Factors Associated With Meconium-Stained Amniotic Fluid Among Postdated Women In Kirkuk Province, Iraq

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KEYWORDS
MSAF; pregnancy, postdated women

ABSTRACT
Background: Meconium-stained amniotic fluid (MSAF), also known as green-stained amniotic fluid, has long been associated with the risk of miscarriage. MSAF is becoming more prevalent as a woman gets older and reaches a peak of 15% around delivery time. Studies indicated that MSAF affects 7–9% of all term births. Objectives: The main aim of this study is to identify whether the prolongation of pregnancy beyond the expected date of delivery has negative effects on the health of both mothers and the neonate. To identify the risk factors related to meconium-stained amniotic fluid among postdated deliveries. Additionally, to identify the risk factors related to MSAF among postdated deliveries. Methodology: The study was carried out over six months in the hospitals in the Kirkuk province region of Iraq. The constructed questionnaire (Using the interviewing technique) was used for data collection. Statistical significance was defined as a P value of less than or equal to 0.05. Results: The study results reveal that the mean age is 28.36 ± 6.52. Concerning residence, most reported that they have been living in urban areas. Regarding the client's educational qualifications, more than half read and write. The gestational age for less than half is 37-40 weeks. Regarding the occurrence of MSAF, the study found a significant association between gestational age, educational qualifications of the mothers, and their residency. Conclusion: MSAF is among the risk factors that jeopardize the life of the mother and the baby during pregnancy and after delivery. The study revealed significant findings among some demographic data such as the mother's gestational age and the area of residency along with the women's educational qualifications with MSAF. The study recommended that extra attention and care be provided to the rural areas which have a crucial role in the prevention of such problems.

1. Introduction

Meconium is the newborn's first stool or discharge from the bowel. Meconium is rare to be seen in the amniotic fluid before 34 weeks despite its presence in the intestine around 12 weeks of pregnancy (Monfredini et al., 2021). Meconium-stained amniotic fluid (MSAF) or meconium passage during labor causes many adverse effects that increase the risks of repellent birth outcomes (Addisu & Mekie, 2023). MSAF, sometimes called green-stained amniotic fluid occurs frequently in routine obstetric care (Gallo et al., 2023). According to Martínez-Burnes & Mota-Rojas (2019), meconium contains mucus, pancreatic secretions, intestinal bile acids, desquamated cells from the fetal skin and intestine, and vernix caseosa. More recent studies indicated that 7–22% of all term births are affected by MSAF, and the rate could increase to 40% among post-term pregnancies (Levin et al., 202; Gallo et al., 2023; Addisu & Mekie, 2023). Meconium-stained amniotic fluid is associated with several disorders, including diabetes mellitus, ruptured membranes, pre-eclampsia, oligohydramnios, postdated mothers, extended gestational age, and miscarriage risk has long been linked to MSAF (Dereje et al., 2023; Addisu et al., 2018). Also, MSAF is associated with meconium aspiration syndrome (MAS) and could be linked to other neonatal problems such as acute respiratory distress syndrome (ARDS) and hypoxic-ischemic encephalopathy (HIE) (Levin, et al., 2021). MSAF, in addition to its effect on the rate of pregnancies, particularly long and post-term pregnancies, is also associated with greater perinatal mortality and morbidities and may be a worrisome sign of fetal deterioration (Shakya et al., 2022; Abate et al., 2021). Furthermore, pre-eclampsia may be related to the degree of hypoxia, particularly in cases of placental abruption, which results in the fetus's severe hypoxia and eventual mortality, (Abdul-Kader & Ghalib, 2020). Moreover, insufficient nutrition transport and uteroplacental insufficiency have been linked to these poor newborn outcomes. Additionally, according to Mohammed, MSAF may be connected to cesarean sections (2019).The following are necessary for accurately estimating the natural frequency of extended pregnancy: all

pregnancies should be followed up on universally; obstetric interventions should be avoided; the last menstrual cycle and the first-trimester ultrasound measurement of the crown-rump length (CRL) should be used to determine the early pregnancy date (Alrubaee., et al., 2022). The intrauterine transit of the meconium is one possible sign of the physiological process of fetal gastrointestinal tract maturation (Attali et al., 2023). However, starting at about 34 weeks of gestation, the relaxation of the anal sphincter with in-utero meconium transit has been linked to fetal discomfort and infection (Terloyeva et al., 2020). Meconium-stained liquor may be a warning sign of fetal distress, necessitating prompt action and continuous fetal heart rate monitoring (Al-deen Abdulghafor, et al., 2022). Consequently, MSAF is associated with extremely high risks, such as cesarean sections and the difficulties that accompany the procedure and is regarded as an issue for both the mother and the newborn. Determining the maternal variables and sociodemographic impacts can help identify how to develop lifesaving techniques.

Aim of the study

The main aim of this study is to find out the prevalence of MSAF among postdated pregnancies and to identify whether the prolongation of pregnancy beyond the expected date of delivery has negative effects on the health of both mothers and neonates. Also, to identify the risk factors related to meconium-stained amniotic fluid among postdated deliveries.

2. Materials and Methods

Design of the study

A cross-sectional design was used in this research.

Setting and duration of the study

The study was conducted to gather data from different governmental hospitals in the province of Kirkuk, Iraq. The study lasted four months, covered five general hospitals, and ran from November 10th, 2023, to March 20th, 2024.

Tools of the study

Data was collected through a self-constructed questionnaire that employed the interviewing method. To guarantee the samples' comprehension, the questionnaire's language and format were modified and translated into the local Arabic language, as well as the English language, and examined by subject-matter specialists and experts to achieve its reliability and validity. In addition to the experts' examination, a pilot study was conducted before the data collection. The questionnaire was made of three parts; Part I was concerned with sociodemographic data; Part II utilized the maternal and labor characteristics; Part III was about the obstetric complications during delivery. The statistical program for social sciences was used for data processing and statistical analysis (SPP, version 26). Descriptive and inferential statistical data analysis were used to analyze the data.

Population and sampling

The population of the study was the postdated women from Kirkuk governorate and those whose pregnancies extended to or beyond 40 weeks of gestation were recruited as a target population for this study. The accurate sample size decision is made when effect size, type of study, number of predicting variables, measuring methods, and data analysis technique are considered (Serdar, et al., 2021). The appropriate sample size was determined using power analysis through a free sample size calculator program by (Daniel Soper, 2020). The analysis indicated a minimum sample size of 102 participants; however, the sample size was increased to 300 women to include all eligible women in the selected hospitals to increase the power and validity of the study, following the exclusion and the attrition with some of the missing data, the total sample size was 260.

Ethical Considerations

Formal approval to carry out the study was granted by the College of Nursing/University of Kirkuk's scientific review board before beginning the study that took place in Kirkuk Government hospitals. Also, informed consent was obtained from the participants before initiating the study and that included all details of the study purposes, questions, and further details that allowed the participants to understand the process of completing the surveys voluntarily. Further, the Kirkuk Health Directorate's formal permission was granted in addition to approval from the administrators of each hospital to carry out the study.

3. Results and Discussion

Regarding the descriptive analysis, table 1 shows that the mean age of the sample was 28.36 ± 6.52; Concerning residence, most reportedthat they have been living in urban areas (*n = 157*; 60.4%). Regarding the client's educational qualifications, more than half were read and write (*n = 139*; 53.5%), followed by those who were illiterate (*n = 32*; 12.3%). Concerning the client's husband's educational qualifications, the majority of the clients read and wrote (*n = 132*; 50.8%).

Table 1. *Participants' sociodemographic characteristics (N = 260)*

Variable	Frequency	Percent
Age (Years): Mean (SD): 28.36 ± 6.52 15-22. 23-30 31-38 39-45	 51 121 66 22	 19.6 46.5 25.4 8.5
Residence Urban Suburban Rural	 157 30 73	 60.4 11.5 28.1
Client's Educational Qualification Illiterate Read and write Elementary School Graduate High School Graduate Diploma Bachelor's degree	 32 139 27 21 21 20	 12.3 53.5 10.4 8.1 8.1 7.7
Client's Husband's Educational Qualification Illiterate Read and write Elementary School Graduate High School Graduate Diploma	 24 132 32 19	 9.2 50.8 12.3 5.0

Bachelor's degree	13 40	7.3 15.4
Client's Occupational Status Governmental Employee Self-Employed Housewife Student	 26 9 224 1	 10.0 3.5 86.2 .4
Client's Husband's Occupational Status Governmental Employee Self-Employed Out of work Others	 51 121 66 22	 19.6 46.5 25.4 8.5

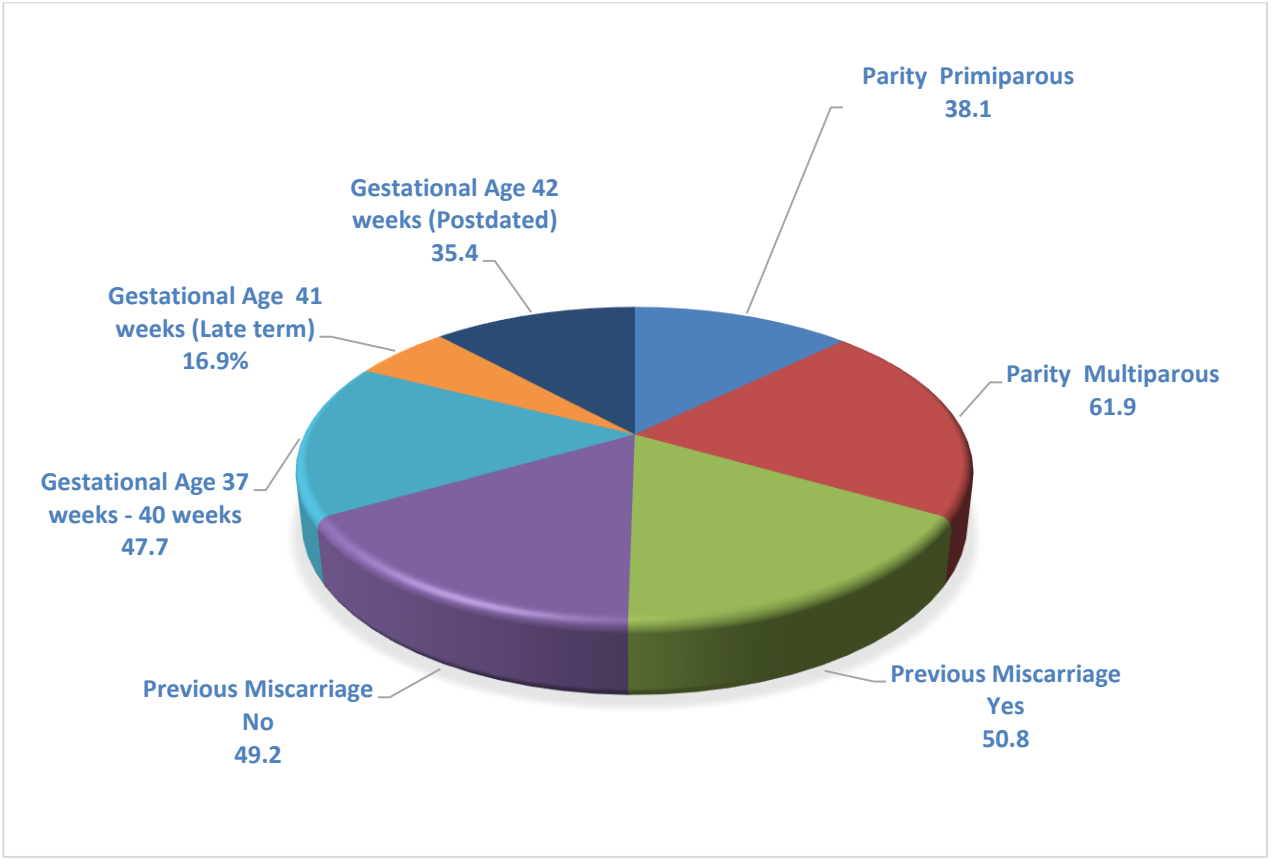

Figure 1. Participants' reproductive status

Figure 1 displays that the majority were multiparous (n = 161; 61.9%), illustrating the participants' gestational age and it revealed that half were37-40- weeks (n = 124; 47.7%), followed by postdated women of gestational age of 42 weeks (n = 92; 35.4%), and those whose gestational age rated under late term gestational age (41 weeks) constitutes (n = 44; 16.9%). Moreover, the same figure showed the miscarriage history among the subjects and distributed between almost half to half between positive and negative answers (50.8%, 49.2%) respectively.

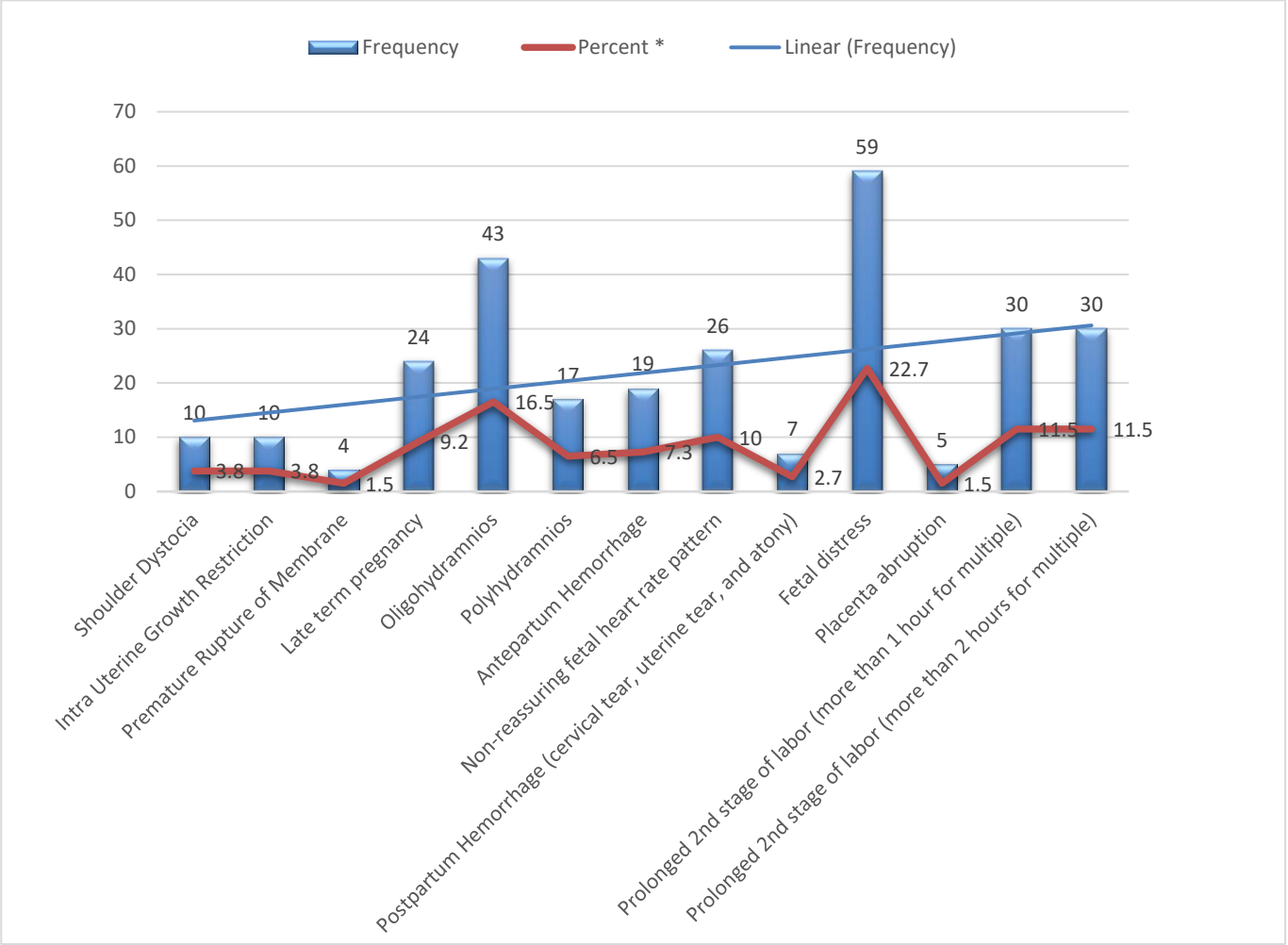

Figure (2). *Obstetric complications during delivery*

Figure 2 revealed the most reported obstetrical complications and that included fetal distress (*n* = 59; 22.7%), oligohydramnios (*n = 43*; 16.5%), prolonged 2nd stage of labor (more than 1 hour for multiple), and prolonged 2nd stage of labor (more than 2 hours for multiple) (*n = 30;* 11.5%) for each of them, non-reassuring fetal heart rate pattern (*n = 26*; 10.0), late-term pregnancy (*n = 24*; 9.2%), antepartum hemorrhage (*n = 19*; 7.3%), polyhydramnios (*n* = 17; 6.5%), shoulder dystocia and intrauterine growth restriction (*n = 10*; 3.8%) for each of them, whereas postpartum hemorrhage (cervical tear, uterine tear, and atony) constitute (*n = 7*; 2.7%), placenta abruption (*n = 5*; 1.9%), and premature rupture of membrane (*n = 4*; 1.5%).

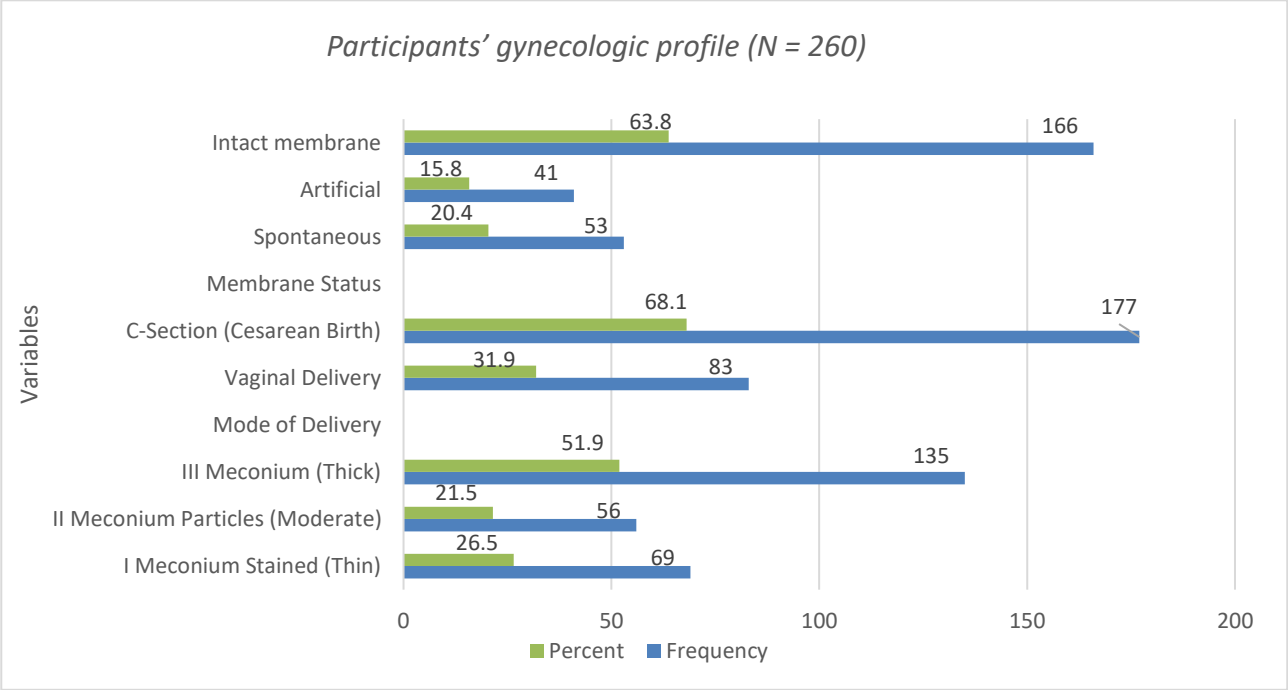

Figure 3. Participants' gynecological profile

Figure 3 shows the study's findings regarding the gynecological profiles of the participants. The figure exhibit that more than a half experience third-grade meconium-stained amniotic fluid (*n = 135*; 51.9%), followed by those who came up with first-grade meconium-stained amniotic fluid (*n = 69*; 26.5%), and those who experienced second grade meconium-stained amniotic fluid (*n = 56*; 21.5%). Concerning the types of delivery, the majority have cesarian section delivery (*n = 177*; 68.1%) compared to those who have normal vaginal delivery (*n = 83*; 31.9%). Regarding subjects' membrane status, the figure shows that most of them have an intact membrane (*n = 166*; 63.8%), followed by those who have spontaneous rupture (*n = 53*; 20.4%), and those who have artificial rupture (*n = 41*; 15.8%).

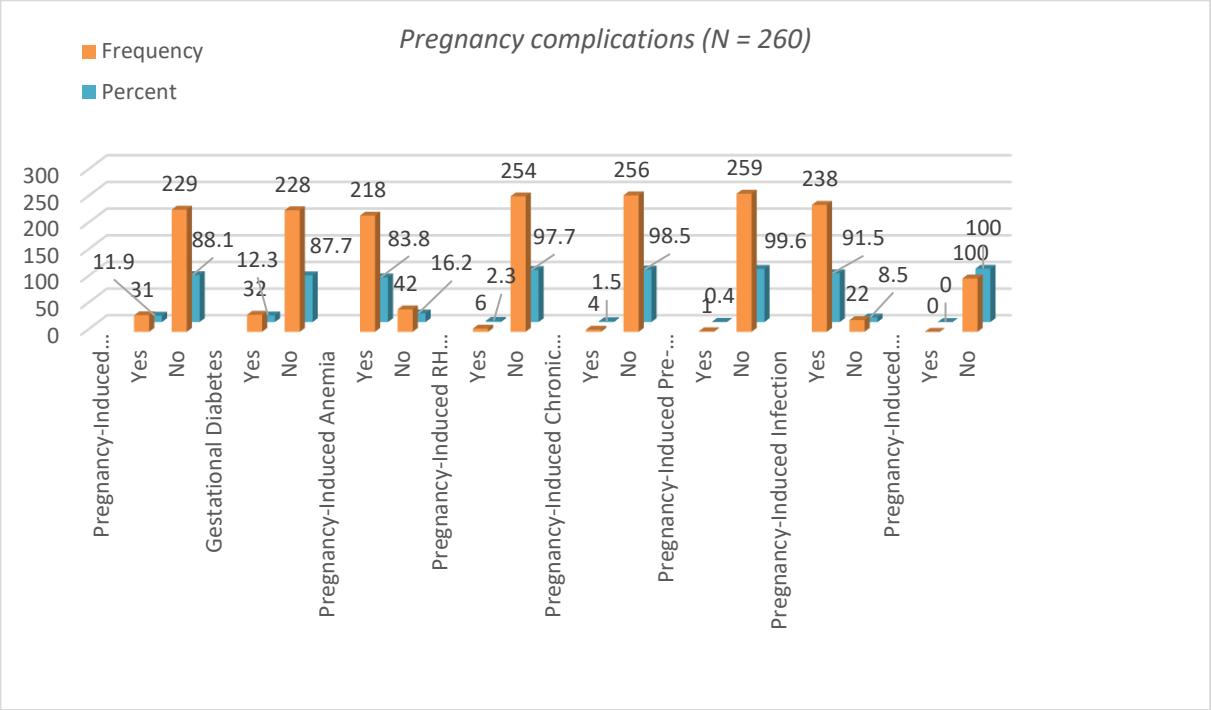

Figure 4. Pregnancy complications

In Figure 4, the study results reveal that the majority do not experience pregnancy-induced hypertension (*n = 229*; 88.1%) and most of them do not experience gestational diabetes (*n = 228*; 87.7%). Regarding pregnancy-induced anemia and pregnancy-induced infection the study indicated that the majority experienced both complications (*n = 218*; 83.8%), (*n = 238*; 91.5%) respectively. Also, a clear majority of the participants did not experience pregnancy-induced RH isoimmunization, pregnancy-induced chronic illness, and pregnancy-induced pre-eclampsia (*n = 254*; 97.7%), (*n = 256*; 98.5%), (*n = 259*; 99.6%) respectively. Moreover, none of the participants encountered pregnancy-induced intrahepatic cholestasis (*n = 260*; 100.0%)

Table 2. Association between staining amniotic fluid and residence

			Residence			Total
			Urban	Suburban	Rural	
Meconium Staining Amniotic Fluid	I Meconium Stained (Thin)	Count	43	7	19	69
		% within Meconium Staining Amniotic Fluid	62.3%	10.1%	27.5%	100.0%
		% within Residence	27.4%	23.3%	26.0%	26.5%
		% of Total	16.5%	2.7%	7.3%	26.5%
	II Meconium Particles (Moderate)	Count	43	8	5	56
		% within Meconium Staining Amniotic Fluid	76.8%	14.3%	8.9%	100.0%
		% within Residence	27.4%	26.7%	6.8%	21.5%

		% of Total	16.5%	3.1%	1.9%	21.5%
	III Meconium (Thick)	Count	71	15	49	135
		% within Meconium Staining Amniotic Fluid	52.6%	11.1%	36.3%	100.0%
		% within Residence	45.2%	50.0%	67.1%	51.9%
		% of Total	27.3%	5.8%	18.8%	51.9%
Total		Count	157	30	73	260
		% within Meconium Staining Amniotic Fluid	60.4%	11.5%	28.1%	100.0%
		% within Residence	100.0%	100.0%	100.0%	100.0%
		% of Total	60.4%	11.5%	28.1%	100.0%
df = 4, Chi-square = 14.967, p-value = .005						

df: Degree of freedom

With respect to inferential statistics, this study found some interesting associations between some of the demographic data and stained amniotic fluid. For instance, in Table 2 a significant association was found between stained amniotic fluid and the samples' residence (x^2 = 14.967, p < 0.05). Similarly, the study showed a significant association between MSAF and both the clients and their husbands' educational qualifications (x^2 = 18.736, p-value = .044, x^2 = 23.027, p <.011) respectively (Tables 3 & 4). Moreover, the study also found a significant association between gestational age and MSAF (x^2 = 40.756, p< 0.000) as illustrated in Table 5. Concerning factors of the family's monthly income, the analysis found a significant association with MSAF in laboring mothers (p< 0.001) as displayed in Table 6.

Table 3. Association between staining amniotic fluid and client's educational qualification

			Client's Educational Qualification						Total
			Illiterate	Read and Write	Elementary School Graduate	High School Graduate	Diploma	Bachelor's degree	
Meconium Staining Amniotic Fluid	I Meconium Stained (Thin)	Count	10	29	10	8	4	8	69
		% within Meconium Staining Amniotic Fluid	14.5%	42.0%	14.5%	11.6%	5.8%	11.6%	100.0%
		% within Client's Educational Qualification	31.3%	20.9%	37.0%	38.1%	19.0%	40.0%	26.5%
		% of Total	3.8%	11.2%	3.8%	3.1%	1.5%	3.1%	26.5%

	II Meconium Particles (Moderate)	Count	4	27	8	8	6	3	56
		% within Grades of Meconium Staining Amniotic Fluid MSAF	7.1%	48.2%	14.3%	14.3%	10.7%	5.4%	100.0%
		% within Client's Educational Qualification	12.5%	19.4%	29.6%	38.1%	28.6%	15.0%	21.5%
		% of Total	1.5%	10.4%	3.1%	3.1%	2.3%	1.2%	21.5%
	III Meconium (Thick)	Count	18	83	9	5	11	9	135
		% within Grades of Meconium Staining Amniotic Fluid	13.3%	61.5%	6.7%	3.7%	8.1%	6.7%	100.0%
		% within Client's Educational Qualification	56.3%	59.7%	33.3%	23.8%	52.4%	45.0%	51.9%
		% of Total	6.9%	31.9%	3.5%	1.9%	4.2%	3.5%	51.9%
Total		Count	32	139	27	21	21	20	260
		% within Grades of Meconium Staining Amniotic Fluid	12.3%	53.5%	10.4%	8.1%	8.1%	7.7%	100.0%
		% within the Client's Educational Qualification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	12.3%	53.5%	10.4%	8.1%	8.1%	7.7%	100.0%
df = 10, Chi-square = 18.736, p-value = .044									

df: Degree of freedom

Table4. Association between staining amniotic fluid and the client's husband's educational qualification

			Client's Educational Qualification						Total
			Illiterate	Read and write	Elementary School Graduate	High School Graduate	Diploma	Bachelor's degree	
Meconium Staining Amniotic Fluid	I Meconium Stained (Thin)	Count	8	40.6%	20.3%	1.4%	7.2%	18.8%	100.0%
		% within Meconium Staining Amniotic Fluid	11.6%	21.2%	43.8%	7.7%	26.3%	32.5%	26.5%
		% within Client's Educational Qualification	33.3%	10.8%	5.4%	0.4%	1.9%	5.0%	26.5%
		% of Total	3.1%	28	7	6	8	4	56
	II Meconium Particles (Moderate)	Count	3	28	7	6	8	4	56
		% within Grades of Meconium Staining Amniotic Fluid MSAF	5.4%	50.0%	12.5%	10.7%	14.3%	7.1%	100.0%
		% within Client's Educational Qualification	12.5%	21.2%	21.9%	46.2%	42.1%	10.0%	21.5%
		% of Total	1.2%	10.8%	2.7%	2.3%	3.1%	1.5%	21.5%
	III Meconium (Thick)	Count	13	76	11	6	6	23	135
		% within Grades of Meconium Staining Amniotic Fluid	9.6%	56.3%	8.1%	4.4%	4.4%	17.0%	100.0%
		% within Client's Educational Qualification	54.2%	57.6%	34.4%	46.2%	31.6%	57.5%	51.9%
		% of Total	5.0%	29.2%	4.2%	2.3%	2.3%	8.8%	51.9%
Total		Count	24	132	32	13	19	40	260

	% within Grades of Meconium Staining Amniotic Fluid	9.2%	50.8%	12.3%	5.0%	7.3%	15.4%	100.0%
	% within Client's Educational Qualification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.2%	50.8%	12.3%	5.0%	7.3%	15.4%	100.0%
df = 10, Chi-square = 23.027, p-value = .011								

df: Degree of freedom

Table 5. Association between staining amniotic fluid and gestational age

			Gestational Age			Total
			37 weeks - 40 weeks	41 weeks (Late term)	42 weeks (Postdated)	
Meconium Staining Amniotic Fluid	I Meconium Stained (Thin)	Count	47	8	14	69
		% within Meconium Staining Amniotic Fluid	68.1%	11.6%	20.3%	100.0%
		% within Gestational Age	37.9%	18.2%	15.2%	26.5%
		% of Total	18.1%	3.1%	5.4%	26.5%
	II Meconium Particles (Moderate)	Count	32	16	8	56
		% within Meconium Staining Amniotic Fluid	57.1%	28.6%	14.3%	100.0%
		% within Gestational Age	25.8%	36.4%	8.7%	21.5%
		% of Total	12.3%	6.2%	3.1%	21.5%
	III Meconium (Thick)	Count	45	20	70	135
		% within Meconium Staining Amniotic Fluid	33.3%	14.8%	51.9%	100.0%
		% within Gestational Age	36.3%	45.5%	76.1%	51.9%
		% of Total	17.3%	7.7%	26.9%	51.9%
Total		Count	124	44	92	260
		% within Grades of Meconium Staining Amniotic Fluid	47.7%	16.9%	35.4%	100.0%

	% within Gestational Age	100.0%	100.0%	100.0%	100.0%
	% of Total	47.7%	16.9%	35.4%	100.0%
df = 4, Chi-Square = 40.756, p-value = .000					

df: Degree of freedom

Table 6. Association between staining amniotic fluid and family's monthly income

			Family Budgetary Status						Total
			< 200,000 IQD	200,000 - 500,000 IQD	501,000 - 800,000 IQD	801,000 - 1,000,000 IQD	1,001,000 - 1,500,000 IQD	> 1,500,000 IQD	
Meconium Staining Amniotic Fluid	I Meconium Stained (Thin)	Count	22	13	23	4	5	2	69
		% within Meconium Staining Amniotic Fluid	31.9%	18.8%	33.3%	5.8%	7.2%	2.9%	100.0%
		% within Family Budgetary Status	22.0%	21.7%	37.7%	30.8%	22.7%	50.0%	26.5%
		% of Total	8.5%	5.0%	8.8%	1.5%	1.9%	0.8%	26.5%
	II Meconium Particles (Moderate)	Count	16	25	13	0	2	0	56
		% within Meconium Staining Amniotic Fluid	28.6%	44.6%	23.2%	0.0%	3.6%	0.0%	100.0%
		% within Family Budgetary Status	16.0%	41.7%	21.3%	0.0%	9.1%	0.0%	21.5%
		% of Total	6.2%	9.6%	5.0%	0.0%	0.8%	0.0%	21.5%
	III Meconium (Thick)	Count	62	22	25	9	15	2	135
		% within Meconium Staining Amniotic Fluid	45.9%	16.3%	18.5%	6.7%	11.1%	1.5%	100.0%
		% within Family Budgetary Status	62.0%	36.7%	41.0%	69.2%	68.2%	50.0%	51.9%
		% of Total	23.8%	8.5%	9.6%	3.5%	5.8%	0.8%	51.9%

Total	Count	100	60	61	13	22	4	260
	% within Meconium Staining Amniotic Fluid	38.5%	23.1%	23.5%	5.0%	8.5%	1.5%	100.0%
	% within Family Budgetary Status	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	38.5%	23.1%	23.5%	5.0%	8.5%	1.5%	100.0%
df = 10, Fisher's Exact Test = 31.097, p-value = .001								

df: Degree of freedom

The relationship between demographic, obstetrical, and maternal morbidities and MSAF was investigated in this study. This study found that the majority of the sample had undergone cesarean section (68.1%) especially those with grade III meconium. This was compatible with numerous studies done in the past and recently that showed that women with MSAF are more susceptible to having a cesarean section, 2024; Mundhra & Agarwal, 2013; Unnisa, et al., 2016; Mohammad, et al., 2018; Tolu, et al., 2020). However, interestingly, this is contrary to a study conducted by Parween, et al., (2022) who found that non-MSAF women have cesarean sections more than clients with MSAF. Their rationale is that they deal with referral cases that are associated with high-risk factors.

Regarding MSAF-related characteristics, in recent years, there has been an increasing amount of literature on socioeconomic status and its consistent linkage with health and wellness worldwide and considered an important criterion of healthiness in general and specifically in maternal and prenatal healthiness. Socioeconomic variables include occupational status, income, education, and residence (Mahmood, et al, 2013; Finch, 2003; Murata, et al., 2022). Likewise, interesting findings emerged from this study. The study found a significant association between the participants' residence, income, and educational backgrounds and MSAF. The clients' husbands' educational background was also found to have a significant association with MSAF.

Thus, accordingly, this study found a significant association between subjects' residence and the MSAF, this may be attributed to the type and services provided by the different health institutions in each area. This finding was compatible with a study done It was discovered that the family's monthly income was connected to the existence of MSAF in laboring mothers. Less than 200,000 IQD monthly income was associated with a twofold increased risk of MSAF development compared to incomes of 200,000 IQD and above for women. Research findings by Abate et al. also point toward such findings (2021). This may be explained further by the tendency of low-income women to put off obtaining medical attention. Low nutritional status is also a result of low monthly income. Poor socioeconomic status is linked to poor nutritional status, which can result in low birth weight and extended labor due to insufficient energy to deliver the unborn baby, as well as inadequate nutrients and oxygen for the developing fetuses

According to this study, 61.9% of multigravida moms and 38.1% of primiparous women gave birth to neonates with MSAF. Similar findings were made by (Sharma et al., 2015), who indicated that 55% of moms were multigravida and 45% were primigravida in their study. Sori, et al., (2016) found that 66.8% of the moms in the research were primigravida, which lend support to this outcome. However, Afsar et al., (2016) found that although there was no significant correlation ($p>0.05$) between MAS and mortality, it was more common among primiparous women (60%) compared to multiparous moms (40%). As aforementioned, research has shown that gestational age

is highly connected to MSAF, and women who are postdated are 8.8 times more likely to experience MSAF hazards than those who give birth at term stages. A statistically significant correlation was discovered in this study between MSAF and gestational age (late-term) pregnancy defined as ≥41 weeks. This finding is consistent with many studies conducted on this subject (Rathoria et al., 2018; Addisu, et al., 2018; Shekari, et al., 2022; Dereje, et al., 2023). Further, this was supported by the results of researchers from Australia (Carr, et al., 2019) and Iran (Zarepur, et al., 2017). This could be explained by the fetus's increasing motile secretion and gastrointestinal tract development as gestational age increases, which increases fetal bowel peristalsis and ultimately results in the passage of meconium.

The majority of the study group had pregnancy-induced anemia, and the study found no connection between MSAF and these comorbidities. This research did not find any connection between MSAF and the comorbidities or obstetric complication conditions of mothers (anemia, preeclampsia, and chronic hypertension). This was supported by the Shekari, et al., (2022) study which revealed no linkage between MSAF and maternal comorbidities. The fact that most maternal comorbidities suggest that pregnancy should be terminated at an early gestational age could account for the variance in the lack of association between comorbidities and MSAF. Supplemental medication and inadequate diet may be to blame for this. Consequently, post-term pregnancies are uncommon in moms with comorbidities. In contrast, there was a reduced frequency of MSAF in mothers who had a history of either gestational diabetes or overt diabetes. The only comorbidities associated with MAF were these two conditions. Most diabetic guidelines suggest inducing labor for an elective birth. In situations of poor neonatal outcomes, it is easy to understand why there is an increase in the rates of cesarean sections and operative vaginal deliveries when MSAF is present. These procedures decrease the delivery time, particularly when combined with thick AF or irregular fetal heart rate (FHR) in the first stage of labor. Prior research has demonstrated that MSAF is notably linked to an increased risk of moderate (1000–2000 mL) and severe (>2000 mL) post-partum hemorrhage PPH compared to clear AF (Bouchè et al., 2018). However, a different study found that the risk is higher for minor (500–1000 mL) and moderate PPH but not for severe PPH (Fang et al., 2020), a finding that may require additional investigation. In this study, the stage of labor is linked to meconium aspiration syndrome (MAS) among obstetric-related parameters.

Conclusion: The study's findings showed a relationship between the gestational age, residency, income, and educational attainment of mothers who gave birth to children with multiple system atrophy (MSAF). These results demonstrated how important it is for medical professionals to support and educate the public about better women's health promotion and how to lower the incidence of MSAF in infants.

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