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Neonatal Sepsis and Associated Factors among Neonates Born in Dessie Comprehensive Specialized Hospital May 2024

Kalki Birhanuan Amare*

Department of Medicine Wollo University College of Health Sciences, Amhara, Ethiopia

Abstract

Background: Neonatal sepsis is a severe blood bacterial infection in neonates at the age of equal to or less than 28 days of life, and it's still the major significant cause of death and long-term morbidity in developing countries. Clinical presentation is non-specific and includes fever, respiratory distress, lethargy, impaired or refusal of feeding, jaundice, absent Moro reflex, hypothermia, convulsions, bleeding disorder and bulging fontanel. So, newborn survival is an issue of great concern to the world, especially to developing countries. Care for the neonate often receives little attention in maternal and child health programs. So, it is important to do additional research regarding this title, typically on associated factors.

Objective: To assess the Prevalence of neonatal sepsis and associated factors among neonates born in Dessie Comprehensive Specialized Hospital.

Method: Institution-based cross-sectional studies were employed. The study subjects were selected using a systematic sampling method 362 neonates were planned, and 333 were collected. The data was collected by interviewing and using a chart review method. The data was entered and exported to S.P.S.S. version 25.00 for clearing and analysis, and Logistic regression analyses were employed to identify factors associated with neonatal sepsis. Using 95% CI, variables with a p-value <0.05 were identified as statistically significant factors.

Result: In this study, 333 study participants were involved, making a response rate of 91.9%. The Majority [34.8%] of the study participants were in the age group of 25-29 years with mean and S.D. age of 29.3±5.59 years, respectively. Two-thirds of the study participants were married, and 30.6% were in primary education. Most [70.6%] of the study participants had a household monthly income of <5000 ETB. Two-thirds of the study participants were multiparous, 27.9% of the study participants have a history of abortion, and 28.8% of the study participants have two living children. Sixty-two percent of the study participants had A.N.C. follow-up, and S.V.D. delivered 72.1% of the study participants. One-fourth of the mothers had a history of U.T.I., 54.1% of the participants had a maternal history of foul-smelling liquor, and 22.5% had M.S.A.F. during labor and delivery. Sixty-six percent of the participants' deliveries had a history of PROM, 43.2% of the participants had a PROM duration of >18 hours and 37.8% of the labor duration was> 24 hours. Regarding the specific characteristics of the neonate, 35.4% of the neonate were low birth weight and 18.3% were delivered in the preterm phase of gestation. More than twenty-three percent of the neonates were developing birth asphyxia, and 37.8% of the neonates had an Apgar score of <=6 at the first minute. Sixteen percent of the neonates received ventilation, 25.2% of the neonates were supported with oxygen through an intranasal catheter, and 27.9% were supported with mask oxygen.

Conclusion: In this study, the magnitude of neonatal sepsis was 37%. Of those having sepsis, 63% developed an early onset of neonatal sepsis, and 37% developed a late onset of neonatal sepsis. The determinant factor affecting neonatal sepsis was the mode of delivery of C.S., which was 97% less likely to cause neonatal sepsis than S.V.D. [AOR=0.03, 95%CI=0.001, 0.04] While the instrumental method is used more than S.V.D. [AOR=7.8, 95%CI=2.43, 32.01], mother having U.T.I. during pregnancy [AOR=1.2, 95%CI=1.01, 3.21], had M.S.A.F. liquor during labour and delivery [AOR=8.4, 95%CI=2.05, 34.02], maternal liquor of PROM [AOR=3.7, 95%CI=2.47, 18.37], duration of PROM during delivery of >18 hours compared to duration of PROM <18hours [AOR=11.5, 95%CI=3.42, 38.92] and low birth weight and preterm.

Introduction

Background

Sepsis is a systemic inflammatory reaction syndrome due to a suspected or confirmed infection. A dysregulated host response to infection causes a life-threatening organ failure. It's also a prevalent last pathway to death from numerous infectious diseases around the world. [1,2]. The Global Burden of Disease (G.B.D.) estimated 1.3 million annual incident cases of neonatal sepsis and other infections [approximately 937 cases per 100,000 live births] and 203,000 sepsis-attributable neonatal deaths [3,4]. In sub-Saharan Africa alone, an estimated 5.3-8.7 million disability-adjusted life-years have been lost in 2014 due to neonatal sepsis and consecutive long-term morbidity [5]. In sub-Saharan Africa, neonatal sepsis is the leading newborn killer, where more than one-third of neonatal deaths [6].

***Corresponding author:** Kalki Birhanuan Amare, Department of Medicine Wollo University College of Health Sciences, Amhara, Ethiopia, E-mail: kalki.birhanuan@amare.com

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Neonatal sepsis is associated with increased medical costs, prolonged hospital stays and potentially poor long-term neurodevelopmental outcomes. Surviving infants, approximately a quarter of the neonates, have significant neurological sequelae as a consequence of central nervous system involvement, septic shock or hypoxemia secondary to severe parenchyma lung disease despite prompt instigation of antibiotic therapy [7].

Based on the onset of clinical signs and symptoms, it is classified as early onset sepsis (E.O.S.) if the onset of clinical features present from birth to 7 days [usually <72 hours], and late-onset sepsis (L.O.S.) if it presents from 8 to 28days after birth [8]. Out of the three leading causes of neonatal mortality, sepsis is the third leading cause of neonatal mortality worldwide [9].

Neonatal sepsis is a severe blood bacterial infection in neonates at the age of equal to or less than 28 days of life, and it's still the major significant cause of death and long-term morbidity in developing countries [10,11].

Clinical presentation is non-specific and includes fever, respiratory distress, lethargy, impaired or refusal of feeding, jaundice, absent Moro reflex, hypothermia, convulsions, bleeding disorder and bulging fontanel [12]. Several neonatal risk factors were identified that play an essential role in the occurrence of neonatal sepsis, such as male sex, preterm delivery, gestational age, birth asphyxia, low birth weight; <2.5kg, APGAR score less than seven in the first one-minute, mechanical ventilation, and prolonged rupture of membranes have significant roles in early and late-onset neonatal sepsis, as they do in resource-rich countries [13].

The rates of bloodstream infection (B.S.I.) in neonates are 3-20 times higher in developing countries. In some countries, approximately half of the patients in neonatal intensive care units (NICUs) acquire infection. The case fatality rates of neonatal sepsis may reach 52%, contributing to almost one million deaths, and are responsible for about 30-50% of the total neonatal deaths in developing countries. Even though sepsis-related mortality is largely preventable with the prevention of sepsis itself, timely recognition, rational antimicrobial therapy and aggressive supportive care [14-17].

Statement of the problem

Globally, an estimated 1.3 to 3.9 million annual neonatal sepsis cases and 400,000 to 700,000 annual deaths were reported. About 6,700 newborns die every day [18]. Among hospital-born infants, hospital-acquired infections account for an estimated 4% to 56% of all deaths in the neonatal period. Among these, 84% of deaths are preventable [19-20]. Developing countries accounted for around 85.0% of sepsis and deaths worldwide. Annually, an estimated 5.29 to 8.73 million lives are lost due to neonatal sepsis in S.S.A. countries [21,22].

Neonatal sepsis is one of the most common causes of neonatal morbidity and mortality, accounting for about 26% of neonatal deaths in developing countries [23]. Furthermore, neonates with sepsis may fail to feed, have convulsions, fast breathing, severe lower chest indrawing, fever and hypothermia as the presenting signs [24]. Neonatal sepsis can exhibit mild symptoms at rest, but it can quickly advance to meningitis and multisystem organ failure, which are linked to significant mortality and morbidity [25].

The neonatal mortality rate in Ethiopia was 33 deaths per 1000 live births, and the significant causes of death in neonates are neonatal infections [26,27]. Studies conducted in different parts of Ethiopia from 2015 – 2019 showed that the magnitude of neonatal sepsis ranged from 33.8-78% (33.8% in Wolayita, 64.8% in Gondar, 76.8% in Mekelle, 77.8% in Shashamane, and 78.3% in Arba Minch [28-32].

The main significant factors associated with neonatal sepsis were maternal factors [meconium-stained amniotic fluid [33], U.T.I. during pregnancy [34], Place of delivery [35], Antenatal follow-up [36], and PROM and neonatal factors (birth weight and APGAR score) [37].

Newborn survival is an issue of great concern to the world, especially to developing countries. Care for the neonate often receives little attention in maternal and child health programs. Therefore, it is important to do additional research regarding this title, typically on associated factors. Therefore, this research was conducted to determine neonatal sepsis's Prevalence and associated factors in Dessie Comprehensive specialized hospitals in North Ethiopia. In addition, it will allow stakeholders to reduce the problem by working on identified factors.

Significance of the study

The significance of a study is multifaceted, encompassing both public health and clinical perspectives. Understanding the implications and importance of such a study is crucial for guiding healthcare policies, improving clinical practices, and ultimately enhancing the well-being of newborns.

The study's findings will be important for Early Detection and Intervention of the cause, optimizing Healthcare Resources, enhancing Prenatal Care, reducing mortality, detecting disease burden, health education, and informed treatment strategies.

The findings are also important for research and policy development, such as Contribution to Scientific Knowledge and Policy Recommendations, which can use the study's findings to develop evidence-based policies and guidelines to reduce the incidence of neonatal sepsis and improve neonatal health outcomes.

In summary, a study on the Prevalence of neonatal sepsis and its associated factors is significant as it provides actionable insights for healthcare professionals, policymakers, and the community, ultimately contributing to improving neonatal health and reducing neonatal mortality.

Literature Review

The Prevalence of neonatal sepsis

A study done in Ruvuma, Southern Tanzania, revealed that the Prevalence of neonatal sepsis was 49.8% [38]. A study done in Lira Regional Referral Hospital Northern Uganda on neonates admitted to NICU revealed that the Prevalence of neonatal sepsis was 41.2% [39]. A study done in Hiwot Fana Comprehensive Specialized University Hospital revealed that of the neonates admitted to the NICU, 53.1% were diagnosed with neonatal sepsis. Among these, 139 [67.8%] of the Majority had early onset neonatal sepsis, and the rest had late onset neonatal sepsis [40].

A study done in Shashemene on neonatal sepsis revealed that of 244 neonates admitted to the NICU, 190(77.9%) had neonatal sepsis. Of those, 64.7% had early-onset neonatal sepsis, and 35.3% had late-onset neonatal sepsis [31]. The study done in Harar Town, Eastern Ethiopia, revealed that the major morbidity profile among all neonates was Neonatal sepsis, which accounted for 154 (52.7%) [41].

A study done in Arsi University Teaching and Referral Hospital

revealed that 901 neonates were admitted to the NICU, of which 303 were admitted with a diagnosis of clinical sepsis, making the Prevalence of neonatal sepsis 34% [42]. A study done at Hawassa University Comprehensive Specialized Hospital found that among neonates admitted to the NICU, the magnitude of neonatal sepsis was 56% [43].

A study on neonatal sepsis in the Somalia region found that the overall Prevalence was 42.9% CI = (38.4-47.8) [44]. A study done in Arbaminch, southern Ethiopia, revealed that the magnitude of neonatal sepsis was 78.3% [45].

The determinant factor of neonatal sepsis

A study done in Tanzania revealed that the factors associated with neonatal sepsis were prematurity, age of more than a week, intravenous cannulation after birth, and resuscitation with nasal oxygen prongs [38].

A study done in Lira Regional Referral Hospital Northern Uganda on neonates admitted to NICU revealed that the determinant factor was neonates 1-3 days of age were more likely to develop N.S. than those older than 4-28 days of age. The possibility of developing NS was 1.894 times higher in male neonates than in females [39].

A study done in Hiwot Fana Comprehensive Specialized University Hospital revealed that preterm neonates were eight times more likely to develop neonatal sepsis than postpartum neonates. Neonates born from mothers living in urban areas were 74% less likely to develop neonatal sepsis than neonates whose mothers lived in rural areas. Neonates born from mothers who had attended A.N.C. were 68% less likely to develop neonatal sepsis. Neonates born from mothers who had used antibiotics during pregnancy were 61% less likely to develop neonatal sepsis than neonates born from mothers who had not used antibiotics. Neonates born from mothers with a duration of membrane rupture < 12 hours and 12 – 17 hours were 89% and 79% less likely to develop neonatal sepsis than neonates born from mothers with a rupture of membrane > 18 hours, respectively [40].

The finding of the study done in Shashemene revealed that neonates whose age was less than seven days were three times more likely to develop neonatal sepsis compared with the age of neonates greater than eight days of age. Neonates who had birth asphyxia were 3.54 times more likely to have neonatal sepsis compared to those who did not have birth asphyxia. The neonates who used oxygen via mask were 2.859 times more at risk of developing neonatal sepsis compared to Neonates who did not use it at birth [41].A study done for determinants of neonatal sepsis in the study done in Harar Town, Eastern Ethiopia, revealed that neonates who come from rural areas were 2 times more likely to acquire neonatal sepsis than those who live in urban. Neonates born from mothers who have no A.N.C. follow-up were 2 times more likely to have neonatal sepsis than those Having A.N.C. follow-up [42].

Conceptual framework (Figure 1)

Objectives

General objective

- To assess the Prevalence of neonatal sepsis and associated factors among neonates born in Dessie Comprehensive Specialized Hospital.

Specific objectives

- To determine the Prevalence of neonatal sepsis among neonates born in Dessie Comprehensive Specialized hospital
- To identify factors affecting neonatal sepsis among neonates born in Dessie Comprehensive Specialized hospital

Methods

Study area

The study was conducted in Dessie Comprehensive Specialized Hospital, north-eastern Ethiopia. Dessie city administration is far from Bahir Dar (481 kilometers), the capital city of Amhara regional state, and 401 kilometers from Addis Ababa, the capital city of Ethiopia. Dessie Comprehensive Specialized Hospital was established in 1942. It serves a population of 5 million and has 603 healthcare workers. And has an average of 1,200 annual neonatal sepsis cases admission. The

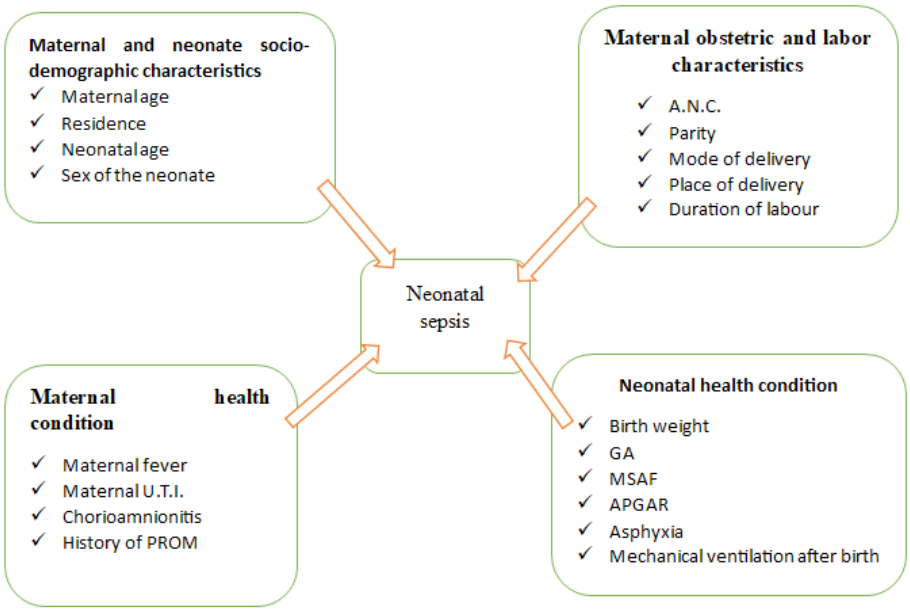

Figure 1: Conceptual framework on neonatal sepsis and associated factors adopted from literature review.

hospital has been giving multiple services such as medical, surgical, obstetric, A.N.C., chronic follow-up, pediatric, orthopedic center service, D.M. service, A.R.T. and follow-up services, delivery, neonatal I.C.U. Service etc.

Study period

This study was conducted from January 1 to April 20, 2024.

Study design

An institution-based cross-sectional study was conducted.

Population

Source population

All neonates were delivered to Dessie Comprehensive Specialized Hospital.

Study population

All neonates were admitted to the Dessie Comprehensive Specialized Hospital NICU ward.

Inclusion and exclusion criteria

Inclusion criteria

All neonates delivered in Dessie Comprehensive Specialized Hospital were admitted within 28 days of delivery.

Exclusion criteria

Neonates were delivered to D.C.S.H. and admitted to other health facilities.

Sample size determination

A single population proportion formula was used to estimate the sample size, and the following

assumptions were made: A proportion of 34% was admitted with assessment neonatal sepsis from the study done in Arsi University Teaching Hospital [42].

Level of significance 5% (α= 0.05), 95 % confidence level (Z α/2 = 1.96) and absolute precision or margin of error 4% (d = 0.05).

The following formulas were used to calculate sample sizes.

$$n = (Z\alpha/2)2 * p(1-p)/d2; \text{ then after substituting } (1.96)2\ (0.34*0.66) = 345$$

$$(0.05)2$$

The minimum sample size required for the study was estimated to be 345. By adding 5% for a possible non-response rate, a total sample size of 362 was obtained.

Sampling techniques and procedures

Systemic random sampling was used

Operational definition

Neonatal sepsis is a clinical syndrome manifested with systemic signs and symptoms of infections during the first 28 days of life.

Neonatal sepsis

Independent variables

- Maternal and neonatal socio-demographic characteristics include maternal age, residence, neonatal age, and sex of the neonate.
- Maternal health condition; maternal fever, maternal U.T.I., chorioamnionitis, history of PROM
- Maternal obstetric and labor characteristics: A.N.C., parity, mode of delivery, Place of delivery, duration of labor
- Neonatal health condition ; Birth weight, G.A., M.S.A.F., APGAR, asphyxia, mechanical ventilation after birth

Data collection instrument

A structured questionnaire was adapted from the results of different research done on similar literature. It was first prepared in English. The questionnaire has three sections: the first section is a socio-demographic-based questionnaire, the second is a reproductive history-based questionnaire, and the third is a questionnaire about neonatal health conditions.

Data quality control

One day of training was given to data collectors on how to fill out the questionnaire and the overall data collection process before the actual time of data collection. The pretest was conducted in 5% of the sample size, a similar population. And correction was done accordingly. Data was checked daily for completeness and consistency during data collection.

Data collection procedure

Training for data collectors and supervisors was given on the planned date. The data collection formats were made ready for use. The participants were requested to complete the questionnaire. Following informed consent and screening for exclusion criteria, each individual's mother was asked to respond to the questionnaire. During data collection, supervision was carried out, and the collected data was checked daily. Data collectors were supervised, and the questionnaire was checked for completeness and accuracy to determine its validity. If any problem arose during the data collection process, the principal investigator intervened appropriately.

Data analysis

Data was entered and analyzed using S.P.S.S. software (version 25.0). It was coded and cleaned before analysis. Using a confidence interval of 95% and p- a value of 0.05. Descriptive statistics were calculated to describe the Prevalence of neonatal sepsis. Binary logistic regression was done to analyze the relationship between the dependent and independent variables. All variables having a p-value <0.25 were candidates for multivariable binary logistic regression. Multivariable logistic regression was used to analyze statistical significance because confounding variables can affect binary logistic regression. Variables having a p-value were stated as statistically significant. Tables and graphs were used to present the results.

Ethical consideration

Before data collection, ethical clearance was received from Wollo University, the College of Health Science, and the School of Medicine research team. The department wrote a formal letter of medicine to the concerned office. Permission was asked from the responsible body of the unit. The data collectors adequately informed Each study participant about the purpose, methods, and anticipated benefits of the study. Respondents who were volunteers were available at the time of data collection and interviewed without writing their names to ensure confidentiality.

Dissemination of the results

Based on the work plan, after the data was collected and analyzed, a conclusion was drawn dis, a discussion was made, and public defense was done. After accommodating the examiner's comment and getting permission from the concerned authority, information will be disseminated to the concerned body and the public, and the publication of the findings will be considered.

Result

Maternal Socio-demographic characteristics of the study participants

In this study, 333 study participants were involved, making a response rate of 91.9%. The Majority (34.8%) of the study participants were in the age group of 25-29 years with mean and S.D. age of 29.3±5.59 years, respectively. Two-thirds of the study participants were married, and 30.6% were in primary education. Most (70.6%) of the study participants had a household monthly income of <5000 ETB (Table 1).

Maternal Obstetric related characteristics of the study participants

Two-thirds of the study participants were multiparous, 27.9% of the study participants have a history of abortion, and 28.8% of the study participants have two living children. Sixty-two percent of the study participants had A.N.C. follow-up, and S.V.D delivered 72.1% of the study participants (Table 2).

Characteristics of the maternal risk factors for neonatal sepsis

One-fourth of the mothers had a history of U.T.I. 54.1% of the participants had a maternal history of foul-smelling liquor, and 22.5% had M.S.A.F. during labor and delivery. Sixty-six percent of the participants' deliveries had a history of PROM, 43.2% had a PROM duration of >18 hours, and 37.8% of the labor duration was> 24 hours (Table 3).

Table 1: Maternal demographic characteristics of the study participants admitted to NICU DCSH, 2024.

Variable	Frequency	Percent
Age in years		
18-24	55	16.5
25-29	116	34.8
30-34	108	32.4
>=35	54	16.2
Marital status		
Married	228	68.5
Single	29	8.7
Divorced	66	19.8
Widowed	10	3.0
Maternal education level		
Illiterate	75	22.5
Primary	102	30.6
Secondary	62	18.6
Collage and above	94	28.2
Household monthly income		
<5000	235	70.6
5000-10,000	81	24.3
>10,000	17	5.1

Table 2: Maternal obstetric-related characteristics of the study participants.

Variable	Frequency	Percent
Gravidity		
Primiparous	60	18
Multiparous	214	64.3
grand multiparous	59	17.7
History of abortion		
Yes	93	27.9
No	240	72.1
Number of living children, including the current		
1	92	27.6
2	96	28.8
3	79	23.7
4	44	13.2
6	22	6.6
Has A.N.C. follow-up		
Yes	206	61.9
No	127	38.1
Mode of delivery		
SVD	240	72.1
CS	62	18.6
Instrumental	31	9.3

Table 3: Characteristics of the maternal risk factors for neonatal sepsis.

Variable	Frequency	Percent
History of maternal U.T.I.		
Yes	84	25.2
No	249	74.8
History of maternal fever		
Yes	180	54.1
No	153	45.9
History of foul-smelling liquor		
Yes	136	40.8
No	197	59.2
MASF		
Yes	75	22.5
No	258	77.5
PROM		
Yes	220	66.1
No	113	33.9
Duration of PROM(n=220)		
<18 hrs.	125	56.8
>18hrs	95	43.2
Duration labor		
<6 hrs	37	11.1
6-12hrs	51	15.3
12-24hrs	119	35.7
>24hrs	126	37.8

The magnitude of the neonatal sepsis

The finding of the study revealed that 37% of the study participants have developed neonatal sepsis, as shown in the figure below (Figure 2).

The characteristics of types of neonatal sepsis (Figure 3)

The clinical profile-related characteristics of the study participants

Regarding the specific characteristics of the neonate, 35.4% of the neonates had low birth weight, and 18.3% were delivered in the preterm phase of gestation. More than twenty-three percent of the neonates were developing birth asphyxia, and 37.8% had an APGAR score of = 6

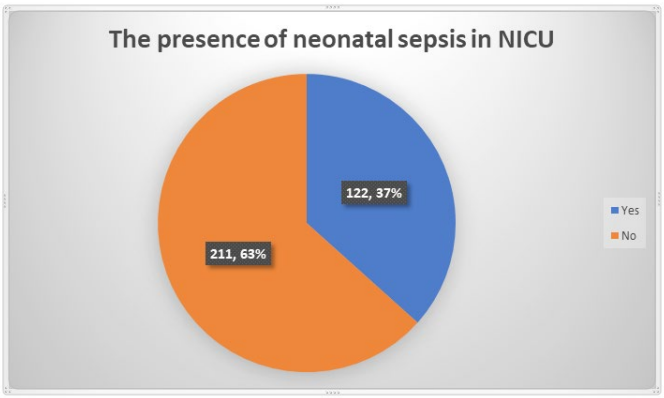

Figure 2: The magnitude of neonatal sepsis among neonates admitted to NICU at D.C.S.H.

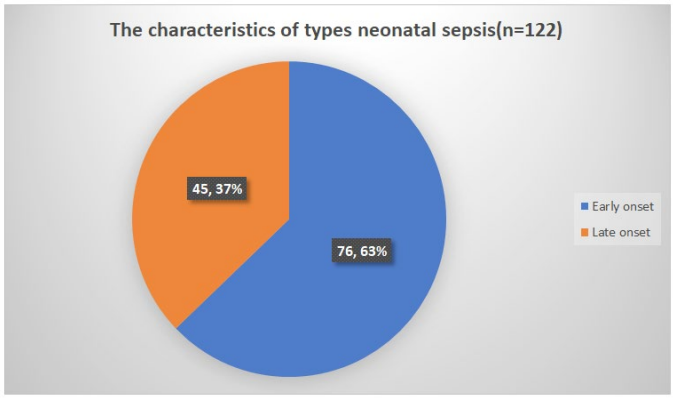

Figure 3: The characteristics of onset neonatal sepsis.

at the first minute. Sixteen percent of the neonates received ventilation, 25.2% were supported with oxygen through an intranasal catheter, and 27.9% were supported with mask oxygen (Table 4).

The determinants of neonatal sepsis

The strength of association was measured using an odd ratio and 95% confidence interval. Accordingly, mode of delivery, maternal U.T.I., maternal foul-smelling liquor, Presence of M.S.A.F., PROM, Duration of PROM, Birth weight, G.A. at delivery and presence of birth asphyxia were associated with neonatal sepsis by bivariate logistic regression. The multivariate logistic regression revealed that study participants whose mode of delivery of C.S. was 97% less likely to have neonatal sepsis compared to S.V.D. (AOR=0.03, 95%CI=0.001, 0.04) Study participants who used the instrumental method showed a 7.8-fold increase in sepsis compared to those who used S.V.D. (AOR=7.8, 95%CI=2.43, 32.01). Study participant's mothers having U.T.I. during pregnancy were 1.2 folds increased neonatal sepsis compared to its opposite compartment (AOR=1.2, 95%CI=1.01, 3.21) and participants who had M.S.A.F. liquor during labor and delivery had 8.4 folds increase neonatal sepsis compared to its opposite compartment (AOR=8.4, 95%CI=2.05, 34.02).

The study participants whose maternal liquor of PROM had 3.7 folds increased neonatal sepsis compared to its opposite compartment (AOR=3.7, 95%CI=2.47, 18.37) and study participants whose duration of PROM during delivery of >18hours had 11.5 folds increase its sepsis compared to duration of PROM <18hours (AOR=11.5, 95%CI=3.42, 38.92). The study participants who had low birth weight and preterm had 4.7 folds and 2.1 folds increased in sepsis, respectively, compared to the opposite compartment (Table 5).

Table 4: The clinical profile-related characteristics of the study participants.

Variable	Frequency	Percent
Birth weight		
LBW <2.5KG	118	35.4
NBW 2.5-3.999	175	52.6
Overweight >=4kg	40	12.0
Gestational age in weeks		
Preterm	61	18.3
Term	238	71.5
post term	34	10.2
Birth asphyxia		
Yes	78	23.4
No	255	76.6
First minute APGAR		
<=6	126	37.8
7-10	207	62.2
Fifth minute APGAR		
<=6	84	25.2
7-10	249	74.8
Receive ventilation		
Yes	54	16.2
No	279	83.8
Oxygen with nasal catheter		
Yes	84	25.2
No	249	74.8
Oxygen with mask		
Yes	93	27.9
No	240	72.1
Neonatal admission diagnosis		
R.D.S.	97	29.1
MAS	62	18.6
PNA	27	8.1
Sepsis	80	24.0
Jaundice	18	5.4
Hypoglycemia	25	7.5
Hypothermia	24	7.2

Discussion

Neonatal sepsis is a severe medical condition characterized by a systemic infection in newborn infants, typically within the first 28 days of life. It is a leading cause of morbidity and mortality among newborns worldwide. Sepsis occurs when the body's response to an infection triggers widespread inflammation, leading to organ dysfunction and potentially life-threatening complications. Accordingly, in this study, the magnitude of neonatal sepsis among neonates admitted in D.C.S.H. is 37%. This finding is similar to the study done in Northern Uganda (41.2%), Arsi University Teaching and Referral Hospital (34%) (39, 42). The finding is higher than the study done in Shashemene (27.9%) (41). The finding is lower than the study done in Tanzania (49.8%), Hiwot Fana Specialized Hospital (53.1%), Harar Town (52.7%), Hawassa University Comprehensive Hospital (56%) and Arba-Minch town (78.3%) (38, 40, 41, 43, 45). This difference may be due to factors like genetics, socio-economic status, access to healthcare, and Prevalence of risk factors such as maternal infections. Variations in antibiotic prescribing practices, including prophylactic use during labor or postnatal treatment, can affect the Prevalence of neonatal sepsis.

Overuse or misuse of antibiotics can contribute to the emergence of antibiotic-resistant bacteria and alter the neonatal microbiome, potentially increasing the risk of sepsis. Differences in data collection methods, such as retrospective vs. prospective studies, medical record reviews vs. active surveillance, and variations in the duration of follow-up, can impact the accuracy and completeness of reported neonatal sepsis rates, difference hygiene practices, sanitation, overcrowding, and exposure to pathogens in healthcare settings or communities, can influence the transmission of infectious agents and contribute to the incidence of neonatal sepsis.

Study participants whose mode of delivery of C.S. is 97% less likely to have neonatal sepsis compared to S.V.D. This may be due to the fact that during vaginal delivery, the newborn passes through the birth canal, potentially exposing them to maternal vaginal and rectal flora, including harmful bacteria such as Group B Streptococcus (G.B.S.). In contrast, C-section delivery bypasses this route of exposure, reducing the likelihood of neonatal colonization with maternal pathogens.

Vaginal delivery can sometimes result in fetal trauma or distress, which may increase the risk of neonatal infection due to compromised barrier function and immune response. C-section delivery is often performed in cases where there are maternal indications or risk factors for diseases that could potentially be transmitted to the newborn during vaginal delivery, such as active genital herpes infection or maternal H.I.V. with high viral load.

Study participant mothers having U.T.I. during pregnancy is 1.2 folds increase its neonatal sepsis compared to its opposite compartment. This may be due to maternal U.T.I.s during pregnancy or colonization with uropathogenic bacteria, which can increase the likelihood of neonatal U.T.I.s. Infants born to mothers with untreated or recurrent U.T.I.s may acquire bacteria during passage through the birth canal or during the perinatal period.

Participants who had M.S.A.F. liquor during labor and delivery had 8.4 times more neonatal sepsis compared to the opposite compartment. This may be because in cases where meconium passage is associated with maternal infection or inflammation, there is a potential risk of intrauterine infection affecting the fetus. Maternal infections, such as chorioamnionitis (infection of the fetal membranes), can lead to the transmission of bacteria or inflammatory mediators to the baby, increasing the likelihood of neonatal sepsis.

The study participants whose maternal liquor of PROM have 3.7 folds increased neonatal sepsis compared to its opposite compartment. This may be due to R.O.M., which may lead to prolonged labor, especially if contractions do not begin spontaneously or if labor progresses slowly. Prolonged labor increases the risk of intrauterine infection as the fetus remains exposed to the vaginal environment for an extended period, increasing the likelihood of bacterial colonization and transmission.

The study participants who were low birth weight and preterm had 4.7 folds and 2.1 folds more sepsis, respectively, compared to their opposite compartments. This may be due to low birth weight neonates being often cared for in neonatal intensive care units (NICUs) or other healthcare settings where they may be exposed to healthcare-associated pathogens. Overcrowding, inadequate infection control practices, and exposure to sick patients can increase the risk of acquiring infections, including sepsis.

Conclusion

In this study, the magnitude of neonatal sepsis is 37%. Of those having sepsis, 63% developed an early onset of neonatal sepsis, and 37% developed a late onset of neonatal sepsis. The determinant factor affecting neonatal sepsis is that the mode of delivery of C.S. was 97% less likely to cause neonatal sepsis than S.V.D. (AOR=0.03, 95%CI=0.001, 0.04) While the instrumental method is used more than S.V.D. (AOR=7.8, 95%CI=2.43, 32.01), mother having U.T.I. during pregnancy (AOR=1.2, 95%CI=1.01, 3.21), M.S.A.F. liquor during labour and delivery (AOR=8.4, 95%CI=2.05, 34.02), maternal liquor of PROM (AOR=3.7, 95%CI=2.47, 18.37), duration of PROM during delivery of >18hours compared to duration of PROM <18hours (AOR=11.5, 95%CI=3.42, 38.92) and low birth weight and preterm.

Recommendation

Reducing neonatal sepsis involves a multifaceted approach that includes preventive measures, early detection, and prompt treatment. Here are some recommendations:

- Ensuring proper antenatal care for pregnant women helps in identifying and managing risk factors such as maternal infections and maternal health conditions and providing interventions to reduce the risk of neonatal sepsis.
- Administering intrapartum antibiotics to mothers at risk of transmitting bacterial infections to their newborns can significantly reduce the risk of early-onset neonatal sepsis.
- Encouraging and supporting breastfeeding provides newborns with essential nutrients and antibodies that help strengthen their immune system, reducing the risk of infections, including sepsis.
- In cases where neonatal sepsis is suspected, prompt initiating empirical antibiotic therapy based on local antimicrobial resistance patterns and guidelines can improve outcomes while awaiting culture results.
- Providing optimal neonatal care, including maintaining a warm, clean, and hygienic environment, proper umbilical cord care, and avoiding unnecessary invasive procedures, helps prevent infections in newborns.
- Immunizing pregnant women against vaccine-preventable diseases such as influenza and pertussis can reduce the risk of infections in mothers and newborns.
- Implementing continuous quality improvement initiatives in healthcare facilities, including surveillance of neonatal sepsis rates, audit and feedback mechanisms, and regular training and updates, can help identify areas for improvement and enhance the quality of care provided to newborns.

Abbreviations

ANC: Antenatal Care

A.O.R. Adjusted Odd Ratio

B.S.I. Blood Stream Infection

CI: Confidence interval

D.C.S.H. Dessie Comprehensive Specialized Hospital

E.O.S. Early Onset of sepsis

G.A. Gestational Age

G.B.D. Global Burden of Disease

L.O.S. Late Onset of sepsis

M.A.S. Meconium Aspiration Syndrome

M.S.A.F. Meconium Stained Amniotic Fluid

NICU: Neonatal Intensive Care Unit

NS: Neonatal Sepsis

PNA: Perinatal asphyxia

PROM: Premature Rupture of Membrane

R.D.S. Respiratory Distress Syndrome

U.T.I. Urinary Tract Infection

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