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Fetal and Maternal Outcome in *T*erm *P*regnancies with Meconium-stained Amniotic Fluid in Bashair Teaching Hospital from

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Abstract

Background**:** Meconium-stained amniotic fluid (MSAF), especially observed before term, is considered a sign of fetal jeopardy. Although many studies characterized this condition and associated it with delivery mode, data is lacking in our country, Sudan. So we organized for this study.
Objectives**:** To determine the prevalence of meconium-stained amniotic fluid at term pregnancies who attended delivery at Bashair Teaching Hospital and the associated risk factors. To determine & discuss fetal and maternal outcomes in term pregnancies with meconium-stained amniotic fluid in Bashair Teaching Hospital.
Methodology: This study is a descriptive, observational, cross-sectional and hospital-based study. It was conducted from May to October 2021, at Bashair Teaching Hospital. Out of 290 term deliveries during the study period, 73 patients were diagnosed with MSAF. Caretakers were interviewed through a detailed questionnaire. Data was processed using the SPSS program (Version. 26).
Results: Meconium-stained amniotic fluid prevalence was 7.9%. The mean caretaker's age was 28.04 ± 5.1 years (range was 16-40 years). Parity one was in 34 (46.6%) and gestational age among caretakers was as follows: 28 (38.4%) were in GA 39 weeks, followed by 19 (26%) in GA 38 weeks. Cesarean section was done in 23 (31.5%). Maternal complications were reported in 2 (2.7%) of women, both suffering from bleeding. Regarding fetal outcome: The mean birth weight was 3.0 ± 0.46 (2- 4.2 kg). Apgar score was < 7 in 17 (22.6%) at 1 min, and 9 in (12%) at 5 mins. 13 (17.3%) of fetuses needed NICU admission, due to acute respiratory distress in 10 (76.9%), followed by apnea in 2 (7.7%). The death among neonates was 1 (1.4%).

Conclusion**:** The prevalence of MSAF was 7.9% . The maternal complication rate was 2.7%, with no deaths. The neonatal NICU admission was 17.3%, and the death rate was 1.4%.

Keywords: Fetal, Maternal, Outcome, Term Pregnancies, Meconium-stained, Amniotic fluid.

Introduction:

Meconium-stained amniotic fluid is frequently encountered in obstetric and neonatal practice. Its incidence is thought to increase with gestational age, being less common in preterm labors (5%) but more common in term (7- 22%) and post-term deliveries (23-52%). Although the exact cause of this situation is not known, fetal distress, cord problems, and maternal hypertension are some identified potential risk factors [1]. The passage of meconium in utero is a problem both in intrapartum and postnatal for the well-being of the fetus and that of the mother. [2]

Studies in India and Pakistan found higher proportions of cesarean section, fetal heart rate abnormalities, meconium aspiration syndrome (MAS), low Apgar score (<7) at the fifth minute and neonatal death in cases of MSAF. To minimize the occurrence of these complications and improve their management, the scientific community especially in England and the USA was mobilized by setting guidelines for obstetric and neonatal management of MSAF. [3,4]

These guides recommended, among others, the continuous monitoring of the fetal heart rate during labor and the use of amnioinfusion in thick MSAF. Several countries have implemented these recommendations, including amnioinfusion during labor, which helped significantly reduce the cesarean section and MAS [5]. Similarly, other practices such as the decrease in post-term births, early diagnosis of abnormal fetal heart rate, increased cesarean section rate, and early ultrasound assessment were associated with a significant decrease in MAS rate [3].

In Sudan, literature is still poorly documented on the subject. The incidence of MSAF is not known and its consequences have not been described. This study was therefore aimed at determining the maternal and fetal consequences.

For the mother's and the fetus's health, meconium transit in utero is a problem both intrapartum and postnatally. Increased rates of caesarean sections, irregular fetal heart rates, meconium aspiration syndrome (MAS), low Apgar scores (7) at the fifth minute, and neonatal deaths were discovered in studies conducted in India and Pakistan. By establishing recommendations for the obstetric and neonatal management of MSAF, the scientific community, particularly in England and the USA, was mobilized to reduce the likelihood of severe problems and improve their management. These guidelines advised, among other things, using amnioinfusion in thick MSAF and continuously monitoring the fetus' heart rate during labor. [2,3]. Several countries have implemented these recommendations, including the use of amnioinfusion during labour which helped to significantly reduce the rate of caesarean section and MAS.

It has been suggested that the study of Fetal and maternal outcomes in term pregnancies with meconium-stained amniotic fluid in general had different outcomes. A better understanding of such a concept could help inform clinicians and policymakers in the future. Despite the increasing number of term pregnancies with meconium-stained amniotic fluid there are no sufficient data found about this issue. Importance of my

study is to add a new data and this may be very helpful to other medical collegues to expand their results further about this issue in Sudan.

MATERIALS AND METHODS

This is a descriptive, observational, cross-sectional & hospital-based study. The study was carried out during the period from May to November 2021. It was conducted at Bashair Teaching Hospital in women with term pregnancies who experienced meconium-stained amniotic fluid during the period of study.

Inclusion criteria:

Women with term pregnancies experienced meconium-stained amniotic fluid at Bashair Teaching Hospital during the study period whom gave consent to be part of the study.

Exclusion criteria:

- Preterms
- Post date pregnancy
- Women with non-meconium staind amniotic fluid.

Independent variables are demographical characteristics: Age, Residence, and Occupation**.** The dependent variables are term pregnancy, meconium-stained amniotic fluid, maternal outcome & neonatal outcome.

The data was collected by comprehensive structured close ended interviewing questionnaire that covering the relevant aspects and variables in the study, which designed by researcher and was collected by researcher and two registrars who are experienced to fill the questionnaire.

In order to determined the prevalence of meconium-stained amniotic fluid we assessed all term deliveries conducted during study period (N=920), then patients with meconium-stained amniotic fluid (N=73) were studded further for sociodemographical information, medical history, management and outcome. The data was exported to SPSS version 25.0 for data analysis.

The study was presented to the ethics review committee of the Sudan Medical Specialization Board. Ethical approval was obtained from the ethical committee at the research unit- EDC, and from Bashair Teaching Hospital administrative authorities. Written consent was obtained from participants after explaining the nature and purpose of the study, and confidentiality of participants' data was considered by coding the questionnaire.

Results:

Out of 920 term deliveries during the study period, 73 had meconium-stained amniotic fluid, with a prevalence of 7.9%.

Sociodemographic:

In this study, 73 patients were included. The mean mothers age was 28.04 ± 5.1 years (range was 16-40 years) . Majority of mothers, 45 (61.6%) were within age group 26-35 years.

Regarding education level, 29 (39.7%) had university level, 28 (38.4%) had secondary school level, and 13(17.8%) had basic school level.

The majority 64 (87.7%) of mothers were housewives, and 62(84.9%) were from urban areas. 40 (54.8%) had low socioeconomic status, and 33 (45.2%) had moderate socioeconomic status. **Table (1)**

Medical history:

Regarding antenatal booking status, 61 (83.6%) were booked and 12 (16.4%) were unbooked for antenatal care.

Almost half of women 34 (46.6%) were parity one, followed by 14 (19.2%) as parity two.

Gestational age among mothers was as follows: 28 (38.4%) were in GA 39 weeks, followed by 19 (26%) were in GA 38 weeks, and 17 (23.3%) were in GA 37 weeks. 26 (35.6%) had a history of similar conditions. **Table (2)**

Among mothers, 12 (16.4%) had chronic illnesses, mostly hypertension in 7 (58.3%), followed by diabetes mellitus 4 (33.3%). **Table (3)**

Outcomes:

The duration of maternal hospital stay as < 24 hours was in 40 (54.8%), 1-3 days in 29 (39.7%) and 3-7 days in 4 (5.5%). **Table (4)**

The mode of delivery was spontaneous vaginal delivery in two-thirds 50 (68.5%), and bleeding. **Table (5)**

Regarding fetal outcome: 72 (98.7%) of fetuses were alive, and 1 (1.3%) was fresh stillbirth. **Table (6)**

The mean birth weight was 3.0 ± 0.46 (2 to 4.2 kg) . Almost half of fetuses weight 43 (57.3%) was 2.3 kg .

Apgar score was < 7 in 17 (22.6%) at 1 min, and < 7 in 9 (12%) at 5 mins.

13 (17.3%) of fetuses were admitted to NICU. **Table (7)**

The cause of NICU admission was acute respiratory distress in majority 10 (76.9%), followed by apnea in 2 (7.7%), and others in 1 (1.4%). **Table (8)**

Among neonates who were admitted to NICU, 5 (38.5%) stayed for 1-3 days, 5 (38.5%) stayed for 3-7 days, and 2 (15.4%) stayed for 24 hours. **Table (9)**

The death among neonates was in 1 (1.4%). **Table (10)**

Table 1: Sociodemographic of patients with meconium-stained amniotic fluid in Bashair Teaching Hospital from May to November 2021

Sociodemographic	**Frequency**	**Percent**
Age groups		
16-25years	22	30.1
26-35years	45	61.6

36-45years	6	8.2
Total	73	100.0
Education level		
Illiterate	2	2.7
Basic school	13	17.8
Secondary school	28	38.4
University	29	39.7
Postgraduate	1	1.4
Total	73	100.0
Occupation		
Housewife	64	87.7
Employee	9	12.3
Total	73	100.0
Residence		
Urban	62	84.9
Rural	11	15.1
Total	73	100.0
Socioeconomically status		
Low	40	54.8
Moderate	33	45.2
Total	73	100.0

Table 2: Medical history of patients with meconium-stained amniotic fluid in Bashair Teaching hospital.

Clinical data	**Frequency**	**Percent**
ANC Booking status		
Booked	61	83.6
Un-booked	12	16.4
Total	**73**	**100.0**
Parity		
Primigravida	6	8.2
1	34	46.6
2	14	19.2
3	8	11.0
4	5	6.8
5	4	5.5
6	1	1.4
7	1	1.4
Total	73	100.0
Gestational age in weeks		
37	17	23.3
38	19	26.0

39	28	38.4
40	9	12.3
Total	73	100.0
History of similar condition (meconium-stained amniotic fluid)		
Yes	26	35.6
No	47	64.4
Total	73	100.0

Table 3: Chronic illness among patients with meconium-stained amniotic fluid in Bashair Teaching Hospital.

Chronic illness	**Frequency**	**Percent**
Yes	12	16.4
No	61	83.6
If yes		
HTN	7	58.3
DM	4	33.3
Other	1	8.3
Total	**12**	**100.0**

Table 4: Duration of hospital stay among patients with meconium-stained amniotic fluid in Bashair Teaching hospital.

Duration of hospital stay	**Frequency**	**Percent**
<24 hrs	40	54.8
1-3 days	29	39.7
3-7 days	4	5.5
Total	73	100.0

Table 5: Maternal complication among patients with meconium-stained amniotic fluid in Bashair Teaching Hospital .

Maternal complication	**Frequency**	**Percent**
Yes (bleeding)	2	2.7
No	71	97.3
Total	73	100.0

Table 6: Neonatal outcome of patients with meconium-stained amniotic fluid in Bashair Teaching Hospital.

Fetal outcome	**Frequency**	**Percent**
Alive	72	98.7
Fresh still birth	1	1.3
Total	75	100.0

Table 7: Fetal outcome of patients with meconium-stained amniotic fluid in Bashair Teaching Hospital.

Fetal outcome	Frequency	Percent
Birth weight /kg		
2-3	43	57.3
>3-4	25	36.0
>4-5	5	6.7
Total	73	100.0
Apgar score		
Apgar score < 7 at 1 minute	17	22.6
Apgar score < 7 at 5 minute	9	12.0
NICU admission		
Yes	13	17.3
No	60	82.7
Total	73	100.0

Table 8: Cause of NICU admission among neonates of patients with meconium-stained amniotic fluid in Bashair Teaching Hospital.

Cause of NICU admission	**Frequency**	**Percent**
ARDS	10	76.9
Apnea	2	15.4
Other	1	7.7
Total	**13**	**100.0**

Table 9: Duration of NICU stay among neonates of patients with meconium-stained amniotic fluid in Bashair Teaching Hospital.

Duration of NICU stay	**Frequency**	**Percent**
24 hrs	2	15.4
1-3 days	5	38.5
3-7 days	5	38.5
> 7 days	1	7.7
Total	13	100.0

Table 10: Discharge condition among neonates who were admitted to NICU with meconium-stained amniotic fluid in Bashair Teaching Hospital.

Discharge condition	Frequency	Percent
Alive and well	72	98.7
Death	1	1.3
Total	73	100.0

Discussion:

MSAF is a very common finding, occurring in up to 20% of deliveries at term.4 Aspiration of meconium occurs as a result of hypoxia and hypercarbia which act synergistically to stimulate fetal gasping. It can contribute to MAS, representing a leading cause of perinatal death. This study showed that out of 920 deliveries during the study period, 73 had meconium-stained amniotic fluid, with a prevalence of 7.9%. This percentage is comparable with a previous study performed in Cameroon (11.15 %), Brazil (11.9%), and India (8.3%) [3,25,31] On the other hand slightly higher prevalence was reported in Ethiopia (17.8%) and Nigeria (20.4%) [23, 33]. This might be explained by a difference in study design, setup and population. However, another study conducted in India, Kolkata, reported MSAF at 30.6% which was relatively higher than that in our study.

The present study showed that the mean mother's age was 28.04 ± 5.1 years (range was 16-40 years) and almost half of mothers 45 (61.6%) were within the age group 26-35 years. this finding was supported by a previous study by *Addisu D, et al;* [23]. where the mean age of the study participants was 28.05 ±5.1 years. and nearly two-thirds, 344 (69.5%) of mothers were in the age group of > 30 years. Also *Dohbit JS, et al;* [3] study revealed that the average age of pregnant women was 27.72 ± 5.34.

In spite of the debate, there are still a number of unresolved controversies concerning the management of labor with meconium-stained amniotic fluid. Nevertheless, most obstetricians feel unsafe about the state of the fetus if meconium-stained liquor is seen. This influences the mode of delivery. In settings where other facilities of intrapartum monitoring like cord blood sampling, CTG, and non-stress tests are not available, instrumental as well as cesarean delivery are found to be increased when meconium is present. In the present study, cesarean section was done in 23 (31.5%). This was comparable to a previous study where the patients with MSAF were more likely to undergo operative delivery. [24,28,31] Almost half of the women 34 (46.6%) were primigravida, followed by 14 (19.2%) as multi para. This was comparable to several studies *Addisu D, et al;* [23] which stated half of the mothers were Para I, also with Tolu LB, et al; [31] study which stated that there were 75(52.1%) primigravida in a stained fluid group. In contrast Mesumbe EN, et al; [28] study reported more than half of the participants (54.9 %) were multiparous.

Several investigators have demonstrated an association of meconium staining and poor perinatal outcome [35,36,37]. In this study maternal complications was reported in 2

(2.7%) of patients, both suffering from bleeding, with no maternal deaths reported. This was comparable with *Tolu LB,et al;* [31] study where no intrapartum death was stated.
In our study gestational age among patients was as follows: 28 (38.4%) were in GA 39 weeks, followed by 19 (26%) were in GA 38 weeks, and 17 (23.3%) were in GA 37 weeks. This is comparable with *Dohbit JS,et al;* [3] study where the mean gestational age at delivery in the MSAF patients was (39.7 weeks). Also, *Addisu D, et al;* [23] stated that the mean gestational age was 38.95 weeks with SD of ±1.276 weeks. Furthermore, *Mohapatra V, et al;* [24] stated that out of 300 pregnant women, 196 (66.67%) were at 37-40 weeks of gestation, 92 (30.61%) at > 40- 42 weeks, and 12 (2.72%) at > 42 weeks of gestation. So reported higher mean gestational age was 40.31± 0.48 weeks. The positive correlation between advanced gestational age and the prevalence of MSAF concurs with previous observations made by *Meis et al.* [38] and *Millar et al.* [39] who found that the prevalence of MSAF could be up to 50% at 42 weeks of gestation.
The mean birth weight was 3.0 ± 0.46 (2-4.2 kg). In almost half of fetuses 43 (57.3%) the weight was 2-3 kg . Majority have normal birth weight. this is comparable to *Mohapatra V, et al;* [24] study where the mean birth weight of babies in the study group was 2.89 ± 0.44 kg. Also *Dohbit JS, et al;* [3] Case–control study result showed the mean birth weight was 3277.11 ± 493.59 g. Moreover the weights were similar in the two groups.
The incidence of fetal and neonatal morbidities was high in the MSAF patients. These included FHR abnormalities, low Apgar in a similar context. We reported Apgar score of < 7 in 17 (22.6%) at 1 min, and < 7 in 9 (12%) at 5 min. Moreover 13 (17.3%) of fetuses were admitted to NICU. A similar result was reported by *Tolu LB, et al;* [31] stating that there were more low Apgar scores at birth where 36.8% of Infants with MSAF had low 5th minute Apgar scores and 31(21.5%) needed intensive care unit admissions. *Mohapatra V, et al;* [24] study reported that 20% of babies required NICU admission, 17.7% had poor Apgar scores at birth. This indicated very high rate of NICU admissions among patients. Furthermore, the cause of NICU admission was acute respiratory distress in majority 10 (76.9%), followed by apnea in two (7.7%). Similarly, *Dohbit JS,et al;* [3] stated that fetal heart rate abnormalities, neonatal infection and neonatal asphyxia were causes of NICU admission. Moreover *Tolu LB, et al;* [31] reported that the Causes were birth asphyxia & neonatal sepsis.
The present study showed a neonatal mortality rate of 1.4%. It is considered a low rate compared to *Mohapatra V, et al;* [24] study (2.22%) and *Mesumbe EN,et al;* [28] study (2.3%). Much higher death rate was reported by *Dohbit JS,et al;*[3] in (4.7%) and *Tolu LB, et al*; [31] in (9%), The current study was conducted at the tertiary hospital located in the capital city of Sudan compared to the study by *Dohbit JS,et al;*[3] which was conducted in district hospital western Cameroon, and *Tolu LB, et al*; [31] study in São Paulo (Southeastern Brazil) which serve rural areas. The possible limited access to health care in rural populations might result in late presentation despite poor progress of labour resulting in high MSAF and, therefore with high mortality.
Limitations: This study was conducted at a tertiary urban based hospital with relatively good obstetric care among relatively literate with easy access to care which might limit its generalizability to other centers and the wider population.

Conclusions:

Meconium-stained amniotic fluid prevalence was 7.9%. The mean mother's age was 28.04 ± 5.1 years (range was 16-40 years). The majority of women were parity one, followed by parity two. The commonest gestational age among mothers was 39 weeks. The duration of maternal hospital stay was < 24 hours in over half of patients. The mode of delivery was spontaneously vaginal delivery in the majority and cesarean section was undergone by about one-third of patients. The maternal complications rate was 2.7%, where all suffering from bleeding. Regarding fetal outcome, neonatal birth weight was normal in the majority with a mean 3.0 ± 0.46 (2- 4.2 kg), and a low Apgar score was in the fifth of patients. NICU admission rate was 17.3%, mostly with acute respiratory distress or apnea. The death rate among neonates was 1.4%.

Recommendations:

- Proper intrapartum care including continuous electronic fetal monitoring, and timely obstetric intervention followed by appropriate neonatal care is essential to alleviate the adverse outcome associated with it.
- Multi-centric, with a large sample, controlled study is needed to identify significant risk factors.

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Declaration :

This article is our original work. The submitted manuscripts contain original and authentic results, data and their ideas, which were not published elsewhere. No material from other publications is reproduced in our article. Co authorshould not submit the same manuscript, in the same language simultaneously to more than one journal. The author of this paper has read and approved the final version submitted.

Ethical clearance:

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Competing interest :

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