

Examine the Incidence of Neonatal Sepsis also Analyze the Risk Factors and Mortality Associated with Neonatal Sepsis

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ABSTRACT

Objective: To examine the prevalence of neonatal sepsis and also determine the risk factors and mortality associated with this malignant disorder.

Study Design: Prospective/Observational

Place and Duration of Study: This study was conducted at the Neonatal intensive care unit Pediatric Medicine, Bolan Medical Complex Hospital Quetta from June 2018 to December 2018.

Materials and Methods: A total of 320 patients of both genders who were admitted to NICU were included in this study. Patients and mothers demographic were recorded. Diagnosis of neonatal sepsis was done clinically. Prevalence of neonatal sepsis was recorded. Risk factors and mortality associated to neonatal sepsis were examined.

Results: Out of 320 patients, 60 (18.75%) diagnosed to have neonatal sepsis. In which 31 (51.67%) neonates were males while 48.33% were females. Maternal risk factors such as maternal age, PROM, delivery mode, history of UTI and history of antenatal care were highly associated to neonatal sepsis p-value 0.001. Neonatal risk factors such as birth weight, gestational age, birth asphyxia and resuscitation at birth were significantly associated to neonatal sepsis. 18 (30%) neonates died due to sepsis.

Conclusion: The prevalence of neonatal sepsis and mortality associated to this malignant disorder in our setup was high and the most prevalent risk factors were birth weight, gestational age, birth asphyxia significantly associated to neonatal sepsis.

Key Words: New born, Sepsis, Incidence, Risk factors, Mortality

Citation of articles: Bizenjo A, Rayaz S, Hussain M, Iqbal M. Examine the Incidence of Neonatal Sepsis also Analyze the Risk Factors and Mortality Associated with Neonatal Sepsis. Med Forum 2019;30(6):50-54.

INTRODUCTION

Approximately, one million deaths per year are caused by infection occurring in the neonatal period (0-28 days), accounting for over 25% of global neonatal deaths¹, 99% of these deaths occur in developing countries.² Early onset neonatal sepsis (EONS) remains a major cause for neonatal mortality and morbidity. The case fatality in EONS ranges from 16.7% to 19.4%.^{3,4} Neonatal septicemia (NNS) is a great masquerader and can present with very nonspecific manifestations pertaining to any system of the body. More than half of neonates admitted to neonatal intensive care units (NICUs) carry a diagnosis of "suspected sepsis" and

these infants account for up to 25% of NICU days in some units.⁵ In addition, many other conditions can mimic the sepsis, which leads to both over and under treatment and each has its own hazards.⁶ Screening tests such as total and differential leukocyte counts, band cells, absolute neutrophil counts (ANCs), and rapid immunological techniques like C-reactive proteins (CRPs) assays may help in the diagnosis of septicemia; however, they lack the capacity to detect specific pathogens and are not available in many centers in developing countries.⁷ The gold standard for diagnosis of NNS is a positive blood culture, which is positive in only 50-80% at best, however, negative blood culture does not rule out the disease.^{8,9}

It is important to know the etiology, various risk factors and antimicrobial sensitivity patterns of organisms that cause neonatal infections in developing countries in order to develop effective treatment strategies and to reduce neonatal mortality.^{10,11} Most of the previous studies on NNS were on hospital born neonates, however, the fact remains that the majority of childbirths in our country are occurring at home or in the community by trained or untrained birth attendants. However, data on diagnosis, severity, bacteriological profile and antibiotic sensitivity of home/domiciliary delivered and community-acquired infections in neonates are scanty.

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Received: January, 2019

Accepted: March, 2019

Printed: June, 2019

The present study was conducted aimed to examine the incidence rate of neonatal sepsis and factors associated to neonatal sepsis. Mortality due to neonatal sepsis was also examined. This study will be helpful to make better strategies in prevention of risk factors that were significantly associated to neonatal sepsis.

MATERIALS AND METHODS

This prospective observational study was conducted at Neonatal intensive care unit, Bolan Medical Complex Hospital Quetta from 1st June 2018 to 31st December 2018. Total 320 patients of both genders who were admitted to NICU were included in this study. Patients ages were ranging from birth to 30 days. Patients demographic details including, age, sex, gestational age, birth weight, resuscitation after birth and Apgar score were recorded after taking informed consent from parent's guardians. Mothers demographic were also recorded. Neonates with neurological disorders, neonates required surgical treatments and those parents who were not interested to participate were excluded from this study. All the neonates were diagnosed clinically to examine the prevalence of neonatal sepsis. Risk factors associated to neonatal sepsis were examined. Mortality due to neonatal sepsis was also recorded. All the data was analyzed by SPSS 21.0. Percentages and frequency were recorded to analyze the values. P-value <0.05 was set as significant value.

RESULTS

There were 170 (53.12%) male neonates and 150 (46.88%) neonates were females. 180 (56.25%) patients were ages 0 to 7 days while 140 patients had ages above 7 days. 110 (34.38%) patients had low birth weight less than 2.5kg, 165 (51.56%) patients had normal birth weight and 20 (6.25%) patients had birth weight above 4kg. 60 (18.75%) patients had gestational age less than 37 weeks (preterm) while 260 (81.25%) neonates had term delivery. 50 (15.63%) patients had birth asphyxia. 162 (50.63%) patients had Apgar score less than 7 and 158 (49.37%) patients had above 7 at 5 min. 126 (39.37%) patients found resuscitation at birth (Table 1).

According to the mother's demographic details, 67 (20.94%) mothers were ages less than 20 years, 163 (50.94%) had ages 20 to 30 years, 75 (23.44%) were ages 31 to 40 years and 15 (4.69%) were ages above 40 years. 198 (61.88%) mothers were primiparous and 38.12% were multiparous. 120 (37.5%) mothers found to have premature rupture of membrane. 200 (62.5%) had vaginal delivery, 110 (34.38%) had C-section and 10 (3.12%) had instrumental delivery. 270 (84.38%) gave birth at hospital, 30 (9.38%) were health centers and 20 (6.25%) had home delivery. 25 (7.81%) mothers had history of foul smelling liquor. 34 (10.63%) had history of urinary tract infection and 165 (51.56%) had history of antenatal care (Table 2).

Table No. 1: Demographical details of all the neonates

Variables	No.	%
Gender		
Male	170	53.12
Female	150	46.88
Age (days)		
1 – 7	180	56.25
> 7	140	43.75
Birth Weight (kg)		
LBW <2.5	110	34.38
NBW 2.5-4	165	51.56
> 4	20	6.25
Gestational Age		
Term	260	81.25
Preterm	60	18.75
Birth Asphyxia		
Yes	50	15.63
No	270	84.37
Apgar Score		
<7	162	50.63
> 7	158	49.37
Resuscitation		
Yes	126	39.37
No	194	60.63

Table No.2: Mothers demographical details

Variable	No.	%
Age (years)		
<20	67	20.94
20 – 30	163	50.94
31 – 40	75	23.44
> 40 yrs	15	4.69
Parity		
Primi	198	61.88
Multi	122	38.12
PROM		
Yes	120	37.5
No	200	62.5
Delivery Mode		
Vaginal	200	62.5
C-section	110	34.38
Instrumental	10	3.12
Place of Delivery		
Hospital	270	84.38
Health centers	30	9.38
Home	20	6.25
History of Foul Smelling Liquor		
Yes	25	7.81
No	295	92.19
UTI History		
Yes	34	10.63
No	286	89.37
Antenatal Care History		
Yes	165	51.56
No	155	49.44

Out of 320 neonates 60 (18.75%) patients had neonatal sepsis (Table 3). From total 170 male patients 31 (18.24%) patient had neonatal sepsis and out of total females, 29 (19.33%) patients had neonatal sepsis. 27 patients had neonatal sepsis with ages 0 to 7 days and 33 patients had sepsis with ages above 7 days (8 to 30 days). 20/110 patients with LBW, 25/165 patients with NBW and 15/20 patients with >4kg birth weight were found to have neonatal sepsis. 32/60 patients with preterm delivery and 28/260 with term delivery had neonatal sepsis. Out of 50 patients with birth asphyxia 35 patients had neonatal sepsis p-value <0.05. 40 patients had neonatal sepsis with Apgar score <7 and 20 with Apgar score >7. 50 patients with neonatal sepsis had resuscitation at birth (Table 4).

According to the maternal risk factors associated to the neonatal sepsis, maternal age, PROM, delivery mode, history of UTI and history of antenatal care were highly associated to neonatal sepsis p-value 0.001 (Table 5). According to the mortality due to neonatal sepsis 18 (30%) patients died and 42 (70%) recovered after treatment (Table 6).

Table No.3: Frequency of neonatal sepsis

Neonatal Sepsis	No.	%
Yes	60	18.75
No	260	81.25

P-value <0.05

Table No.4: Neonatal risk factors associated to neonatal sepsis

Variable	Total (%)	Neonatal sepsis (%)	P value
Gender			
Male	170 (100)	31 (18.24)	0.07
Female	150 (100)	29 (19.33)	
Neonatal age (days)			
1- 7	180 (100)	27 (15)	0.32
>7	160 (100)	33 (20.62)	
Birth weight			
LBW	110 (100)	26 (23.64)	0.75
NBW	165 (100)	30 (18.18)	
Over weight	20 (100)	4 (20)	
Gestational age			
Term	260 (100)	28 (10.77)	0.02
Preterm	60 (100)	32 (53.33)	
Birth Asphyxia			
Yes	50 (100)	35 (70%)	0.001
No	270 (100)	15 (5.55)	
Apgar Score			
≤7	162 (100)	40 (24.69)	0.045
>7	158 (100)	20 (12.66)	
Resuscitation at Birth			
Yes	126 (100)	50 (39.68)	0.03
No	194 (100)	10 (5.15)	

Table No.5: Maternal risk factors associated to neonatal sepsis

Variable	Total (%)	Neonatal sepsis (%)	P value
Neonatal Age (years)			
<20	67 (100)	25 (37.31)	0.01
20 – 30	163 (100)	20 (18.40)	
31 – 40	75 (100)	10 (13.33)	
> 40	15 (100)	5 (33.33)	
PROM			
Yes	120 (100)	45 (37.5)	0.03
No	200 (100)	15 (7.5)	
Delivery Mode			
Vaginal	200 (100)	25 (12.5)	0.012
C-section	110 (100)	34 (30.91)	
Instrumental	10 (100)	1 (10)	
Place of Delivery			
Hospital	270 (100)	48 (18.78)	0.035
Health centers	30 (100)	8 (26.67)	
Home	20 (100)	4 (20%)	
UTI History			
Yes	34 (100)	19 (55.88)	0.001
No	286 (100)	41 (14.34)	
Antenatal Care History			
Yes	165 (100)	45 (27.27)	0.002
No	155 (100)	15 (9.68)	

Table No.6: Mortality among neonatal sepsis patients (n=60)

Mortality	No.	%
Died	18	30.0
Recovered	42	70.0

DISCUSSION

Globally, neonatal sepsis is one of the most common infections found in neonates with high mortality and morbidity rate.^{12,13} The present study was conducted to examine the incidence rate of neonatal sepsis and risk factors associated with neonatal sepsis also analyze the mortality rate among patients with neonatal sepsis. In present study we included 320 neonates who had admission to NICU at our institution. Out of 320 patients, we found 60 (18.75%) patients had neonatal sepsis. These results were similar to some other studies conducted regarding neonatal sepsis in which the prevalence rate varies from 15 to 40%.¹⁴⁻¹⁶ Many studies showed the incidence rate of neonatal sepsis was above 50% among neonates who were admitted to NICU.^{17,18}

In our study, from total 170 male patients 31 (18.24%) patient had neonatal sepsis and out of total females 29 (19.33%) patients had neonatal sepsis, there were no significant difference found between genders and we considered that genders were not significant risk factor. Different authors showed similarity to our study results

regarding gender wise prevalence of neonatal sepsis.^{19,20} In present study we found that 20 out of 110 total study patients with LBW, 25 out of 165 patients with normal birth weight (2.5 to 4kg) and 15 out of 20 patients with >4kg birth weight were found to have neonatal sepsis. We found that neonates with over birth weight and low birth weight had a high prevalence of neonatal sepsis and we found those two factors were significantly associated to neonatal sepsis. These results showed similarity to some other studies in which birth weight was highly associated to neonatal sepsis.²¹ In this study we found 32 out of 60 patients with preterm delivery and 28 out of 260 with term delivery had neonatal sepsis. Out of 50 patients with birth asphyxia 35 patients had neonatal sepsis p-value <0.05. 40 patients had neonatal sepsis with Apgar score <7 and 20 with Apgar score >7. 50 patients with neonatal sepsis had resuscitation at birth. Many of previous studies demonstrated birth asphyxia, Apgar score and preterm delivery were the significant neonatal risk factors associated to neonatal sepsis.^{22,23}

In the present study, according to the maternal risk factors associated to the neonatal sepsis, maternal age, PROM, delivery mode, history of urinary tract infection and history of antenatal care were highly associated to neonatal sepsis. We found that mothers with ages below 20 years and above 40 years were the significant risk factors of neonatal sepsis. We found mother with premature rupture of membrane had a high prevalence of neonatal sepsis 37.5% out of 120. These results were comparable to some other studies.^{24,25} This study showed that mothers with C-section delivery were also a significant risk factor. Urinary tract infection was found to be a common risk factor and we found out of 34 mothers 55.88% neonates had neonatal sepsis. Antenatal care was also a significant risk factor associated to neonatal sepsis. These results showed similarity to many previous studies in which maternal age, PROM history, delivery mode, urinary tract infection and maconium stained liquor were the common risk factors and highly associated to neonatal sepsis.^{24,25}

In the current study the mortality rate was 30% and recovered neonates after treatment were 70% among patients with neonatal sepsis. Many of studies reported the mortality rate due to neonatal sepsis was 20% to 70%.²⁶ We observed that early and better treatment modalities were very helpful to reduce the mortality and morbidity rate.

CONCLUSION

Sepsis is commonly found malignant and life threatening disease in all over the world with high rate of mortality. From this study we concluded that the incidence rate of neonatal sepsis is low with low rate of mortality compared to many previous studies. Risk factors such as birth weight, birth asphyxia, Apgar

score <7, resuscitation at birth, maternal age, PROM history, UTI history and delivery mode were the highly associated risk factors. Early detection and better treatment may helps to reduce the mortality rate.

Author's Contribution:

Concept & Design of Study: Attaullah Bizenjo
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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