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CARDIOTOCOGRAPHY AND PERINATAL OUTCOME IN WOMEN WITH AND WITHOUT MECONIUM-STAINED LIQUOR IN TERTIARY CARE CENTER PUMHS NAWAB SHAH.

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ABSTRACT:

BACKGROUND: When meconium is present in the amniotic fluid, it gives the fluid a greenish hue. This can happen for various reasons, such as fetal stress, post-term pregnancy, or other factors. Healthcare providers need to be aware of meconium staining during labor and delivery.

OBJECTIVE: To determine cardiotocography (CTG) tracings and perinatal outcomes in women with and without meconium-stained labour.

MATERIAL AND METHODS:

Study Design: A prospective cohort study.

Settings: This study will be conducted at the Department of Obstetrics and Gynecology, PUMHS NAWABSHAH.

Duration of Study: Six months from 07-11-2023 to 06-05-24.

Sample Size: Calculated by using WHO sample size determination software.

Sample Technique: Non-probability consecutive sampling.

SUBJECTS & METHODOLOGY: Sixty-four women presenting in labour were decided to be selected and studied. Thirty-two patients with clear and 32 with meconium-stained liquor will be selected. After a patient fulfilled the eligibility criteria examination was done patients were selected with meconium-stained and clear liquor. Their admission CTG, interval (30 minutes) CTG, cervical dilation, duration of labour, the need for syntocinon, mode of delivery, and perinatal outcome with APGAR score were noted in the datasheet. Patients with reassuring patterns. Whenever a patient shows reassuring patterns, vaginal delivery was planned but in those with pathological traces, urgent delivery was considered. All data was collected and analyzed via SPSS 25.

RESULT: Overall no statistically significant difference was observed between the two main groups (meconium stained and not stained) in terms of cardiotocography findings, however, Significant differences were observed in cardiotocography findings among the different

meconium grading groups (P<0.0001). Significant differences were also observed in APGAR scores at 5 minutes among the meconium grading groups (P<0.0001).
CONCLUSION: Abnormal CTG tracing was seen in higher grades of the meconium-stained liquor group (MSL). The Grade 3 meconium tracing is related to poor APGAR score and increased risk of abdominal delivery.

INTRODUCTION:

A monitoring method used to measure uterine contractions and the fetal heart rate during pregnancy is called cardiotocography. When evaluating the health of the fetus during pregnancy, cardiotocography is an essential instrument. A fetus's health and growth may be learned a great deal by keeping an eye on its heart rate and uterine contractions. Another useful technique for keeping an eye on the health of the fetus during birth is cardiotocography (CTG). CTG, which was created in the middle of the 20th century, enables medical professionals to evaluate both uterine contractions and the fetal heart rate at the same time. Healthcare professionals may make well-informed judgments on the necessity of interventions to guarantee safe delivery with the assistance of CTG, which provides real-time information on the mother's contractions and the baby's heart rate.

It's crucial to understand the limits of CTG, though, as it's not always reliable and may not always be an accurate indicator of fetal health.

Because of its limitations, CTG may not always give a clear picture of the perinatal outcome when used alone for monitoring. To guarantee the best potential results for mother and child, healthcare practitioners must carefully evaluate all aspects, including the presence of meconium staining, while diagnosing and managing pregnancies.

Fecal discomfort may be indicated by stool discharged in pregnancy, as shown by meconium-stained amniotic fluid.[1]

Meconium-stained liquor may result from fetal hypoxia, intrauterine infection, or post-term pregnancy, among other causes, and may pose concerns to

About 12–14% of pregnancies are having meconium staining of the amniotic fluid, which may indicate asphyxia[3]. It is disputed if meconium-stained amniotic fluid alone indicates fetal distress, and its accuracy in predicting fetal compromise has been called into question.[1,2]

Nonetheless, because meconium staining and symptoms of hypoxia are linked to an increase in prenatal morbidity and death, its existence continues to worry obstetricians and neonatologists[1].

Although the presence of clear amniotic fluid is often regarded as a comforting indication during labor, meconium presence is not a reliable indicator of the condition of the fetus2. When there is no CTG available, doctors use intrapartum fetal auscultation and the color of the meconium to detect fetal distress.

Although the bulk of the research has produced contradictory findings, some have revealed a connection between aberrant cardiotocography findings and the presence of meconium-stained fluid. Our goal in this study is to find out if there is any relationship between perinatal outcomes and cardiotocography in women who have or have not had liquor tainted with meconium. Enhancing prenatal care and improving the health of the mother and fetus can be greatly aided by knowing how CTG affects perinatal outcomes in these situations.

This research will yield important data about the application of cardiotocography and its impact on perinatal outcomes in women whose beverages have been tainted by meconium.

SUBJECTS & METHODOLOGY:

A decision was made to choose sixty-four women who were presenting with labor symptoms. 32 patients who presented with liquor tainted with meconium and thirty-two patients with clean liquor will be chosen. After a lady satisfied the requirements, a vaginal exam was carried out. Artificial rupture of the membranes was performed if labor was detected, and the cervix was judged to be favorable with intact membranes. The research also included the women whose membranes spontaneously burst at term. An initial 30-minute CTG will be performed, and subsequent CTG will be performed sporadically, on women who have clear liquor and grade 1 staining in their amniotic fluid. Continuous CTG was maintained in women with meconium-stained liquor grade 2, in active labor. Vaginal birth was scheduled for those with reassuring CTG patterns but in those with grade 3 liquor concerning CTG trace, resuscitative interventions, including as oxygen administration, repositioning the mother, rehydration, and stopping the administration of oxytocin, were taken into consideration. But if a disconcerting pattern continued or the tracings turned pathologic, an emergency Caesarean section was performed to deliver the baby. SPSS 25 was used for data collection and analysis. For categorical variables, a chi-square test (or Fisher's exact test, if applicable) was used to compare the two groups, and a student t-test was used for continuous variables with a normal distribution. Statistical significance will be defined as a probability value less than 0.05. We'll compute the relative risk and its 95% confidence intervals.

RESULTS

Cardiotocographic and Perinatal Characteristics of Study Patients

A total of 64 women undergoing labor were included in the study. We chose 32 women who had clear liquor and 32 with meconium-stained liquor (any grade). The overall distribution of cardiotocographic and perinatal characteristics of study patients is summarized in Table 1. The majority of participants (*n*=41, 64.1%) exhibited reassuring cardiotocography patterns during monitoring, while 23.4% (*n*=15) showed suspicious patterns, and 12.5% (*n*=8) presented pathological patterns. Similarly, intrapartum cardiotocography revealed reassuring patterns in 65.6% (*n*=42) of cases, with 18.8% (*n*=12) showing suspicious patterns and 14.1% (*n*=9) demonstrating pathological patterns. Syntocinon injection was administered in 35.9% (*n*=23) of cases. Cervical dilatation at the time of admission varied, with 34.4% (*n*=22) of participants having dilatation less than 5 cm, 53.1% (*n*=34) having dilatation between 5 and 9 cm, and 12.5% (*n*=8) having complete dilatation (10 cm). The mean duration of labor was 4.64 ± 1.01 hours. The majority of deliveries (*n*=42, 65.6%) were spontaneous vaginal deliveries, followed by Caesarean sections (*n*=18, 28.1%) and induced vaginal deliveries (*n*=4, 6.3%). The APGAR score at 5 minutes was less than 7 in 31.3% (*n*=20) of neonates. Meconium-stained liquor was observed in 50.0% of cases. Among these, meconium grading revealed clear meconium in 50.0% (*n*=32) of cases, Grade 1 in 23.4% (*n*=15), Grade 2 in 17.2% (*n*=11), and Grade 3 in 9.4% (*n*=6) of cases.

CTG.Abnormality.Admission

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Reassuring	41	64.1	64.1	64.1
	Suspicious	15	23.4	23.4	87.5

	Pathological	8	12.5	12.5	100.0
	Total	64	100.0	100.0	

APGAR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	>=7	44	68.8	68.8	68.8
	<7	20	31.3	31.3	100.0
	Total	64	100.0	100.0	

Comparison of Cardiotocographic and Perinatal Characteristics in Patients with and without Meconium Stained Liquor

Of the 64 patients included in the study, 32 patients each were in the clear liquor and meconium-stained liquor groups. The comparison of cardiotocographic and perinatal characteristics between these two groups is presented in Table 2. In the group with meconium-stained liquor present, 56.3% (*n*=18) of cases exhibited reassuring patterns, while 25.0% (*n*=8) showed suspicious patterns and 18.8% (*n*=6) demonstrated pathological patterns. In comparison, the group with clear liquor had 71.9% (*n*=23) reassuring, 21.9% (*n*=7) suspicious, and 6.3% (*n*=2) pathological cardiotocography patterns.

In the intrapartum CTG, the group with meconium-stained liquor present showed 56.3% (*n*=18) reassuring, 21.9% (*n*=7) suspicious, and 21.9% (*n*=6) pathological patterns, while the group with clear liquor demonstrated 75.0% (*n*=24) reassuring, 15.6% (*n*=5) suspicious, and 9.4% (*n*=3) pathological patterns. There were no significant differences between the groups in terms of the need for Syntocinon injection administration (*P*=0.193), cervical dilatation at admission (*P*=0.429), mean labor duration (*P*=0.394), delivery mode (*P*=0.253), or APGAR score at 5 minutes (*P*=0.106).

Comparison of Cardiotocographic and Perinatal Characteristics in Women based on Meconium Grading

Based on meconium grading, patients were categorized into four groups: Clear meconium (*n*=32), meconium grade 1 (*n*=15), meconium grade 2 (*n*=11), and meconium grade 3 (*n*=6). The comparison of cardiotocographic and perinatal characteristics among these groups is shown in Table 3. Significant differences were observed in cardiotocography findings among the different

meconium grading groups (P<0.0001). Specifically, the proportion of reassuring cardiotocography patterns decreased with increasing meconium grading. In the clear liquor group, 71.9% (n=23) had reassuring patterns, while in meconium grade 1, it was 93.3% (n=14), meconium grade 2 was 36.4% (n=4), and meconium grade 3 was 0.0% (n=0). Conversely, the incidence of pathological (n=4, 66.7%) cardiotocographic patterns increased with higher meconium grading (meconium grade 3). Similarly, significant differences were noted in intrapartum cardiotocography changes among the meconium grading groups (P=0.002). The clear liquor group had the highest proportion of reassuring patterns (75.0%, n=24), while the meconium grade 1 and meconium grade 2 groups showed a decline in reassuring patterns with increasing meconium grading. There were significant differences observed among the meconium grading groups in terms of cervical dilatation at admission (P=0.001), labor duration (P=0.034), delivery mode (P<0.0001), and APGAR score at 5 minutes (P<0.0001). Specifically, cervical dilatation less than 5 cm was more prevalent in meconium grade 1 (n=9, 60.0%) and meconium grade 2 (n=4, 36.4%) groups compared to the clear meconium group (n=9, 28.1%). Moreover, the mean labor duration differed significantly across the groups, with the meconium grade 3 (3.50 ± 1.98 hours) group having the shortest duration. Regarding delivery mode, the clear liquor group predominantly had spontaneous vaginal deliveries (n=24, 75.0%), while the meconium grade 3 group mostly underwent Caesarean sections (n=6, 100.0%). Additionally, significant differences were observed in APGAR scores at 5 minutes among the meconium grading groups (P<0.0001).

Crosstab

			Grading.Meconium				
			Clear	Grade 1	Grade 2	Grade 3	Total
Intrapartum.CTG.Changes	Reassuring	Count	24	13	5	0	42
		% within Grading.Meconium	75.0%	86.7%	45.5%	.0%	65.6%
	Suspicious	Count	5	2	3	2	12
		% within Grading.Meconium	15.6%	13.3%	27.3%	33.3%	18.8%
	Pathological	Count	3	0	3	4	10
		% within Grading.Meconium	9.4%	.0%	27.3%	66.7%	15.6%
Total		Count	32	15	11	6	64
		% within Grading.Meconium	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	29.074[a]	6	.000
Likelihood Ratio	27.970	6	.000
Linear-by-Linear Association	14.981	1	.000
N of Valid Cases	64		

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .75.

DISCUSSION:

Meconium-stained amniotic fluid is a concerning condition for physicians and obstetricians alike, as it is linked to elevated incidence of cesarean delivery and perinatal illness.

Up to 20% of births can involve a patient who presents with liquor tainted with meconium. Aspirating thick fluid can have serious repercussions for the fetus, including newborn death. Higher risks of atypical labor, fetal distress, the need for intervention during labor, and a low APGAR score are associated with this syndrome.

Because of the study's design, we were unable to characterize the frequency of meconium-stained liquor.

We examine the effects of meconium-stained liquor on perinatal outcomes and anomalies of the fetal heart rhythm.

In our study, most women presented had reassuring CTG traces at the admission (n= 23 in the clear liquor group, n= 18 in meconium-stained liquor), the same findings seen in intrapartum CTG.

On comparing the two main groups, we did not find any significant difference in terms of the need for Syntocinon injection administration (*P*=0.193), cervical dilatation at admission (*P*=0.429), mean labor duration (*P*=0.394), delivery mode (*P*=0.253), or APGAR score at 5 minutes (*P*=0.106).

When different grading was seen in meconium-stained liquor, CTG findings worsened as the grade increased. Pathological CTG was frequently seen in grade 3 meconium liquor. the same findings were observed in a prospective cohort study conducted at Agha Khan University, by BE Odongo et al[4], which compared CTG findings among clear versus meconium-stained liquor and found suspicious and pathological tracing were more common in higher grades of meconium. Jeevitha, K et al[5] in 2023 also presented the same findings in their study of increased abnormal CTG in higher grades of meconium. Some other studies also proposed the same remarks.[6,7]

The study found that women with meconium-stained liquor were more likely to undergo Caesarean delivery. This finding was also seen in a study done by BE Odongo et al[4,] by Jeevitha, K[5], Nirmala[6], Vandana[8], Aruna, M,[9] Samarawickrama[10], Trupti, J[11].

This might reflect the unnecessary hurry and fear of obstetricians for the baby thus keeping a low threshold for abdominal delivery.

However, the mode of delivery selections should be based on a personalized therapeutic strategy that compares the anticipated time to vaginal birth with the anticipated time to the commencement of electrolyte-induced harm.
There was no significant difference in Apgar scores between the two groups. That is against the result obtained by Pooja et al[12], Divya, Net al[13], Kapil, Singh et al[14], and Asma, Qayyum, et al[15] in their studies, they found low APGAR with meconium-stained liquor.
However, a significant difference in APGAR was seen among patients with different grades of meconium staining in candidates having meconium-stained liquor at the start. Favoring results of the above-mentioned studies.

Overall, throughout labor, an aberrant fetal heart rate pattern was shown to be significantly correlated with the thickness of the meconium.
greater grades of meconium-stained liquid may have several negative effects, including a greater risk of cesarean sections, poor Apgar scores, neonatal hospitalizations, and perinatal death. Therefore, only when meconium is linked to aberrant fetal heart rates is it linked to obstetric risk and a markedly elevated risk of unfavorable newborn outcomes in the amniotic fluid. Meconium-stained amniotic fluid primarily serves the clinical purpose of alerting the obstetrician to the need to monitor the fetus for any new symptoms of impairment.

CONCLUSION:
There were more suspicious and pathologic CTG tracings in the liquor group that had a thicker meconium-stained layer. Thicker meconium was shown to be substantially linked to caesarean birth. Adverse effects on fetuses and neonates are observed in the same cohorts.

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