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A Study of the Prevalence of Meconium Staining among Newborns at Jibla University Hospital

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Abstract: ***The fetal gut has a thick, dark - green, germ - free, odorless stool known as meconium that occurs from 10 weeks of age, but it usually goes through the first 24 to 48 hours after birth. In utero passage of meconium can indicate normal gastro - intestinal maturation or, greater concern, an indication of acute or chronic foetal hypoxia. The aim of the study was to determine the prevalence of meconium staining among newborns at Jibla University Hospital between 13 February and 27 March 2023. During the study period, 39 (17.72%) cases of meconium staining (24 females & 15 males) were enrolled from 220 total birth. Mothers were an average of 27.5 years old. There were 184 (83.6%) normal deliveries and 36 (16.4%) cesarean delivery in the mothers. There was a total of 495 births previous (453 normal deliveries and 42 cesarean deliveries), male to female ratio of the babies born was 118 (54%) males and 112 (46%) females. The mean gestational age in our study was 38.1 weeks, and the rate of meconium staining was 39 (17.72%); Male 15 (38%) and female 24 (62%) department by type of meconium staining to the first 10 (25.6%%), the second 14 (35.9%) and the third 15 (38.5%). The presence of meconium in amniotic fluid, such as gestational age, can be influenced by risk factors, so it is important to monitor during pregnancy.***

Keywords: meconium staining, newborns, gestational age, delivery methods, study prevalence

1. Introduction

Meconium staining, the presence of meconium in the amniotic fluid, is a common occurrence during pregnancy, affecting approximately 8 - 15% of deliveries (**Viswanathan, M., & Kotecha, S.2018).** While meconium staining is often considered a sign of fetal maturity, it can also be associated with potential fetal distress and adverse outcomes for both the fetus and the newborn (**O'Mahony, D., & Ryan, A.2016; Neri, A., & Sibaeva, G. W.2011).** Understanding the significance of meconium staining is crucial for providing optimal prenatal and perinatal care.

The most frequent causes of meconium in amniotic fluid (MAF) are gastro - intestinal fetal maturity, fetal response to hypoxia and intra - uterine infection. Removal or thickening of meconium upon delivery means that the infant has more than twice the possibility of having a pH below 7.1 in the blood of the umbilical artery, A 5 - minute APGAR score of 7 was achieved, compared to clear fluid or meconium fluid during the entire labor (**Poggi *et al.*, 2009).**

The main complication arising from MAF is meconium aspiration syndrome (MAS). Mechanical and chemical effects and inflammatory reactions brought about by MAS

may interfere with the normal passage to extra - uterine life, causing obstructions of the respiratory tract, damage to lung tissue, inactivation of surfactants, chemical pneumonitis and a decrease in oxygen blood pressure **(Usta *et al.*, 2008).**

Although the extent and factors associated with meconium are studied in developed countries, there is inadequate evidence on meconium stained amniotic fluids (MSAF's) magnitude and associated factors to create effective prevention strategies. Consequently, the aim of this study was to determine the prevalence of meconium staining among newborns at Jibla University Hospital.

The existence of MAF in cephalic presentation is of great concern, even among the elderly midwives and obstetricians. Fetal hypoxia is a condition that could be caused by meconium passing, which was once believed to be a clear sign of fetal death 'in utero'. Notwithstanding the contemporary obstetricians can't be indifferent at the viewing of meconium stained fluid during labour which requires strict vigilance of the fetal well - being **(Jain *et al.*, 2017).**

The airways can be obstructed, inflammation can occur, surfactant function can be interfered with, and respiratory difficulties can result in meconium aspiration syndrome (MAS))**Gehlot *et al.*, 2021).** Perinatal morbidity and mortality can be increased by MSAF, a risk factor that can occur in developed and developing countries**. (Asha P. S., Sujatha T. L., 2021).**

Because of many factors associated with socio - economic aspects and quality of service, the adverse effect of MSAF is even worse in developing countries. This is a difficult situation to design effective prevention strategies due to the lack of information about it) **Addisu *et al.*, 2018).**

Accordingly, the aims of this study are to determine the prevalence of meconium - stained amniotic fluid and risk factors for meconium - stained amniotic fluid at birth.

The Greek word "meconium arion" means "opium - like. " The word meconium is derived from this Greek word. Meconium is the initial substance present in the developing fetal intestines and is the infant's first intestinal motion**. (Asha P. S., Sujatha T. L., 2021).** Meconium can be yellow, brown, or green **(Singh & Mittal, 2020).** The fetal gut contains a thick, dark - green, germ - free, odorless stool known as meconium that is present from the age of 10 weeks, typically, it usually passes within the first 24 to 48 hours after birth. MSAF is a result of meconium being passed into amniotic fluid during pregnancy, which stains it **(Liabsuetrakul & Meher, 2022; Abraham *et al.*, 2018; Addisu *et al.*, 2018).** About 8 - 38% of pregnant women are infected with MSAF, so it is a common disease obstetrics **(Zhu *et al.*, 2023).**

Depending on the standard classification system for meconium, MSAF can be divided into three categories: I (translucent, light green or yellow flesh), II (iridescent, dark green and light yellow, brown), and III (non - transparent and dark green), and depending on the solid contents, the thickly or thinner of the structure can be determined by structural properties **(Unsworth & Vause, 2010).**

Normal gastrointestinal maturation or acute or chronic fetal hypoxia could be indicated by the in - utero passage of meconium. Some of the conditions associated with meconium passage in - utero include placental inadequacy, pre - eclampsia, oligohydramnios, intrapartum infections, and certain maternal medicine **(Monen *et al.*, 2014; Mundhra & Agarwal, 2013; Shaikh *et al.*, 2010).**

The risk of perinatal asphyxia and respiratory distress is higher in babies who are born through a MSAF during their first month of life **(Monen *et al.*, 2014; Mundhra & Agarwal, 2013; Shaikh *et al.*, 2010). .** The MAS is a negative outcome of accidental inhalation of meconium in - utero or during delivery **(Poggi & Ghidini, 2009).** Approximately 3 - 9% of infants delivered with MSAF experience this complication **(Wiswell, 2018).**

Water, mucopolysaccharide, digestive secretions, solids, blood, minerals and fatty acids are a sterilized combination of meconium. Meconium has 5.5 - 7 pH range **(Cleary & Wiswell, 1998).**

The green color of meconium is due to the large concentration of bile pigments excreted by the biliary tract from the fourth month onwards. The fetus is deficient in intestinal bacteria, which explains many of the differences in composition between meconium and adult feces **(Divia, 2018).**

Making attempts to increase people's knowledge of known risk factors, can help to stop or reduce the incidence of this situation, and can also assist in identifying cases more quickly during childbirth. Furthermore, intensive care and quick intervention can enhance neonatal outcomes **(Khatun *et al.*, 2009).**

The MSAF is involved in about 10% to 26% of all deliveries. MSAF is not usually seen before 38 weeks of gestation, even though meconium appears in the intestine early in pregnancy. The risk of MSAF incidence increases by 30% if the fetus is born at a gestation age of 42 weeks or more **(Cleary & Wiswell, 1998).** High rates of surgical delivery and an increase in perinatal asphyxia, perinatal diseases and mortality are associated with MSAF, which causes an increase in maternal morbidity. Ensuring that meconium stained amniotic fluid is not present and that risk factors are identified early can lead to improved maternal and newborn outcome**.)Asha P. S., Sujatha T. L., 2021).**

2. Materials and methods

Study area, design, and populations

The present study is retrospective, descriptive, and quantitative. This study was conducted at Jibla University Hospital from 13 February 2023 to 27 March 2023. Jibla University Hospital is located 6 kilometers southwest of Ibb City, Yemen.

It has been providing service for more than 3millions people in Ibb governorate, with three government hospitals: Al -

Thawra Hospital, Nasser Hospital and Maternity and Childhood Hospital.

Jibla University Hospital is one of the oldest hospitals in Yemen, where it was established in 1965, and was formerly called Jibla Baptist Hospital, which provides the best medical and health services especially in the field of obstetrics.

All procedures have been done by experienced obstetricians and gynecologists. The study included all newborns with or without meconium that were born at Jibla University Hospital, whether natural or caesarean.

Data collection
All neonates admitted to Jibla University Hospital are recorded in a study questionnaire. This served as a database from which the study participants were retrieved.

Data Analysis
After collecting the data, it was rechecked for completeness and consistency and coded before entering it. Frequency and percentages were utilized in the statistical analysis. The chi - square test was conducted for comparative purposes. SPSS software version 23 was used. A 95% limitation and a 5% significance level were adopted. The significance of a P - value under 0.05 was assessed.

3. Results & Discussion

Socio - demographic characteristics: Two hundred and twenty women were enrolled in the study with a 100% response rate. The average age of our study participants was 27.5 years (Table 1).

Obstetrics related characteristics: The mean gestational age were 38.1 weeks. The 17 (7.7%) mothers had a premature opening of the obstetric sinus. Births were distributed in the study to normal birth184 (83.6%) and caesarean36 (16.4%). History of previous births163 (74%) compared to no history of previous births 57 (26%). Total previous births were 495 distributed to 453 normal deliveries and 42 caesarean deliveries (Table1).

Medical characteristics: Concerning medical conditions of mothers, two (0.90%) mothers had anemia, two (0.90%) had asthma, two (0.90%) had diabetes, one (0.45%) had pulmonary tuberculosis, one (0.45%) had eclampsia and one (0.45%) had PET (Table1).

Table 1: Characteristics of the study population (Mothers=220)

Variables	Total (N, %)
Mothers' Average ages	27.5
15 - 19	20 (9%)
20 - 24	54 (24.5%)
25 - 29	67 (30.5%)
30 - 34	38 (17%)
35 - 39	30 (13.6%)
40 - 44	10 (4.5%)
45 - 49	1 (.5%)
Mothers' Average weight	55.8
30 - 38	5 (2%)
39 - 46	9 (4%)
47 - 55	79 (35.9%)
56 - 64	59 (26.8%)
65 - 73	26 (11.8%)
74 - 82	5 (2%)
83 - 91	35 (15.9%)
92 - 100	2 (.9%)
Birth type:	
Normal birth	184 (83.6%)
Caesarean	36 (16.4%)
Previous obstetric:	
Previous obstetric history	
Yes	163 (74%)
No	57 (26%)
Type of Previous obstetric	
Normal birth	453
Caesarean	42
Premature opening of the obstetric sinus:	
Yes	17 (7.7%)
No	203 (92.3%)
Other diseases:	
Anemia	2 (0.90%)
Asthma	2 (0.90%)
Diabetes	2 (0.90%)
Pulmonary tuberculosis	1 (0.45%)
Eclampsia	1 (0.45%)
PET	1 (0.45%)
Nothing	211 (96)
Gestational age:	
Average gestational age in weeks	38.1
24 - 27	1 (0.5%)
28 - 31	2 (0.9%)
32 - 35	17 (7.7%)
36 - 39	151 (68.6%)
40 - 43	48 (21.8%)
44 - 47	0 (0%)
48 - 51	1 (.5%)

Prevalence of meconium staining: The prevalence of meconium staining was found to be 39 (17.72%) (24 females & 15 males) were enrolled from 220 total birth during the study period distributed according to types of meconium staining: the first 10 (25.6%) (Male 6 (15.38%) & Female 4 (10.26%)), the second 14 (35.9%) (Male 4 (10.26%) & Female 10 (26.6%)) and the third 15 (38.5%%) (Male 5 (12.82%) & Female 10 (26.64%)) (Table - 2).

Newborn: Gender of newborn were in the study to male 118 (54%) and female 102 (46 %), The mean weight of the study newborns was 3.37 and the mean length 48.66. Found some diseases at birth RDS 2 (0.90%) and RD - Hypoxia 1 (0.45%) (Table - 3).

Factors associated with meconium staining: The association between socio - demographic characteristics, obstetrics related characteristics and medical related characteristics of women, and meconium staining were assessed; maternal age, mothers' weight, mode of delivery, number of previous obstetric, premature opening of the obstetric sinus, maternal illness and gestational age we did not find here any relationship between these factors and between the prevalence of meconium staining among newborns (Table - 4).

Table 2: Neonatal and maternal demographic characteristics (n=39)

Demographic characteristics		Number (%)
Mothers'	Mothers' ages (year)	27.7 (±6.6) (Mean ± SD)
	15 - 19	15 (38%)
	20 - 24	14 (36%)
	25 - 29	10 (26%)
	30 - 34	0 (0%)
	35 - 39	0 (0%)
	40 - 44	0 (0%)
	45 - 49	0 (0%)
	Mothers' weight (kg)	57.2 (±10.16) (Mean ± SD)
	30 - 38	1 (3%)
	39 - 46	5 (13%)
	47 - 55	13 (33%)
	56 - 64	14 (35%)
	65 - 73	4 (10%)
	74 - 82	1 (3%)
	83 - 91	1 (3%)
	92 - 100	0 (0%)
	Gestational age (week)	38.1 (±2.47) (Mean ± SD)
	24 - 27	0 (0%)
	28 - 31	0 (0%)
	32 - 35	5 (13%)
	36 - 39	22 (56%)
	40 - 43	12 (31%)
	44 - 47	0 (0%)
	48 - 51	0 (0%)
	Birth type:	
	Normal birth	34 (87.2%)
	Caesarean	5 (12.8%)
	Premature opening of the obstetric sinus:	
	Yes	3 (7.7%)
	No	36 (92.3%)
	Other diseases:	
	Anemia	1 (2.6%)
	PET	1 (2.6%)
	Nothing	37 (94.9%)
Neonatal	**Gender**	
	Male	15 (38.5%)
	Female	24 (61.5%)
	Birth weight (kg)	2.9 (±0.45) (Mean ± SD)
	Birth length (cm)	48.4 (±6.33) (Mean ± SD)
Meconium staining	**Meconium staining**	
	Meconium staining	39: Male 15 (38%) & Female 24 (62%)
	Grades of meconium staining:	
	The first	10 (25.6%): Male 6 (15.38%) & Female 4 (10.26%)
	The second	14 (35.9%): Male 4 (10.26%) & Female 10 (26.64%)
	The third	15 (38.5%): Male 5 (12.82%) & Female 10 (26.64)

Table 3: Characteristics of the study population (Newborn =220)

Variables	Total (N, %)
Gender of born	
Male	118 (54%)
Female	102 (46%)
Newborn Average weight	3.37
Newborn Average length	48.66
Other diseases at birth	
RDS	2 (0.90%)
RD – Hypoxia	1 (0.45%)

Table 4: Risk factors of the study population (n = 220)

Risk Factors	Meconium Condition (P - value)
Maternal age	.496
Mothers' weight	.413
Mode of delivery	.510
Number of previous obstetric	.670
Premature opening of the obstetric sinus	.993
Maternal Illness	.288
Gestational Age	.029*

**P< 0.05*

In this study, rate of meconium staining is 39 (17.72%). Study results similar to previous studies concluded that there is a relationship between gestational age and meconium staining among newborns **(Khatun *et al.*, 2009; Begum *et al.*, 2013; Chaudhary *et al.*, 2018; Dohbit *et al.*, 2018; Chhetri & Aryal, 2020).** . The association between MSAF and gestational age (36 - 43) weeks pregnancy was found to be statistically significant in this study. This result is similar to **G/silassie *et al.*, *(*2022)** study which found that there is an association between gestational age ≥ 41 weeks and MSAF. In late - term pregnancy, the placenta may have reached its maximum size and the age of the placental tissue has begun to diminish, leading to uteroplacental vascular insufficiency and an increase in the risk of MSAF **(G/silassie *et al.*, 2022).** Meconium passage occurs rarely before 34 weeks of pregnancy, but it becomes more common after 37 weeks of pregnancy as gestational age increases. Preventing or reducing the incidence of this condition can be achieved by making efforts to increase people's awareness of known risk factors. Detecting cases more quickly during childbirth can also be aided by it. Furthermore, neonatal outcomes can be improved by intensive care and rapid intervention **(Khatun *et al.*, 2009).**

The presence of MAF had no correlation with the mother's age, similar to the findings of a case control study of 50 women in Turkey (**Simsek *et al.*, 2008).** Comorbidities like high blood pressure, diabetes, and obesity may be more prevalent in older pregnant women. The duration of labor and the release of MAF may be affected by these complications. Previous pregnancies with normal births have been shown to protect against MAF incidence. The presence of MAF is not the only condition for a caesarean to be selected. When making the decision about delivery methods, other variables like cervical dilation progression, previous births, and foetal vitality are taken into account **(Osava *et al.*, 2012).**

4. Conclusion

Meconium - stained amniotic fluid was prevalent in a notable percentage of newborns (17.72%) at Jibla University Hospital .This prevalence aligns with international standards .The presence of meconium can indicate fetal stress and potentially increase complications during birth . Gestational age appears to be a significant risk factor .Close monitoring and appropriate interventions during pregnancy are crucial.

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