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ORIGINAL ARTICLE

Maternal Factors Associated with Early Neonatal Sepsis: A Multicenter Cross-Sectional Study

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ABSTRACT

Background: Early neonatal sepsis is a dangerous medical condition that affects children under 28 days of age. There are many maternal risk factors that lead to early onset of neonatal sepsis.

Objective: The aim of this study was to find out the maternal factors associated with early neonatal sepsis.

Materials and method: The present multicenter cross-sectional study was conducted at the department of Gynae Hayatabad Medical Complex Peshawar and Paediatric Department Khyber Teaching Hospital Peshawar from January 2022 to June 2022 after taking approval from the ethical committee of the institute. The non-probability sampling procedure was applied for sample collection. The sample size was 260 individuals determined through WHO calculator. Neonates of both genders and different age groups (ranged 1-3 days) diagnosed with early neonatal sepsis were included. Data including name, age, residence, and contact details of each participant were recorded. Preterm birth, meconium-stained liquor, and PROM were noted as maternal risk factors (per operational definition). A statistical analysis of the collected data was done using SPSS version 20.

Results: A total of 260 neonates diagnosed with early onset of sepsis were included in this study out of which male were 125(48.0%) and females were 135(51.9%). The mean age of the study population was 2.15+0.58 days. Majority of the neonates were in the age group 1-2 days 167 (64.2%) followed by age group 3 days 93(35.7%) respectively. The most prevalent maternal risk factors in the early neonatal sepsis was PROM 170 (65.3%) followed by meconium-stained fluid 80 (30.7%) and preterm birth 55 (19.6%) respectively. For maternal and gestational age and gender of the participants the data was stratified. Chi square test was used for stratification data and p-value <0.05 was considered statistically significant**.**

Conclusion: Our study concluded that the major risk factor for early neonatal sepsis is prolonged rupture of membrane followed by meconium stained liquor and preterm delivery.

Keywords: Neonatal sepsis, risk factors; prolonged rupture of membrane

INTRODUCTION

The rate of neonatal death worldwide is 23 per 1,000 live births. The World Health Organization estimates that one million neonatal infections cause the deaths of about four million neonates each year.[1] Neonatal sepsis occurs in developing nations about three times more commonly than in developed countries, where the prevalence is ten per thousand live births. Early onset sepsis (EOS) is a kind of sepsis that develops within the first week of life, while late onset sepsis (LOS) occurs over the remaining three weeks.[2] Neonatal sepsis is the most prevalent and significant cause of infant mortality and morbidity that can be controlled. Both maternal and neonatal variables, such as maternal age greater than 35 or less than 20 years, preterm, parity, cesarean delivery, infection of the urinary tract in the third trimester of pregnancy, and neonate sex, are associated with risk factors for sudden-onset neonatal sepsis.[3] Prolonged rupture of membrane (PROM), which is defined as membrane rupture lasting more than 18 hours before to labor, is one of the major risk factors for it and premature deliveries. It accounts for around 8%–10% of all pregnancies. [4] There has been no noticeable difference in the accuracy of diagnoses, clinical management, or outcomes for treating neonatal sepsis despite numerous attempts over the past 30 years to work and practice clinical research that include millions of neonates as well as their families.[5] As a result, depending to the criteria used, we continue to see EOS symptoms in various populations before the first seven days of life and/or in cases of infection within the first 72 hours of life .[6] Despite having a high mortality rate, early onset neonatal sepsis (EONS) lacks a distinct clinical sign and requires a lengthy diagnosis confirmation process. Thus, taking the risk factors into account is crucial for the most effective diagnostic strategy.[7] The purpose of the study is to determine the prevalence of maternal risk factors in early neonatal sepsis in our population because the previous studies have reported wildly different findings and there is not enough data on these risk factors. In order to decrease morbidity and mortality by these maternal risk factors, we may be able to apply the findings of our study to the local community and develop some strategies and guidelines that will benefit patients, pediatricians, and gynecologists.

MATERIALS AND METHOD

The present multicenter cross-sectional study was conducted at the department of Gynae Hayatabad Medical Complex Peshawar and Paediatric Department Khyber Teaching Hospital Peshawar from January 2022 to June 2022 after taking approval from the ethical committee of the institute. The non-probability sampling procedure was applied for sample collection. The sample size was 260 individuals determined through WHO calculator by taking a 5% threshold of significance, an 80% test power, and an expected 20% of meconium-stained liquor in neonatal sepsis cases. Neonates of both genders and different age groups (ranged 1-3 days) diagnosed with early neonatal sepsis were included in this study wile children whose parents who were not welling to include their children in the study were excluded. Data including name, age, residence, and contact details of each participant were recorded. Preterm birth, meconium-stained liquor, and PROM were noted as maternal risk factors (per operational definition). Through pre-made Performa, the researchers themselves registered all of this data. A statistical analysis of the collected data was done using SPSS version 20. Quantitative variables like maternal and gestational ages were presented as mean ± S.D. Qualitative variables such as gender and maternal risk factors, including PROM, meconium-stained liquor, and premature birth, were presented in frequency and percentages. To account for effect modifiers, the data was stratified by patient gender, mother age, and gestational age. The Chi square test was used to the stratification data, and a p value of less than 0.05 was considered significant.

RESULTS

A total of 260 neonates diagnosed with early onset of sepsis were included in this study out of which male were 125(48.0%) and females were 135(51.9%). The mean age of the study population was 2.15+0.58 days. Majority of the neonates were in the age

group 1-2 days 167 (64.2%) followed by age group 3 days 93(35.7%) respectively as presented in table 1. The most prevalent maternal risk factors in the early neonatal sepsis was PROM 170 (65.3%) followed by meconium-stained fluid 80 (30.7%) and preterm birth 55 (19.6%) respectively. For maternal and gestational age and gender of the participants the data was stratified. Chi square test was used for stratification data and p-value <0.05 was considered statistically significant as shown in table 2.

Table 1: Age and gender wise distribution of the study population n=260

Variable	Frequency /Percentage
Age in days	
1-2	167 (64.2%)
3	93(35.7%)
Mean sd age	2.15+0.58 days
Gender	
Male	125(48.0%)
Female	135(51.9%)

Table 2: Maternal risk factor stratification based on age, gender, gestational age, and maternal age in cases of early neonatal sepsis N=260

Maternal risk factors	Age in days P value 0.62		Sex Value of P 0.44		Maternal age in years		Gestational age in weeks	
	1-2	3	Male	Female	20-30	31-35	<37	>37
Preterm delivery	40	15	25	30	30	25	55	Zero
Meconium stained liquor	58	22	31	49	60	20	64	16
Prolonged rupture of membrane	114	56	82	88	135	35	128	42

DISCUSSION

Newborn sepsis, also known as neonatal sepsis, is a dangerous medical illness that affects children under 28 days of age. It is a severe reaction to an infection. When a neonate contracts sepsis due to an infection, their entire body may become inflamed. Organ failure and even death may result from it. Sepsis can be categorized in to early onset neonatal sepsis (develops within the first 72 hours of life) and late onset neonatal sepsis (develops after 3 days of life).[5] There are many maternal risk factors that lead to early onset of neonatal sepsis. The present study was conducted to determine the maternal risk factors associated with neonatal early neonatal sepsis. A total of 260 neonates diagnosed with early onset of sepsis were included in this study out of which male were 125(48.0%) and females were 135(51.9%). Gender wise distribution in the present study is similar to the study carried out by Ahmed, Faraz, et al, in their study female gender was predominant [8.] The most prevalent maternal risk factors in the early neonatal sepsis in our study was PROM 170 (65.3%) followed by meconium-stained fluid 80 (30.7%) and preterm birth 55 (19.6%) respectively. Our study's results are consistent with the study conducted by Sudhir et al.[9], they reported PROM in 71.4% of patients, meconium fluid in 35.7%, and premature birth in 24% of cases. Similarly our study findings are similar to Ahmed, Faraz, et al in their study the most common maternal risk factor was prolonged rupture of membrane followed by meconium-stained fluid and preterm birth.[8] However, some research, such as Agarwal et al., had different findings.[10] According to the study of Kurien Anil Kuruvilla et al PROM, meconium liquor, and premature birth accounted for 35%, 20%, and 50% of cases, respectively. [11] A research conducted by Shah GS et al. found that the main maternal and newborn risk factors for neonatal sepsis were meconium stained amniotic fluid (MSAF) PROM,, foul-smelling liquor, poor Apgar score at delivery and low birth weight.[12]Another study conducted in North Ethiopia in 2016 by Destaalem Gebremedhin & colleagues10 identified the risk variables for newborn sepsis in hospital settings and discovered that around 76.8% of the 78 patients in the study had early onset sepsis.[13] In our study females were more effected from sepsis as compared to male. These findings are similar to the previous study.[8]According to a multi-center study, clinical chorioamnionitis & maternal colonization with group B stretococcus are the most significant predictors of future newborn infection following PROM.[14] According to Seaward et al. (2012), there is a strong correlation between newborn infection with more than six vaginal digital screenings, which is a significant yet frequent risk factor.[15] how ever in our study we did not focus on these factors. Preterm birth was a major risk facter for sepsis in our study (19.6%). Moreover, invasive procedures such as endotracheal intubation and umbilical catheterization are more common in preterm infants. Cytomegalovirus (CMV), hepatitis B virus (HBV), herpes simplex virus, Mycobacterium tuberculosis, Toxoplasma, Campylobacter fetus, and Listeria species are all more likely to infect premature babies. Low birth weight and intrauterine development retardation are also caused by toxoplasmosis and CMV infection. Premature babies have a lower immune system's capacity to fend against illness. They are eventually more susceptible to infection by common organisms like coagulase negative Staphylococcus. Vertical transfer from bacteria in the mother's lower genital tract during spontaneous vaginal delivery or through ascending contaminated amniotic fluid is a common cause of early-onset.[16] Two well-known risk factors for early-onset newborn sepsis include maternal chorioamnionitis & group B streptococcal infection.[17] In conclusion, the findings of our study are very significant to our community since they may assist patients and physicians in reducing the morbidity and death from neonatal sepsis by managing these risk variables.

CONCLUSION

Our study concluded that the major risk factor for early neonatal sepsis is prolonged rupture of membrane followed by meconium stained liquor and preterm delivery.

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