

THE PREVALENCE AND MANAGEMENT OUTCOME OF PREGNANT MOTHERS WITH CHORIOAMNIONITIS IN MEKANE SALEM PRIMARY HOSPITAL, ETHIOPIA, 2019

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Abstract	<i>Several obstetrical factors have been connected with Chorioamnionitis including null parity, spontaneous labor, longer length of labor and membrane rupture, multiple digital vaginal examinations. The main objective of this study is to determine the prevalence and management outcomes of mothers with chorioamnionitis in Mekaneselam Primary Hospital, Ethiopia 2019. Institutional based retrospective descriptive cross-sectional study was conducted. Information on mother's details, the clinical course and the maternal and neonatal outcome of mothers with chorioamnionitis were reviewed from the medical records for the past 2 years. The sample size was 140 mothers. Census sampling technique was used. The study period was from February 21/2019 to March 12/2019. The data from the mother's cards were collected, analyzed and represented via graphical and tabular presentations. Results reported that between 2018 and 2019 there was a total of 3790 mothers who delivered at MekaneSelam primary hospital. Among them 140 (3.7%) had chorioamnionitis. The neonates born from women with amniotic fluid infection 100 (70.14%) were improved, 23 (16.43%) were stillbirths, 10 (7.14%) died after delivery, 7 (5%) had intra uterine fetal death. The presence of IAI mothers was shown to have high rate of perinatal, maternal morbidity and mortality which was significantly higher than that of the general population.</i>
Keywords	<i>Chorioamnionitis, prevalence and management outcome, MekaneSelam Primary Hospital.</i>

INTRODUCTION

Intra-uterine infection (IAI) has been regarded as one of the important causes of premature rupture of membranes (PROM) and preterm birth which results in the rise in still birth, fetal lesions, morbidity and mortality (1). IAI pertains to any infection with regards to the amniotic fluid, placenta, membranes and decidua. This condition could be in other words referred to as chorioamnionitis, amnionitis, or amniotic fluid infection (2). IAI could be classified as clinical or subclinical infection and histologic chorioamnionitis depending on the presence or absence of overt clinical signs and the results of diagnostic tests. A number of studies state that increased fetal and maternal sepsis is as a consequence of prolonged membrane rupture. It was also reported that chorioamnionitis is a cause of maternal febrile morbidity in the peripartum period and is associated with 20 to 40 percent of cases of early neonatal sepsis and pneumonia. (2)

Several obstetrical factors have been associated with IAI, including nulliparity, spontaneous labor, longer length of labor and membrane rupture, multiple digital vaginal examinations (especially with ruptured membranes), meconium-stained amniotic fluid, internal fetal or uterine monitoring, and presence of genital tract pathogens (eg, sexually transmitted infections, group B Streptococcus, bacterial vaginosis) (3,4,5). Longer length of labor and length of ruptured membranes appear to be important risk factors, whereas an increasing number of digital vaginal examinations may be a consequence of longer labor rather than an independent risk factor particularly prior to membrane rupture (6,7). Multiparous mothers are at low risk of IAI regardless of obstetric practice or risk

factors. (8). Eventhough, chorioamnionitis is caused by organisms that are part of the normal vaginal flora it could be due to hematogenous dissemination of microorganisms. The chief pathogens are Bactericides and Prevotella species, E.coli, anaerobic streptococci, and GBS. (9).The diagnosis of chorioamnionitis is confirmed based on maternal fever and maternal and fetal tachycardia, in the absence of other localizing signs of infection. In more severely ill mothers, uterine tenderness and purulent amniotic fluid may be present (10).

Parenteral antibiotic therapy has to be enforced as soon as chorioamnionitis is diagnosed, unless delivery is imminent (11). Three random studies have reported that mother-newborn pairs who receive timely intrapartum treatment have better outcomes than the mothers treated after delivery (Gentamycin Ampicillin, Metronidazole or single broad-spectrum Ceftriaxone) (12). A reduction in frequency of neonatal bacteremia and pneumonia, as well as decreased period of maternal fever and hospitalization are the major advantages of early treatment of IAI (13). According to the Sooper et al., acute chorioamnionitis is a relatively common complication of pregnancy with global values reporting 9.6% and the regional value of 8.1% in latin mothers. Recent years shows that higher frequencies of such infections have been reported involving as many as 4-10.5% of pregnancies and mortality may be associated with chorioamnionitis.(14, 15, 16).

In 2009, Mercer and Arheart investigated 13 random mothers with less than 35 weeks of gestation, the proposed microbial pathogenesis for preterm labour or ruptured membranes has prompted investigators to give various antimicrobials in an attempt to forestall delivery. Meta-analysis indicated that only 3 out of 10 were benefited. Others developed chorioamnionitis and newborns born were affected with sepsis, respiratory distress and intracranial hemorrhage.(17)

Mercer BM, et al conducted a trial with two groups, one group of mothers with membranes ruptured and the gestational age of 24 to 32 were given combined drugs for 7 days (ampicillin, amoxicillin plus, erythromycin or placebo). Other group of mothers with same gestational age with ruptured membranes was given tocolytics and corticosteroids. Results indicated that antimicrobial treated women had significantly fewer newborns with respiratory distress syndrome, necrotizing enterocolitis and composite adverse outcomes.(18)

METHOD AND MATERIALS

The study was conducted from February 21/2019 to March 12/2019 at MekaneSelam Primary Hospital, Amhara, Ethiopia. Institutional based retrospective cross-sectional study was conducted.

Population

Source population:All mothers who had their deliveries at MekaneSelam Primary Hospital between 21/06/2018 to 21/06/ 2019.

Study:Mothers who have been diagnosed with chorioamnionitis and delivered at MekaneSelam Primary Hospital Ethiopia during 21/06/ 2018 to 21/06/ 2019.

Inclusion criteria:All mothers who had been diagnosed with Chorioamnionitis and delivered at MekaneSelam Primary Hospital Ethiopia during the study period.

Exclusion criteria: Mothers who have been diagnosed with Chorioamnionitis but whose medical records were not clearly recorded or not registered at MekaneSelam Primary Hospital Ethiopia.

SAMPLE SIZE DETERMINATION

The sample size was determined by using a standard formula for single population proportion. A non-respondent rate of 10 will be calculated and this number included in the study by using 95% confidence interval (CI) and 5% margin of error the sample size determined as follows.
 $No = Z_{\alpha}^2 (Pq) / D^2$

No: sample size of population assuming more than 10,000 total population.

P: 0.5 (maximum variability assumed)

D: 0.05 (margin error between the sample and population)

Z: 1.96 (critical value at 95% confidence interval)

Q: 0.5(1-p)

Therefore

$$No = (1.96)^2 (0.5)(0.5) / (0.05)^2 = 384$$

No=384

Since our Target Population is 127 and we use 10% of non-response then final sample size (nf) is =140.

SAMPLING TECHNIQUE

The Census sampling technique was used in this study.

DEPENDENT VARIABLE

Prevalence and Management outcome of Chorioamnionitis. **Independent variable**

1. OBSTETRICAL

Gestational age PROM (Premature Rupture Of Membranes)

2. SOCIO DEMOGRAPHICAL STATUS:

Age Parity Gravida **Data collection procedures:**

Instrument The medical records of the pregnant mothers with chorioamnionitis were used with structured questionnaires to collect the specific data. **Data collection Technique:**

The mother’s medical records were reviewed retrospectively for chorioamnionitis. Information on mothers’ details, the clinical course, and the maternal, neonatal outcomes were reviewed from medical records of chorioamnionitis for the past 2 years. Data was collected from February 21, 2019 to March 12, 2019.

Data quality management

Each day the cards were collected from the medical records department in the hospital and the data were recorded using questionnaire with care taken not to miss any data. The cards were double checked before they were returned. The quality of the data mainly depended on the initial diagnosis made by the physicians at the hospital by proper recording and storing the data.

Data processing, analysis, interpretation and presentation:

The mother’s data were collected from medical records, analyzed and represented using various graphs, tables and written explanations. Finally, the data was presented by using frequency and percentage with different tables and figures. 95 % Confidence Interval would be used to measure the strength of the association between the independent and dependent variables.

RESULTS

Sociodemographic and Obstetrical data of the participants: There were 140 maternal cards utilized for data analysis. In our study 110 (78.6%) were found with the age group of 20-35 years. Most of the Mothers were from rural 99 (70.7%) and without hospital facility, only 41 (29.3%) mothers were living in urban. In this study most of the mothers are primi (first time pregnancy) 67 (47.5%). The mother who had no ANC follow up and developed chorioamnionitis were 60 (43%) of the cases and the rest had ANC follow.

SOCIO DEMOGRAPHIC DATA	VARIABLES	FREQUENCY	PERCENTAGE %
Age	<20 years	18	12.9
	20-35 years	110	78.6
	>35 years	12	8.6
	Total	140	100.0
Place	Urban	41	29.3
	Rural	99	70.7
	Total	140	100.0
Parity	Para 1	67	47.9
	Para 2-4	40	28.6
	Para 5-7	26	18.6

	> Para 8	7	5
	Total	140	100.0
ANC Follow up	Yes	80	57
	No	60	43
	Total	140	100.0

Table1: Shows the socio demographic variables of the mothers with chorioamnionitis at MekaneSelame primary Hospital between 21/6/20018 to 21/6/2019.

Figure 1: Shows that the most of the mothers 93 (66.4%) were in the gestational age of 36- 39 weeks, 21 mothers (15.0%) were at 32-35 weeks of gestation, 20 mothers (14.30%) are at >40 weeks of gestational age and 6 (4.3%) mothers were in gestational age of 28-31 weeks.

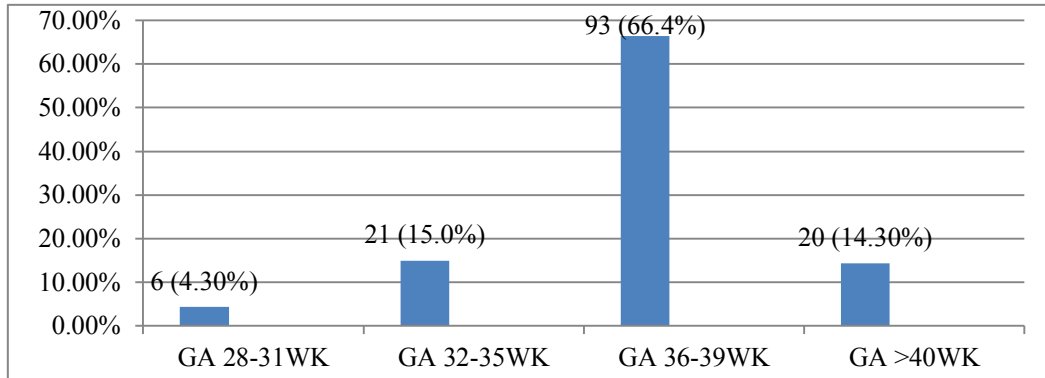


Figure 1: The gestational age of mothers with chorioamnionitis at MPH between 21/6/20018 to 21/6/2019.

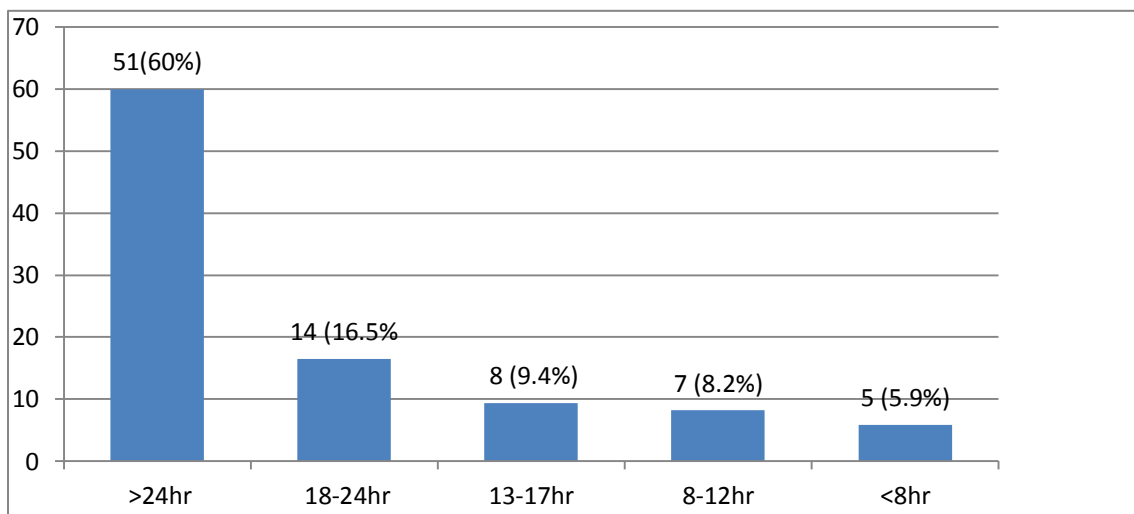


Figure 2: Shows mothers presented to the hospital with PROM (preterm rupture of membranes) in that 85 mothers 51 (60%) of the mothers had gush of fluid of more than 24 hours, 14 (16.5%) had gush of fluid for 18-24 hours, 8 (9.4%) had gush of fluid for 13-17 hours, 7 (8.2%) had rupture of membrane for 8-12 hours but only 5 (5.9%) mothers had gush of fluid for < 8 hours.

Figure 2: The duration of rupture membrane before the mother presented to MekaneSelame Primary Hospital between 21/6/20018 to 21/6/2019.

PREVALENCE OF CHORIOAMNIONITIS

Prevalence of chorioamnionitis= $\frac{\text{Number of people with chorioamnitix} \times 100}{\text{Total Number of people}}$ **(Equation -i)**
 $= \frac{140}{3790} \times 100 = 3.7$

In this study the total number of pregnant mothers was: 3790. Mothers who were affected with chorioamnionitis were: 140 (Table 1). The prevalence rate is: 3.7%

Management outcome of chorioamnionities

Neonatal outcome on mother with chorioamnionitis:

Table 2: depicts that 30 (27.3%) of the neonates were born from mothers with chorioamnionitis and had an APGAR score of < 5 at the first minute, 62 (56.4%) of them had an APGAR score of 5-8 and the rest 18 (16.4%) had an APGAR score of >8.

Whereas at the fifth minute, 21 (19.1%) of them continued to have an APGAR score of below < 5, 58 (52.7%) of the neonates had an APGAR score of between 5-8 and 31 (28.2%) of the neonates had APGAR score above 8 (Table 2).

S.no	APGAR at 1 st minute	Frequency	Percentage%
1.	<5	30	27.3
2.	5-8	62	56.4
3.	>8	18	16.4
Total		110	100.0
S.no	APGAR at 5 th minute	Frequency	Percentage
1.	<5	21	19.1
2.	5-8	58	52.7
3.	>8	31	28.2
Total		140	100.0

Table 2: Shows the APGAR score at 1st and 5th minute of neonates born from chorioamnionitis mothers at MekaneSelam primary hospital between 21/6/2018 to 21/6/2019

Table 3 portrays that the neonates born from mothers with chorioamnionitis 100 (70.14%) were improved, 23(16.4%) were stillbirths, 10 (7.1%) neonatal deaths 7 (5%) were IUFD. When the APGAR score at 1st minute was < 5, 4 neonates had died and 4 were referred to neonatal ICU, only 10 out of the 30 neonates with APGAR score of less than 5 improved. When the APGAR score at 5th minute was < 5 they were 6 deaths and 8 were referred to neonatal ICU only 6 out of the 16 neonates with APGAR score of less than 5 has been improved.

S. no	APGAR at 1 st minute	Neonatal outcome			Total
		Improved	Death after birth	Refer to Neonatal Unit	
1.	<5	10	4	4	18
2.	5-8	56	0	2	58
3.	>8	18	0	0	18
Total		84	4	6	94
S. no	APGAR at 5 th minute	Neonatal outcome			Total
		Improved	Death after birth	Refer to Neonatal Unit	
1.	<5	16	6	8	30
2.	5-8	47	0	3	50
3.	>8	30	0	0	30
Total		93	6	11	110

Table 3:APGAR score at 1st and 5th minute and the neonatal outcome baby born from chorioamnionitis mothers in MPH between 21/6/2009 to 21/6/2011.

PREMATURE RUPTURE OF MEMBRANE (PROM)

The neonatal outcome from the mother with the ruptured membranes when the duration exceeds >18 hours out of 48 neonates 37 had improved, 5 died after birth, 10 were still births, 5 IUFD and 6 were referred to neonatal ICU. Whereas when the rupture of the membrane was <18 hour, out of 20 neonates 12 improved, 3 died after delivery and 5 was referred to neonatal ICU (Table 4).

NRFHB (NON - REASSURING FETAL HEART BEAT)

In this study 45 (40.9%) mothers with chorioamnionitis had meconium stained amniotic fluid of these deliveries 4 newborns died after delivery and 4 were referred to neonatal ICU and the rest had improvement.

Sixty-five 65 (59.1%) mothers had no meconium staining, 6 died after delivery and 3 were referred to neonatal ICU and 56 had improved completely (Table-4).

In our study 84 (60%) of the mothers had NRFHB (Non-Reassuring fetal Heart Beat) on follow up of these 6 neonates died after delivery, 7 were referred to neonatal ICU, 14 were stillbirths, 3 IUFD

and the remaining (54) survived (Table 4).

The total number of mothers 56 (40%) had no record of NRFHBP (Non-Reassuring fetal Heart Beat) and 34 of the neonates were born alive and improved, 9 were stillbirths, 4 died after delivery, 4 was Intra Uterine Fetal Death and 5 was referred to the neonatal ICU. (Table 4).

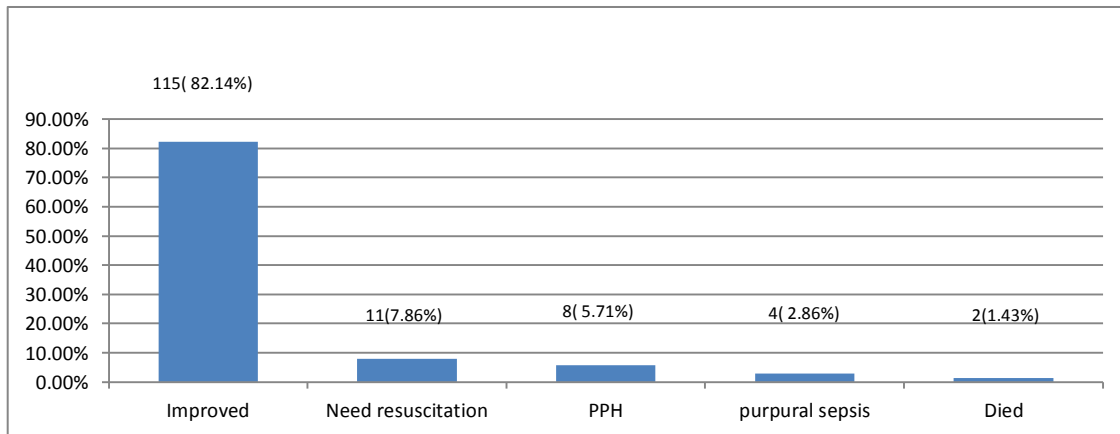
S. no	Duration of membrane rupture	Neonatal Outcome			Total
		Improved	Death after birth	Referred to Neonatal Unit	
1.	<8hrs (not prolonged)	5	0	2	7
2.	<12hrs	3	1	2	6
3.	<18hrs	4	2	1	7
4.	>18hrs	37	5	6	48
	Total	49	8	11	68
S. no	NRFHB (Non Reassuring Fetal Heart Beat):	Neonatal Outcome			Total
		Improved	Death after birth	Referred to Neonatal Unit	
1.	Yes	54	6	7	67
2.	No	34	4	5	43
	Total	88	10	12	110

Table 4: Shows the Duration of rupture of membranes and the mothers who had develop chorioamnionitis and Non-Reassuring Fetal Heart Beat and neonatal outcome from those mothers in MPH between 21/6/2018 to 21/6/2019.

Maternal outcome in chorioamnionitis:

From the total 140 mothers 115 (82.14%) had improvement after delivery, 11 mothers (7.86%) mothers were resuscitated, 8 mothers (5.71%) had developed post-partum hemorrhage, 4 mothers (2.86%) developed puerperal sepsis and 2 (1.43%) mothers were after delivery.

Figure 3: Shows the outcome of mothers who had chorioamnionitis as a complication in MPH between 21/6/2018 to 21/6/2019.



DISCUSSION
The study was carried

out to review the prevalence and management outcome of chorioamnionitis in pregnant mothers at MekaneSelam Primary Hospital who had visited the hospital from 21/06/2018 to 21/06/2019. In our study the prevalence rate of chorioamnionites was 3.7% which was similar to study done by department of health and family welfare in Harer town, Ethiopia 3.5% n 2017 (19). The similarity in results may be due to inadequacies in diagnostic facilities. Comparing the study done by Naeye in 2017 (prevalence rate of 2.9%) which is lesser than this study(3.7%) the higher range could be due to the fact that the chorioamionitis increased based on health conditions and behaviors. Furthermore, factors such as gestational age, economic conditions and ethnic differences influence the incidence. (20)

Several obstetrical factors have been associated with IAI, include nulliparity, longer length of labor and membrane rupture, multiple digital vaginal examinations (especially with ruptured membranes), meconium-stained amniotic fluid, and presence of genital tract pathogens. Multiparas

mothers are at low risk of IAI regardless of obstetric practice or risk.(6)

Forty-one of the total cases were from MekaneSelam, the rest were from outside which were mostly rural and without hospital facilities and 43% of the women had no AnteNatal Care (ANC) follow up, which was due to the low socioeconomic statuses and inadequate medical supplies. From total 140 mothers 48% mothers were primipara, 28.6% of the women had 2-4 pregnancies, 18.6% mothers had 5-7 pregnancies and 5% of mother had 8 or more pregnancies according to our results as the parity increase the prevalence of chorioamnionitis decrease.

In our study the highest incidence of chorioamnionitis were seen when the rupture of membrane were prolonged for more than 24 hours (61%) but unlike other studies there were seven mothers who have developed IAI while the duration of rupture was below 8 hours it may be due false estimate of the time or other comorbid conditions which may have hastened the infection. Wondel et al, stated that delaying delivery up to 12 hours following the diagnosis of chorioamnionitis is not associated with poor neonatal outcome.(21). From table 3, the 1st and 5th minute APGAR score from the 110 newborns were significantly depressed with 27.3% of them having an APGAR score of <5 at 1st minute and the APGAR at <5 has been improved from 27.3% to 19.1% at the 5th minute. 16.4% of the newborns were stillbirths, 7.1% of them died shortly after delivery and 5 were referred to neonatal ICU for intensive care. Amniotic fluid infections were the most common cause of prenatal death in Addis Ababa, Ethiopia in 2016 (21.8/1000 live births). Most such infections appear to originate in the fetal membranes near the cervical OS. The high rate of spread of this local infection in to the amniotic fluid in appeared related to a lack of antimicrobial activity in amniotic fluids. Factors that adversely affect nutrition in the gravid mother, lack of prenatal medical and low water usage was associated high rate of fatal infections (22). In our study 10 (9.1%) neonates died out of 110 neonates, whereas the national neonatal mortality rate was 39 deaths per 1000 live birth Addis Ababa and neonatal mortality rate as 125 death per 1000 live births in Afar region as reported in the 2016 EDHS (22).

With chorioamnionitis the fetal and neonatal morbidity is substantially increased. Alexander and colleagues in 2012 studied 1367 very-low-birth weight neonates delivered at Parkland Hospital. Approximately 7% were born to women with overt chorioamnionitis, and their outcomes were compared with similar newborns without clinical infection. Those in the infected group had a higher incidence of sepsis, respiratory distress syndrome and early-onset of seizures intraventricular hemorrhage and periventricular leukomalacia (23).

The APGAR score at first minute of below 5 was associated with 4 deaths and 5 referrals to neonatal ICU. When the APGAR at the fifth minute is below 5 it is associated with six deaths and 7 referrals to neonatal ICU only 20 out of the 30 neonates with APGAR score of less than 5 has improved. One of the other factors affecting neonatal outcomes is said to be duration of rupture of membrane when the duration exceeds > 18hrs 37 had improved 5 died after birth and 6 were referred to neonatal ICU out of 48 neonates. Whereas if the rupture of the membrane is < 18hrs 12 improved, 3 died after delivery and 5 was referred to neonatal ICU out 20 of neonates. Petrova and co- workers conducted a study in 2010 with more than 11million singleton live births during labor 1.6%of mothers had fever and this was a strong predictor of infection related death in both term and preterm neonates.(24). In this study 39 (41.9%) of the mothers with chorioamnionitis had meconium stained amniotic fluid of this deliveries 4 died after delivery, 12 were stillbirths, 2 were referred to neonatal ICU and the rest showed improvement. Showing the fact that meconium stained amniotic fluid increases the risk for poor maternal and neonatal outcome (7, 8).

From table 4, 60.2% of the mothers had NRFHB followed by 4 neonates who died after delivery, and the 4 were referred to neonatal ICU and 14 were stillbirths, the remaining survived.Loof JD 2014

and Hauth JC 2009 stated that Non reassuring fetal heart-rate (FHR) patterns such as tachycardia and the absence of FHR variability are relatively common in the presence of acute chorioamnionitis(25,26). Although these patterns have been utilized as markers of "fetal distress" or "fetal jeopardy" in women without chorioamnionitis, their significance as predictors of neonatal outcome in the presence of IAI were unclear in their studies (20). The majority of women 115 (82.14%) had improved after delivery, 11 (7.86%) needed resuscitation, 8 (5.71%) developed PPH, 4 (2.86%) had puerperal sepsis as a complication and 2 (1.4%) died after delivery.

CONCLUSION AND RECOMMENDATIONS:

Conclusion

1. The management outcome of neonates and mothers with chorioamnionitis in our study is efficient when compared to other studies in Ethiopia.
2. This study showed that Nulliparity, longer duration of rupture of membrane, being from with poor health facility, the presence of genitourinary tract infection and the number of ANC follow up were associated with high rate of chorioamnionitis.
3. The presence of IAI in the mother was shown to have high rate of perinatal and maternal morbidity and mortality which was significantly higher than that of the general population.
4. The presence of NRFHBP with meconium stained amniotic fluid, low APGAR score at the 1st and 5th minute and longer duration of rupture of amniotic fluid were predictors of poor outcome on the newborn.

Recommendations

To Mekanesselam Hospital health professionals:

1. We recommend after reviewing this data that the hospital staff to have better chart keeping, Neonates' data should also be linked to the mothers' cards so as to retrieve them easily in the future studies.

Nursing Researchers:

1. The further researchers should be addressed the place, used prospective based design and primary data collection technique and use large sample size.

Availability of data and materials:

All data generated or analyzed during this study are included in this published article.

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Ethics approval and consent to participate:

Ethical clearance was obtained from department of Midwifery, College of Medicine and Health Science, Wollo University institutional review committee and approval with reference Number Mid/0456/19 was granted.

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