WOLKITE UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES
DEPARTMENT OF MIDWIFERY

PREVALLENCE OF NEONATAL SEPSIS AND ASSOCIATED FACTORS AMONG NEONATES ADMITTED AT DURAME GENERAL HOSPITAL IN KAMBATA TAMBARO ZONE, SOUTHERN *ETHIOPIA.2021G.C.*

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ABBREVIATIONS AND ACRONYM

AOR	Adjusted Odds Ratio
CDC	Communicable for Disease Control
CONS	Coagulase Negative Staphylococci
CRP	C-reactive proteins
CS	Caesarean Section
CSF	Cerebral Spinal Fluid
CMV	Cytomegalovirus
E coli	Escherichia Coli
EOS	Early Onset
GBS	Group B Streptococci
LOS	Late Onset Sepsis
MSAF	Meconium-Stained Amniotic Fluid
WKU	Wolkite University
NICU	Neonatal Intensive Care Unit
SPSS	Statistical Package for Social Science
SVD	Spontaneous Vaginal Delivery
WHO	World Health Organization

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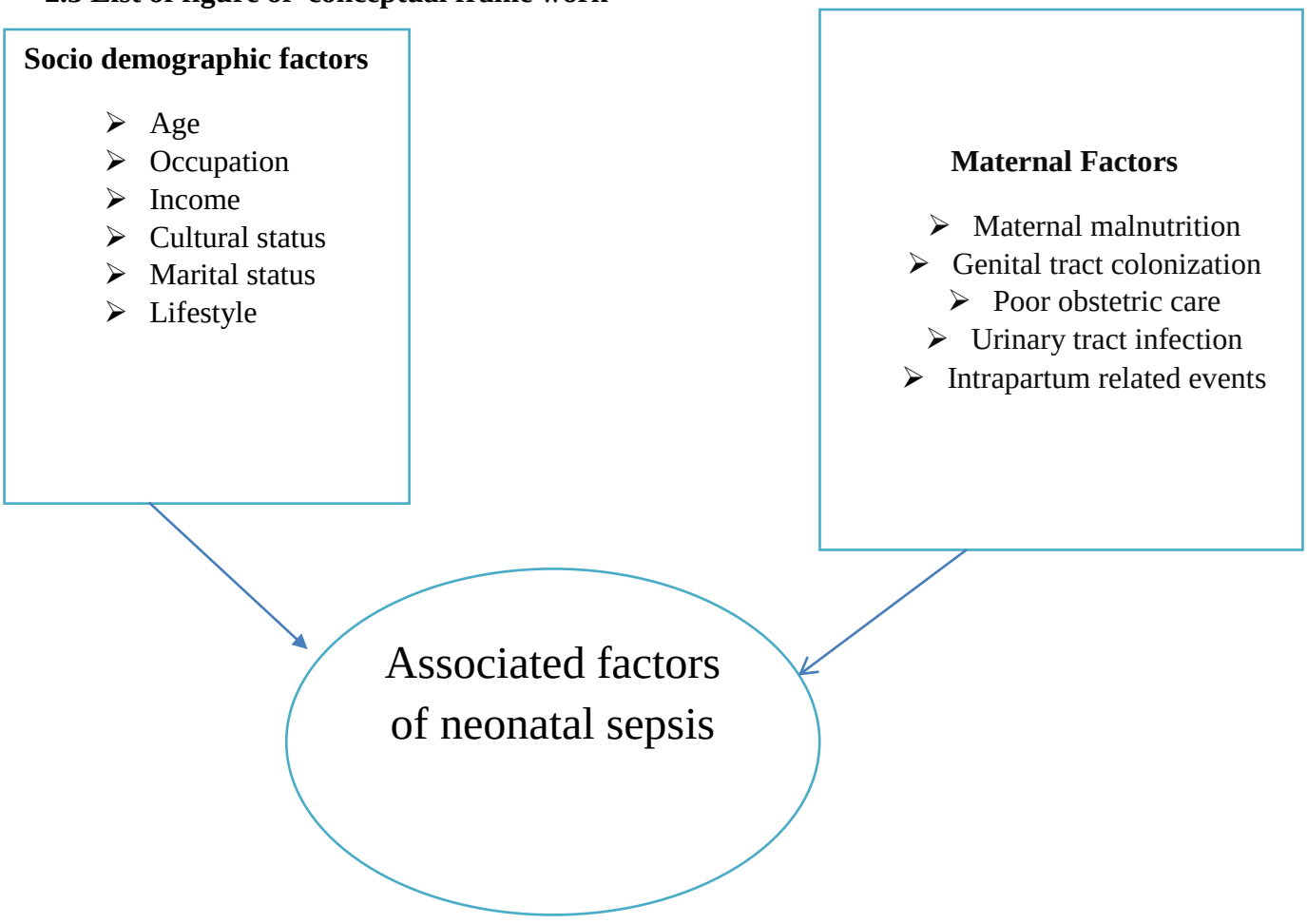

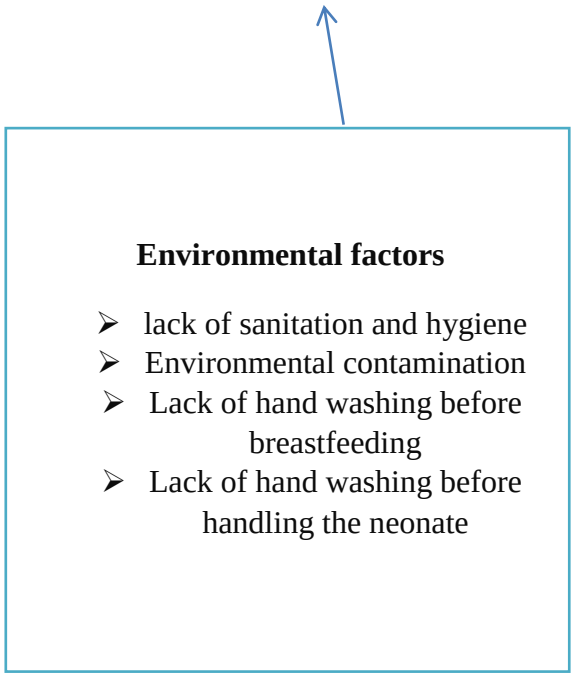
Environmental factors
lack of sanitation and hygiene
Environmental contamination
Lack of hand washing before breastfeeding
Lack of hand washing before handling the neonate

Abstract

Background

Neonatal sepsis is the one of the most common causes of neonatal hospitalization in developing countries. it is also a major cause of mortality in the world affecting both developed and developing countries. Diagnosis and management of sepsis are a great challenge facing neonatologists in neonatal intensive care units due to nonspecific signs and symptom. Therefore, this study aims to determine prevalence and associated factors of neonatal sepsis at durame general hospital in kambata Tambaro Zone Southern Ethiopia.

Objectives: The purpose of this study were to assess prevalence and associated factors of neonatal sepsis among neonates admitted in neonatal intensive care unit at durame general hospital in Southern Ethiopia, 2021GC .

Methods: Institutional-based cross- sectional study was conducted. A Systematic random sampling technique was used to select a total of 291 neonates. Data was collected by using a pretested structured questionnaire. Data entry and analysis were made by using EPI data version 4.6 and SPSS version 20 respectively. A bivariate and multivariate analysis with a 95% confidence level was performed and those variables ($p<0.05$) were deemed statistically significant.

Results: the overall prevalence of neonatal sepsis was (11.3%). Mothers who had history of STI during index pregnancy (AOR=0.260 95% CI 0.108-0.626) frequency per vaginal examination greater than three during labor and delivery (AOR 11.752(4.922-28.055); 95% CI, birth asphyxia (AOR 0.404(0.171-0.953); 95% CI. were significantly associated with neonatal sepsis.

Conclusion: The prevalence and associated factors of neonatal sepsis was high maternal, neonatal and health service related factors were identified for neonatal sepsis. Therefore, training of health workers, provision of health care services as per standards and monitoring and evaluation of obstetrical/neonatal care during labor and delivery are mandatory.

KEY WORD: Associated factor, Neonatal intensive care units, Neonatal sepsis;

CHAPTER ONE

INTRODUCTION

1.1 Background

Neonatal sepsis (NS) is defined as systemic inflammatory response syndrome in the presence of or as a result of suspected or proven infection in a neonate. [1] Also it is a major cause of morbidity and mortality worldwide accounting about 26%[2]. Especially neonates in low – income countries where identification and specific treatment of the bacteria are often unsatisfactory were more affected. It is possible to save most case of neonatal sepsis by using timely gold standard diagnose and sensitive antibiotics treatment with good supportive care [3].Neonatal infection are most prevalent and high case fatality risk associated with sever bacterial infection which account 9.8% were found in the low- income countries of sub-Saharan Africa, South Asia and Latin America [4]. The routes of transmission were not much known globally were different environment risk factors may affect paths of transmission. However, Neonatal sepsis mostly affects low-birth weight infants, neonates who undergo invasive procedures during their hospitalization in the Neonatal Intensive Care Unit (NICU) and also acquired horizontally from the environment or vertically from mother [5]. Around half of neonatal deaths caused by sepsis occur during the first week of life and remains a feared and life threatening complication, especially among very low-birth weight (VLBW) and preterm infants [6]. Neonatal sepsis also has an economic impact that resulted from increased medical costs, prolonged hospital stay, and potentially poor long term neurodevelopment out comes. Despite this fact, the world is witnessing a steady decline in the number of neonatal deaths due to sepsis. Ethiopia demographic and health survey (EDHS,2016) reported that the neonatal mortality rate was 29/1000 live birth, which was reduced slowly from 39/1000 in 2005 and 37/1000 live birth in 2011. Particularly Amhara region of the country was at the top in infant and neonatal mortality rates (NMRs) it was 67 and 47 per 1000 live birth respectively. Neonatal sepsis also contributes substantially to neonatal morbidity and mortality and is an ongoing major global public health challenge particularly in developing countries according to World Health Organization(WHO), globally each year over 4 million neonates died within 28 day of birth, infections are considered to be leading cause of neonatal death (35%) followed by deaths resulted from preterm births (28%), intrapartum related complications (24%) and asphyxia (23%);studies conducted on the proportion and risky factors of neonatal sepsis in Ethiopia are from referral hospitals, which may

not be generalized to primary health care unit where a significant proportion of mothers give birth in these health facilities, this study sough to determine the proportion of clinical neonatal sepsis and associated factors in the study areas, Neonatal sepsis also is one of the most common reasons for admission to neonatal units in developing countries. It is also major cause of mortality in both developed and developing countries. Neonatal sepsis is the systemic inflammatory response syndrome in the presence of or as a result of suspected or proven infection during the first 28 days of life. Neonatal sepsis is the third most common cause of death in the neonate, contributing 10-20% of deaths in this age group, most of which occur in resource limited countries like Ethiopia. In Ethiopia the current neonatal mortality rate is 11 per 1000 live births. Many researchers have studied the common causative agents of neonatal sepsis in the study area as well as in the country as a whole. This study therefore, was aimed to determine prevalence and associated factors of neonatal sepsis at Durame General Hospital Southern Ethiopia.

1.2 Statement of the problem

. In 2010 worldwide, 7.6 million children less than 5 years old died, predominantly due to infectious causes including sepsis; neonatal deaths accounted for 40% of the total lives lost (7). More than 40% of under-five deaths globally occur in the neonatal period, resulting in 3.1 million newborn deaths each year.(8). Globally 15% of neonatal deaths are caused by neonatal sepsis and particularly it is a major concern in the LMICs. Furthermore, it is also associated with increased medical costs, prolonged hospital stay and potentially poor long-term neurodevelopment outcomes. Surviving infants, approximately one-fourth of neonates, have significant neurological sequelae as a consequence of CNS involvement, septic shock or hypoxemia secondary to severe parenchyma lung disease despite prompt instigation of effective antibiotic therapy. Despite of this, the world is witnessing a steady decline in the number of neonatal deaths due to sepsis, the neonatal mortality from sepsis declined by only 28% [9,10].

Neonatal sepsis encompasses various systemic infections of the newborn, such as septicemia, meningitis, pneumonia, arthritis, osteomyelitis etc.[11].Depending on the onset age of the disease, neonatal sepsis is divided into early neonatal sepsis or late onset sepsis(12). Neonatal sepsis remains as an important cause of morbidity and mortality among infants in developing countries accounting for 30-50% of total deaths each year (13). The incidence of neonatal sepsis ranged from 4.2-11 % live born babies and the leading etiologic agents were gram-negative

bacteria in the same hospital (14).The ethiology of neonatal sepsis in developing Countries different from that in developed countries in the pattern of etiological bacteria and their antibiotic suscepitiablity(5).In developed and developing Countries, most nosocomial infections in NICU are related to a longer duration of hospitalization ,low birth weight and gestational age, respiratory diseases, invasive interventions, and medical treatments(11). Neonatal sepsis prevalence of 38.9% and 25% have been Mwanza and Dar es Salaam, respectively(7,10).T. In the Kenya Demographic and Health Survey (KDHS) of (10) the neonatal mortality rate stood at 31 per 1000 live births (10).(3).

Since the spectrum of organisms that cause neonatal sepsis changes overtime and varies from region to region and hospital to hospital even in the same city/country, it is necessary to conduct periodic surveillance to access the changing pattern of organisms causing neonatal sepsis (8,15). Other factors which are going considered are; demographic, social, health services and clinical factors however the study will focus on outcome of interest and on clinical facility Ethiopia neonatal sepsis is still challenging situation in health services (11). Based on this consideration, a retrospective study is carrying out to investigate the proportion organisms of neonatal sepsis and to identify risk factors of neonatal sepsis during the period of may to august 20201GC in the neonatal intensive care unit at Durame General Hospital,Kambata Tambaro Zone Southern Ethiopia. The aim of the present study is to evaluate the prevalence of neonatal sepsis and risk factors of neonatal sepsis(5-8).

SIGNIFICANCE OF STUDY

Neonatal sepsis is one of the mortality and morbidity in our Country, although guidelines and policies on neonatal sepsis in Ministry of Health of Ethiopia, there is a gap in terms of implementation. Neonatal sepsis infection among neonates in Durame General Hospital in Kambata Tambaro Zone Southern Ethiopia. Hence the rational for conducting this study is to dig out the prevalence of neonatal sepsis among neonates and to document the extent of the finding since there is no study conducted in our study area. Furthermore, this study may provide some form of baseline data for further and broader research in the Durame General Hospital authorities to develop Neonatal sepsis is a leading cause of morbidity and mortality in both developing and developed countries. Innovative approaches that would be effective in reducing neonatal sepsis. Therefore this study is undertake the prevalence of neonatal sepsis and also to assess risk factors

associated with neonatal sepsis in Durame General Hospital,Kambata Tambaro Zone,Southern Ethiopia. Results from this study were also provide update information for appropriate management of neonatal sepsis

CHAPTER TWO

LITERATURE REVIEW

2.1 Prevalence of neonatal sepsis

A hospital based retrospective study done in Kenya reported that prevalence of community acquired culture proven sepsis was 12.8% (19). In neonates less than 7 days old, 13.5% (11.5-16%) had proven bacteremia and among those 7-60 days old, 12.1% (10.1- 14.4%) had proven bacteremia (2).

A hospital based retrospective cross- sectional study employed the prevalence of neonatal sepsis among neonates in, Tanzania reported that acquired positive blood culture sepsis was 25-54%(3).

A hospital based retrospective study done the prevalence of proven sepsis in term newborns in the postnatal wards of Kenyatta National Hospital reported was 12% (20).

Ahos Kohli et al found in their retrospective clinical- laboratory study that the prevalence of confirmed blood stream infection in neonates at the Aga Khan University Hospital in Nairobi was 2002.

A hospital based prospective study carried out the prevalence of neonatal sepsis among neonates in Ethiopia, revealed that prevalence of blood culture proven was in their study,44.7% and another study showed that the prevalence of meningitis in suspected sepsis as defined by CSF positive to gram staining, aerobic bacterial culture or latex particle agglutination assay was 17.9%. Blood cultures were positive in 53.3% of neonates with meningitis in 2010 (13,14).

A hospital based retrospective study done prevalence and outcome of sepsis among neonates in Sudan Kartum prevalence was sepsis proven was 17.5%.prevalence of sepsis that the low ,blood culture was revealed 61.5% and C-reactive protein was proven 44.7% of baby with positive blood culture(16).A hospital based retrospective done prevalence of sepsis among neonates in Thailand revealed that showed prevalence of sepsis was 1.8% in 2014(21).

A hospital based cross sectional study with retrospective document review was carried out prevalence and associated factors of neonatal sepsis among neonates in Ethiopia Shashemene in 2017 was proven 77.9% in 2017(23).

2.2 Associated factors of neonatal sepsis

A hospital based based retrospective quantitative analysis study was carried out risk factors of neonatal sepsis among neonates in Brazil revealed that showed was 12.9% in 2016(21,22).A

hospital based retrospective with case control study was carried out risk factors of neonatal sepsis among neonates in Taiwan shows that (Matched Odds Ratio(MOR),parental nutrion,6.07;95%CI(1.14-32.2;) and Intravascular Hemorrhage(MOR 2.68,95%CI 1.20-5.99).Parenteral nutrition more risk than intravascular hemorrhage. A hospital based study retrospective case control was carried out risk factors of neonatal sepsis among neonates in Sri Jaywardonepura General Hospital in that the low was proven 4.6%. 2015(23).Some of associated factors for neonatal sepsis include; prematurity or low birth weight, preterm labor,premature or prolonged rupture of membranes, maternal chorioamnionitis, fetal hypoxia, traumatic delivery, male gender and low socio-economic status.

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CHAPTER THREE

OBJECTIVES

3.1 GENERAL OBJECTIVE

To assess the prevalence and associated factors of sepsis among neonates admitted in NICU at Durame General Hospital Southern, Ethiopia, 2021 .

3.2 SPECIFIC OBJECTIVES

To determine the prevalence of sepsis among neonates admitted in NICU at Durame General Hospital inSouthernt,Ethiopia,2021

To identify the associated factors of sepsis among neonates admitted in NICU at Durame General Hospital in Southern ,Ethiopia 2021

CHAPTER FOUR

Methodology

4.1 Study setting

The study was conducted in Southern Region Durame Town in the Southern part of Ethiopia. There is only one General Hospital, Five Primary Hospital, Thirty sixth Health centre including Three private Health centre and One hundred Thirty sixth rural health post and the FANC service is provided by Durame Hospital and local health center. It is situated at distance of 335 km away from the capital city of Addis Ababa and 125 km from regional capital, Hawasa Which is one of the among referral hospitals with easy access and has quality in Ethiopia. Paediatrics and child health department provides services for both rural and urban populations and includes outpatient clinics, an emergency department, paediatric, surgical, medical, orthopaedic, surgical, medical, orthopaedic, malnutrition ward and NICU

4.2 Study design and period

Health institution based cross sectional study with prospective study, it was conducted from May 17/2021 to August 24/2021 GC

4.3 source Population

Source population was all neonates who were admitted in Durame General Hospital.

4.4 Study Population

All systematically selected neonates who were admitted at NICU in Durame General Hospital

4.5 Inclusion and exclusion criteria

4.6 Inclusion criteria

All neonates admited in the Neonatal Intensive Care Unit (NICU) ward of Durame General Hospital with positive clinical diagnosis for sepsis children less than or aged 28 days for the period from May 2021 to August 2021GC.

Including in the study are infants;

a. Aged 0 to 28 days.

b. Whose mothers give consent?

4.7 Exclusion criteria

The following infants are excluding;

a. Infants aged above 28 days.

b. Infants who are not admitted to NICU

4.8 Sample size determination

The sample size was determine using a single proportion formula were considering the following statistical assumption; standard statistical approach to determination of sample size for of the prevalence of neonatal sepsis; the desiring level of confidence desiring for the prevalence estimated and a tolerance error margin or width of the confidence interval (a measure precision of the estimated) so that the necessary sample size is then calculable for a given precision level. A taken from previous that 77.9% of neonatal sepsis in Oromia Regional State shashemene referral hospital (Ethiopia 2017). Using this study a prevalence of 77.9% will be used to calculate sample size Z = The corresponding z-score for the 95%confidence level (CI) = 1.96

Margin of error (d) = 5%

Level of significance (α) = 5% and by adding 10% non-response rate the final sample size will be calculated as follows:

$$n=\frac{\left(\left(\frac{za}{2}\right)^2 P(1-p)\right)}{d^2}$$

$$=\frac{(1.96)^2 (0.779)x(1-0.779)}{0.05^2}$$

n=290.95~=291

Where: n=sample size za/2= critical value for normal distribution at 95% confidence

P= established proportion D= an absolute precision (margin of error

4.9 Sampling technique and Procedure

Systematic random sampling technique were used to obtain the required number of neonates presented for taking NICU follow up in the NICU clinic, and then the sampling interval k was determined by dividing the number of neonates gained NICU follows up in the NICU clinic daily in this hospital by the sample size.

4.10 Variables of the study

Dependant variables

Neonatal sepsis

Independent variables

The independent variables of the study include

Social demographic factors of the mother:- Age, marital status, residence, Education level, income, Religion

Social factors:

Health service factors

Obstetric factor,

Clinical factors:

4.11 Data collection procedure

The source of data for the study were individual NICU record fillies are used .The fillies consists of information record at the NICU first such as place of residence, age of the neonates, and

obstetrics history of mother and routine medication of neonates. The postnatal women were sakes for the informed consent and she was with her child we reassess. The neonatal sepsis which were picked at this time are noted. They are asking that so as to trace other neonatal sepsis which was occurred during the whole neonatal period especially mortality. This gives period prevalence of neonatal sepsis. Data was collected by the group members using the semi structured questionnaires.

4.12 Data Quality management

Structured questionnaire is prepared in English and translated into Amharic and Kambata language translated back to English language to increase measurement accuracy and for field work purpose. Pre-test of the questioners is done on 5% of sample size in similar area, which is not include in study before the actual data collection to see for the accuracy of response and to estimate time needed. On daily basis collected information reviewed and possible errors were returned.

4.13 OPERATIONAL DEFINITIONS

Neonatal resuscitation: A set of interventions at the time of birth to maintain the initiation of breathing and circulation of the neonate

Neonatal sepsis is a clinical syndrome with systemic signs and symptoms of infection within the first 4 weeks of life.

4.14 Data collection Procedure tool

Structured pretested and English version questionnaire were used to collect the data during the study period of Jun 14 to July 11, 2021 G.C. The tool which is adopted from different related thesis works and modified as appropriate for this study was used for data collection. It has a detail of question on Socio-demography, prevalence and associated factors towards Neonatal Sepsis. The data was collected by Three BSc midwifery and supervised by Two BSc, midwifery and investigator. The training were given to data collectors by supervisor.

4.15 Data quality Assurance

Before starting the actual survey, quality of the data was assured by pretest the questionnaires on the area other than actual study area to decrease any bias associated with data collection.

Through the course of data collection the data collectors were supervised and regular meeting was held to discuss between data collectors and principal investigator to correct problem which was rised during data collection period. Every weekend the collected questionnaires were reviewed by supervisors and communicate with the Principal investigator to check for completeness. Finally the collected data was reviewed and check for full completeness before data entry; the incomplete data were discarded and counted as non-respondent.

4.16 Data Processing and analysis

Data were entered into password protecting Microsoft access and analysis do using paired t-test while categorical variables (PVE, STI and birth asphyxia) are compare using [OR]The data was entered after defining variables and analyzes using SPSS v. 20.0 statistical software the categorical variables was analyses using [OR] $P < 0.05$ is considered significant. Odds ratios (OR) is the measure of association and confidence interval (95% CI) were reported factors with p-value 0.2or less bivariate analysis are select for multivariate analysis they are entered into logistic regression model for analysis using enter method to determine the model that is best explaining association factors of between neonatal sepsis

5. Ethical consideration

Ethical clearance was obtained from the school of midwifery ethical review committee in the University of Wolkite. Communication with the chief executive officer/CEO of study hospital were made through formal letter obtained from the department of midwifery, cooperation and permission was obtained from study hospital unit heads.

The study subjects was informed about the purposes of the study, benefit of the study, anonymous filling of the questionnaires, and their right to refuse to participate from the study. Written consent was secured from each participant. At all level of the study confidentiality was secured the informed consent of each patient's parent or guardian were obtained. The dignity, integrity and privacy of each patient were treated as important and respected at all times.

CHAPTER FIVE

Results

The study population consisted of 291 neonates hospitalized during the study period. Of these, 54.3% (158/291) were female, and almost ¾ had low birth weight (41%; 119/291). About ¼ of parents never had attended school, and the majority of mothers were housewives. There was a burden of early neonatal mortality rate in this study were occurring during the first seven days of life, and 119/291 (40%) were pre-term births (<32 weeks). More about one in nine mothers never had visited any prenatal care or antenatal check-ups (3.1%; 9/291).

Table 1:-Socio-demographic and economic characteristic of mothers of neonates admitted to NICU in Durame Kanbata Tambaro Zone General Hospital, Southern Ethiopia (n=291)

Variable	Category	Frequency	Present (%)
Age	20-29	134	46.0
	30-39	141	48.5
	=>40	16	5.5
Marital status	Single	12	4.1
	Married	279	95.9
Occupational status	House wife	206	70.8
	Government employees	27	9.3
	Self-employee	44	15.1
	Subsistence farmer	10	3.4
	Student	4	1.4
Ethnicity	Kambata	152	52.2
	Hadiya	80	27.5
	Halaba	41	14.1
	Walayta	9	3.1
	Amhara	4	1.4
	Oromo	5	1.7
Educational status	Illiterate	111	38.1
	Read/Write	48	16.5
	Primary	47	16.2
	Secondary	40	13.7
	Diploma	30	10.3
	University	15	5.2
Monthly income	Below 1000	71	24.4
	1000-2000	92	31.6
	2000-3000	58	19.9
	3000-4000	24	8.2
	=>4000	46	15.8
Lifestyle factors	Have you use drug abuse during pregnancy	6	2.1

	No	285	97.1

Table 2:- Medical and Obstetrical Characteristics of mothers of Neonates Admitted to NICU in Durame Kambata Tambaro Zone General Hospital, Southern Ethiopia, 2021

Variable	Category	Frequency	Percent%
History of maternal UTI	Yes	45	15.5
	No	246	84.5
History of ANC	Yes	282	96.9
	No	9	3.1
History of maternal fever during pregnant	Yes	113	38.8
	No	178	61.2
Had you ever been admitted during ANC	Yes	34	11.7
	No	257	88.3
Have you ever had STI	Yes	95	32.6
	No	196	67.4
Frequency of PVE	<3	241	82.8
	>3	50	17.2
History of foul smelling liquor	Yes	11	3.8
	No	280	96.2
History of chorioamnionitis	Yes	8	2.7
	No	283	97.3
MSAF	Yes	4	1.4
	No	287	98.6
History of PROM	Yes	56	19.2
	No	235	80.8
Parity	1-3 Children	129	44.3
	3-6 Children	128	44.0
	=>7 Children	34	11.7
Mode of delivery	SVD	214	73.5
	C/S	20	6.9
	Vacum	57	19.6
Environmental contamination	Yes	22	7.6
	No	269	92.4
Duration of labor	5-8 hours	198	68.0
	9-11 hours	68	23.4
	=>12 hours	25	8.6
Maternal malnutrition	Yes	79	27.1
	No	212	72.9
Personal hygiene	Yes	279	95.9
	No	12	4.1

Table 3:- Socio-Demographic Characteristic of Neonates Admitted to Neonatal Intensive Care Units(NICUs) of Durame Kambata Tambaro Zone General Hospital, Southern Ethiopia,2021

Variable	Category	Frequency	Percent%
Age	<7	244	83.8
	>7	47	16.2

Sex	Male	133	45.7
	Female	158	54.3
GA	<37 weeks	201	69.1
	37-42 weeks	90	30.9
Birth weight	<2.kg	119	40.9
	2.kg-2.5kg	63	21.6
	2.5kg-3.4kg	70	24.1
	3.4kg-4.kg	39	13.4
	>4,kg	------	--------
Types of neonatal sepsis	EONS	259	89.0
	LONS	32	11.0
Apgar score	Below 6	194	66.7
	6-7	82	28.2
	=>8	15	5.2

Table 4:-Socio-Demographic Characteristic of Neonates Admitted to Neonatal Intensive Care Units(NICUs) of Durame Kambata Tambaro Zone General Hospital, Southern Ethiopia,2021

Variable	Category	Frequency	Percent%
Central venous catheterization	Yes	286	98.0
	No	5	1.7
NG Tube insertion	Yes	265	91.1
	No	26	8.9

Table 5:- Clinical characteristic of neonates who were admitted to NICU in Durame Kambata Tambaro Zone General Hospital, Southern Ethiopia 2021

Variable	Category	Frequency	Percent%
Birth asphyxia	Yes	87	29.9
	No	204	70.1
Artificial feeding	Yes	85	29.2
	No	206	70.8
Suspected of neonatal sepsis	Yes	33	11.3
	No	258	88.7
Cord care after delivery	Yes	270	92.8
	No	21	7.2
Skin care/Birth done with	Water only	-------	-------
	Water with soap	32	11.0
	Others specify as still not begin	259	89.0
Is current breast feeding Breastfeeding schedule	Yes	197	67.7
	No	94	32.3
	On demand	146	50.2
	Hour based schedule	114	39.2
	Others specify as unable to breastfeed for sometimes	31	10.7
Is replacement feeding used	Yes	6	2.1
	No	385	97.9
Hand washing before breastfeeding	Yes	267	91.8
	Sometimes	24	8.2
Hand washing before	Yes always	263	90.4

handling the neonate	Sometimes	28	9.6
Expose to six adult /care giver one weeks prior to presenting complaint	Yes	7	2.4
	No	284	97.6
Environmental contamination	Yes	22	7.6
	No	269	92.4
Present of any one of the following sign	Inability/refuse breastfeeding	260	89.3
	History of convulsion	14	4.8
	Drawsy,lethargic/unconsous	12	4.1
	RR>60/min on two separate counts	5	1.7

Table 6:-Bivariable and Multi variable Analysis of factors Associated with Neonatal Sepsis Among Neonates Admitted at Durame Kambata Tambaro Zone General Hospital,Southern Ethiopia,2021

Variable	Category	Neonatal Sepsis (%)		COR (95% CI)	AOR (95% CI)
Age of mother		Yes	No		
	20-29	18(6.2)	116(39.9)	1.49(0.386-5.737)	
	30-39	12(4.1)	129(44.3)	2.48(0.619-9.938)	
	>40	3(1.0)	13(4.5)	1	
Marital status	Single	1(0.3)	11(3.8)	1	
	Married	32(11.0)	247(84.9)	0.70(0.088-5.617)	
Occupation	House wife	27(9.3)	174(59.8)	0.92(0.109-7.779)	
	Government employees	1(0.3)	26(8.9)	3.71(0.205-67.149)	
	Self-employee	3(1.0)	41(14.1)	1.95(0.177-21.541)	
	Subsistence farmer	1(0.3)	10(3.4)	1.43(0.076-26.895)	
	Student	1(0.3)	7(2.4)	1	
Educational status	Illiterate	11(3.8)	100(34.4)	0.649(0.078-5.421)	
	Read/write	8(2.7)	40(13.7)	0.357(0.041-3.116)	
	Primary	6(2.1)	41(14.1)	0.488(0.054-4.415)	
	Secondary	6(2.1)	34(11.7)	0.405(0.045-3.677)	
	Diploma	1(0.3)	29(10.0)	2.071(0.121-35.605)	
	University	1(0.3)	14(4.8)	1	
Monthly income	Below 1000 birr	7(2.4)	64(22.0)	0.87(0.240-3.159)	
	1000-2000 birr	14(4.8)	78(26.8)	0.53(0.164-1.714)	
	2000-3000 birr	7(2.4)	51(17.5)	0.69(0.190-2.532)	
	3000-4000 birr	1(0.3)	23(7.9)	2.19(0.231-20.773)	
	Above 4000 birr	4(1.4)	42(14.4)	1	
History of maternal UTI	Yes	31(10.7)	14(4.8)	0.004(0.001-0.017)	0.403(0.101-1.615)
	No	2(0.7)	244(83.8)	1	
Blood group	A+	11(3.8)	83(28.5)	1	
	A-	1(0.3)	19(6.5)	2.52(0.306-20.706)	
	B+	11(3.8)	80(27.5)	0.96(0.396-2.348)	
	B-	5(1.7)	22(7.6)	0.58(0.183-1.854)	
	AB	2(0.7)	22(7.6)	1.46(0.301-7.065)	
	D+	1(0.3)	25(8.9)	3.31(0.408-26.932)	
	D-	2(0.7)	7(2.4)	0.46(0.085-2.520)	
History of maternal fever during pregnancy	Yes	10(3.4)	23(7.9)	1.53(0.698-3.344)	
	No	103(35.4)	155(53.3)	1	
Had you ever been admitted during ANC	Yes	4(1.4)	29(10.0)	0.95(0.314-2.902)	
	No	30(10.3)	228(78.4)	1	
Have you ever had STI	Yes	18(6.2)	77(26.5)	0.355(0.170-0.740)	**0.260(0.108-0.626)***
	No	15(5.2)	181(62.2)	1	
Frequency of PVE	<3	13(4.5)	228(78.4)	1	
	>3	20(6.9)	30(10.3)	11.69(5.279-25.899)	**11.752(4.922-28.058)***
History of foul smelling liquor	Yes	4(1.4)	29(10.0)	0.20(0.056-0.732)	0.245(0.024-2.514)
	No	7(2.4)	251(86.3)	1	

History of chorioamnionitis	Yes	3(1.0	30(10.3)	0.198(0.045-0.869)	1.148(0.055-23.787)
	No	5(1.7)	253(86.9)	1	
MSAF	Yes	1(0.3)	32(11.0)	0.38(0.038-3.728)	
	No	3(1.0)	255(87.6)	1	
History of PROM	Yes	23(7.9	33(11.3)	0.064(0.028-0.146)	0.403(0.101-1.615)
	No	10(3.4)	225(77.3)	1	
Parity category	1-3 children	20(6.9)	109(37.5)	0.53(0.147-1.892)	
	4-6 children	10(3.4)	118(40.5)	1.14(0.296-4.403	
	=>7 children	3(1.0)	31(10.7)	1	
Environmental contamination	Yes	1(0.3	32(11.0)	2.84(0.369-21.801)	
	No	21(7.2)	237(81.4)	1	
Duration of labor category	5-8 hours	22(7.6)	176(60.5)	1	
	9-11 hours	6(2.1)	62(21.3)	1.29(0.501-3.333)	
	=>12 hours	5(1.7)	20(6.9)	0.50(0.171-1.466)	
Birth weight	<2.kg	16(5.5)	103(35.4)	0.54(0.148-1.949)	
	2.kg-2.5 kg	7(2.4)	56(19.2)	o.67(0.162-2.747)	
	2.5 kg-3.4 kg	7(2.4)	63(21.6)	0.75(0.183-3.082)	
	3.4 kg-4.kg	3(1.0)	36(12.4)	1	
Neonates age category	<37 weeks	27(9.3)	174(59.8)	0.46(0.183-1.158)	
	37-42 weeks	6(2.1)	84(28.9)	1	
Birth asphyxia	Yes	16(5.5)	71(24.4)	0.403(0.193-0.084)	**0.404(0.171-0.953)***
	No	17(5.8)	187(64.3)	1	
Artificial feeding	Yes	12(4.1)	21(7.2)	0.69(0.323-1.475)	
	No	73(25.1)	185(63.6)	1	
Maternal malnutrition	Yes	15(5.2)	64(22.0)	0.396(0.189-0.831)	0.439(0.182-1.060)
	No	18(6.2)	194(66.7)	1	
Personal hygiene	Yes	31(10.7)	2(0.7)	1	
	No	248(85.2)	10(3.4)	0.63(0.131-2.984)	
NG tube insertion	Yes	32(11.0)	1(0.3)	0.29(0.038-2.223)	
	No	233(80.1)	25(8.6)	1	
Types of neonatal sepsis	EONS	32(11.0)	227(78.0)	0.23(0.030-1.734)	
	LONS	1(0.3)	31(10.0)	1	
Cord care after delivery	Yes	32(11.0)	1(0.3)	1	
	No	238(81.8)	20(6.9)	2.69(0.349-20.722)	
Skin care/bathing done with	Soap and water	1(0.3)	32(11.0)	1	
	Others specify as still not begin	31(10.7)	227(78.0)	0.23(0.030-1.734)	
Is current breast feeding exclusive	Yes	20(6.9)	13(4.5)	1	
	No	177(60.8)	81(27.8)	0.704(0.334-1.485)	
Breast feeding schedule	On demand	18	128(44.0)	1.053(0.330-3.361)	
	Hour based schedule	11	103(35.4)	1.39(0.409-4.700)	
	Others specify as unable to breastfeed for sometimes	4	27(9.3)	1	
Is replacement feeding used	Yes	2(0.7)	31(10.7)	0.244(0.043-1.388)	
	No	4(1.4)	254(87.3)	1	
Age of neonate admitted	From birth to one week	32(11.0)	227(78.0)	1	
	From one week at birth to four weeks	1(0.3)	31(10.7)	2.17(0.864-5.463)	

Sex of neonate admitted	Male	17(5.8)	116(39.9)	1	
	Female	16(5.5)	142(48.8)	1.30(0.630-2.687)	
Hand washing before breastfeeding	Yes	31(10.7)	236(81.1)	1	
	Sometimes	2(0.7)	22(7.6)	1.45(0.324-6.444)	
Hand washing before handling the neonate	Yes always	32(11.0)	231(79.4)	1	
	Sometimes	1(0.3)	27(9.3)	3.74(0.491-28.475)	

Table 7:-Bivariable and Multi variable Analysis of factors Associated with Neonatal Sepsis Among Neonates Admitted at Durame Kambata Tambaro Zone General Hospital,Southern Ethiopia,2021

CHAPTER SIX

Discussion

Neonatal sepsis contributes substantially to neonatal morbidity and is a major global public health challenge. in this study, the overall prevalence of neonatal sepsis was 11.3% (95% CI this finding is lower than previous studies reported in Iran(18.4%)[38]and higher than studies reported in Mexico(4.3%) [39] this variation could be due to unique cultural features of the population, local obstetric and neonatal practices, socio-economic and sexual practice, hygiene, and nutritional deference over setting [41]. This finding is however, much similar with the findings of studies from Uganda (11%),[25] and also lower than studies reported in India (32%),[26]Tanzania (31.4%), [27]and Nigeria (34%).[29] Bishoftu (72.2%)[30] and Shashemene (77.9%)[23] were much higher than the current finding. the possible reason for having different results may be due to difference of study population studied in the different area and the period in which the studies were conducted.in this study, neonates born from mothers who had a history of urinary tract infection (UTIs) during the index pregnancy were less likely to develop neonatal sepsis. This finding was a little defference with the findings of studies conducted previously in Mekelle [31] and Bishoftu [30] which revealed that maternal urinary tract and sexual infections were a significant factor for the development of neonatal sepsis. especially if untreated during third trimester pregnancy or labor. Hence, neonatal sepsis may result from the colonization of the birth canal by the infectious agent.[30,32] this study also identified significant associations between neonatal birth asphyxia and neonatal sepsis. The odds of developing neonatal sepsis among neonates who have a history of neonatal birth asphyxia at birth were six times higher as compared to neonates who were not have birth asphyxia. This finding was in agreement with studies from Bangladesh,[32]Tanzania[27]and Ghana [33] which identified neonatal birth asphyxia at birth was a significant risk factor for neonatal sepsis. Asphyxia and resuscitation procedures at birth pose a greater risk of neonatal sepsis. Many life-supporting procedures such as suctioning and endotracheal intubation can lead to transient and persistent bacteremia [33] new born infants are especially vulnerable to nosocomial infections because of their intrinsic susceptibility to infection as well as the performance of invasive procedures for neonatal birth asphyxia and resuscitation to which they are subjected.[33] studies from China, Korea and Ethiopia revealed that different medical procedures which are undertaken below the optimal level of sepsis (sterility or disinfection)for the management of neonatal health problems

predispose the neonate to a great risk of neonatal sepsis [28,34,35]this may result from poor practices and none adherence to guide line by health professionals during birth asphyxia and resuscitation that may predispose the neonate with a greater risk of developing sepsis. Per vaginal examination (PV) during labor or delivery was found to be a significant factor for neonatal sepsis. Neonates from mothers who had a history of PV examination greater than three were six times more likely to develop neonatal sepsis. This finding was in line with finding from a study in Bangladesh in which neonates of mothers who has history of vaginal examination greater than three was found to be (6. 9) more likely to develop neonatal sepsis.[32] vaginal organisms can be introduced in to cervical canal even during sterile conditions. Hence, babies are at risk from ascending infection thought to be caused by vertical transmission from an infected mother. Therefore, the vaginal examination can increase the risk of harm for women and their babies.[36] however,a study in Makelle, Ethiopia reported that there was no significant association between PV examination and neonatal sepsis [37]this may also result from differing in study settings where the quality of obstetrical and neonatal heath care services provided to mothers and neonates in primary hospitals differ to that of referral hospitals.a hospital based retrospective study done in Kenya reported that prevalence of community acquired culture proven sepsis was 12.8%]19] in neonates less than seven day old,13.5%(11.5-16%)had proven bacteremia and among those 7-28 days old, 12.1%(10.1-14.4) had proven bacteremia.our study finding is (11.3%) likely lower different with this study finding due to study population, study area and as well as difference hospital. In this study the associated factors of neonatal sepsis.a hospital based retrospective quantitative analysis study was carried out risk factors of neonatal sepsis among neonates in Brazil revealed that showed was 12.9% in 2016(31,32) while the associated factors of neonatal sepsis in this study was maternal STI,PVE greater than three hour and Birth asphyxia.the finding also differ due to study area, socio-demographic status study population, study period and hospitals.

Conclusion

The prevalence of neonatal sepsis was high. Late neonatal age at onset of sepsis, being female, 30-39 years of age of the mother, history of UTI,STI, birth asphyxia and frequent per vaginal

examination greater than three times during labor and delivery and were identify risk factors for neonatal sepsis.

Recommendation

Therefore, training of health workers, provision of health care services as per standards and monitoring and evaluation of obstetrical/neonatal care during labor and delivery are mandatory.

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ANNEX II:

QUESTIONNAIRE

Questionnaire on prevalence and associated factors of neonatal sepsis among neonate admitted in neonatal intensive care unit (NICU) age from birth to 28 days. Date of Interview----------

Interviewer code……

Part I. Maternal Data		
A. Socio-economic and demographic data		
1	Maternal Age (in year)	**……..**
2	Marital status	A .Single B .Married C .Divorced D. Widow
3	Religion	A. Muslim B. Orthodox C. Protestant D. Catholic D. Other Specify
4	Occupational Status	1. Housewife 2. Government employee 3;Self employee 4. Subsistence Farmer 5;Family
5	Ethnicity	A .Kambata B. Hadiya C.Halaba D.Wolayta E.Amhara F.Oromo G.Other Specify
6	Educational Status	A. Illiterate B. Read/Write C. Primary D. Secondary E.Diploma F. University G. College
7	Water Source	A. Tap B. Well C. Bore hole D. River E. Water vendor
8	Monthly income	**……..**
9	Life style factors	Do you Smoke A. Yes B .No
		Do you drink Alcohol? A .Yes B .No
		Have you use drug abuse during pregnancy? A .Yes B .No

B	Maternal and Neonatal Risk Factors	1) History of maternal UTI A. Yes B. No
		2) History of ANC A. Yes B .No
		3) Blood group…….
		4) History of maternal fever during pregnancy? A. Yes B. No If yes did you use any medication? 1.Yes 2.No
		5) Had you ever been admitted during ANC? A. Yes B. No If yes what was cause of admission Malaria/Other mention----------
		6) Have you ever had an STI? A. Yes B .No C .If Yes which disease gonorrhea/Syphilis D. Others ……..
		7) Frequency of PVE----------
		8) History of foul smelling liquor A. Yes B. No
		9) History of chorioamniotitis A. Yes B. No
		10) MSAF A. Yes B. No
		11) History of PROM A. Yes B. No If yes duration of PROM----------
		12) Pairity----------
		13) Mode of delivery A. SVD B.C/S C.Vacum D. Forceps if your answer is C//D was trauma on the

		new born during delivery 1.yes 2. No
		14.Environmental Contamination A. Yes B. No
		15) Duration of labor----------
		16) Age of neonates----------
		17) Sex A. Male B. Female
		18) Birth weight----------
		19) GA----------
		20) Birth asphyxia A. Yes B. No
		21) Apgar score----------
		22) Artificial feeding A. Yes B. No
		23) Maternal malnutrition A. Yes B No
		24) Personal hygiene A. Yes B. No
		W) NG tube insertion A. Yes B. No
		25) Central venous catheterization A. Yes B. No
		26) Suspected neonatal sepsis and other cases A. Yes B. No
		27) Types of neonatal sepsis A.EONS B.LONS
		28) Cord care after delivery A. Yes B. No
		29) Skin care/bathing done with A. Water only B. Soap and water C. Other specify
		30) Is current breastfeeding exclusive? A. Yes B. No
		31) Breastfeeding schedule A. On demand B. Hour based schedule C. Other specify……..

		32) Is replacement feeding used? A. Yes(state why) B. No
		33) Hand washing before breast feeding? A. Yes C. No
		34) Hand washing before handing the neonate (mother and other) A. Yes always B. Sometimes C. No
		35) Exposure to sick adult/care giver one week prior to presenting complaint A Yes B. No If yes 1. Respiratory symptom 2. GIT symptom 3 Ault discharge from hospital <2 week a go
		36) Present of any one of the following sign A. Inability or refusal to breastfeed B. History of convulsion C Drowsy, lethargic or unconscious D. RR>60/ min on two separate counts E. Grunting F. Nasal flaring G. Severe lower chest wall in drawing

THANK YOU FOR YOUR COOPERATION!!!