

e-ISSN: 2383-3106



Prevalence and determinants of neonatal sepsis among admitted neonates in Hiowt- Fana Specialized Referral Hospital, Harar, Ethiopia, 2019

Arif Hussen Jamie (MSc)^{1*}

1. Harar Health Science College, Department of Pediatrics Nursing, East Ethiopia, arifhussen.ah@gmail.com

Article Info.	ABSTRACT
	Background and Objective: Neonatal sepsis is a systemic infection occurring in the
Article type:	first 28 days of life and is a leading cause of disease and death of neonates. It accounts
Research Article	for five million newborn deaths the objective of this study was to assess prevalence
	and determinants of neonatal sepsis among admitted neonates at in Hiowt- Fana
	Specialized Referral Hospital, Harar, Ethiopia, 2019.
	Methods: Hospital-based cross-sectional study with a retrospective chart review
	method was conducted in Tertiary Hospital in Harar town. Data were collected
Received: 27 July 2021	from April 1 to May 30, 2019. The sample size was calculated by using single
Revised: 21 Aug 2021	population proportion sample formula and the final sample size was 292. Data
Accepted: 23 Aug 2021	were collected using a checklist and analyzed through SPSS-20. Binary and
	multiple logistic regressions were applied to find the association between
	independent and dependent variables.
Keywords:	Findings: In general, the prevalence of neonatal sepsis in this study was 52.7%. This
Determinant Factors,	study indicated that prolonged rupture of membranes (PROM) of the mother
Ethiopia,	(P-value=0.002, AOR=2.74 (95% CI: 1.32, 4.39)), gestational age of neonates
Neonatal Sepsis,	(P-value=0.001, AOR=0.85(0.34-0.815)) and birth weight of the neonate
Prevalence	(P-value=0.001, AOR=0.45(0.04-0.61)) were significantly associated with neonatal
	Sepsis.
	of the methor, sectorized are of neonated and high weight of the neonate. Therefore
	of the mother, gestational age of neonates and birth weight of the neonate. Therefore,
	service utilization of mothers, early detection of fisky situations and appropriate
	practice of newborn care should be strengthened by training of health workers,
	provision of nearth care services as per standards, and monitoring and evaluation of

Cite this article: Jamie AH. Prevalence and determinants of neonatal sepsis among admitted neonates in Hiowt-Fana Specialized Referral Hospital, Harar, Ethiopia, 2019. *Caspian J Pediatrs* September 2021; 7(2): 538-44.

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Publisher: Babol University of Medical Sciences

Introduction

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Neonatal sepsis is a systemic infection occurring in the first 28 days of life and is a leading cause of disease and death of neonates ^[1]. Based on the onset of clinical signs & symptoms, it is categorized as early and late ^[2]. Early-onset neonatal sepsis occurs within the 1st seven days of life and Late-onset neonatal sepsis occurs after

^{*}Corresponding Author: Arif Hussen Jamie (MSC),

Address: Amir nur woreda, Keb.02, Harar, Pobox#609, Ethiopia.

Tel: +251 921843442E-mail: arifhussen.ah@gmail.com

that ^[3]. Neonatal sepsis accounts for five million newborn deaths and is mostly diagnosed in underdeveloped countries ^[4]. When the risk of neonatal death is compared, it is 6 times higher in developing countries than developed countries. Evidence showed that neonatal deaths accounted for 52% of all <5 children mortality in South Asia, 53% in Latin America & Caribbean, 34% in sub-Saharan Africa ^[5], 41 % in Ethiopia ^[6].

Neonatal sepsis signs and symptoms are nonspecific, may be unclear for some time and wrong for conditions distinctive of this period of life such as respiratory disorders caused by prematurity. In addition, there are many infants with presumed suspected clinical sepsis for every septic newborn ^[3].

It is difficult to diagnose early because the problem has no specific sign symptoms and treating neonates with antibiotics based on slight sign symptoms is liable to over-treat non-infected neonates ^[7]. Therefore, identification of risk factors and timely initiation of treatments can significantly decrease neonatal disease and death ^[5].

Different literatures represented that both maternal and neonatal factors cause neonatal sepsis for instance prolonged rupture of membrane (PROM), urinary tract infection, intra-partum fever, instrumental delivery, frequent vaginal examination, never attend antenatal care (ANC) and home delivery which were maternal factors and low birth weight, complicated or instrument-assisted delivery, low APGAR scores and invasive procedures during hospital admission in neonatal factors ^[8-14].

Some studies have been done in different parts of Ethiopia and suggested that the prevalence of neonatal sepsis is high despite a considerable burden of neonatal sepsis in our setting. Since there were no studies on the title; therefore, this study was conducted in Harar, Hiowt-Fana Specialized Referral Hospital to find prevalence and determinants of neonatal sepsis among admitted neonates in the past year. So, the study will give a picture from Harar, Ethiopia and will create an opportunity to reduce the problem based on factors identified.

Methods

Study setting and participants

A retrospective cross-sectional study was conducted for the last year's data. Data were collected from April 1 to May 30, 2019. All charts of neonatal sepsis from January 2018 to January 2019 G.C were retrieved from the registration book that met the inclusion criteria at in Hiowt- Fana Specialized Referral Hospital which is founded in Harar town, Ethiopia, and it is 514 km far away from the capital city Addis Ababa. The constructed hospital provides services in the Era of colonial Italy in 1933 G.C and for neighboring regions.

Inclusion and exclusion criteria

Neonates diagnosed with neonatal sepsis according to established clinical and hematological criteria of Integrated Management of Neonatal and Childhood Illness (IMNCI) were included in this study, while charts with incomplete information were excluded.

Sampling and sample size

The sample size was calculated using the single population proportion formula using the prevalence of neonatal sepsis of 77.9% from a study conducted in Shashemene Town, Oromia Regional State, Ethiopia¹⁵, and after adding 10% non-response, the total sample size was 292.

Data collection tools

Data were collected using a record review checklist that was adapted by reviewing the relevant literature to meet the objectives of the study. The checklist contains questions and statements in four parts that assess: sociodemographic characteristics, maternal birth history, maternal health status, and a part that assesses the

general birth and health status of the newborn. Data were collected by 4 trained nurses. Daily, each questionnaire was checked for completeness by the study director and necessary feedback was given to the data collectors for the next day.

Operational definition

Case (Neonatal sepsis): The established IMNCI clinical features including the presence of two or more of persistent fever (\geq 37.5 °C) or persistent hypothermia (\leq 35.5 °C) for more than one hour, fast breathing (\geq 60 breath per minute), severe chest in drawing, grunting, not feeding well, movement only when stimulated, bulged fontanel, convulsion, lethargic or unconsciousness along with \geq 2 of the hematological criteria such as total leukocyte count (<4000 or > 12,000 cells/mm3), absolute neutrophil count (<1500 cells/mm3 or > 7500 cells/mm3), platelet count (<150 or > 450 cells/mm3), and random blood sugar (<40 mg/dl or > 125 mg/dl) were used to diagnose neonatal sepsis cases.

Data analysis

After data collection, the questionnaire was checked for completeness and coded. The data were entered into Epi-info version 3.5.3 and exported, cleaned and analyzed by using SPSS 20. Mono, bi and multivariate analyses were performed. Variables with a p<0.05 in bi-variate analysis were entered into multiple logistic regression and variables with a p<0.05 in multivariate analysis were considered statistically significant associations.

Results

Socio demographic characteristics

A total of 292 neonatal charts were examined in this study and the index mothers were included in the study. Of these, 197(67.7%) of the mothers/caregivers/ neonates were in the age group below 35 years, 153(52.40%) of them were rural dwellers, 181 (62%) were born male, 243(83.22%) were less than 7 days of age (table 1).

Obstetric characteristics of the respondents.

Out of the total 292 newborns included in the study, 170 (58.2%) mothers were multipara, 174 (59.59%) mothers had ANC follow-up during their pregnancy, 173 (59.25 %) had spontaneous vaginal delivery and 80 (27.4%) mothers had history of PROM (table 2).

Of the 292 samples included in the study, 185 (63.4%) showed birth asphyxia. As for gestational age, 203 (69.5%) were term-born and 180 (61.6%) of them weighed between 2.5 and 4kgs (table 3).

The main morbidity profile of all neonates admitted to the neonatal intensive care unit of the hospital of Hiowt Fana Specialized Referral was neonatal sepsis 154(52.7%), followed by 65 (22.3%) perinatal asphyxia and 27 (9.2%) meconium aspiration syndrome, respectively.

Determinants of neonatal sepsis

In bivariate logistic regression analysis, maternal age, place of residence, neonatal sex, medical history PROM, ANC, gestational age and birth asphyxia were statistically associated with neonatal sepsis. Variables that showed statistically significant associations with neonatal sepsis in bivariate analysis were included in multivariate logistic regression to control potential confounders. After controlling for the effect of other predictor variables, multivariate logistic regression analysis showed statistically significant association between, PROM, gestational age, birth weight and neonatal sepsis with p<0.05. AOR=2.74(1.32-4.39), AOR=0.85(0.34-0.815) and (AOR=0.45(0.04-0.61), respectively.

Variables	Category	Frequency	Percentage
A == = f == = 41 = ==	< 35 years	197	67.47
Age of mothers	\geq 35 years	95	32.53
Pasidanaa	Urban	139	47.60
Kesidence	Rural	153	52.40
Marital status Currently	married	248	84.93
Maritar status Currentry	un married	44	15.07
Educational status	Not attended formal education	167	57.19
Educational status	Attended formal education	125	42.81
Occupation	House wife	211	72.26
Occupation	Employed	81	27.74
Sex of peopete	Male	181	61.99
Sex of neonate	Female	111	38.01
Ago of poonsta (in days)	1–7 days	243	83.22
Age of neonate (in days)	8–28 days	49	16.78

Table 1. Socio	demographic	characteristics	of mothers	and infant	admitted
in Hiowt- l	Fana Specializ	ed Referral Hos	spital, Hara	r, Ethiopia	, 2020

Table 2. Obstetric characteristics of mothers of admitted neonates in Hiowt-
Fana Specialized Referral Hospital, Harar, Ethiopia, 2020

Variables	Category	Frequency	Percentage
Donity	Primi para	122	41.78
Painy	Multi para	170	58.22
DDDOM	Yes	80	27.40
FFROM	No	212	72.60
Anta Partum Hamarrhaga	Yes	9	3.08
Alle Faltulli Helilolillage	No	283	96.92
Ante Natal Clinia follow un	Yes	174	59.59
Ante Natal Chine Johow up	No	118	40.41
Place of delivery	Health institution	288	98.63
Flace of delivery	Other than health institution	4	1.37
	Spontaneous Vaginal Delivery	173	59.25
Mode of delivery	Cesarean Section	113	38.70
	Instrumental	6	2.05
Duration of labor	< 24 h	282	96.58
	\geq 24 h	10	3.42
Matamal HIV status	Positive	2	0.68
waternar m v status	Negative	290	99.32
Uningry treat infaction (UTI)	Yes	37	12.67
Officiary tract infection (011)	No	255	87.33

Table 3. Characteristics of neonate who were admitted in Hiowt- Fana Specialized Referral Hospital, Harar, Ethiopia, 2020 in relation to risk factors Variables

Variabl	Ν	%	P-value	
Birth asphyxia	Yes	185	63.36	0.002
	No	107	36.64	
Gestational Age	Preterm	19	6.51	0.001
	Term	266	91.10	
	Post term	7	2.40	
Birth weight	LBW	112	38.36	0.001
	Normal	180	61.64	

Discussion

In this study the prevalence of neonatal sepsis was 52.7%. It is lower than studies done in Debrezeit, 72.2%, ^[16] Shashamene, 77.9%, ^[15] and Douala(Cameron), 79.1% ^[17] and it is also higher than studies done in India, 7.6%, ^[18]

Iran, 18.4% ^[19], Kenya, 23.9%, ^[20] Temeke and Mwananyamala hospitals, Tanzania, 31.4%, ^[21] Egypt, 40.7% ^[22] and Black Lion specialized hospital (Ethiopia), 44.7%.^[23] The difference could be due to sociodemographic/economic/variations, methodological differences like that of sample size, study design.

Newborns of mothers with PROM had more than 2-fold higher risk of developing neonatal sepsis than newborns of mothers who did not have PROM (AOR =2.74(95%CI 1.32, 4.39) the result is consistent with studies from Mexico ^[11], Brazil ^[24] and Mekelle ^[9]. It is evident that early rupture of the membrane favours ascending infection leading to sepsis.

In this study neonates born at 37 weeks gestational age had a 15% lower risk of developing neonatal sepsis than preterm infants (AOR =0.85(0.34-0.815)). This shows that neonates born at term have a lower risk of developing neonatal sepsis than neonates born preterm. This result is consistent with studies conducted in Tikur Anbsa, ^[23] Gondar, ^[8] Tanzania ^[21] and Mexico ^[25]. The possible explanation is that preterm infants are immature, their immune systems are not well developed and they are poorly breastfed, which predisposes them to poor nutrition and body defenses and eventually to sepsis.

In this study, it was found that those neonates with a normal birth weight (>2500g) had a significantly lower risk of developing neonatal sepsis than neonates with a low birth weight. This result is in agreement with the findings of studies from Mexico, Tanzania, Gondar and Tikur Anbesa^[8, 21, 23, 25]. This could be due to the fact that low birth weight neonates have an increased risk of hypothermia because they have little subcutaneous fat, have a large body surface area relative to weight and have a poorly developed immune system.

Limitations of the Study

Because the study included only public, not private, institutions, the results may be difficult to generalize to the general population. A control group is required to determine risk factors associated with morbidity such as sepsis, as this is a cross-sectional study with no control group.

Conclusion and recommendation

Maternal PROM gestational age and neonatal birth weight have been identified as risk factors for neonatal sepsis. Therefore, maternal service utilization, early identification of risk situations and appropriate neonatal care should be strengthened through by training of health workers, provision of health services according to standards, and monitoring and evaluation of obstetric/neonatal care.

Acknowledgment

The author would like to thank Harar Health Science College, Hiowt- Fana Specialized Referral Hospital and Data collectors.

Ethical Code

Ethical approval was obtained from the Harar Health Sciences College Research Review Ethical Committee (Ref.No.HHSC-70/2019). Approval was obtained from the appropriate hospital authorities.

Funding

There was no financial support for this research.

Conflict of interest

The authors declare that there is no conflict of interest.

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