmentation with oxytocin, stressing the uterine wall. Obesity is related to delayed confirmation of labor complications due to challenges within the clinical evaluation, as well as fetal surveillance, leading to delayed identification of uterine rupture. (5-8) Uterine rupture remains the chief contributor to maternal adverse outcomes. Research has emphasized uterine rupture in multigravida women, commonly related to previous C-sections and delayed referrals. Classifying the relationship between BMI and uterine rupture in cases of multigravida women may have significant public health implications.

Stratifying risk based on BMI might improve antenatal counseling, inform assessments concerning the trial of labor and elective C-section delivery, and improve intrapartum monitoring among the high-risk women. (9-12)

Uterine rupture is a serious obstetric emergency that contributes considerably to fetomaternal morbidity and mortality, specifically in low-income countries. However, the multigravida women are at increased risk of uterine rupture due to repeated stretching as well as uterine wall weakening across successive pregnancies. Locally generated data on the frequency of uterine rupture in relation to BMI can support evidence-based clinical decision-making and inform public health policies aimed at minimizing the fetomaternal complications. Thus, this study is justified to evaluate the frequency of uterine rupture within multigravida women with different BMI categories to contribute significant evidence toward enhancing maternal healthcare outcomes.

Methodology

This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Khyber Teaching Hospital, Peshawar, [21-07-2024—21-01-2025]. Ethical approval was obtained prior to initiating the study. A sample of eighty women was selected for this study, using a confidence level 95%, a margin of error 9%, and an expected frequency of uterine rupture among overweight and obese women 21.31%. (13) A non-probability consecutive sampling technique was used.

Women aged between 18 and 40 years, with a singleton pregnancy on ultrasound and a multigravida (being pregnant two or more times on medical record), and gestational age > 36 weeks, calculated on the last menstrual period. Women with placenta accreta spectrum disorders, connective tissue disorders, such as Marfan syndrome, a history of preeclampsia, chromosomal or structural anomaly, and women with previous uterine rupture were omitted.

Informed consent was taken from each patient. A pro forma was used to record demographic and obstetric information, including age, gestational age, parity, socioeconomic status, profession, residence, and education. For all patients, weight and height were measured, and body mass index was calculated using the formula Weight (Kg)/Height (Meter)2. Patients were categorised into three groups: underweight (BMI < 18.5 kg/m²), normal weight (BMI 18.5 to 25.0 kg/m²), and overweight or obese (BMI > 25.0 kg/m²).

Uterine rupture was assessed through ultrasonography. Uterine rupture was defined as a disruption or tear of the uterine muscle and visceral peritoneum, or a separation of the uterine muscle with extension to the bladder or broad ligament. All the assessments were performed under the supervision of a consultant.

SPSS 26 was used for data analysis. Uterine rupture and other categorical demographics were expressed as frequency and percentages. Age, gestational age, parity, and BMI were calculated using mean and standard deviation. Uterine rupture was stratified by BMI, age, parity, gestational age, and other demographics using the chi-square test, with P values kept significant at ≤ 0.05.

Results

The study was conducted on 80 women, with a mean age of 29.29 ± 6.43 years. Mean BMI was 24.15 ± 4.44 kg/m2, mean gestational age was 39.18 ± 1.49 weeks, and the mean parity was 3.38 ± 1.15. Table 1 presents the demographic profile of the patients.

The overall frequency of uterine rupture was 27 (33.8%) (Figure 1). The analysis revealed a significant relationship between uterine rupture and Body Mass Index: 18 (66.7%) patients with uterine rupture were in the overweight or obese category, 7 (25.9%) had normal weight, and 2 (7.4%) were underweight (P = 0.03) (Table 2). Upon stratification, parity greater than 3 was associated with uterine rupture (P = 0.006). Other significant factors were rural residence (P = 0.02) and poor economic status (P = 0.004) (Table 3).

Table 1   Demographics

Demographics		n	%
Profession	Housewife	54	67.5%
	Job	26	32.5%
Area of residence	Urban	28	35.0%
	Rural	52	65.0%
Socioeconomic status	Poor	43	53.8%
	Middle	29	36.2%
	Rich	8	10.0%
Education	Uneducated	31	38.8%
	Primary	13	16.2%
	Secondary	19	23.8%
	Higher	17	21.2%
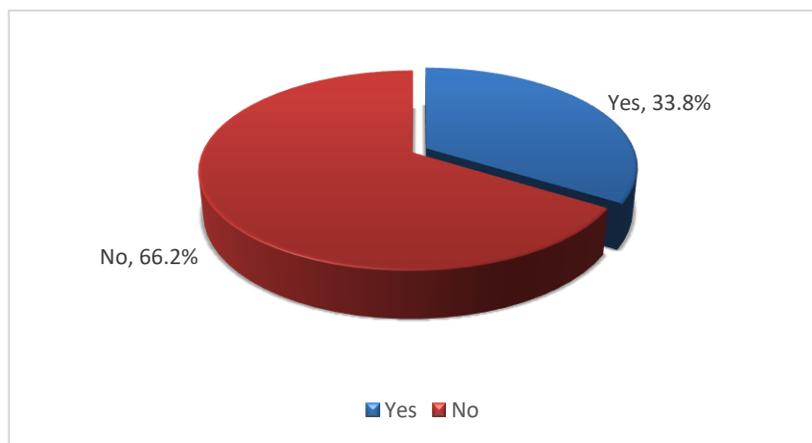
Figure 1: Frequency of uterine rupture

Table 2: Frequency of uterine rupture in different BMI groups

		Uterine rupture				P value
		Yes		No		
		n	%	n	%	
BMI groups	Underweight	2	7.4%	8	15.1%	0.03
	Normal weight	7	25.9%	26	49.1%	
	Overweight/Obese	18	66.7%	19	35.8%	

Table 3: Stratification of BMI with various factors

Factors		Uterine rupture				P value
		Yes		No		
		n	%	n	%	
Age distribution (Years)	18 to 30	19	70.4%	26	49.1%	0.06
	31 to 40	8	29.6%	27	50.9%	
Gestational age (Weeks)	37 to 39	12	44.4%	28	52.8%	0.47
	> 39	15	55.6%	25	47.2%	
Parity	2 to 3	8	29.6%	33	62.3%	0.006
	> 3	19	70.4%	20	37.7%	
Profession	Housewife	21	77.8%	33	62.3%	0.16
	Job	6	22.2%	20	37.7%	
Area of residence	Urban	5	18.5%	23	43.4%	0.02
	Rural	22	81.5%	30	56.6%	
Socioeconomic status	Poor	20	74.1%	23	43.4%	0.004
	Middle	3	11.1%	26	49.1%	
	Rich	4	14.8%	4	7.5%	
Education	Uneducated	15	55.6%	16	30.2%	0.06
	Primary	3	11.1%	10	18.9%	
	Secondary	7	25.9%	12	22.6%	
	Higher	2	7.4%	15	28.3%	

Discussion

The findings from this study, conducted at a local centre, offered a focused perspective on the profile of women experiencing uterine rupture. The mean age of the patients in this study was 29.29 years, comparable to the populations studied by Marwah et al. in India (mean age 27 years) and Pipal et al. (mean age 25). [13,14] This validates the understanding that uterine rupture frequently affects women in their peak reproductive years, a trend also observed by various studies. [15,16] The predominance of homemakers (67.5%) and rural residents (65.0%) aligns with the strong socioeconomic patterning of this complication. Studies have similarly reported that most uterine rupture cases occurred among homemakers and women from rural backgrounds, highlighting how limited access to resources and healthcare can elevate risk. [14,16] The study had an overall frequency of uterine rupture 33.8%.

A significant association was observed between lower educational status and uterine rupture; this finding aligns with studies that identified education of less than 12 years and illiteracy as significant risk factors [14,15]. This study also found an association between low economic strata and uterine rupture, a finding that aligns with the high burden of obstetric complications in low-income populations. [16,17]

Higher parity was associated with uterine rupture in this study. High parity, or grand multiparity, is a well-documented risk factor, especially in resource-constrained settings. The studies from Pakistan and India reported that the majority of the rupture cases were in grand multigravidas, often due to obstructed labour and unsupervised deliveries. [14,16]

Uterine rupture was significantly associated with BMI, as the majority of patients with BMI > 25 kg/m2 had a higher frequency of the condition. Obesity is a recognised risk factor for various obstetric complications; its association with uterine rupture is less frequently reported. The study by Baek et al. reported that 35% of their uterine rupture patients were overweight or obese, but their sample mainly consisted of women with scarred uteri. [18] Another study reported a high mean BMI of 29.06 kg/m² but did not provide a categorical analysis. [15] High BMI may pose a risk through associated conditions. This finding suggests that antenatal risk assessment must include obesity as a critical factor in populations where it coexists with high parity and low healthcare access.

The novelty of the current study lies in its integrated presentation of a risk profile for patients with uterine rupture. Factors such as rural residence, low education, and high parity are well-known. Still, this study quantifies their confluence within a single cohort, showing that 81.5% of rupture cases were rural, 74.1% were poor, and 70.4% had parity > 3. The strong association with higher BMI contributes to the knowledge of uterine rupture aetiology.

This study was not without its limitations. The study used a cross-sectional design, which may limit the ability to establish causality. The small sample size and single-centre setting may limit the generalisability of the findings to other centres with different demographic data. Future studies shall address the aforementioned limitations.

Conclusion

In conclusion, this study showed that the frequency of uterine rupture was significantly higher in the overweight/obese BMI group, compared to the underweight and overweight groups, in multigravida women. Future research should adopt a prospective design to include detailed obstetric histories, especially prior uterine surgery, and intrapartum management pathways.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRB 441/DME/KMC)
Consent for publication
Approved
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Conflict of interest

The authors declared no conflict of interest.

Author Contribution

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Data Collection, Conception of Study, Data Analysis and Manuscript drafting.
ZA (Associate Professor)
Development of Research Methodology Design, Critical Input and Final approval of draft.
LA (PGR)
Review of Literature

M (Senior Registrar)
Review of Literature and Critical Input
SUK (Medical Officer)
Manuscript Review and Critical Input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.

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