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Prevalence and Risk Factors of Meconium-stained Liquor in Females Presenting with Postdates Pregnancy

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ABSTRACT

Postdates pregnancy has many complications during and after delivery. Meconium stained amniotic fluid is a common occurrence during labor and is associated with increased caesarean section rate and fetal morbidity and mortality. Meconium stained liquor is the most occurring problem in postdate pregnancy, usually encountered by obstetricians. But controversial results are present in literature. So we conducted this study to find the extent of problem in local population. The objective of this study is to assess the frequency of meconium stained liquor in females presenting with postdates pregnancy.

Methods: A cross sectional study was conducted at Shifa International Hospital Islamabad, from December 2018 to June 2019. The sample size of 225 cases was included and after taking approval from ethical review board and department, the patients were included through convenient sampling. Data was entered and analyzed through SPSS version 26. The quantitative data like age, BMI and gestational age were presented as mean and standard deviation.

Qualitative variables like meconium-stained liquor were presented as frequency and percentage. Parity was also presented as frequency. Data was stratified for age, gestational age, parity and BMI. Post-stratification, meconium-stained liquor was compared in stratified groups by using chi-square test considering P-value≤0.05 as significant.

Results: The mean age of females was 29.43±6.10years. The mean gestational age of females at the time of delivery was 40.40±0.49 weeks. The mean BMI of females was 25.52±5.13kg/m^2. Meconium stained liquor was observed in 52 (23.11%) cases.

Conclusion: This study indicate that while meconium-stained liquor is a frequent issue in postdate deliveries, its prevalence does not show a statistically significant correlation with any factors. There is the need for monitoring of postdate pregnancies, regardless of maternal characteristics, as meconium-stained liquor remains a prevalent concern with potential complications for maternal and neonatal outcomes.

Key words: Postdate pregnancy, Meconium-stained liquor, BMI, Gestational age.

INTRODUCTION

The terms "postdate," "post-term," "post maturity," and "prolonged pregnancy" are well-established by the World Health Organization (WHO) and the International Federation of Gynecology and Obstetrics to define pregnancies that extend beyond the expected date of delivery.(1) According to WHO guidelines, a pregnancy that progresses beyond 294 days, or 42 weeks of gestation, is classified as postdate. Such pregnancies are not uncommon, with an estimated prevalence of approximately 7%.(2)

However, other studies now suggest that complications begin to increase even before reaching the 42-weeks of gestation. Among these complications the meconium-stained amniotic fluid is a condition where the fetus passes meconium into the amniotic fluid. It is frequently observed in obstetric and neonatal care. This condition is associated with adverse maternal and fetal outcomes, including an increased rate of cesarean sections, fetal morbidity, and mortality.

Meconium is a substance composed of water (70-80%), combined with elements like amniotic fluid, intestinal cells, and lanugo, which are hazardous to fetal life.

The reported incidence of meconium-stained amniotic fluid varies significantly across studies. Some research has indicated a relatively low occurrence, with 7.7% of postdate pregnancies affected in a sample of 908 women.(3) Other studies report higher incidences, such as 17.1% in a sample of 1680 and up to 23.53% in smaller cohorts.(4) As there are certain factors which vary among different populations so there is the need for further research to establish a clearer understanding of its frequency in postdate pregnancies.

This study aims to evaluate the prevalence of meconium-stained amniotic fluid in postdate pregnancies, given the range of complications associated with prolonged gestation. The postdate pregnancies are associated with certain risks during and after delivery. It is important to assess the incidence of meconium-stained amniotic fluid for improving maternal and neonatal outcomes. While previous studies have noted a low frequency of this condition in postdate pregnancies, we want to determine its frequency and associated factors in our population.

LITERATURE REVIEW

Meconium-stained amniotic fluid (MSAF) is a condition observed in 10-15% of all pregnancies and is indicative of signal adverse neonatal outcomes. The prevalence and implications of MSAF can vary significantly based on socioeconomic factors and healthcare quality, with more severe effects often noted in developing countries. In Ethiopia less preventive strategies are available for prevention of its incidence.(5)

In specific studies, the frequency of MSAF in postdate pregnancies has been highlighted. One study conducted at Khyber Teaching Hospital in Peshawar, Pakistan, reviewed records of 495 patients with gestational ages over 40 weeks, revealing a high MSAF frequency of 67.47%.(6) This study also noted that spontaneous labor was more common than induced labor and that MSAF presence significantly increased the likelihood of cesarean deliveries due to fetal distress. Similarly, a study from Rejshree Medical Research Institute in Bareilly reported an MSAF incidence of 10.8%, with a greater prevalence in primigravida and with advancing gestational age.(7)

These studies shows the increased risk and need for careful monitoring and intervention in pregnancies with meconium staining of the amniotic fluid to mitigate perinatal morbidity and mortality. Several risk factors have been identified as significant contributors to the occurrence of meconium-stained liquor in postdates pregnancies. One of the notable risk factor is maternal obesity, as indicated by pre-pregnancy body mass index (BMI). Studies have shown that term macrocosmic infants, who are often born to obese mothers, have a higher likelihood of meconium-stained amniotic fluid.(8)

Additionally, the presence of meconium-stained amniotic fluid is associated with an increased

risk of postpartum hemorrhage (PPH). In a large-scale retrospective cohort study, it was found that women who experienced meconium-stained amniotic fluid had a higher incidence of moderate to severe postpartum hemorrhage compared to those without meconium in their amniotic fluid.(9) These findings shows multifactorial nature of meconium-stained liquor in postdates pregnancies, highlighting the importance of monitoring and managing maternal health indicators such as BMI and gestational duration to find associated risks.

Meconium aspiration syndrome (MAS) is a significant complication associated with meconium-stained amniotic fluid in postdates pregnancies. MAS occurs when a newborn breathes a mixture of meconium and amniotic fluid into the lungs around the time of delivery. This condition is a leading cause of severe illness and death in newborns and occurs in about 5 percent to 10 percent of births, typically when the fetus is stressed during labor, particularly if the infant is past its due date.(10, 11) While MAS can cause immediate respiratory distress and breathing problems, it is rare for the syndrome to result in long-term complications or health conditions.

The management of a newborn delivered with meconium-stained amniotic fluid (MSAF) is critical. Early detection and intervention are essential for improving outcomes and reducing the risk of long-term complications or health conditions associated with MAS. Focus on providing effective respiratory support, which may include positive pressure ventilation (PPV) and other resuscitative measures as required. Current protocols emphasize the importance of differentiating between vigorous and non-vigorous infants to guide immediate interventions.(12) The current guidelines in 2024 by the American College of Obstetricians and Gynecologists' Committee on Obstetric Practice, showed the importance of avoiding tracheal suctioning in vigorous infants and instead focusing on those who show signs of distress.

A study published in the Nepal Health Research Council journal revealed that intrauterine meconium passage in near-term or term fetuses, associated with feto-maternal stress factors and infections, has contributed to an increased rate of cesarean sections.(13)

The diagnostic tools for detecting meconium-stained liquor in postdates pregnancies primarily involve clinical signs and evidence-based algorithms aimed at assessing amniotic fluid abnormalities during labor. One such study focuses on creating these algorithms for use in low- and middle-income birth facilities, particularly for low-risk, singleton pregnancy.

MATERIAL AND METHODS

A cross sectional study was conducted at Shifa International Hospital Islamabad, from December 2018 to June 2019. The sample size of 225 cases was calculated by using WHO calculator with Confidence level **(**95%), margin of error (3.5%) and taking expected percentage of meconium stained liquor (7.7%) in postdates pregnancy. After taking approval from ethical review board and department, the patients were included through convenient sampling. All females fulfilled selection criteria were enrolled in the study from labor room of Department of Obstetrics & Gynecology. After obtaining informed consent all demographic information (name, age, parity, BMI, gestational age) were recorded. Then, females were followed-up in labor room by researcher herself. During labor, time of rupture of membranes and appearance of meconium was noted. Depending upon the consistency and color, liquor was grouped as thick (deep green), thin (yellow) and moderately stained. If present, then meconium-stained liquor was labeled (as per operational definition). All this information was recorded on a specially designed proforma.

Data was entered and analyzed through SPSS version 26. The quantitative data like age, BMI and gestational age were presented as mean and standard deviation. Qualitative variables like meconium-stained liquor were presented as frequency and percentage. Parity was also presented as frequency. Data was stratified for age, gestational age, parity and BMI. Post- stratification, meconium-stained liquor was compared in stratified groups by using chi-square test considering

P-value≤0.05 as significant.

RESULTS

The mean age of females was 29.43±6.10years. The mean gestational age of females at the time of delivery was 40.40±0.49 weeks. The mean BMI of females was 25.52±5.13kg/m^2. The demographic distribution is shown in table 1. There were 45 (20%) primigravida (parity 0), 42 (18.7%) had parity 1, 65 (28.9%) had parity 2, 46 (20.4%) had parity 3 and 27 (12%) had parity 4 as shown in figure 1. Meconium-stained liquor was observed in 52 (23.11%) cases (fig. 2).

In patients aged 20-30 years, meconium-stained liquor was observed in 34 (26.4%) cases. In patients aged 31-40 years, meconium-stained liquor was observed in 18 (18.8%) cases. The difference was insignificant (p>0.05).

In patients delivered at 40-week, meconium-stained liquor was observed in 34 (25%) cases. In patients delivered at 41-week, meconium-stained liquor was observed in 18 (20.2%) cases. The table 2 shows relationship of meconium-stained liquor with variables. In primigravida, meconium-stained liquor was observed in 11 (24.4%) cases. In multigravida, meconium-stained liquor was observed in 41 (22.8%) cases. The difference was insignificant (p>0.05). In underweight patients, meconium-stained liquor was observed in 6 (30%) cases. In patients of normal BMI, meconium-stained liquor was observed in 23 (26.7%) cases. In overweight patients, meconium-stained liquor was observed in 14 (20.6%) cases. In obese patients, meconium-stained liquor was observed in 9 (17.6%) cases. The difference was insignificant (p>0.05).

Table 1: Demographic distribution of pregnant females with postdate delivery.

Parameter	Mean	Standard Deviation
Age (years)	29.43	6.1
Gestational Age (weeks)	40.4	0.49
BMI (kg/m^2)	25.52	5.13

Table 2: Relationship of meconium-stained liquor with age, gestational age, parity and BMI.

Variable		Meconium-Stained Liquor (Yes)	Meconium-Stained Liquor (No)	Percentage (Yes)	P-Value
Age (years)	20–30	34	95	26.40%	0.181
	31–40	18	78	18.80%	
Gestational Age (weeks)	40	34	102	25.00%	0.406
	41	18	71	20.20%	
Parity	Primigravida	11	34	24.40%	0.812
	Multigravida	41	139	22.80%	
BMI (kg/m^2)	Underweight	6	14	30.00%	0.518
	Normal	23	63	26.70%	
	Overweight	14	54	20.60%	
	Obese	9	42	17.60%	

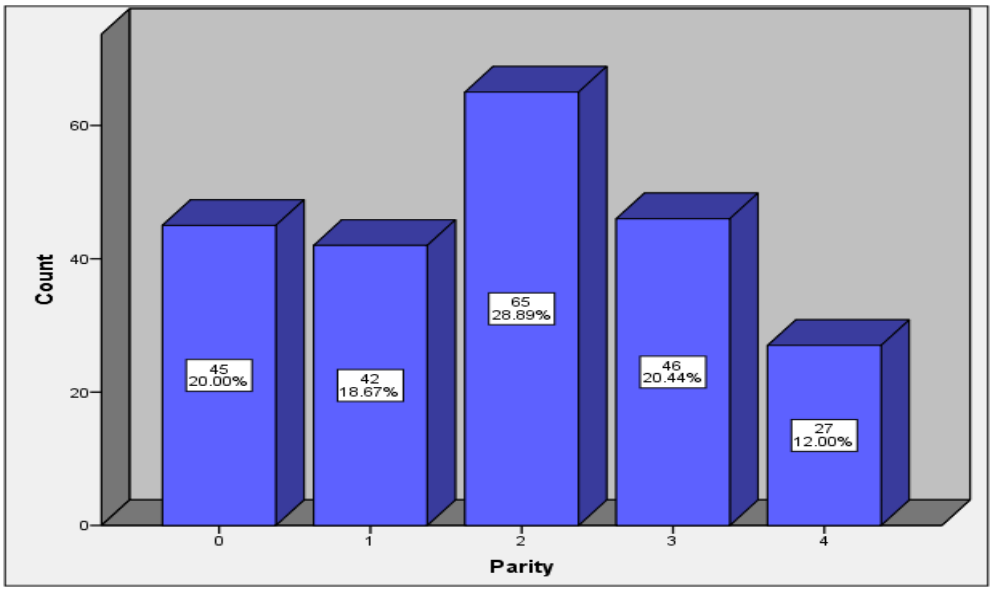

Fig 1. Frequency distribution of parity among females

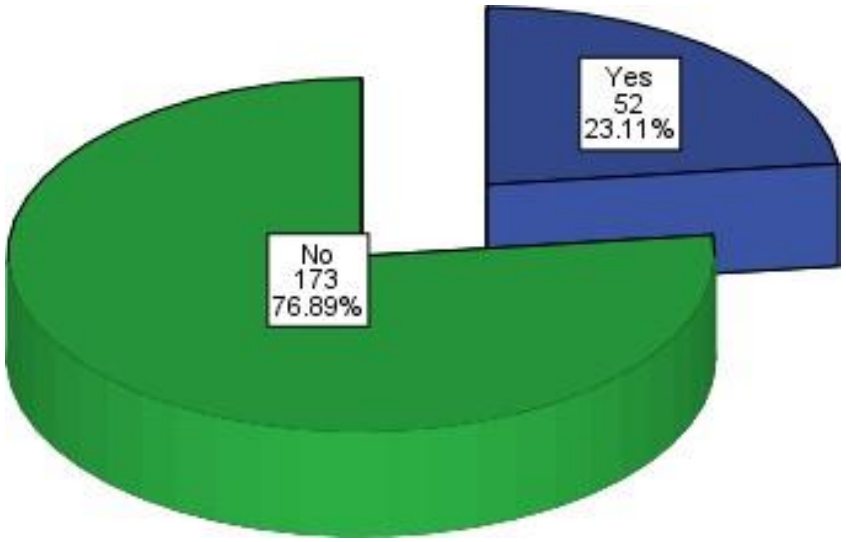

Fig 2. Percentage of pregnant females with meconium stained liquor

DISCUSSION

Post-term pregnancy is a pregnancy that extends to 42 weeks of gestation or beyond. Fetal, neonatal and maternal complications associated with this condition have always been underestimated. It is not well understood why some women become post-term although obesity, hormonal and genetic factors have been implicated. The management of post-term pregnancy constitutes a challenge to clinicians; knowing who to induce, who will respond to induction and who will require a caesarean section.(14)

In our study 23.11% females had postdate meconium-stained liquor. Meconium-stained amniotic fluid or liquor, was found in about 10-15% of all pregnancies in another study. The etiology and pathophysiology of meconium-stained liquor is poorly understood. It is generally believed that the presence of Meconium-stained liquor in other circumstances is a marker of fetal distress and may be associated with adverse fetal and neonatal outcome.(15)

One study showed that there were only 7.7% females who had meconium-stained liquor in postdates pregnancy. In another study, frequency of meconium-stained liquor was 17.1% among females with postdates pregnancy.(16) One more study found meconium-stained liquor in

23.53% cases in postdates pregnancy. In post term pregnancies the incidence varies from 28-52%. Post-date deliveries in subjects with meconium-stained amniotic fluid and 1% postdate delivery in subjects with clear liquor group.(17)

The exact etiology of meconium-stained liquor remains unclear. Previous studies have demonstrated that the incidence of meconium-stained liquor rises with gestational age. A study found that in 98.4% of cases with meconium-stained liquor, the neonates were admitted to the neonatal intensive care units, these were delivered at 37 weeks of gestational age or later as it shows maturation of autonomic nervous system.(18)

The study showed that MSL was more frequent in younger women aged 20–30 years (26.4%) compared to those aged 31–40 years (18.8%), although the difference was statistically insignificant ($p = 0.181$). This is same findings as in other study, higher prevalence of MSL in younger women, due to physiological immaturity of the cervix and uterine function, potentially increasing the risk of fetal stress.(19)

MSL was slightly more common at 40 weeks of gestation (25.0%) compared to 41 weeks (20.2%), though this difference was not significant ($p = 0.406$). Prior research, such as the work of Karmarker et al., suggests that MSL incidence increases with advancing gestation due to progressive fetal maturity and gastrointestinal motility.(20)

Primigravida women exhibited a slightly higher frequency of MSL (24.4%) compared to multigravida women (22.8%), with no significant difference ($p = 0.812$). This is consistent with the findings of Gupta et al., who reported a marginally increased incidence of MSL in primigravida, likely due to prolonged labor and uterine inexperience.(21)

The incidence of MSL varied across BMI categories, with the highest prevalence in underweight women (30.0%) and the lowest in obese women (17.6%), although the differences were not statistically significant ($p = 0.518$). These findings are same as noted in another study higher rates of MSL in underweight women due to possible nutritional deficiencies impacting placental function.

CONCLUSION

The frequency of meconium-stained liquor is low but not ignorable. So in future, post-date pregnancy should be carefully handled during delivery to avoid meconium stained liquor. Meconium-stained liquor is the most occurring problem in postdate pregnancy, usually encountered by obstetricians. Now we have got the local evidence and we will recommend to deliver such cases through cesarean section in order to prevent meconium stained liquor and its complications and update guidelines to manage postdates pregnancy without risking the life of fetus and mother and prevent meconium stained liquor and its complications.

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