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Research Article

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Effect of Different Grades of Meconium-Stained Amniotic Fluid on Perinatal Outcome in Low Risk Pregnancies

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ABSTRACT

Amniotic fluid stained with meconium is a significant consideration as it influences the intrapartum observation and management. Meconium aspiration by the fetus is considered a significant leading cause of increased perinatal morbidity and mortality, consequently, this result in severe respiratory distress and meconium aspiration syndrome**.** This study aimed to determine the impact of different degrees of meconium-stained amniotic fluid (MSAF) in low-risk pregnancies at term on pregnancy outcome. The study design was prospective cohort, conducted in Tripoli Medical center, Tripoli/Libya, from January to July 2016, 155 patients were selected randomly from the hospital during their delivery time. Sociodemographic data were obtained from the patients themselves and their files and were collected in a pre-prepared information sheet. Additionally, the CTG result at time of delivery, the degree of meconium and Apgar score at 1 minute, 5 minutes and 10 minutes were recorded. Four patients were excluded from the study due to maternal complications, which developed after admission, and from the aim of the study we included only low risk patients.

One hundred and fifty five patients were randomly selected for the study, 4 patients considered as high risk and were excluded from the study. The mean age of the patients was (31±6.2) years. Out of 151 patients, 48 (31%) were having clear liquor at the time of delivery, 15 (9.7%) of them have grade I meconium, 38 (%) have grade II meconium and 51 (%) have meconium grade III. there were 20 cases (19.4%) with Apgar score below 7 at 1 minutes, among which 1 (0.9%) babies were grade I MSAF, 3 (2.9%) babies were in grade II, and 16 (15.5%) in grade III MSAF, P value < 0.05, pathological CTG was found more commonly associated with grade III MSAF, 19 (12.6%) from all cases, followed by 5 (3.3%) of grade II MSAF and 2 (1.3%) of grade I MSAF. there were 72 (47.7%) vaginal deliveries and 79 (52.3%) delivered by caesarean section.

From our findings, we concluded that different grades of meconium are associated with increased pathological CTG, operative interventions, low Apgar scores and overall increased perinatal morbidity and mortality.

Key wards- *Meconium; Fetal outcome; Meconium Stained Amniotic Fluid; Meconium Aspiration Syndrome.*

INTRODUCTION

Amniotic fluid stained with meconium is a significant consideration as it influences the intrapartum observation and management. 69% of neonates pass meconium by 12 hours of age; however, some fetuses pass meconium while in utero.[1] It is reported that about 1-18% is the incidence of meconium stained liquor.[2] It is higher in newborn babies over 42 weeks gestation and reaches approximately 30%. There is controversy regarding the significance of meconium-stained liquor. Some consider it as a sign of fetal compromise, while others believe that it is not associated with fetal distress.[3] The presence of meconium-stained liquor is alarming sign for meconium aspiration syndrome (MAS), birth asphyxia, caesarean section, neonatal resuscitation and neonatal intensive care unit admissions.[4]

Meconium is sterile, yellow or greenish dark liquid, sticky and tarry in texture, normally passed by the new born baby, and can be found in gastrointestinal tract of the fetus as early as 10-16 weeks gestational age. It is normally retained in infant bowel until birth. It is composed of 75% water, 25% bile salt pigment, pancreatic enzymes, lipid, muco-glycoproteins, and intestinal secretions (4). Meconium is very toxic to the lungs and inactivates surfactant.

Fetal distress means intrauterine hypoxia, which is reflected by alterations in the fetal heart rate, commonly bradycardia and the passage of meconium. Signs of fetal distress include variations in fetal heart rate, passage of meconium in the amniotic fluid, non-reactive cardiotocography and low fetal scalp PH.[5] Advanced maternal age, prolonged labour, postdates pregnancy, cholestasis of pregnancy, low birth weight; intrauterine growth restrictions and pre-eclampsia are major risk factors for the passage of meconium.[6]

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Meconium aspiration by the fetus is considered a significant leading cause of increased perinatal morbidity and mortality, consequently, this result in severe respiratory distress and meconium aspiration syndrome (MAS).[7] From the literature, there are facts about meconium as it is harmful on fetal tissues, it induces vasoconstriction of umbilical vessels leading to necrosis and thrombi formation ultimately tissue ischemia. Despite the fact that meconium is sterile, it inhibits the antibacterial effect of amniotic fluid by changing levels of zinc increasing the risk of infections. In the presence of fetal distress and hypoxia aspiration of meconium into the lungs may occur resulting in tissue inflammation and respiratory distress.[7]

Thick meconium in high risk patients has better predictive value; in contrast, light meconium has a poorer correlation with fetal distress.[8] The consequences of moderate and thick meconium have a considerable high risk of abnormal CTG, at 1 and 5 minute Apgar score below 7, acidic pH, sepsis, need for oxygen and admission to NICU.[9]

Most new born babies with meconium-stained liquor are term (more than 37 weeks gestation), on the other hand, premature babies (less than 32 weeks gestation) pass meconium in very rare occasions.[10] Meconium is rare in preterm babies and it is associated with chorioamnionitis. It may give the possibility of listeria infection. The incidence of preterm meconium staining of liquor is unknown. However, meconium should be considered as a non-reassuring sign in preterm deliveries. Hypoxia and infections are recognized factors that caused high incidence of meconium-stained amniotic fluid (MSAF) independent on fetal maturation. Advanced gestational age is associated with increased incidence of meconium-stained amniotic fluid, which is explained by peristalsis maturation in the fetal bowel.[11] Meconium Aspiration syndrome is characterized by fetal respiratory distress immediately after delivery with radiographic evidence of aspiration pneumonitis, a condition associated with staining of umbilical cord, skin and nails.[11]Thus this study was done with an objective to correlate the presence of different grades of meconium in amniotic fluid with perinatal outcome so as to know its significance as an indicator of fetal distress.

This study aimed to determine the impact of different degrees of meconium-stained amniotic fluid (MSAF) in low-risk pregnancies at term on pregnancy outcome.

MATERIALS AND METHODS

The study design was prospective cohort, conducted in Tripoli Medical center, Tripoli/Libya, from January to July 2016, 155 patients were selected randomly from the hospital during their delivery time. Sociodemographic data were obtained from the patients themselves and their files and were collected in a pre-prepared information sheet. Additionally, the CTG result at time of delivery, the degree of meconium and Apgar score at 1 minute, 5 minutes and 10 minutes were recorded. 4 patients were excluded from the study due to maternal complications, which developed after admission, and from the aim of the study we included only low risk patients.

Statistical analysis

Statistical analysis was computerized using the statistical program for social sciences (SPSS version 21) that used for data entry and analysis. Descriptive statistics were used and all results are presented as frequencies, mean ± standard deviation and percentages. Categorical data were compared using Chi-square test and Fisher's exact test if appropriate. A *P* value of less than or equal to 0.05 was considered statistically significant.

RESULTS

One hundred and fifty five patients were randomly selected for the study, 4 patients considered as high risk and were excluded from the study. The mean age of the patients was 31 years. The questionnaires were reviewed for analysis and interpretation of information as shown in the following tables and figures.

Out of 151 patients, 48(31.8%) had clear liquor at the time of delivery, 15(9.9%) of them had grade I meconium, 38(25.2%) had grade II meconium and 50 (33.1%) had meconium grade III (Table1,Fig.1).

Table 1: Color of liquor at the time of delivery

Liquor color	No.	(%)
Clear	48	31.8%
Meconium grade I	15	9.9%
Meconium grade II	38	25.2%
Meconium grade III	50	33.1%
Total	151	100%

The mean age was (31± 6.2). The maximum age was 49 years and the minimum age was 17 year (Table2,Fig.2).

Table 2: Age distribution of the study group

Age distribution	Clear liquor	Grade I	Grade II	Grade III
≥20	3 (6.2%)	0 (0%)	3 (7.8%)	2 (4%)
21-25	8 (16.6%)	3 (20%)	8 (21%)	7 (14%)
26-30	14 (29.1%)	3 (20%)	6 (15.7%)	18 (36%)
31-35	11 (22.9%)	6 (40%)	9 (23.6%)	11 (22%)
36-40	10 (20.8%	2 (13.3%)	6 (15.7%)	10 (20%)
≥40	2 (4.1%)	1 (6.6%)	6 (15.7%)	2 (4%)
Total	**48**	**15**	**38**	**50**

In this study, the parity of the patients ranged from nullipara to Para 7, the majority of patients were between Para 1and Para 3 (72.9% of the clear liquor, 66.6% of grade I meconium, 44.7% of grade II meconium and 38% of grade III, ***P*** value = 0.048 (Table3,Fig.3).

Table 3: Parity of the study population

Parity distribution	Clear liquor	Grade I	Grade II	Grade III
P0	6 (12.5%)	4 (26.6%)	13 (34.2%)	20 (40%)
P1-P3	35 (72.9%)	10 (66.6%)	17 (44.7%)	19 (38%)
P4-P6	6 (12.5%)	1 (6.6%)	7 (18.4%)	10 (20%)
≥ P7	1 (2%)	0 (0%)	1 (2.6%)	1 (2%)
Total	**48**	**15**	**38**	**50**

Regarding the number of previous miscarriages, most of the patients showed no history of miscarriage as it is shown in the table; most of the patients who had previous miscarriages were between 1 and 3 miscarriages. There is no association between the number of previous miscarriages and meconium, *P* value = 0.847 (Table 4,Fig.4).

Table 4: Number of previous miscarriages

Previous miscarriage	Clear liquor	Grade I	Grade II	Grade III
0	34 (70.8%)	10 (66.6%)	28 (73.7%)	38 (76%)
1-3	12 (25%)	3 (20%)	10 (26.3%)	10 (20%)
4-6	2 (4.2%)	2 (1.3%)	0 (0%)	2 (4%)
≥ 7	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total	**48**	**15**	**38**	**50**

In the current study, women with preterm delivery are more likely to have clear liquor, and there is strong association between preterm delivery and absence of meconium, *P* value = 0.000 (Table5 ,Fig.5).

Table 5: Gestational age at delivery

Gestational age	Clear liquor	Grade I	Grade II	Grade III
Term	29 (60.4%)	13 (86.6%)	36 (94.7%)	49 (98%)
Preterm	19 (39.5%)	2 (13.3%)	2 (5.2%)	1 (2%)
Total	**48**	**15**	**38**	**50**

There is no association between the amount of liquor and meconium at the time of delivery,

P value = 0.648 (Table6 ,Fig.6).

Table 6: Oligohydramnios at admission

Oligohydramnios	Clear liquor	Grade I	Grade II	Grade III
No	32 (66.6%)	10 (66.6%)	24 (63.1%)	27 (54%)
Yes	16 (33.3%)	5 (33.3%)	14 (36.8%)	23 (46%)
Total	**48 (100%)**	**15 (100%)**	**38 (100%)**	**100%))50**

As it is obvious from the table above, there is strong association between suspicious and pathological CTG and meconium. Women with meconium are more likely to have abnormal CTG trace, especially grades II and III, *P* value = 0.001(Table 7,Fig.7).

Table 7: Cardiotocography (CTG) at time of delivery

CTG	Clear liquor	Grade I	Grade II	Grade III
Reactive	33 (68.7%)	11 (73.3%)	20 (52.6%)	14 (28%)
Suspicious	7 (14.6%)	2 (13.3%)	13 (34.2%)	17 (34%)
Pathological	8 (16.6%)	2 (13.3%)	5 (13.1%)	19 (38%)
Total	**48 (100%)**	**15 (100%)**	**38 (100%)**	**50 (100%)**

As it is shown above, there is association between delivery by caesarean section and meconium, that is to say, women with clear liquor, grade II and III meconium are more likely to deliver by caesarean section than women in grade I meconium, high caesarean section in the clear liquor group is explained by the presence of indications other than fetal distress, *P* value = 0.001(Table 8,Fig.8).

Table 8: Mode of delivery

Mode of delivery	Clear liquor	Grade I	Grade II	Grade III
NVD	13 (27%)	12 (80%)	20 (52.6%)	27 (54%)
C/S	35 (72.9%)	3 (20%)	18 (47.4%)	23 (46%)
Total	**48 (100%)**	**15 (100%)**	**38 (100%)**	**50 (100%)**

The majority of cases have Apgar score 8-10 at first minute, only 2.1% of the clear liquor group, 5.4% of grade II meconium and 24.5% of grade III were severely depressed with Apgar score between 0-5. There is strong association between low Apgar score at first minute and grades II and III meconium, *P* value = 0.000 (Table 9 ,Fig.9).

Table 9: Apgar score at 1 minute after delivery

Apgar score	Clear liquor	Grade I	Grade II	Grade III
0-5	1 (2%)	0 (0%)	2 (5.2%)	12 (24%)
6-7	12 (25%)	1 (6.7%)	1 (2.6%)	4 (8%)
8-10	35 (72.9%)	14 (93.3%)	35 (92.1%)	34 (68%)
Total	**48 (100%)**	**15 (100%)**	**38 (100%)**	**50 (100%)**

It is clear, that only 2.1% of clear liquor group, 1.9% of grade III meconium were severely depressed with Apgar score 0-5. There is no association between low Apgar score at 5 minutes after delivery and meconium, *P value* = 0.06 (Table 10,Fig.10).

Table 10: Apgar score at 5 minutes after delivery

Apgar score	Clear liquor	Grade I	Grade II	Grade III
0-5	1 (2.1%)	0 (0%)	0 (0%)	1 (2%)
6-7	0 (0%)	0 (0%)	3 (7.9%)	6 (12%)
8-10	47 (97.9%)	15 (100%)	35 (92.1%)	43 (86%)
Total	**48 (100%)**	**15 (100%)**	**38 (100%)**	**50 (100%)**

There is no association between low Apgar score at 10 minutes and meconium, ***P*** value = 0.5 (Table 11,Fig.11).

Table 11: Apgar score at 10 minutes after delivery

Apgar score	Clear liquor	Grade I	Grade II	Grade III
0-5	0 (0%)	0 (0%)	0 (0%)	0 (0%)
6-7	1 (2.1%)	0 (0%)	0 (0%)	0 (0%)
8-10	47 (97.9%)	15 (100%)	38 (100%)	50 (100%)
Total	**48 (100%)**	**15 (100%)**	**38 (100%)**	**50 (100%)**

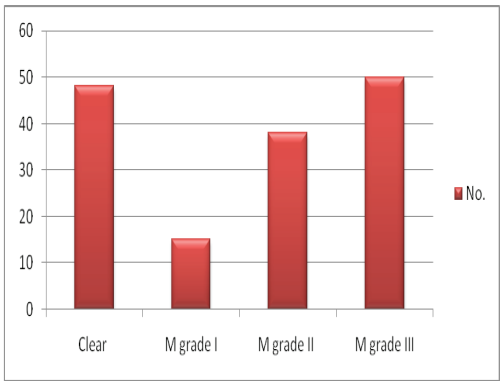

Figure 1: Color of liquor at the time of delivery

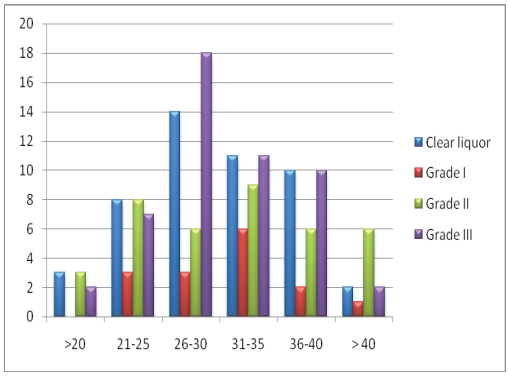

Figure 2: Age distribution of the study group

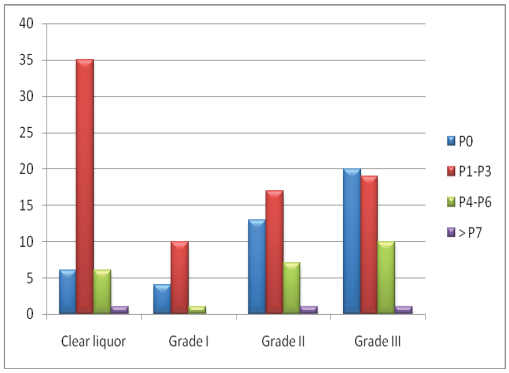

Figure 3: Parity of the study population

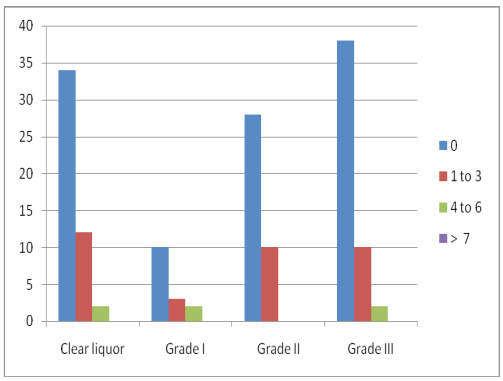

Figure 4: Number of previous miscarriages

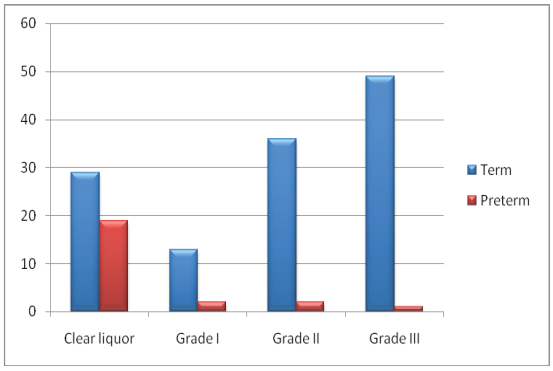

Figure 5: Gestational age at delivery

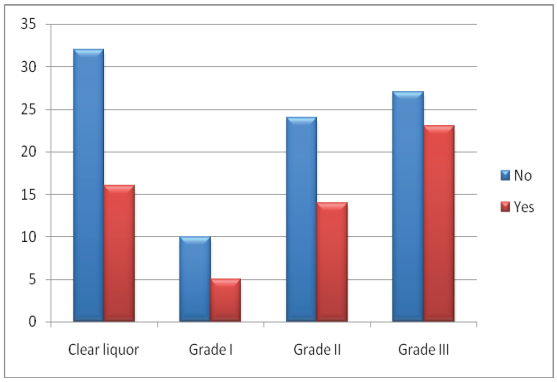

Figure 6: Oligohydramnios at admission

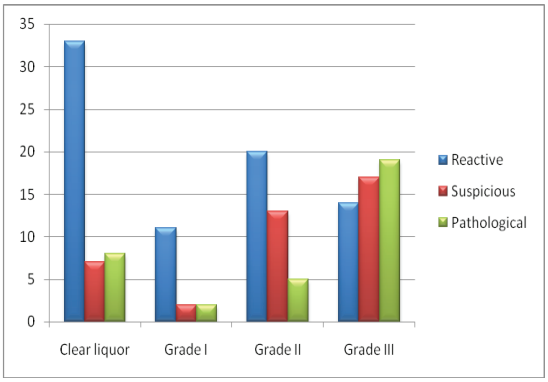

Figure 7: Cardiotocography (CTG) at time of delivery

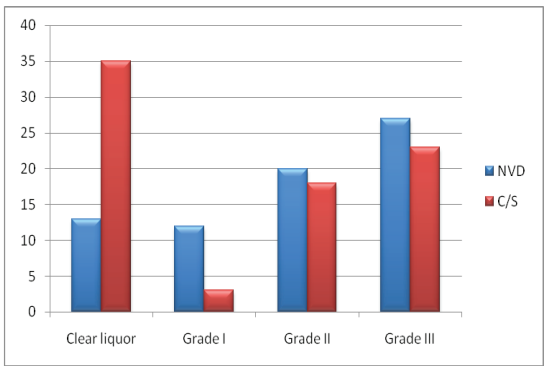

Figure 8: Mode of delivery

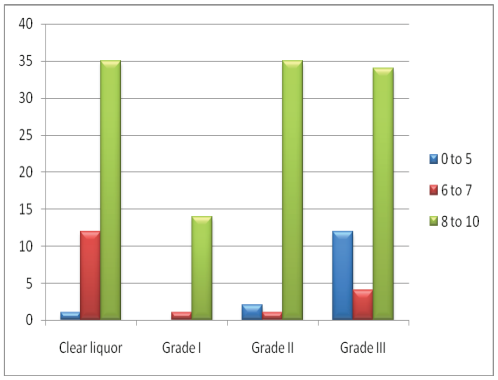

Figure 9: Apgar score at 1 minute after delivery

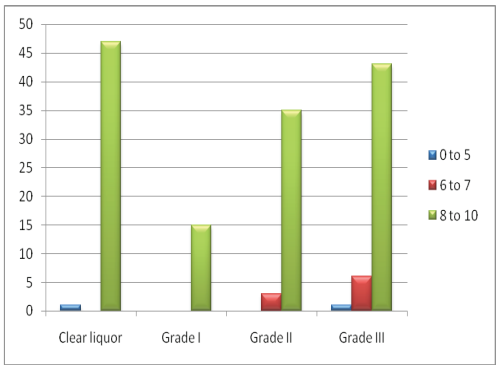

Figure 10: Apgar score at 5 minutes after delivery

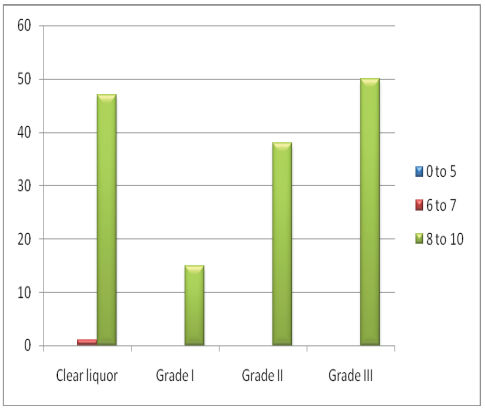

Figure11: Apgar score at 10 minutes after delivery

DISCUSSION

Meconium-stained amniotic fluid (MSAF) resulted from the passage of fetal bowel contents into amniotic fluid, it is a common finding in laboring women and it is estimated to be up to about 18%.[2] It is even more common in post-term pregnancies and growth restricted fetuses. Significant unfavorable outcomes have been associated with MSAF, and it is considered as a poor predictor of fetal outcome.[12] The passage of meconium could be physiological incident that indicate maturity of the fetus. On the other hand, it may reflect fetal distress or increased vagal stimulation by cord compression.[13] The presence of MSAF in labour often causes worry and anxiety for the patient as well as the health care provider, due to the concern of fetal jeopardy. The MSAF brings about low Apgar scores at birth, fetal academia and hypoxia, additionally, the emergency caesarean section for fetal distress, meconium aspiration syndrome and neurodevelopmental handicaps are potential complications.[14] In most of the cases thick meconium have resulted in substandard perinatal outcomes, the exact pathophysiology for meconium passage in liquor is not well known. It could be explained by neural stimulation of maturing gastro-intestinal tract, mostly due to acidosis during labour.[15] Successful management of pregnancies with MSAF mandates a better understanding of meconium passage pathophysiology. Meconium is toxic to the respiratory tract; the presence of meconium in the vocal cords is known as meconium aspiration syndrome MAS and occurs in 20-30% of all cases of MSAF.[16] Pregnant cases with MSAF should be closely monitored during labour for optimum perinatal outcome, and caesarean section is not always indicated.[17] New born babies with Apgar score below 7 at 5 minutes are 3 times more likely to suffer from neurological abnormalities. MSAF in the presence of reactive CTG is not considered a risk of fetal compromise and does not need any intervention.[18] Prolonged labour and excessive uterine contraction may lead to severe asphyxia, this mandates close fetal monitoring, active management of labour and optimal care after birth. Ultimately, this will avoid unnecessary caesarean section in all cases of MSAF.[19]

In our study, 151 cases were selected randomly from the hospital during their delivery time. Among them were 48

cases (31.8%) with clear liquor, and 103 of cases have MSAF, from 103 cases of MSAF, there were 15 cases (14.5%) with grade I MSAF, 38 (36.8%) with grade II MSAF, 50 cases (48.5%) with grade III MSAF.

Table 12: Comparison of different meconium grades with other studies

	Grade I meconium	Grade II meconium	Grade III meconium
Our study	14.5%	36.8%	48.5%
Nirmala et al (25)	39%	43%	18%
Surekha et al (26)	34.16%	29.16%	36.66%
Meena et al (22)	34.4%	40.8%	24.8%

In this study, there were 20 cases (19.4%) with Apgar score below 7 at 1 minutes, among which 1(0.9%) baby was grade I MSAF, 3(2.9%) babies were in grade II, and 16(15.5%) in grade III MSAF, *P* value < 0.000, statistically significant. In contrast to our study, Meena et al, found that 12 (13.9%) babies were in grade I MSAF,15 (14.7%) babies were in grade II and 20 (32.25%) in grade III MSAF at 5 minutes (22). Even though the MAS is out of the scope of this research, the current study found strong relation between low Apgar score at 1 minute and meconium, and severely depressed babies with Apgar score < 5 were more common among mothers who had meconium grade III.

In the current study, pathological CTG was found more commonly associated with grade III MSAF, 19(12.6%) from all cases, followed by 5(3.3%) of grade II MSAF and 2(1.3%) of grade I MSAF. There is strong relation between suspicious and pathological CTG and meconium, especially those with grade II and III meconium, and it was statistically significant. When our results compared to Meena et al[22], who found that abnormal CTG patterns were more likely to be associated with grade III MSAF, 22 cases (35.5%), grade II 19 (18.6%), grade I 9 (10.46%).

(This statement needs to be improved)

Regarding the mode of delivery in our study, there were 72 (47.7%) vaginal deliveries and 79 (52.3%) delivered by caesarean section. The caesarean section rate is higher among grade II and III MSAF compared to grade I. Patil et al, showed the caesarean section rate as 42%.[20] Espinheir et al, in his study estimated caesarean section as 62.5%.[21] It is obvious that there was increased caesarean section rate among patients with meconium stained liquor. Oligohydramnios and postdates pregnancies were found to be associated with MSAF cases, especially grades II and III[23], however, this was not found in our study where oligohydramnios was not risk factor for meconium. Osava et al, found that MSAF cases are more common among primigravida women, in contrast to our findings which showed that the multipara women are more likely to have meconium stained liquor.[24]The strength of this study is that it is a prospective study and all cases were assessed during the time of delivery. However, we only included the low risk pregnancies in this study.

CONCLUSION

From our findings, we concluded that different grades of meconium are associated with increased pathological CTG, operative interventions, low Apgar scores and overall increased perinatal morbidity and mortality. Thus early diagnosis of women at risk for MSAF is important, and intrapartum surveillance and close fetal monitoring with CTG or clinically is mandatory.Grade III meconium should indicate immediate action, the need for skilled medical staff at the time of delivery, additionally, intensive nursery care in the neonatal period to improve the outcome.

REFERENCES

1. Kumari R, Srichand P, Devrajani BR, Shah SZA, Devrajani T, Bibi I, et al. (2012) Foetal outcome in patients with Meconium Stained Liquor, *J Pak Med Assoc*. **62**, 474-476.

2. Eriksen N, Hostetter M and Parisi V. (1994) Prophylactic amnioinfusion in pregnancies complicated by thick meconium, *Am J ObstetGynecol*. **171**, 1026-1030.

3. Tayade S. (2012) The significance of meconium stained amniotic fluid - a cross sectional study in a rural setup, *IJBAR*. **3**, 861-866.

4. Mundhra R and Agarwal M. (2013) Fetal outcome in meconium stained deliveries, *J ClinDiagn Res*. **7**, 2874-2876.

5. Wong SF, Chow KM and Ho LC (2002) The relative risk of 'foetal distress' in pregnancy associated with meconium-stained liquor at different gestation, *J ObstetGynaecol*. **22**, 594-599.

6. Bhutta ZA and Jalil S. (1992) Meconium aspiration syndrome: the role of resuscitation and tracheal suction in prevention, *Asia Oceania J ObstetGynaecol*.**18**, 13-17.

7. Ashfaq F and Shah AA (2004) Effect of aminoinfusion for meconium stained amniotic fluid on perinatal outcome, *J Pak Med Assoc*. **54**, 322-325.

8. Ratnam SS, BhaskarRao K and Arulkumaran S. (1992) Practical approach to Intrapartum fetal monitoring in labour, *Obstetrics and Gynecology for Postgraduates* **1**, 115-125

9. Berkus MD, Langer O, Samueloff A, Xenakis EM, Field NT and Ridgway LE. (1994) Meconium-stained amniotic fluid: increased risk for adverse neonatal outcome, *Obstet Gynecol*. **84**(1), 115-120.

10. Stark, Cloherty and Eichenwald (2012) Manual of neonatal care. 7th edition. Lippincott Williams and Wilkins, 439-444.

11. Avery GB, Fletcher MA, Mac Donald MG, eds. (2016) Neonatology, pathophysiology and management of newborn, 9th ed. Philadelphia:Lippincot, 320,552

12. Oyelese Y, Culin A, Ananth CV, Kaminsky LM, Vintzileos A and Smulian JC. (2006) Meconium-stained amniotic fluid across gestation and neonatal acid-base status, *ObstetGynecol*. **108**, 345-349.

13. Khatun M, Arzu J, Haque E, Kamal MAL, Mamun M, Khan M, et al. (2009) Foetal outcome in Deliveries with Meconium Stained Liquor, *Bangladesh J Child Health* **33**, 41-45.

14. Maymon E, Chaim W, Furman B, Ghezzi F, ShohamVardi I and Maroz M. (1998) Meconium stained amniotic fluid in very low risk pregnancies at term gestation, *Eur J ObstetGynecolReprodBiol*. **80**, 169-173.

15. Becker S, Solomayer E, Dogan C, Wallwiener D and Fehm T. (2007) Meconium-stained amniotic fluid-perinatal outcome and obstetrical management in a low-risk suburban population,

Eur J ObstetGynecolReprodBiol. **132**, 46-50.

16. Khatun et al (2009) Fetal outcome in deliveries with MSL –Bangladesh, *J child health* **33**(2), 41-50.

17. Sasaikala et al. (1995) Perinatal outcome in relation to mode of delivery in meconium stained amniotic fluid, *Indian J Pediatr*. *62*, 6367.

18. Levene MI, Sands C, Grindulis H et al (1986) Comparison of two methods of predicting outcome in perinatal asphyxia, *Lancet* **1**, 67-69.

19. Fujikureat et al. (1975) The significance fo meconium staining, *AMJ obstetgynaecol*. **121**, 45-50.

20. Patil et al, (2006) A one year cross sectional study of management practices of MSAF and perinatal outcome, *J Obstetgynecolindia* **56**(2), 128-130.

21. Espinhera MC et al, (2011) Meconium aspiration syndrome – the experience of a tertiary centre, *Rev portal pneumol*. **17**(2), 71-76.

22. Meena p, Seetha P et al. (2013) Meconium Stained Liquor and Its Fetal Outcome - Retrospective Study, *IOSR Journal of Dental and Medical Sciences* **6**(2), 27-31.

23. Rajput U and Jain A (2013) Impact of meconium stained amniotic fluid on early neonatal outcome", *Journal of Evolution of Medical and Dental Sciences* **2**(45), 8788-8794.

24. Osava R, da Silva F and Junqueira S. (2013) Meconium-stained amniotic fluid and maternal and neonatal factors associated, *Rev. SaúdePública* **46(**6).

25. Nirmala Dhuhan et al, (2010) Meconium staining of amniotic fluid, a poor indicator foetal compromise, *J k science* **12** no.4.

26. Surekha Tayade et al, (2012) The significance of meconium stained amniotic fluid – A cross sectional study in rural set up. I, *J BAR* 0**3** (12).