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Frequency of Intrauterine Death in Primigravida with Meconium Stained Liquor at Term

Laraib Fatima[1], Ayesha Khan[2], Tahira Naz[1], Hina Khan[1], Ambreen Zafar[1], Kashmal Khattak[1]

[1]Hayatabad Medical Complex, Peshawar, KP, Pakistan.
[2]Northwest General Hospital, Peshawar, KP, Pakistan.

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Correspondence to: Laraib Fatima, Hayatabad Medical Complex, Peshawar, KP, Pakistan.
Email: drlaraib656@gmail.com

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ABSTRACT

Background: The intrauterine death remains a major obstetric complication, particularly in primigravida who present with amniotic fluid containing meconium. Identification of concomitant attendant demographic risk factors facilitates selective surveillance as well as early intervention, especially in low-resource hospital settings. **Objective:** To determine the frequency of intrauterine death in primigravida with meconium stained liquor at term. **Study Design:** Descriptive cross-sectional study. **Duration and Place of Study:** The study was conducted from November 2022 to May 2023 at the Department of Obstetrics and Gynaecology, Hayatabad Medical Complex, Peshawar. **Methodology:** A total of 126 primigravida women aged 18–40 years with singleton pregnancies beyond 36 weeks gestation and meconium-stained liquor on ultrasound were enrolled. Patients with abnormal fetal presentation, congenital anomalies, or maternal comorbidities were excluded. Data were collected prospectively, and fetal outcomes were monitored until delivery. **Results:** The mean maternal age was 29.83 ± 4.64 years and mean gestational age was 39.37 ± 1.68 weeks. The frequency of intrauterine death was 4.80%. A significant association was found with maternal age (p=0.007) and socioeconomic status (p=0.012), while gestational age showed no significant relationship (p=0.418). Multivariate analysis identified maternal age >30 years as a significant predictor of intrauterine death (OR=0.21, p=0.017). **Conclusion:** In primigravida women with meconium-stained liquor, maternal age over 30 years significantly increases the risk of intrauterine death.

INTRODUCTION

Meconium-stained liquor (MSL) is not an uncommon finding in term as well as post-term labour, defined as the presence of fetal fecal matter—meconium—in the amniotic fluid.[1] While passage of meconium can be a normal finding due to fetal maturity, it can be an indirect indication of underlying fetal hypoxia or distress.[2] Meconium in the amniotic fluid is associated with a heightened risk of adverse outcomes, including meconium aspiration syndrome (MAS), respiratory distress, as well as an increase in neonatal morbidity and mortality.[3] Occurrence of MSL is more with increasing gestational age, particularly after 40 weeks, and is a frequent discovery in day-to-day clinical obstetric practice.[4]

Primigravidas, as first-time pregnancy holders, can be at a characteristic risk profile with MSL.[5] Due to inexperience of uterine musculature and a chance of prolonged or dysfunctional labor in primigravidas, fetal stress can be more significant with a corresponding rise in the chance of passing of meconium.[5] Also, suboptimal intrauterine surveillance or delayed intervention in labor can be responsible for adverse outcomes.[6] Vigilant intrapartum surveillance with appropriate obstetric intervention at an early stage can prevent fetal compromise in such a case. Also, absent previous history of labor can predetermine clinical management of course of labor more variably in primigravidas with a consequential need for a high level of suspicion when MSL is observed.[7]

Intrauterine demise (IUD) is still one of the saddest conclusions in obstetrics, with severe psychological as well as emotive implications for awaiting families.[8] Etiology of IUD is multifactorial, some of which include placental insufficiency, umbilical cord accidents, infections, congenital anomalies, and hypoxia of a fetus.[9] Hypoxia of a fetus, in general, is of paramount importance when MSL is involved because it can indicate as well as be a cause of suboptimal fetal oxygenation.[10] Late detection or suboptimal treatment of such a condition can result in a non-remitting conclusion, further highlighting a necessity for consistent observation of a fetus as well as early intervention once signs of warning appear.[11]

For primigravidas with meconium-stained liquor at term, a risk of intrauterine death is an important

consideration, especially in circumstances without adequate and expeditious obstetric care.[12] Due to first-time labors' physiological vagaries as well as a potential delay in appreciating fetal compromise, this group of primigravidas may be particularly vulnerable. The circumstance of MSL should provide clinical alertness with more careful observation, continuous electronic fetal monitoring, as well as preparedness for expeditious delivery should signs of fetal compromise become apparent.[13] It requires thoughtful coordinated obstetric alertness, expeditious decision-making, as well as observation in accordance with evidence-based practice guidelines during labor as well as delivery to avert intrauterine death in this high-risk population.

A study conducted by Tolu LB et al. reported an intrauterine death rate of 9% among patients presenting with meconium-stained liquor.[14]

Conducting this study in the Peshawar region is relevant since corresponding local data on outcomes of meconium-stained liquor among primigravidas are not forthcoming in vast quantities. Delayed intrapartum surveillance and suboptimal emergency obstetric responses are common challenges faced by most regional healthcare centers. By exploring the intrauterine death pattern and its consequences in this specific context, the study can guide identification of intervention points, evidence-based policies, as well as regional maternal and fetal outcomes.

METHODOLOGY

This descriptive study was carried out at the Department of Obstetrics and Gynaecology, Hayatabad Medical Complex (HMC) Peshawar, from November 2022 to May 2023. A total of 126 primigravida women were enrolled using a non-probability consecutive sampling technique. The sample size was calculated using WHO software, based on a 95% confidence interval, 5% margin of error, and an expected frequency of intrauterine death of 9% among women presenting with meconium-stained amniotic fluid. Women aged 18 to 40 years with a singleton pregnancy of more than 36 weeks gestation, confirmed by last menstrual period and ultrasound, were included if they were primigravida and had echogenic amniotic fluid visualized on ultrasound resembling vernix caseosa, consistent with meconium-stained liquor. Women were excluded if they had abnormal fetal presentations such as breech or transverse lie, experienced antepartum hemorrhage, had any fetal congenital anomalies detected on ultrasound, or had a known history of maternal heart disease, diabetes mellitus, or bronchial asthma.

Each patient meeting the eligibility criteria was enrolled after providing written informed consent. Demographic information including age, gestational age, and family socioeconomic background was recorded on a predesigned proforma. Patients were monitored throughout the labor and delivery process. Fetal death was identified when ultrasound confirmed cessation of cardiac activity in a fetus of 28 weeks gestation or more. All relevant observations were documented prospectively.

Data were analyzed using IBM SPSS version 25. Quantitative variables such as maternal age and gestational age were expressed as mean ± standard deviation. Frequencies and percentages were calculated for qualitative variables including socioeconomic status and intrauterine death. Stratification was performed for age, gestational age, and socioeconomic background to explore potential associations. The chi-square test was applied for post-stratification analysis, and a p-value ≤0.05 was considered statistically significant. Multivariate logistic regression was also applied.

RESULTS

The study examined 126 primigravida patients with meconium-stained liquor at term, with a mean age of 29.83±4.64 years and mean gestational age of 39.37±1.68 weeks. The majority of participants belonged to middle socioeconomic status (69 patients, 54.8%), followed by poor socioeconomic status (49 patients, 38.9%), and rich socioeconomic status (8 patients, 6.3%) (Table-I).

Table I

Patient Demographics

Demographics	Mean ± SD
Age (years)	29.83±4.64
Gestational Age (weeks)	39.37±1.68
Socioeconomic Status	
Poor n (%)	49 (38.9%)
Middle n (%)	69 (54.8%)
Rich n (%)	8 (6.3%)

The overall frequency of intrauterine death was 4.80% (6 cases) among the study population, while 95.20% (120 cases) had no intrauterine death (Table-II).

Table II

Frequency of Intrauterine Death

Intrauterine Death	Frequency	% age
Yes	6	4.80%
No	120	95.20%

When examining demographic associations with intrauterine death using Fischer Exact Test, maternal age demonstrated a highly significant relationship (p=0.007), with a striking pattern where no intrauterine deaths occurred in mothers aged 30 years or younger (0 out of 69 patients, 0.0% versus 69 patients with no intrauterine death, 100.0%), while all 6 cases of intrauterine death occurred exclusively in mothers older than 30 years (6 out of 57 patients, 10.5% versus 51 patients with no intrauterine death, 89.5%) (Table-III). Gestational age showed no significant association with intrauterine death (p=0.418), with intrauterine deaths occurring in 2 out of 67 patients at ≤39 weeks gestational age (3.0% versus 65 patients with no intrauterine death, 97.0%) and in 4 out of 59 patients at >39 weeks gestational age (6.8% versus 55 patients with no intrauterine death, 93.2%) (Table-III). Socioeconomic status revealed a significant association (p=0.012) with intrauterine death, showing a clear socioeconomic gradient where no intrauterine deaths occurred in the poor socioeconomic group (0 out of 49 patients, 0.0% versus 49 patients with no intrauterine death, 100.0%), 4 deaths occurred in the middle socioeconomic group (4 out of 69 patients, 5.8% versus 65 patients with no intrauterine death, 94.2%), and the highest proportion of intrauterine deaths was observed in the rich socioeconomic group (2 out of 8 patients, 25.0% versus 6 patients with no intrauterine death, 75.0%) (Table-III).

Table III
Association of Intrauterine Death with Demographic Factors

Demographic Factors		Intrauterine Death		p-value
		Yes n(%)	No n(%)	
Age (years)	≤30	0 (0.0%)	69 (100.0%)	0.007*
	>30	6 (10.5%)	51 (89.5%)	
Gestational Age (weeks)	≤39	2 (3.0%)	65 (97.0%)	0.418*
	>39	4 (6.8%)	55 (93.2%)	
Socioeconomic Status	Poor	0 (0.0%)	49 (100.0%)	0.012*
	Middle	4 (5.8%)	65 (94.2%)	
	Rich	2 (25.0%)	6 (75.0%)	

***Fischer Exact Test**

Multivariate analysis revealed that maternal age was the only statistically significant predictor of intrauterine death (β=-1.56, p=0.017, OR=0.21, 95% CI: 0.058), while gestational age approached significance (β=1.833, p=0.051, OR=6.254, 95% CI: 0.992) and socioeconomic status was not significant (p=0.951) (Table-IV).

Table IV
Multivariate Analysis of Factors Associated with Intrauterine Death

Variables	β Coefficient	Standard Error	Wald χ^2	df	p-value	Odds Ratio	95% Confidence Interval
Age	-1.56	0.656	5.656	1	0.017*	0.21	0.058
Gestational Age	1.833	0.939	3.81	1	0.051	6.254	0.992
Socioeconomic Status			0.101	2	0.951		
- Poor	17.673	4131.154	0	1	0.997	47357282	0
- Middle	0.457	1.436	0.101	1	0.75	1.579	0.095
Constant	-18.592	27.753	0.449	1	0.503	0	

DISCUSSION

The observed intrauterine death rate of 4.80% in our cohort aligns with the recognized increased perinatal mortality associated with meconium-stained amniotic fluid, which serves as an indicator of fetal compromise and potential hypoxic stress during labor. The exclusive occurrence of intrauterine deaths in mothers older than 30 years, with a 10.5% incidence rate compared to zero deaths in younger mothers, reflects the well-established association between advanced maternal age and increased obstetric complications. This age-related risk likely stems from physiological changes including decreased uterine blood flow, increased prevalence of underlying medical conditions such as hypertension and diabetes, and age-related decline in placental function, all of which can compromise fetal oxygenation and increase susceptibility to hypoxic injury when meconium is present. The counterintuitive finding that intrauterine deaths were more frequent in the wealthy socioeconomic group (25.0%) compared to middle-class (5.8%) and poor patients (0%) may be explained by delayed presentation to healthcare facilities due to overconfidence in private healthcare arrangements, potential over-medicalization leading to unnecessary interventions, or lifestyle factors associated with higher socioeconomic status that may increase pregnancy-related risks. The lack of significant association between gestational age and intrauterine death suggests that once meconium staining occurs at term, the fetal vulnerability remains consistently elevated regardless of whether delivery occurs at early term or post-term gestation.

The intrauterine death rate of 4.80% in our study was comparable to the perinatal mortality reported by Shirsath SB et al. [15] (6%) and slightly lower than the neonatal mortality observed by Shilpasri YM et al. [16] (5.5%). However, our study's mortality rate was higher than that reported by Mahapatra P et al. [17] (1%) and Tolu LB et al. [14] (9% early neonatal death versus 1% in controls). The variation in mortality rates across studies may be attributed to differences in study populations, healthcare facilities, and the severity of meconium staining, as Shilpasri YM et al. [16] noted that 100% of deaths occurred in the thick meconium group.

The mean maternal age in our study (29.83±4.64 years) was higher than that reported in most comparative studies, including Mohammad N et al. [18] (26.7±4.4 years), Ali L et al. [19] (27.9±3.97 years), and the age ranges reported by Shirsath SB et al. [15] (26-30 years in 70% of cases) and Mahapatra P et al. [17] (20-35 years in 88.8%). This age difference may explain our unique finding that maternal age demonstrated a highly significant relationship with intrauterine death (p=0.007), with all 6 cases occurring exclusively in mothers older than 30 years. This age-related risk pattern has not been specifically reported in the reviewed literature, suggesting that advanced maternal age may be an independent risk factor for adverse outcomes in meconium-stained pregnancies.

Our gestational age findings (mean 39.37±1.68 weeks) were similar to Shilpasri YM et al. [16] (39.82 weeks) and Divya NV et al. [20] (41 weeks mean with 56.4% ≥40 weeks). Interestingly, gestational age showed no significant association with intrauterine death in our study (p=0.418), contrasting with the general understanding that post-term pregnancies are associated with increased meconium staining. However, Ali L et al. [19] also found that post-dates pregnancy did not significantly influence MSAF outcomes, supporting our findings.

The socioeconomic status association with intrauterine death revealed an unexpected pattern in our study, with the highest proportion of deaths occurring in the rich socioeconomic group (25.0%) compared to none in the poor group and 5.8% in the middle group (p=0.012). This finding is contrary to typical healthcare patterns and may reflect small sample size effects or other confounding factors not captured in the reviewed literature, as none of the comparative studies specifically analyzed socioeconomic status as a predictor of adverse outcomes.

Our multivariate analysis identified maternal age as the only statistically significant predictor of intrauterine death (β=-1.56, p=0.017, OR=0.21, 95% CI: 0.058), which

differs from the emphasis placed on meconium consistency in other studies. Mohammad N et al. [18] Shilpasri YM et al. [16] Shirsath SB et al. [15] and Divya NV et al. [20] all consistently demonstrated that thick meconium was the primary predictor of adverse outcomes, including low Apgar scores, increased cesarean rates, and higher incidence of meconium aspiration syndrome. The absence of meconium grading analysis in our study limits direct comparison with these findings and may explain why we identified different risk factors.

The focus on primigravida patients in our study provides a unique perspective not specifically addressed in the reviewed literature, where most studies included mixed parity populations. Mahapatra P et al. [17] and Tolu LB et al. [14] used control groups with clear amniotic fluid, which strengthened their conclusions about MSAF-specific risks, while our study focused exclusively on MSAF cases. This methodological difference may account for variations in risk factor identification and outcome assessment compared to the broader literature findings.

Despite these methodological differences, our findings contribute valuable insights into the demographic risk factors associated with adverse outcomes in meconium-stained pregnancies, particularly highlighting the significance of advanced maternal age in primigravida patients. The consistent pattern of increased morbidity and mortality across all studies reinforces the importance of vigilant monitoring and skilled obstetric care in managing deliveries complicated by meconium-stained amniotic fluid. Future research incorporating meconium grading, larger sample sizes, and multicenter designs would further enhance our understanding of this important obstetric complication.

This study has several limitations that should be acknowledged. As a single-center study conducted at one tertiary care hospital, the generalizability of our findings to other healthcare settings and populations may be limited. The relatively small sample size of 126 patients, while adequate for preliminary analysis, may have affected the statistical power to detect smaller but clinically significant associations. The exclusive focus on primigravida patients, while providing unique insights, limits the applicability to the broader obstetric population that includes multiparous women. Additionally, the absence of meconium grading classification in our study design prevented comparison with established severity-based risk stratification models used in the literature. The cross-sectional nature of the study also limits our ability to establish temporal relationships and causality between the identified risk factors and outcomes.

CONCLUSION

Our study has concluded that maternal age emerges as a significant independent predictor of intrauterine death in primigravida patients with meconium-stained amniotic fluid at term, with all cases of intrauterine death occurring exclusively in mothers older than 30 years. The findings demonstrate that advanced maternal age carries substantial risk for adverse perinatal outcomes in this specific population, while gestational age and socioeconomic status showed less consistent associations.

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