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Neonatal sepsis: the incidence rate of neonatal sepsis in different hospitals of Dehradun

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ABSTRACT

New born infection that is called 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. The present study was conducted in different Pediatric Department of tertiary care hospital of Dehradun, Uttrakhand, India. Mothers and caregivers participated in a personnel interview to gather clinical and demographic information. All the other information was collected from the case report form. A total of 250 neonates were enrolled in this study. Data were analyzed by using chi square test. In this study the incidence rate of neonatal sepsis was 32.05%. A total 250 neonates were studied, (males – 169 & females-81) out of which 159 (63.6%) cases were EOS and 91(36.4%) cases were LOS. Culture report found positive in 70 (28%) cases, while in 180 (72%) cases the culture report was negative. The predominant predisposing factors were , premature rupture of membrane 105(66.03%), low body weight 90(56.60%), Lack of breast feeding 58(63.73%),Low Apgar Score 80(50.31%), prolonged rupture of membrane 54 (33.96%), Aspiration of feed 47.25%, GI tract pathology 42(46.15%),while the major clinical feature of sepsis were Birth Asphyxia 61 (67.03%), Apnea 88(55.34%), Respiratory Distress 45 (49.45%). The most frequently identified pathogens in newborns with sepsis were Escherichia coli (12.90%) and Klebesella pneumonia (35.48%) in EOS and Escherichia coli (41.02%) and Candida (25.64%) in LOS. Place of residence, mother's educational attainment, maternal health (both before and after conception), and inadequate feeding were all statistically significantly correlated with the neonates' good culture results. According to the study's findings, socioeconomic variables significantly influence neonatal sepsis; thus, improving environmental factors, nutrition, mother education, and standard of living may also lower newborn mortality and morbidity.

Key words: Neonatal Sepsis, Socioeconomic Status, Culture Positive Sepsis, Tertiary care hospital.

INTRODUCTION: Neonatal sepsis is a bacterial infection characterized by clinical features of systemic involvement during the first month of life.[1] It is characterized by bacteremia and clinical symptoms caused by micro-organism and their toxic products.[2] It is an infection of the body that is spread by the bloodstream. Many bacteria and viruses produce sepsis in newborns. Early-onset sepsis (EOS) is a blood infection that occurs before the seventh day of life. Late-onset sepsis (LOS) occurs at or after the seventh day of life. The most prevalent type of early-onset neonatal sepsis is with Group B beta-hemolytic streptococcus (GBS) or Streptococcus agalactiae. GBS bacteria enter the circulation, causing septicemia and hemolysis of the red blood cells.[3,4] 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.[5] Sepsis occurs 9.8 times out of every 1000 live births. An invasive infection that develops within the first twenty-eight (28) days of life is called sepsis. It could be caused by bacteria, viruses, fungi, or even toxins.

. These signs could be multiple and include diminished spontaneous activity, less vigorous sucking, apnea, bradycardia, temperature instability, respiratory distress, vomiting, diarrhea, abdominal distention, jitteriness, jaundice and seizures.[6] It has been classified as either early onset sepsis (EOS) (0-7 day of age) or late onset sepsis (LOS) (7-28 days of age).[7, 8]A few papers distinguish between very early onset (within 24 hrs), EOS (24 hrs to six days), and LOS (more than six days to 30days) sepsis.[9,10] About 10-30% of pregnant women are colonized with group B streptococcus bacteria in the genital tract or rectum.[11]The fetus contracts GBS sepsis when the bacteria

ascends into the uterus during pregnancy, when the fetus aspirates infected amniotic fluid, when the bacteria crosses the placenta from the mother, or when the fetus passes through the birth canal at delivery of the women who are colonized with GBS, approximately 50-70% colonize their infants prior to or at delivery and, consequently the newborn infant has a 2- 5% risk of developing GBS sepsis.[12,13]

METHODOLOGY: The present study was conducted in the pediatric department of tertiary care hospitals of Dehradun Uttrakhand India. For this study Primary data has been collected. Total 250 neonates with a presumptive diagnosis of septic who were admitted in NICU (Neonatal Intensive Care Unit) of pediatric department of Shri mahant Indresh Hospital and Doon district hospital were included in this study. Neonates greater than 28 days of age and those who had no sign and symptoms of neonatal sepsis were excluded from this study. Neonates with clinical features of sepsis were included in the study with age 0 to 28 days. Based on when the clinical indications of infection appeared, neonates were split into two groups those with early-onset infections (sepsis symptoms from birth to 72 hours old) and those with late-onset infections (sepsis symptoms from 72 hours to 28 days old). In a personnel interview, moms and caregivers provided clinical and demographic information. The case report form was used to gather the additional data.

STATISTICAL ANALYSIS: Statistical analysis was done to compare the association of socioeconomic factors with culture positive and culture negative sepsis. The statistical analysis is done by using Chi-square test. P-value of less than 0.05 was considered as statistically significant<0.01 as highly significant and P-value <0.001 as extremely significant.

RESULTS: 250 neonates were Included in the study, 159 (63.6%) and 91 (36.4%) were younger than or equal to seven days (EOS) and older than seven days (LOS), for example. Of the 250 newborns, 88 (35.2%) weighed 2.5 kg or more at delivery, whereas 118 (47.2%) weighed less than 2.5 kg. 82 (32.8%) neonates were born at a gestational age of 37 weeks or more (term). Out Of the 250 neonates, 88 (35.2%) were born with 2.5 kg or more, while 118 (47.2%) weighed less than 2.5 kg. 82 (32.8%) of the newborns had a gestational age of 37 weeks or above (term) at delivery. 168 (67.2%) were preterm, meaning they were born before the 37th gestational month. Of the neonates, 24 (9.6%) were delivered at home, while 226 (90.4%) were born in hospitals, making hospitals the most common location of delivery. However, it was discovered that 27 (33.3%) of the female infants and 43 (25.4%) of the male neonates had sepsis that was confirmed by culture. 12 (15%) neonates who lived in urban settings and 58 (23.2%) who lived in rural regions or urban slums developed sepsis that was confirmed by culture. Regarding the moms' educational attainment, 41 (48.23%) had no formal education, 12 (20%) had a middle school education, 8 (10%) had a high school education, 6 (30%) had an intermediate education, and 60% had graduated. Nine (37.5%) of the newborns born at home and 61 (26.9%) of those born in the hospital developed culture-positive sepsis. The mother's educational attainment, site of residence, and inadequate feeding were all statistically significantly correlated with the neonates' Positive culture results. The data of neonates were co-related and are presented in **Table no 1.**

Factors	Total no examined	Sepsis(+) n=70	Sepsis(-) n=180	P value	Odds ratio	95% confidence interval
Age (Days)				<	0.2720	0.1528 to
< 7 (Early onset)	159	29(18.2)	130(81.7)	0.0001***		0.4843
> 7 (Late onset)	91	41(45.05)	50(54.9)			
Gender						0.3831 to
Male	169	43(25.4)	126(74.5)	0.2288	0.6825	1.216
Female	81	27(33.3)	54(66.6)			
Place of domicile				0.0015**	0.3408	0.1708 to
Urban	80	12(15)	68(85)			0.6800
Rural	170	58(34.1)	112(65.8)			
Level of education of mother						
Illiterate	85	41(48.23%)	44(51.7)			
Middle school	60	12(20%)	48(80)	<		
High school	80	8(10%)	72(90)	0.0001***		
Intermediate	20	6(30%)	14(70)			
Graduation	5	3(60%)	2(40)			
Place of delivery						
Hospital	226	61(26.9)				0.2563 to
Home	24	9(37.5)	165(73)	0.3383	0.6162	1.481
			15(62.5)			
Poor feeding						3.439 to
Yes	88	56(63.6)	32(36.3)	<	7.125	14.76
no	71	14(19.7)	57(80.2)	0.0001***		

Table no 1: Relationship between culture positive sepsis and socioeconomic factors

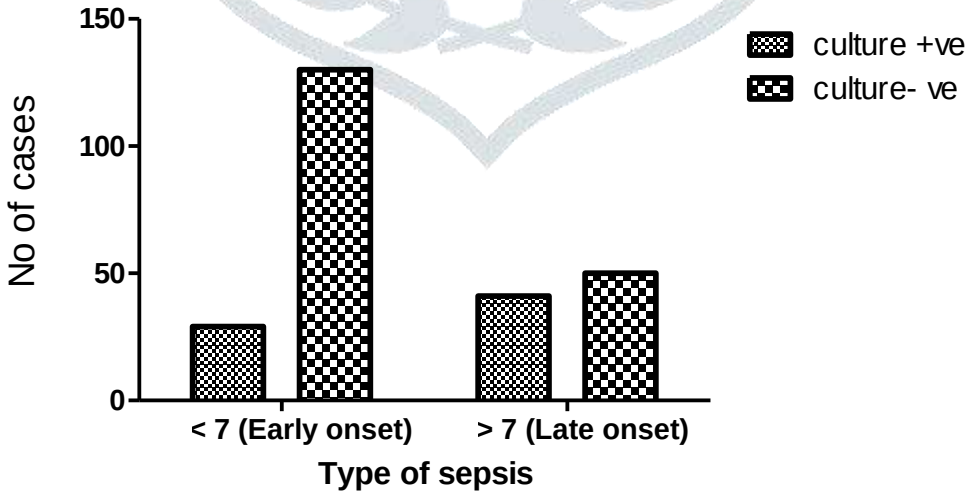

Figure1: Distribution of patients on the basis of their culture report.

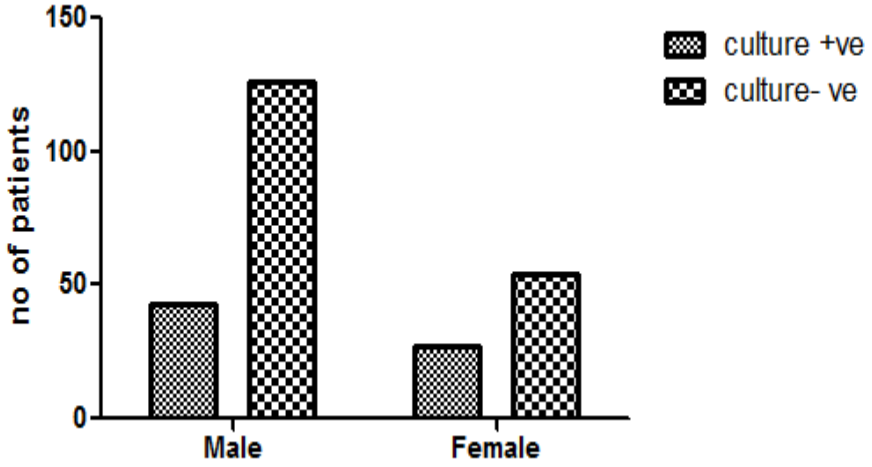

Figure2: Distribution of male and female neonates on the basis of culture report.

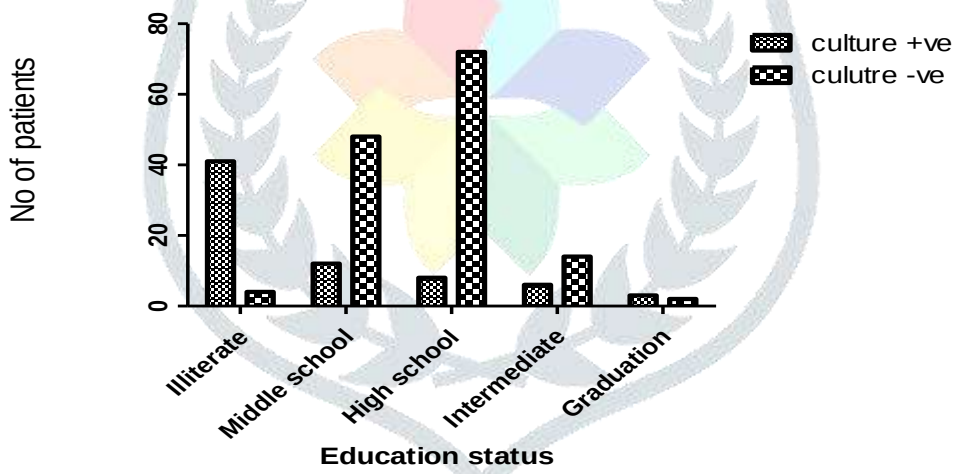

Figure 3: Distribution of education of mothers on the basis of culture report.

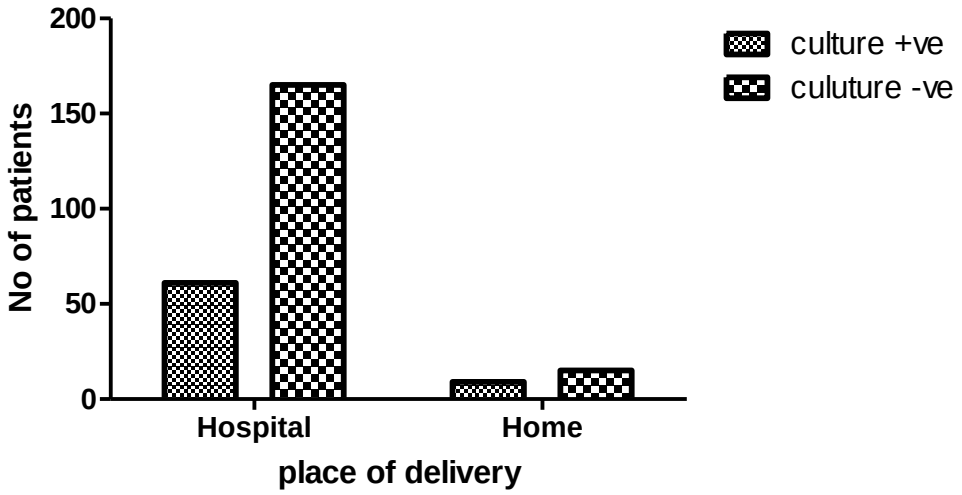

Figure 4: Distribution of place of delivery on the basis of culture report.

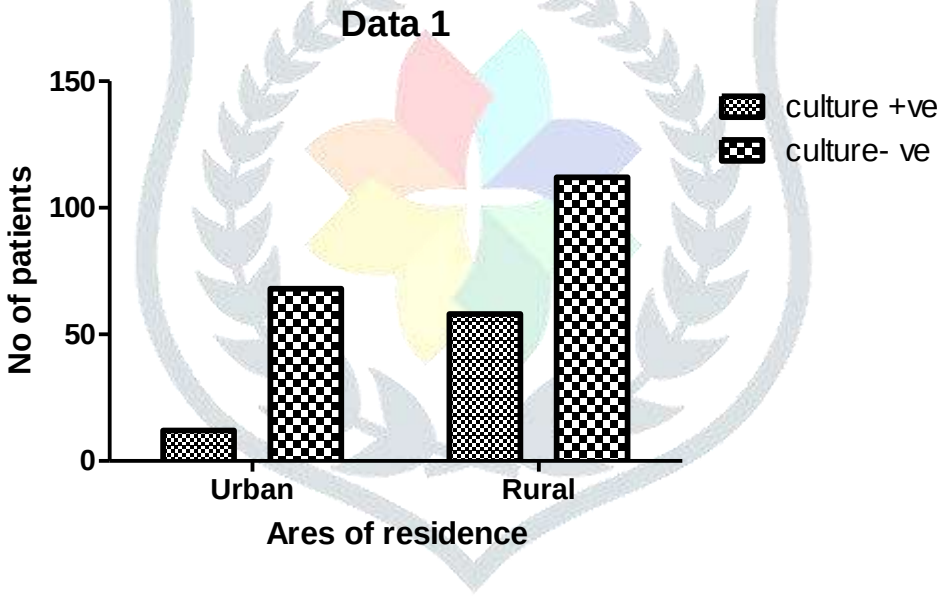

Figure 5: Distribution of area of residence on the basis of culture report.

DISCUSSION: The rate of newborn septicemia in underdeveloped countries (39/1000) is significantly larger than that of their affluent counterparts (1 to 10/1000 live births). [14, 15,] One of the main issues in developing nations is neonatal sepsis, which can result in high rates of morbidity and death.In developing nations, newborn sepsis is one of the most frequent causes for admission to NICU. In this study, 250 cases of neonatal sepsis were assessed, and the diagnosis of sepsis was made based on the presence of clinical symptoms, signs, and a positive culture sepsis report.Since 98% of the five million newborn fatalities that occur globally each year occur in underdeveloped nations, mostly in Asia and Africa, research on neonatal sepsis is crucial in this area. Over the course of six months, 250 instances of neonatal sepsis were documented from tertiary care hospitals of Uttrakhand region. 159 (63.8%) of the cases were Early Onset Neonatal Sepsis (EONS), and 91 (36.4%) were Late Onset Neonatal Sepsis (LONS). These figures are consistent with reports from other developing nations, such as Bangladesh (70.7 % vs 29.3%)[1], Ethiopia (98.7% vs 1.3%)[16], Iran (77.5% vs 22.5%) [17], and Baghdad (67.5% vs 32.5%).[18] Early Onset Neonatal Sepsis (EONS) was more prevalent than Late Onset Neonatal Sepsis (LONS), which is consistent with reports from other developing nations However, a prior report from Bangladesh indicated that LONS (Late Onset Neonatal Sepsis) was more prevalent in Bangladesh's rural population, even in the absence of specialized neonatal care facilities.

(Jeeva M. Sanker, Jain NK) [16,1].Other investigations have revealed bacterial isolation rates of 45.9% in Nigeria, 52.6% in India, 54% in Pakistan, and 47.88% in Baghdad. In contrast, just 28% of patients in our research had a poor cultural report, compared to 72%. In this study, the male to female ratio was 2:1.In contrast, the male to female ratio in sepsis was 2 to 1 when compared to the findings of (Mosayebi et al. and Aletayeb et al.) [22, 23]. The current investigation has determined a correlation between lower socioeconomic position and culture-proven sepsis. Poor hygiene, a lack of clean portable water for bathing the newborn and preparation of feed, inadequate cord care, maternal age greater than 30, incapacity to properly vaccinate the newborn, and inability to attend antenatal care clinics (ANC) are all common characteristics among the lower socioeconomic group and may be contributing factors to the higher rate of sepsis in this group. In the current study, poor feeding and positive culture results in the newborns were statistically significantly correlated with the mother's educational attainment and location of residence ($P < 0.05$). According to Onyedible et al. [24], poor feeding, inadequate cord care, and area of residence were all statistically significantly associated with culture-positive sepsis. This conclusion is consistent with those of Ogunlesi and colleagues in Sagamu[25] and Motara and colleagues in Johannesburg[26], who observed that inadequate neonatal feeding is a key characteristic of sepsis. The neonates' birth weight is demonstrated by the fact that low birth weight neonates have greater levels of culture positive. According to Manurung TN et al.[27], infants born low and preterm had a decreased risk of neonatal sepsis when they got breast milk because it contains bioactive substances that are rich in antibacterial, antiviral, and anti-inflammatory properties that help to boost immunity against infection, growth, and development. Medical practitioners have to assist and motivate nursing moms. According to Kumar S. et al. [28], EONS was significantly predicted by maternal age (>30 years), third-trimester UTI, and PROM. This study emphasizes the need of appropriate and well-managed prenatal screening for the detection and treatment of maternal infections as well as screening for high-risk pregnancies for neonatal perinatal therapy in order to prevent neonatal sepsis. The socioeconomic factors that contributed to neonatal sepsis in Kenya were identified by Kimaiyo Jepkosgei et al.[29] as follows mothers' lack of income, low household income level, living in rural areas, having large family sizes, shorter birth intervals than two years, vaginal delivery, complications during pregnancy, and lower maternal age.

CONCLUSION AND RECOMMENDATION: The study found that in hospital settings in the Dehradun area of Uttrakhand, socioeconomic variables may have a significant role in newborn sepsis. Neonatal sepsis is significantly influenced by socioeconomic circumstances. Neonatal care outcomes are positively impacted by improved mother socioeconomic status. Numerous studies have shown that the incidence of newborn sepsis was greatly decreased by higher doses of breast milk, encouragement for women to maintain a sustainable supply of breast milk, and improved economic and educational standing. In order to raise the socioeconomic standing of caregivers and their households, the government should fund community empowerment initiatives with assistance from governments and development partners. In order to diagnose and treat newborn sepsis, ongoing attention to detail will be essential. Additionally, additional funding is required for the health care system in order to make it more accessible to everyone, especially those with lower incomes.

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